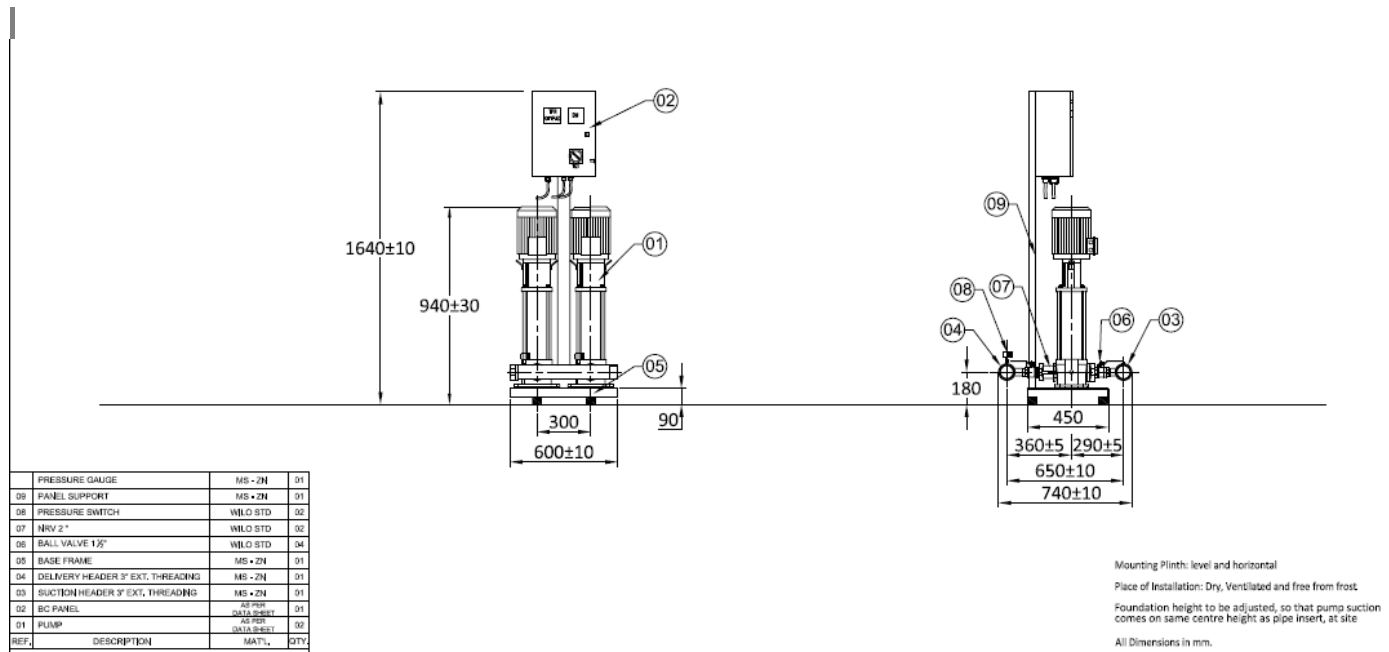


**MANUAL FOR  
TWIN PUMP BOOSTER  
CONTROL PANEL**

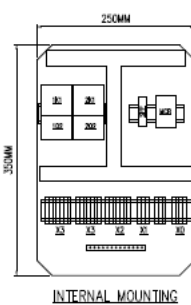
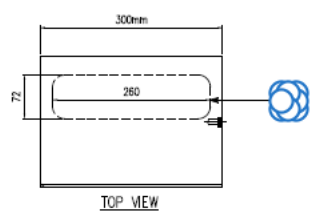
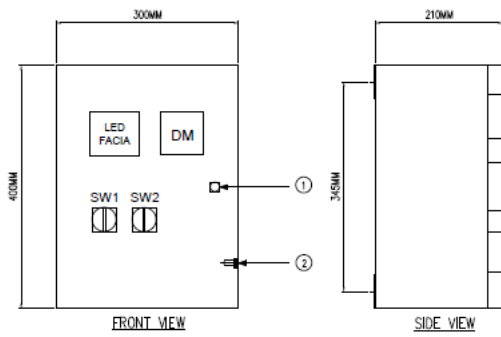
**Table Of Contents.**

