Grundfos MixiMizer®

Pumps incorporating the (MR) Mixing Reset Control with date code 0718 or higher

Installation and operating instructions

UL LISTED

Return and supply temp. sensors, outdoor air temp. sensor

UP 15 pump, return and supply temp. sensors
Original installation and operating instructions.

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

Warning
This product may be used by children aged 8 years and above as well as persons with reduced physical, sensory or mental capabilities or lack of experience with and knowledge of the product, provided that they are under supervision or have been given clear instructions concerning the safe use of the product.
Such persons must also understand the hazards involved in the use of the product.
Never allow children to play with the product.
Cleaning and user maintenance must not be carried out by children or persons with reduced physical, sensory or mental capabilities without proper supervision.
1. Limited warranty

Products manufactured by Grundfos Pumps Corporation (Grundfos) are warranted to the original user only to be free of defects in material and workmanship for a period of 24 months from date of installation, but not more than 30 months from date of manufacture. Grundfos’ liability under this warranty shall be limited to repairing or replacing at Grundfos' option, without charge, F.O.B. Grundfos' factory or authorized service station, any product of Grundfos manufacture. Grundfos will not be liable for any costs of removal, installation, transportation, or any other charges which may arise in connection with a warranty claim. Products which are sold but not manufactured by Grundfos are subject to the warranty provided by the manufacturer of said products and not by Grundfos' warranty. Grundfos will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, or if the product was not installed or followed by Grundfos’ printed installation and operation instructions.

To obtain service under this warranty, the defective product must be returned to the distributor or dealer of Grundfos products from which it was purchased together with proof of purchase and installation date, failure date, and supporting installation data. Unless otherwise provided, the distributor or dealer will contact the Grundfos factory or authorized service station for instructions. Any defective product to be returned to the factory or service station must be sent freight prepaid; documentation supporting the warranty claim and/or a Return Authorization must be included if so instructed. GRUNDFOS WILL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, OR EXPENSES ARISING FROM INSTALLATION, USE, OR ANY OTHER CAUSES. THERE ARE NO EXPRESS OR IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH EXTEND BEYOND THOSE WARRANTIES DESCRIBED OR REFERRED TO ABOVE.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages and some jurisdictions do not allow limitations on how long implied warranties may last. Therefore, the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

2. 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.

3. Product introduction

3.1 Introduction

Hot water heating systems can now be accurately and comfortably controlled by modulating the hot water supply. As the outdoor temperature changes, your Grundfos MixiMizer® will automatically calculate the pump speed required to ensure proper water temperature for your heating system.

Grundfos pumps are carefully inspected and tested before shipment. This pump should provide long, efficient, trouble-free performance. To ensure maximum performance and reliability, please follow the simple instructions in this manual.
3.2 Delivery and handling

3.2.1 Shipment inspection
Examine the components carefully to make sure no damage has occurred to the pump during shipment.

**Caution** Do not drop or mishandle the pump; dropping will damage the pump.

Grundfos MixiMizer® injection pump package includes the following:
- one Grundfos UP15-42 MixiMizer® pump with integral control
- two water temperature sensors (supply and return), pre-wired into control box with 8 ft (2.4 m) (each) of wire
- one 6 ft (1.8 m) line cord with 115 V plug, pre-wired into control box
- one outdoor air temperature sensor (OATS)
- two flange gaskets
- installation and operating instructions
- four sensor (supply and return) cable ties.

3.3 Applications

**Caution** The pump is for indoor use only.

The Grundfos UP 15-42 MixiMizer® is a fully integrated injection mixing pump utilizing indoor/outdoor control.

Appropriate water temperature is supplied by the mixing loop through adjustments in pump speed based on outdoor temperature and supply/return piping sensors.

Equipped with a weather responsive controller, also known as indoor/outdoor controller or reset controller, the MixiMizer® automatically calculates and controls water temperatures according to outdoor temperatures in primary/secondary piping systems.

For maximum design flexibility, the MixiMizer® can be integrated into a thermostat or zoning control system.

3.4 Pumped liquids

**Warning** The pump must not be used for the transfer of flammable liquids such as diesel oil, gasoline, and similar liquids.

Pump not for pool or marine use.

This Grundfos UP15-42 MixiMizer® pump is intended for pumping clean, thin, non-aggressive and non-explosive liquids, not containing solid particles, fibers or mineral oils.

