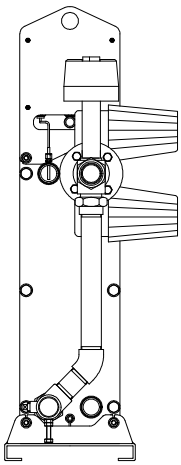
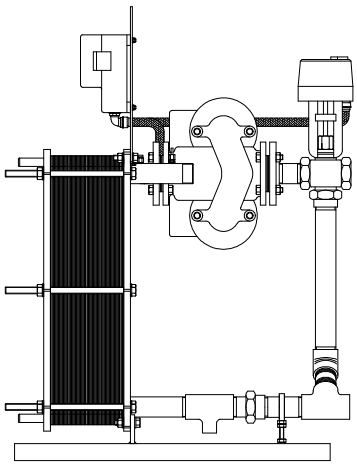
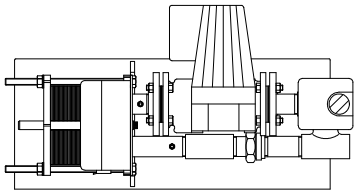
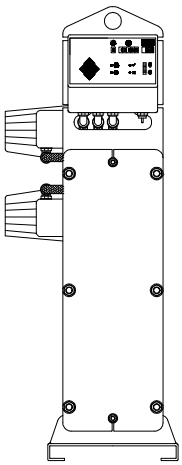
# Rycroft HT Breeze

## Operating and Maintenance Manual









**CP002. V3**

# VERY IMPORTANT – PLEASE READ CAREFULLY

# 1. RUNNING

## 1.1 Safety Points

- **During operation the unit may have very hot or very cold surfaces.**

- **The temperature probe is installed directly in the secondary flow. Do not remove when the system is hot, full or under any pressure.**

- **The equipment has danger from electricity. Do not remove covers or allow any exposed live parts. Isolate before working on the unit.**

- **Take care when lifting, only use the designated lifting point. Use only certified lifting equipment capable of lifting the weight. Water may also be present and spillage occur.**

- **Never Lift the Rycroft HT Breeze by it's pipework, or pipe connections.**

- **Take care when handling as some of the edges may be sharp.**

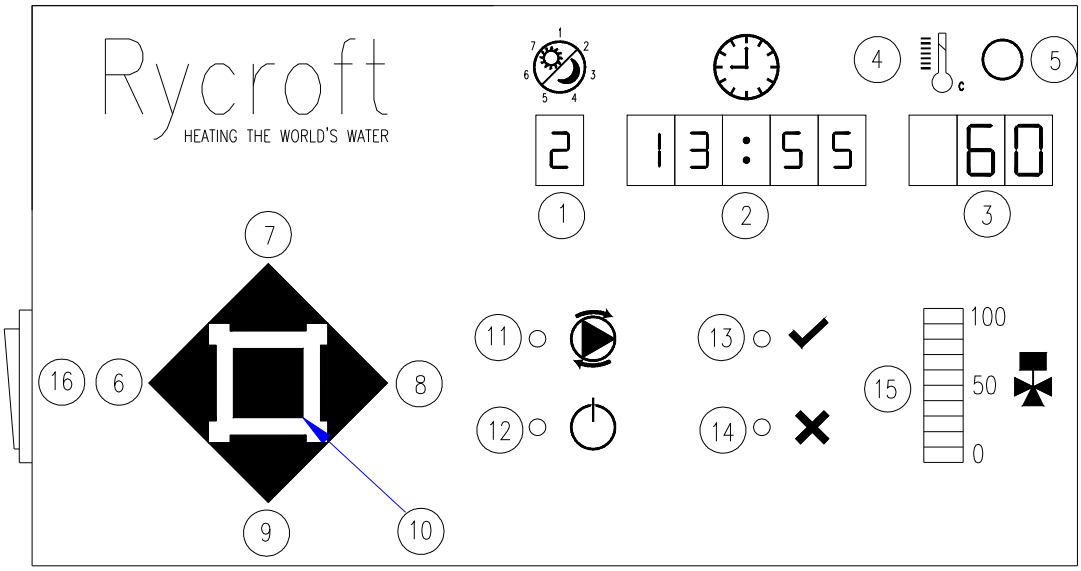
## 1.2 Start Up

### Checks

- ❖ Check that the electrical installation is complete. ☐
- ❖ Check that the mechanical installation is complete. ☐
- ❖ Check that the system has been flushed and that there are no leaks. ☐
- ❖ Any air has been eliminated from the system. ☐
- ❖ That valves are opened in required sequence ☐

Switch on via switch (16).

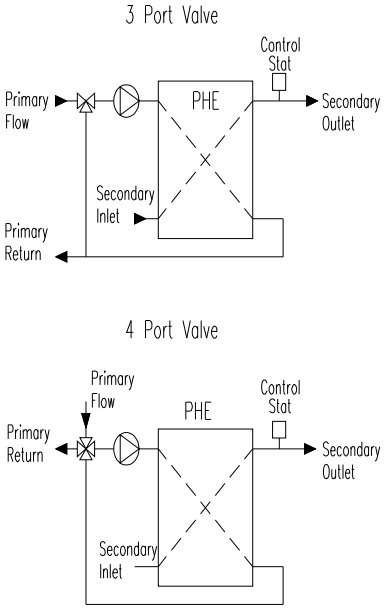
The front panel will illuminate. After a few seconds of self checks the displays will settle to the Day (1) (Time-clock only), Time (2) and Temperature (3) the pump(s) will start (11) and the valve will open (15) , and the system healthy indicator (13) will illuminate.
In the majority of applications, the resulting control and running will be perfectly satisfactory.
The standard temperature setting is $60^0$C and the unit will run continuously. (24 Hour Operation)
To change any of the default settings, see section (2.3)



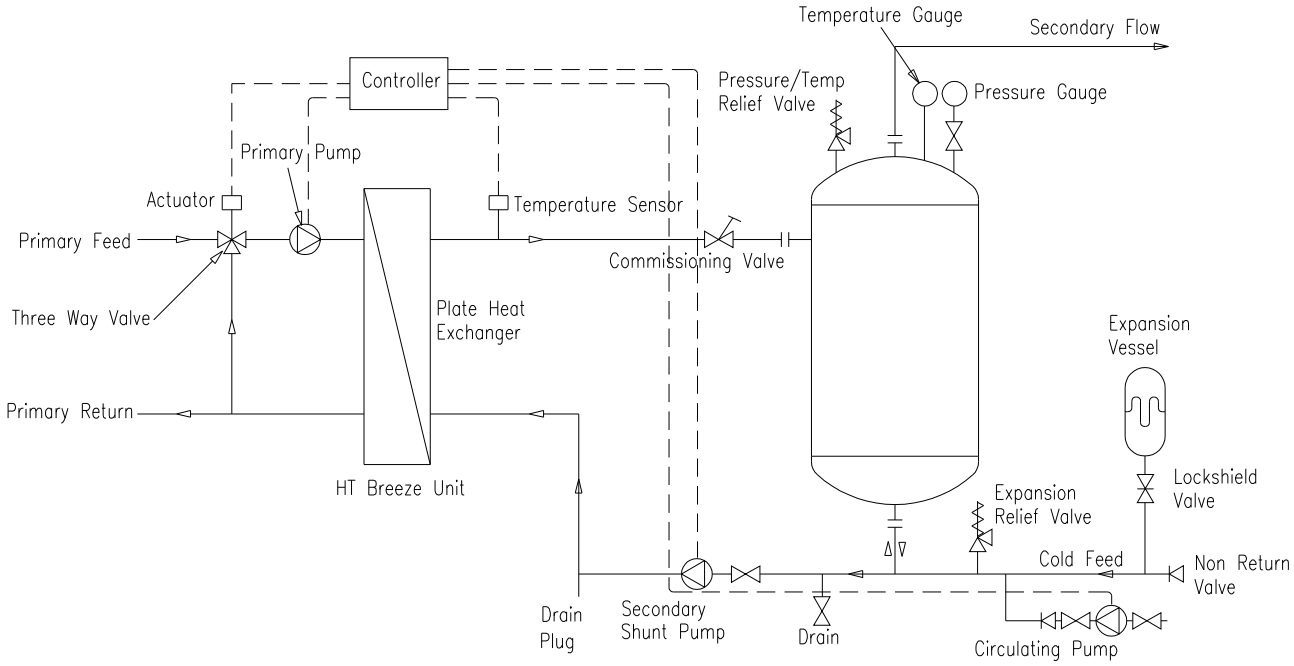

1 – Day/Mode Display
2 – Time/Alarm Display
3 – Temperature/Parameter Display
4 – High Temperature Alarm Indicator
5 – Reset Pushbutton
6 – Step Left Pushbutton
7 – Value Increase Pushbutton
8 – Step Right Pushbutton
9 – Value Decrease Pushbutton
10 – Mode Select Pushbutton
11 – Pump Energised Indicator
12 – Power On Indicator
13 – System Healthy Indicator
14 – System Fault Indicator
15 – Valve Position Bar Display
16 – On/Off Switch

## 1.3 Working Principle

The HT Breeze comprises of a Supapac Plate Heat Exchanger, either a 3 port or 4 port control valve, primary pump, temperature sensor and PID controller all mounted on a skid base.
The motorized 3 or 4-port control valve allows rapid adjustment of the primary heat input to match changes in secondary hot water demand.
The HT Breeze requires no insulation and the design ensures that the outlet temperature does not fall below the set point (60 Deg C default but can be adjusted to suit customer requirements) and consequently reduces the risk of legionnaires disease.
Providing the class of accommodation and details of the number and type of fixtures are known, Rycroft will be pleased to recommend the optimum size of HT Breeze.




Or in conjunction with a buffer vessel to form a semi-instantaneous water heater.



# 2. INSTALLING

## 2.1 Sizing and Selection

To size a stand alone Rycroft HT Breeze, use the following demand factors.

