

PPM Formaldemeter™ 400
Formaldehyde Monitor

Operation Manual

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1 INTRODUCTION

The PPM Formaldemeter™400 is an easy-to-use, hand held direct reading instrument designed for the rapid measurement of airborne formaldehyde levels.

Please read these instructions carefully and familiarise yourself with the instrument before use. This operating manual will provide you with all the necessary information for the correct use of your Formaldemeter™400.

1.1 Initial Receipt of the PPM Formaldemeter™400 Kit

Your PPM Formaldemeter™ 400 kit has been packaged carefully and includes all the components necessary for full operation. Immediately upon receipt, please examine the kit contents carefully to ensure that you have received the following items in good condition.

Component list

The instrument kit contains:

- Formaldemeter™ 400 instrument with battery installed
- Formaldehyde calibration standard
- Thermometer
- Vial of phenol filters (10)
- Ball point pen
- Certificate of calibration
- Operation manual
- Warranty registration card

Please report any missing items to your dealer.

Damage

Inspect all items carefully. Any damage must be reported immediately to both the carrier and your dealer.

1.2 General Description

Unlike other formaldehyde monitoring devices such as colour stain tubes and badges, the Formaldemeter™ 400 is capable of measuring many samples consecutively without the need for inconvenient ancillary equipment. Being ultra compact and battery operated, the instrument is truly field portable. The Formaldemeter™ 400 is extremely simple to use

and provides immediate, semi-quantitative readings of atmospheric formaldehyde concentration displayed on a digital read-out.

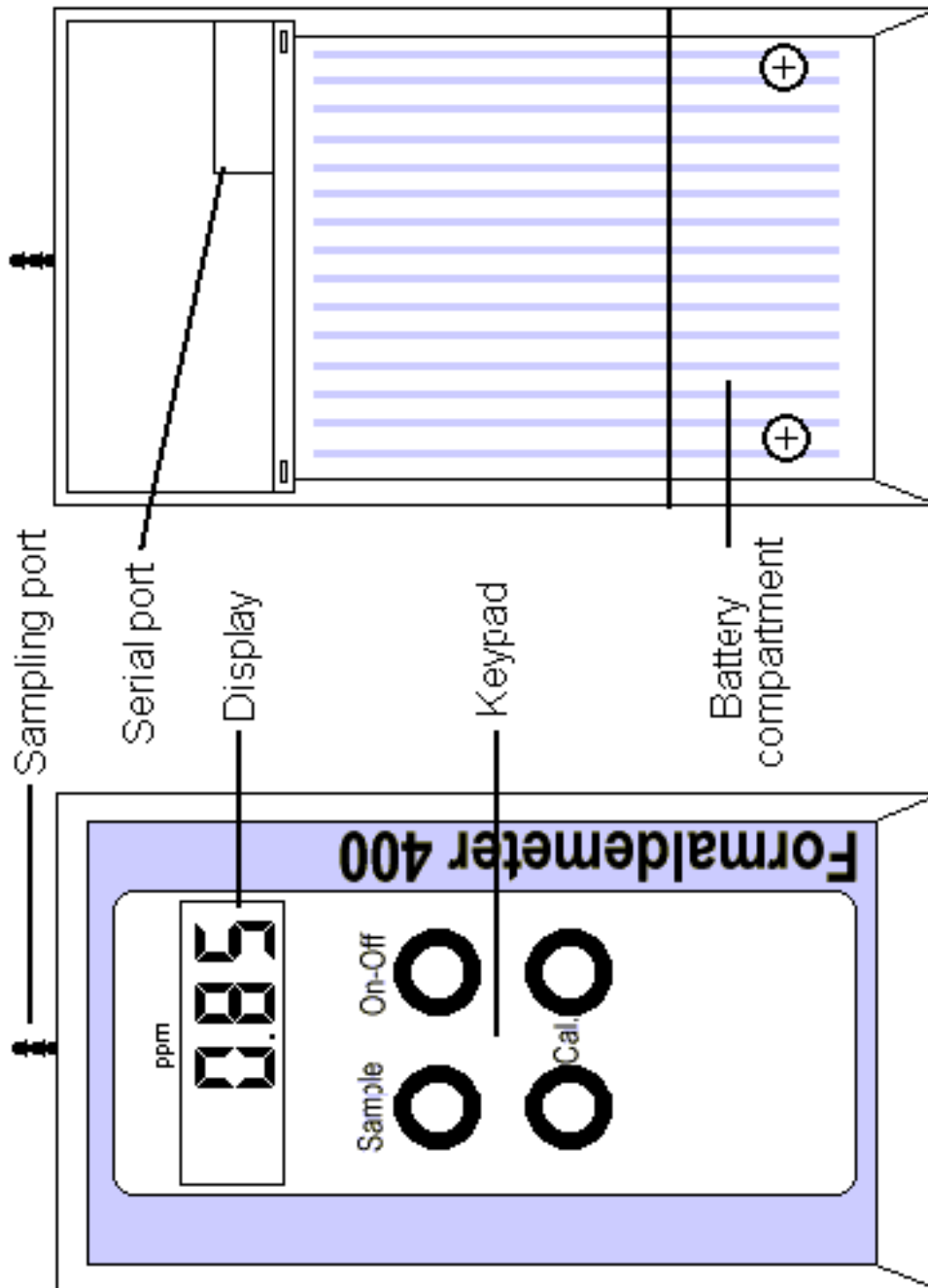
The instrument is designed to measure the concentration of formaldehyde in snatch (discrete) samples of air and should be employed primarily as a screening device.

