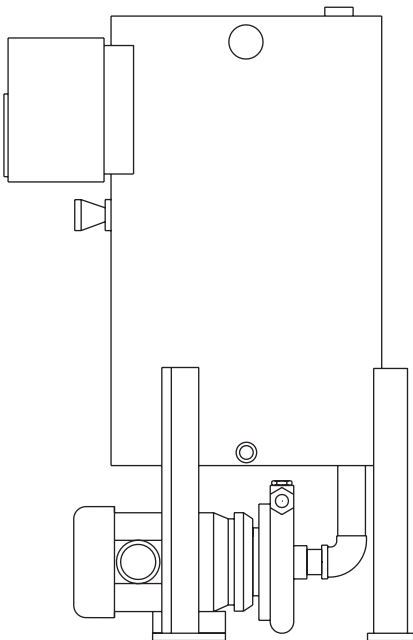


M Series

Condensate Recovery Unit

Installation and Maintenance Instructions



1. Safety information
2. General product information
3. Installation
4. Wiring diagram
5. Operation and commissioning
6. Maintenance
7. Spare parts
8. Fault finding

1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application.

The products listed below fully comply with the requirements of the Pressure Equipment Directive (PED), ATEX Directive (ATEX) and carry the  and  marks when so required.

The products fall within the following Pressure Equipment Directive categories:

Product	Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
M Series	-	2	-	SEP

Product marking per ATEX Directive  II 2G CT3.

- i) The product has been specifically designed for use on condensate which is in Group 2 of the Pressure Equipment Directive.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure.

Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person.

Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety and who has had specific training on pressurised systems.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of these products may reach temperatures of 200 °C (392 °F).

These products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

2. General product information

2.1 Description

The Spirax Sarco M series is a compact packaged condensate recovery unit designed for relatively small loads. It comprises a vertical receiver with single close-coupled motor pump and control gear pre-wired and ready for use.

Standards

This product fully complies with the requirements of:

- Machinery Directive
- Low Voltage Directive
- Electromagnetic Compatibility Devices Directive

This product is not a pressurised vessel and therefore does not need to comply with the Pressure Equipment Directive (PED).

Certification

The product is available with material certification to EN 10204 2.1 and EN 10204 2.2.

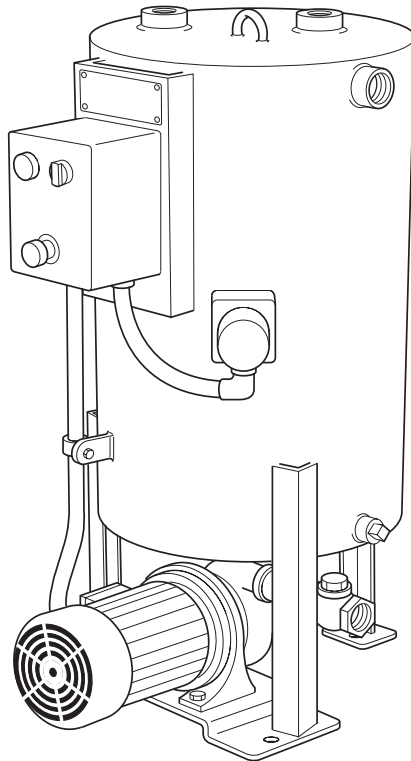


Fig. 1 M series pump

2.2 Construction

Receiver

Steel construction, hot dip galvanised. Designed for vented operation but pressure tested to 2.1 bar (30.45 psi). Alternatively is a mild steel receiver painted externally with two coats of primer is available on request.

Pumps

Pumps are designed to operate under conditions of extremely low NPSH. Close-coupled motor pump with cast iron casing and gunmetal impeller having a stainless steel shaft and a suitable mechanical seal. 2 850 rpm motor suitable for 380/415 volt 3 phase 50 Hz supply. TEFV IP55 enclosure with Class 'F' insulation utilizing Class 'B' temperature rise only.

Control gear

Float operated magnetic level switch pre-wired to control panel with the enclosure mounted on a stand-off bracket. Enclosure houses contactor starter with overload and single phasing protection. A rotary 'Hand/Off/ Auto' selector provides manual control for test or maintenance. The control gear enclosure is pre-wired in a flexible conduit to the motor pump terminal box.

Warning: Customer electrical supply must contain suitable fuse protection.

