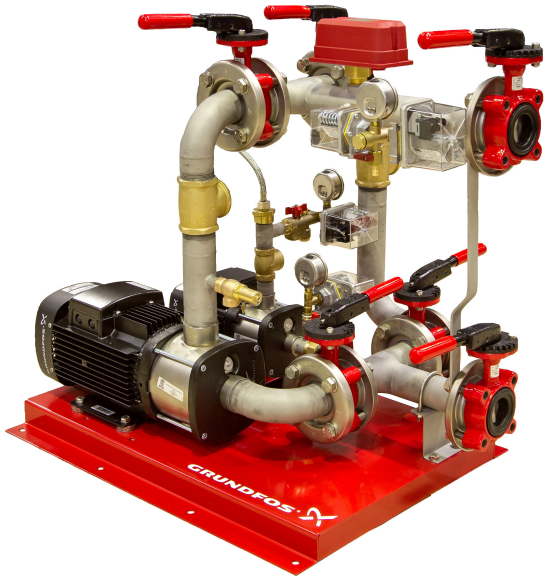
Fire CONTROLLER

Installation and operating instructions

SS EN12845
SS 883001
INSTA 900



Declaration of conformity

GB: EC declaration of conformity

We, Grundfos, declare under our sole responsibility that the product Fire RS, to which this declaration relates, is in conformity with these Council Directives on the approximation of the laws of the EC Member States:

— Machinery Directive (2006/42/EC)
Standards used: EN 809: 1998, EN 12100: 2010.

— Low Voltage Directive (2006/95/EC).
Standards used: EN 60204-1:2011, EN 61439-1:2011.

— EMC Directive (2004/108/EC).

This EC declaration of conformity is only valid when published as part of the Grundfos installation and operating instructions (publication number 98598034 1213).

Wahlstedt, 1st December 2013

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Person authorised to compile technical file and empowered to sign the EC declaration of conformity.

CONTENTS

Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

1. Symbols used in this document

Warning

If these safety instructions are not observed, it may result in personal injury.

Warning

If these instructions are not observed, it may lead to electric shock with consequent risk of serious personal injury or death.

Caution ***If these safety instructions are not observed, it may result in malfunction or damage to the equipment.***

Note ***Notes or instructions that make the job easier and ensure safe operation.***

2. General information

These installation and operating instructions are to be used in conjunction with the following documentation:

- wiring diagram for the controller
- installation and operating instructions for the pump
- installation and operating instructions for the pressure switch
- service instructions.

Warning

The control cabinet delivered may only be used for controlling and supplying the corresponding pump with electricity. Any use beyond this is not in accordance with its intended use.

The control cabinet must not be used to supply voltage to other pump systems, not even other fire pump sets. In addition, each control cabinet is designed for a certain motor power. This primarily applies to fuses and contactors. Therefore, it is not allowed to use it to control electric motors with another motor output.

4.3 Controller

4.3.1 General description

The Fire RS extinguishing water booster set is operated via a controller especially designed for this purpose. The controller is for monitoring and for switching on both pumps automatically.

The controller is placed in a control cabinet being delivered separately for wall mounting.

In case of small leakages the jockey pump starts automatically when the pressure is lower than the pressure set on the pressure switch for the jockey pump. If the stop pressure is reached the jockey pump stops again.

As soon as the sprinklers are activated and water is consumed, the pressure in the discharge pipe is reduced. If the pressure becomes lower than the starting pressure set on the pressure switches, the jockey pump will start automatically first and then the main pump via the corresponding pressure switches. The pressure switch for the main pump must be set to a higher start pressure than the pressure switch for the jockey pump.

Both pumps are stopped manually via the controller. For safety reasons, a redundant pressure switch is connected in addition to the pressure switch for the main pump.

Manual pump operation is provided via a manual switch for commissioning, servicing and testing for both pumps.

In case of dry running the jockey pump will be stopped by the pressure switch mounted at the suction manifold. A dry running for the main pump is not possible, as the main pump should not stop for any reason in case of fire.

The controller is operated by means of the control panel and the manual switches in the cabinet door.

4.3.2 Control elements and indicating instruments

All controls and indicating instruments are placed in the cabinet door. See fig. 2. The control panel is described in section *8. Control panel*.

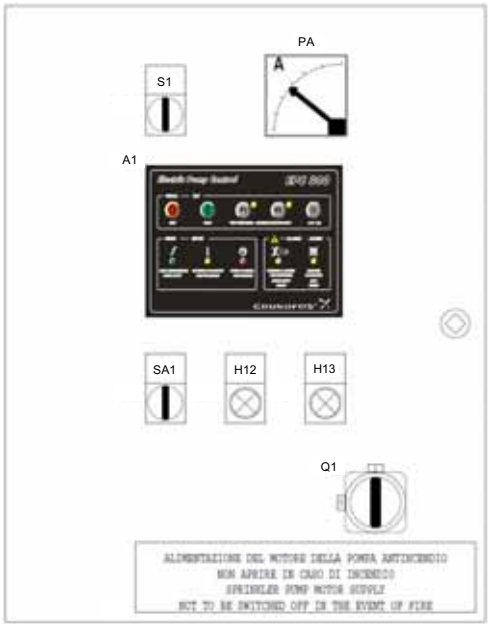

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Fig. 2 Control elements and indicating instruments in the control cabinet door

Pos.	Description
A1	Control panel
H12	Signal lamp"Jockey pump is running"
H13	Signal lamp "Alarm jockey pump"
PA	Ammeter
S1	Selector switch (TEST-0-AUT), main pump
SA1	Selector switch (MAN-0-AUT), jockey pump
Q1	Main switch

The control elements and signal lamps have the following functions:

Control panel (A1)

The control panel contains the buttons required for control and various indicator lights. The control panel is described in section *8. Control panel*.

Signal lamp "Jockey pump is running" (H12)

The green indicator light is on when the pump is running.

Signal lamp "Alarm jockey pump" (H13)

The red indicator light is on when there is a fault preventing the jockey pump to start.

Ammeter (PA)

The ammeter shows the actual current consumption of the electric motor.

Selector switch for main pump (S1)

The switch is used to stop the main pump after a manual or automatic start (position "0") and to select the operating mode. In "AUT" position the main pump is in automatic mode and in "TEST" position in manual mode to start the main pump for a test run or during commissioning. The selector switch should be locked to prevent unauthorised activation. When the main switch is set to "I", the power supply to the electric motor is provided via the selector switch.

Selector switch for jockey pump (SA1)

The switch is used to stop the jockey pump after a manual or automatic start (position "0") and to select the operating mode. In "AUT" position the jockey pump is in automatic mode and in "MAN" position in manual mode to start the jockey pump for a test run or during commissioning.

Main switch

The main switch is used to switch on the power supply to the control cabinet.

4.3.3 Main components in control cabinet

The main components in the control cabinet are shown in fig. 3.