3.5 Features and benefits
- Variable speed
- system supply-temperature sensor 140 °F (60 °C) max.
- boiler return-temperature sensor 135 °F (57 °C) min.
- heating curve can be adjusted by 5 °F in parallel
- pump exercising every three days of no operation.

3.6 Identification

3.6.1 Nameplate

- Circulator
- 115 V
- 1 PH
- 60 Hz
- 10 µF
- P/N: XXXXXXXX
- PC  XX XX
- I1/1 (A) P1 (W)
- .74 85  -
- MAX FLUID TEMP. 230F

**Fig. 1** Nameplate

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Circulator</td>
</tr>
<tr>
<td>2</td>
<td>Pump type</td>
</tr>
<tr>
<td>3</td>
<td>Voltage</td>
</tr>
<tr>
<td>4</td>
<td>Frequency</td>
</tr>
<tr>
<td>5</td>
<td>Capacitor</td>
</tr>
<tr>
<td>6</td>
<td>Single-phase</td>
</tr>
<tr>
<td>7</td>
<td>Power</td>
</tr>
<tr>
<td>8</td>
<td>Current</td>
</tr>
<tr>
<td>9</td>
<td>Approval</td>
</tr>
<tr>
<td>10</td>
<td>Product number</td>
</tr>
<tr>
<td>11</td>
<td>Production code (year, week)</td>
</tr>
<tr>
<td>12</td>
<td>Country of origin</td>
</tr>
<tr>
<td>13</td>
<td>Insulation class</td>
</tr>
<tr>
<td>14</td>
<td>Impedance-protected</td>
</tr>
<tr>
<td>15</td>
<td>Maximum liquid temperature</td>
</tr>
</tbody>
</table>
4. Operating conditions

All minimum and maximum settings are operating, not safety limits. Necessary auxiliary equipment and safety devices must be added.

- The boiler return minimum temperature is fixed at 135 °F (57 °C). This function can be disabled via a DIP switch.
- The system supply maximum temperature is fixed at 140 °F (60 °C). This function can be disabled via a DIP switch.
- Heating curve parallel shift: The heating curve can be shifted 5 °F parallel to the default curve. This function can be enabled via the DIP switch.
- Pump exercising: After every three days of no operation, the controller will exercise the pump for 10 seconds. The "% of pump performance" LED will be on during exercising.
- Post purge: A 20-second post purge is available once the demand for heat ceases or controller enters warm weather shutdown (WWSD). The purging is performed using the last speed used.
- As speed varies, the controller flashes the "% of pump performance" LED On for 0.25 seconds and Off for 0.25 to 2.5 seconds.
- A 2-second delay from demand arises until the pump is actually started prevents issues with a noisy demand relay signal.
- Optional boiler on/off output is activated when the pump speed is raised to the boiler-enable percentage (30 % pump speed) and deactivated when the pump speed falls to 50 % of the boiler-enable percentage (15 % pump speed). The boiler-enable relay has a minimum activation time of 3 minutes and a minimum deactivation time of 20 seconds.
- Optional zone control input: The unit can accept an external "Call-For-Heat" input signal. This must be a powered signal (20 to 30 VAC 1 VA). This function can be enabled via a DIP switch.
- Warm weather shutdown (WWSD): When the outdoor air temperature is higher than 70 °F (21 °C) (with ± 1 °F (1.8 °C) hysteresis), the unit will shut down until the temperature drops below 70 °F (21 °C).

5. Installation

Note
All minimum and maximum settings are operating, not safety limits. Necessary auxiliary equipment and safety devices must be added.

Warning
Read all installation instructions including section 5.2 Electrical installation before installing the pump.

Warning
When installing this pump, always follow basic safety precautions and any federal, state, and local requirements.

Note
All minimum and maximum settings are operating, not safety limits. Necessary auxiliary equipment and safety devices must be added.

Consult piping manufacturers for material selection before installing this pump. Absence of pumped liquid may damage some piping materials.

Caution
Thoroughly clean and flush the system prior to pump installation.
5.1 Mechanical installation

Variable-speed injection systems require complete isolation between the boiler loop and system loop.

For example, when the injection pump is turned off, there must be no heat transfer from the boiler loop to the system loop. In order to avoid this unwanted heat transfer, review standard primary-secondary piping techniques described below. See fig. 1.

