

READ AND SAVE THESE INSTRUCTIONS

Key to be removed from door and retained by maintenance engineer

Vapac®

**Minivap
Humidifier**

Model LDV4/LDV4-S



**Please read these instructions
BEFORE
installation and start-up.**

Failure to observe manufacturers recommendations may invalidate warranty.

**Vapac reserve the right to change the design or
Specification of the equipment described in this manual without prior notice.**

Minivap

Positioning the Minivap unit

DO's

DO mount the unit indoors.

DO mount the unit close to the steam nozzle position.

DO ensure adequate service access to the front of the unit -min. 700mm (2'3").

DO remove the cylinder to gain access to the mounting holes in the back of the steam section.

DO use M6 projecting type wall bolts or equivalent to mount the unit in position.

DON'Ts

DON'T install the unit close to sources of strong electromagnetic emissions e.g. variable speed lift motor drives, KVA transformers, etc.

DON'T mount unit in an unventilated enclosure.

DON'T mount in a position requiring ladder access to the unit.

DON'T install the unit behind a false ceiling or other situation where an unusual malfunction (e.g. water leak) would cause damage.

DON'T install the unit in an area which will be hosed down.

DON'T install the unit where the ambient air temperature can exceed 35°C (95°F).

DON'T mount the unit inside a cold-room or other place where temperature and humidity conditions can cause condensation on electrical components.

DON'T mount the unit where the sound of a contactor opening/closing and water flow in a pipe would be unacceptable e.g. libraries, private apartments, etc.

DON'T place any object in front of an RDU (if used) where humidity conditions can cause condensation.

DON'T mount on a duct or plenum.

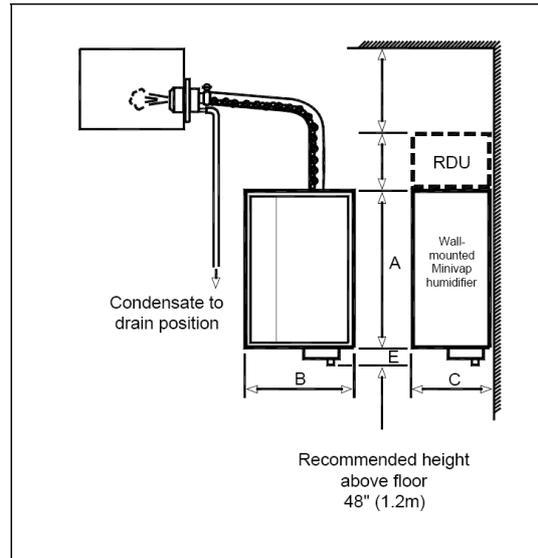


Figure 1: Reference Dimensions

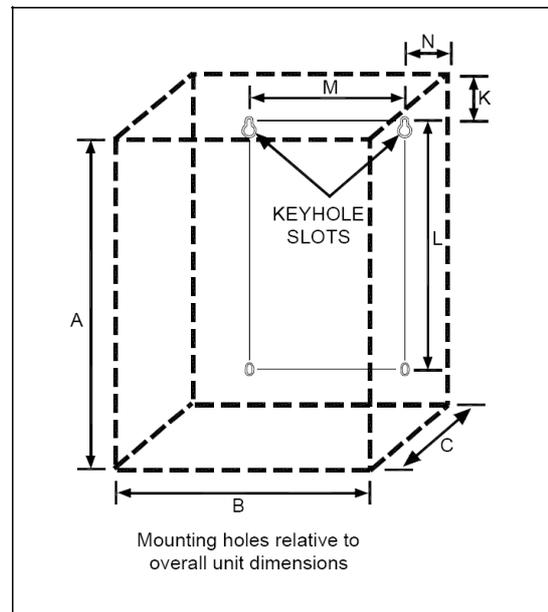


Figure 2: Mounting Holes

Table 1: Reference Dimensions

Reference	Inches (approximate)	mm
A	19 ¾	500
B	12 ¾	325
C	9	230
E	2 ½	65
K	2 ¾	70
L	13 ¼	335
M	5	125
N	2	53

Minivap

Plumbing - Cold Water Connections

DO's

- DO** connect only to normal town piped water supplies.
- DO** install a stop-valve/shut-off valve and a strainer close to the unit.
- DO** provide a water supply with sufficient pressure and pipe size to ensure an adequate flow rate to the unit - 1.2 litres/min (0.3 US gal/min).
- DO** use the flexible water connection provided.
- DO** thoroughly flush through new pipework before connecting to the unit.