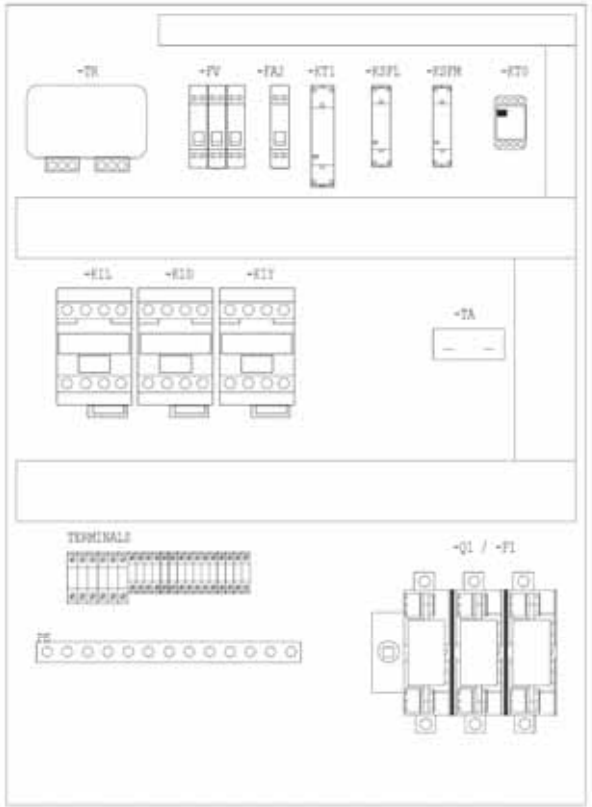

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Fig. 3 Main components in control cabinet

Pos.	Designation
F1	Main fuse
FA2	Fuse for 24 V control circuit
FA3	Fuse for 230 V control circuit
FV	Fuse for transformer
K1L	Mains contactor
K1D	Delta contactor
K1Y	Star contactor
KA1	Relay for monitoring of control voltage
KT0	Time relay (optional)
KT1	Time relay
KSFL	Phase-monitoring relay
KSFM	Phase-monitoring relay for motor terminals
PE	Protective conductor bar
Q1	Main switch
TA	Current transformer for measuring the motor current
TR	Transformer (400/24 V) for control voltage
TR1	Transformer (400/230 V) for control voltage

4.3.4 Inputs and outputs

Inputs

The controller has six digital inputs. See table below. The table also states terminal designations and the status when activated.

Designation	Digital input	Terminal	Upon activation
DI1	Pressure switch 1 for main pump	6 + 7	Open
DI2	Pressure switch 2 for main pump	8 + 9	Open
DI3	Priming tank level switch (for starting the pump)	10 + 11	Closed
DI4	Additional pressure switch for "Pump running" indication (pressure in the discharge line)	12 + 13	Closed
DI5	Pressure switch for jockey pump	2 + 52	Closed
DI6	Dry run switch for jockey pump	53 + 54	Open

The digital inputs are not short-circuit proof.

Outputs

The controller has five digital outputs which are potential-free changeover contacts. The signals from the digital outputs can be passed on to a building management system.

Designation	Digital output	Terminal	Upon activation
AR1	Alarm, power supply to controller	31 + 32	Open
AR2	Automatic pump requirement	33 + 34	Closed
AR3	Main pump running	35 + 36	Closed
AR4	Alarm, power supply to motor	37 + 38	Closed
AR5	Failure to start	39 + 40	Closed

4.4 Functions

4.4.1 Operating functions

Automatic operation of the main pump

Note ***Automatic operation is the normal operating mode. For this mode, the selector switch for the system must be set to "AUT".***

When the extinguishing water booster set is in automatic mode, only the green "POWER SUPPLY" indicator light in the control panel is on. All other alarm and status indicator lights should be off.

As soon as the sprinklers are activated and water is consumed, the pressure in the discharge pipe is reduced. If the pressure falls below the cut-in pressure set on the corresponding pressure switch, the main pump will start automatically. The "PUMP RUNNING" indicator light will light up, and the AR3 digital output will be activated. Furthermore, the "PUMP ON DEMAND" indicator light will light up, and the AR2 digital output will be activated.

If the main pump set cannot start due to a fault, the yellow "START FAILURE" indicator light will light up, and the AR5 digital output will be activated. The alarm indication will be reset automatically, when the fault has disappeared.

It is only possible to stop the main pump manually by setting the selector switch to "0" and pressing [Stop].

For safety reasons, a redundant pressure switch should always be connected in addition to the primary pressure switch.

See also section *12.1 Automatic operation*.

Manual operation of the main pump

During start-up and for test purposes, the main pump can be started manually by turning the selector switch for the main pump to "TEST" and pressing [Start]. When [Start] is pressed, the start relay is activated by bypassing the pressure switch in the discharge line. The red "PUMP RUNNING" indicator light will light up, and the AR3 digital output will be activated. In manual mode, the "PUMP ON DEMAND" indicator light does not light up, and the AR2 digital output will be deactivated.

To switch off the pump press the [Stop] button.

To restore automatic mode, the selector switch for the main pump must be turned back to "AUT" position.

See also section *12.2.2 Main pump*.

Pressure switch test

The pressure switch function for the main pump can be tested by means of [P1] and [P2]. To do this, turn the selector switch to "TEST" position. During the testing procedure, the corresponding indicator light will light up alongside the respective button. See also section *12.3 Test run*.

Indicator light test

It is possible to carry out an indicator light test. To test the function of the indicator lights of the control panel, press  .

See also section *14.2 Control cabinet*.

Automatic operation of the jockey pump

If there are some small leakages in the pipework or as soon as the sprinklers are activated and water is consumed, the pressure in the discharge pipe is decreasing. If the pressure falls below the cut-in pressure set on the corresponding pressure switch, the jockey pump will start automatically and the green "JOCKEY RUN" indicator light will light up. The jockey pump should always start before the main pump.

If the jockey pump set cannot start due to a fault, the red "JOCKEY ALARM" indicator light will light up. The alarm indication will be reset automatically, when the fault has disappeared.

If the pressure in the discharge pipe reaches the cut-out pressure again, the jockey pump stops. However, it is also possible to stop the jockey pump manually by turning the selector switch for the jockey pump to "0" position.

See also section *12.1 Automatic operation*

Manual operation of the jockey pump

During start-up and for test purposes, the jockey pump can be started manually by turning the selector switch for the jockey pump to "MAN" position. When started, the start relay is activated by bypassing the pressure switch in the discharge line and the green "JOCKEY RUN" indicator light will light up.

To switch off the pump turn the selector switch for the jockey pump to "0" position.

To restore automatic mode, the selector switch for the jockey pump must be turned back to "AUT" position.

See also section *12.2.1 Jockey pump*.

Dry run protection of the jockey pump

The jockey pump is protected against dry running by a pressure switch placed in the suction manifold. In case of dry running the jockey pump stops. After the dry running condition disappear the jockey pump starts automatically again, if the request still exists.

