

These instructions contain operating information and should be left with the unit.



Steam Room Unit

Installation & Operation Manual

(Edition 1)

Installation in countries covered by EC Directives:

This product will meet the requirements of the Low Voltage Safety Directive 73 / 23 EEC and the EMC Directive 89 / 336 EEC when installed in accordance with the instructions contained in this manual.

Failure to comply with these instructions may invalidate the manufacturer's warranty or any certificate/declaration of conformance requested to be supplied with the unit.

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Important Installation Points

The unit must be installed to comply with national regulations and/or codes of practice. A qualified electrician must carry this out.

Ensure at least 1000 mm clear side access to the electrical panel of the cabinet - left hand side of cabinet.

Do not locate the cabinet where the ambient temperature around the unit could exceed 35 °C e.g., an unventilated roof mounted enclosure.

Do not locate the cabinet where a ladder is required for service access as this could make servicing and cylinder service or exchange hazardous.

Make sure steam line(s) have adequate slope (min 12%) for condensate drainage.

Provide adequate support to prevent sags developing in flexible steam lines, which can fill with water and create a "trap".

Do not locate vented drain directly under the cabinet.

Important Electrical Connection Items

Before commissioning the unit, check that all electrical (power) connections - including those at the terminals and contactor are tight.

Check that the transformer primary winding connection is correct for the supply voltage at VAPAC terminals A & B.

The VAPAC transformer must not be used to power other equipment (except for a 24V / 30Watt lamp supplied via terminals 1&2).

Important Maintenance Items

Only a qualified electrician should carry out maintenance.

The boiler contains hot water, and must be drained before any maintenance is carried out on the steam section. This should be done prior to isolating the power, and removing the front access panel

Installation.

Positioning the VAPAC

Do's

- Do** mount the unit as close to the steam distribution pipe(s) as possible.
- Do** mount the unit at a height convenient for reading the display window.
- Do** ensure adequate side access to the electrical section (min 1000 mm).
- Do** ensure adequate service access to the front of the unit (min 1000 mm).
- Do** ensure adequate service access below the unit (min 300 mm).
- Do** ensure that the holes above the airgap between the electrical and the steam sections remain unobstructed to allow a free flow of air.
- Do** use the marking on the side of the carton as a template to mark the mounting hole positions.
- Do** remove the cylinder, if necessary, to access 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** mount the unit close to sources of strong electromagnetic emissions e.g. variable speed lift motor drives, kVa transformers etc.
- Don't** mount the unit in an unventilated enclosure.
- Don't** mount in a position requiring ladder access to the unit.
- Don't** mount the unit behind a false ceiling or other situation where an unusual malfunction (e.g. water leak) would cause damage.
- Don't** mount the unit in an area which will be hosed down.
- Don't** install the unit where the ambient temperature can exceed 35°C.
- 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..

Dimensions in mm and Service Weight in Kg.

Positioning and Dimensions of the VAPAC

Model	PV15/
A	675
B	435
C	298
D	182
F	175
G	136
H	-
K	38
L	516
M	203
N	38
UNIT Kg.	30

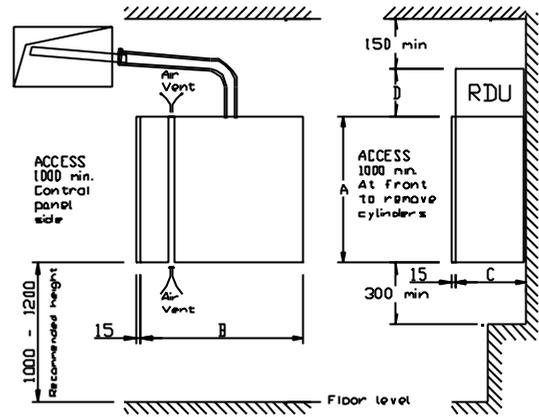


Fig 1

Mounting Hole Positions.