Table 1

| Facility | Private Hand Basin | Public Hand Basin | Shower | Bath | Slop Sink | Bar Sink | Kitchen Sink | Washing Machine | Lab Sink | Dish washer |
|---|---|---|---|---|---|---|---|---|---|---|
| Hospital | 1 | 2 | 4 | 4 | 4 | | 10 | 10 | 3 | 10 |
| Hotel & Residential Hall | 1 | 2 | 4 | 4 | 4 | 12 | 10 | 10 | | 10 |
| School | 0.5 | 3 | 10 | - | 3 | | 10 | 3 | 3 | 10 |
| Sports Centre / Barracks | 0.5 | 2 | 10 | - | 3 | 12 | 10 | - | - | 10 |
| Restaurant | 0.5 | 4 | - | - | 12 | 12 | 19 | - | - | 10 |
| University | 0.5 | 3 | 10 | - | 3 | - | 10 | - | 3 | 10 |
| Offices | 0.5 | 3 | 3 | - | 3 | - | 10 | - | 3 | 10 |
| Factory | 0.5 | 3 | 4 | - | 3 | - | 10 | - | 3 | 10 |
| Apartments | 1 | - | 4 | 4 | 3 | - | 3 | 3 | - | 2 |

**Sizing Considerations.**
Careful consideration must be given to the sizing of stand alone instantaneous water heaters. Standard demand units incorporate a degree of diversification that would be inappropriate for continuous use applications. A more desirable method of sizing for continuous applications is to complete a fixture count and allocate an appropriate flow for each fitting. It should also be noted that shower demands for Schools, Sports Centres and Universities should only be used for medium to large installations. Please refer to our design department for further information.
Example

Using Table 1, a 173 bed Hospital ward with showers, hand basins and sinks.

| | | | |
|---|---|---|---|
| 42 Single person showers | 42 x 4 | = | 168 |
| 55 Private hand basins | 55 x 1 | = | 55 |
| 9 Public hand basins | 9 x 2 | = | 18 |
| 3 Slop sinks | 3 x 4 | = | 12 |
| 15 Baths | 15 x 4 | = | 60 |
| Total Demand Units | | = | 313 |

The shower factors are based upon intermittent use. Where certain activities may result in all showers operating together, please contact our sales department for advice.

The correctly sized Rycroft HT Breeze can now be selected from Table 2

Table 2

| HT Breeze Model | Maximum Demand Units | Max Continuous Duty @ 60 Deg C (litres/sec) | Boiler Power (kw) | Min Secondary Volume (litres) |
|---|---|---|---|---|
| CP-B25 | 15 | 0.25 | 52 | 45 |
| CP-B50 | 23 | 0.50 | 105 | 75 |
| CP-B75 | 45 | 0.75 | 157 | 85 |
| CP-B100 | 70 | 1.00 | 209 | 125 |
| CP-B125 | 90 | 1.25 | 261 | 135 |
| CP-B150 | 130 | 1.50 | 313 | 150 |
| CP-B200 | 210 | 2.00 | 418 | 200 |
| CP-B250 | 320 | 2.50 | 522 | 250 |
| CP-B300 | 480 | 3.00 | 627 | 300 |
| CP-B350 | 640 | 3.50 | 732 | 350 |
| CP-B400 | 820 | 4.00 | 836 | 400 |
| CP-B450 | 1050 | 4.50 | 935 | 450 |
| CP-B500 | 1300 | 5.00 | 1040 | 500 |

These sizes represent the standard range of Rycroft HT Breeze instantaneous water heaters. For larger requirements for both single and three phase please contact our technical department. Both Standard and Special designs can be offered to suit your specific requirements.
To size a Rycroft HT Breeze and Buffer Vessel use the following maximum demand rates.

Table 3

| Facility | Private Hand Basin | Public Hand Basin | Shower | Bath | Slop Sink | Bar Sink | Kitchen Sink | Washing Machine | Lab Sink | Dish washer | Load Factor |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hospital | 10 | 15 | 70 | 60 | 50 | | 80 | 100 | 40 | 150 | 0.7 |
| Hotel & Residential Hall | 10 | 15 | 50 | 50 | 50 | 100 | 80 | 100 | | 150 | 0.5 |
| School | 5 | 20 | 180 | | 40 | | 80 | 40 | 40 | 150 | 0.8 |
| Sports Centre / Barracks | 5 | 15 | 220 | | 40 | 100 | 80 | | | 100 | 1 |
| Restaurant | 5 | 25 | | | 100 | 100 | 140 | | | 150 | 1 |
| University | 5 | 20 | 220 | | 40 | | 80 | | 40 | 150 | 0.8 |
| Offices | 5 | 10 | 180 | | 40 | | 40 | | 40 | 100 | 1 |
| Factory | 5 | 20 | 120 | | 50 | | 80 | | 40 | 100 | 1 |
| Apartments | 5 | | 50 | 50 | 40 | | 20 | 40 | | 20 | 0.7 |

Example

| | | | |
|---|---|---|---|
| 42 Single person showers | 42 x 70 | = | 2940 |
| 55 Private hand basins | 55 x 10 | = | 550 |
| 9 Public hand basins | 9 x 15 | = | 135 |
| 3 Slop sinks | 3 x 50 | = | 150 |
| 15 Baths | 15 x 60 | = | 900 |
| Total Volume | | = | 4675 |
| Load Factor from Table 3 | | = | 0.7 |
| Total Demand Rate | 4675 x 0.7 | = | 3273 litres/hr |

The Rycroft HT Breeze and Buffer Vessel combination should be sized as follows:-

The Buffer Vessel Capacity = 25% of the total hourly demand therefore the required storage capacity = 3273 x 0.25 = 818 litres. The nearest standard Buffer Vessel sizes are 800 and 900 litres. It is recommended to go up in size and therefore a 900 litre Buffer Vessel should be selected.

The Rycroft HT Breeze can be selected as follows:-

| | | |
|---|---|---|
| Continuous hourly demand | = | 3273 litres |
| Specific Heat Capacity of water | = | 4.187 kj/kg, ºC |
| Cold Feed Temperature | = | 10ºC |
| Secondary Flow Temperature | = | 60ºC |

Therefore the required kw rating = $\frac{3273 \times 4.187 \times (60-10)}{3600}$ = 190.3 kw

The nearest standard Rycroft HT Breeze is a CP-B100 which is rated at 209 kw

A Rycroft HT Breeze and Buffer Vessel combination is used when water demand is not constant but high flow frequently occurs. Boiler power requirements are reduced by storing hot water in the buffer vessel for peak demands.

The Rycroft HT Breeze should always be installed with a secondary return line coming back from the system and into the cold feed line prior to the Rycroft HT Breeze or Buffer Vessel. This will remove nuisance high limit tripping due to temperature overshoot, which would occur if the unit was intalled on a 'dead end' system, when an outlet was closed. To ensure full heat dissipation, the secondary volume shold not be less than that shown in Table 2.

For larger capacities contact the sales department for advice.

## 2.2 Installation

**Foundations**
The Rycroft HT Breeze should be mounted on prepared foundations that are level.

**Lifting**
One lifting hole is provided on the top of the Rycroft HT Breeze control panel.
Avoid the use of chains as screwed connections may be damaged by the links.

**Caution:- Never lift the Rycroft HT Breeze by it's pipework or pipe connections.**

**Pipework**
Make sure that the pipework flanges are square and correctly spaced before bolting up. See that the weight of the pipework is taken by external supports and not by the Rycroft HT Breeze. Allowances should be made for expansion of the pipes either by suitable bends or flexible joints. Tighten flange bolts in a diametrically opposite sequence not consecutively round each flange.

**Connections**
Threaded connection may be sealed with PTFE tape. Flanged connections should be sealed with a suitable gasket and sealing agent.

**Liquid Expansion**
Changes in volume with temperature must not be overlooked. The system pressure will rise dramatically if there is nowhere for water to expand. It is not advisable to use a relief valve as a means of releasing the excess water.
Vented systems use the atmospheric vent as an expansion pipe with discharge back into the tank. Unvented systems require a separate expansion tank.

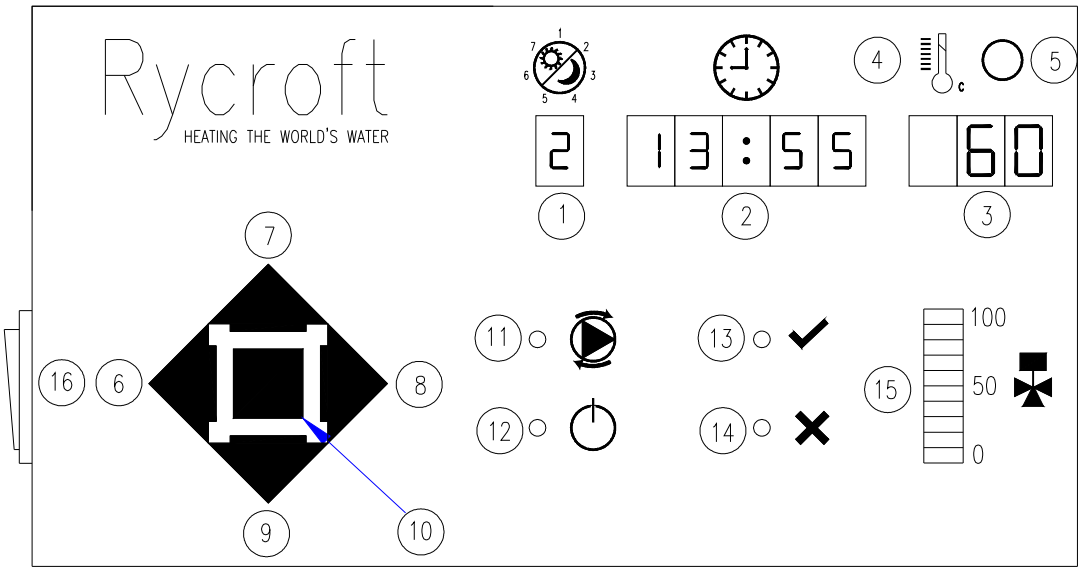
**Venting**
Vent valves must be fitted at the highest point in the connecting pipework so that the Rycroft HT Breeze can be bled of air for initial operation. It is **essential** that the flooded can type pump motors which are commonly used for all Rycroft HT Breeze pumps are bled of air and flooded before starting. See the pump manufacturers instructions supplied.