Overpressure compensation

To protect the extinguishing water booster set against too high pressure a safety valve has been installed in the discharge pipe of the main pump being activated at 12 bar.

4.4.2 Monitoring functions

You will find an overview of the status and fault indications related to the monitoring functions in section *8.2 Status indications* and section *8.3 Fault indications*.

Controller power supply

The connection of the controller to the mains is monitored in order to determine whether the phase sequence is correct. If it is, the "POWER SUPPLY" indicator light is on, and the AR1 digital output is activated.

Position of selector switch for main pump

The position of the selector switch for the main pump is monitored. If this selector switch is not in position "AUT" the yellow "MOTOR SUPPLY FAILURE/NON AUTO" indicator light is flashing.

Start request of main pump

If, in automatic mode, there is a start request from either a pressure switch (DI1 or DI2 open) or the level switch in the priming tank (DI3 closed), the "PUMP ON DEMAND" indicator light will light up, and the AR2 digital output will be activated. In manual mode, the "PUMP ON DEMAND" indicator light does not light up, and the AR2 digital output remains deactivated.

Operation of main pump

It is possible to monitor whether the main pump is running via an additional pressure switch built into the discharge line. If the start relay for the motor is activated and the contact in the DI4 digital input is closed, the "PUMP RUNNING" indicator light will light up, and the AR3 digital output will be activated.

If there is no signal from the pressure switch to the DI4 digital input on the pressure side, although the start relay has been activated by the motor, the "START FAILURE" indicator light will light up, and the AR5 digital output will be activated.

Power supply to the motor of the main pump

The power supply to the motor is monitored by means of a phase monitoring relay. If there is a voltage failure on the motor terminals when the start relay is activated, the yellow "MOTOR SUPPLY FAILURE/NON AUTO" indicator light will light up, and the AR4 digital output will be activated.

Operation of jockey pump

If, in automatic mode, there is a start request from the pressure switch for the jockey pump (DI5 open) and the start relay for the motor is activated, the "JOCKEY RUN" indicator light will light up.

Motor failure of the jockey pump

If the motor of the jockey pump is overheated, the red "JOCKEY ALARM" indicator light will light up.

5. Identification

All important data of the extinguishing water booster set and its main components are on the extinguishing water booster set nameplate, the nameplate of the pump, the nameplate of the electric motor, and the nameplate of the controller.

Nameplate of the controller

The controller can be identified by means of the nameplate. The nameplate of the controller is attached externally on the right side and internally on the cabinet door.

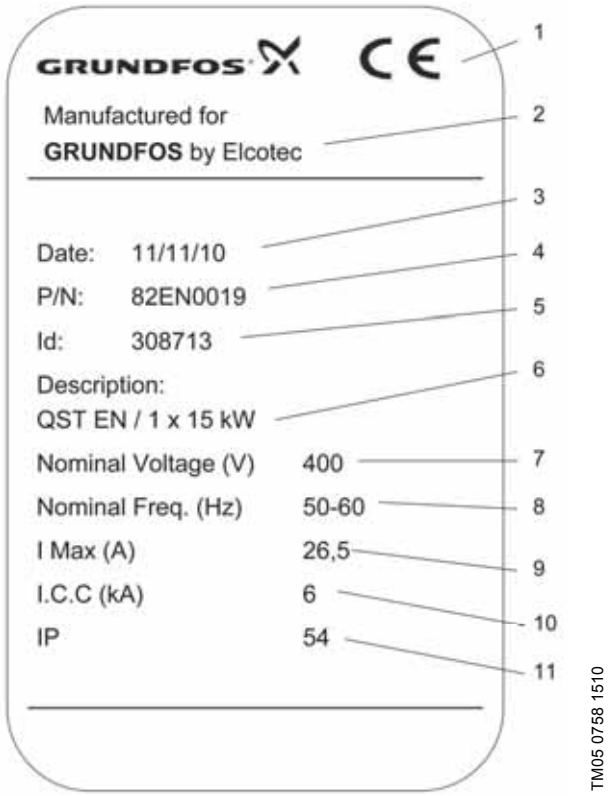

Fig. 4 Nameplate of the controller

Pos.	Description
1	CE mark
2	Manufacturer
3	Production date
4	Product number
5	Serial number
6	Type designation
7	Rated voltage
8	Nominal frequency
9	Max. current
10	Rated short-circuit current
11	Protection class

Type key for controller

Example AVV. QST + J EN / 1x 5,8 kW -SD 1x 0,65kW -DOL

Type range
Controller for electrically driven main and jockey pump

Controller approval
EN: in accordance with EN 12845

Number of connectable main pumps

Performance of connectable main pump(s)

Starting method for main pump
DOL: direct on line
SD: star/delta

Number of connectable jockey pumps

Performance of connectable jockey pump(s)

Starting method for jockey pump
DOL: direct on line
SD: star/delta

The example shows a controller for electrically driven pumps in accordance with EN 12845. The main pump has a motor output of 5.8 kW and the jockey pump of 0.65 kW.

6. Technical data

6.1 Complete extinguishing water booster set

All important technical data including the weight of the complete extinguishing water booster set are stated on the corresponding nameplate.

Sound pressure level

Motor power of main pump [kW]	$\bar{L}_{pA}$ [dB(A)]
5.5	63
7.5	63
11	63
15	63
18.5	63
22	69
30	74

16 bar. However the maximum inlet pressure is determined by the pump operation manual.

6.2 Pumps

All important technical data of the main pump and jockey pump are stated on the corresponding nameplate.

6.3 Controller

Control cabinet: Sheet steel, grey.
Enclosure class: IP54.
Dimensions w x h x d: 400 x 600 x 250 mm.
Weight: Up to approx. 80 kg.
Supply voltage: 3 x 400 V, 50 Hz, PE.
Max. current consumption: See wiring diagram.
Back-up fuse: Max. 20 A.
Connecting terminals: L1, N = 2.5 - 6 mm^2.
Overvoltage category: III.
Rated short-circuit current: 6 kV.
Degree of contamination: 2.
Ambient temperature: 5 to +40 °C.
Production country: Italy.

Electrical data of signal relay outputs

Voltage class: Category 1.
Insulation voltage: 115 V (in relation to earth).
Insulation test voltage: 1.5 kVAC.
Max. supply voltage: 115 VAC.
Max. load: 2 A, 250 V.
Min. load: 100 mA, 12 VDC.
Max. load power: 230 VA/24 W.

7. Operating conditions

7.7 Relative air humidity

The relative air humidity must not be too high to prevent condensation of moisture in the air. This can lead to damage of the controller or the electric motor. If humidity is a problem, install room heating incorporating a hydrostat.

7.8 Effect of ambient temperature and altitude on motor output

Motor power [kW]	Motor efficiency class	Maximum ambient temperature [°C]	Maximum altitude above sea level [m]
0.55	-	+40	1000
0.75 - 22	IE3	+60	3500
30	IE3	+55	2750

If the ambient temperature exceeds the above temperature values or the pump is installed at an altitude exceeding the above altitude values, the motor must not be fully loaded due to the risk of overheating. Overheating may result from excessive ambient temperatures or the low density and consequently low cooling effect of the air. In such cases, it may be necessary to use a motor with a higher rated output.