2.3 Electrical details

Unit	M0207	M2107	M211
kW rating	0.75	0.75	1.10

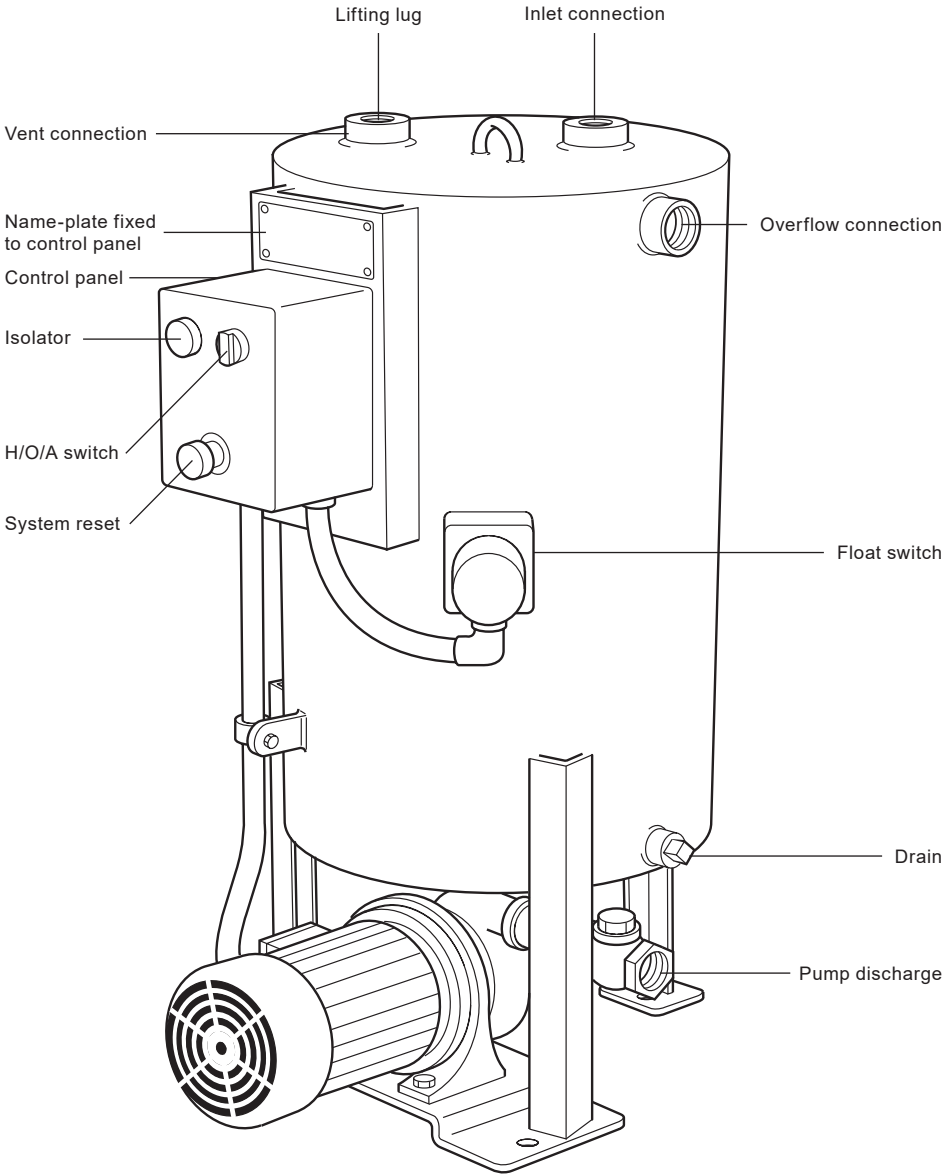
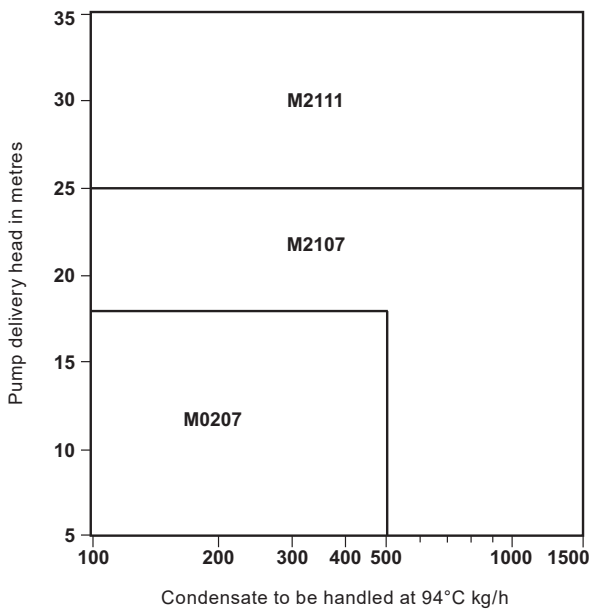
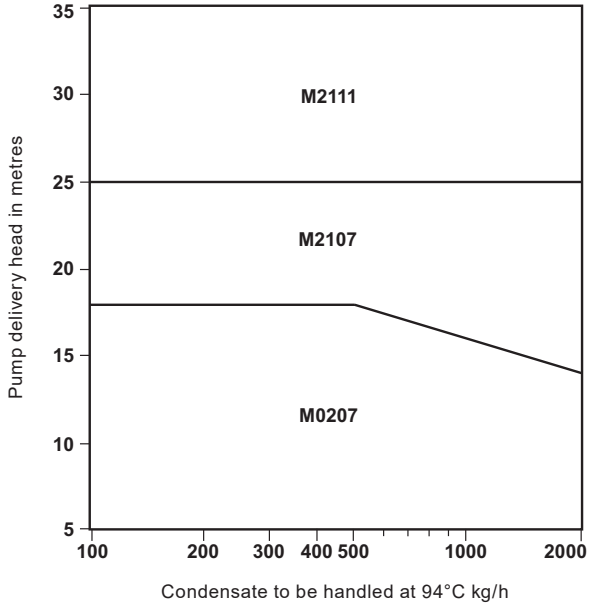


