HAL-HVX501
Handheld Volatile Organic Compound Meter/Monitor

Operational Manual

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Version Table

Date	Version	Comment
April 2, 2014	1.0	Initial Release
July 8, 2014	1.1	PTH Probe Function Added to Unit

Disclaimer

The information in this manual is believed to be accurate, however, Hal Technology assumes no responsibility for any inaccuracies that may be contained in this manual. Under no circumstances will Hal Technology be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. In the interest of continued product development, Hal Technology reserves the right to make improvements or changes in this manual and the products it describes at any time, without notice or obligation.

Quality Assurance

- This product has met Hal Technologies product specifications. All the test instruments and standard materials used for calibration are traceable.
- This certification is for new products only. It is not valid for previously owned or exhibition units.

Commonly Used Symbols

The following symbols are used throughout this manual:

WARNING

The action described could lead to harmful damage of the instrument.

NOTICE

Noting items of interest or instrument features and/or requirements.

Unpacking and Inspection

- Inspect the receiving package and notify the shipper immediately if there appears to be susceptible damage during shipping.
- Please verify that the enclosed items coincide with the shipping package list.

WARNING

This Instrument contains static sensitive components that may be damaged through improper handling. The warranty is void for any unauthorized opening of the instrument.

Environmental Requirements

To avoid accidents or damage to the instrument, please avoid using the instrument in the following situations:

- DO NOT expose to combustible or explosive environments.
- DO NOT expose to environments where rust or radioactivity are present.
- DO NOT expose to an environment exceeding the specified limits.

Technical Support and Warranty

Within a year from the date purchased, the manufacturer will provide free technical support and software upgrades, if applicable. For additional help, please contact info@haltechnologies.com

NOTICE

It is strongly recommended that the instrument should be calibrated semi-annually or annually at least. Please contact Hal Technology to schedule your calibration or any services needed. The HAL-HVX501 can only be serviced at Hal Technology or by a Hal Technology authorized professional.

1. Introduction

Figure 1: HAL-HVX501 Volatile Organic Compound (VOC) Meter

The HAL-HVX501's low-power consumption design enables long operation times. Exceptional sensor stability and a patented self-calibration algorithm allow very long intervals between calibration intervals. An optional external temperature and humidity probe can be used to enhance the sensor measurements by applying custom compensation algorithms. The USB port provides the capability of downloading internally stored data with HalTech's Data Downloader software package and it is fully compatible to Window XP/7/8/8.1 operating system. The HalTech HVX501 Volatile Organic Compound meter makes it easy to take quick measurements of VOC levels spanning 0 to 2ppm, 0 to 20.00 PPM, 0 to 200.0ppm or 0 to 2000ppm (isobutylene standard) at users' purchasing choice. With a built-in pump, the HVX501 is a point-to-sample instrument and responds very quickly

to ambient changes in VOC concentration.

1.1 Features

- User selectable over a hundred of target gases
- Easy to use interface - minimal operator training required
- Wide measuring range
- Rapid response time - typically less than 6 seconds
- Direct real time readings allow immediate response to measurements
- Reliable and low power consumption photo ionization detection technology
- 500 data points of storage capacity.
- Customizable back light and contrast settings (power saving)
- High-speed USB connectivity fully compatible to Window XP/7/8
- Simple and easy in-field calibration
- External digital temperature and humidity sensor (optional)
- Audible excess limit warning (user defined)
- No less than 6 hours of continuous operation.

1.2 Specifications

- ***Target Gas:*** Volatile Organic Compounds. See **Section** 4. *Gas List* for a list.
- ***Sensor Technology:*** PID, lamp energy: 10.6 eV
- ***Sampling Method:*** Pump and point sampling
- ***Measurement Range:*** 1 ~ 2000 PPB or 0.01 ~ 20.00 PPM, 0.03 ~ 200.0 ppm or 0.05 ~ 2000 ppm
- ***Warm-up Time:*** < 1 minute for most accurate results
- ***Response Time:*** < 6 seconds
- ***Non-linearity:*** < ± 5% of full scale
- ***Temperature Dependence:*** N/A
- ***Humidity Dependence:*** < 0.2 ppm @ 90%RH
- ***Humidity Quenching Effect:*** <15% @90%RH