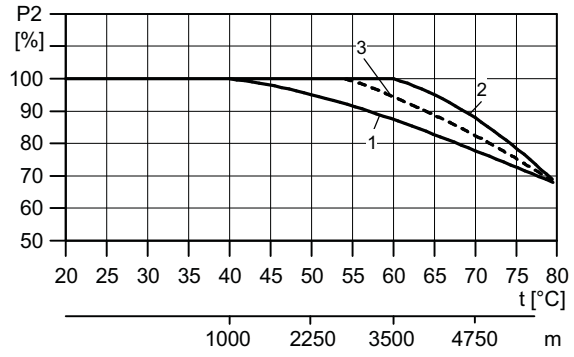

Fig. 7 Motor output depending on ambient temperature/ altitude

Pos.	Motor power [kW]
1	0.37 - 0.55
2	0.75 - 22
3	30

Example

Fig. 7 shows that the load of the motor at an ambient temperature of 70 °C must not be loaded more than 89 % of the rated output. If the pump is installed 4750 metres above sea level, the motor must not be loaded more than 89 % of the rated output.

In cases where both the maximum temperature and the maximum altitude are exceeded, the derating factors must be multiplied (0.89 x 0.89 = 0.79).

8. Control panel

Note

The control panel is only used for operating the main pump. To operating elements and signal lamps for the jockey pump are described in section 4.3.2 Control elements and indicating instruments.

The control panel is divided into three areas:

- operating buttons
- status indicator lights
- fault indicator lights.

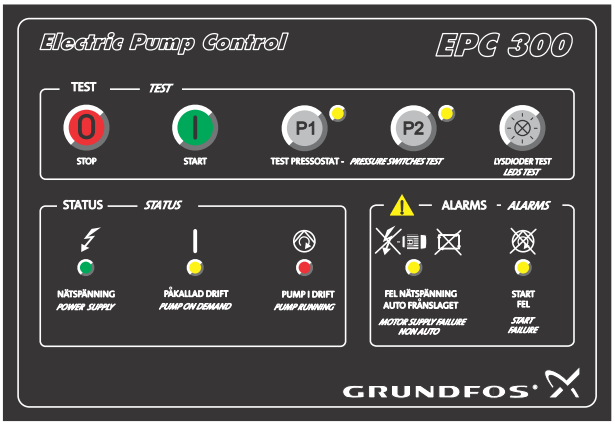

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Fig. 8 Control panel

8.1 Button functions

Button	Description
	Manual stop of main pump (only possible when the selector switch for the main pump is set to "TEST").
	Manual start of main pump (only possible when the selector switch is for the main pump set to "TEST").
	Test of pressure switch 1
	Test of pressure switch 2
	Indicator light test

8.2 Status indications

The operating status of the main pump and the controller is indicated by means of three indicator lights under "Status" in the control panel. The operating status of the jockey pump is indicated by an indication light in the front door of the control cabinet.

The following table provides an overview of status indications. Status indications can be forwarded to a building management system.

Status	Indicator light			Potential-free signal
		Status	Text	
Mains voltage correct.		On	POWER SUPPLY	AR1 activated
The main pump has received a start request from the pressure switch or the level switch in the priming tank.		On	PUMP ON DEMAND	AR2 activated
The main pump is running (automatic or manual start).		On	PUMP RUNNING	AR3 activated
Checking the function of pressure switch 1.		On	PRESSURE SWITCHES TEST	-
Checking the function of pressure switch 2.		On	PRESSURE SWITCHES TEST	-
The jockey pump is running (automatic or manual start).		On	JOCKEY RUN	-

8.3 Fault indications

Faults of the main pump are indicated by means of the two indicator lights under "Alarms" in the control panel. Faults of the jockey pump are indicated by an indication light in the front door of the control cabinet.

The following table provides an overview of fault indications. Fault indications can be forwarded to a building management system. Fault indications will not be recorded. The indicator lights go out as soon as the fault has disappeared.

Status	Indicator light			Potential-free signalling
		Status	Text	
Phase failure. No power supply.		Off	POWER SUPPLY	AR1 not activated
Fault in the power supply to the motor of the main pump.		On	POWER SUPPY FAILURE NON AUTO	AR4 activated
The selector switch for the main pump is not in "AUT" position.		Flashing	POWER SUPPY FAILURE NON AUTO	-
The main pump does not start despite start request, which means the start relay has energised, but the DI4 contact remains open.		On	START FAILURE	AR5 activated
The jockey pump does not start due to a fault.		On	JOCKEY ALARM	-

10. Installation

Warning

The extinguishing water booster set must be installed and connected in accordance with local regulations and by qualified personnel.

Caution

Installation of the extinguishing water booster set must be carried out in accordance with the following instructions. If these instructions are not followed, malfunctions can result which can cause damage to the sprinkler pump system.

10.1 Mounting

10.1.1 Installation site

Warning

Installation and operation in a potentially explosive environment are not permissible.

Warning

The control cabinet must be placed so that water from the pump or pipework cannot pose any danger.

10.1.5 Control

Warning

When drilling holes, make sure not to damage any wires or water and gas pipes. Furthermore, ensure safe installation.

Mount the control cabinet on the wall as close as possible to the pump system and within view of the pump system by means of screws. Drill holes into the wall or floor according to the drilling template on the back of the control cabinet, and use dowels and screws of adequate size.

10.2 Electrical connection

Warning

During electrical installation, make sure that the power supply cannot be accidentally switched on.

Check that the supply voltage and frequency correspond to the values stated on the nameplate.

The electrical connection must be made in accordance with the wiring diagram in the control cabinet.

Procedure

- The connection to the mains supply must be fitted with a fuse of the correct size, in accordance with local regulations, and connected to the main switch in the control cabinet. PE must be connected using the PE terminal block.
- Pressure switch 1 for the main pump must be connected to terminals 6 and 7 in the control cabinet, and pressure switch 2 for the main pump to terminals 8 and 9.
- The pressure switch for the jockey pump must be connected to terminals 2 and 52 in the control cabinet.
- The pressure switch for dry running protection of the jockey pump must be connected to terminals 53 and 54 in the control cabinet. If this pressure switch should not be used, put a cable/bridge between terminal 53 and 54
- The additional pressure switch for the "Pump running" indication is to be connected to terminals 12 and 13. If no additional pressure switch is used, put a cable/bridge between terminal 12 and 13.
- If there is a level switch for measuring the filling level in the priming tank, it must be connected to terminals 10 and 11.
- If status and alarm indications are to be transmitted to a building management system, terminals 31 to 40 must be used for this purpose.

11. Commissioning

Warning

Start-up must be carried out by authorised personnel. The control cabinet of the controller must remain closed during start-up. Danger of death through electric shock!.