---

**Fig. 1** Injection loop without thermal trap

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Important notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The injection piping (supply and return) must be at least one pipe diameter smaller than the piping of the boiler and system loops.</td>
</tr>
<tr>
<td>2</td>
<td>There must be a maximum of 4 pipe diameters between the tees in the boiler and system loops in order to prevent ghost flows when the variable speed injection pump is off and either the boiler pump or system pump is on.</td>
</tr>
<tr>
<td>3</td>
<td>There must be at least 6 pipe diameters of straight pipe on either side of the tees in order to prevent momentum of water in the boiler and system loops from pushing flow through the injection loop.</td>
</tr>
<tr>
<td>4</td>
<td>To prevent convective heat transfer through the injection loop, there should be a minimum of 1 ft (0.3 m) drop to create a thermal trap.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design injection flow rate [gpm (lpm)]</th>
<th>Nominal injection pipe dia. [in. (mm)]</th>
<th>MixiMizer® pump type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 (0-19)</td>
<td>1/2 (12.7)</td>
<td>BUC5/MR*</td>
</tr>
<tr>
<td>0-8 (0-30)</td>
<td>3/4 (19.0)</td>
<td>BUC5/MR</td>
</tr>
<tr>
<td>0-16 (0-60)</td>
<td>1 (25.4)</td>
<td>BUC7/MR*</td>
</tr>
</tbody>
</table>

* Warning: Can produce flow velocity greater than 8 ft/sec in this size.
5.1.1 Pump mounting
Arrows on the side or bottom of the pump housing indicate direction of flow through the pump. Grundfos MixiMizer® pumps can be installed in both vertical and horizontal lines. Direction of flow should be from the boiler loop into the system loop.

The pump must be installed with the motor shaft positioned horizontally. Under no circumstances should the pump be installed with the shaft vertical or where the shaft falls below the horizontal plane. See fig. 2.

Fig. 2  Pump installation positions

5.1.2 Terminal box position
Preferred installation of the pump will have the terminal box located to one side of the pump or the other, with the conduit entry down.

If the terminal box position needs to be changed, ensure that the power supply is turned off and close the isolating valves before removing the hex socket head screws.

To change terminal box position:
1. Remove the four (4) hex socket head screws (4 or 5 mm wrench) while supporting the stator (motor).
2. Carefully separate the stator from the pump housing and rotate it to the correct terminal box orientation and refit it.
3. Replace the hex socket head screws and tighten diagonally and evenly (7 ft-lb. torque).
4. Check that the motor shaft turns freely. Remove the large screw in the middle of the nameplate, insert a small flat blade screwdriver into the end of the shaft, and turn gently.

If the shaft does not turn easily, repeat the disassembly/reassembly process.

5.2 Electrical installation
When installing and using this electrical equipment, always follow basic safety precautions and local code requirements, including the following:

Warning
The installer must ensure that this controller and its wiring are isolated and/or shielded from strong sources of electromagnetic noise. Conversely, this Class B digital apparatus complies with Part 15 of the FCC Rules and meets all requirements of the Canadian Interference-Causing Equipment Regulations. However, if this controller does cause harmful interference to radio or television reception, which can be determined by turning the controller off and on, the user is encouraged to try to correct the interference by reorienting or relocating the receiving antenna, relocating the receiver with respect to this controller, and/or connecting the controller to a different circuit from that to which the receiver is connected.

Warning
The non-metallic outdoor air temperature sensor (OATS) and pump control box enclosures do not provide grounding between conduit connections.

Use grounding type bushings and jumper wires.

Warning
Improper installation and operation of this controller could result in damage to the equipment and possibly even personal injury. It is your responsibility to ensure that this controller is safely installed according to all applicable codes and standards. This electronic controller is not intended for use as a primary limit control.

Other controllers that are intended and certified as safety limits must be placed into the control circuit.
6. Sensor installation

Warning
All electrical work should be performed by a qualified electrician in accordance with the national, state, and local regulations and accepted codes of good practice.

Warning
All field wiring must pass through a suitable, listed conduit fitting, to ensure proper strain relief.

Warning
All field wiring should meet or exceed requirements for class 2 wiring per Article 725 of the National Electrical Code rated at 30 VAC 250 VA.

Ensure that enough wiring is in the control box to reach the terminal block.

