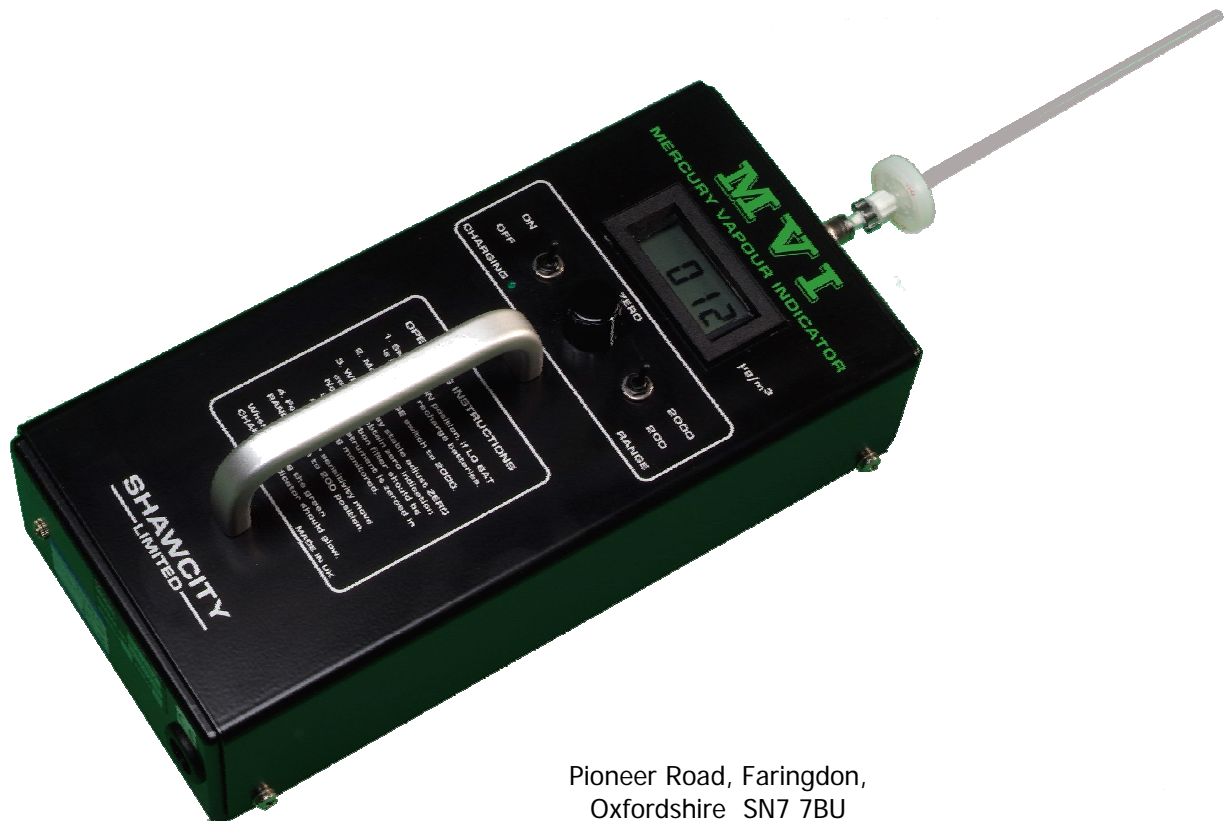


MVI

Mercury Vapour Indicator

N.B the MVI must not be used without the filter connected. The instrument can be damaged without the filter fitted.

USER MANUAL



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Warranty and Safety Notes

Warranty

The warranty period on this product is 12 months from date of sale.

We guarantee to repair or replace faulty goods supplied by Shawcity Limited or, at our option, to refund the purchase price subject to a claim being made in writing to us within 12 months after sale.

Any goods which are in subject of a guarantee claim must be returned to us, carriage paid, and accompanied by the customer's advice note which should state the date of purchase of the goods in question and the nature of the fault.

Safety Notes

Mercury amalgamates with gold, silver, stainless steel and copper alloys. Accidental trapping of mercury can cause serious damage to vital parts of electronic equipment and delicate instruments. Mercury is also toxic if inhaled, ingested or absorbed through the skin or eyes. Care must always be exercised when handling mercury.

The MVI contains a high voltage source and ultraviolet lamp. Both of these items are shielded inside the MVI to control the safety hazard.

DO NOT MODIFY/SERVICE OR REPAIR THESE INSTRUMENTS WITHOUT CAREFUL REFERENCE TO THE SERVICE/REPAIR MANUAL.

N.B the MVI must not be used without the filter connected. The instrument can be damaged without the filter fitted.



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Front View





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Introduction

The Shawcity MVI Mercury Vapour Indicator is a highly sensitive instrument designed to detect minute concentrations of mercury vapour in the atmosphere.

