

PPM Formaldemeter™ *kitV-m*

3 Parameter IAQ Monitor with built-in Memory

Operation Manual



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1. INTRODUCTION

The PPM Formaldemeter™ *htV-m* is a precise 3 parameter indoor air quality monitor suitable for monitoring low level concentrations of hazardous formaldehyde vapours under extremes of temperature and humidity, in parts per million (ppm) and mg/m^3 . Fast and easy to use, pressing a single button gives an immediate indication of concentration levels.

The *htV-m* has a built in non-volatile memory and real time clock. It can be used as a manual hand held device or a continuous data logger capable of over 7 days (optional) continuous monitoring and thus has the option of being mains or battery powered.

A PC can automate the sampling and logging of data at specific times by a direct RS232 interface or via a wireless connection. The SPC-2 programme can be used to monitor the instrument continuously using the RS232 interface on the Formaldemeter™ *htV-m*.

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

Please note that PPM Technology Limited shall not be liable for errors that may appear herein or for incidental or consequential damages in connection with or arising from the use of this material.

1.1 Initial Receipt of your Formaldemeter™ *htV-m* kit

Your PPM Formaldemeter™ *htV-m* 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.

Kit Contents

The Formaldemeter *htV-m* kit contains:

- Formaldemeter™ *htV-m* instrument with Stand
 - Formaldehyde Calibration Standard
 - RS232 cable and Download Software CD
 - USB to RS232 Converter Kit
 - DC Mains adapter with Universal Input Plugs
 - Vial of phenol filters (10)
 - PPM Technology pen
 - Certificate of Calibration
 - Quick set-up Guide. Full operation Manual on CD
- 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™ *htV-m* 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. It can also be mains powered suitable for continuous monitoring. It can be connected directly to a manager PC for automation via the RS232 interface.

The Formaldemeter™ *htV-m* is extremely simple to use and provides immediate, semi-quantitative readings of atmospheric formaldehyde concentration displayed on a digital read-out, in both ppm and mg/m³.

The Formaldemeter™ *htV-m* is designed to measure the concentration of formaldehyde in snatch (discrete) samples of air and should be employed primarily as a screening device.

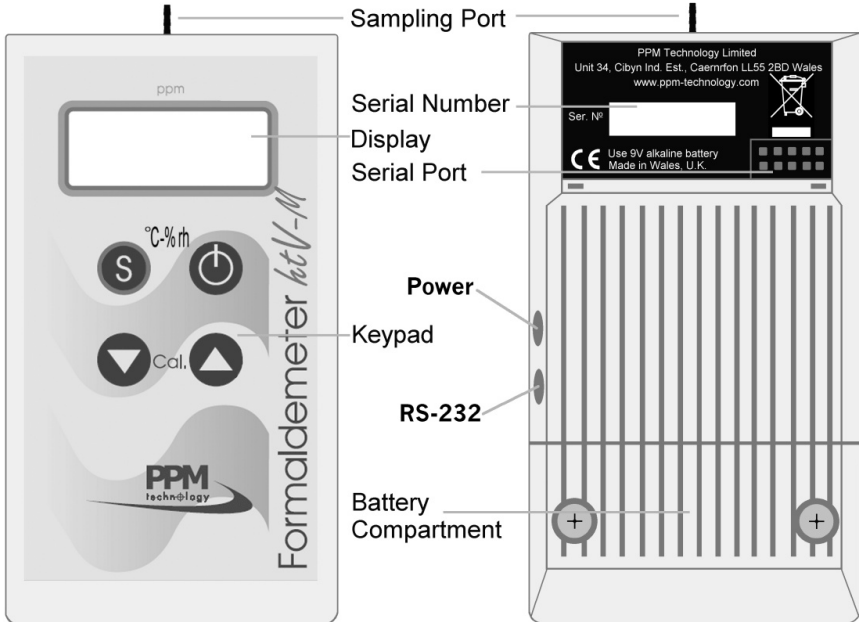
Important points

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

- The Formaldemeter™ *htV-m* is temperature compensated to operate most accurately in the range 10 – 30 °C.
- The results obtained with the PPM Formaldemeter™ *htV-m* 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 aldehydes.
- Care must be taken to ensure that fluid or dust is not drawn into the instrument. This could permanently damage the sensor.
- The Formaldemeter™ *htV-m* 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

Instrument Diagram



•Sampling Port

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

•Display

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

•Keypad

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

•**Display Key**

----	sensor recovering
0.00	sensor ready
run	sampling
CAL	taking calibration sample
SEt	set calibration level
bAt	replace battery
SEt CAL	instrument not calibrated
FULL	memory full
Schd	schedule

•**RS232 Port**

The RS232 interface allows direct connection to PC to be used with PPMonitoring software

•**DC Power Port**

The DC Power Port gives the option of the instrument to be mains powered.