All field wiring must have insulation stripped exposing 0.24 in. (6.0 mm) of conductor before placement into control box terminal block.

6.1 Outdoor air temperature sensor (OATS)

The outdoor air temperature sensor includes a built-in 10 kW (ohm) thermistor which provides an accurate measurement of the outdoor temperature. The OATS is protected by a white UV-resistant PVC plastic enclosure. See fig. 3 and fig. 4 and section 6.1.1 Mounting OATS.

Fig. 3 Closed OATS

Fig. 4 Open OATS

Warning
All field wiring must be low voltage. Power for the controller is provided through the power cord supplying power to the pump. Use copper conductors only. Disconnect all power sources prior to servicing.

Warning
Risk of electric shock: This pump is supplied with a grounding conductor and grounding-type attachment plug. To reduce the risk of electric shock, be certain that it is connected only to a properly grounded, grounding type receptacle. The safe operation of this pump requires that it be grounded in accordance with the National Electrical Code and local governing codes and regulations.

Warning
All field wiring must be low voltage. Power for the controller is provided through the power cord supplying power to the pump. Use copper conductors only. Disconnect all power sources prior to servicing.

6.1.1 Mounting OATS

- Remove the screw and pull the front cover off the sensor enclosure.
- The OATS can either be mounted directly onto a wall or in a 2 x 4" electrical box. When the OATS is wall mounted, the wiring should enter through the back or bottom of the enclosure. Do not mount the OATS with the conduit knockout facing upwards as rain could enter the enclosure and damage the sensor. See fig. 5.

Fig. 5 Mounting the open OATS
• In order to prevent heat transmitted through the wall from affecting the sensor reading, it may be necessary to install an insulating barrier behind the OATS enclosure.

• The OATS should be mounted on a wall which best represents the heat load on the building (a northern wall for most buildings or a southern facing wall for buildings with large south facing glass areas). The OATS should not be exposed to heat sources such as ventilation or window openings. The OATS should be installed at an elevation above the ground that will prevent accidental damage or tampering.

• Install field wiring from the OATS mounting location to the control box for the control wiring. Do not run field wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference (EMI), use a shielded cable or a twisted-pair cable. If you use a shielded cable, connect the screen to the Com (-) terminal in the controller and not to ground.

• Connect the two field wires from the OATS directly to the control box "Com (-)" and "Os/V" (not polar sensitive) terminals. See fig. 10.

6.2 Water temperature sensors (supply and return)
The water temperature sensor has a zinc sleeve for quick response, a wide operating range, and is factory pre-wired. See fig. 6.

**Note**

Sensors are designed to be mounted on a pipe or in a temperature immersion well.

• The sensor can be strapped directly to the pipe using the cable tie provided. Place insulation around the sensor to reduce the effect of air currents on the sensor measurement. See fig. 7.

• Place the sensor downstream of a pump or after an elbow or similar fitting. This is especially important if large-diameter pipes are used as the thermal stratification within the pipe can result in erroneous sensor readings. Proper sensor location requires that the liquid is thoroughly mixed within the pipe before it reaches the sensor.

• Each sensor is provided with a label. One sensor is the return sensor (fig. 8), and one is the supply sensor (fig. 9). Mount the return sensor to the return piping of the boiler loop. Mount the supply sensor to supply piping of the system loop.

![Mounted sensor](image)

![Return sensor label](image)

![Supply sensor label](image)
6.3 Optional boiler on/off output

The boiler terminals will activate the boiler when the pump is ramped up to the boiler-enable percentage (30 %) and is shut off when the pump is ramped down to 50 % of the boiler-enable percentage. The boiler-enable function includes a minimum "ON" time of 3 minutes and a minimum "OFF" time of 20 seconds. Connect field wiring to the control box terminals Boil & Boil (not polar sensitive). See fig. 10.

6.4 Optional zone control input

Connect field wiring 24 V (AC) power supply or heat demand to control box terminals "DEM" and "DEM" (not polar sensitive). See fig. 10.