**Filling**

Before filling the system check that the drain valve is closed and all air vents are open. Flush out the system before installing the Rycroft HT Breeze to remove any foreign matter. Close any manual air vents and run the Rycroft HT Breeze. Crack the vents to release air

**Caution:- Do not fill the system too quickly otherwise pockets of air may become trapped**

## 2.3 Operation and Set Up

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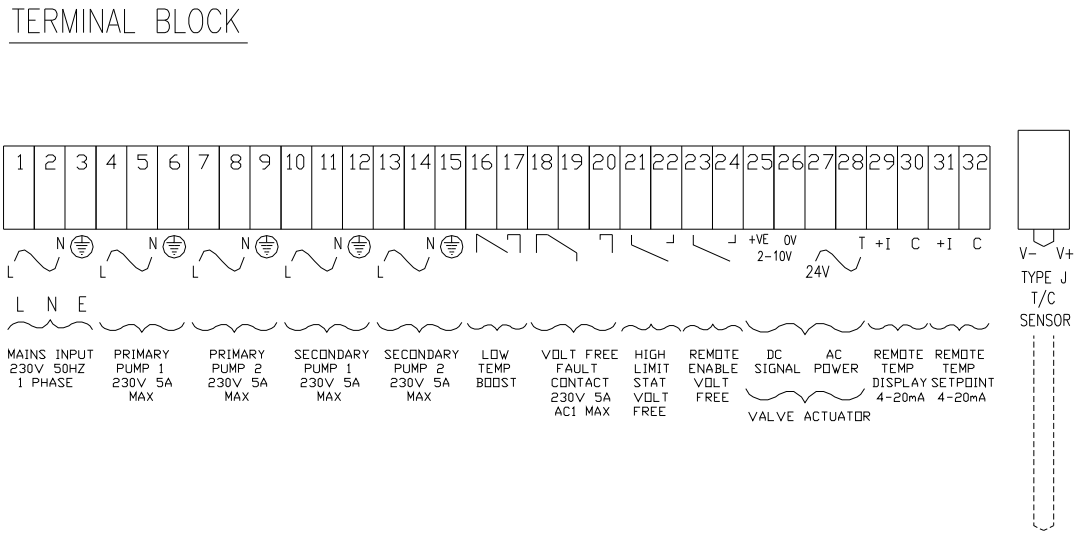
## Electrical Connections



The Electrical connections are located in the terminal compartment. A description of the terminals can be found on the inside of the terminal compartment cover.
Connect a single phase 230V 50Hz supply to the *Mains Input* terminals. The rating plate will have all the information necessary to rate this supply.
If the unit is to be controlled remotely connect the remote control switch or contacts to the *Remote enable* terminals. If the unit is to be controlled locally fit a link between these terminals. **Do NOT apply voltage to the terminals of these contacts!**
Voltage free Fault relay contacts are provided for *Remote Fault Indication*.

## Operation

The Rycroft HT Breeze is a self-contained unit, which controls up to two primary and two secondary pumps together with a two-port valve to provide hot water. When the system is fitted with two primary pumps they are operated on a shared duty-standby cycle with automatic changeover on pump failure.

The Rycroft HT Breeze can be energised by its own internal time clock function, by a remote switch or Building Management System or by a combination of the two.

### a) Remote Switch or Building Management System Control

The Rycroft HT Breeze will be turned on when contacts connected to the *Remote Enable terminals* are closed. This allows the user to control the time of day when hot water will be available. When the contacts are open the system is turned off.

### b) Internal Time clock Control

For this function to work the Time clock function should be turned on (see Set Up) and the *Remote Enable terminals* should be linked.

Under Time clock control the Rycroft HT Breeze will be automatically turned on and off at preset times of the day. Up to two on and two off times can be programmed for each day of the week.

The system can be re-activated after it has automatically switched off by pressing the *Value Increase* (7)
pushbutton. Each press of this pushbutton will add 30-minute increments to a total, which is shown in the Time/Alarm window. Pressing the *Value Decrease* (9) pushbutton will subtract 30-minute increments from the total time. The time value counts down and when the time shown has elapsed, the unit will revert to normal time clock operation.

### c) Remote Switch and Internal Time clock Control

For this function to work the Time clock function should be turned on (see Set Up) and a remote control switch should be connected to the *Remote Enable* terminal*s*.

Under Time clock control the Rycroft HT Breeze will be automatically turned on and off at preset times of the day. Up to two on and two off times can be programmed for each day of the week. When contacts connected to the *Remote Enable terminals* are opened the Rycroft HT Breeze will be turned off.

When the system has turned off under time clock control it can be re-activated by pressing the *Value Increase* (7) push button. Each press of this push button will add 30-

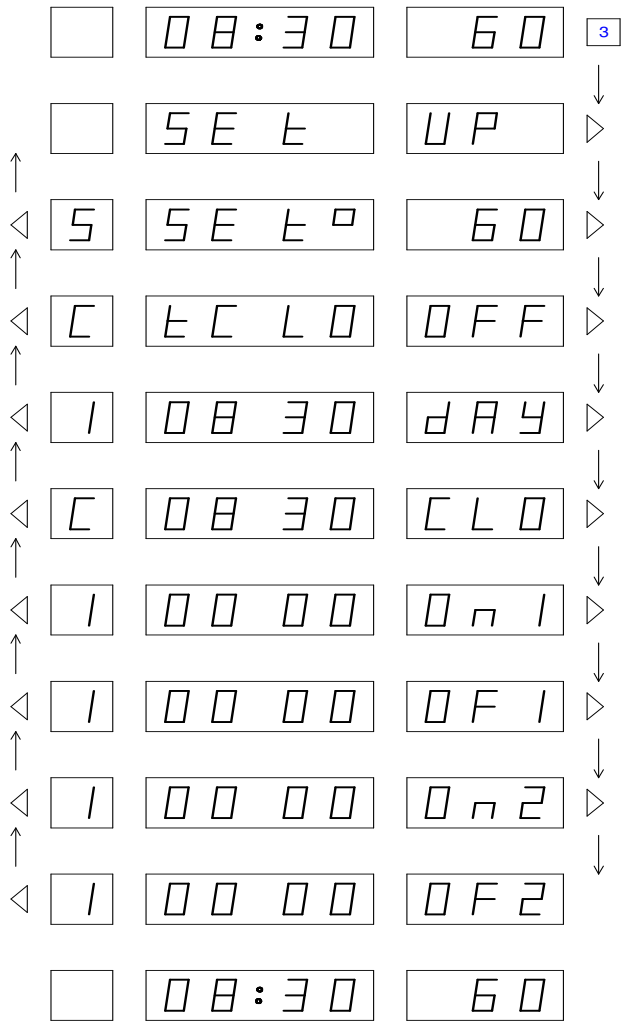
minute increments to a total, which is shown in the Time/Alarm window. Pressing the *Value Decrease* (9) push button will subtract 30-minute increments from the total time. The time value counts down and when the time shown has elapsed, the unit will switch off and revert to normal time clock operation. However, when the system has been turned off under remote control it cannot be re-activated by pressing the *Value Increase* (7) push button.

**Set up**

The Rycroft HT Breeze control unit is already programmed with temperature and control settings that will suit most applications. All the values are adjustable so that you can customise the unit to exactly match your system.

The set up routine is entered by pressing and holding the *Mode* (10) push button for three seconds. Press the *Step Right* (8) and *Step left* (6) pushbuttons to move forwards and backwards through the sequence. Press the *Value Increase* (7) or *Value Decrease* (9) pushbuttons to alter the value shown in the display. Press and hold the *Mode* (10) pushbutton for 3 seconds to exit the set up routine.

**Figure 1 - Set Up Sequence**




Press and hold for 3 seconds to enter *Set Up* routine

Press *Step Right* to move to first value

Press *Value Increase* or *Value Decrease* pushbuttons to alter water temperature

Press *Value Increase* to turn Time clock function on or off

Press *Value Increase* or *Value Decrease* to change Day number

Press *Value Increase* or *Value Decrease* pushbuttons to change time. Press and hold pushbutton for rapid change

Press *Value Increase* or *Value Decrease* pushbuttons to change the time of the first timed on and off period. Press and hold pushbutton for rapid change

Press *Value Increase* or *Value Decrease* pushbuttons to change the time of the second timed on and off period. Press and hold pushbutton for rapid change

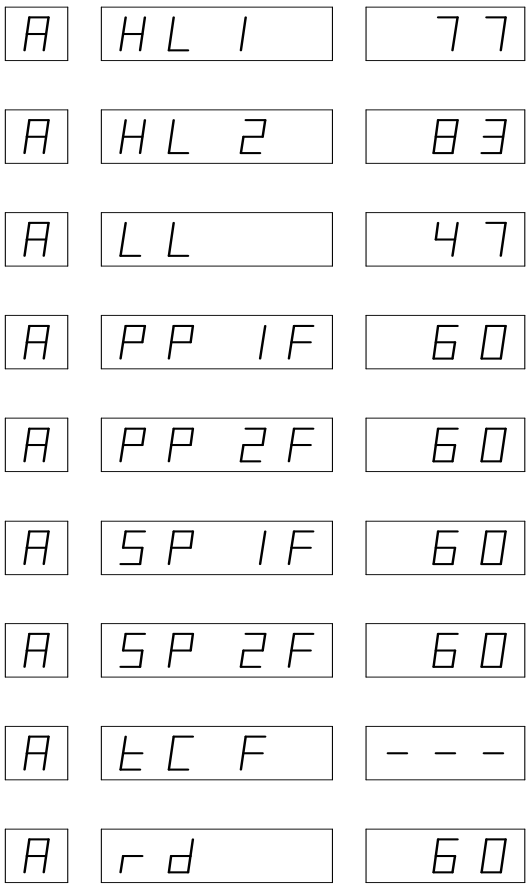
Press *Step Right* pushbutton to set the on-off times for day 2, day 3, day 4 etc. Press and hold *Value Select* pushbutton for 3 seconds to exit Set Up routine

The system continues to control when the controller is in the set up routine allowing adjustments to be made on the fly

**System Faults**

When a fault situation is detected the System Fault (14) indicator will be lit and the internal Fault relay will be energised. The normal time and temperature display will be replaced by an alarm message. The messages and meanings are shown in Figure 2 below. . If a system fault occurs when the controller is in the set up routine the System Fault (14) indicator will be lit but the display will not be replaced by an alarm message. The alarm message can be viewed by leaving the Set Up routine.

