

MANUAL FOR WMP BOOSTER CONTROL PANEL

Table Of Contents.

1.	General Arrangement of the system	2
2.	Sensor and Tank general Arrangement	3
3.	General P&I Drawings	4
4.	Panel GA Drawings	5
5.	General	7
6.	Safety	7
7.	Transport and Storage	7
8.	Installation	8
9.	Operating Principle	8
10.	Product Key Type	8
11.	Description of Product Accessories	8
12.	Mounting	10
13.	Functional Description of Booster	11
14.	Fittings	13
15.	Commissioning	14
16.	Faults, causes and rectifications	14
17.	Symbols and Descriptions	15
18.	Menu Structure	16
19.	Fault, Cause and Remedies	17

Fig 2

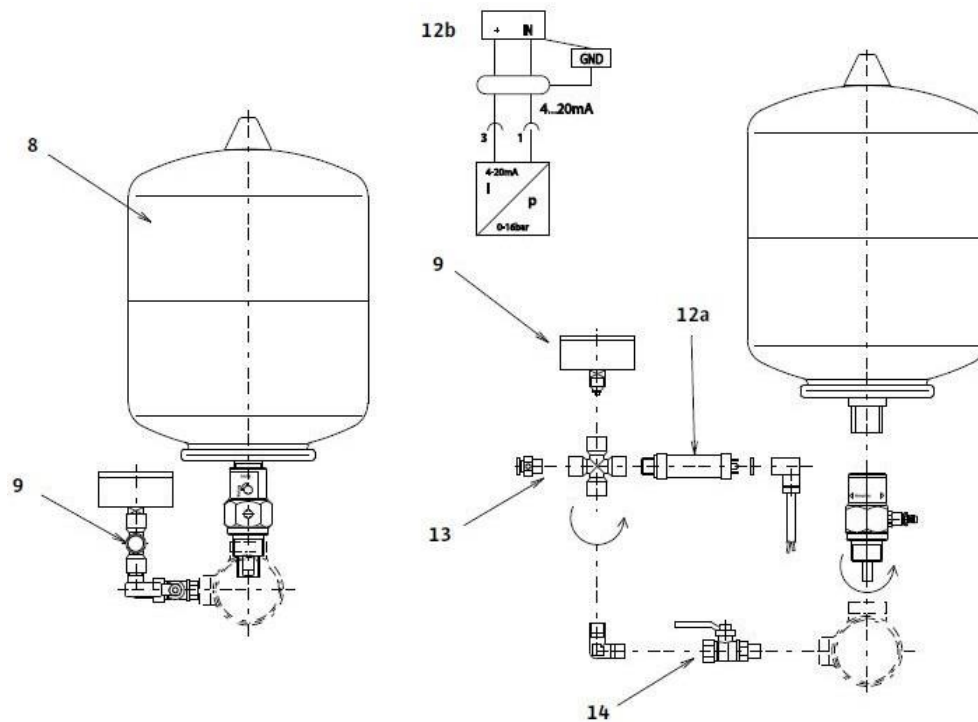


Fig 3

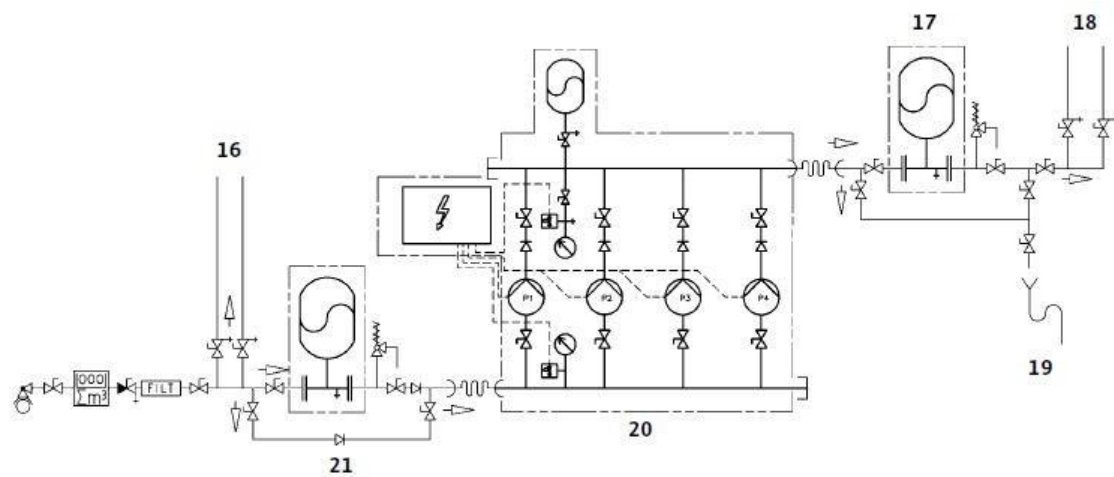


Fig 4

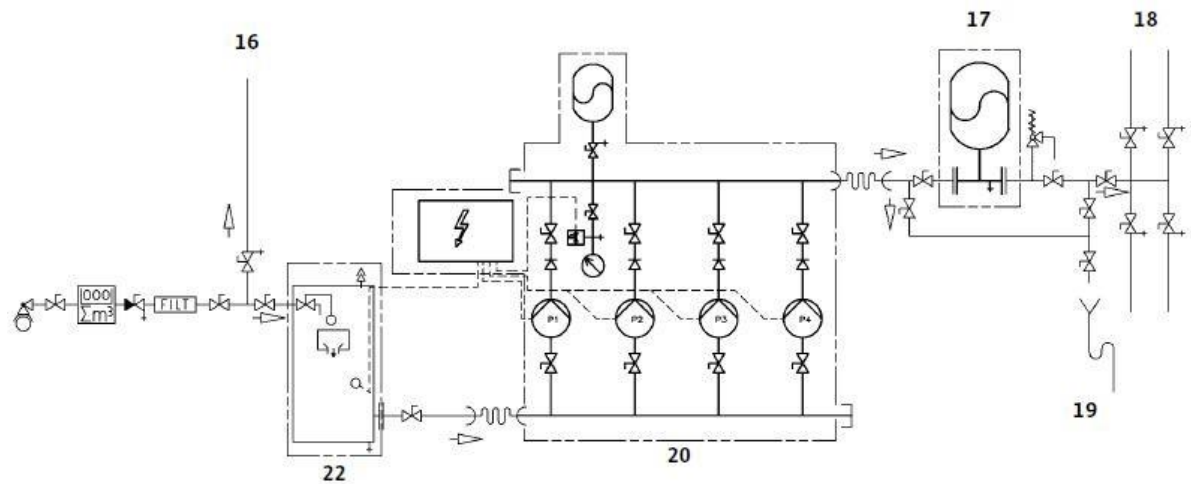


Fig 5

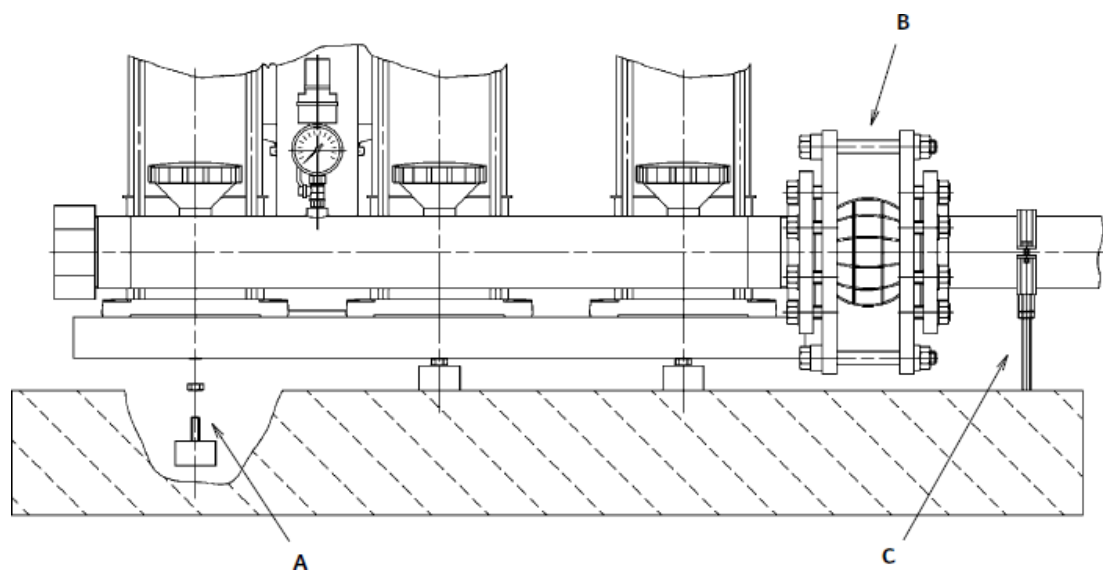


Fig 6

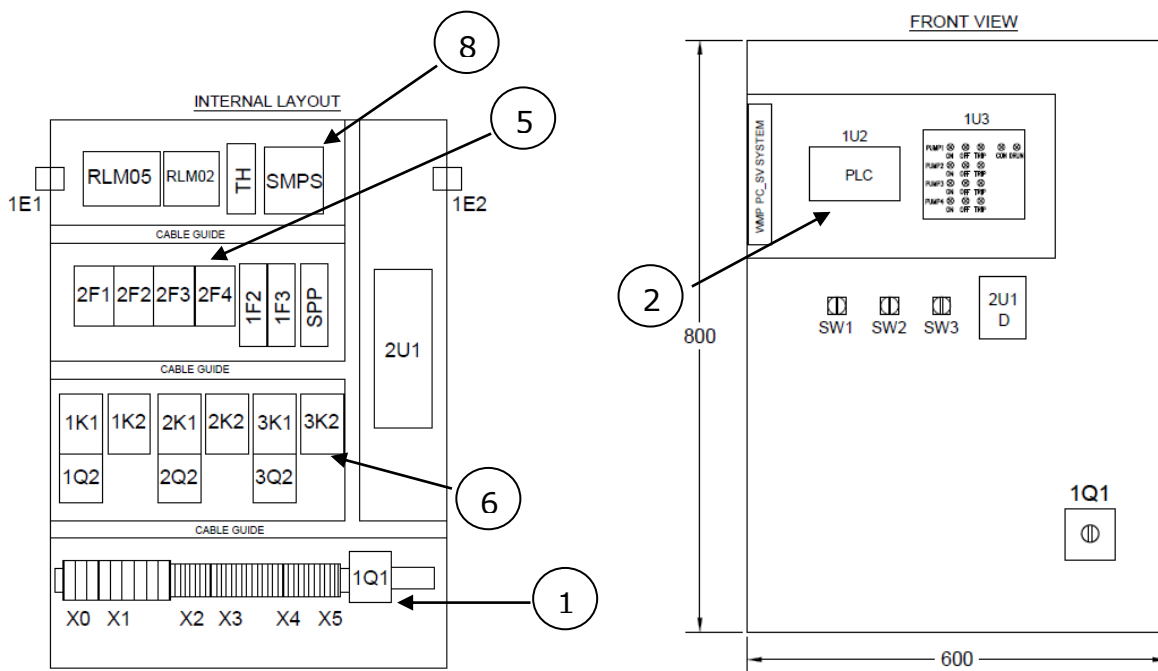


Fig 7

Fig 8

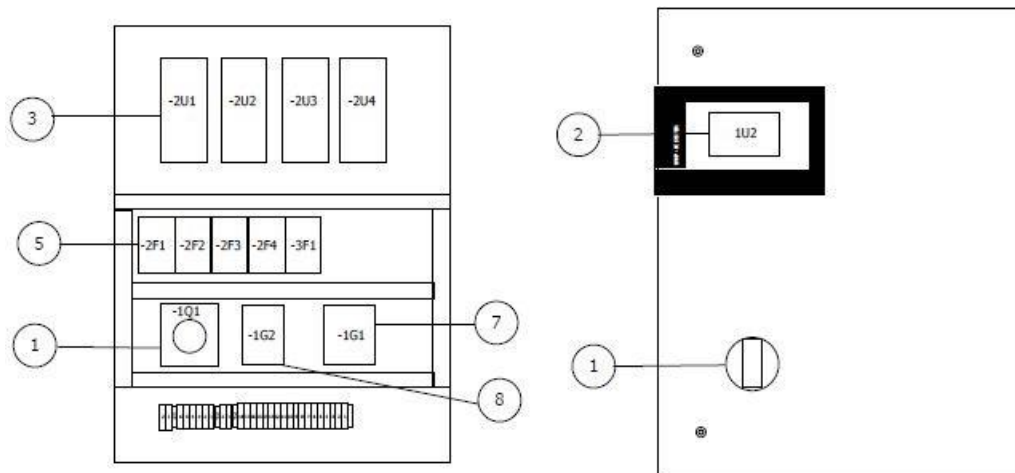