---

**Fig. 10**  UP 15-42 MixiMizer® electrical connections

- **Optional boiler On/Off output**
- **Outside temperature sensor**
- **Sensor supply**
- **Return sensor**
- **Optional zone control input**

*Use copper conductors only*

*Signal wires must be min. 300 V rating*

*Class 2 only*
7. Operation

7.1 Settings

7.1.1 DIP switch settings

Fig. 11 Dip switches

<table>
<thead>
<tr>
<th>Switch</th>
<th>ON</th>
<th>OFF</th>
<th>DEFAULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Permanent demand</td>
<td>External demand</td>
<td>Permanent demand</td>
</tr>
<tr>
<td>B</td>
<td>Max. system supply set at 140 °F (60 °C)</td>
<td>Max. system supply feature is Off</td>
<td>ON position</td>
</tr>
<tr>
<td>C</td>
<td>Boiler return minimum set</td>
<td>Boiler return minimum feature at 135 °F (57 °C)</td>
<td>ON position</td>
</tr>
<tr>
<td>D</td>
<td>Starting temp. 70 °F (21 °C)</td>
<td>Starting temp. 75 °F (23 °C)</td>
<td>No shift</td>
</tr>
</tbody>
</table>

7.1.2 Heating curve dial setpoint

Before adjusting the dial settings, read through the sequence of operation to ensure that you understand how this control function works.

Fig. 12 Heating curve dial

The heating curve setting determines the how many degrees the supply water temperature will be raised for each one degree drop in outdoor temperature. The heating curve dial position can be calculated as in the following example.

**Example: Heating curve dial setpoint**

System design temperature = 120 °F (48 °C)

Outdoor design temperature = 10 °F (-12 °C)

Warm weather shutdown (WWSD) = 70 °F (21 °C)

Dial setpoint* = \[
\frac{120 - 70 \, ^\circ F}{70 - 10 \, ^\circ F} = \frac{48 - 21 \, ^\circ C}{21 - (-12) \, ^\circ C}
\]

= Dial setpoint of 0.8*

* See fig. 13.
Fig. 13  Heating curve

Heating curve table - dial setpoint
(warm weather shutdown = 70 °F / 21 °C)

<table>
<thead>
<tr>
<th>Outdoor design temperature [°F (°C)]</th>
<th>80 (26.6)</th>
<th>90 (32.2)</th>
<th>100 (37.7)</th>
<th>110 (43.3)</th>
<th>120 (48.8)</th>
<th>130 (54.4)</th>
<th>140 (60)</th>
<th>150 (65.5)</th>
<th>160 (71.1)</th>
<th>170 (76.6)</th>
<th>180 (82.2)</th>
<th>190 (87.7)</th>
<th>200 (93.3)</th>
<th>210 (98.8)</th>
<th>220 (104.4)</th>
<th>230 (110)</th>
</tr>
</thead>
<tbody>
<tr>
<td>System design temperature [°F (°C)]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 (15.5)</td>
<td>1.0</td>
<td>2.0</td>
<td>3.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 (10)</td>
<td>0.5</td>
<td>1.0</td>
<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
<td>3.0</td>
<td>3.5</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 (4.4)</td>
<td>0.3</td>
<td>0.7</td>
<td>1.0</td>
<td>1.3</td>
<td>1.7</td>
<td>2.0</td>
<td>2.3</td>
<td>2.7</td>
<td>3.0</td>
<td>3.3</td>
<td>3.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 (-1.1)</td>
<td>0.3</td>
<td>0.5</td>
<td>0.8</td>
<td>1.0</td>
<td>1.3</td>
<td>1.5</td>
<td>1.8</td>
<td>2.0</td>
<td>2.3</td>
<td>2.5</td>
<td>2.8</td>
<td>3.0</td>
<td>3.3</td>
<td>3.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 (-6.6)</td>
<td>0.2</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>1.0</td>
<td>1.2</td>
<td>1.4</td>
<td>1.6</td>
<td>1.8</td>
<td>2.0</td>
<td>2.2</td>
<td>2.4</td>
<td>2.6</td>
<td>2.8</td>
<td>3.0</td>
<td>3.2</td>
</tr>
<tr>
<td>10 (-12.2)</td>
<td>0.2</td>
<td>0.3</td>
<td>0.5</td>
<td>0.7</td>
<td>0.8</td>
<td>1.0</td>
<td>1.2</td>
<td>1.3</td>
<td>1.5</td>
<td>1.7</td>
<td>1.8</td>
<td>2.0</td>
<td>2.2</td>
<td>2.3</td>
<td>2.5</td>
<td>2.7</td>
</tr>
<tr>
<td>0 (-17.7)</td>
<td>0.1</td>
<td>0.3</td>
<td>0.4</td>
<td>0.6</td>
<td>0.7</td>
<td>0.9</td>
<td>1.0</td>
<td>1.1</td>
<td>1.3</td>
<td>1.4</td>
<td>1.6</td>
<td>1.7</td>
<td>1.9</td>
<td>2.0</td>
<td>2.1</td>
<td>2.3</td>
</tr>
<tr>
<td>-10 (-23.3)</td>
<td>0.1</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>0.9</td>
<td>1.0</td>
<td>1.1</td>
<td>1.3</td>
<td>1.4</td>
<td>1.5</td>
<td>1.6</td>
<td>1.8</td>
<td>1.9</td>
<td>2.0</td>
</tr>
<tr>
<td>-20 (-28.8)</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.6</td>
<td>0.7</td>
<td>0.8</td>
<td>0.9</td>
<td>1.0</td>
<td>1.1</td>
<td>1.2</td>
<td>1.3</td>
<td>1.4</td>
<td>1.6</td>
<td>1.7</td>
<td>1.8</td>
</tr>
</tbody>
</table>
7.2 Startup