**Figure 2 – Alarm messages**




First High temperature level detected

Second High temperature level detected – buzzer sounds and the system is automatically shut down.

Low temperature detected

Primary Pump No 1 failure – if two primary pumps are fitted Primary Pump No 2 will be energised.

Primary Pump No 2 failure – Primary Pump No 1 will be energised

Secondary Pump No 1 (shunt) failure – system is automatically shut down

Secondary Pump No 2 (re-circulation) failure – system is automatically shut down

Thermo-couple failure – the system is automatically shut down

System has been remotely disabled

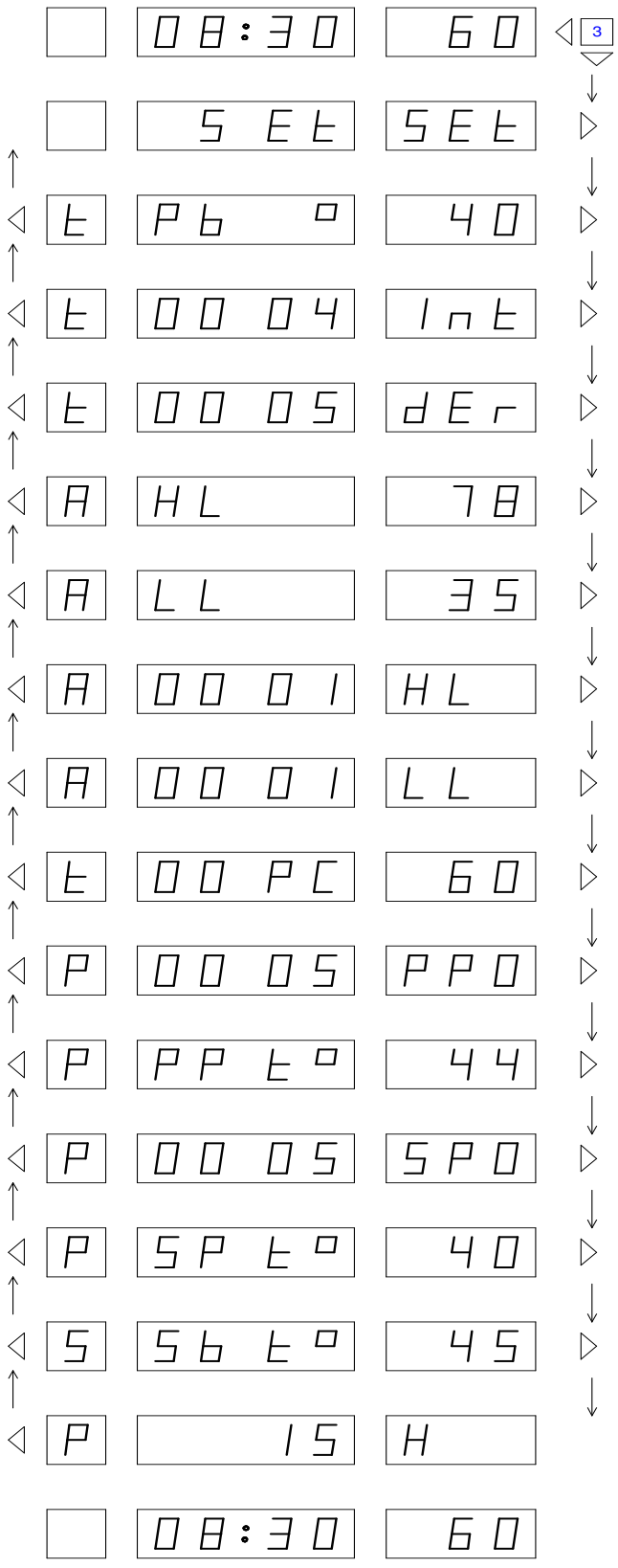
The Second High temperature level alarm will automatically shut the system down and sound a warning buzzer. The buzzer can be silenced by pressing the *Reset* (5) pushbutton. When the fault has been diagnosed and corrected the system can be re-activated by pressing the *Reset* (5) pushbutton again, this can only be performed when the temperatures have returned to near normal. All the other alarms will automatically reset when the problem has been corrected. Alarms constantly re-occurring could indicate that the system is incorrectly configured.

**Advanced Set up Routine**

The system is supplied with default settings, which suit most applications. The advanced set up features allow Installers and Engineers to tailor the settings to suit particular installations. The system continues to control when the controller is in the advanced set up routine so that the results of adjustments can be seen immediately. In addition manual control of the valve position is available.

The set up routine is entered by simultaneously pressing and holding the *Mode* [10], *Step Left* [6] and *Value Decrease* [9], Pushbuttons for three seconds. Press the *Step Right* [8] and *Step Left* [6] pushbuttons to move forwards and backwards through the sequence. Press the *Value Increase* [7] or *Value Decrease*[9] pushbuttons to alter the value shown in the display. Press and hold the *Mode* [10], pushbutton for 3 seconds to exit the set up routine.

**Figure 3 – Advanced Set Up**




Press and hold for 3 seconds to enter Advanced Set Up routine

Press *Step Right* pushbutton to move to the first setting value

Press *Value Increase* or *Value Decrease* pushbuttons to alter Proportional Band

Press *Value Increase* or *Value Decrease* pushbuttons to alter Integral time

Press *Value Increase* or *Value Decrease* pushbuttons to alter Derivative time

Press *Value Increase* or *Value Decrease* pushbuttons to alter First level High temperature limit

Press *Value Increase* or *Value Decrease* pushbuttons to alter Low temperature limit

Press *Value Increase* or *Value Decrease* pushbuttons to alter High temperature limit time delay

Press *Value Increase* or *Value Decrease* pushbuttons to alter Low temperature limit time delay

Press *Value Increase* or *Value Decrease* pushbuttons to vary valve position. Figure shows percentage open See Manual Control.

Press *Value Increase* or *Value Decrease* pushbuttons to alter Primary Pump over-run time.

Press *Value Increase* or *Value Decrease* pushbuttons to alter Primary Pump over-run temperature.

Press *Value Increase* or *Value Decrease* pushbuttons to alter Secondary Pump over-run time

Press *Value Increase* or *Value Decrease* pushbuttons to alter Secondary Pump over-run

Press *Value Increase* or *Value Decrease* pushbuttons to alter the Night Set-back/Pasteurisation temperature.

Press *Value Increase* or *Value Decrease* pushbuttons to alter Primary Pump duty – standby time.

Press and hold *Mode* pushbutton for 3 seconds to exit Set Up routine

**Night set back/Pasteurisation**
When the DIP switch for Night set-back/Pasteurisation is set to the on position and the unit is put into standby. When the set back/pasteurisation value (S  Sb to) is set to above the normal set temperature (S  SET To) The controller will assume pasteurisation and will raise the temperature to the set back/pasteurisation value for one hour, before returning to standby. Alternatively when the set back/pasteurisation value (S Sb To) is set to below the normal set temperature. The controller will assume set back and will lower the temperature to this value until the normal day running begins.

**Manual Control**
The Advanced Set Up routine allows the engineer to position the control valve manually. This feature is active while this set up window is visible. This feature can be disabled and control restored to automatic by pressing the *Step Left* (6), or *Step Right* (8) pushbuttons to display another parameter or pressing and holding the *Mode* (10), pushbutton to exit the advanced set up routine.

**Remote set point adjustment**
When a 4  - 20mA signal is connected to the remote set input the set point can be varied between 20deg c at 4mA and 100deg c at 20mA at the rate of 5 Degrees per milliamp. It should be noted that the controller assumes control as soon as the milliamp level rises above 2mA consequently if the controller loses signal it will revert to the controller internal set point.

**DIP Switch Settings**
The physical configuration of the system and the Night Set-back function are programmed into the controller by setting the position of eight switches. The switches are located on the display printed circuit board. To change the position of these switches:

1) Isolate the mains supply to the controller.
2) Open the hinged door.
3) Remove the four black fixing screws and slide the control facia out of the enclosure taking care not to pull the connecting cable.
4) Turn the facia over – the DIP switch is located on the bottom edge of the circuit board.
5) Change the switch positions as required (see table below)
6) Replace facia, close hinged door and switch on the mains supply.