Fig. 2 M series pump

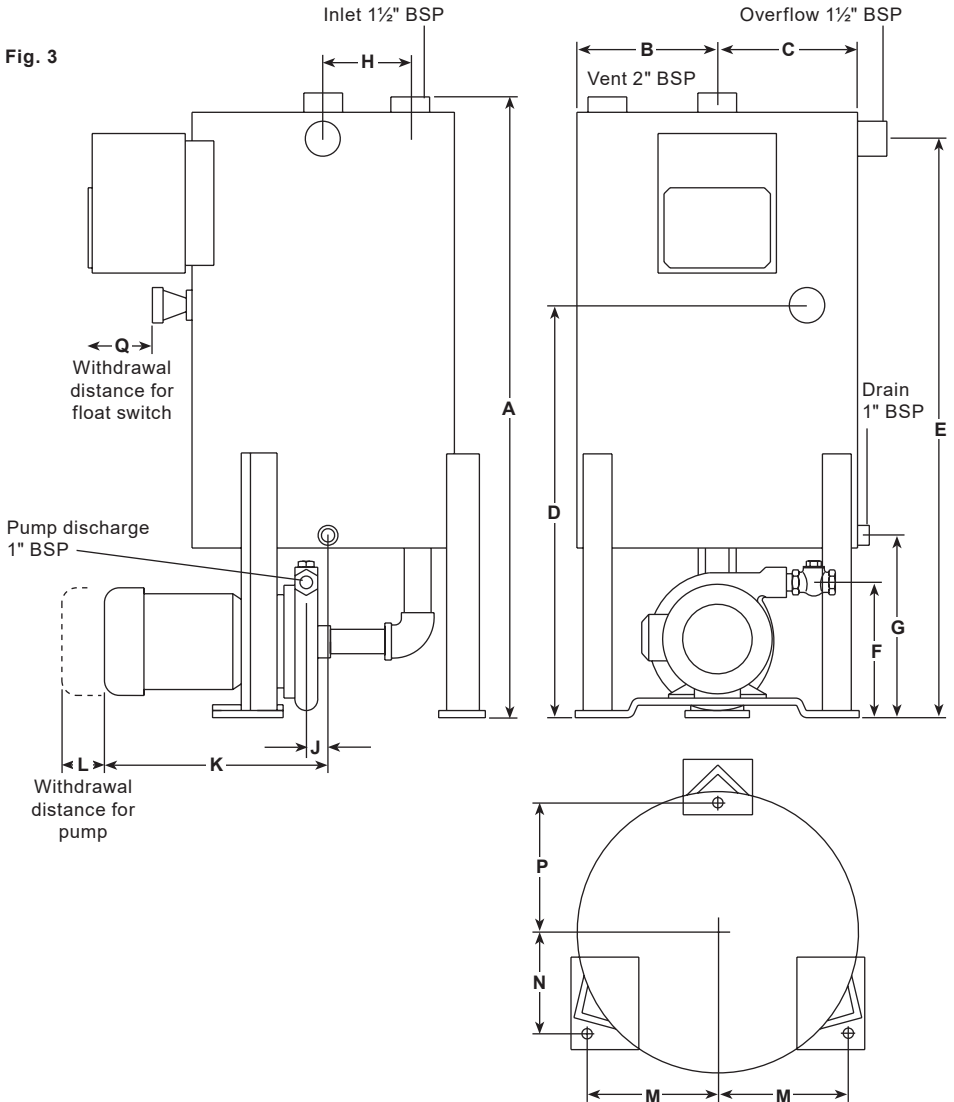
2.4 Sizing charts



2.5 M0207 Dimensions/weights (approximate) in mm and kg

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	Weight
1075	240	260	665	1005	215	320	150	25	380	200	220	195	220	700	95.0

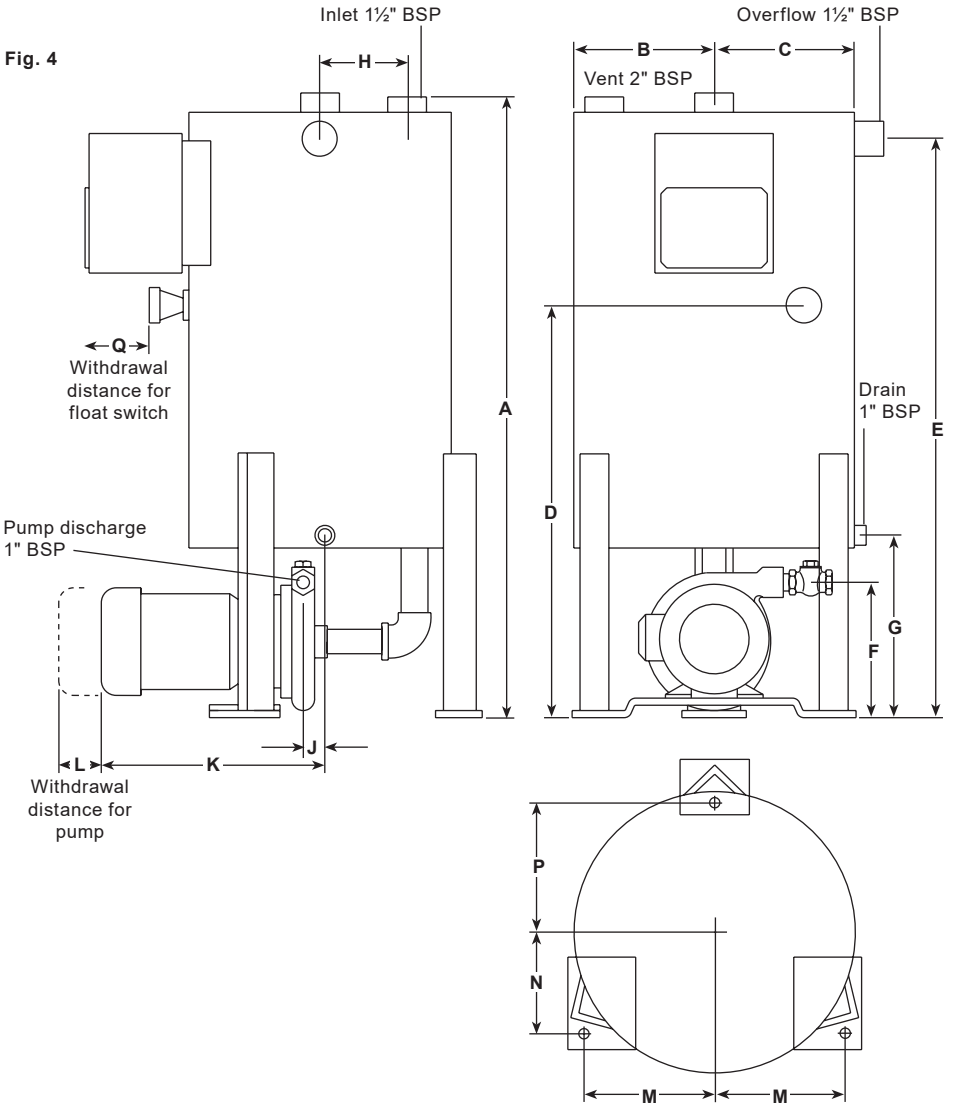
Note: these figures are for guidance only and not to be used for design purposes.



2.6 M2107 and M2111 Dimensions/weights (approximate) in mm and kg

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	Weight
1075	240	260	665	1005	235	320	150	25	380	200	220	195	220	700	95.0

Note: these figures are for guidance only and not to be used for design purposes.