*Do not start the pump until the system has been filled, flushed, properly vented, and checked for leaks.*

- Ensure that water does not enter the terminal box during the installation process.
- Do not use the pump to vent the system. Install additional ventilation for system purging.
- Never let the pump run dry. The bearings require water lubrication and will be damaged otherwise.
- Fill system with water. This will result in immediate lubrication of the bearings.
- When control installation is complete, operate the pump for 5 minutes to purge remaining air from the bearing chamber. This is especially important when installing the pump during the off-season.

7.3 Performance indicator LEDs

![Fig. 14 Performance indicator LED's](image)

- **Power On (Green):** Indicates that power is turned on.
- **% of Pump Perf. (Yellow):** Indicates the speed of the pump by flashing at different rates.
- **Call for Heat (Green):** External device requesting heat from system.
- **Pump Perf. Reduced (Yellow):** Indicates that pump speed is limited due to protection limits.
- **Boiler (Green):** Boiler activated for operation.
8. Fault finding

Whenever a fault is detected in any of the sensors, the control LEDs will flash in a specific way, to indicate the location of the problem, and the control will assume a specific operating condition.

1. Call-for-Heat LED is flashing (see fig. 15)
   a) There is a short or open circuit to the OATS,
   b) and the controller assumes an outdoor temperature of 30 °F (-1 °C)

2. Pump-Perf.-Reduced LED is flashing (see fig. 16)
   a) There is a short or open circuit to the supply sensor,
   b) and the controller runs pump at 10 % and activates boiler protection, if enabled

3. Call-for-Heat and Pump-Perf.-Reduced LEDs are flashing (see fig. 17)
   a) There is a short or open circuit to boiler return sensor
   b) Boiler protection is disabled

---

![Fig. 15 Indicator light (Call for Heat)](image1.png)

![Fig. 16 Indicator light (Pump Perf. Reduced)](image2.png)

![Fig. 17 Indicator lights (Call for Heat and Pump Perf. Reduced)](image3.png)
8.1 Testing sensors

**Warning**

*During testing all wires to the control box must be disconnected.*

8.1.1 Testing outdoor air temperature sensor (OATS)

1. Measure the ambient air temperature next to the OATS.
2. Disconnect all field wiring from the OATS.
3. Measure the resistance (ohms) directly at the OATS location, convert ohms reading to temperature. See section 8.4.2 OATS / return sensor / supply sensor temperature resistance chart.
4. Compare ambient air temperature to the measured sensor resistance.
   Both temperatures should be close +/- 10%.
   See section 8.4.2 OATS / return sensor / supply sensor temperature resistance chart.

8.2 Testing supply and return sensors

1. Disconnect sensor wiring from control box.
2. Measure the resistance (ohms) of the supply sensor and then the return sensor (wires have no polarity). See section 8.4.2 OATS / return sensor / supply sensor temperature resistance chart.
3. Compare liquid temperature to table in section 8.4.2 OATS / return sensor / supply sensor temperature resistance chart.
   Both temperatures should be close +/- 10%.

8.3 Possible reasons for short circuit

- Water in the OATS housing
- Nail or staple in field wiring.