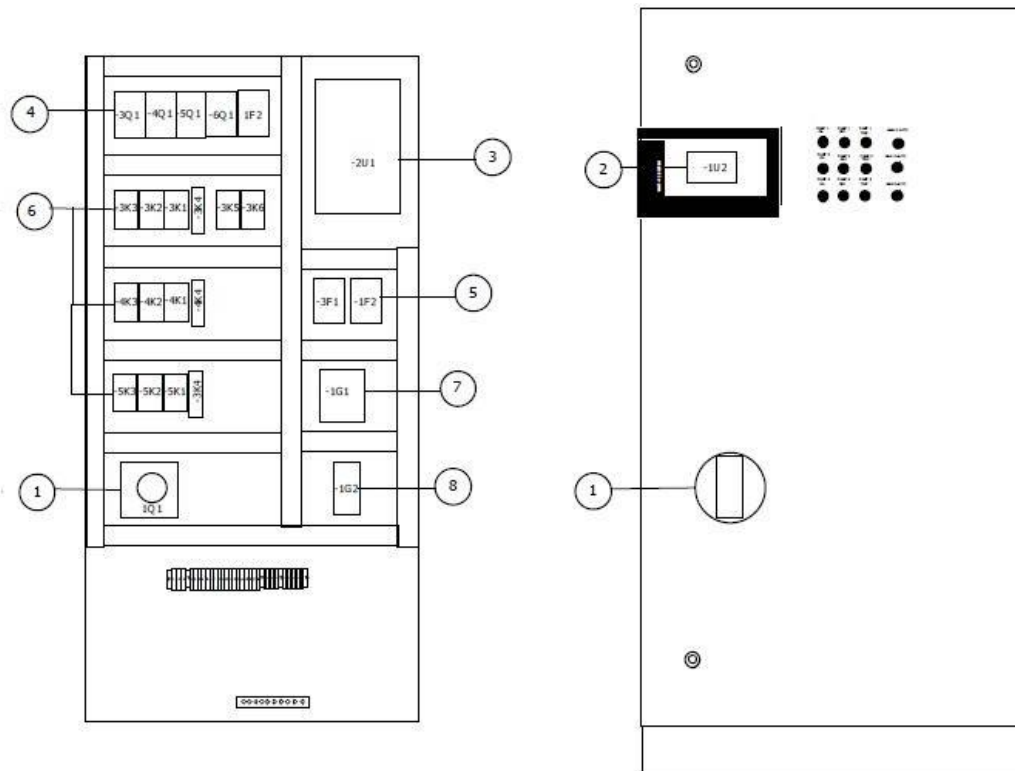


Fig 9



1. General.

Installation and commissioning by qualified and trained persons only.

1.1 About this document.

These installation and operating instructions are an integral part of the unit. They must be kept readily available at the place where the unit is installed. Strict adherence to these instructions is a precondition for the proper use and correct operation of the unit. These installation and operating instructions correspond to the relevant version of the unit and the underlying safety standards valid at the time of going to print.

2. Safety.

Read these instructions carefully before installing and starting up. Pay special attention to the points regarding safety of the equipment for the intermediate or final user.

2.1. Symbols in the instructions.



Safety instruction: If not followed, could cause injury for person.