The following table shows the switch controls. (Bold positions are factory default values)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Function |
|---|---|---|---|---|---|---|---|---|
| On | | | | | | | | No Operation |
| **Off** | | | | | | | | No Operation |
| | On | | | | | | | No Operation |
| | **Off** | | | | | | | No Operation |
| | | On | | | | | | Fault Relay Operates During Remote Disable |
| | | **Off** | | | | | | Fault Relay No Operation During Remote Disable |
| | | | On | | | | | Valve Output 2-10V |
| | | | **Off** | | | | | Valve Output 0-10V |
| | | | | **Off** | | | | Night Setback OFF |
| | | | | On | | | | Night Setback ON |
| | | | | | Off | Off | | No Secondary Pumps fitted |
| | | | | | Off | **On** | | 1 Secondary Pump fitted (SHUNT) |
| | | | | | **On** | Off | | 1 Secondary Pump fitted (RECIRC) |
| | | | | | | | **Off** | 1 Primary Pump Fitted |
| | | | | | | | On | 2 Primary Pumps fitted |

Factory Default Settings □

**Set Up:** Alternative setting record (Date)

| | | ……. | ……. | ……. |
|---|---|---|---|---|
| Set point | = 60 | ……. | ……. | ……. |
| Time clock | = Off | ……. | ……. | ……. |
| Day (Set) | = 1 = Mon 7 = Sunday | | | |
| Clock (Set) | = Time | | | |
| Day 1 ON 1 | = 0000 | ……. | ……. | ……. |
| Day 1 OFF1 | = 0000 | ……. | ……. | ……. |
| Day 1 ON 2 | = 0000 | ……. | ……. | ……. |
| Day 1 OFF 2 | = 0000 | ……. | ……. | ……. |
| Day 2 ON 1 | = 0000 | ……. | ……. | ……. |
| Day 2 OFF1 | = 0000 | ……. | ……. | ……. |
| Day 2 ON 2 | = 0000 | ……. | ……. | ……. |
| Day 2 OFF 2 | = 0000 | ……. | ……. | ……. |
| Day 3 ON 1 | = 0000 | ……. | ……. | ……. |
| Day 3 OFF 1 | = 0000 | ……. | ……. | ……. |
| Day 3 ON 2 | = 0000 | ……. | ……. | ……. |
| Day 3 OFF 2 | = 0000 | ……. | ……. | ……. |
| Day 4 ON 1 | = 0000 | ……. | ……. | ……. |
| Day 4 OFF 1 | = 0000 | ……. | ……. | ……. |
| Day 4 ON 2 | = 0000 | ……. | ……. | ……. |
| Day 4 OFF 2 | = 0000 | ……. | ……. | ……. |
| Day 5 ON 1 | = 0000 | ……. | ……. | ……. |
| Day 5 OFF 1 | = 0000 | ……. | ……. | ……. |
| Day 5 ON 2 | = 0000 | ……. | ……. | ……. |
| Day 5 OFF 2 | = 0000 | ……. | ……. | ……. |
| Day 6 ON 1 | = 0000 | ……. | ……. | ……. |
| Day 6 OFF 1 | = 0000 | ……. | ……. | ……. |
| Day 6 ON 2 | = 0000 | ……. | ……. | ……. |
| Day 6 OFF 2 | = 0000 | ……. | ……. | ……. |
| Day 7 ON 1 | = 0000 | ……. | ……. | ……. |
| Day 7 OFF 1 | = 0000 | ……. | ……. | ……. |
| Day 7 ON 2 | = 0000 | ……. | ……. | ……. |
| Day 7 OFF 2 | = 0000 | ……. | ……. | ……. |

◁ □ **Set Set:**
▽

Alternative setting record (Date)

| | | ……. | ……. | ……. |
|---|---|---|---|---|
| Proportional Band | = 60 % | ……. | ……. | ……. |
| Integral Time | = 4mins | ……. | ……. | ……. |
| Derivative Time | = Off | ……. | ……. | ……. |
| High Limit | = 78°c | ……. | ……. | ……. |
| Low Temperature warning | = 35°c | ……. | ……. | ……. |
| High Temperature limit time delay | = 1min | ……. | ……. | ……. |
| Low Temperature warning time delay | = 1min | ……. | ……. | ……. |
| Manual valve operation | = 00 % | (Not presetting) | | |

| | | | | |
|---|---|---|---|---|
| Primary pump overrun time | = 5mins | ……... | …… | …… |
| Primary pump overrun temperature | = 40°c | …… | …… | …… |
| Secondary pump overrun time | = 5mins | …… | …… | …… |
| Secondary pump overrun temperature | = 40°c | …… | …… | …… |
| Night Set-back/Pasteurisation temperature | = 68°c | …… | …… | …… |
| Primary pump duty changeover time | = 15hrs | …… | …… | …… |

By pressing the reset (5) and mode (10) buttons simultaneously for a few seconds the time clock settings will be returned to the factory default settings.

By pressing the reset (5) and decrease (9) buttons the control and alarm parameters will be returned to the factory default settings.

# 3. HEALTH

## 3.1 Maintenance

Where possible a detailed inspection of the Rycroft HT Breeze should be made after the first six months. This will provide an insight into future requirements for efficient maintenance. If the Rycroft HT Breeze is cleaned and there is no sign of corrosion, it can be safely assumed an annual inspection will be sufficient for future servicing. All electrical connections should be checked and tightened if necessary.

Caution:- Maintenance should only be performed by qualified personnel only.
Electrical work should be carried out by a qualified electrician in strict conformance to the latest requirements.

In order to maintain the Rycroft HT Breeze unit you will require the following tool kit:

Set of metric Allen keys up to M16.

Set of metric spanners.

Set of screwdrivers

A pipe wrench to suit a maximum 50 mm nominal pipe size.

M16 friction ratchet and M16 deep ring spanner (CP-B25 to CP-B250)

**Controller**
The controller is run via an EPROM that stores all the changes to the time programmes and other data.
After the first six months, all connections in the panel should be checked and tightened if necessary.

**Temperature Thermocouple**
Ensure that the Thermocouple connections are satisfactory. Refer to the manufacturer's instructions.

**Control Valve and Actuator**
Check that the valve will open and close by using the manual facility on the controller.
Electrical connection should be checked at the actuator. The linkage should also be tightened to ensure good mechanical contact. Refer to the manufacturer's instructions.

**Primary Pump**
Ensure that the pump is on the correct speed setting and that wiring is secure at all terminals.

**Plate Heat Exchanger**
A series of contoured plates with ports form a plate pack with flow channels. The hot water flows down alternate channels while the cold water flows up alternate channels. This creates 100% counter flow.

### 3.2 Service

Rycroft offers a full and comprehensive range of service and support. This encompasses the maintenance, commissioning and repair of General water heating equipment. Including Heat exchangers, Boilers, Pressurisation units, Booster sets and Calorifiers.

**Speak to the customer service and support Department Rycroft Ltd**

### 3.3 Spares

All individual Rycroft HT Breeze component parts are available as replacement and spare items. Please quote as much of the original ordering information as possible to allow the supply of the correct part(s)

# 4. INFORMATION

## 4.1 Specification

**Power supply requirements**
Voltage: 230 Volts, 50Hz, Single Phase.
Or 400 Volts, 50Hz, Three Phase.

Nominal current: Maximum 16Amps (Pump and Duty dependant) for the single phase. The three phase model has no limit.

**Inputs**
Temperature probe: Type J thermocouple (Grounded) via a 12 bit A/D converter (minimum 0.1 $^{o}$c resolution. Display range: 0 – 250$^{o}$ c

Volt free contacts:
To enable from remote source (Time-clock, SCADA,BMS, boiler controls etc)
For connection of a supplementary high limit contact or thermostat as a second alarm
Pump (s) fault contact

Signal
4-20mA remote set point adjustment. 4mA = 20°c. 20mA = 100°c

**Outputs**
Pumps (Power) :
Two primary (1Duty, 1Standby) single phase 230v 5A Maximum (Resistive load ) or 400v for the larger units.
Two secondary pumps (1circulation,1shunt ) single phase 230v 5A Maximum ( Resistive load)
Valve actuator supply, 24 v.a.c 10 VA Max Control signal 2 – 10 v, 0 - 10.d.c 0.1mA, Max. The effective control setting range 0 – 87$^{o}$ c
Volt free contacts
Changeover fault contac for remote alarm on fault, to SCADA, BMS, Annunciator etc
For low temperature boost. A contact closes on Low Temperature to allow a 'Boost' of Primary heating for example.
Primary pump (s) start

Signal
4 – 20mA remote indication of process variable. 4mA = 0° c.20mA = 100°c

**Enclosure**

The enclosure is Polystyrene based, with a clear polycarbonate hinged lid ingress protection rated at IP65. The lid has a snap lock and can be fitted with the screwdriver slotted locking catch (Supplied loose)

***NOTE: The volt free contact terminals must not have voltage applied to them**

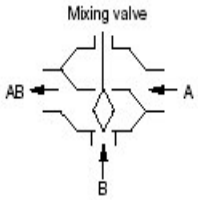
## 4.2 Valve and actuator

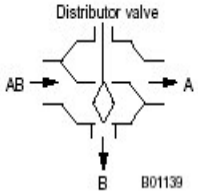


### BXN: Three-way valve with male thread; nominal pressure 16 bar

As a mixing valve or distribution valve, for continuous control of cold water, hot water or air. Condition of the water in accordance with VDI 2035. Used together with the AVM 104/114/124(S) and AVF 124(S) valve drives as a regulating unit. Variable characteristic (linear, equal percentage or quadratic) with SUT valve drives.
Valve body and seat are of cast brass; spindle of stainless steel; plug of brass with glass-fibre-reinforced Teflon sealing ring; packing box of brass with EPDM O-ring. When the spindle is extended, the control passage A-AB is closed.





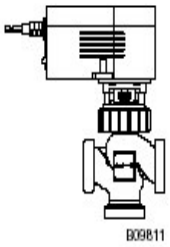

| Type | Nominal diameter DN | Connection | $k_{VS}$-value [m³/h] | Weight [kg] |
|---|---|---|---|---|
| BXN 015 F230 | 15 | G 1B | 1 | 0.75 |
| BXN 015 F220 | 15 | G 1B | 1.6 | 0.75 |
| BXN 015 F210 | 15 | G 1B | 2.5 | 0.75 |
| BXN 015 F200 | 15 | G 1B | 4 | 0.75 |
| BXN 020 F200 | 20 | G 1¼B | 6.3 | 0.89 |
| BXN 025 F200 | 25 | G 1½B | 10 | 1.12 |
| BXN 032 F200 | 32 | G 2B | 16 | 1.49 |
| BXN 040 F200 | 40 | G 2¼B | 25 | 2.19 |
| BXN 050 F200 | 50 | G 2¾B | 40 | 2.94 |

| | | | | |
|---|---|---|---|---|
| Operating temperature [1] | –15...130 °C | | Leakage rate for control passage | ≤ 0.02 % of $k_{VS}$-value |
| Operating pressure | up to 120 °C | 16 bar | Mixing passage | 1 % of $k_{VS}$-value |
| | up to 130 °C | 13 bar | Nominal stroke | 8 mm |
| Valve characteristic | linear | | | |
| Control ratio | 50 (typical) | | Dimension drawing | M07424 |

1) At temperatures under 0 °C, use stuffing-box heating (accessory). When combined with valve drives, the temperature of the medium should not exceed 100 °C.