8.4 Possible reasons for open circuit

- Sensor wire insulation has been damaged.
- Sensor is disconnected.
- Sensor insulation is interfering with sensor at the pipe location.
- Faulty sensor.

8.4.1 Test the power supply or heat demand

Make sure exposed wires and bare terminals are not in contact with other wires or grounded surfaces. Turn on the power or provide a heat demand and measure the voltage across the leads. The voltmeter should read between plus and minus 4 V of the supplied voltage.
8.4.2 OATS / return sensor / supply sensor temperature resistance chart

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Resistance</th>
<th>Temperature</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>[°F]</td>
<td>[°C]</td>
<td>[Ω]</td>
<td>[°F]</td>
</tr>
<tr>
<td>-50</td>
<td>-46</td>
<td>490,813</td>
<td>90</td>
</tr>
<tr>
<td>-45</td>
<td>-43</td>
<td>405,710</td>
<td>95</td>
</tr>
<tr>
<td>-40</td>
<td>-40</td>
<td>336,606</td>
<td>100</td>
</tr>
<tr>
<td>-35</td>
<td>-37</td>
<td>280,279</td>
<td>105</td>
</tr>
<tr>
<td>-30</td>
<td>-34</td>
<td>234,196</td>
<td>110</td>
</tr>
<tr>
<td>-25</td>
<td>-32</td>
<td>196,358</td>
<td>115</td>
</tr>
<tr>
<td>-20</td>
<td>-29</td>
<td>165,180</td>
<td>120</td>
</tr>
<tr>
<td>-15</td>
<td>-26</td>
<td>139,402</td>
<td>125</td>
</tr>
<tr>
<td>-10</td>
<td>-23</td>
<td>118,018</td>
<td>130</td>
</tr>
<tr>
<td>-5</td>
<td>-21</td>
<td>100,221</td>
<td>135</td>
</tr>
<tr>
<td>0</td>
<td>-18</td>
<td>85,362</td>
<td>140</td>
</tr>
<tr>
<td>5</td>
<td>-15</td>
<td>72,918</td>
<td>145</td>
</tr>
<tr>
<td>10</td>
<td>-12</td>
<td>62,465</td>
<td>150</td>
</tr>
<tr>
<td>15</td>
<td>-9</td>
<td>53,658</td>
<td>155</td>
</tr>
<tr>
<td>20</td>
<td>-7</td>
<td>46,218</td>
<td>160</td>
</tr>
<tr>
<td>25</td>
<td>-4</td>
<td>39,913</td>
<td>165</td>
</tr>
<tr>
<td>30</td>
<td>-1</td>
<td>34,558</td>
<td>170</td>
</tr>
<tr>
<td>35</td>
<td>2</td>
<td>29,996</td>
<td>175</td>
</tr>
<tr>
<td>40</td>
<td>4</td>
<td>26,099</td>
<td>180</td>
</tr>
<tr>
<td>45</td>
<td>7</td>
<td>22,763</td>
<td>185</td>
</tr>
<tr>
<td>50</td>
<td>10</td>
<td>19,900</td>
<td>190</td>
</tr>
<tr>
<td>55</td>
<td>13</td>
<td>17,436</td>
<td>195</td>
</tr>
<tr>
<td>60</td>
<td>16</td>
<td>15,311</td>
<td>200</td>
</tr>
<tr>
<td>65</td>
<td>18</td>
<td>13,474</td>
<td>205</td>
</tr>
<tr>
<td>70</td>
<td>21</td>
<td>11,883</td>
<td>210</td>
</tr>
<tr>
<td>75</td>
<td>24</td>
<td>10,501</td>
<td>215</td>
</tr>
<tr>
<td>80</td>
<td>27</td>
<td>9,299</td>
<td>220</td>
</tr>
<tr>
<td>85</td>
<td>29</td>
<td>8,250</td>
<td>225</td>
</tr>
</tbody>
</table>

9. Maintenance and service

9.1 Summer/warm weather testing

When the outdoor temperature is higher than 70 °F (21 °C) and the warm weather shutdown (WWSD) feature is active, the pump will normally not be in operation. To test the pump, disconnect one of the wires from the air temperature sensor in the control box. This will simulate an open circuit in the outdoor sensor and the controller will assume an outdoor temperature of 30 °F (-1 °C). This will allow the pump to operate for testing and/or service. Remember to reconnect the outdoor temperature sensor wire when finished.
## 10. Technical data