Caution

The sprinkler pump is not allowed to run against a closed valve as this may cause an unacceptable temperature increase or the formation of steam. This may cause damage to the sprinkler pump.

11.1 Preparations before start-up

Before start-up the following have to be done:

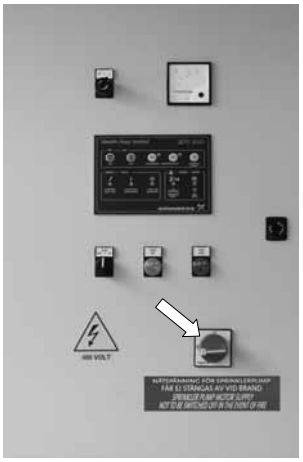
1. Check that all screw connections are fitted securely.
2. Check that all pipes are installed correctly.
3. Check that all electrical connections inside and outside the controller are correctly connected and fitted securely.
4. Check that all fuses in the control cabinet are switched on.
5. Check that all safety devices are installed.
6. Make sure that any storage tank and pump priming tank are filled with enough water.
7. Set pressure values on the three pressure switches, see pressure switch operating manual. The value of the pressure switches for the main pump should be 0.5 bar higher than the value of the pressure switch for the jockey pump.

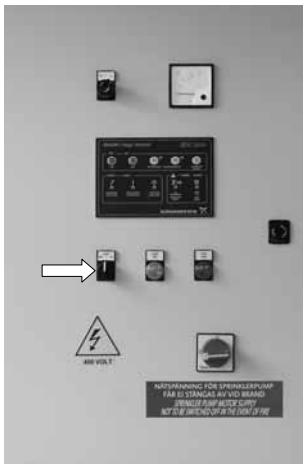
11.2 Start-up

Caution

Before switching on the extinguishing water booster set it must be filled with water.

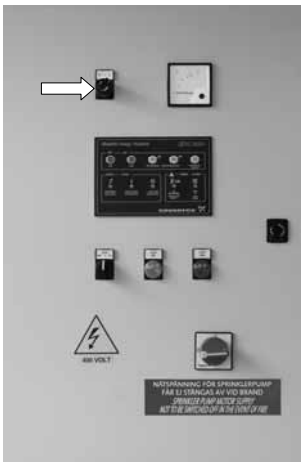
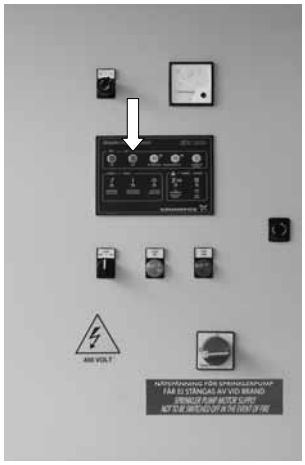
In case of dry running the main pump will not stop.

Step	Illustration
1. Open the isolating valve on the suction manifold. Open the isolating valve on the suction side of the main pump. Open both isolating valves of the bypass line. Open the isolating valve on the discharge manifold.	
2. Close the isolating valve on the discharge manifold.	
3. Turn the main switch to "I" position.	
4. Open the ball valve for testing the pressure switches for the main pump and the jockey pump.	

Step	Illustration
5. Turn the selector switch for the jockey pump to "MAN" position. The jockey pump will start.	

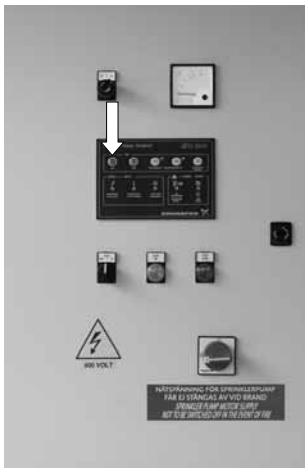
Note: If the jockey pump does not start, see section *8.3 Fault indications* and *15. Fault finding*.

6. As soon as the jockey pump starts, check the direction of rotation. The correct direction of rotation is indicated by arrows on the fan cover of the motor.

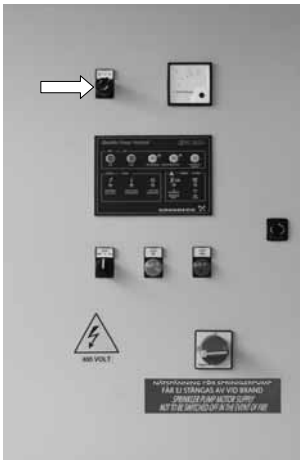
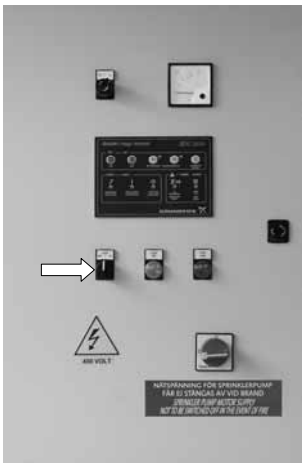
7. Turn the selector switch for the main pump to "TEST" position by means of the key.	
8. Start the main pump manually by pressing the [Start] button. Keep the button pressed until the pump starts.	

Note: If the main pump does not start, see section *8.3 Fault indications* and *15. Fault finding*.

9. As soon as the main pump starts, check the direction of rotation. The correct direction of rotation is indicated by arrows on the fan cover of the motor.

Step	Illustration
10. Stop the main pump manually by pressing the [Stop] button.	

11. Close the ball valve for testing the pressure switches for the main pump and the jockey pump.

12. Turn the selector switch for the main pump to "AUTO" position by means of the key.	
13. Turn the selector switch for the jockey pump to "AUTO" position.	

14. Open the isolating valve on the discharge manifold.

12. Operation

Warning
The control cabinet must remain closed during operation. Risk of electric shock!

Caution ***Ensure sufficient ventilation of the controller!***

Status and alarm messages are indicated via indicator lights in the control panel. See section *8.2 Status indications* and *8.3 Fault indications*. If the outputs of the pump set are connected to a building management system, the operation can be monitored remotely. To remedy any faults arising, see section *15. Fault finding*.

The three possible modes are described in the following sub-sections:

- automatic operation (normal operation)
- manual operation (for start-up and after service work)
- test run.

12.1 Automatic operation

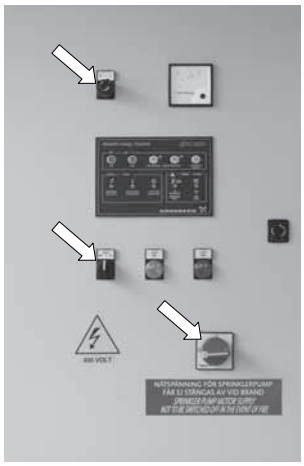
Once the pump set has been installed and started up according to the installation and operating instructions, no further operation is necessary.

The pump set works automatically and switches itself on as soon as water is drawn from the sprinkler system and the pressure switch detects a pressure drop.