DON'Ts

- DON'T** connect to a water supply that has been softened using a salt exchange system (sometimes called base exchange or ion exchange system).
- DON'T** connect to demineralized water supplies.
- DON'T** over tighten the water supply connection with a wrench or spanner- a flexible connection with nylon nut with washer is provided to allow a firm hand-tightening - if water seepage occurs, undo the nut to wipe the washer clean and then re-seat it.

Plumbing - Drain Connection

DO's

- DO** use copper pipe or plastic pipe rated for 100°C (212°F).
- DO** arrange to discharge drain water from the unit into a vented and trapped drain at a position where flash steam rising from the drain line tundish will not pose a problem for the Vapac or other equipment.
- DO** provide adequate fall for the drain pipework to allow free flow of water drained from each unit.
- Do ensure drain line pipe size will accommodate water being drained at the same time from other equipment connected to it.

General

- DO** ensure metal drain and supply water pipework is grounded electrically close to the unit.

Water quality:

Hardness: 50 - 500 ppm (3 - 30 gr/US gal.)

Conductivity: 80 - 1000 micrSiemens/cm

Water Pressure: 0.3 - 8 bar (5 - 120 psig)

Water Flow Rate: 1.2 litres/min. (0.3 US gal/min)

Drain Flow rate: 4.5 litres/min. (1.2 US gal/min)

- a) Tundish fill-cup
- b) Steam cylinder
- c) Drain pump
- d) Drain trap
- e) Feed valve with flow restrictor
- f) Feed/Drain manifold
- g) Water connection 3/4"
- h) Flexible connector with 3/4" nut at both ends
- j) Strainer
- k) Stop valve
- l) Ø35mm (1 3/8" steam hose + hose clips
- m) Ø35mm (1 3/8" copper pipe + support Tundish

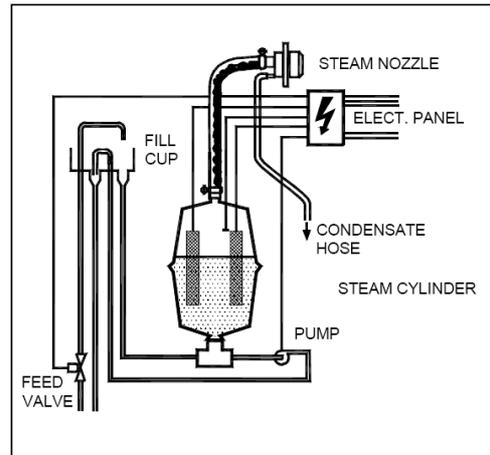


Figure 3: Plumbing – Drain Connection

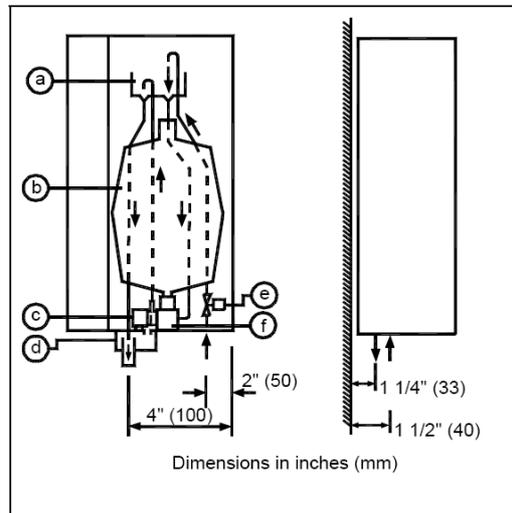


Figure 4: Positions of Water and Drain Connections

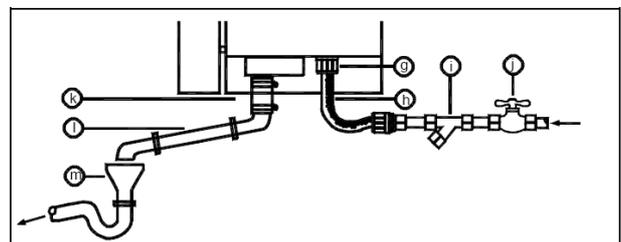


Figure 5: Plumbing Connections

Minivap

Nozzle Installation

General positioning:

The position of the nozzle in the air-conditioning system relative to other items- bends, filters, heat exchangers, etc., is critical and must be decided by the design engineer responsible for the project.