Electrical safety instructions. If not followed could cause injury to the person.

ATTENTION!

Safety instruction: If not followed could cause damages for the equipment and it's operating.

2.2 Staff Training.

The Personnel installing the pump must have the appropriate qualifications for this work.

2.3 Risks incurred by failure to comply with the safety precautions.

Failure to comply with the safety precautions could result in personal injury or damage to the pump or installation. Failure to comply with the safety precautions could also invalidate any claims for

damages. Lack of care may lead to problems such as failure of important pump or machinery functions, Danger to persons from electrical, mechanical, and Bacteriological influences, Material damage.

2.4 Safety Precautions for the operator.

Regulations for the prevention of accidents must be followed. Directives issued by the local Electricity supply companies are to be observed.

2.5 Installation and commissioning of system.

If system is going to be commissioned after six months from the date of dispatch, revalidation of the system is required. Revalidation to be done through Wilo authorized service personnel before commissioning system.

3. Transport and storage.

3.1 When the equipment is delivered, check that it has not been damaged in transit. If any defects are found please inform supplier.



The equipment must be transported by means of authorized load carriers. Stability of the load must be ensured, since with this particular range of pumps, the center of gravity has been shifted to the top (top-heavy). Transport straps or ropes must be secured to the existing transport lugs or taken round the base frame. The pipes will not withstand loads and should not be used to secure loads in transit.

ATTENTION!

Loading of the pipes in transit can result in leaks.

If the delivered equipment is to be installed later, store it in a dry place and protect it from impacts and all outside effects (moisture, frost, etc....).

If Transit damage is observed to the system inform to the delivery company (forwarding agent) or our customer service department, even if you did not find any damage initially. After removing the packing, the installation must be stored or installed according to the installation conditions described above.

4. Installation.

4.1. Room

The controller must be installed in a shelter or in a room that is easy to reach, normally ventilated and protected from frost.

4.2. Electrical connections.



The electrical connections and checking must be done by a qualified electrician in accordance with the local standards.

Refer Motor data plate for the electrical characteristic (Frequency, Voltage, nominal current)

Check if the motor complies with the mains supply used. Provide switch fuse disconnecting unit to protect the power supply.



DO NOT FORGET CONNECTING TO EARTH (green-yellow conductor).

5. Operating principle.

The Control panel is used to automatically control of pressure boosting systems. It is used in water supplies of residential high-rise buildings, hotels, and hospitals, administrative and industrial buildings.

In conjunction with suitable sensors the pumps run on a low noise and energy saving level. The power of the pumps can be adapted to the constantly changing requirements of the pressure boosting system.

6. Product information

6.1 Type key Booster

e.g. : WMP Booster 4 x MVI 806 PLC-C	
WMP Boost	Pressure Booster System Model
4 x	Number of pumps 2-4
MVI 806	Pump Model
PC	PLC Based Controller
C / SV / MV / MVB	C-Fixed Speed, SV-Single VFD, MV-Multiple VFD, MVB-Multiple VFD with Bypass.
SD	Special Design

e.g. : Switch Box 4x3.0kW PLC-C	
Switch Box	Control Panel
4 x	Number of pumps 2-4
3.0kW	Maximum motor power P2 [kW]
PC	PLC Based Controller
C / SV / MV / MVB	Model C-Fixed Speed, SV-Single VFD, MV-Multiple VFD, MVB-Multiple VFD with Bypass.
SD	Special Design

6.2 Technical Data

Mains supply voltage [V]	3~415V, 50Hz
Nominal current I [A] :	See name plate
Protection class:	IP 54.
Max. Ambient temp.	40°C
Main side protection	In accordance with wiring diagram

7. Description of the product and the accessories.

7.1 Description of product and its accessories. Function description.

The booster system is compact installation that is supplied completely piped-up and ready to connect (except if there is a separate panel stand). The only connections that has to be made are the pipe work and Mains power supply to panel. It may also be necessary to install accessories ordered and supplied separately. The booster system can be connected as shown in Figure 6.

Note: You will find information on the pump type used in the attached Installation and operating instructions for the pump.

The corresponding regulations and standards must be observed to use the drinking water supply and/or fire extinguishing supply.

Regulations of the water companies or the competent fire protection authorities must be included where appropriate. Local conditions (e.g., a supply pressure that is too high or fluctuates considerably and which might require the installation of a pressure relief valve).

7.2 Components of the pressure boosting system.

The complete installation is made up of three main components.

1. Mechanical and hydraulic installation components (Figure 1a and 1b):

The compact installation is mounted on a **base frame with vibration absorbers (3)**. It consists of a group of 2 to 4 **high pressure centrifugal pumps (1)**, which are combined by means of a **supply manifold pipe (4)** and a **delivery manifold pipe (5)**. A **shut-off valve (6)** is fitted on the supply and delivery side and a **non-return valve (7)** on the supply or delivery side of each pump. A unit, which can be shut off, **with pressure sensor and Pressure gauge (9)**, and a **diaphragm pressure tank (8)** as an optional supply to be connected to delivery pipeline. A **low water/dry run protection device (11)** can be mounted on the supply manifold pipe or retrofitted. In the case of small to medium installations, the **control Panel (2)** is mounted on the base frame by means of a **stand (10)** and ready-wired with the electrical components of the installation. In the case of larger installations, the control unit is accommodated in a **separate stand (Fig. 1b)** and the electrical components are pre-wired with the corresponding connecting cable. With the separate stand, the final wiring is done by the customer as per wiring drawing supplied along with the booster panel.

2. High pressure centrifugal pumps (1):

Different types of multi-stage high pressure centrifugal pumps are installed in the booster system depending on the intended use and the performance parameters required. The number of these pumps can vary between 2 and 4. A separate Installation and operating instructions provide information on installed pumps.

3. Control Panel (2):

Different switching and control units of different types and different comfort levels can be supplied and installed to activate and control the system the attached Installation and operating instructions provide information on the control panel installed on booster system.

Pressure sensor / diaphragm pressure tank set (Fig. 2): Optional supply.

Diaphragm pressure tank are supplied as per order specification. Please read tank O & I manual for installation of the tank, filling, and Maintaining Pre-charge air in Tank.

Function of the pressure boosting system.

Wilo booster installations are equipped with non-self-priming, multi-stage high pressure centrifugal pumps as standard. These are supplied with water via the supply manifold pipe. In case of suction operation from lower-lying tanks, a separate, vacuum-proof and pressure-proof intake pipe with foot-operated valve has to be installed, which should rise steadily from the tank to the installation. The pumps increase the pressure and deliver the water to the consumer via the delivery manifold pipe. To do this, they are

switched ON and OFF or controlled depending on the pressure. The pressure sensor continuously measures the actual pressure value, converts it into a current signal and transmits it to the control unit. Depending on demand and the type of control system, the control unit switches the units ON or OFF or changes the speed of one or more pumps until the set control parameters are reached (a more precise description of the type of control system and the control process is given in the control panel operation).

The total delivery volume of the installation is divided over several pumps. This has the big advantage that the installation output is adapted very precisely to the actual demand and the pumps are operated in the most favorable power range in each case. A high level of efficiency and an economic energy consumption of the installation is achieved with this design. The first pump that starts up is called the base load pump. All the other pumps needed to reach the installation operating point are called peak load pump(s). If the installation is designed to supply drinking water a pump must be provided as a standby pump, i.e., with maximum extraction, one pump is out of service or on standby. To ensure even use of all the pumps, the control unit changes the pumps continuously, i.e. the order of switching on and the allocation of the base load/peak load or reserve pump functions change regularly. The diaphragm pressure tank that is installed performs a certain buffer function on the pressure sensor and prevents oscillation of the control system when switching the installation on and off. However, it also guarantees a small water extraction (e.g., with very small leaks) from the storage volume without switching on the base load pump. This reduces the switching frequency of the pumps and stabilizes the operating state of the booster system.

ATTENTION!

To protect the axial face seal or slide bearing, the pumps must not run dry, otherwise they may leak!