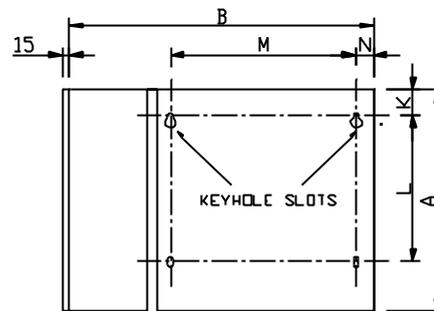


Fig 2

Steam Outlet Positions

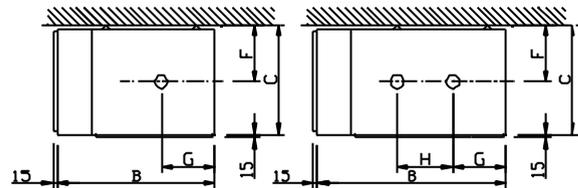


Fig 3

Positioning the steam pipes

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).
- Do** check if alternative slope of Ø35mm pipe has been specified requiring rotation of pipe in its socket before installation.
- Do** Use bracket /lug on the end of Ø54mm pipes for extra support.

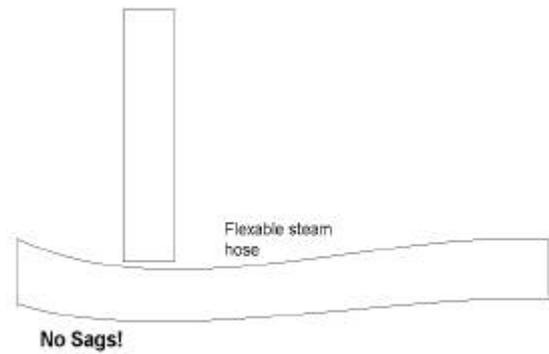


Fig 4

Steam Hose Connection

Do's

- Do** use Vapac steam hose or well insulated copper pipe
- Do** keep steam hose as short as possible (under 2m for max efficiency)
- Do** arrange to have a vertical rise immediately over the unit of 300mm
- Do** use the full height available between the unit and steam pipe 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
 - a) fit pipe clips every 30-50cm
 - or b) support straight lengths on cable trays or in heat resistant plastic pipe.
- 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) and in cold ambient conditions to avoid excess condensate and reduction in delivered output.

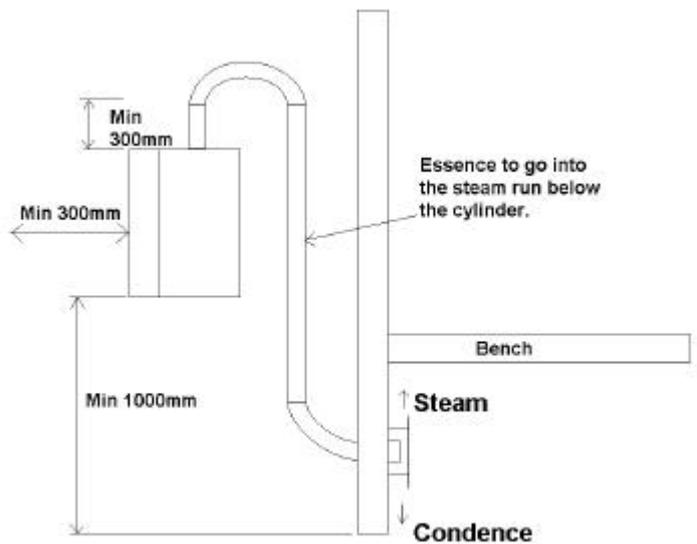


Fig 5

Don'ts

- Don't** allow steam hose to develop kinks or sags. **Don't** include horizontal runs or 90° elbows in the steam line.

Steam Distribution Pipe requirement	
Model	PV15/
35mm Ø Pipe No.	1
* Duct Pressure Pa.	+1000 -600

Plumbing Considerations.

Cold water supply.

General

The Electrode Boiler range of units is capable of operating with a range of water quality raw mains. The water supply should be within the following limits:-

Hardness	50 – 500 ppm
Conductivity	80 – 1000 mS/cm
Silica	0
Pressure of	between 1 - 8 bar.

Water Supply rates

1.2 l/min	PV15/
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Do's

- 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 all units connected to the system.
- Do** use the water connection with nylon nut provided.