DO's

DO obtain project engineer's instruction/drawing for chosen location of pipe.

DO obtain project engineer's instruction/drawing for pipe position relative to the top & bottom of the duct (or sides if airflow is vertical).

Steam Hose Connection

DO's

DO use steam hose/copper pipe of equivalent size to the steam cylinder outlet dia. 22mm (7/8").

DO use Vapac steam hose or well insulated copper pipe.

DO keep steam hose as short as possible - under 2m (6ft) for max efficiency.

DO arrange to have a vertical rise immediately over the unit of 300 mm (1 ft).

DO use the full height available between unit and steam nozzle to provide maximum slope (min 12-20% for condensate to drain back to the steam cylinder (or down to a condensate separator). Always provide a continuous slope.

DO provide adequate support to prevent sagging.
- fit pipe clips every 30-50cm (12"-20") support straight lengths on cable trays or in heat resistant plastic pipe.

DO use a Vapac condensate separator or simple trapped pipe connection to drain off condensate from extended steam lines.

DO ensure radius hose bends are fully supported to prevent kinks developing when in service.

DO add extra insulation to steam hose for longer runs (2m-5m (6ft-15ft) and in cold ambient conditions to avoid excess condensate and reduction in delivered output.

DO arrange for the condensate from the steam nozzle to be discharged into the tundish installed for the drain water from the humidifier. Use 6mm (1/4) diameter (100°C / 212°F rated) tubing to connect to 6mm (1/4") copper pipe or to discharge direct into the tundish.

DON'Ts

DON'T allow steam hose to develop kinks or sags.

DON'T include horizontal runs or 90° elbows in the steam line.

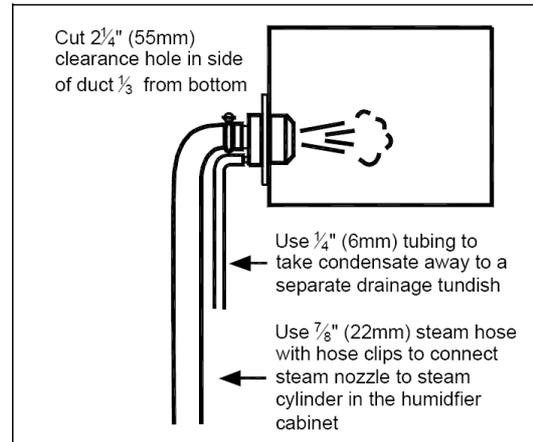


Figure 6: Steam nozzle installation

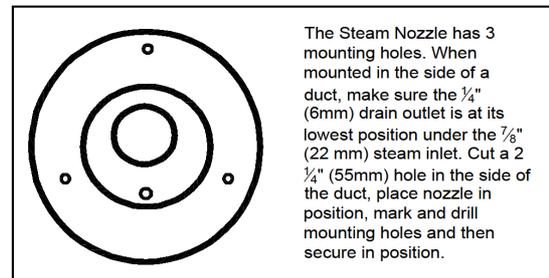


Figure 7: Steam nozzle mounting holes

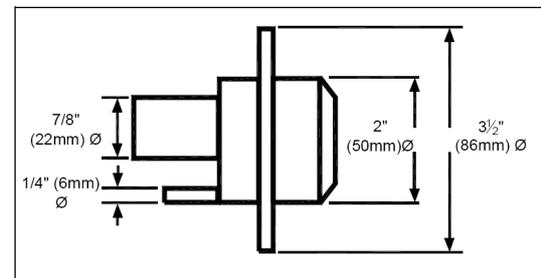


Figure 8: Vapac Steam Nozzle

Minivap Electrical Connections

The wiring to the Minivap should be done by a qualified electrician and the external overcurrent protection and wiring should comply with the appropriate Regulations and Codes of Practice. The standard Minivap unit is designed to suit 240V single phase electrical supply. Note: Minivap units for USA/ Canada are fitted with UL/CSA rated dual Voltage transformer and have supply Voltage options 240V and 120V. As standard, the unit is connected for 240 V electrical supply. For 120 V remove transformer link between H3 & H2 and fit links between H1 & H3 and H2 & H4.