Important points

It is important that you are aware of the following points when using the instrument

- The Formaldemeter™400 is temperature compensated to operate most accurately in the range 5 – 40°C.
- The results obtained with the PPM Formaldemeter™400 are instantaneous spot readings. A single reading is not necessarily representative of long term personal exposure. A series of readings taken at short intervals is preferable to infrequent tests.
- Avoid smoking in the environment to be analysed – tobacco smoke contains formaldehyde.
- Care must be taken to ensure that fluid or dust is not drawn into the instrument. This could permanently damage the sensor.
- The Formaldemeter™400 has been designed to be sufficiently robust for everyday field use. However, should the unit sustain a severe physical shock, the operation and calibration of the instrument should be checked using the supplied formaldehyde calibration standard.

1.3 Instrument Features



Sampling Port

The brass sampling port is the inlet through which the sample is drawn into sensor.

Display

The liquid crystal display (LCD) shows the formaldehyde concentration of the sample in 0.01 ppm increments. The display also shows text messages during certain operations.

Display Key

- - - -	<i>sensor recovering</i>
000	<i>sensor ready</i>
run	<i>sampling</i>
CAL	<i>taking calibration sample</i>
SET	<i>set calibration level</i>
bAt	<i>replace battery</i>
SET CAL	<i>instrument not calibrated</i>

Keypad

The instrument is operated by four buttons, some of which have multiple functions. The button switches are located beneath the membrane and are operated by pressing firmly where indicated.

Battery compartment

The battery compartment is located beneath a cover at the bottom rear of the instrument. To gain access to the battery, simply remove the cover by unscrewing the two screws.

A flat battery is indicated by bAt on the display. See section 5.1 for guidance on battery replacement.

Serial port

This socket can be used for connecting your Formaldemeter™ 400 to the PPM Base Unit or PC for automated continuous monitoring applications.

2 TECHNICAL INFORMATION

2.1 Principle of Operation

Electrochemical formaldehyde sensor

The PPM Formaldemeter™400 uses proven electrochemical sensing technology for determining the concentration of formaldehyde in air samples. The instrument contains an electrochemical formaldehyde sensor comprising two noble metal electrodes and a suitable electrolyte.

When air is drawn into the sensor by means of the internal sampling system, a small voltage is generated which is directly proportional in magnitude to the concentration of formaldehyde in the sample.

This voltage is produced as a result of the electrooxidation of formaldehyde at one of the catalytically active electrodes.

The signal is fed to a precision electronic amplifier and output on the instrument's display, when calibrated, as formaldehyde concentration in ppm (parts-per-million by volume).

All the electronic systems are based on modern, integrated circuitry employing the latest surface mount technology to ensure that the Formaldemeter™400 is an exceptionally robust and reliable instrument.

2.2 Interferants

Phenol & resorcinol

The presence of phenol in the air can give a reading on the Formaldemeter™ 400. When monitoring formaldehyde in situations where phenolic resins are used, the phenol filters provided should be used. These fit on to the sampling port of the instrument. The filters will completely remove phenols from the sample even at concentrations in excess of 1000 ppm without affecting the formaldehyde reading.

Phenol filter life

Each filter should be used no more than five times and then discarded. Partially used filters should not be stored in the vial with unused filters. Replacement filters can be ordered from PPM through your local distributor.

Alcohols & aldehydes

As is found with other portable detection equipment, the meter is not totally specific to formaldehyde alone, being susceptible to a degree of interference from a small range of other chemicals. Other aldehydes and alcohols such as methanol and ethanol in the atmosphere can cause cross-interference effects.