<b>1.</b>	General Arrangement of the system .....	3
<b>2.</b>	Sensor and General Arrangement .....	3
<b>3.</b>	Panel GA Drawings.....	4
<b>4.</b>	General .....	5
<b>5.</b>	Safety .....	5
<b>6.</b>	Transport and Storage.....	5
<b>7.</b>	Installation .....	6
<b>8.</b>	Operating Principle.....	6
<b>9.</b>	Product Info & Type Key .....	6
<b>10.</b>	Description of Product Accessories .....	6
<b>11.</b>	Mounting .....	8
<b>12.</b>	Functional Description of Booster.....	8
<b>13.</b>	Fittings .....	11
<b>14.</b>	Commissioning .....	12
<b>15.</b>	Faults, causes and rectifications .....	12

**Fig 1**



**Fig 2**



PART NAME	DESCRIPTION OF DOOR MOUNTING PARTS
①	DOOR LOCK
②	EARTHING STUD - 1NO.
③	GLAND PLATE FROM BOTTOM (REMOVEABLE FROM OUTSIDE)

PART NAME	DESCRIPTION OF INSTRUMENTS
DM	DIGITAL METER
BPC 02	TWIN PUMP ELECTRONIC CONTROLLER
SW1	AUTO-OFF-MANUAL SELECTOR SWITCH FOR PUMP 1
SW2	AUTO-OFF-MANUAL SELECTOR SWITCH FOR PUMP 2

**NOTES :-**

- ENCLOSURE BODY : 1.6MM/2MM CRCA SHEET WITH BITTAL MAKE
- PAINT FINISH : INSIDE & OUTSIDE (RAL 7035 - POWDER COATED)
- PANEL DESIGNED FOR WALL MOUNTING.
- POWER SUPPLY : 415V±10%,3PH,50Hz±3%
- PANEL OPERATED ON : 415V±10%,3PH,50Hz±3%
- CABLE ENTRY FROM BOTTOM
- QUANTITY - AS PER REQUIRED

## 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. In particular, 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 on, 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, water transfer and drain application. 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

This is fix speed system panel. Description details given in below table. Example considered is for 'Booster Application'. For Water Transfer wording will be 'WT Box' and for 'Drain Application'; 'Drain Box'.

e.g.: SW BOX TWIN-B'STER-TP 2.5-4A/1.5KW\_4972

SW BOX ..-B'STER	Pressure Booster System Panel
TWIN	Number of pumps 2
TP	Three Phase
2.5-4A	Ampere rating of Pump Motor
4972	Control Panel Drawing number

#### 6.2 Technical Data

Mains supply voltage [V]	3~415V,50Hz
Nominal current I [A] :	See name plate
Protection class :	IP 42
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 1.

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 (Fig. 1):

The compact installation is mounted on a **base frame with vibration absorbers**. It consists of a group of 2 **high pressure centrifugal pumps (1)**, which are combined by means of a **supply manifold pipe (3) and a delivery manifold pipe (4)**. A **shut-off valve** 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 also a **diaphragm pressure tank** as an optional supply to be connected to delivery pipeline. **A low water/dry run protection device 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 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.

Pump model varies as per application. A separate Installation and operating instructions provide information on installed pumps.

### 3. Control Panel (2):

This control panel can be supplied and installed to activate and control the different system as per application. The system the attached Installation and Operating instructions provide information on the control panel installed on booster system.

### Pressure Switch / diaphragm pressure tank set 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. Depending on demand and the type of control system, the control unit switches the units ON or OFF or varies the number of pumps.

The total delivery volume of the installation is divided over two 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. And the other pump needed to reach the installation operating point is called peak load pump. 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 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 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.

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.

### 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 fix speed-based system is specially designed for automatic control of 1 to 2 Pumps connected in parallel to maintain constant pressure in the system. This panel is equipped with a multimeter, LED fascia and offers a very simplified control and input unit, membrane keyboard for easy operation of pumps in manual mode. The microcontroller-based Controller operates the pump to meet changing system demand received by the pressure/ level switch by switching ON and OFF the pumps in case of fixed speed system.