•**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 the display flashing:

BAt

•**Serial Port**

This socket can be used for connecting your Formaldemeter™ *hctV-m* to the PPM AMS-2 or SPC-2

2. TECHNICAL INFORMATION

2.1 Principle of Operation

Electrochemical Formaldehyde Sensor

The Formaldemeter™ *hclV-m* 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 electro-oxidation 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™ *hclV-m* is an exceptionally robust and reliable instrument.

2.2 Interferents

Phenol and Resorcinol

The presence of phenol in the air can give a reading on the Formaldemeter™ *h6V-m*. When monitoring formaldehyde in situations where phenolic resins are used. These fit onto the sampling port of the instrument. The filters will completely remove phenol from the sample at concentrations in excess of 1000ppm without affecting the formaldehyde concentration.

Alcohols and 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.

Sensor Background Reading

Due to the high sensitivity of the sensor: a background reading can often be produced even when sampling in an atmosphere considered to be free of interference. Background interference can be reduced using the new features on the Formaldemeter™ *h6V-m*, please contact PPM Technology Ltd for details.

Humidity Extremes

As the sensor is very sensitive, it is possible that extremes of humidity (generally, anything outside 40-60% RH) may cause a background reading on Formaldemeter instruments. The Formaldemeter™ *h6V-m* is specially designed to reduce the effect.

A list of common chemicals, which can cause interference, is available on request.

3. USING THE Formaldemeter™ *hdV-m* AS A HANDHELD DEVICE

Upon receipt of your *hdV-m*, it is set to function as a handheld.

3.1 Taking a Sample

Power On

Press the POWER button once. The display will show

- - - -

followed by:

0.00

This indicates that the instrument is ready to take a sample.

Power Off

Switch the instrument off by pressing and holding down the ON-OFF button for 3 seconds until display shows

OFF

then release. A click is heard, your instrument is now off.

Sampling

Turn instrument on, hold the instrument in the atmosphere to be sampled. Press and release the SAMPLE button.

The display will show

run

The internal pump should be heard running for a short period as it samples the air.

The display will next flash between the following two screens for 10 seconds

- . - - and **0.00**

The display will then show - . - - flashing, as the sample is analysed. After 60 seconds, the display will show a non-flashing value, which is held until the instrument is switched off. This indicates the formaldehyde concentration in parts per million

(ppm).

By holding down the ▲ button the instrument will show the reading in mg/m³ alternating with the following screen:

Alt=

By holding down the ▼ button, the display will show the time taken to reach the displayed concentration in seconds.

In the event that high levels of an interferent is present, the instrument will give a reading in around 10 seconds, to avoid the sample being affected by the interference.

Alternative Settings

The two durations listed above (10 and 60 seconds), may vary depending on the specifications of the supplier or customer. These values are the default set by the instruments manufacturer. For further details please contact your local distributor.

3.2 Sensor Recovery Period

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 pump will not operate and the display will flash:

- - - -

The cell is clear only when the following display is shown for three seconds without interruption:

0.00

The instrument is now ready to take the next sample.

If the instrument does not clear after approximately 5 minutes, then refer to troubleshooting section of the manual.

3.3 Memory Full

Since the *htV-m* has a built in memory system, every sample taken either manually or continuously will be recorded, eventually after many samples (minimum 2000) have been taken the memory will become full and the display will show:

FULL

This means further samples cannot be taken since the memory is full. The display will continue to show: **FULL**, until the memory is downloaded and cleared or the over write option is selected.

The memory is cleared using the download software included in your *htV-m* kit.

Option – Alternatively it is possible to set to over write the oldest sample in the memory with the latest. (See section 5.4 Stop on Full Mode or use the download software to change the settings).

3.4 Calibration Check and Adjustment

Please read this section thoroughly before attempting to check or adjust calibration. Users are strongly advised to familiarize themselves with the instrument before attempting to adjust the calibration and should follow the instructions carefully.