- ***Expected Sensor Life:*** 5 years typical in non-corrosive environment.
- ***Calibration Interval:*** 1 year factory calibration, or user calibration
- ***Display Units:*** PPM
- ***Memory:*** Up to 500 sets of data
- ***Interface:*** USB
- ***Power:*** Rechargeable Lithium ion battery (3.7V/1250mAh); Universal AC adapter 100~ 240VAC to 5VDC/1A
- ***Dimension:*** 80 (W) × 158 (H) × 42 (D) mm
- ***Weight:*** Approximately 230 grams
- ***Environmental Conditions:*** Operating: 0~ 40°C, <90%RH non-condensing; Storage: -20 ~ 70°C, <90%RH
- ***Standard accessories:*** AC adapter, USB cable, CD with data download software and user manual
- ***Optional accessories:*** Pressure, temperature and humidity sensor probe

1.3 Interface

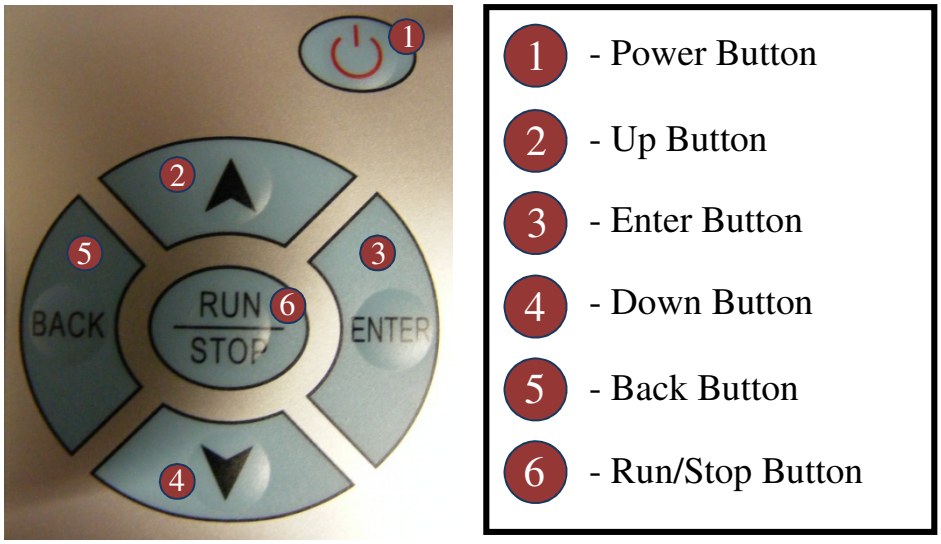

Figure 2: Close-up of the gas meter interface.

2. Basic Operation

Six control keypads are used to operate the instrument: ⏻ , **RUN/STOP**, **ENTER**, **BACK**, ▲, ▼. Each button controls the following features:

- **Power button** ⏻ : While the unit is off, press and hold the power button for approximately 2 seconds to turn on the instrument. While the unit is on, press and hold the power button for approximately 2 seconds to turn off the instrument. If the instrument is not taking measurements it will automatically power off after 5 minutes of inactivity.
- **RUN/STOP**: Start or stop measuring/sampling.
- ▲ ▼ : Move the cursor to select desired screen or item.
- **ENTER**: Confirm the current selection, enter a parameter, or save the current sampling value.
- **BACK**: Change the concentration unit while the unit is measuring or return from the current selection.

The side of the enclosure includes

- USB Interface: Connect the USB interface to a computer for data downloading.
- POWER port: An AC adapter plug-in port: 5 VDC @ 1 A.
- Charge Status LED: LED flashes during charge cycle and becomes steady after the charge cycle is finished.

2.1 Measuring Screen

The Measure screen, shown in

Figure **3**, is the main screen of the instrument as it is used for sampling volatile organic compounds. The Indicator Display in the upper left corner shows immediate information about the sample time, sound options, and alarm settings of the instrument. As well as these, the measure screen shows the date, time, temperature and humidity (optional), and battery status.

NOTICE

- Push the **RUN/STOP** key to start measuring/sampling. During the sampling process, the backlight will dim if it is set to in the instrument settings.
- Data are logged automatically if the sample interval is set between 1 and 9, or the current sampling value can be saved when the **ENTER** key is pressed. Push the **RUN/STOP** key to stop measuring.
- The instrument will automatically shut off after 5 minutes of inactivity unless the unit is sampling.