Note ***In automatic mode, the selector switch for the main and jockey pump must be set to "AUTO" position.***

System in automatic operation

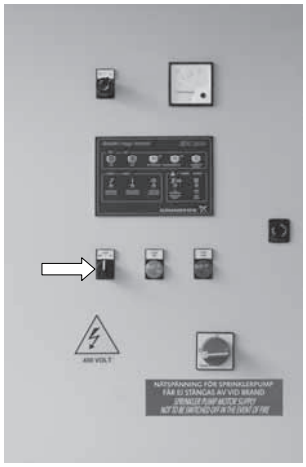
When the main switch is set to "I" position and the selector switch for the main and jockey pump are set to "AUT" position, the fire pump set is in automatic mode.



Note ***The main pump is not stopped in case of warnings.***

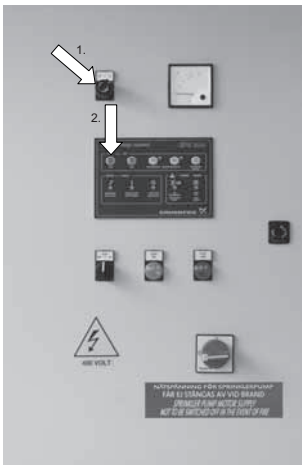
Stopping the jockey pump

The jockey pump is normally stopped by turning the selector switch for the jockey pump to "0" position.



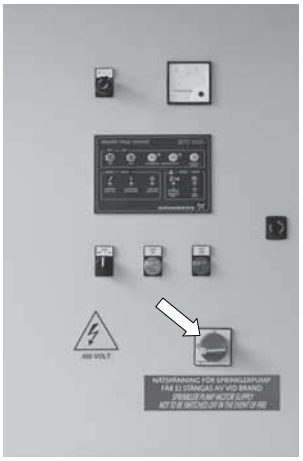
Stopping the main pump

The main pump is normally stopped by turning the selector switch to "TEST" position (first step) and then pressing the [Stop] button (second step).



Emergency shutdown

Emergency shutdown is possible by turning the main switch to "OFF" position.
To restart the system, the main switch must be set to "I" again.

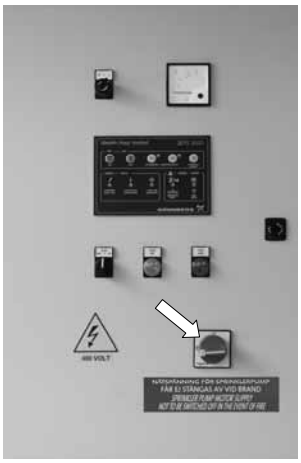
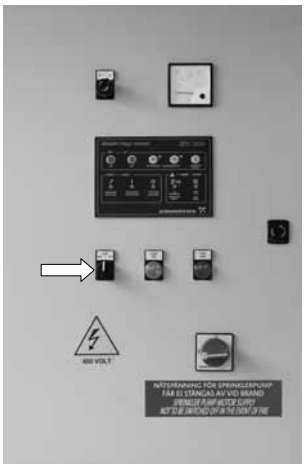


12.2 Manual operation

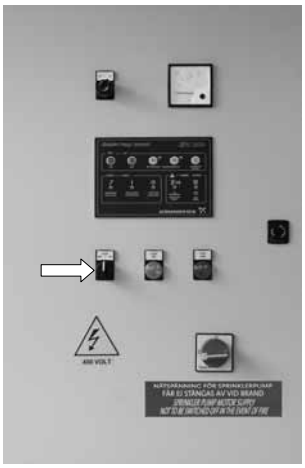
Both pumps can also be started and stopped manually for a functional test, at start-up or after service work.

12.2.1 Jockey pump

Starting procedure

Step	Illustration
1. Turn the main switch to "I" position, if this has not already been done.	
2. Close the isolating valve on the discharge manifold. Open the ball valve for testing the pressure switch for the jockey pump.	
3. Turn the selector switch for the jockey pump to "MAN" position.	
Note: If the jockey pump does not start, see the indicator lights. See also section *15. Fault finding*.	

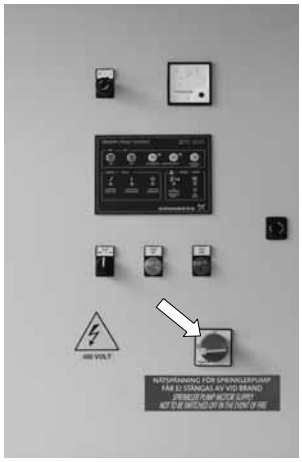
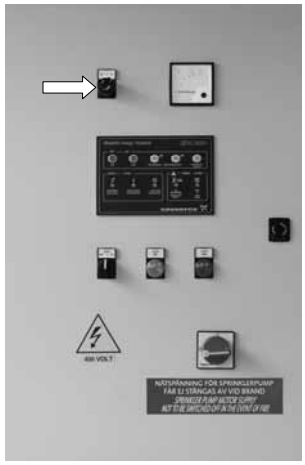
Stopping procedure

Step	Illustration
1. Turn the selector switch for the jockey pump to "AUT" position.	
2. Close the ball valve for testing the pressure switch for the jockey pump.	
3. Open the isolating valve on the discharge manifold.	

Note ***After stopping, the pump set returns to automatic mode.***

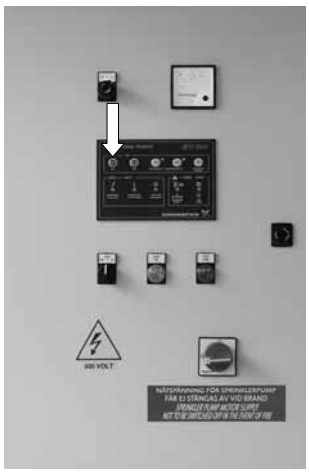
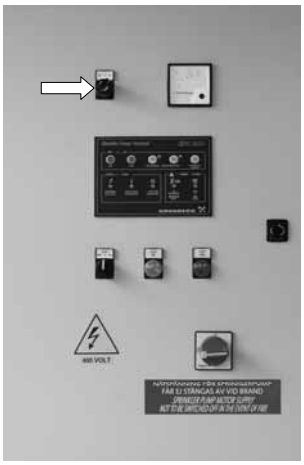
12.2.2 Main pump

Starting procedure

Step	Illustration
1. Turn the main switch to "I" position, if this has not already been done.	
2. Turn the selector switch for the main pump to "TEST" position by means of the key.	
3. Close the isolating valve on the discharge manifold. Open the ball valve for testing the pressure switches for the main pump.	
4. Start the pump manually by pressing the [Start] button. Press the button until the pump starts.	

Note: If the main pump does not start, see the indicator lights. See also section *15. Fault finding*.