3.4.1 General Information

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™ *66V-m* is supplied complete with a formaldehyde calibration standard and has a built in thermometer essential for calibrating the instrument.

It is recommended that calibration check or adjustment be carried out at the approximate operational temperature.

3.4.2 Temperature & Humidity Sensor

1. Hold down the SAMPLE button and press the ON-OFF button once. Release the SAMPLE button.

2. The Instrument will briefly display:

HEAT

3. The instrument will then show the temperature reading in °C, followed by:

°C

4. The instrument will then display the humidity (in % RH), followed by:

%rH

5. The instrument will cycle through these four screens until it is either switched off manually, or it will switch itself off after 30 seconds.

The Sensor used for the temperature and humidity readings is accurate to within ± 3.0 %Rh for humidity, and ± 0.4 °C for temperature, within the operational limits for the instrument. To ensure the accuracy of the instrument the temperature &

humidity sensor is replaced with the instruments annual service.

3.4.3 The Formaldemeter™ Calibration Standard

The PPM Formaldehyde Calibration Standard consists of formaldehyde absorbed on a 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 standard varies with temperature and for this reason, the instrument has a built in thermometer and a temperature / concentration table is supplied.

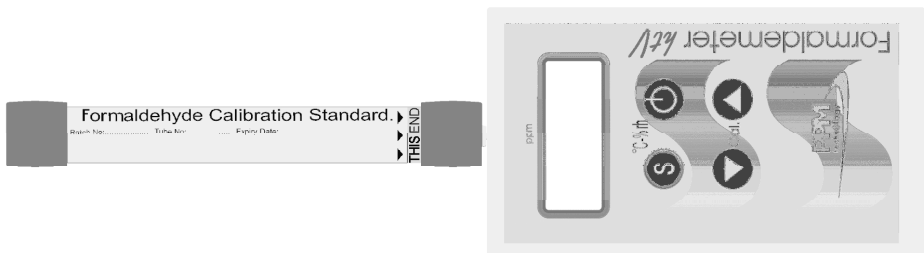
Due to the effect of body temperature, handle the calibration standard only by the yellow end caps, to ensure temperature equilibrium.

Temperature Equilibrium

The calibration standard should always be allowed to stabilise within the recommended temperature range of 15-29°C for at least 1 hour before use.

Calibration Standard Expiry

Each calibration standard may be used for a maximum of 6 months (as indicated by the given expiry date), or a maximum of 100 samples. New calibration standards can be ordered from PPM Technology or through your local distributor.



3.4.4 Calibration Check Procedure

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

Before carrying out a calibration check, the sensor must be clear of formaldehyde vapour from any previous samples. The Temperature sensor must be read (as described earlier) and a note taken as this is vital for the calibration procedure.

Procedure

1. Place the calibration standard and the instrument on a work surface. Handle the calibration standard as little as possible to avoid heating the tube, holding it by the yellow caps. Remove both end plugs.
2. Switch the instrument on by pressing the ON-OFF button once. Wait for the display to show: **0.00**
3. Insert the nozzle into the sampling end of the tube. Ensure a good seal around the instrument nozzle by pushing the calibration 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 in the calibration standard securely.
5. The display will flash between the following two screens for 10 seconds: -. - - and **0.00**
6. The display will then show a flashing, -. - - as the sample is analysed. After 60 seconds, the display will show a non-flashing value, which is held until the instrument is switched off. This indicates the formaldehyde concentration in ppm.
7. Refer to the Temperature/Concentration look-up table on the standard tube. If the reading is within 5% of the value shown in the table, then no re-calibration is required.
8. If re-calibration is required, follow the calibration adjustment procedure that follows.

Leave the instrument switched off for approximately 5 minutes to recover before commencing another calibration check, adjustment or taking a sample.

3.4.5 Calibration Adjustment Procedure

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.

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. 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 instrument and calibration standard on a work surface
2. Handle the calibration standard only by the yellow end caps.
3. Press the ON-OFF button to switch the instrument on.
4. Wait for the display to show: **0.00**
5. Remove the yellow plugs from both ends of the calibration standard.
6. Insert the instrument nozzle into the sampling end of the calibration standard. 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. The pump will be heard drawing a vapour sample and the screen will briefly show:
CAL
9. When the pump stops, remove the calibration tube and replace both yellow end plugs.
10. The display will show an increasing, flashing value for 60 seconds, followed by:

Set 1.750

11. Read the temperature noted down recently and determine the required concentration reading from the lookup table on the calibration standard, for example:

Temperature: 21°C
Reading: 2.13 ppm

12. Now use the Cal ▲ and ▼ buttons to adjust the display reading to the required concentration.

13. Press the SAMPLE button to store this calibration value. The display will show:

CAL

followed by:

End

The Formaldemeter™ *hitV-m* will then switch off automatically.