ALL Dimensions in mm

Model	PV15/
A	79
B	198

Don'ts

Don't use a wrench or other tool to tighten the water supply connection - the nylon nut and rubber washer provided, should only require tightening by hand to effect a seal. If water seepage occurs, undo the nut to wipe the washer clean and re-seat it.

Drain connection. General

Do's

Do ensure metal drain and supply water pipework is grounded electrically close to the unit (a ground/earth stud is positioned on the underside of the cabinet

Drain capacity per cylinder

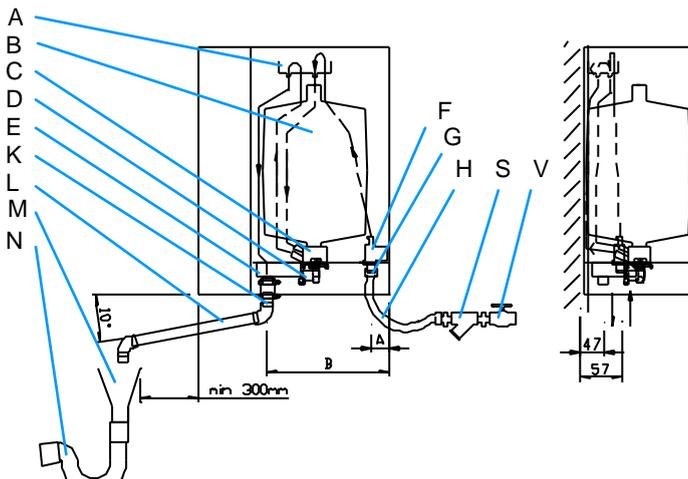
= pump discharge rate of max 16.8 l/min at 50 Hz.

Power supply 17.2 l/min at 60 Hz.

Drain Connection

Do's

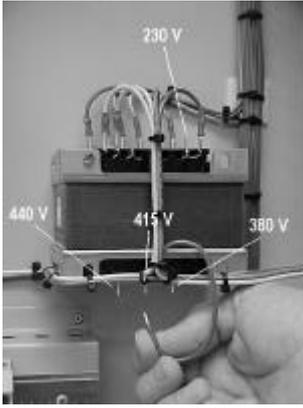
- Do** use copper or plastic pipe rated for 100 °C.
- Do** arrange to discharge drain water from the unit into a trapped and vented drain at a position where flash steam rising from the drain line vent will not pose a problem for the VAPAC or other equipment.
- Do** provide adequate fall for the drain 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 all the VAPAC units that are connected to it.



KEY: -

- A Tundish Fill-cup
- B Steam Cylinder
- C Feed Drain Manifold
- D Drain Pump
- E Drain Trap Dish
- F Feed Solenoid Valve
- G Water Connection $\frac{3}{4}$ " BSP.
- H Flexible hose $\frac{3}{4}$ " BSP.
- K 35 \varnothing Steam Hose coupling and Hose Clips.
- L 35 \varnothing copper or plastic Drain for 110°C Water with supports.
- M Tundish
- N U-trap side exit.
- S Optional Strainer
- V Isolation stop cock

Electrical Connections



Important Power Connection Information

VAPAC 24V secondary Transformer Primary supply connections:
 VAPAC units are wired to allow connection to alternative site Voltages.
 Make the following simple checks before connecting the power supply:-
 Move the RED connection on the Transformer primary winding circuit to the position marked with the supply Voltage that is to be connected between power terminals A1 and A2.
 The transformer primary circuit terminal positions are clearly marked:- 230V, 380, 415 & 440V. For sites where the actual (measured) voltage is 400V the preferred transformer tapping is 380V.

- Note:**
- 24 V ac. Control circuit - 3.15 A 20 mm (F - Quick blow) fuse (Pt.No. 1080096) mounted on Terminal rail F2.
 - Transformer Primary Circuit - One fuse protects the control circuit on Single cylinder units F1 315ma (slow blow) (Pt. No. 1080098) mounted in fuse-terminal holder protects the Transformer Primary.
 - 230V ac Pump Supply. - The pump is feed from the main transformer via a 230 volt auto winding. The pump is protected by fuse F1 feeding the transformer primary.