Stopping procedure

Step	Illustration
1. Stop the main pump manually by pressing the [Stop] button.	
2. Turn the selector switch for the main pump to "AUT" position by means of the key.	
3. Close the ball valve for testing the pressure switches for the main pump.	
4. Open the isolating valve on the discharge manifold	

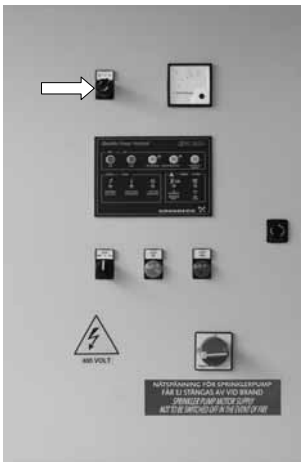
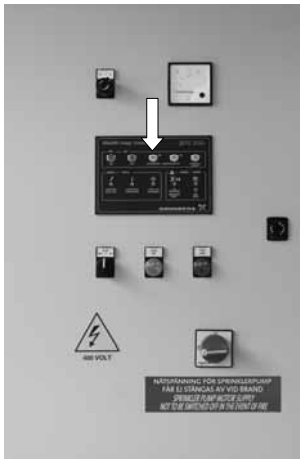
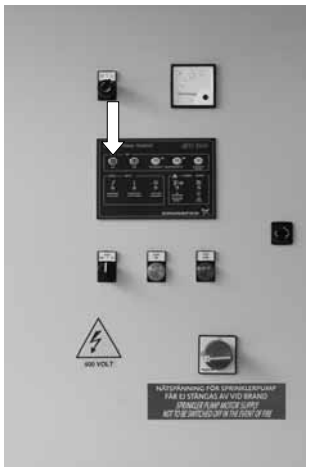
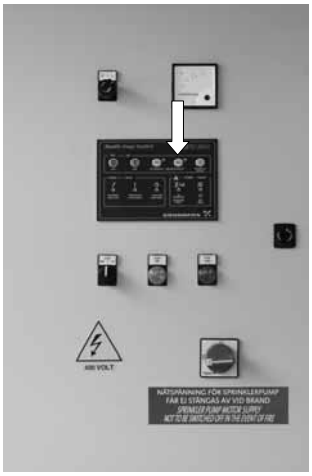
Note ***After stopping, the main pump is in automatic mode again.***

12.3 Test run

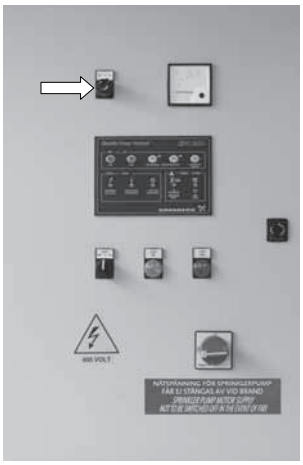
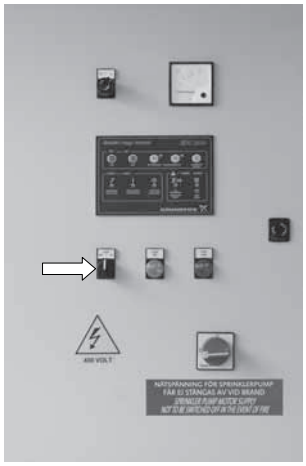
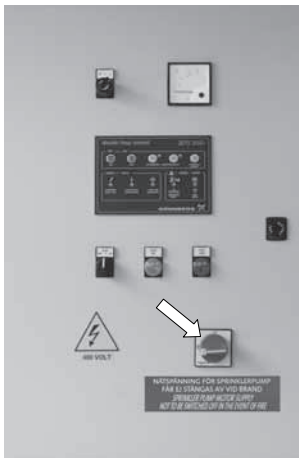
Caution

Do not leave the pump room during the test run. Observe all operating and fault indications as the main pump does not stop automatically in case of fault.

In this section the testing of the function of the two pressure switches for starting the main pump is described. To test the function of the jockey pump follow the procedure described in section *12.2.1 Jockey pump*.

Step	Illustration
1. Turn the selector switch for the main pump to "TEST" by means of the key.	
2. Close the isolating valve on the discharge manifold. Open the ball valve for testing the pressure switches for the main pump.	
3. Start the main pump by pressing the [P1] button.	
4. Stop the pump by pressing the [Stop] button.	
5. Start the main pump by pressing the [P2] button.	
6. Switch off the main pump again, as described in section *12.2.2 Main pump*.	

13. Shut down

Step	Illustration
1. Close the isolating valve on the discharge manifold.	
2. Close the isolating valve on the suction manifold.	
3. Turn the selector switch for the main pump to "O" position by means of the key.	
4. Turn the selector switch for the jockey pump to "O" position by means of the key.	
5. Turn the main switch to "O" position.	

If pumps are not used during periods of frost, they must be drained to avoid damage.

Drain the pump by loosing the air vent screw in the pump head and remove the drain plug from the base.

Do not tighten the air vent screw and replace the drain plug until the system is to be used again.

14. Maintenance

Warning

Maintenance work must be carried out by authorised personnel.

Only trained personnel are allowed to open the cabinet door.

Switch off the power supply before carrying out any maintenance work.

Note

The operator is responsible for ensuring that all maintenance, inspection and installation work is performed by qualified personnel. A regular maintenance plan will help avoid expensive repairs and contribute to trouble-free, reliable operation.

14.1 Pumps

Pump bearings and shaft seals are maintenance-free.

Keep motor cooling fins and fan blades clean to ensure sufficient cooling of the motor and electronics.

14.2 Control cabinet

Warning

Before opening the control cabinet, switch off the voltage supply via the main switch. Otherwise, there is a risk of death due to electric shock

The following maintenance work must be carried out regularly:

- Test indicator lights once a week.
- Check wire connections once a year.

To test the indicator lights of the control panel, press . See fig. 10. If an indicator light fails, please contact Grundfos.

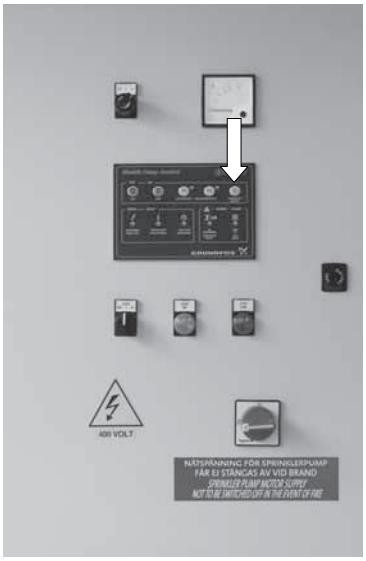


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Fig. 10 Indicator light test

Once a year, check all screw connections to the terminals and all earth connections to make sure they are tight. Any loose connections must be tightened. Check the cables for visible damage and replace, if necessary.

15. Fault finding

Warning

Only trained personnel are allowed to open the cabinet door.

Warning

Before removing the terminal box cover on the motor, opening the control cabinet or before any service work on the sprinkler pump system, the mains supply must be completely disconnected and it must be ensured that it cannot be accidentally connected again. To do this, turn the main switch to "OFF" position and lock it using a padlock.