The instrument has now been recalibrated.

4. ADDITIONAL FEATURES

4.1 Data Retrieval – This function enables the user to view the last 10 manually samples reading only. Use the download software to retrieve all data required.

Accessing the Data

1. Hold down the SAMPLE button and press the ON-OFF button once. Release the SAMPLE button.
2. The Instrument will briefly display:

HEAt

The instrument will then flash between displaying the following two screens:

Temperature reading and °C

3. Once the instrument is in this mode press the Cal ▲ and ▼ buttons at the same time and release. The display will briefly show:

dAtA

4. The display will then flash between the following two screens (as an example):

run0 and **0.08**

The first screen indicates which previous sample is being displayed, the most recent first, from **run0** (most recent), to **run9** (the oldest).

Use the Cal ▲ and ▼ buttons to move to the desired sample reading.

By pressing the SAMPLE button when viewing a reading, the instrument will display the reading in mg/m^3 , as shown below:

Alt0 and 0.09

Press the ON-OFF button when done to turn the instrument off.

4.2 Clearing The Non FRAM Memory

As with the older *hclV* model, the *hclV-m* has sufficient memory capacity to log the last 10 samples as well as the FRAM memory.

While viewing the data, hold down both the Cal ▲ and ▼ buttons at the same time, until the display has run through all the following screens:

CLr3 CLr2 CLr1 CLr0 ()

The non-FRAM memory will now be clear.

5. USING THE Formaldemeter™ *hclV-m* AS A CONTINUOUS MONITOR

The built in memory and real time clock enables the instrument to log all 3 parameters at corresponding times, allowing improved monitoring and analysis opportunities. A schedule must be set up using the download software enclosed in order for continuous monitoring. It is possible to view direct real-time readings on your own PC by using a specialist wireless communications module or SPC-2, both available through PPM Technology Ltd.

Real Time Clock

The Real Time clock is an internal clock, which can only be set up and viewed via a RS232 link and using the download software programme. The clock cannot be displayed on the Formaldemeter™ *hclV-m* screen. It is used internally.

Schedule Mode

In order for continuous monitoring to take place a **Schedule** must be set up. A schedule allows the user to control every aspect of the monitoring e.g. set start time, how often you want to sample, for how long and on which days.

A schedule can only be set up via a PC using the download programme software and RS232 cable provided to transfer the information to the Formaldemeter™. However, once a schedule has been programmed into the instrument, it can be started at any time without a PC being present.

5.1 Switching the Formaldemeter™ *htV-m* from a Handheld Device to a Continuous Monitor.

Press **POWER**, **SAMPLE** and **CAL ▲** at the same time, the screen will display

ConF briefly, followed by

Schn which means Schedule NO

Press the arrow key **CAL ▲** to change to

Schy which means Schedule YES

Press **SAMPLE** to select.

If a schedule has been set in the memory using the download software programme, the schedule has now been activated.

Press the **POWER** button at this point to confirm your option. Continue to press the **POWER** button until the instrument has switched off.

The *htV-m* can now be used as a continuous monitor.

5.2 Starting a Schedule

Switching the *htV-m* on again, after activating a schedule (as done above), this will start the schedule. The screen will display:

0.00

until the set schedule begins as previously set by a PC.

Then **run** will be displayed when the schedule is set to take a sample.

Then **Schd** flashes intermittently with . . . until the instrument has finished analysing the sample. The sample reading will then be displayed until the next scheduled sample. During continuous sampling the display will show **Schd** flashing intermittently with the previous stored reading.

The schedule has now been set up and is running.

Once a schedule is running, all buttons on the Formaldemeter™ *htV-m* are disabled apart from the POWER button.

If no schedule has been set up on a PC, using the specialist software, the Default Schedule will run. The Default Schedule is set to sample continuously for as long as the instrument is turned on, at intervals of every 2 minutes.

The instrument can be scheduled to sample as often as required: as soon as the instrument has cleared after taking the previous sample; once a minute; once an hour and / or anything in between.