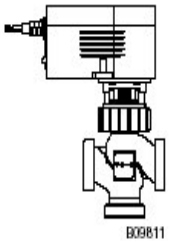
#### Accessories

| | |
|---|---|
| 361951 015* | 1 screw fitting for male thread with flat seal DN 15 |
| 361951 020* | 1 screw fitting for male thread with flat seal DN 20 |
| 361951 025* | 1 screw fitting for male thread with flat seal DN 25 |
| 361951 032* | 1 screw fitting for male thread with flat seal DN 32 |
| 361951 040* | 1 screw fitting for male thread with flat seal DN 40 |
| 361951 050* | 1 screw fitting for male thread with flat seal DN 50 |
| 361988 100 | Heating for packing box for AVM / AVF 124(S): 230 V~; 15 W, MV 505498 |
| 361988 102 | Heating for packing box for AVM / AVF 124(S): 24 V~; 15 W, MV 505498 |
| 378070 102 | Heating for packing box for AVM 104(S) / 114(S); 24 V~, 15 W |
| 378034 001 | Valve with packing box, silicon-free; synthetic lubricant; max. 130 °C |



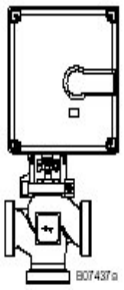

Combined with electric drive with a pushing force of 250 N

| Drive | | | Input<br>Running time | AVM 104<br>3-point<br>120 s | AVM 104S<br>0...10 V<br>30 / 60 / 120 s |
|---|---|---|---|---|---|
| Valve | $\Delta p_{max}$ | $\Delta p_s$ | Close/off pressure | | |
| BXN 015 | 4 | – | 6 | | |
| BXN 020 | 4 | – | 4.3 | | |
| BXN 025 | 3 | – | 3 | | |
| BXN 032 | 2 | – | 2 | | |
| BXN 040 | 1.2 | – | 1.2 | | |
| BXN 050 | 0.8 | – | 0.8 | | |



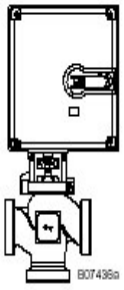

Combined with electric drive with a pushing force of 500 N

| Drive | | | Input<br>Running time | AVM 114<br>3-point<br>120 s | AVM 114S<br>0...10 V<br>60 / 120 s |
|---|---|---|---|---|---|
| Valve | $\Delta p_{max}$ | $\Delta p_s$ | Close/off pressure | | |
| BXN 015 | 6 | – | 15 | | |
| BXN 020 | 5 | – | 9.4 | | |
| BXN 025 | 4 | – | 6.5 | | |
| BXN 032 | 3,7 | – | 4.3 | | |
| BXN 040 | 2.7 | – | 2.7 | | |
| BXN 050 | 1.8 | – | 1.8 | | |




Combined with electric drive with spring return with a pushing force of 500 N

| Drive | | | | Input<br>Running time | AVF 124<br>3-point<br>60 / 120 s | AVF 124S<br>0...10 V<br>60 / 120 s |
|---|---|---|---|---|---|---|
| Valve | $\Delta p_{max}$ | | $\Delta p_s$ | Close/off pressure | | |
| BXN 015 | 6 | (4) | 16 | 15 | | |
| BXN 020 | 5 | (2.8) | 9.4 | 9.4 | | |
| BXN 025 | 4 | (2.8) | 6.5 | 6.5 | | |
| BXN 032 | 3,7 | (2) | 4.3 | 4.3 | | |
| BXN 040 | 2.7 | (1.5) | 2.7 | 2.7 | | |
| BXN 050 | 1.8 | (0.8) | 1.8 | 1.8 | | |




Combined with electric drive with a pushing force of 800 N

| Drive | | | | Input<br>Running time | AVM 124<br>3-point<br>30 / 60 / 120 s | AVM 124S<br>0...10 V<br>30 / 60 / 120 s |
|---|---|---|---|---|---|---|
| Valve | $\Delta p_{max}$ | | $\Delta p_s$ | Close/off pressure | | |
| BXN 015 | 8 | (6) | – | 15 | | |
| BXN 020 | 8 | (6) | – | 10 | | |
| BXN 025 | 8 | (5) | – | 9 | | |
| BXN 032 | 6 | (4) | – | 7 | | |
| BXN 040 | 4.4 | (2.5) | – | 4.4 | | |
| BXN 050 | 3 | (1.5) | – | 3 | | |

Complete type code: valve and drive each with F-variant
Valve: For F-variant, technical details and accessories, see table of valve types
Drive: For F-variant, technical details, accessories and fitting position, see Section 51
Example: BXN 015 F210 / AVM 114S F132

$\Delta p_{max}$[bar]= Max. permissible pressure difference across the valve at which the drive can still firmly open and close the valve.

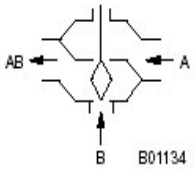
$\Delta p_s$ [bar]= Max. permissible pressure difference across the valve at which, in the event of a malfunction, the drive can close the valve.

(...) Values apply when used as a diverting valve

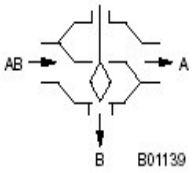
### Operation

Using an electric drive, the valve can be moved to any position. The control passage A-AB closes when the valve spindle is extended. Using either the AVM AVM 104/114/124(S) valve drive or the AVF 124(S) valve drive with spring return, the valve can be used as either a mixing valve, for distribution valve. Only with AVM 124(S) or AVF 124 (S).

**Used as a mixing valve**




**Used as a distribution valve**




The valve spindle is fixed to the drive spindle. This enables the valve to close when used as either a control valve or a diverting valve. It also stops the plug from flapping about in the end position and, at the same time, hinders cavitation and erosion. Because there is no opposing spring pressure when the valve closes, the full force of the drive is available for the permissible pressure difference.

### Engineering and fitting notes

The control unit can be fitted in any position except facing downwards. The ingress of condensate, drops of water etc. into the drive should be prevented.
In order to restrain contaminants in the water (e.g. welding beads, rust particles etc.) and prevent the spindle seal from being damaged, we recommend the employment of collective filters, e.g. for each floor or feed pipe. The composition of the water should be in accordance with VDI 2035.
The valve and drive can be assembled without having to be set up; the drive adapts itself automatically to the valve stroke and to the stops as soon as power is applied.
To prevent the flow of the medium fr
m being audible in quiet rooms, the pressure difference across the valve should not exceed 50% of the stated values.

### Additional technical details

**Technical information**

| | |
|---|---|
| – Pressure and temperature specifications | DIN 2401 |
| – Flow parameters | VDI/VDE 2173 |
| – Sauter slide rule for valve sizing | 7 090011 003 |
| – Manual for slide rule | 7 000129 003 |
| – PC program for Sauter valve and drive sizing | 7 000675 003 |
| – Valvedim.exe | |
| – Technical manual: 'Valves and drives' | 7 000477 003 |
| – Parameters, Fitting Notes, Control, General Information | |
| – CE-conformity Pressure Equipment Directive | 97/23/EG item 3.3 |

**Additional specifications**

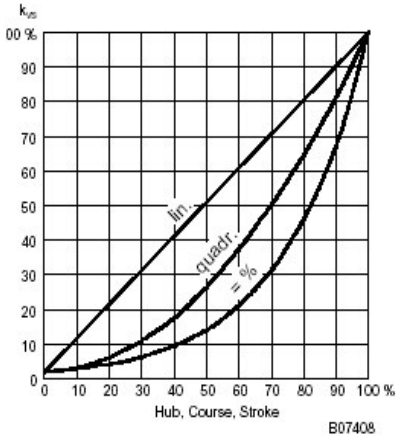
Chill-cast valve body (DIN 1709) with male thread cylindrical as per ISO 228/1 Class B, flat seal on body.
Packing box with O-ring of ethylene-propylene.

**Material numbers as per DIN**

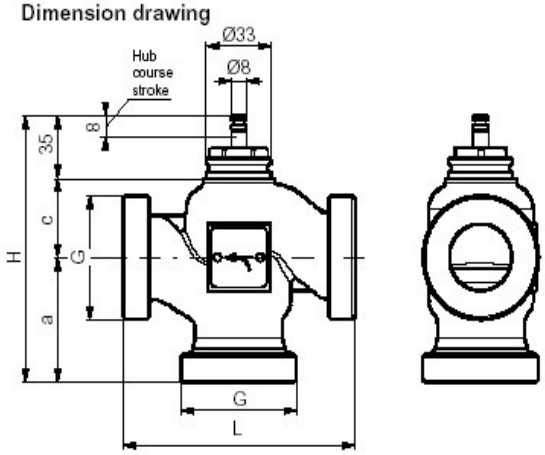
| | DIN material no. | DIN code |
|---|---|---|
| Valve body | CC 754S-GM | Cu Zn 39 Pb 1 Al-C |
| Valve seat | CC 754S-GM | Cu Zn 39 Pb 1 Al-C |
| Spindle | 1.4305 | X 8 Cr Ni S 18-9 + 1G |
| Plug | 2.0402.26 | Cu Zn 40 Pb 2 F43 |
| Packing box | 2.0401.10 | CU Zn 39 Pb 3 F36 |