3. Installation

Note: Before actioning any installation observe the 'Safety information' in Section 1.

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation:

- 3.1 On receipt of the unit**, check to ensure that all the equipment has been received and is undamaged. Items sent loose are placed in a separate carton for safety.
- 3.2 Fitting:** The pump suction pipework incorporates a resilient coupling, avoiding expansion stresses and facilitating pump removal. A 1" BSP bronze non-return valve is fitted to the pump delivery. Installation requires only connection of the inlet, vent, overflow and discharge pipework, and wiring between the customers supply isolator and the control gear enclosure. With the selector turned to 'Auto' the unit operates to match demand without attention.
- Note:** It is recommended that a lockshield valve should be fitted in the delivery pipework so that, in the event of the system head being substantially less than the unit head, the valve may be adjusted to increase the system head, thus reducing possible cavitation and noise.
- 3.3 Check** materials, pressure and temperature and their maximum values. If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure that a safety device is included in the system to prevent overpressurisation.
- 3.4 Determine** the correct installation situation and the correct direction of fluid flow.
- 3.5 Remove** protective covers from all connections.
- 3.6 Installation** - Position the unit on the floor and bolt it down, ensuring that sufficient space is left for insertion and withdrawal of the level control float switch (see Section 2.5).
- 3.7 Piping** - Pipework connected to the receiver and pump(s) must be free from all stresses such as could be caused by expansion and inadequate support. A union should be fitted directly after the pump discharge non-return valve to simplify maintenance and a fullway valve in the delivery pipework so that the unit may be isolated and the system head adjusted to match the pump discharge head, if required.
- 3.8 Electrical wiring** - The standard unit is designed to operate from 380 /415 volts, 3 phase, 50 Hz, 4-wire supply with fuses fitted by customer prior to control panel.

Typical wiring diagrams can be seen in Section 4, more detailed diagrams can be found enclosed in the control panel.

To provide adequate electrical protection for the pump motors, all starters incorporate protection from single phasing. If starters are provided from other sources it is essential that this feature is included within their scope.

The normal scope of supply does not include an emergency stop switch which can be included during the electrical installation if required.

It is important to note, that notwithstanding any instructions contained herein, the electrical circuit, wiring procedures and installation must meet any National or Local standards which are in force.

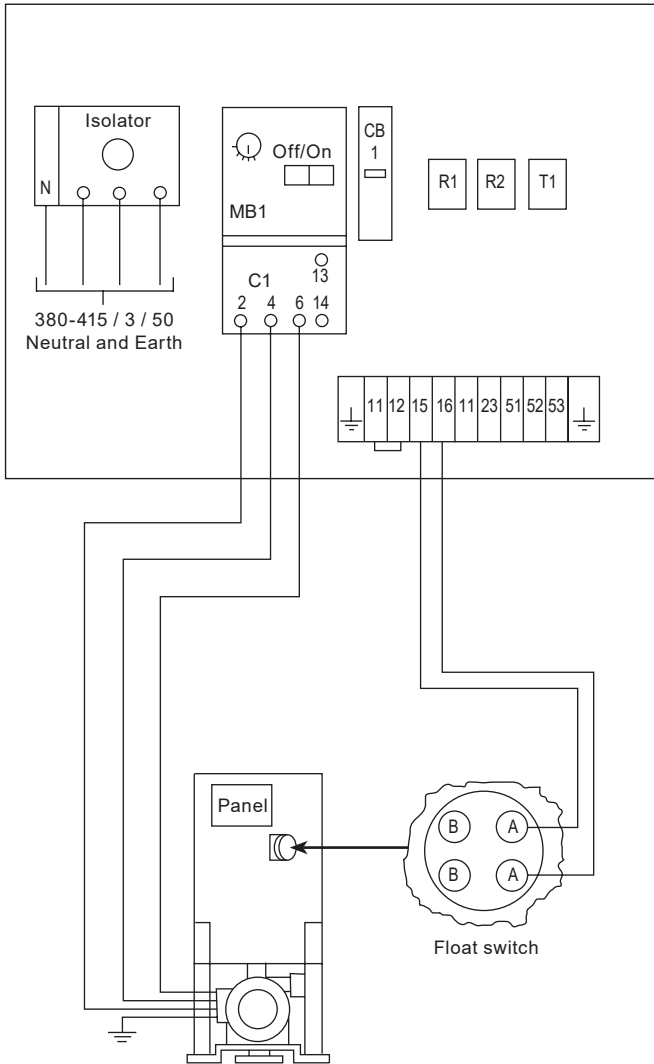
- 3.9 Receiver connections** - Connect the receiver as shown in Section 2.5.