External protection

A 25A fused disconnect or MCB should be used in the electrical supply to the unit and this should be located adjacent to the Vapac cabinet or within easy reach and readily accessible.

Minivap Terminals (see Fig.11)

Terminals 1 and 2 are for the power supply connections. Terminals 3 and 4 are for 24Vac supply for Vapac Supplied Hygrostat. Terminals 5 and 6 are for the external control circuit connections.

Important: the external wires connected to these two terminals (5 & 6) must be Volt-free.

Terminals A and B are for connection of an RDU (Room Distribution Unit). **Note: An RDU can only be used with units connected to 208V or 240V.**

Control Circuit Connection

The Minivap can be operated by a single step humidistat / hygrostat which has Volt-free contacts.

Note 1: This circuit operates at 5V dc provided by the Minivap PCB.

Note 2: Minivap terminals 3 & 4 must NOT be used for security circuit purposes.

Security circuit

When a high limit humidistat, interlock or airflow switch are in use, these should be wired to interrupt the power supply to the Minivap unit either indirectly or directly.

Cable entry

Cable glands are provided and must be used to ensure cables are held securely at the entry position.

Output Reduction

Using a very small-bladed screwdriver, the output of the Minivap can be reduced by a small adjustable potentiometer mounted on the control PCB 1150608. The adjustment range is approximately 50%-1 00% of the full output which is set by a resistor plug called the Current set Plug or CSP located centrally on the control PCB The full output current is marked on the CSP.

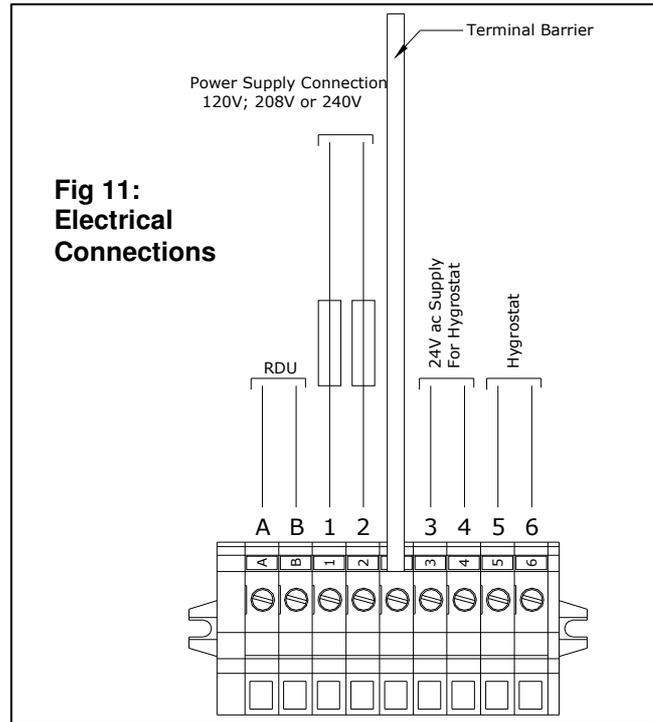


Fig 11: Electrical Connections

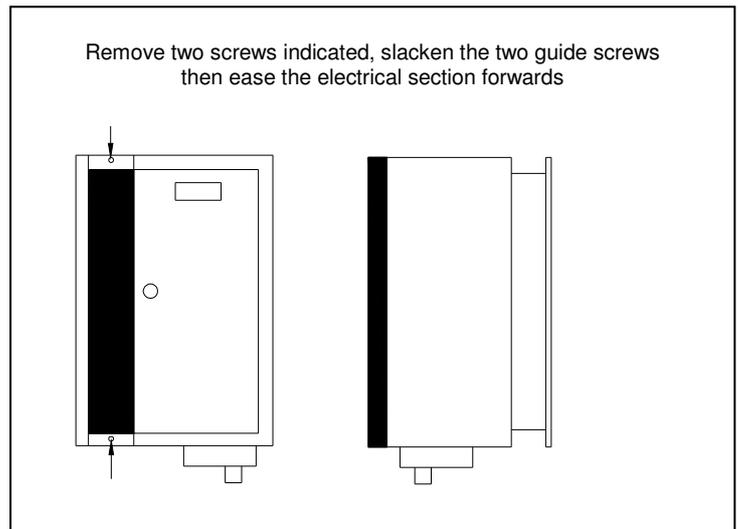


Fig 12: Opening of the Electrical Section

Making the electrical connection

Releasing the electrical section:

To make the electrical connections to the unit it is necessary to detach the electrical section. To do this, open the door, disconnect the hose and the electrode caps from the steam cylinder, then remove the steam cylinder from the cabinet by lifting R out the manifold.