5.3 Ending a Schedule

If a schedule is running the instrument must be turned off first, then turned on again by pressing:

POWER, SAMPLE and **CAL ▲** at the same time, the screen will display

ConF

briefly, followed by

Schy

which means Schedule YES

Press arrows to select

Schn which means Schedule NO

Press the **SAMPLE** button to select then hold down the **POWER** button. Schedule Mode is now off.

5.4 Stop On Full Mode

If Stop On Full Mode is on, and the internal FRAM *hctV-m* memory is full, the *hctV-m* will not sample until memory is cleared.

If Stop On Full Mode is off, and the internal FRAM *hctV-m* memory is full, the oldest readings will be overwritten by the newest readings.

Either may be selected by pressing:

POWER, **SAMPLE** and **CAL ▲** at the same time, screen will display:

ConF briefly, followed by:
Sch Y or **Sch n**

Select the required setting by pressing **SAMPLE** to confirm choice. The display will now show:

SoF Y Stop On Full Yes or **SoF n** Stop On Full
No

use arrow keys to navigate between the two settings pressing **SAMPLE** to select the required option.

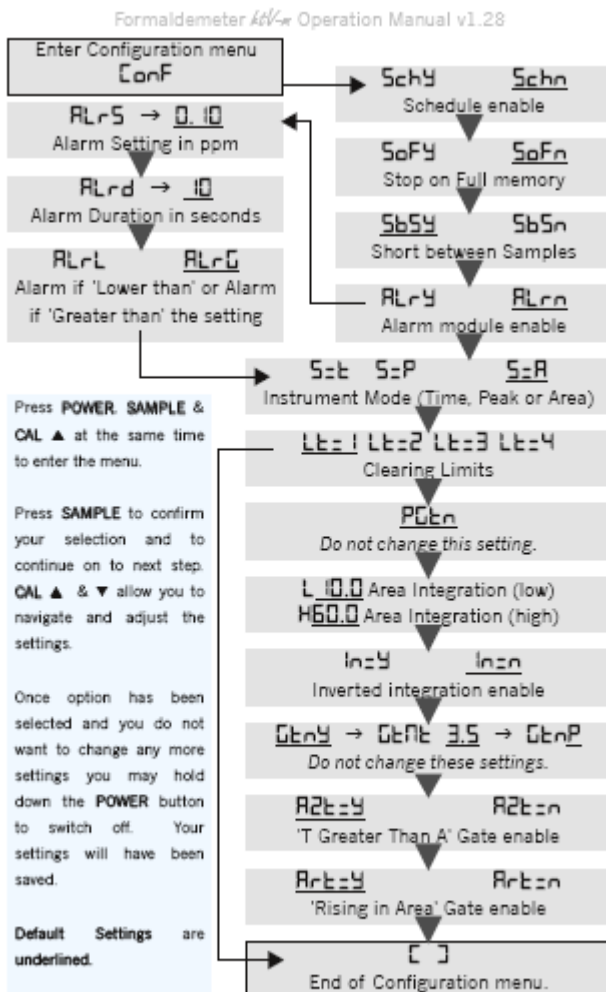
When the FRAM memory is full the message FULL is shown when the instrument is turned on and if a sample is taken.

If Stop On Full Yes is set, then sampling is prohibited when memory is full.

Various Instrument Modes, Limits and the Optional Alarms may

also be set up in a similar way see detailed flow chart that follows.

5.6 Flow Chart Explanation



5.6.1 Schedule Selection

Schedule Yes

The user wishes to start a schedule. For using Formaldemeter™ *hclV-m* as a continuous monitor.

Schedule No

The user does not wish to start a schedule, For using the Formaldemeter™ *hclV-m* as a handheld device.

Stop On Full Selection

See earlier **section 5.4** for detailed information.

Mode Selection

Time Mode The sample value is given at the calibration time to peak. For further details contact PPM Technology.

Peak Mode The sample value is given at the highest sensor output. For further details contact PPM Technology.

Area Mode This is the Default Setting. The sample value given is at the higher area-time limit.

5.6.2 Limit Selection

This mode governs how quickly the instrument takes to clear before another sample can be taken. The default limit for the Formaldemeter™ *hclV-m* is **Lt =1**, which means that the fuel cell must be very stable before the instrument allows the user to take another sample.

To change Limit, the *hclV-m* must first be **RE-SET** (see **section 6.3**), before following the Flow Chart instructions on previous page.