Remember the receiver is not a pressure vessel and must be vented to atmosphere. The vent pipework should be adequately sized and arranged to drain back to the receiver. The overflow should be via an inverted syphon close to the vessel and, if necessary, protected against freezing.

4. Wiring diagram

M Series single pump control panel connection diagram

Fig. 5



Notes:

1. Volt free contacts:- 13 and 14 on contactor (normally open contacts).
2. Volt free contacts:- 51, 52 and 53 common fault alarm pump trip /H.L.A.
3. Remove link, and connect emergency stop to terminal block connections 11 and 12.

5. Operation and commissioning

After installation or maintenance ensure that the system is fully functioning. Carry out tests on any alarms or protective devices.

1. Ensure that the starter 'Hand /Off/Auto' switch is turned to the 'Off' position.
2. Fill the receiver to ensure that there are no leaks.
Note: Open pump isolating valve(s) slowly, to safeguard pump mechanical seals and discharge valve(s).
3. Ensure that the emergency stop button is disengaged if fitted.
4. Press the panel system reset button.
5. Turn the 'Hand /Off/Auto' switch to 'Hand' to check the direction of rotation pump, anticlockwise looking from pump to motor, then switch 'Off' immediately.
6. Turn the 'Hand /Off/Auto' switch to 'Auto'. The pump should start when the receiver is full, and stop when the receiver empties.
7. Check to see that the pump switches 'Off' automatically as the condensate level drops.
8. Operate emergency stop to confirm function if fitted.
Note: The pump must not restart on release until the panel system reset button is pressed.
9. In the event of the system head being substantially less than the specified head, the valve in the delivery pipework should be adjusted to increase the system head thus reducing possible cavitation and noise.
10. Check for leaks and correct operation.

6. Maintenance

Note: Before actioning any maintenance observe the 'Safety information' in Section 1.

6.1 General pump removal

To remove a pump, close the isolating valve in the discharge pipework, disconnect the electricity supply and proceed as follows:

- Loosen and remove the bolts between the pump and the base plate.
- Disconnect the pump discharge pipework by breaking the union between the non-return valve and the isolation valve.
- Back off the elbow gland nut on the inlet side.
- Pull the pump backwards to clear the inlet pipe from the elbow and remove the pump.

6.2 Running the pump and routine maintenance

Make certain the pump is free by rotating the shaft. If the pump will not turn, remove volute to free impeller. Check to see that the rotation is correct, i.e. anticlockwise when looking from the pump to the motor. Motor bearings are grease packed for life. Pumps are fitted with self-adjusting mechanical seals, which require no attention under normal conditions.

Warning: These pumps must not under any circumstances be run dry or damage to the mechanical seals will result.

Item	Qty	Description
1	1	Impeller
2	1	Volute casing
3	1	Seal housing
4	1	Joint ring
5	1	Impeller washer
6	1	Shaft extension
7	1	Pin
8	1	Impeller key 5 mm sq
10	4	Vent/drain plug ¼" BSPT
11	1	Mechanical seal
12	4 or 8	Stud M8 x 20
13	4 or 8	Nut M8
14	4	Skt Hd cap screw M10 x 35
21	1	Pump adaptor
22	3	Skt Hd cap screw M8 x 18
23	1	Hex set screw M8 x 16
24	1	Guard adaptor
25	1	Skt Hd cap screw M8 x 10
26	4	Nut M10