Power Supply Connection

Electrical Connections

The wiring to the Vapac should be done by a qualified electrician. The external overcurrent protection and wiring should comply with the appropriate Regulations and Codes of Practice.

Important: Make sure the connection to the primary Voltage winding of the VAPAC transformer matches the supply Voltage which is to be connected between VAPAC terminals A&B.

A fused disconnect/isolator or MCB should be used to disconnect the supply from all electrodes simultaneously.

This must be sized to suit the total maximum phase/line current of the unit and should be located adjacent to the VAPAC cabinet or within easy reach and readily accessible.

In Steam Room, units terminals A, B and C are the power supply connections as indicated in the wiring diagram.

Cable Entry Provision

Cable glands must be used to ensure cables are held securely at the entry position. All VAPAC Steam Room Units are equipped with a removable gland-plate. The installing electrician should remove this and take it to a workbench to drill for the required cable gland size.

VAPAC Control Circuit Transformer

The internal control circuit of the Vapac unit is operated at 24Vac. As standard the VAPAC includes a transformer with alternative primary winding options 230, 380, 415, and 440V and requires on site adjustment to match it to the Voltage connected to Vapac terminals A and B.

The transformer 8V secondary supply is not used.

Important: The VAPAC transformer must **NOT** be used to power other equipment or the warranty will be invalidated (except for a 24V / 30Watt lamp supplied via terminals 1&2).

Notes:-

1. All units must have a PE earth connection connected to the units terminal.
2. Unit with N.A. in the following tables means NOT AVAILABLE there is not a unit available to run at the voltage and phases shown. Please check that the correct model reference is ordered and installed, for the low or high voltage required, and at the desired steam output.
3. These tables give the maximum capacities for each unit at the different voltages. Lower outputs can be provided using "Output Reduction pot on the PCB"
4. Standard design is for 50 Hz. Supplies. Design for 60 Hz. Also available - 60 Hz. Supply must be specified with order as standard pump is only 50Hz.
5. If a maximum KW has been strictly specified which is less than the maximum in the Electrical Data, this must be specified with order as an alternative Current Set Plug (CSP) will be needed. This is subject to the agreement of the manufacturer.
6. For other Voltage electrical supplies, contact the VAPAC distributor.

AKO Electronica controller

1. Press ↓ for 5 seconds. The current SET POINT value will be displayed and LED "2" will flash.
2. Press the ↑ or ↓ keys to adjust the SET POINT to the required value.
3. Press the ↑ and ↓ keys simultaneously to set the new value. The display will revert to Temperature indication status and the LED "2" stops flashing

E1 indicates probe short-circuit or open-circuit.

Parts List

<u>Part No.</u>	<u>Description</u>
1010254	Lock and Key
M520250	Hose Flexible Feed Connector
1060501	Contacto DPBF20 24V 50/60H
1080098	Fuse 20MM 315MA Anti-Surge
1080096	Fuse 20X5MM 3.15A Anti-Surge
1110400	Lamp Neon Red
1150582	PCB control VAPAC 4AL
1150620-C	LSI & Alarm PCB Rev "C"
1190400	Switch Rocker DPCO
1190401	Switch Rock SPCO Moment
1190402	Switch Rocker SPCO
1200032V	TRM SAK2.5 027966 Klip
1200060V	TRM Fuse SAKS1 019112 Klip
1200513V	TRM SAK10 011006 Klip
1210109	Temp Control -50/+99 C
1240106	Trans 220/240 24V 2.9A @ 65 C
1240149	Transformer Current 200T TOROD
M010219	Gland Plate
2160120	Gasket -Vapac Pump Housing
2560028	Tube Silicone 16MM ID
2560029	Tube Silicone 9MM ID
2560030	Tube Silicone 22MM ID
2600070	New Pump No Housing
2620320	Valve Assy 24v 1.21/min 10.5mm
3910112	Cover Pump
3910168	Tundish Fill Cup
3910195	Feed/Drain Man - Pump Housing
M520158	Neutral Connector-Discharge
M990600	Drain Trap Ass.