Next undo and remove the two screws which hold the electrical panel to the outer cabinet (see Fig.2) and ease the whole electrical section forward (see Fig.3) to disengage R from the locating slots in the back panel.

Then undo the two holding screws to release K from its top and bottom runner. The electrical panel is then free and can be rested at an angle within the cabinet (see Fig.4) to allow the wiring connections to be made to the terminal block.

Completing the connection:

Remove the knock-outs in the top and/or side (for Minivap with RDU) and fit the glands provided. Pass the cables through the cable glands, make secure connections to the appropriate positions of the terminal block then tighten the cable glands.

Note: If an RDU is fitted there is a smaller knock-out on the top and a hard plastic grommet provided for the fan motor loads.

On completion re-attach the electrical panel to its runners, slide R back and secure in position before replacing and reconnecting the steam cylinder.

Important:

When replacing the cylinder make sure its O-ring seal and capping ring are in position on the manifold

The position for the white cap (for the water level sensing electrode) is marked by a label saying 'White', the electrode cable no. 1 must be put on the electrode nearest to the white cap.

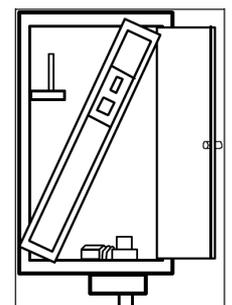


Figure 13

Minivap

Start-Up Instructions

With installation, plumbing and electrical connection complete: Turn on the water supply to the Minivap. Close the fused disconnect or circuit breaker on the electrical supply to the Minivap.

Put On/Off switch on fascia panel to position 1. The Minivap is now ready to operate when the humidistat/ hygrostat switches the unit On.

Commissioning / Start-Up

With the correct electrical and water connections completed, the Minivap unit can be switched on. When the humidistat/hygrostat switches, electrical power is applied to the electrodes and cold water flows into the cylinder. The Minivap programme arranges for the water to be introduced in stages until the full operating current is reached. The level of electrical current depends on the minerals present in normal town Water supply. It is unlikely that the full operating current will be reached when the cold water first enters the cylinder, in this case, the cold water feed valve will close when the water reaches the water level detection electrode, which is located at the top of the cylinder and prevents the cylinder overflowing.

The current which flows between the electrodes will heat the water until it boils. The steam produced will be carded up the steam hose to the steam pipe/nozzle. As the boiling continues more cold water will be added, bringing in more minerals until the mineral concentration required for full output is reached.

Thereafter the Minivap system will continuously monitor and control the concentration of the boiling water by adjusting the amount of water drained from and fed into the cylinder.

Features of the Minivap Operation

The Minivap system of control is designed to adjust the function to keep the unit operating in the face of changing water quality in the cylinder and changing electrode condition even if, in an adverse operational circumstance, this results in some reduction in output while the situation exists.

Note: The Minivap PCB disconnects the power to isolate the electrodes during drainage to avoid earth leakage.

The Minivap unit will stop operating in response to extreme fault conditions identified as:

- High Overcurrent STOP
- Drain Fault STOP (no drain function)
- Feed Fault STOP (water not reaching cylinder)

The 'stop' condition on the Microvap PCB will be cleared by switching the unit off and on. When a 'stop' condition occurs, follow the service and maintenance procedure to inspect the steam cylinder and drain pump.

End of Cylinder Life

The steam cylinder needs to be exchanged for a new one when the output of the unit is excessively reduced by the build-up of scale deposits.

Cylinder Exchange

Cylinder Life

The water hardness and the humidity demand at site will determine the effective life of a steam cylinder. Units located in areas with naturally soft waters will experience the longer cylinder life, possibly upwards of 12 months in calendar terms. With hard waters, a more frequent cylinder exchange must be expected and cylinder exchange 2 or 3 times a year can be the average situation. The normal scaling up of the Vapac steam cylinder is outside the Vapac warranty.