A low-water protection device (Fig. 4) must be connected to monitor the supply pressure and its switching signal is hooked to the control unit

7.3 Scope of supply

- Pressure boosting system complete.
- Installation and operating manuals Booster system, Pumps, control panel, VFD, PLC and accessories.
- Electrical circuit diagram.

7.4 Accessories

Accessories must be ordered separately if needed.

8. Installation/mounting.

8.1 Installation at Site.

The system is installed in the room or in a dry, well ventilated and frost-proof, separate room that can be locked. Adequately dimensioned floor drainage (sewer connection or similar) must be provided in the installation room. No harmful gases must penetrate the room or be present there. Adequate space must be provided for maintenance work. The main dimensions are given on the attached installation plan. The installation should be freely accessible from at least two sides. The installation surface must be horizontal and flat. The system is designed for a maximum ambient temperature of +0 °C to 40 °C with a relative atmospheric humidity of 50%. Installation and operation in the vicinity of living rooms and bedrooms is not recommended. To avoid the transmission of structure-borne noise and to ensure a stress-free connection to upstream and downstream pipes, compensators with extension limiters or flexible connecting pipes should be used!

8.2 Foundation/substrate:

The construction of the booster allows it to be set up on a level concrete floor. The base frame is mounted on height-adjustable vibration absorbers to prevent structure-borne noise. If the customer also wants to secure the installation to the floor, suitable measures must be taken to avoid structure-borne noise.

8.2.1 Hydraulic connection and pipes.

The installation must not be connected until all the welding and soldering work and the necessary flushing and, if necessary, disinfecting of the pipe system and the booster installation has been done.

The customer's pipes must be installed free from stresses. Compensators with length limiters or flexible connecting pipes are recommended for this purpose in order to avoid stresses on the pipe connections and minimize the transmission of installation vibrations to the building installation. The pipe fixings must not be secured to the booster pipes to prevent the transmission of structure-borne noise to the building (see Fig. 5 for example).

Pipe connection can be made either on the right or left of the installation, depending on the site conditions. It may be necessary to change blind flanges or thread caps already fitted. In the case of booster installations with horizontal pumps, the pipes on the suction side must be supported so that the tilting moments that can be generated through a shift in the installation's center of gravity are safely absorbed. The flow resistance of the intake pipe must be kept as small as possible (i.e., short pipe, few elbows, adequately large shut-off valves), otherwise the low-water protection device may respond with high volume flows through high pressure losses. (Note

NPSH of the pump, avoid pressure losses and cavitation).

8.2.2 Flushing the pipes and the system reduces the risk of adversely affecting the potable water quality. The water must be completely replaced after a longer period of system standstill.

For simple flushing of the installation, we recommend the installation of a T-piece on the end pressure side of the Booster system (in the case of a diaphragm pressure tank on the end pressure side, immediately downstream of the latter), upstream of the next shut-off device. Its branch, provided with a shut-off device, drains into the wastewater system during the flushing process and has to be suitably dimensioned according to the maximum volume flow of an individual pump (see Fig. 6).

8.2.3 Dry-running protection system and protection Against low water level (accessory)

Suitable dry run protection device must be used to protect pumps running dry.

8.2.4 Diaphragm pressure vessel (accessory)

For transport reasons, the diaphragm pressure vessel is sent separately packed along with booster. Before commissioning this tank must be connected to delivery line with isolation valve. When installing diaphragm vessels, also make sure there is enough room for maintenance work or replacement. Please note diaphragm pressure vessels require regular testing according to directive of pressure vessel. Setting pre charge pressure in tank follow the installation and operating instructions of the relevant diaphragm pressure vessel.

8.2.5 Safety valve (accessory)

A component-tested safety valve must be installed on the discharge to limit or protect the installation against excess pressure.

9. Description and Function of Pressure Booster system:

The PLC based system is specially designed for automatic control of 2 to 4 Pumps connected in parallel to maintain constant pressure in the system. The PLC based panel is equipped with a multicolor, wide screen, user friendly touch screen HMI with or without Variable frequency drives and offers a very simplified control and input unit, menu navigation for easy operation and control of pumps in duty as well stand by operation. The PLC based Controller operates the pump to meet changing system demand received by the sensors by switching ON and OFF of the pumps in case of fixed speed system and in case of Variable frequency drives by varying the speed of the pumps

to meet system requirement and energy saving levels.

9.1 Construction of the Control Panel : The construction of the control panel varies depending upon motor rating of the pump (Direct-on-line starting or Star-Delta starting).

It consists of following main components.

Mains Switch: Mains power disconnect switch to isolate panel power supply connected to mains distribution network (See Fig 6, 7, 8 & 9 item number 1).

Programmable Logic Controller with inbuilt touch Screen HMI: Modularly constructed PLC with display the operating data, operating state and menu functions (See Fig 6, 7, 8 & 9 item no 2) is system dependent.

Frequency Convertor: Frequency convertor for speed variation of base load pump in case of single VFD system and main as well peak load pumps speed variation in case of multiple VFD boosters. (See Fig 7, 8 & 9 item no 3)

Circuit Breaker and fuse protection: Circuit Breaker and fuse protection devices for Motor, Frequency convertor and control devices are used (See Fig 6, 7, 8 & 9 item no 4 and 5)

Contactors and Contactor Combinations: contactors/combination used for switching on and off the pumps in Direct on line or in Star delta combination based on customer requirement. . (See Fig 6, 7, 8 & 9 item no 6)

Manual-0-Automatic switch: Selector switches for the selection of pump operating Modes. "Manual"- manual start stop of the pumps. "0" Pump off "Auto"- Pumps released for automatic operation with the PLC. (See Fig 6, 7, & 9 on panel door)

9.2 System Operating Modes: The PLC based controller has five different programs to select the function based on following mode of system operation.

9.2.1 Fixed Speed System: In this mode base load pump as well as peak load pumps will run in fixed speed. Pumps automatic cascading, alteration and duty standby operation is possible in auto mode.

9.2.2 Single VFD System: In this mode base load pump will be run through VFD and peak load pumps will run in fixed speed. Automatic cascading, pump alteration and duty/standby operation is possible in auto mode.

9.2.3 Multiple VFD System: In this mode base load pump as well as peak load pumps will run through VFD in variable speed. Automatic cascading, pump alteration and duty/standby operation is possible in auto mode.

9.2.4 Multiple VFD with bypass System: In this mode base load pump as well as peak load pumps will run through VFD in variable speed. An additional provision to run the pumps by bypassing particular Pump's VFD. Automatic cascading, pump alteration and duty/standby operation is possible in auto mode.

9.2.5 Special design System: Pumps will be controlled based on the specific customized operation as per customer specifications. It is totally customized and order specific. Please refer customer order specification for the functions.

9.2.6 Water Transfer System. In this mode base load pump as well as peak load pumps will run in fixed speed. Automatic cascading, pump alteration and duty standby operation is possible in auto mode. This function is used for OHT tank filling or UG Tank drain application.

Normal operation of fixed speed system: The constant pressure requirement is set in PLC as Set Point. If there is no "External off" message and no other fault, the controller gives command to base load pump to start, the base load pump starts. When base load pump runs at maximum speed and the pressure requirement cannot be met by the base load pump than the controller will switch ON the first peak load pump. In the event that the demand continuous to increase than the controller switches ON other peak load pump.

If the process value is near to the set value than no need of peak load pumps to achieve the demand. The controller switch OFF peak load pumps one by one and maintains output value by base load pump.

If the demand decreases further the base load pump will be switch OFF. The process repeats once again when demand increased.

An additional provision to bypass the Pumps from Auto to Manual Operation through PLC, as well as Auto-0-Manual switch in case of PLC failure.

Normal operation of single VFD system: The constant pressure requirement is set in PLC as set point. If there is no "External off" message and no other fault, the controller gives command to base load pump to start, the base load pump starts on VFD and increases the speed. When base load pump runs at its maximum speed and the pressure requirement cannot be met by the base load pump than the controller will

switch ON the first peak load pump in full speed. Both Base load pump and peak load pumps try to maintain constant pressure by adjusting the speed of the Base load pump. In the event that the demand continuous to increase than the controller switches ON other peak load pump to maintain constant pressure in the line.