### 10.1 MixiMizer® technical data

<table>
<thead>
<tr>
<th>Max. ambient temperature</th>
<th>107 °F (42 °C) with control box vertical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>105 °F (41 °C) with control box on top of pump and horizontal</td>
</tr>
</tbody>
</table>

**Outdoor air temperature sensor**

<table>
<thead>
<tr>
<th>Terminals:</th>
<th>Out/V &amp; Com (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input:</td>
<td>5 V DC +/- 5 % max.</td>
</tr>
<tr>
<td>Output:</td>
<td>0.166 mA DC +/- 5 % max.</td>
</tr>
</tbody>
</table>

| Operating range:      | -67 to 149 °F (-55 to 65 °C) |

| Sensor:               | NTC thermistor, 10 Ohms @ 77 °F (25 °C +/- 0.2 °C), B = 3892 |

| Enclosure:            | White, UV resistant, PVC, NEMA 1 |

**Control box**

| Input voltage:        | 120 V +/- 10 %, 50/60 Hz, 250 VA |
| Output rating:        | 1.8 A, 1/12 Hp |

**Supply and return temperature sensors**

<table>
<thead>
<tr>
<th>Terminals:</th>
<th>(Sup &amp; Com) (Ret/I &amp; Com)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input:</td>
<td>5 V DC +/- 5 % max.</td>
</tr>
<tr>
<td>Output:</td>
<td>0.166 mA DC +/- 5 % max.</td>
</tr>
</tbody>
</table>

| Operating range:      | 14 to 266 °F (-10 to 130 °C) |

| Sensor:               | NTC thermistor, 10 Ohms @ 77 °F (25 °C +/- 0.2 °C), B = 3892 |

| Wire:                 | 8 ft (2.43 m), 300 V, UL2722, PVC insulation, 221 °F (105 °C) |

**Optional boiler On/Off output**

<table>
<thead>
<tr>
<th>Terminals:</th>
<th>Boil and Boil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input:</td>
<td>30 VAC</td>
</tr>
<tr>
<td>Output:</td>
<td>2.5 amp pilot duty</td>
</tr>
</tbody>
</table>

**Optional zone control input**

<table>
<thead>
<tr>
<th>Terminals:</th>
<th>Dem and Dem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input:</td>
<td>20-30 VAC</td>
</tr>
<tr>
<td>Output:</td>
<td>0.1 VA max.</td>
</tr>
</tbody>
</table>
10.2 UP 15 pump technical data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. working pressure</td>
<td>145 psi (10 bar)</td>
</tr>
<tr>
<td>Min. inlet pressure</td>
<td>5 psi (0.34 bar)</td>
</tr>
<tr>
<td>Integrated check valve</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Connection</th>
<th>Flow range [gal/min. (l/min.)]</th>
<th>Head range [ft (m)]</th>
<th>Motor</th>
<th>Amps</th>
<th>Watts</th>
<th>Hp (kW)</th>
<th>Max. liquid temperature</th>
<th>Volute material</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP15-42FC/MR</td>
<td>GF 15/26 flange - (2) 1/2&quot; diameter bolt holes</td>
<td>0-9 (0-34)</td>
<td>0-14 (0 - 4.26)</td>
<td>2-pole, single-phase</td>
<td>0.74</td>
<td>85</td>
<td>1/25 (0.03)</td>
<td>205 °F (96 °C)</td>
<td>Cast iron</td>
</tr>
<tr>
<td>UP15-42BUCX/MR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Silicon bronze</td>
</tr>
<tr>
<td>BUC5:</td>
<td></td>
<td>0 - 8.5 (0 - 32)</td>
<td>0 - 14.5 (0 - 4.42)</td>
<td>2-pole, single-phase</td>
<td>0.74</td>
<td>85</td>
<td>1/25 (0.03)</td>
<td>205 °F (96 °C)</td>
<td>Silicon bronze</td>
</tr>
<tr>
<td>BUC7:</td>
<td></td>
<td>0-6 (0 - 60.56)</td>
<td>0-15 (0 - 4.57)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. Approvals

- UP 15 pump cULus Listed
- Supply and return temp. sensors cULus Listed, cCSAus
- Outdoor air temp. sensor cCSAus

12. 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.

Subject to alterations.