A list of common interferants is available on request.

2.3 Sensor Background Reading

Due to the high sensitivity of the sensor and the widespread occurrence of formaldehyde in the indoor environment, a background reading of up to 0.05 ppm can often be produced even when sampling in an atmosphere considered to be free of formaldehyde or other contaminants.

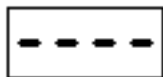
3 USING THE PPM FORMALDEMETER™400

3.1 Taking a Sample

Power on

Press the ON-OFF button once.

The instrument will display:



flashing for 3 seconds as the instrument checks the sensor,

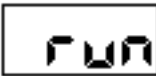
followed by:



indicating that the instrument is ready to take a sample.

Sampling

Hold the instrument in the atmosphere to be sampled. Press and release the SAMPLE button.

The display will show  and the internal pump should be heard running for almost two seconds as it samples the air.

Display reading As the sample is analysed, the display will show:

flashing 

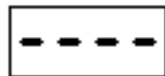
After approximately 10 seconds, a value will be displayed on the LCD and held until the instrument is switched off. This indicates the formaldehyde concentration in ppm.

Power off Switch the instrument off by pressing the ON-OFF button once.

If you forget to switch the instrument off after a test, the PPM Formaldemeter™400 will automatically switch itself off after 5 minutes.

3.2 Sensor Recovery Period

Sensor clearing Between samples, the instrument should be left switched off for a few minutes to allow the sensor to clear of any residual formaldehyde. As a general rule, the higher the reading obtained, the longer it takes for the sensor to clear. If the instrument is switched on before the sensor has cleared, the display will show:



flashing and the sampling pump will not operate.

The cell is clear only when the display shows:



permanently 3 seconds after power on.

The instrument is now ready to take the next sample.

4 CALIBRATION CHECK AND ADJUSTMENT



PLEASE READ THIS SECTION THOROUGHLY BEFORE ATTEMPTING TO CHECK OR ADJUST CALIBRATION. USERS ARE STRONGLY ADVISED TO FAMILIARISE THEMSELVES WITH THE INSTRUMENT BEFORE ATTEMPTING TO ADJUST THE CALIBRATION AND SHOULD FOLLOW THE INSTRUCTIONS CAREFULLY.

4.1 General Information

Check calibration regularly

Sensor sensitivity can change very gradually with time, so periodic recalibration may be required. It is advisable to check calibration regularly to ensure that the instrument is functioning correctly.

A quick calibration check can be carried out by drawing a formaldehyde vapour sample of known concentration into the instrument's sensor and noting whether the displayed reading agrees with the expected concentration value.

The PPM Formaldemeter™400 is supplied complete with a formaldehyde calibration standard and a thermometer, which are essential components for checking and adjusting calibration.

4.2 The Formaldemeter™400 Calibration Standard

The PPM Formaldehyde Calibration Standard consists of formaldehyde absorbed on a solid substrate in a glass tube from which a headspace vapour sample can be drawn. Each standard is carefully manufactured to a high tolerance.

Effect of temperature

The concentration of formaldehyde vapour generated in the calibration tube varies with temperature and for this reason, a thermometer and temperature/concentration table is supplied.

Handle the calibration standard as little as possible, and only by the yellow end caps to avoid heating the tube.

Temperature equilibration

Before using the standards, they should always be allowed to stabilise within the recommended temperature range of 15-29°C for at least 1 hour.

Standard life

Each standard has a capacity for 100 samples or a life of six months (whichever occurs sooner) and it must not be used after the indicated expiry date. New calibration standards can be ordered from PPM or through your local distributor.

4.3 Calibration Check Procedure

Temperature equilibration

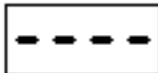
Place the instrument, thermometer and calibration standard together in a place where the temperature is stable for at least one hour before commencing the calibration check procedure to allow thermal equilibration.

Sensor check

Before carrying out a calibration check, the sensor must be clear of formaldehyde vapour from any previous samples. When the sensor is clear, the display will show:



3 seconds after power on.

If the display shows flashing  for longer than 5 seconds, then the sensor is not ready to take a sample. Switch the instrument off and allow it to recover for a few minutes.

Procedure

1. Place the standard with the thermometer on a work surface. Handle the calibration standard as little as possible to avoid heating the tube, holding it by the yellow end caps. Remove both end plugs.
2. Switch the instrument on by pressing the ON-OFF button once. Wait for the display to show:



3. Place the instrument on the work surface and insert the nozzle into the sampling end of the tube (as indicated by the black arrow). Ensure a good seal around the instrument nozzle by pushing the standard tube firmly against the instrument when taking a sample.
4. Press the SAMPLE button and wait until the internal sampling pump stops before removing the standard from the instrument. Replace the end plugs securely.
5. The display will initially show:

flashing 

Observe the final reading displayed (after approximately 10 seconds).