If the process value is near to the set value than no need of peak load pumps to achieve the demand. The controller switch OFF peak load pumps one by one and maintains output value by base load pump speed to maintain constant speed.

If the demand decreases further the base load pump will be switch OFF slowly by reducing the speed. The process repeats once again when demand increased.

An additional provision to bypass the Pumps from Auto to Manual Operation through PLC, as well as Auto-0-Manual switch in case of VFD and PLC failure.

Normal operation of Multiple VFD System: If there is no "External off" message and no other fault, the speed controlled base load pump will start up and increases the speed of the pump, here the speed of the pump depends upon the consumption also. If the demand increases the speed of the base load pump increases. When base load pump runs at its maximum speed and the required demand cannot be met by the base load pump than the controller will switch ON the first peak load pump and runs at same speed. The controller increases the speed to cover the required output In the event that the demand continuous to increase than the controller switches ON other peak load pump and all pumps will run at equal speed.

If the process value is near to the set value than no need of peak load pumps to achieve the demand. The controller switches OFF peak load pumps one by one and maintains output value by base load pump speed to maintain constant speed.

If the demand decreases further the base load pump will be switch OFF. The process repeats once again when demand increased.

Normal operation of Multiple VFD with Bypass System: In the mode of operation the switching on and off the pumps are done in the same way as described in multiple VFD system, with an additional provision to bypass the Pumps from VFD operation to mains operation through PLC or through Auto-0-Manual switch in case of failure of VFD or controller.

Normal Operation of Water Transfer System. This mode of operation is similar to fixed speed system, in addition to it has provision to control multiple tank filling application by use of actuator valves. The actuator valve of respective tank will open and close

when tank is empty and full respectively. Accordingly pump operation can be controlled.

Common functions in All Operation Modes.

Pump duty cycling: The different pump alteration mechanism is applied in order to ensure that the loads on all pumps are as uniform as possible to equalize the running time of the different pumps. The adjustments can be done in menu.

Operation based pump change: If suppose the first pump is base load pump and remaining are peak load pumps. The pumps are switch on one by one to achieve the required output at the event when process value leads to set values. The peak load pumps switched off one by one and base load pumps runs at minimum speed. Once again when demand increases the second pump switch on and becomes base load pump. The pump runs at min speed. After some fixed time the first pump will be switched off and works as peak load pump. The base load pump sequence will be changed to second pump regardless of the actual running hour of the single pump.

Time dependent pump change: If this mode is on the base load pump will change will happen at a programmed time. The time can be adjusted in menu no.3.3.3

Standby Pump: A Pump can be defined as stand by pump in menu. The activation of this operating mode means that the pump/s will not be activated in normal operation. It will be switched on only if the pump/s is switched off due to fault. The standby pump/s is however subject to standstill monitoring and included in test run. Service life optimization ensures that every pump will act as a standby pump.

Pump tests run: To avoid standstill of pumps for long period a cyclic test run is used. The tests run will be only executed during the standstill of the system. By activating this function, the all pumps which are not running will be switched on from test run time interval for that period and then switch off one by one.

Manual pump test is activated by pressing Manual test button, pumps are switched on for test run period and switch off one by one.

Reserve pump: If this function is selected, the number of pumps selected in Standby mode the pump will not be in normal cycle of operation. It will function only during fault in normal working cycle pump.

Zero Flow Test: This function is active only when base load pump running. If the pressure is stable for set time the base load pump will be switched OFF. If peak



loads are under operation this function is deactivated.

Pump Change over upon fault:

Fixed Speed System: If the base load pump has a fault, the next peak load pump which has no fault will work as a base load pump.

Single VFD system: Failure of the VFD the system operation will change over to fixed speed system operation of that pump.

Multiple VFD system: If the base load pump VFD has a fault, the next peak load VFD pump which has no fault will work as a base load pump.

Multiple VFD with bypass system: If the base load pump VFD has a fault, the next peak load VFD pump which has no fault will work as a base load pump. But additional provision to run the system in bypass mode in fixed speed operation is available.

External Off: The control system can be deactivated by an external normally closed potential free contact. This function has priority before all others. In this mode pump test run remains active.

Motor protection:

Over temperature protection: The fault in the motor which are equipped with PTC resistor for excess temperature protection is optional relay is required for signal processing.

Over current protection: Standard system with bypass motors is protected by means of thermal overload method. All Motor protection devices protect the motor during operation with frequency convertor or in mains operation. The motor protection is active in emergency operation and causes deactivation of the corresponding pump.

Dry run protection:

Using Float switch: Float switch installed in suction tank of the booster system to monitor water in tank. Installation of the float switch must be done as per the operation and installation procedure of float switch. When there is no water in tank the float switch will operate, and controller stops all pumps in dry run. System will restart automatically once the dry run condition is resumed.

Using pressure sensor: A pressure sensor is mounted on suction pipeline and connected to controller. The required suction pressure is set in controller to stop all pumps in case of dry run. When the suction pressure is less than the set required suction pressure in the line. The controller will stop all pumps and dry run trip is indicated. System will restart automatically once the dry run condition is resumed.

Max pressure protection. When this function is activated in auto mode all pumps will stop once the actual pressure crosses the max.pr limit. Once actual pressure reaches are below the limit normal system operation is resumed. This function is available in auto as well as in manual mode. In Manual mode an additional pressure switch is required are required to get this protection. This pressure switch is optional supply.

Operation of the control panel: The Touch screen display the operating state of the pumps, controller, frequency convertor and sensors. All commissioning parameters must be set via the display. The color changes depending upon the operating state. GREEN system is ok, RED fault, Operating panel is shown on the touch screen in a context-specific manner and can be selected directly. The plain text and user friendly graphical symbols will guide to reach the menu.

The controller operating parameters are protected by two stage security systems. By pressing the login button symbol it will take to corresponding password (Menu 3.7). After password has been entered the system is enabled at associated user level

User 1 Password:

This level the display is enabled for almost all menu items however parameter inputs are limited. The password for this user level is assigned in menu no 3.7

Factory setting: Password:

Name: user1

Password: 1111

User 2 Password:

This level almost all menu items enable with exception of the simulation mode.

Name: user2

Password: 2222

Scope of Supply:

1. Switch Box PLC Based.
2. Wiring Diagram.
3. Operation and installation Manual.

10 Installation /Fitting.

10.1 Installation.

Wall mounting: The panels for booster systems are mounted directly on booster's skid.

Floor mounting: Floor mounted version is to be erected on a plane area. It is supplied with 100 mm height plinth. Others than this size is optional.



10.2 Electrical connections.

Electrical connection must be carried out by an Electrical installer authorized by the local power Supply Company in accordance with the applicable local regulations.

ATTENTION!

The pumps are connected to the terminal blocks in accordance with the wiring diagram. PE must be connected to the earth bus.

Pressure sensor/switches to the terminals in accordance with the installation and operating instructions. Use a shielded cables for control cable and shield must be earthed.

11. Commissioning.

We recommend having the unit put into operation by the Wilo customer service. The customer's wiring is to be checked to make sure it is correct, especially the earthing, before switching the unit on for the first time.

Priming to the pumps and pipework must be done before system put into operation for the first time.

All steps for Installation, commissioning and operation are described in the booster-system's manual.

11.1 Factory setting.

The controller is pre-set at factory preset value given in factory setting data in this manual. This factory pre-setting can be restored again by the WILO-Service manual.

Commissioning engineer has to feed 'Motor Name Plate data' in controller & then proceed further.

11.2 Motor direction of rotation Check.

Check whether the direction of rotation of the pump in mains operation corresponds with the arrow on the pump housing by briefly switching on each pump in the "Manual" operating mode (menu 2.1). In the case of the wet runner pumps the incorrect or correct direction of rotation is indicated by a control light on the terminal box (see Fitting and Operating Instructions for pump).

Fixed Speed System:

- If all pumps show the incorrect direction of rotation in mains operation reverse 2 random phases of the main power cable by switching OFF main power supply.