- Limit 1 **Lt=1** The normal Formaldemeter™ mode.
- Limit 2 **Lt=2** The normal Glutaraldemeter™ mode.
Do not use on *htV-m*.
- Limit 3 **Lt=3** The medium concentration Formaldemeter™ *htV-m* mode. If the Formaldemeter *htV-m* is used regularly in atmospheres where the concentration of formaldehyde is often well over 2ppm, it is advised to change the limit to 3. This will allow the user to sample at more regular intervals. Please note that when using limit 3, the readings at very low concentration are less accurate, due to the fact that some residual formaldehyde from the previous sample may still be present in the sensor.
- Limit 4 **Lt=4** The high concentration Formaldemeter *htV-m* mode.
Please contact the manufacturers regarding this limit as changing the limit to 4 require additional changes to settings.

5.6.3 Alarm Selection

- Alarm Yes The user wishes to set alarms.
- Alarm No The user does not want to set alarms.
- Alarm Great The alarm will sound if the reading is greater than the set threshold.
- Alarm Low The alarm will sound if reading is lower than the set threshold.

5.7 How to use Data Mode with your Formaldemeter *htV-m*

Note Read and understand this section if you do not intend to use the PPM download software that was supplied with your kit. If you intend using the PPM download software please ignore this section and read the help file/manual supplied with the CD.

You will need a Windows PC; your *htV-m* (fitted with RS232 socket); a RS232 lead (supplied with Kit); a spare RS232 port on the PC or USB port using RS232-USB converter (supplied).

1. Connect the *htV-m* instrument to the PC port using the cable – you will need to know the port number you have connected to if you only have one then this is probably called “COM 1”. If you used a USB Serial Adapter then you may need to check which number was assigned to it – using the Device Manager tool will help. If in doubt then seek the advice of your computer administrator.

2. Once the instrument has been connected enter the Operation Settings menu by holding down all three buttons whilst turning the instrument on – release all the buttons and then use the sample button to scroll through the entries until you get to **232** options which you must set to read **232Y** Press sample again to save your choice and the next item should be **dAt...** this needs to be set to **dAt n** in order to enable the Data Mode.

3. Pressing sample will save you choice and turn the instrument off as this is the last item.

Hyper Terminal

In order to receive the downloaded data you will need a piece of software known as a Terminal Emulator or Serial Capture there

are many available applications such as ProComm, WinComm & Minicom. However many Windows installations come with a Terminal Emulator preinstalled called HyperTerminal. It can be found on the Start menu under Accessories > Communications > HyperTerminal.

Creating a new connection

Start the application and you will be prompted to enter a description for a new connection. Enter a useful name for the new connection we're about to create – something like 'htvMData' – and then click on OK:

You will now be prompted to select the connection type – from the dropdown list select the COM port connected to the instrument to and press OK:

You'll then be prompted the connection properties for the connection – select a baud rate of 9600; 8 data bits; one stop bit and no parity or flow control:

Click on OK to open the connection. You may optionally alter some of the more advanced settings for the connection. Use the button at the top of the screen to disconnect before opening the Properties box and selecting the ASCII Set-up button. Adjust the settings so that there is a tick in each of the boxes.

Close all the property boxes and save the connection for use later on. In future you will find a new submenu in the Start menu which contains all the previously saved connections: Accessories > Communication > HyperTerminal >

Connecting to the *htV-m*

If you have previously created a connection for the *htV-m* and saved it then you may click either select it from the Start menu or open HyperTerminal; cancelling the initial dialogue and then using the File menu to open your connection. If HyperTerminal does not open the connection for you (check for a timer in the status bar) then you can click on the Call button at the top of the screen to connect to you instrument.

Typing a single X into the screen will start the memory download – soon you will see the screen fill up with data. Type any character into the screen to stop the transfer.

Saving Data to a File

HyperTerminal has the facility to save the downloaded data directly into a file – to use this make sure that any transfer has been stopped and select Transfer > Capture Text... from the menu. This will bring up a dialogue where you may enter a file name to save the data to – edit the path and file name to suit your system but ensure that you use a csv extension as this will allow the data file to be opened directly by applications that support the CSV data format. Click on Start to open the file and to return to the main screen. Once there; type in an X to start the transfer – which will be placed into the file. Once the transfer is over: click through to Transfer > Capture Text > Stop menu to close the file and save your data. You may now open the file you specified in, for example, a spreadsheet package such as Excel or OpenOfficeCalc.