The model MVI is calibrated in micrograms/cubic metre ($\mu\text{g}/\text{m}^3$) and will detect mercury vapour concentration in the range 0-2000 $\mu\text{g}/\text{m}^3$.

The instrument is primarily used to monitor environments where mercury or its compounds are produced, processed or stored and where mercury vapours may pose a health hazard to personnel.

A sample of the immediate atmosphere being monitored is drawn by pump into an absorption chamber where a selective ultraviolet light source is absorbed by the sample. At the other end of the chamber a photodiode detector measures the intensity of radiation passing through the sample chamber. The optical system is designed specifically to detect mercury which has a strong absorption line in the ultraviolet region of the spectrum.

The presence of mercury vapour will reduce the radiation energy reaching the photodiode detector in proportion to the vapour concentration. This change affects a photodiode detector creating a change in signal that is detected and displayed on the meter as the mercury vapour concentration in micrograms/cubic metre.

An audible alarm is offered which can give warnings at preset conditions.



Specification

◆	Function	Surveying atmospheres for mercury (Hg) concentrations below and above the accepted exposure limit
◆	Detector	Ultraviolet photometer
◆	Measuring Ranges	0-2000 and 0-200 $\mu\text{g}/\text{m}^3$ (dual range)
◆	Sensitivity	0.1 $\mu\text{g}/\text{m}^3$ (dual range)
◆	Repeatability	$\pm 5\%$ FSD
◆	Response Time	Approximately 6 seconds
◆	Operating Range	+10°C to +40°C
◆	Battery Type	15 Volt Ni-Cad rechargeable
◆	Battery Life	More than 6 hours after full charge
◆	Dimensions	145 x 295 x 80 mm (120 mm with handle)
◆	Weight	2.85 kg
◆	Linearity	Better than 5% from 0 to 500 $\mu\text{g}/\text{m}^3$
◆	Zero Drift	Less than 5 $\mu\text{g}/\text{hour}$



Description

The model MVI Mercury Vapour Indicator is a compact, self contained and completely portable instrument, which indicates the amounts of mercury in micrograms/cubic metre.

The indicating digital display and carrying handle are mounted in the top cover. A female luer connector is provided at the end of the instrument to accommodate a dust and water trap filter with PTFE extension probe. In addition, a length of flexible tubing may be connected to the filter for greater convenience when checking floor areas or gratings.

N.B the MVI must not be used without the filter connected. The instrument can be damaged without the filter fitted.

A voltage regulator fully compensates for changes in battery voltage. A special integrated circuit amplifier provides temperature compensation.

The internal nickel cadmium battery is rechargeable from a plug in battery charger. The operating time between charges is more than 6 hours. Warm up time is about 10 minutes and direct readings are indicated on an easy to read LCD display.

The audible alarm (when fitted) will provide warning of three separate conditions:-

<u>Condition</u>	<u>Audible Signal</u>
1. High mercury vapour concentration	Slow pulse (1/sec)
2. Negative reading (more than $-24 \mu\text{g}/\text{m}^3$)	Continuous tone
3. Low battery	Fast pulse (3/sec)

The audible alarm is inhibited during the first 5 minutes of operation.

Operating Controls





Operating Controls

The MVI indicating display and all operating controls are mounted on the front panel where they are readily accessible when the unit is held in the operating position.

1. **ON/OFF** charging switch is located immediately below the display and to the left. In the ON position the MVI will operate and display. In the OFF position power to the MVI is disconnected. The instrument **MUST** also be switched OFF to enable charging.

2. **Zero Adjust** knob (at centre of panel between handle and display), a ten turn potentiometer used to set the display to zero in mercury free atmosphere.

3. **Range Switch**

a) 2000 - in this range the instrument will measure over a range of 0-2000 $\mu\text{g}/\text{m}^3$ in steps of 1 $\mu\text{g}/\text{m}^3$.

b) 200 - in this range the instrument will measure over a range of 0-200 $\mu\text{g}/\text{m}^3$ in steps of 0.1 $\mu\text{g}/\text{m}^3$.

4. **Indicating Display**

This shows the mercury concentration in the monitored environment.