**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.

**Contactors and Contactor Combinations:** contactors/combination used for switching on and off the pumps in Direct online or in Star delta combination based on customer requirement. (See Fig 2)

**Overload Relays:** overload relays used for the protection of pump motors. It's rating varies with full load current of motor (See Fig 2)

**Miniature Circuit Breaker (MCB):** miniature circuit breaker is provided to isolate the mains supply to the pump. It also provides short circuit protection. (See Fig 2 )

**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 as per feedback. (See Fig 2: SW1, SW2 on panel door)

**9.2 System Operating Modes:** The microcontroller-based controller has two modes of operation.

**9.2.1 Manual Mode:** In this mode both pumps operates when operator operates switch of related pump.

**9.2.2 Auto Mode:** In this mode base load pump (duty pump) will be run as soon as demand sensed through feedback sensor. and peak load pump (duty assist pump) will run if more demand is there. Automatic cascading, pump alteration operation is possible in auto mode.

**9.2.3 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.

**9.2.4 Water Transfer System.** In this mode base load pump as well as peak load pump will run in fixed speed. Automatic cascading, pump alteration 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 Pressure Switch with hysteresis 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 then the controller will switch ON the peak load pump.

If the process value is above the set value of peak load pressure switch, the controller switch OFF peak load pump with time delay 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.

### **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.

**Operation based pump change:** If suppose the first pump is base load pump and remaining is peak load pump. The pumps are switch on one by one to achieve the required output. At the event when process value crossed up the set value, the peak load pump switched off and base load stops at last. Once again when demand increases the second pump switch on and becomes base load pump. If demand increases, first pump run as peak load pump. The base load pump sequence will be changed regardless of the actual running hour of the single pump.

**Time dependent pump change:** If this mode is on the base load pump change will happen at a programmed time. It depends upon combination of dip switch.

**Standby Pump:** One Pump can be kept as stand by pump by connecting only first sensor. The activation of this operating mode means that the pump will not be activated in normal operation. It will be switched on only if the running pump is switched off due to fault. 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, all the pumps which are not running will be switched on from test run time interval for that period and then switch off one by one.

**Pump Change over upon fault:**

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

**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 required optional relay for signal processing.

**Over current protection:** In Standard system motor is protected by means of thermal overload method. 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.

**Scope of Supply:**

1. Switch Box microcontroller 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 switches / level sensor need to connect to the terminals in accordance with the installation and operating instructions.

### 11. Commissioning.

We recommend starting the unit into operation by the Wilo customer service personnel. 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.

#### 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 switching on each pump in the "Manual" operating mode.

#### 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. This is 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. This is 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).

### 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 at factory side.

## 12 Faults, causes and rectification.

### 12.1 Fault displaying and acknowledgement

If any fault occurs, the LED Fascia display the error. Once the fault is rectified it will get RESET.

### 12.2 Faults, Causes and remedies.

In the event of fault appears the fault will be displayed on LED Fascia.

**If the fault cannot rectify, please contact your nearest Wilo customer service point or Representative.**

<b>Fault LED</b>	<b>Causes</b>	<b>System conditions</b>	<b>Remedy</b>
OL1 Trip	Pump1 overloaded	System stops	Check, resolve & Reset relay
OL2 Trip	Pump2 overloaded	System stops	Check, resolve & Reset relay
Dry Off	Protection against low water level Of source tank	System stops	Check the water level If water level is ok then check float switch
LHH	Protection against High water level has tripped (applicable for Drain pumps only)	System stops	Check the water level If water level is ok then check float switch

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 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	Level Switches 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
Rotation direction, single phasing warning light on	➤ Direction of motor rotation false correct	> Check direction of rotation and by changing over phases if necessary
	➤ Out of three , one phase absent	> check power wires for connection

### 12.3 Modbus Mapping Details for Controller with BMS Communication Option.

<b>S.N</b>	<b>Holding Register No.</b>	<b>Description</b>
1	40002	Pump_1 ON
2	40003	Pump_2 ON
3	40004	Level_1
4	40005	Level_2
5	40006	Pump_1 Overload
6	40007	Pump_2 Overload
7	40008	High Level
8	40009	Low Level / Dry Run
9	40010	Pump_1 Manual Mode
10	40011	Pump_2 Manual Mode
11	40014	External On

**Further Information:**

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

[service.in@wilo.com](mailto:service.in@wilo.com)

Technical Specifications are subjected to change.