**Characteristic for drives with positioner**

For AVM 113S or AVF 113S drive with variable coding switch



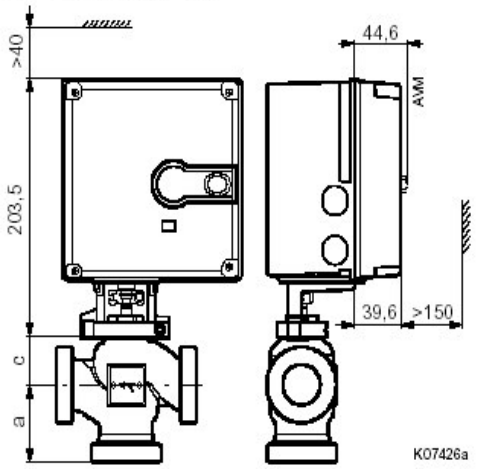

**Dimension drawing**



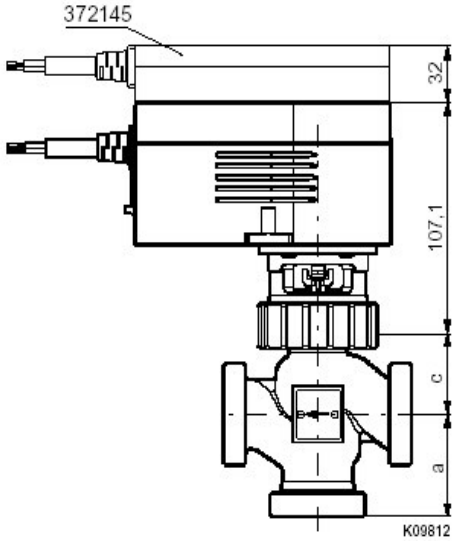

| DIN | | G | a | c | L | H |
|---|---|---|---|---|---|---|
| 15 | ½" | G1B | 50 | 32 | 100 | 117 |
| 20 | ¾" | G1¼B | 50 | 33 | 100 | 118 |
| 25 | 1" | G1½B | 55 | 36 | 110 | 126 |
| 32 | 1 ¼" | G2B | 60 | 38 | 120 | 133 |
| 40 | 1 ½" | G2¼B | 65 | 48 | 130 | 148 |
| 50 | 2" | G2¾B | 75 | 54 | 150 | 164 |

M07424a

AVF 124 and AVM 124

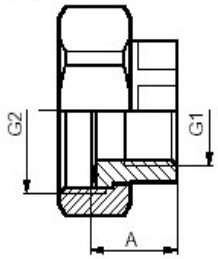



AVM 104 and AVM 114




**Accessories**

361951




| A | DN | G1 | G2 |
|---|---|---|---|
| 32,3 | 50 | Rp2 | G23/4 |
| 33 | 40 | Rp11/2 | G21/4 |
| 26,5 | 32 | Rp11/4 | G2 |
| 24,7 | 25 | Rp1 | G11/2 |
| 20,8 | 20 | Rp3/4 | G11/4 |
| 18,7 | 15 | Rp1/2 | G1 |

M08806

## AVF 124S: Valve drive with spring return and SUT technology

For controllers with continuous output (0...10 V or 4...20 mA). For operating through valves or three-way valves of the VXN and BXN series. Resets to one of the end positions in the event of a power failure or whenever the monitoring contacts are activated. Characteristic (linear/equal-percentage/quadratic) can be set at the positioner.
Housing of fire-retardant plastic, with stepping motor, electronic control unit, LED indicator, return spring, retention magnet, gears and positioner. Body of gears and fixing bracket (for fitting the valve) are of cast zinc. Cover of transparent, fire-retardant plastic. Electronic force-dependent cut-out by means of stops either in the drive or on the valve. Automatically adapted to the valve stroke. Coding switch for changing the characteristic and the running time. Direction of operation can be changed over externally (power supply to terminal 2a or 2b). Electrical connection (max. 1.5 mm²) by screw terminals. Cable inlet Pg16; can be fitted in any position between vertical (upright) and horizontal.

T10168

| Type | Running time [sec] Motor | Spring | Reset function | Pushing force [N] 1) | Power | Weight [kg] |
|---|---|---|---|---|---|---|
| **AVF 124S F132** | 60 / 120 | 18 ±10 | closed (NC) | 500 | 24 V~ | 2.4 kg |
| **AVF 124S F232** | 60 / 120 | 18 ±10 | open (NO) | 500 | 24 V~ | 2.4 kg |

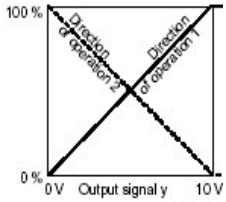
Y02158

**Positioner:**

| | | | |
|---|---|---|---|
| Control signal 1 | 0...10 V, $R_i$ = 100 kΩ | Starting point $U_0$ | 0 or 10 V |
| Control signal 2 | 4...20 mA, $R_i$ = 50 Ω | Control span ΔU | 10 V |
| Position feedback signal | 0...10 V, load > 2.5 kΩ | Switching range $X_{sh}$ | 200 mV |

Y10161

| | | | |
|---|---|---|---|
| Power supply 24 V~ | ± 20 %, 50...60 Hz | Permissible ambient temp. | 5...60 °C |
| Power consumption | | Ambient humidity | < 95 %rh |
| running | 6 VA | | without condensation |
| at a standstill | 3 VA | Degree of protection 2) | IP 54 (EN 60529) |
| on starting | 30 VA (max. 1s) 3) | Protection class | III as per EN 60730 |
| Nominal stroke | 8 mm | | |
| Max. operating temperature | 100 °C at valve | Wiring diagram | A10103 |
| | | Dimension drawing | M07429 |
| | | Fitting instructions | MV 505851 |



B0765

### Accessories

**0313529 001*** Split-range unit for settings sequences. MV 505671; A09421
**0370560 016** Pg 16 cable screw fitting of plastic
**0370880 001** Mechanical stroke indicator; MV 505517
**0370881 001*** Auxiliary change-over contacts 4), simple; MV 505517
**0370882 001*** Auxiliary change-over contacts 4), simple, and pot. 2000 Ω, 1 W; 24 V; MV 505517
**0370882 006*** Auxiliary change-over contacts 4), simple, and pot. 1000 Ω, 1 W; 24 V; MV 505517
**0370883 001*** Potentiometer 2000 Ω, 1 W; 24 V; MV 505517
**0370883 006*** Potentiometer 1000 Ω, 1 W; 24 V; MV 505517

*) Dimension drawing or wiring diagram are available under the same number

1) Max. pushing force: 550 N or, with spring return, 1500 N
2) Degree of protection IP 54 only with Pg 16 cable screw fitting
3) On starting or after spring return operation
4) Infinitely variable; max. load 2 (1) A, 12...250 V~, min. load 250 mA, 12 V~

### Operation

On starting the unit for the first time (after applying power), or on re-starting the unit after the reset function has been triggered, there is a wait of 45 seconds for the reset function to become operable.
Depending on how it is connected (see wiring diagram), the actuator can be used as a continuous drive (0...10 V and/or 4...20 mA), a 2-point drive (open/close) or a 3-point drive (open/stop/close) with intermediate position. When control signals 1 (3u) and 2 (3i) are connected simultaneously, the input with the higher value has priority.
The running time can be matched to the requirements of the task using switches S1 and S2. The characteristic (equal-percentage, linear or quadratic) can be selected via switches S3 and S4.

#### Connected as a 2-point actuator

Opening/closing can be effected via two wires. Power is applied to the drive via terminals 1 and 2b. When power is connected to terminal 2a, the valve's control passage opens. When power is switched off, the drive goes to the opposite end position and closes the valve.

**Connected as a 3-point control unit**

By connecting power to terminal 2a or 2b, the valve can be moved to any position. The coupling rod extends and opens the valve if power is applied to terminals 1 and 2a. It retracts and closes the valve if power is applied to terminals 1 and 2b.

In the end positions (on hitting a stop in the valve or reaching the maximum stroke) or in the event of an overload, the electronic motor cut-off responds (no end switches). The direction of the stroke can be changed by swapping the power-supply wires over.

**Connections for control voltage 0...10 V and/or 4...20 mA**

The integrated positioner controls the drive as a function of the controller's positioning signal *y*.

The voltage signal of 0...10 V– is connected to terminal 3u and the current signal is connected to terminal 3i.

- Direction of operation 1 (mains power at internal connection 2a): the coupling rod extends and opens the valve (control passage) as the positioning signal rises.
- Direction of operation 2 (mains power at internal connection 2b): the coupling rod retracts and closes the valve (control passage) as the positioning signal rises.

The starting point and the control span are both pre-set.

There is a split-range unit available (as an accessory) for setting partial ranges (only for control signal 1).

After the emergency position has been implemented, or when there is a power failure, the drive re-adjusts itself automatically.

After power has been applied, the stepping motor moves to the upper stop in the valve, thereby determining the closed position. Depending on the control voltage, any stroke between 0 and 8 mm can then be obtained. Thanks to the electronics unit, no steps are lost, and the drive needs no periodical re-adjustment. Parallel operation of more than one drive of the same type is guaranteed.

If the power supply fails or is switched off, or the monitoring contacts are triggered, the retention magnet releases the gears and the tensioned spring puts the drive – depending on the variant – to the end position. In so doing, the drive's control function is blocked for 45 seconds so that the end position is attained. The reset function is retarded depending on the speed, so that no pressure surges can occur in the line.

The feedback signal $y_0$ = 0...10 V corresponds to the effective stroke of 0 to 8 mm.

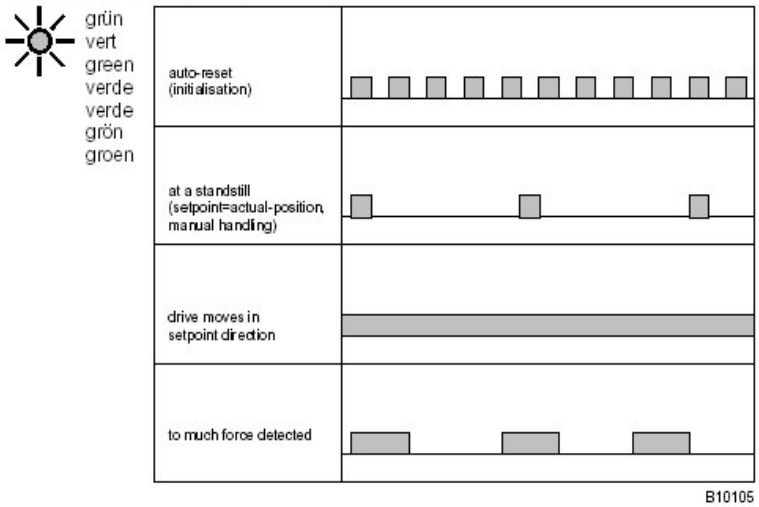
The valve's characteristic can be selected using the coding switch. The equal-percentage and quadratic characteristic can be created only if the drive is used as a continuous drive. Other switches enable the running times to be set. These can be applied irrespective of whether the 2-point, 3-point or the continuous function has been chosen.