Range 0-2000 $\mu\text{g}/\text{m}^3$

Range 2 0-200 $\mu\text{g}/\text{m}^3$

Note: The display will also indicate 'LO BAT' when batteries require charging

Battery Charging





Battery Charging

The MVI incorporates a Ni-Cad battery with a continuous duty cycle of 6 hours' operation. The charge cycle for the battery is 16 hours

Recharging

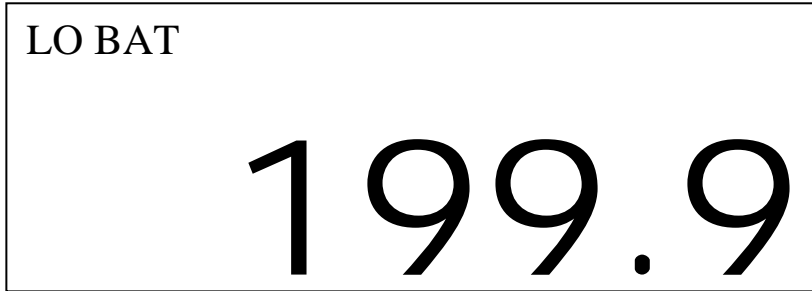
Switch the instrument off. Connect the MVI battery charger to the instrument. Use only the MVI charger. Use of an alternative charger may damage the instrument and will void the warranty. The green charging LED lamp located immediately below the ON/OFF switch will light indicating the batteries are accepting charge.

**If instrument is not regularly used then once a month it should be fully discharged by running it until the LO BAT appears. The instrument must then be fully recharged for 16 hours..
Only store the unit in a fully charged state.**



MVI Display

Low Battery Indication



Zero Setting





Using the MVI

1. Position the instrument with controls facing up.
2. Turn the instrument 'ON' and ensure the 'LO BAT' indication does not appear.
3. Fit the Luer lock filter
4. Allow the instrument 10 minutes to warm up.
5. Fit the charcoal filter in line.
6. Adjust the zero control to indicate zero '000' on the display.
7. Remove the charcoal filter.
- 8: Fit PTFE probe and the MVI is now ready for use.

During use it may be necessary for steps 5 to 8 to be repeated.

**N.B the MVI must not be used without the Luer lock filter.
The instrument can be damaged without this filter.**

After use switch instrument 'OFF' and recharge the batteries.



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Interferences

Since the mercury vapour detector depends on absorption of UV radiation by the sample, it will be affected to some extent by any substance that has greater absorption of UV light than does normal air. Some of the substances commonly encountered are vapour of various hydrocarbons, water vapour, sulphur compounds and particles such as smoke.

There is no measurable interference from CO, CO₂ or ammonia. High concentrations of water vapour interference will give small readings of approximately 3 to 6 ug/M³. However if the instrument is zeroed at a similar humidity, this will not be seen.

Table of some interferences at 100ppm concentration

<u>Compound</u>	<u>Reading in ug/M³</u>
Benzene	20
Toluene	3.5
Acetone	3
Ethyl Alcohol	6
Ethyle Acetate	3

Changing Audible Alarm Level

The mercury alarm level is factory set at 25 µg/m³.

If a different alarm level is required please contact the Factory for adjustment information.



Maintenance

1. Charcoal (Zero) Filter - Part No: 150-173

The mercury zero filter will become saturated after extensive use. It is therefore necessary to check the condition of the filter using the following procedure:

- a) Turn the instrument ON and ensure that the LO BAT indicator does not appear.
- b) Allow the instrument to warm up for 10 minutes. Zero the instrument in fresh air.
- c) Connect the charcoal filter to the MVI. The reading should not increase by more than 1 μg . If the reading increases by more than 1 μg then the filter must be replaced.

2. PTFE Probe and Filter assembly Part No: 703-341

The MVI is supplied with a PTFE probe and Luer filter. This can become contaminated or loaded with dust in regular use. Typical symptoms of contamination are a sluggish response to mercury and an unstable zero. If either of these symptoms occurs then the filter must be replaced.

Replacing the filter:

- a) Unlock the luer filter and discard, replace with a new filter.

3. Internal dust trap filter Part No: 150.172

The MVI is supplied with an internal dust filter. This can become contaminated or loaded with dust in regular use. Typical symptoms of contamination are a sluggish response to mercury and an unstable zero. If either of these symptoms occurs then the filter must be replaced.

Replacing the filter:

- A) Switch the MVI to the OFF position. Remove the 4 case screws, lift the case lid to reveal the internal filter which can be replaced by removing the tubing from both sides of the filter.



Spare Parts List

<u>Description</u>	<u>Part Number</u>
Zero Filter	150-173
PTFE Probe and pack of 10 filters	703-341
Manual	703-990
Set of Batteries	703-362 & 703-363
Pump	150-175
230 VAC Charger (UK)	201-031
220 VAC Charger (European)	201-038
110 VAC Charger (USA)	201-033
Internal dust filter	150-172

Calibration and Repair

The MVI requires annual calibration to maintain the best accuracy. Shawcity Limited will calibrate the instrument against a near Primary Standard and issue a certificate of calibration. If any calibration or repair work is required please return the instrument to The Service Department at Shawcity Ltd. A written estimate will be provided for all work.

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