Fault	Possible cause	Remedy
1. No power supply to controller.	a) Main switch in position "O". No indicator lights on.	Switch on the controller by means of the main switch.
	b) No mains voltage. No indicator lights on.	Check the cable and mains connection. Re-establish the power supply. See section *10.2 Electrical connection*.
	c) Main fuse F1 has tripped.	Cut in fuse F1.
	d) Other fuses have tripped.	Cut in the corresponding fuse.
	e) Phase failure in the electrical supply to the controller. "POWER SUPPLY" indicator light not on.	Connect the power supply correctly. See section *10.2 Electrical connection*.
2. Main pump does not start in automatic mode despite power supply.	a) Selector switch for main pump not in position "AUT"	Turn the selector switch to position "AUT"
	b) Pressure switches or cable to pressure switches defective. Pressure switches incorrectly connected.	Test the pressure switches and replace, if necessary. Check the pressure switch connection according to section *10.2 Electrical connection*.
	c) Defective controller. No indicator lights on.	Replace the controller.
	d) Motor of main pump defective. "START FAILURE" indicator light on.	Check and replace the motor of the main pump, if necessary.
	e) Fault in power supply to motor. "POWER SUPPLY FAILURE/NON AUTO" indicator light on.	Check the motor cable for damages. Check if the motor cable is connected correctly.
3. Main pump does not start in manual mode despite power supply.	a) Selector switch for main pump not in position "TEST".	Turn the selector switch for main pump to position "TEST".
	b) Defective controller. No indicator lights on.	Replace the controller.
	c) Motor of main pump defective. "START FAILURE" indicator light on.	Check and replace the motor of the main pump, if necessary.
	d) Fault in power supply to motor. "POWER SUPPLY FAILURE/NON AUTO" indicator light on.	Check the motor cable for damages. Check if the motor cable is connected correctly.
4. Main pump continues running although [Stop] has been pressed.	a) Selector switch for main pump has not been turned to position "TEST" before pressing [Stop] (applies only to automatic operation).	Turn the selector switch for main pump to position "TEST" before pressing [Stop].
5. Main pump is running, but the "PUMP RUNNING" indicator light is not on.	a) The extra pressure switch is not connected (terminal 12 and 13, NC) or there is no bridge between the two terminals.	Connect the extra pressure switch in the discharge line or mount a bridge with a cable between the terminals 12 and 13.
6. Jockey pump does not start in automatic mode despite power supply.	a) Selector switch for jockey pump not in position "AUT"	Turn the selector switch for jockey pump to position "AUT"
	b) Defective controller. No indicator lights on.	Replace the controller.
	c) Motor of jockey pump defective.	Check and replace the motor of the jockey pump, if necessary.
	d) Motor of jockey pump overheated due to dry running. "JOCKEY ALARM" indicator light on.	Check if all isolating valves are open and if the inlet pressure is sufficient.
	e) There is no pressure switch for dry run protection connected to terminal 53 and 54. Alternative no cable bridge is mounted.	Connect the pressure switch for dry run protection or mount a bridge with a cable between the terminals 53 and 54.

Fault	Possible cause	Remedy
7. Jockey pump does not start in manual mode despite power supply.	a) Selector switch for jockey pump not in position "MAN"	Turn the selector switch to position "MAN"
	b) Defective controller. No indicator lights on.	Replace the controller.
	c) Motor of jockey pump defective.	Check and replace the motor of the jockey pump, if necessary.
	d) Motor of jockey pump overheated due to dry running. "JOCKEY ALARM" indicator light on.	Check if all isolating valves are open and if the inlet pressure is sufficient.
	e) There is no pressure switch for dry run protection connected to terminal 53 and 54. Alternative no cable bridge is mounted.	Connect the pressure switch for dry run protection or mount a bridge with a cable between the terminals 53 and 54.
8. Main and/or jockey pump deliver(s) no or too little water.	a) Wrong direction of rotation.	Interchange two phases of the power supply.
	b) Inlet pressure too low.	Check the conditions on the suction side. See also section *7.3 Minimum inlet pressure*.
	c) Leakage in suction line.	Check and repair the suction line.
	d) Pump draws in air.	Check the inlet conditions and the gaskets in the suction line.
	e) Suction pipe/pump blocked by impurities.	Clean the suction line and/or the pumps.
9. Motor of the main and/or jockey pump is overheated or overloaded.	a) Isolating valve on the discharge manifold in closed position.	Open the isolating valve on the discharge valve.
	b) Pump blocked by impurities.	Clean the pump.
	c) Inlet pressure is too low.	Check the conditions on the suction side. See also section *7.3 Minimum inlet pressure*.
	d) Air in the suction pipe or pump.	Check the inlet conditions and the gaskets in the suction line.
	e) Motor runs on two phases.	Check the electrical connection.
10. Main and/or jockey pump make(s) too much noise. Pumps run unevenly and vibrates.	a) Inlet pressure too low (cavitation).	Check the conditions on the suction side. See also section *7.3 Minimum inlet pressure*.
	b) Air in suction pipe or pump.	Check the inlet conditions and the gaskets in the suction line.
	c) Foreign bodies in the pump.	Clean the pump.
	d) Pump does not rotate freely (frictional resistance) because of incorrect pump shaft position.	Adjust the pump shaft.
	e) Defective pump parts (motor fan, bearings, etc.)	Replace the pump or the defective pump parts.
11. Leaking shaft seal in main or jockey pump.	a) Shaft seal is defective.	Replace the shaft seal.
12. Main and/or jockey pump run(s) backwards after switching off.	a) Leakage in suction line.	Repair the suction line.
13. Very frequent starts and stops of the jockey pump.	a) Leakage in the discharge line or leaking sprinklers.	Check the discharge line and the sprinklers and replace defective parts, if necessary.
	b) Wrong setting of the pressure switch for the jockey pump.	Set the pressure switch correctly.
14. Unexpected start of the main pump.	a) Wrong setting of the pressure switches for the main pump.	Set the pressure switches correctly.
	b) Ball valves for testing the pressure switches in open position.	Close the ball valves for testing the pressure switches.

16. Service, accessories, spare parts

Note

Spare parts and accessories not supplied by Grundfos are not inspected or approved by Grundfos.

The installation and/or use of such products may negatively alter and thus impair specified properties of the pump set and the controller.

The usage of non-authorised spare parts and accessories renders any liability on behalf of Grundfos for resulting damages null and void.

Any malfunctions which cannot be repaired should only be corrected by Grundfos or authorised specialist companies.

Please provide an exact description in the event of a malfunction so that our service technician can prepare and provide the appropriate spare parts.

Please obtain the technical data for the pump set or controller from the nameplate.

17. Warranty

The warranty is governed by the framework of our general terms of delivery. Liability for any damage which is a result of errors during installation, electrical connection or incorrect use is excluded. Liability for consequential damage is excluded. The start of the warranty period is to be verified.

18. Disposal

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

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