6. TROUBLESHOOTING

6.1 Diagnosing the problem

'----' flashes on display and the instrument will not let me sample

The three main reasons for this problem are:

- 1.The instrument has been accidentally calibrated when no calibration standard was present.
- 2.The calibration standard used for calibration has expired.
- 3.The instrument has been damaged and will need to be repaired.

To determine which of the reasons applies to your case follow the procedures shown below (Note - quoted values are for tests performed at 25°C):

1. Make sure that the *htV-m* has been turned off for about 5 minutes.
2. Hold down the left calibration button whilst turning the *htV-m* on.
3. **tEst** will appear on the display. Release all the buttons.
4. A four-digit value will appear (#.###). Give the *htV-m* a few seconds to stabilise.
5. Note the initial value and an approximate rate of change over a minute. If the initial value or the rate of change is over 0.300 then it is likely that your sensor has been damaged - contact your local service centre or PPM Technology Ltd. for

further details.

If the readings look OK then continue with the instrument still in the **tESt** mode:

1. With the sample nozzle inserted into a valid calibration standard take a sample.
2. The display should be set to **0.000** as the pump starts to run and then rise up to a maximum as the sample is drawn in.
3. Press and hold the Left-hand calibration button - the display will show a time value (**t #.#**). Make a note of this.
4. Press and hold the Right-hand calibration button - the display will show the peak value. Make a note of this too.
5. Turn the instrument off. Leave the instrument off for 5-minutes before repeating the tests.

If the peak value is less than 5.000 or has a time value less than 5 seconds then there may be problem with the sampling system or your sensor. Contact your service centre or PPM Technology Ltd. for further details.

6.2 Checking the Gain

1. Make sure that the instrument is turned off.
2. Hold down the Right-hand calibration button whilst turning the instrument on.
3. gAln will appear on the display . Release all the buttons.

4. A four-digit value will alternate with a three-digit exponent on the screen (##### / **E###**).

5. Note both numbers. The instrument will power down after a few seconds.

If the Exponent value is between E015 and E013 then you may have used an expired standard - check your standard expiry date and re-read Section 4.4 on how to calibrate the instrument. When you are ready carry out a RE-SET, as described below, and recalibrate the instrument.

If the Exponent value is less than E013 then you may have accidentally calibrated without a calibration standard being present. Carry out a RE-SET as described below.

6.3 How to perform a full RE-SET of the instrument

Make sure that you have a valid calibration standard to hand before performing this procedure as your current calibration will be deleted, and there is no way of 'undoing' the RE-SET procedure once it has been performed.

1. Make sure that the instrument is turned off.
2. Hold down both Cal ▲ and ▼ buttons whilst turning the *kill-m* on.
3. **rSEt** will appear on the display. Release all the buttons.
4. **—no—** will appear on the display. Change the **—no—** to a **YES** by pressing Cal ▲. To complete the re-set, press the SAMPLE button.
5. **rSEt** will appear on the display. **SEt/CAL** will now appear on the display followed by the **0.00** display. Switch the instrument off and then back on to calibrate.

If, after a RE-SET, you are still experiencing problems then contact PPM Technology Ltd. to arrange a service.

7. MAINTAINANCE

With the exception of the battery, your PPM Formaldemeter™ *htV-m* 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 PPM Technology or an authorised PPM Service Centre.

7.1 Cleaning the Formaldemeter™ *htV-m*

On no account should the Formaldemeter™ *htV-m* 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.

7.2 Storage

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

7.3 Instrument Battery - Low battery indicator

When the battery voltage becomes too low, and the battery needs replacing the display will flash:

bAt

7.4 Battery Replacement

The instrument requires a 9V PP3 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 and place the battery in the compartment.

8. ACCESSORIES

8.1 Wireless One to One Module System

This wireless node can be added via the 10-way connector at the back of the instrument allowing the *ktV-m* to be able to receive and transmit digital signals. The *ktV-m* will be able to communicate wirelessly to a PC thus replacing the RS232 cable. This means that the *ktV-m* can carry out sampling and data logging in unsafe and remote locations with results being sent to a safe working environment.

8.2 SPC-2

Enables the user to view Real-Time Readings from the PC. Contact PPM Technology Ltd for more details.

8.3 Wall Mount

Wall Mounting Bracket for Continuous Monitoring purposes.

9. WARRANTY

The Formaldemeter™ htV-m 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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