- If only one pump shows an incorrect direction of rotation in mains operation 2 random phases are to be reversed in the motor terminal box for motors where $P2 \leq 7.5$ kW (direct starting).

- If only one pump shows an incorrect direction of rotation in mains operation 4 connections are to be reversed in the motor terminal box for motors where $P2 \geq 7.5$ kW (star-delta starting). The winding lead and winding end of 2 phases are to be reversed (e.g. V1 for V2 and W1 for W2).

Systems with FC (frequency converter):

- Frequency convertor operation: Set VFD pump manual operation mode. The direction of rotation in frequency convertor operation is then to be checked by briefly switching each pump on. If pump show an incorrect direction of rotation 2 random phases at the frequency convertor output are to be reversed. The same to check for all VFDs.

Fixed speed pumps follow fixed pump system given above.

11.3 Adjustment of motor protection

Overcurrent: Set as per motor name plate data.

11.4 Other optional modules.

The installation of optional modules is carried out factory side.

12 Faults, causes and rectification.

12.1 Fault displaying and acknowledgement

If any fault occurs, the display the error message will be displayed in red color. Please see menu 3.2 for detail about fault. Once the fault is rectified it can be RESET by pressing reset button.
















12.2 Error memory for faults

The panel provides a fault memory working with the FIFO-principle (First in First Out). Each fault is stored with a timestamp (Date / Time). In maximum 99 faults can be stored. The alarm list can be called in menu 3.5.

12.3 Faults and Causes and remedies.

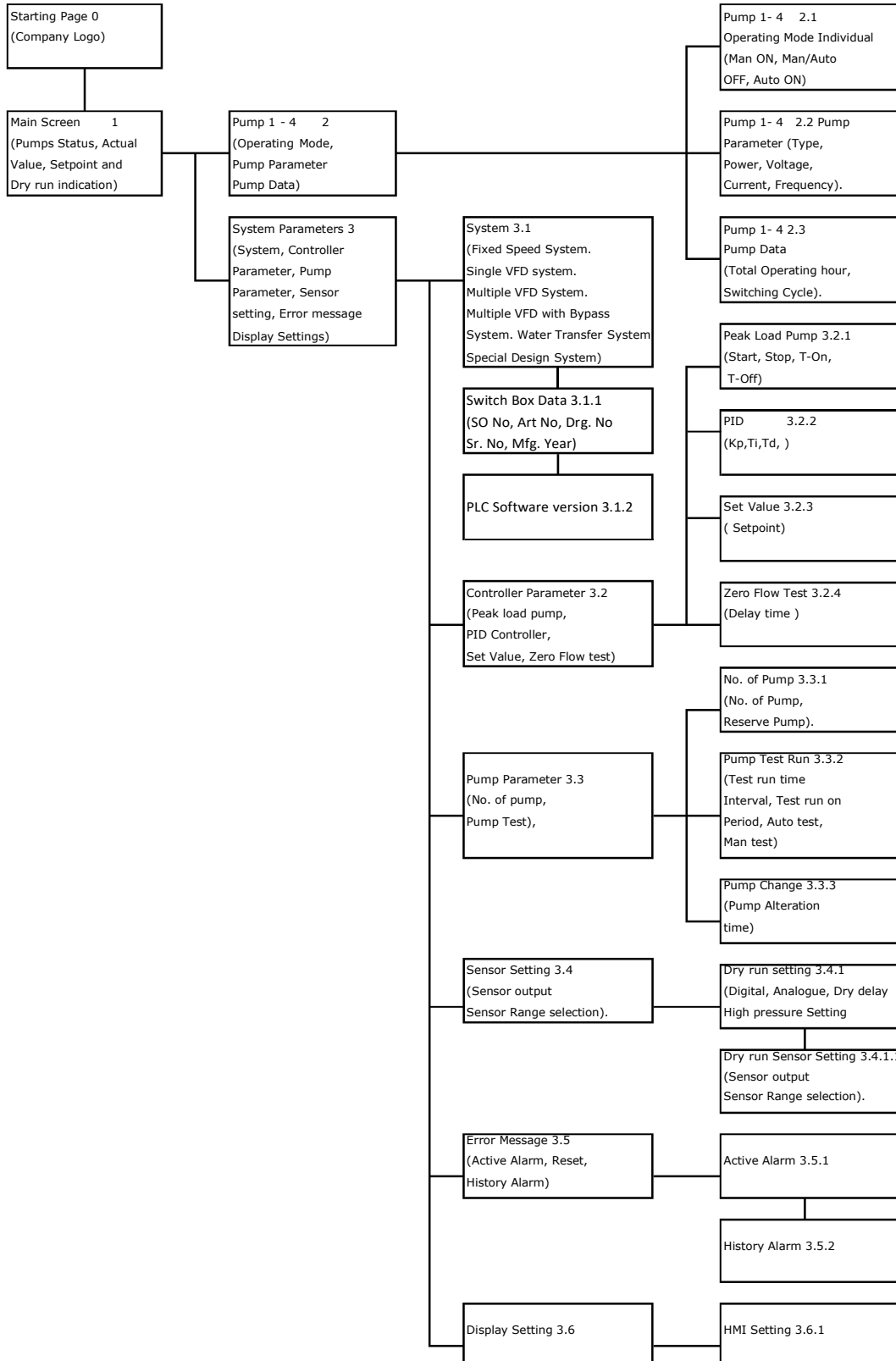
In the event of fault appears the fault will be displayed in menu no 3.5.1 with alarm text, date and time. The fault acknowledgement can be done in menu no 3.5.1 by reset soft button or remote diagnosis.


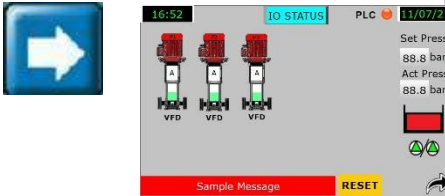
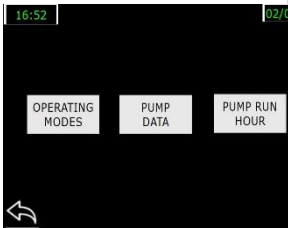
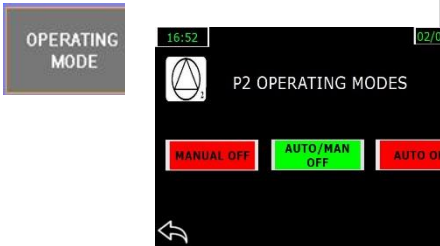
If the fault cannot remedy. Please contact your nearest Wilo customer service point or Representative.

Symbol	Function/ Description
	The pump is selected for manual mode and is not running
	The pump is selected for manual mode and is running
	The pump is selected for mains operation as a peak load pump and is not running
	The pump is selected for mains operation as a peak load pump and is running.
	The pump is selected for mains operation as a base load pump and is not running.
	The pump is selected for mains operation as a base load pump and is running.
	The pump is selected for Auto/Man Off Mode.
	The Trip Signal In Pump or VFD
	Jump to next screen
	Jump to previous screen
	Main Menu Call-up
	Set Point Valve
	Actual Value
	Dry run Trip
	Reset Button




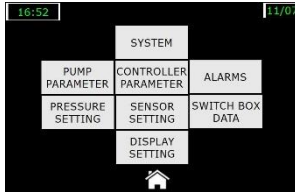

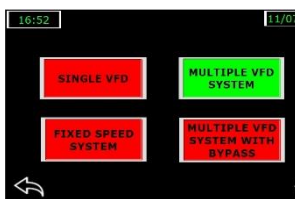

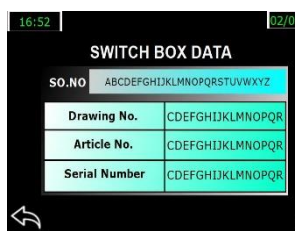
Menu Structure



The menu structure of the control system is structured as follows.