Electrical Data

Max. Output	8	8	15	15
Electrical Supply	Ph+N	2Ph	3Ph	3Ph
No. of electrodes	E1-E2	E1-E2	E1-E3	E1-E3
CSP rated current	27A	15.8A	17.3A	17.3A
Power rating	6.7Kw	7.1Kw	12.2Kw	13.4Kw
Electrode supply	Ph+N	2Ph	3Ph	3Ph
Voltage	230V	415V	380V	415V
Full load current	28.8A	16.9A	18.5A	18.5A
110% over current/supply	33.2A	19.4A	21.3A	21.3A
Fuse rating/phase	40	25	25	25
Supply cable terminals	10mm ²	10mm ²	10mm ²	10mm ²

Cylinder selection

Water quality	8 kg/h	15 kg/h
Soft	PCD2L-2WA	PCM3L-3WA
Medium	PCM2N-2WA	PCM3N-3WA
Hard	PCD2HS-2WA	PCM3H-3WA

Temperature sensor connections.

The sensor wires are connected to VAPAC terminals 4&5 and can be extended by 20 meters.

LAE electronic controller

To set the temperature press set then adjust the temperature using the adjust keys.

PAR indicates probe short-circuit or open-circuit.

Start-Up / Operation

Start-up check list

- a) **Water supply and Drain Connections:** these should be connected as indicated under Plumbing and in accordance with the relevant local regulations. An isolation valve should be adjacent to the unit. The connecting metal plumbing must be grounded close to the unit.
- b) **Steam Line:** This must be connected according to the installation instructions with adequate slope and support.
- c) **Power supply:** Wiring to the unit Should be by a qualified electrician and comply with the relevant regulations using appropriately sized cable and cable glands, with disconnect and fuses to suit the maximum fuse rating of the unit at the supply Voltage. The disconnect/fuses should be adjacent to the unit or within easy reach and readily accessible.
- d) **Control Connections:** Ensure the control signal wires are correctly connected according to the relevant instructions/diagrams and control adaptors fitted if required.
Notes:
 Check that the **Current set Plug (CSP)** is in position on the controller PCB and has the correct current rating for the required output. (CSP values for maximum output of unit on page 7.)
- e) **24V Control Circuit Transformer:** The standard 24V transformer used in the units has primary winding for 220/240V 380/415V & 440v 50/60Hz connection derived from the local electrical supply.
- f) **Output adjustment:** A small potentiometer mounted on the PCB enables an approximated setting between 50% and 100% of full output.

Note: If a maximum kW has been strictly specified which is less than the maximum in the electrical data, then an alternative CSP will be needed and this should be checked before connecting power to the unit.

Start-Up Instructions

First check:

Transformer connection matches supply voltage.

Replace the electrical access panel.
 Turn on the water supply to the unit.
 Close disconnect/circuit breaker feeding supply to the unit.
 Close the On/Off switch.

Commissioning/Start-Up

When starting with an empty cylinder, the program feeds water in stages until the output current is reached or the water reaches the water level electrode. In this case the current flowing between the electrodes will heat the water to produce the steam and more water will progressively be added bringing in more minerals until the electrical conductivity required for the output is reached.

Thereafter the system will continuously monitor and control the conductivity by adjusting the amount of water drained and fed into the cylinder.

Features of series 4 operation

The 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.

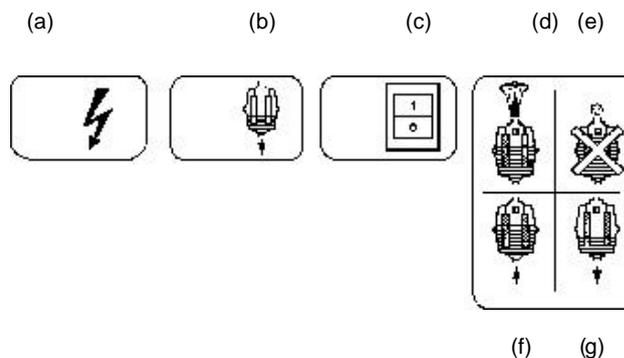
Overcurrent protection

As protection against overcurrent, the unit has one level of response. When the current level 110% is reached, water is drained until the current level is 100%. If the current level remains high, the unit will be switched-off automatically.