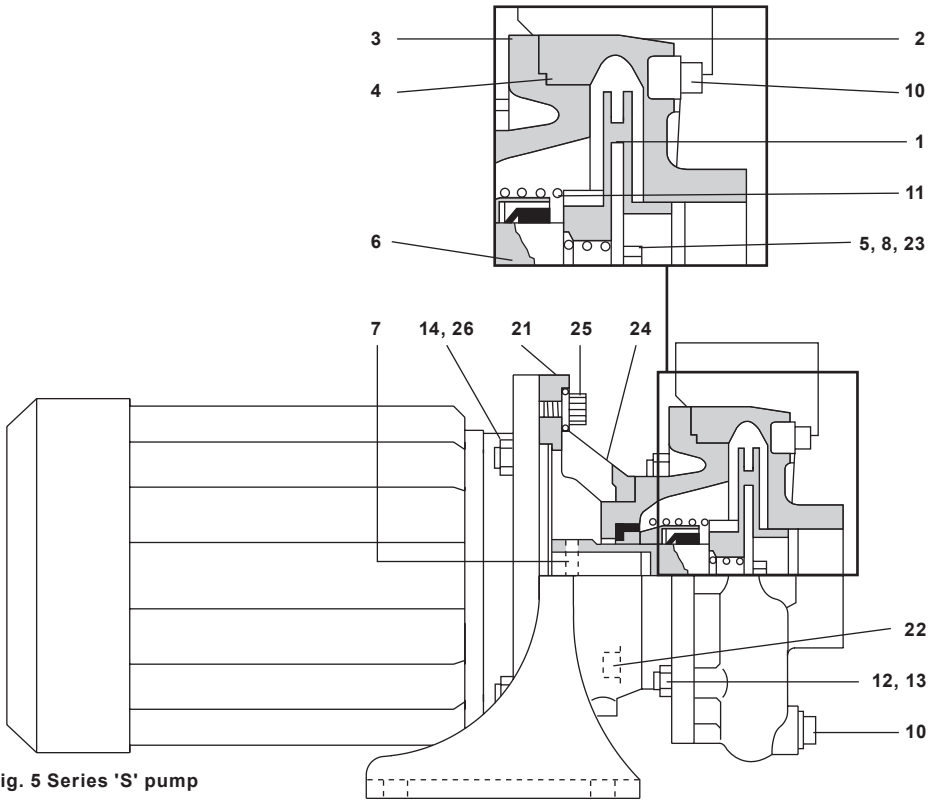


Fig. 5 Series 'S' pump

6.3 Dismantling for replacements - Series 'S' centrifugal pump

(refer to Figure 5):

- To dismantle, separate the volute (2) from the seal plate (3), unscrew the impeller bolt (23) (RH thread), remove the impeller washer (5) and pull off the impeller (1).
- The rotating seal element can now be withdrawn from the shaft, and the stationary seat pulled from its rubber mounting in the seal plate.
- Always fit a new mechanical seal. Ensure that no dirt or grit is present on either seal face and that the shaft is undamaged and free from burrs.
- The bore of the rotating element should be lightly lubricated with Swarfega or similar to enable it to slide freely along the shaft. Caution: Do not use oil or grease.
- If it is necessary to replace the shaft extension, first detach the motor from the pump base, then tap out the drive pin with a drift, supporting the shaft to avoid damage to the motor bearings. If the shaft extension resists removal, heat it quickly to approximately 150 °C (302 °F) and pull it off with a twisting motion. Clean both motor shaft and extension bore and apply Loctite Studlock 270 or similar before reassembly. Always use a new drive pin and volute joint ring.

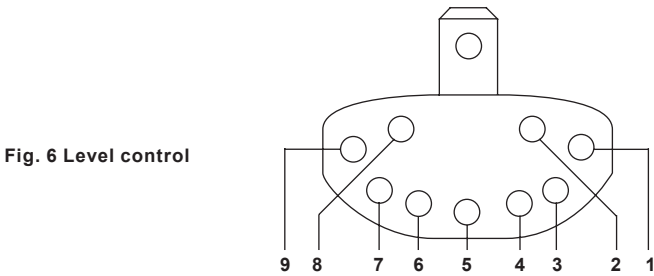
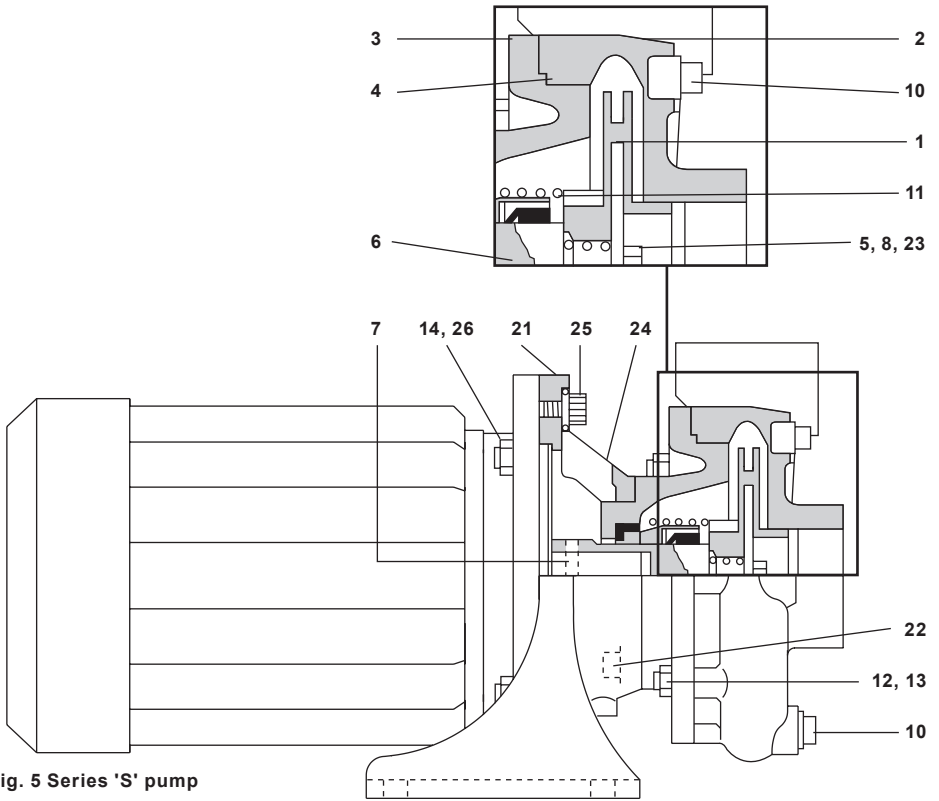
6.4 How to replace a pump:

- a. Position the pump on to the baseplate.
- b. Loosely replace the holding down bolts.
- c. Tighten the inlet elbow gland nut.
- d. Replace the union on the outlet.
- e. Tighten the holding down bolts.

6.5 Level control by float switch:

- To remove the float control, isolate the electric supply, ensuring that the receiver is empty and remove the level control.
- The operating differential may be adjusted by altering the position of the stops on the multi-hole limit plate (see Figure 6). The normal stop positions are 1 - 9. These settings should be used if the stops are inadvertently removed or if a replacement float switch is to be fitted.
- After adjustment, offer the level control up to the receiver and, by moving the float, check the differential and make sure that it does not foul either the top or bottom of the receiver or that the movement is too small which will result in excessive cycling of the pump.
- Full mounting and service instructions are supplied with each level control.

Item	Qty	Description
1	1	Impeller
2	1	Volute casing
3	1	Seal housing
4	1	Joint ring
5	1	Impeller washer
6	1	Shaft extension
7	1	Pin
8	1	Impeller key 5 mm sq
10	4	Vent/drain plug ¼" BSPT
11	1	Mechanical seal
12	4 or 8	Stud M8 x 20
13	4 or 8	Nut M8
14	4	Skt Hd cap screw M10 x 35
21	1	Pump adaptor
22	3	Skt Hd cap screw M8 x 18
23	1	Hex set screw M8 x 16
24	1	Guard adaptor
25	1	Skt Hd cap screw M8 x 10
26	4	Nut M10



7. Spare parts

In the event of spares being required, please contact, in the first instance:

Spirax-Sarco Ltd.,
Charlton House,
Cheltenham,
Glos,
GL53 8ER
Tel: 01242 521361

Quoting the serial number of the condensate recovery unit.

8. Fault finding

Fault	Probable cause	Remedy
Low capacity	1. Incorrect direction of rotation.	1. Rotation should be anticlockwise looking from pump to motor. To reverse, change over two of the phase leads.
	2. Suction valve partially closed.	2. Open valve fully.
	3. Delivery valve partially closed.	3. Adjust valve by the required amount to prevent cavitation.
	4. Excessive temperature of condensate.	4. Check against temperature specified.
	5. Excessive friction loss in condensate return line to hot well.	5. Check that combined friction loss and static head do not exceed pump generated heat.
Cavitation	1. Suction valve partially closed.	1. Open valve fully.
	2. Insufficient pump discharge head.	2. Adjust delivery valve to increase head.
	3. Excessive condensate temperature.	3. Check against temperature specified.
	4. Impeller partially blocked.	4. Remove pump and clear impeller.
Frequent cycling	1. Float switch defective.	1. Remove and check that all parts operate freely.
	2. Float switch incorrectly set.	2. Adjust to give the required differential.
Overload	1. Delivery head too low	1. Adjust delivery valve to increase resistance. Do not close it completely.
	2. Incorrect motor wiring/connections in terminal box.	2. Check connections against wiring diagram inside terminal.
	3. Incorrect rotation.	3. Check rotation is anticlockwise looking from pump to motor.
	4. Mechanical rub.	4. Check for blockage in pump.
	5. Overloads incorrectly set.	5. Reset to motor full load current.