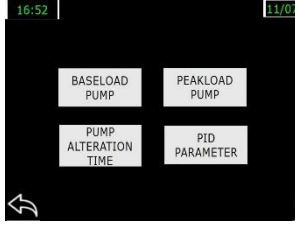









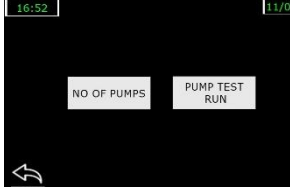

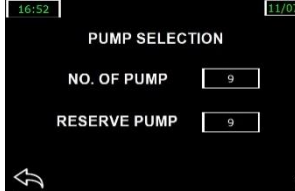



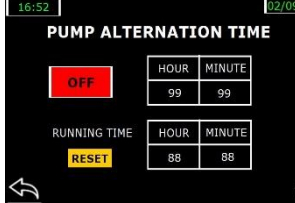


Menu No	Display	Description	Setting Parameter/ Functions	Factory setting
	Visible to User 1 and above	*	Adjustable by User 1 and above	*
C all-up by	User 2	**	User 2	**
0	Starting Page 	* Start up-Power on Display Auto Call-up for the Main screen in 5 sec	None	* -
1	Main Screen 	* Display of operating states the pumps and set value, Process Value of the controlled variable. Error Display Call-up for the pump1-4 setting. Call-up for the system parameters.	None	- - of
2	Pump 1...4 	* Call-up of the operating mode settings of Pump. The parameters and operating data information of the pumps 1 to 4 (Quantity: Installation specifications)	Operating Mode. - Pump Parameter. Pump Data.	- -
2.1	Individual Pump Operation 	* Pump operating mode setting: Man. ON #ON Man Mode [through PLC contactor will On With Mains (except MV Panel)]. All pumps should Be in Manual mode. #Auto/man off (No pumps On Manual via control) #Auto mode [through PLC VFD (if available) & Contactor will On With Mains]	Auto/Man. OFF Auto ON	* Auto




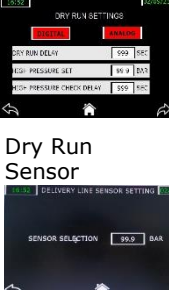

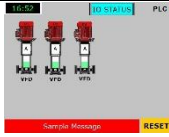


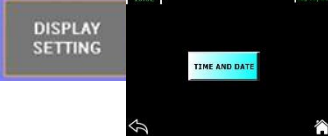
2.2	Pump Parameter	<div><div>PUMP PARAMETER</div><div><div>16:52</div><div>P2 DATA</div><div>TYPE- ABCDEFGHIJKLMNOPQRSTUVWXYZ</div><div><div>POWER 999.99 KW</div><div>VOLTAGE 999 V</div><div>CURRENT 999.99 A</div><div>FREQ 999 HZ</div></div><div>←</div></div></div>	<div>* Display and Setting of the pump Data concerning type, Power, Voltage, Current and motor Frequency of all pumps. Mainly Motor Data</div> <div>Type: Power: Voltage: Current: Frequency</div> <div>** Order specific</div>
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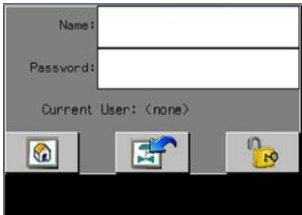
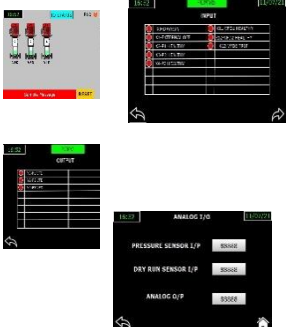
Menu No	Display	Description	Setting Parameter/ Functions	Factory setting
	Visible to User 1 and above	*	Adjustable by User 1 and above	*
C all-up by	User 2	**	User 2	**
2.3	Pump Data	* Display of total operating hours of pump (Since commissioning), the total operating days & total switching cycles (number of activations).	None	-
	 			
3	System Parameters	* Display and Selection of system, Pump Parameters Error Message, Controller Parameter, Sensor Setting, Display Setting.	None	*
	 			
3.1	System	* Display and Selection of Booster type of operation. Fixed Speed, Single VFD, Multiple VFD, Multiple VFD with Bypass Water Transfer, Special Design System. C all-up for the Switch Box data		**
	 			Order No. Specifi c
3.1.1	Switch Box Data	* Display and Setting of	Sale Order NO, ** Order Control Panel Data. Article Number. Specific Drawing No. Sr. No/ Mfg. Yr.	
	 			
		Call-up for the Software version		

3.1.2	PLC Software Version	* Display and Setting of PLC Software version Latest Software details	**	-
		PLC		WMP
				01

Menu No	Display	Description	Setting Parameter/ Functions	Factory setting
	Visible to User 1 and above	*	Adjustable by User 1 and above	*
C all-up by	User 2	**	User 2	**
3.2	Controller Parameter	* Display and Selection of controller Parameters Peak Load pump, PID Controller, Set Point and Zero Flow test.	None	-
	 			
3.2.1	Peak Load Pump data	* Display and Setting Peak load pump data in % and pressure Values in bar Peak load pump ON /OFF Dela (Input of all values in % of Set point of controlled variable)	Start Stop Ton Toff	70% 100% 3 3
	 			
3.2.2	PID Value setting	* Display and Setting PID Values	KP KI KD	50 0.5 0
	 			
3.2.3	Set Point Value	* Display and Setting Set Point	Set Point	4 bar
	 			

Menu No	Display	Description	Setting Parameter/ Functions	Adjustable by	Factory setting
	Visible to	*		User 1 and above	*
C all-up by	User 2	**		User 2	**
3.3	Pump Parameters	* Display and Selection of Pump Parameters Number of Pumps Pump Test.	none	*	Order Specific
					
3.3.1	Number of Pump	Display and Setting of Number of Pumps Standby / Reserve Pump	none	*	Order Specific
					
3.3.2	Pump Test Run	* Display and Setting of Pump test run time interval Auto Test and Manual Test	Test Run Time interval Period	*	- 12 hr 10 sec
					
		Call-up for the Pumps Alteration time setting			
3.3.3	Pump Alteration Time	* Display and Setting of OFF Pump Alteration time of peak ON load pumps on Real time clock		*	OFF
					
3.4	Sensor Setting	* Display and Selection of Delivery Line Pressure Sensor Setting Set as per Sensor range	0-10 bar 0-16 bar 0-25 bar	*	- 0- 16ba r
					
		Call-up for the Dry Run Setting			

Menu No	Display	Description	Setting Parameter/ Functions	Adjustable by	Factory setting
Call-up by	Visible to User 1 and above User 2	* **	User 1 and above User 2	* **	
3.4.1	  <p>Dry Run Setting</p>	<p>* Display, Selection and setting of dry run functions.</p> <p>Select Digital or Analog Signal</p> <p>Dry run delay setting</p> <p>Hi-pressure Setting</p> <p>C all-up for the Dry Run sensor Setting</p>	*	-	Digital 12 sec Pump Specific
3.4.1.1	  <p>Dry Run Sensor</p>	<p>Setting</p> <p>* Display, Selection and setting of dry sensor function.</p> <p>Select sensor range.</p> <p>Dry Run pressure setting</p>	*	-	Install - on spec. 0.1 bar
3.5	  <p>Error Message</p>	<p>* Display and Reset of one Error msg, active alarm signal list with date and time.</p> <p>C all-up for the Error History Message</p>	N	-	-
3.5.1	  <p>Error History</p>	<p>* Display of current alarm one signals of FIFO Basis</p>	N	-	-
3.6	 <p>Display Setting</p>	<p>* Display and Setting of Display Screen Contrast</p> <p>Display Screen Brightness</p> <p>Real Time Clock Date and Time Setting</p>	None	-	As per User Req. Current Date and Time

Menu No	Display	Description	Setting Parameter/ Functions Adjustable by	Factory setting
	Visible to User 1 and above	*	User 1 and above	*
Call-up by	User 2	**	User 2	**
	Password Setting 	* Display and Setting of Password This page will pop up wherever password is req. First Password Second Password	Name password Name password	- user1 1111 user2 2222
	Service Support 	* Status of Input/ Outputs Of PLC Digital Input / Outputs Analog Input / Output	— —	All All