End of Cylinder Life

The steam cylinder needs to be exchange for a new one when the output of the unit is excessively reduced by the build-up of scale deposits. This condition will be indicated by the red lamp on the fascia. The standard cylinders are disposable and outside warranty.

Facia Items.



- a) Power On Indicator Neon (Red)
 b) Manual drain Switch
 c) On/Off Switch
 d) Demand Indicator (Green)
 e) Low Output / Cylinder Change Symbol and Warning Indicator LED (Red)
 f) Water Feed Symbol and Indicator LED (Yellow)
 g) Drain Symbol and Indicator LED (Yellow)

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.

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 and the Vapac On/Off switch in the off position, operate the Manual Drain switch and empty the steam cylinder.
2. Disconnect the VAPAC from the incoming electrical supply by means of the external disconnect switch.
3. Remove 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 drain pump can be removed for inspection/cleaning. By following the instructions for the drain pump removal and cleaning below.
8. With the pump back in position after cleaning, 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 the same sequence in accordance with the details on the collar supplied with the new cylinder.
- 10- The VAPAC unit is supplied with electrode cables routed to avoid contact with the removable door. After a cylinder exchange, it is important to replace the cables as close as possible to their original route.

Vapac Cleanable cylinders

Cleanable versions of the Vapac cylinders are available which can be opened to allow removal of loose scale deposit. The cylinder designs are the same but instead of a welded joint, the two parts are brought together by a seal and two clamping rings with quick-release fasteners.

To order the equivalent cleanable cylinder use the same code but substitute the letters **CC** instead of **CM** or **CD**.

When servicing a cleanable cylinder take it to a service area where it is convenient to open it and to dispose of the contents. When cleaning out loose material also remove any build-up on the end of the short "cylinderfull" electrode. Make sure the slotted strainer is clean, intact and in place. When re-assembling use a new seal and make sure mating surfaces are free of scale particles as they will prevent a perfect seal and cause leaks.

Note 1: Do not touch an operating cylinder of this type in case a leak allowing water at mains voltage to seep out.

Note 2: Do not interfere with the electrodes, if they are badly eroded and/or the internal positioning ring is free, a new cylinder should be used.

Service and Maintenance

As the operation of the Vapac is entirely automatic, it normally requires no attention on a day-to-day basis. General cleaning and maintenance of the component parts of the Vapac 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 Vapac is part of an air-conditioning system being serviced regularly, the Vapac should be inspected at the same time.

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, residual 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 connection to the valve inlet.

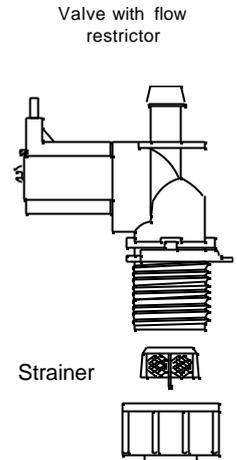
The strainer can be removed using 'long-nosed' pliers to grip the center flange provided on the strainer for this purpose. Withdraw the strainer.

Wash and replace it.

Reconnect and turn on water supply.

Reconnect electrical supply to allow unit to operate.

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



3/4 Nylon nut with washer as part of flexible connector

Drain Pump

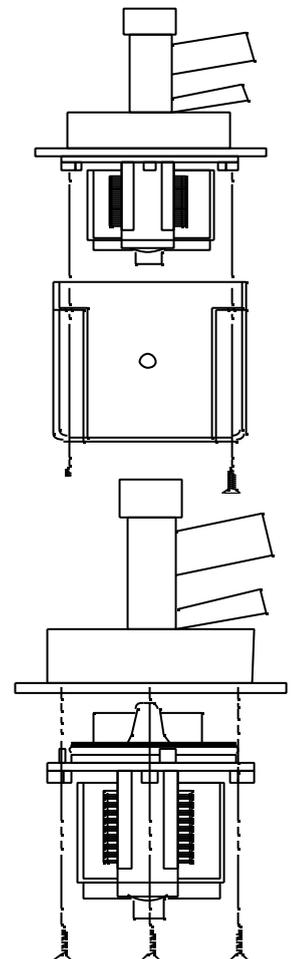
The pump is a sealed unit and should not be dismantled. Instructions for removal / replacement are as follows.