6. Note the reading obtained and temperature
7. Refer to the Temperature/Concentration look-up table on the standard tube. If the reading is within 10% of the value shown in the table, then no recalibration is required.

If recalibration is required, follow the procedure in Section 4.4.

Leave the instrument switched off for approximately 5 minutes to recover before commencing another atmospheric analysis or calibration adjustment.

4.4 Calibration Adjustment Procedure



PLEASE READ THIS SECTION THOROUGHLY BEFORE ATTEMPTING TO ADJUST CALIBRATION. USERS ARE STRONGLY ADVISED TO FAMILIARISE THEMSELVES WITH THE INSTRUMENT BEFORE ATTEMPTING TO ADJUST THE CALIBRATION AND SHOULD FOLLOW THE INSTRUCTIONS CAREFULLY.

Under normal operating conditions, instrument calibration should require only minimal periodic adjustment. To see whether a full recalibration is required, perform a calibration check first as described in section 4.3.

Temperature equilibration

Leave the instrument and calibration standard in a room where the temperature is constant for at least one hour before calibrating to allow thermal equilibration.

Procedure

1. Place the standard with the thermometer on a work surface. Handle the calibration standard as little as possible to avoid heating the tube, holding it only by the yellow end caps.

2. Read the temperature on the thermometer and determine the required concentration reading from the lookup table on the calibration tube.

for example:

Temperature: 23°C

Reading: 3.15 ppm


3. Remove the yellow plugs from both ends of the calibration standard tube.
4. Press the ON-OFF button once to switch the instrument on.

5. Wait for the display to show 

6. Insert the instrument nozzle into the sampling end of the calibration standard (indicated by the black arrow).


To maintain airtight contact between the nozzle and the standard, push the standard firmly against the instrument.


7. Simultaneously depress and release both Cal ▲ and ▼ buttons.

8.  will appear on the LCD, followed by the sound of the pump drawing a vapour sample from the tube.

9. When the pump stops, remove the calibration tube and replace both yellow end plugs.

10. As the instrument analyses the sample, the display will show:

 flashing for approximately 10 seconds, followed by:

 alternating with 

11. Now use the Cal ▲ and ▼ buttons to adjust the display reading to the required concentration.
12. Press the SAMPLE button to store this calibration value. The display will show:

 followed by 

The Formaldemeter™ 400 will then switch off automatically.

The instrument has now been recalibrated.


5 MAINTENANCE

With the exception of the battery, your PPM Formaldemeter™ 400 has no user-serviceable components. It is important that no attempt is made to open the instrument other than to replace the battery. Any evidence of tampering with the instrument will invalidate the warranty.

If you find that your instrument requires service or repair, please return it to the factory or an authorised PPM Service Centre.

5.1 Instrument Battery

Low battery indicator

If  appears on the display when the instrument is switched on, then the battery voltage is too low and needs replacing

Battery Replacement

The instrument requires a 9V PP3 / MN1604 / 6LR61 type alkaline battery.

To replace the battery, simply remove the battery compartment cover at the bottom rear of the instrument by unscrewing the two screws. Clip a new battery to the connector and place the battery in the compartment. Secure the cover in place again with the two screws.

5.2 Cleaning the Formaldemeter™400

Take care during cleaning

On no account should the Formaldemeter™400 be immersed in liquid. Any fluid entering the instrument will destroy the sensor and the electronic circuitry.

If the instrument's enclosure requires cleaning, it should be wiped with a damp cloth. Never use abrasive or solvent based cleaning agents.

5.3 Storage

When not in use, your Formaldemeter™400 should be stored in the supplied carrying case in a clean, dry environment and away from extremes of temperature.

WARRANTY

The PPM Formaldemeter™ 400 is warranted to be free of defects in materials and workmanship under proper and normal use and service for a period of 1 year from the date of purchase. This warranty is limited to repair or replacement (at our option) of any part that proves defective in material or workmanship under normal use and service, provided the product is returned to PPM Technology Limited, shipment charges prepaid.

Damage due to defacement, misuse, tampering, lack of prescribed maintenance or use in violation of the instructions furnished by PPM Technology Limited is not covered.

This warranty is in lieu of all other warranties, express or implied, including but not limited to merchantability or fitness for a particular purpose. In no event shall we be liable for any incidental or consequential damages of any nature.

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