Fault	Cause	Remedies
Pump(s) do not start	No mains voltage	Inspect fuses, cables and connections
	Main switch "OFF"	Switch on main switch
	Water level in storage tank too low, i.e. Low-water level reached	check break tank inlet valve/inlet pipe
	Low-water level switch has triggered	Check inlet pressure.
	Low-water level switch defective	Check, if necessary, replace the low water level switch
	Electrodes incorrectly connected or supply pressures switch incorrectly set.	Check installation or setting and correct.
	Inlet pressure exceeds switch-on pressure	Check default values, correct if necessary
	Check valve closed at pressure sensor	Inspect, open check valve if necessary
	Switch-on pressure set too high	Check setting and correct if necessary
	Fuse defective	Check fuses and replace if necessary
	Motor protection has triggered	Check set values against the pump or motor data, measure current values and correct setting if necessary. Check motor for defects and replace if necessary.
	Contactor Defective	Check and replace if necessary
	Turn-to-turn fault in motor	Check, if necessary, replace motor or get repaired
Pump(s) do not switch off	Inlet pressure fluctuates sharply	Check inlet pressure, if necessary, take measures to stabilize supply pressure (e.g., pressure reducer)
	Inlet pipe blocked or shut off	Check inlet pipe, if necessary, remove blockage or open check valve.
	Nominal diameter of inlet pipe too small	Check the inlet pipe, increase the cross section for the inlet pipe if necessary
	Inlet pipe incorrectly installed	Check inlet pipe, if necessary, change pipe guide.
	Air in inlet	Check, if necessary, seal pipe. Vent pumps
	Impellers blocked	Check pump, if necessary, replace or send for repair.
	Non-return valve leaking	Check, if necessary, replace seal or replace non-return valve.
	Non-return valve blocked or	Check, if necessary, remove blockage or replace non-return valve.
	Gate valve in system closed or not sufficiently open	Check, open the gate valve completely if necessary.
	Volume flow too large	Check pump data and default values and correct if necessary
	Check valve closed at pressure sensor	Inspect, open check valve if necessary
	Switch-off pressure set too high	Check setting and correct if necessary
	Direction of motor rotation false	Check the direction of rotation and correct by changing over the phases if necessary.
	Inlet pressure fluctuates sharply	Check inlet pressure, if necessary, take measures to stabilize supply pressure (e.g., pressure reducer)
	Inlet pipe blocked or shut off	Check inlet pipe, if necessary, remove blockage or open check valve
Switching frequency too high or fluttering	Nominal diameter of inlet pipe too small	Check the inlet pipe, increase the cross-section for the inlet pipe if necessary
	Inlet pipe incorrectly installed	Check inlet pipe, if necessary, change pipe guide
	Check valve closed at pressure sensor	Inspect, open check valve if necessary
	Supply pressure at diaphragm pressure vessel Incorrect	Check supply pressure and correct if necessary
	Valve on diaphragm pressure vessel closed	Check valve and open if necessary

Set switching difference too small	Check setting and correct if necessary
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Fault	Cause	Remedies
Pump(s) not stable and/or make unusual noise.	Inlet pressure fluctuates sharply	Check inlet pressure, if necessary, take measures to stabilize supply pressure (e.g. pressure reducer)
	Inlet pipe blocked or shut off	Check inlet pipe, if necessary, remove blockage or open check valve
	Nominal diameter of inlet pipe too small	Check the inlet pipe, increase the cross section for the inlet pipe if necessary
	Inlet pipe incorrectly installed	Check inlet pipe, if necessary, change pipe guide.
	Air in inlet	Check, if necessary, seal pipe. Vent Pumps
	Air in the pump	Vent pump, check suction line for leaks and seal if necessary
	Impellers blocked	Check pump, if necessary, replace or have repaired.
	Volume flow too large	Check pump data and default values and correct if necessary
	Direction of motor rotation false	Check direction of rotation and correct by changing over phases if necessary
	Mains voltage: a phase is missing	Check fuses, cables and connections
	Pump not adequately secured to base frame	Check fixation, tighten screws if necessary
	Bearing damage	Check pump/motor, replace if necessary or get repaired.
Motor or pump become too warm	Air in inlet	Check, if necessary, seal pipe. Vent Pumps
	Gate valve in system closed or not sufficiently open	Check, open the check valve completely if necessary.
	Impellers blocked	Check pump, if necessary, replace or have repaired.
	Non-return valve blocked or	Check, if necessary, remove blockage or replace non-return valve.
	Check valve closed at pressure sensor	Inspect, open check valve if necessary
	Switch-off point set too high	Check setting and correct if necessary
	Bearing damage	Check pump/motor, replace if necessary
	Turn-to-turn fault in motor	Check, if necessary, replace motor or get repaired
	Mains voltage: a phase is missing	Inspect fuses, cables and connections
Current consumption too high	Non-return valve leaking	Check, if necessary, replace seal or replace non-return valve.
	Volume flow too large	Check pump data and default values and correct if necessary.
	Turn-to-turn fault in motor	Check, if necessary, replace motor or have repaired.
	Mains voltage: a phase is missing	Inspect fuses, cables and connections
Motor protections switch triggers	Non-return valve defective	Check, if necessary, replace non-return Valve
	Volume flow too large	Check pump data and default values and correct if necessary
	Contactors defective	Check and replace if necessary
	Turn-to-turn fault in motor	Check, if necessary, replace motor or get repaired.
	Mains voltage: a phase is missing	Inspect fuses, cables and connections

Fault	Cause	Remedies
Pump(s) produces no or too little power	Inlet pressure fluctuates sharply	Check inlet pressure, if necessary, take measures to stabilize supply pressure (e.g. pressure reducer)
	Inlet pipe blocked or shut off	Check inlet pipe, if necessary, remove blockage or open check valve
	Nominal diameter of inlet pipe too small	Check the inlet pipe, increase the cross-section for the inlet pipe if necessary
	Inlet pipe incorrectly installed	Check inlet pipe, if necessary, change pipe guide
	Air in inlet	Check, if necessary, seal pipe. Vent pumps
	Impellers blocked	Check pump, if necessary, replace or have repaired.
	Non-return valve leaking	Check, if necessary, replace seal or replace non-return valve
	Non-return valve blocked or	Check, if necessary, remove blockage or replace non-return valve
	Gate valve in system closed or not sufficiently open	Check, open the check valve completely if necessary.
	Low-water level switch has triggered	Check inlet pressure
	Direction of motor rotation false	Check direction of rotation and correct by changing over phases if necessary
	Turn-to-turn fault in motor	Check, if necessary, replace motor or get repaired
Dry-running protection system switches off, although water is present	Inlet pressure fluctuates sharply	Check inlet pressure, if necessary, take measures to stabilize supply pressure (e.g., pressure reducer)
	Nominal diameter of inlet pipe too small	Check the inlet pipe, increase the cross section for the inlet pipe if necessary
	Inlet pipe incorrectly installed	Check inlet pipe, if necessary, change pipe guide.
	Volume flow too large	Check Pump data and default values and correct if necessary.
Dry-running protection does not switch off, although lack of water	Electrodes incorrectly connected or supply pressure switch incorrectly set	Check installation or setting and correct
	Low-water level switch defective	Check, if necessary, replace the Low water level switch
	Electrodes incorrectly connected or supply pressures switch incorrectly set	Check installation or setting and correct
	Low-water level switch defective	Check, if necessary, replace the Low water level switch
Rotation direction warning light on (not for all pump types)	Direction of motor rotation false	Check direction of rotation and correct by changing over phases if necessary
Frequency convertor trip	Frequency convertor error	Refer FC converter I&O Manual for fault correction
Pump 1 to 4 Thermal trip	Pump overload trip	Check OLR setting and set as per motor data else replace.
Pressure sensor fault	Pressure sensor defective	Check sensor cable and correct or Replace sensor.
Pressure Maximum/ High Pressure trip	Output pressure of the systems is above set level	Check installation and controller parameters.

Further Information:

For Further information please email to us on following ID: -

service.in@wilo.com

Technical Specifications are subjected to change.

OPERATION & MAINTENANCE MANUAL