**Coding switches**

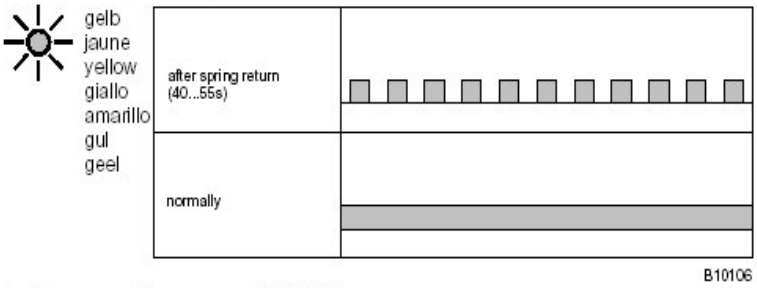
| | S1 | S2 |
|---|---|---|
| 120s | OFF | ON |
| 120s | ON | ON |
| 60s | ON | OFF |
| 60s | OFF | OFF |
| | ON | ON |

| | S3 | S4 |
|---|---|---|
| lin. | OFF | ON |
| lin. | ON | ON |
| = % | ON | OFF |
| $x^2$ | OFF | OFF |
| | ON | ON |

**LED indicator: normal operation**



**LED indicator: safety function**




Split-range unit (accessory 0313529)

The starting point Uo and the control span ΔU can be set using the potentiometer. This makes it possible to activate several regulating units in sequence or in cascade using the controller's control signal. If this accessory is fitted, it is not possible to fit any auxiliary contacts or a potentiometer.

**Engineering and fitting notes**

The ingress of condensate, drops of water etc. along the valve spindle and into the drive should be prevented.

The drive and valve are fitted together by hand, then the screws are tightened; no further adjustment is necessary. The drive is delivered ex works in the open or middle position.

On the 'normally closed' version, the distance piece must be removed once the valve has been fitted.

The idea of having a stepping motor and an electronics unit ensures that several actuators of the same type can be run in parallel.

The maximum number of accessories that can be fitted is one stroke indicator plus one additional accessory: auxiliary contacts, potentiometer or combination, or split-range unit.

The power consumption on starting is relatively high. It occurs only on a cold start or after the spring return has been activated and lasts max. 1 sec. A random delay of up to 20s is fitted in the drive so that, if several drives are run in parallel, they do not all cut in at the same time. Depending on the length of the cable, the cross-section of the cable or the transformer rating should be chosen accordingly:-

| Length of cable | Cross-section of cable | Transformer rating |
|---|---|---|
| Max. 30 m | 0.75 mm² | 30 VA |
| Max. 60 m | 1.5 mm² | 30 VA |
| Max. 100 m | 1.5 mm² | 50 VA |

**Additional technical information**

Transparent cover without lever for manual adjustment. The black housing holds the stepping motor and the electronic control unit. Underneath is the maintenance-free gear unit, the spring and the retention magnet. By breaking out a pre-scored circle in the housing, it is possible to create an aperture to fit a second Pg 16 cable screw fitting.

Auxiliary change-over contacts

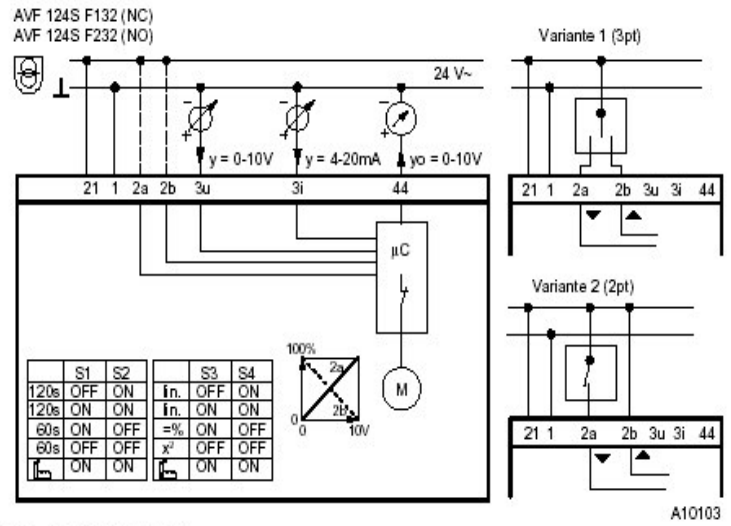
Switch rating: max. 230 V a.c.; min. current 20 mA at 20 V

Switch rating: 4...30 V d.c.; current 1...100 mA

**CE conformity**

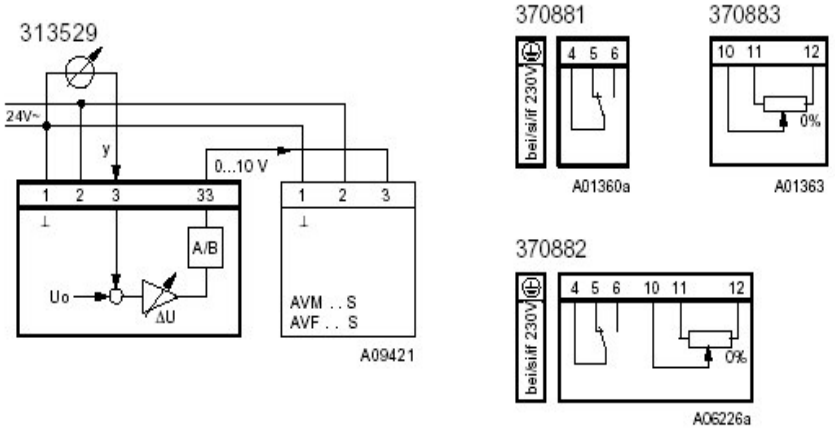
| | | |
|---|---|---|
| EMC directive 89/336/EC | Machine directive 98/37/EC/I/B | Low-voltage directive 73/23 EC |
| EN 61000-6-1 | EN 1050 | EN 60730 1 |
| EN 50081-1 | EN 292 | EN 60730-2-14 |
| EN 61000-6-2 | | Excess-voltage category III |
| EN 50082-1 | | Degree of contamination II |
| | | Excess-voltage category II |

## Wiring diagram

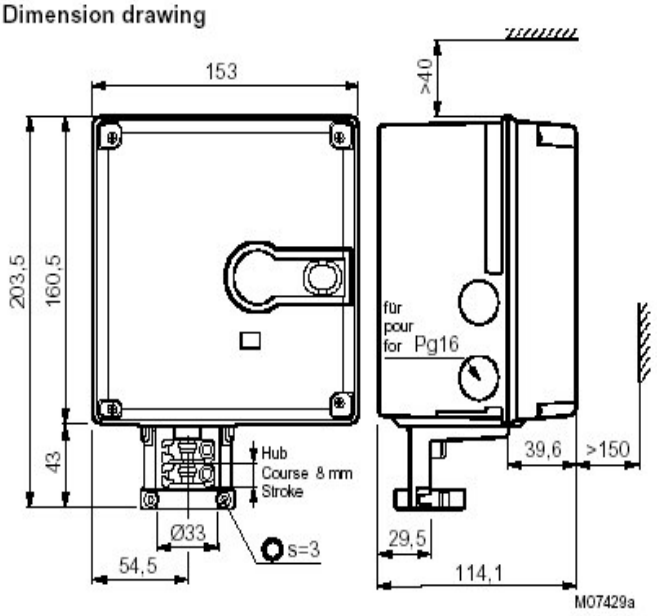



NC = normally closed
NO = normally open

## Accessories




## Dimension drawing



### 4.3 General Pump Detail

**Grundfos UPS series**
The pump is of the canned rotor type, i.e. the pump and motor form an integral unit without a shaft seal and with only two gaskets for sealing. The bearings are lubricated by the pumped liquid.

In order to avoid problems in connection with disposal, great importance has been attached to using as few different materials as possible.

The pump is characterized by:
* Three speed motor
* Ceramic radial bearings.
* Carbon axial bearing.
* Stainless steel rotor can, bearing plate and rotor cladding.
* Aluminium alloy stator housing.
* Cast iron pump housing.
* Stator with built-in thermal switch.

Liquid:
Minimum liquid temperature: 10 deg C
Maximum liquid temperature: 120 deg C

Technical:
Approvals on nameplate: CE,B

Materials:
Material, pump housing: Cast iron
Material, pump housing: 0.6025 DIN W.-Nr.
Material, pump housing: 35 B - 40 B ASTM
Material, impeller: Stainless steel
Material, impeller: 1.4301 DIN W.-Nr.
Material, impeller: 304 AISI

Installation:
Minimum ambient temperature: 0 deg C
Maximum ambient temperature: 40 deg C
Maximum operating pressure: 10 bar
Standard, pipe connection: DIN
Size, pipe connection: DN 40
Pressure stage, pipe connec.:PN 6 / PN 10
Port-to-port length: 250 mm

Electrical data:

Mains frequency: 50 Hz
Enclosure class (IEC 34-5): 44
Insulation class (IEC 85): H

## 4.4 Variations

### Single phase & Three phase industrial versions.

These versions are generally used in harsher environments and where higher pump duties require electric motors with larger running currents.
The units are housed in sheet steel sloping topped enclosures finished in RAL 7032 grey, and fitted with door interlocked isolators. The controller front panels are mounted in the sloping tops for ease of use. The back printed circuit boards are mounted inside the enclosure with the control gear.

The controller operation and features are the same as the HT Breeze range.
The main differences being that the pump motor supplies are switched by contactors and protected by thermal magnetic overloads. The panel control circuit and individual pump power supplies are separately protected.
The overload units are factory set to the pump full load currents. They should be checked and altered or changed if a pump replacement takes place, and initiated by pushing the appropriate manual motor starter start buttons before putting into service. The overload settings are altered by adjustment of the graduated dial on the front of the device.

### Setting the DIP switches

Remove the controller facia bezel screws lift and turn the board over. The DIPswitches are mounted on the underside and are set in the same way as the instruction and table on page 14.

### Connections

The lower control board connections are as follows for the single and three phase industrial versions