Procedure for Cylinder Exchange

1. With power connected to the unit, use the Manual Drain position of the switch to empty the steam cylinder.
2. Disconnect the Vapac from the electrical supply by means of the external disconnect switch or circuit breaker.
3. Open the lockable door to the cylinder chamber and carefully ease off the red electrode caps and the white electrode cap.
4. Loosen the hose clip and disconnect the hose from the top of the steam cylinder.
5. Using a twisting movement, lift the cylinder clear of its seating in the feed/drain manifold and carefully remove the used cylinder from the unit.
6. Inspect the feed/drain manifold to ensure this is clear of sediment.
7. The small drain pump can be removed for inspection/cleaning, by applying steady hand pressure on h inlet housing to ease it back on its mounting and to release it from its 'O' ring connection in the side of the feed/drain manifold. The diagram shows the assembly arrangement of the feed/ drain manifold and pump. The pump motor body is a sliding fit onto its mounting plate.

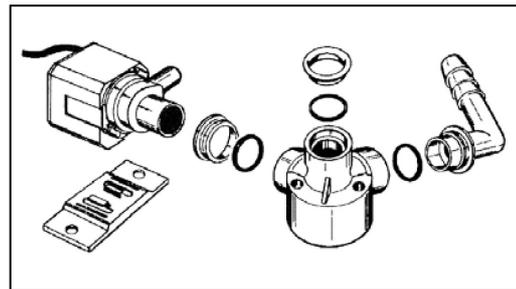


Figure 14: Drain Pump and Manifold

8. With the pump back in position after cleaning, make sure the O-ring seal and capping ring are in position on the manifold then insert the cylinder into the feed/drain manifold, pushing it down firmly, and reconnect the steam hose.
9. The electrode caps must be reconnected in accordance with the details on the collar supplied With the new cylinder electrode no. 1 on the electrode nearest to the white cap.
10. The Vapac unit is supplied with electrode cables routed to avoid contact with the door. After a cylinder exchange, it is important to replace the cables as close as possible to their original route.

Minivap

Service and Maintenance

As the operation of the Minivap is entirely automatic, it normally requires no attention on a day-to-day basis. General cleaning and maintenance of the component parts of the Minivap are recommended at intervals of about one year, but this is largely dependent upon the frequency of its use and the quality of the water supply. Where the Minivap is part of an air-conditioning system being serviced regularly, the Minivap should be inspected at the same time.

Steam and Condensate Hoses

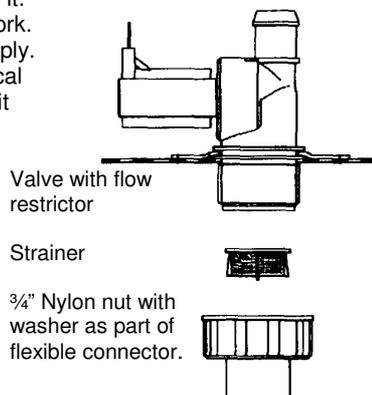
The hoses used with and in the Vapac should be inspected at the normal service visits as part of normal maintenance. At the first signs of deterioration, a hose should be removed and replaced.

Feed Valve with Strainer

The nylon bodied solenoid valve incorporates a small nylon strainer which is a push fit in the 3/4" inlet of the valve. With a new plumbing installation, loose solid material in the pipework could partially block the strainer after start-up. If for this or any other reason a restriction of the water flow is suspected (outside of supply pressure considerations), it would be possible to clean the strainer as follows:

Turn off the water supply to the Unit.
Undo the nylon nut connecting the flexible water connection to the valve inlet.

The strainer can be removed using 'long-nosed' pliers to grip the centre flange provided on the strainer for this purpose. Withdraw the strainer. Wash and replace it. Reconnect Pipework. Turn on water supply. Reconnect electrical supply to allow unit to operate.



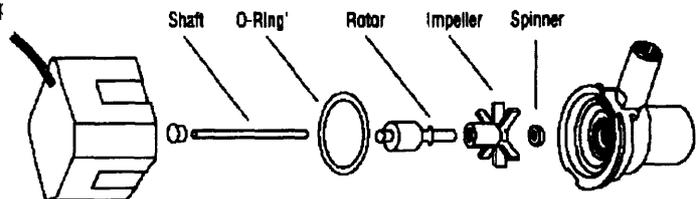
Note: Always replace the strainer after cleaning as it is needed to prevent material lodging in the valve seat or blocking the small flow control restrictor which is fitted in the valve.