1) Place a bucket below the pump, to catch any water remaining in the housing or pipework.

2) Remove the two screws holding the pump cover & lift clear.

3) Undo the three screws holding the pump body to the feed & drain manifold, and remove it - any water trapped in the pump will be released at this point.

4) Fit the replacement pump by following the above steps in reverse order. Ensuring that the O-ring surrounding the impeller housing is correctly seated, and that it mates correctly with the feed / drain manifold.



Trouble-shooting Check List

Preliminary Check

Use manual drain option to check pump operation
If unit power supply is 220/240V, check that transformer connection has been moved from 380/415V to the 220/240V position.

Symptom

Check/Cause/Remedy

Power-On Neon does not light

Check main power is connected and switched on.
 Check power supply fuses.
 Check Power-On neon.

**Power-On Neon -On
 Green Demand/Output
 Modulation**
 indicator LED does not light

Check On/Off switch is closed.
 Check VAPAC internal control circuit fuse(s).
 Check control signal.

**Power-On Neon - On
 Red Low Output/Cylinder
 Change**
 Indicator LED on;
 water at the top of the cylinder

Slow start-up with a new cylinder. Red LED comes on and remains on until unit reaches 60% of current rating.
 Low conductivity (soft) water. Add Alka Seltzer or similar to boost conductivity level.
 If above action is not successful, an alternative lower resistance cylinder may be necessary.
 Normal indication when cylinder replacement is due (see cylinder exchange section).
 Indicates cylinder has dropped below 60% output. Remove cylinder for rinsing out and re-use or fit a new replacement.

Checks

Check water stop valve is open.
 Check internal VAPAC hose connections for a leak.
 Check contactor function.
 Check if PCB is switching contactor.
 Check the steam run for blockages.
 Check to see if essence is running into cylinder which would reduce output.
 Check water level sensing components/circuit connections:

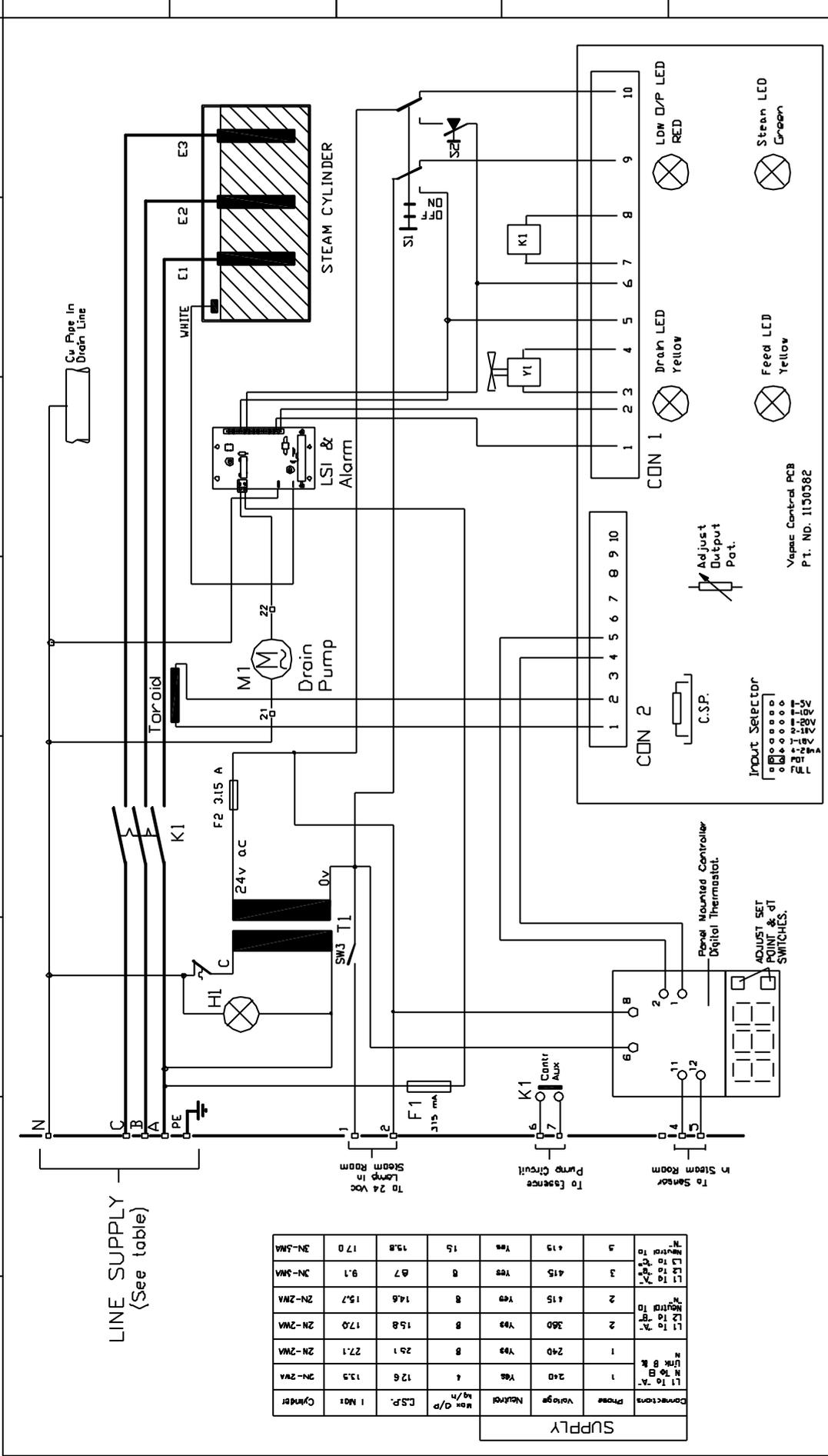
Check

Drain cylinder to remove over concentrated water and re-start.
 Fully salt-treated water should not be used. Use normal town supply or use a blend of town supply and the salt-treated water.

Drain pump function impaired

If pump will not function, empty cylinder by disconnecting, at the tundish fill-cup, the water supply hose to cylinder and draining water into a bucket. Remove, dismantle and clean pump.

A B C D E F G H



LINE SUPPLY
(See table)

Connections	Line to A	Line to B	Line to C	Line to PE	Phase	Voltage	Neutral	Max D/P	C.S.P.	Max	Cylinder
1	240	240	240	240	Yes	240	Yes	1	12.6	13.5	2N-2VA
2	360	360	360	360	Yes	360	Yes	8	25.1	27.1	2N-2VA
3	415	415	415	415	Yes	415	Yes	8	14.6	15.7	2N-2VA
4	415	415	415	415	Yes	415	Yes	8	9.7	9.1	2N-2VA
5	415	415	415	415	Yes	415	Yes	15	15.8	17.0	2N-2VA

Vapac
 VAPAC HUMIDITY CONTROL LTD
 FIRCRIFT WAY, EDENBRIDGE,
 KENT, TN8 6EZ, ENGLAND
 Tel: +44 (0)1732 863447

ISSUE	MODIFICATION	DATE	BY	CHECKED
A	Supply Options Revised	10/00	RPT	
B	Circuit Modified For New Controller	06/91	RPT	
C	Replace On CAD With New Pump	07/90	RPT	
D	Revised T1	2/17/90	RJK	
E	Controller Type 1 & 2	02/90	RPT	
F	Revised to 24V line supply (10 amp fuse)	03/90	RPT	

Steam Room Unit

DATE: 19/09/91
 SCALE: N.T.S.
 DRAWN: R.P.T.
 CHECKED:

TITLE
 Wiring Diagram
 Drg No. A3LZD338/F

Made in England by:
 VAPAC Humidity Control Limited.

VAPAC Humidity Control Limited reserve the right to change the design or Specification of the equipment described in this manual without prior notice.