Drain Pump

The pump should be inspected and cleaned regularly. It is recommended that this be done at each cylinder exchange especially in hard water areas. Failure to keep the pump clear and operational will result in reduced cylinder life.

To remove the pump for maintenance purposes proceed as follows:

- Depress and hold the manual drain switch to empty the cylinder. The pump 'sound' changes distinctly once the cylinder is empty. When this occurs release the switch.
- Disconnect unit electrical supply and follow the cylinder exchange procedure.
- If, due to an electrical or mechanical fault, the cylinder cannot be emptied by the pump, it will be possible to drain most of the water into a bucket by disconnecting and lowering the top end of the tube which feeds cold water to the cylinder from the fill-cup. The remaining cold water will run into the base tray when the pump is withdrawn from its 'O' ring connection and/ or the cylinder is lifted out.
- Ease the pump free of the feed/drain manifold 'O' ring connection, slide it fully off its base plate and release the connecting tube.
- To dismantle and re-assemble pump refer to diagram

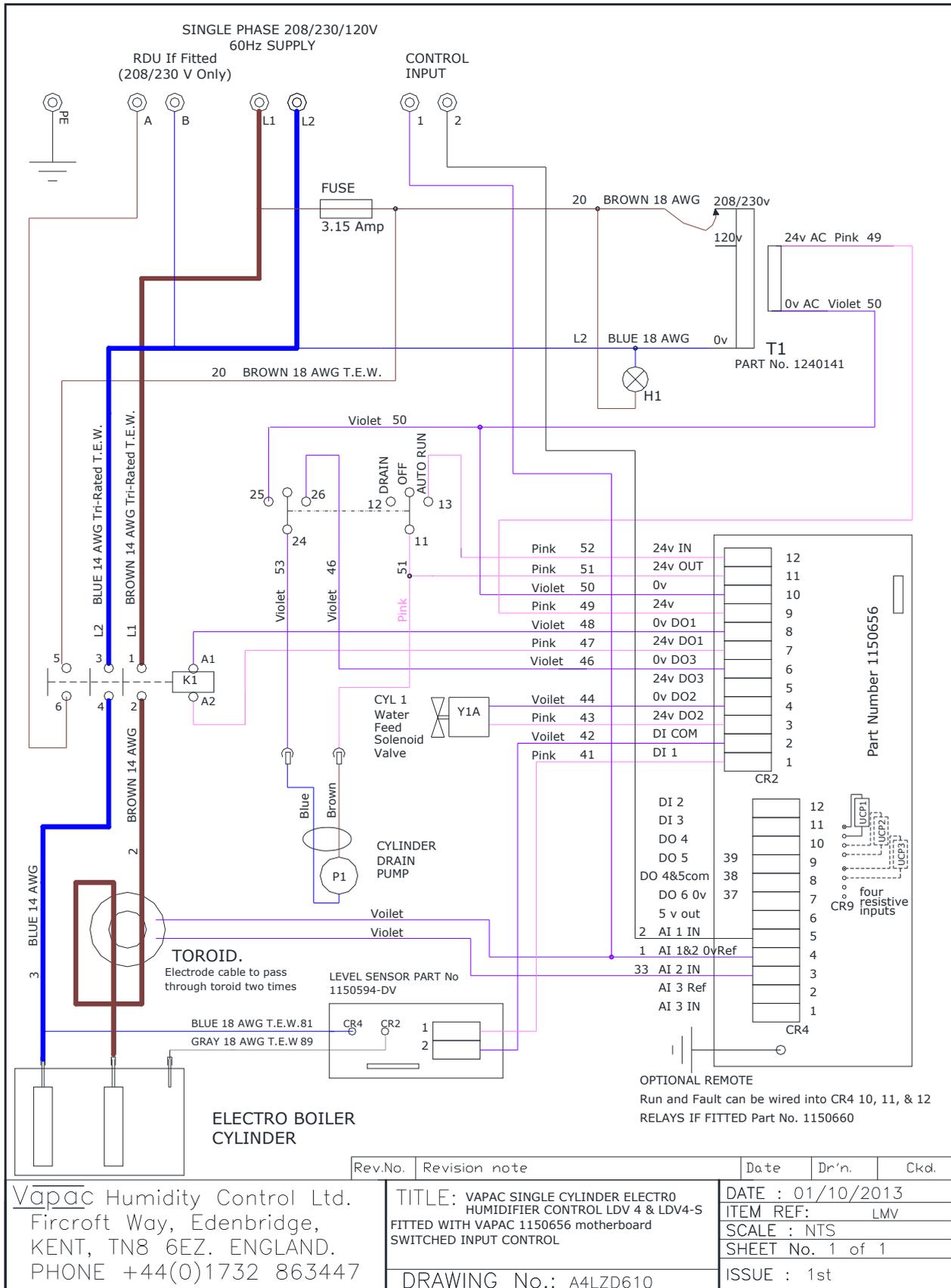


In operation the stainless steel shaft remains stationary while

- the rotor and impeller rotate on it. Remove all scale build-up on the shaft so that the impeller can rotate freely.

Ensure that the 'O' ring seal is correctly positioned when

- fitting the inlet housing to the main pump motor body. When reassembling, make sure the brass spinner is replaced on the shaft in front of the impeller. A smear of multipurpose grease should be applied to the 'O' ring so that the impeller housing can be rotated into position without distorting the 'O' ring underneath it and so maintain the water seal.



Minivap Trouble-shooting Check-List

<p>Preliminary Check:</p> <p>Symptom: Red 'Power-On' Neon - not lit</p> <p>Red 'Power-On' Neon - lit Water in the cylinder No current</p> <p>Red 'Power-On' Neon - lit Water at top of the cylinder and low current</p>	<p>-Use manual drain switch to check pump operation (On/Off switch in 'off position)</p> <p>Check/cause/remedy</p> <p>-Check main power is connected and switched on. -Check security circuit is complete (fan interlock, high humidity override). -Check power supply fuses. -Check Power-On neon.</p> <p>-Check the switch is in the position marked 1 (unit On position). -Check Minivap internal control circuit fuse. -Check humidistat.</p> <p>-Minivap automatic STOP function has operated for one of the following reasons: a) Feed Fault STOP b) Drain Fault STOP c) High Overcurrent STOP If no obvious Feed Fault condition (a) exists, i.e. no water in cylinder, assume that (b) or (c) applied. Carry out full inspection of cylinder and drain pump. Switching the unit Off and On again cancels the automatic STOP condition but user should not put unit back into service until the above action has been taken and the cause of the interruption remedied.</p> <p>-Slow start-up situation with a new cylinder. Low conductivity (soft) water. Add Alka Seltzer to boost conductivity of the water. If above action is not successful and condition returns, an alternative lower resistance cylinder may be necessary</p> <p>-Reduced output due to scale deposits,. Remove cylinder for rinsing out and re-use or fit a new replacement cylinder.</p>
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Minivap Model		LDV4		LDV4-S
Output Range	kg/h lb/h	1.5 – 2.75 3 – 6	2.75 – 5.5 6 – 12	
Max Output	kg/h lb/h	2.75 6	5.5 12	
Power Rating	kW	2.1	4.2	
Electrical Supply 1Ø 60 Hz	Volts	120	240	208
Full Load Current	Amps	19	19	19
Fuse Rating	Amps	25	25	25
Height	mm	500 (19¾")		
Width	mm	325 (12¾")		
Depth	mm	230 (9")		
Service Weight	kg	16 (35 lb)		
RDU Height	mm	185 (7¼")		
RDU Weight	kg	3.5 (8 lb)		
Steam Pipe/Nozzle	No.	1		
Steam Hose Diameter	mm	22		

Control System - On/Off

Steam Hose	-	internal diameter 22mm (7/8")
Steam Hose Length	-	recommended maximum 2m with continuous fall back to, the Minivap unit.
Condensate Hose	-	internal diameter 6mm (1/4")
Water Connection	-	3/4" threaded connection to Minivap feed valve - use flexible connector supplied with unit which (underside) has VC threaded nylon nut at each end.
Drain Connection	-	has connection size 35mm (1 3/4") diameter unthreaded - use short length of hose to interconnect (underside) onto copper pipe and discharge drain water to one side of unit into an open tundish.