2.1.1 Detailed Screen Description

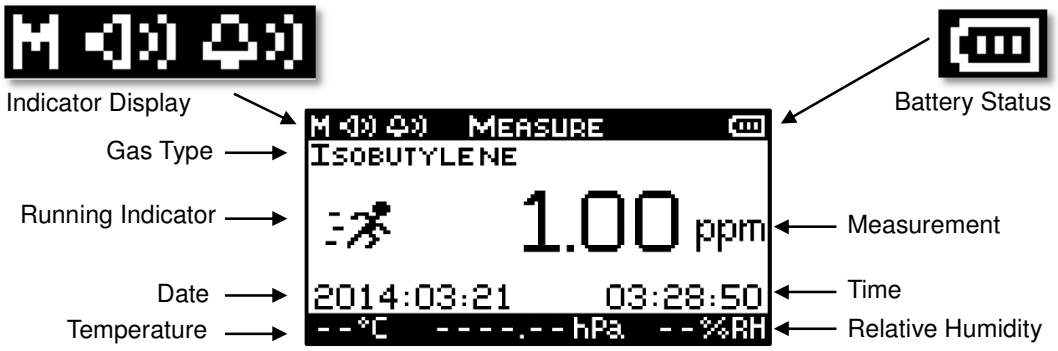

Figure 3: Annotated measure screen of the HVX501

Sample Time Indicator: The first icon in the Indicator Display is the sample time indicator. This indicator will display values of M, or 1 through 9. When set to M, the unit is in manual measurement mode, and samples are taken when the user presses the **ENTER** Button. When set to a number between 1 and 9, automatic samples are taken every 1 through 9 minutes. For example, if the sample time is set to 4, automatic samples are taken every 4 minutes, and the sample time indicator will display 4. Note, a manual measurement can **always** be made by pressing the **ENTER** button.

Sound Indicator: The second icon in the Indicator Display is the sound ON/OFF icon. Note, this options refers to the sounds made when interface or keypad buttons are pressed. It does not affect the alarm or the startup sounds. In Figure **3** the instrument has its sound turned on. If the sounds were turned off, an X would appear next to the sound icon.

Alarm Indicator: The third icon in the Indicator Display is the alarm ON/OFF icon. In Figure 3 the alarm icon shows that the alarm is turned on. To set the alarm, go to the Settings screen and modify the alarm level. To turn the alarm off, set its level to 0 PPM. If the alarm were turned off, an X would appear next to the alarm icon.

Battery Status : The battery indicator displays the battery strength graphically. Three bars represent 100% of charge in the battery; two bars 75%; one bar 50%. No bars signifies a low battery status and simultaneously the alarm will buzz as a warning. Charging of the battery is necessary at this level and after a few seconds of audible warnings the instrument will shut off.

Gas Type: The Gas Type setting defines the response of the instrument. To change which gas is being measured go to the settings screen and adjust the Measurement Gas. Note, this setting does not exclude other VOCs from being sensed, it simply adjusts the instrument response for the gas selected. If a single gas response is desired, the user must ensure that only one VOC is being measured.

Running Indicator: When the unit is measuring, the running icon will be displayed and the pump will be operating. When the unit is idle (not measuring), the running icon will not be displayed and the pump will be off.

Temperature: The current temperature is displayed in units of degrees Celsius. This measurement is not standard and requires the optional temperature and relative humidity probe to function. If no temperature and humidity probe is installed, the unit will display: - - ºC.

Relative Humidity: The current relative humidity is displayed in units of percent. This measurement is not standard and requires the optional temperature and relative humidity probe to function. If no temperature and humidity probe is installed, the unit will display: - - %.

Pressure: The current absolute pressure is displayed in units of hPa (hectopascals). The unit pf hPa is chosen internationally since 1 hPa = 1 mBar. This measurement is not standard and requires the optional PTH probe to function. If no probe is installed, the unit will display: - - - - . - - hPa.

Time: The user set time is displayed.

Date: The user set date is displayed.

WARNING

- By default, the backlight will automatically dim after approximately 60 seconds of keypad inactivity when not actively making measurements.
- The instrument will be automatically shut down if there is no keypad activity for approximately 5 minutes; this does not apply if the instrument is running.

2.2 Browsing Screen

Use the **UP** and **DOWN** keys to navigate to the Browse Screen and press **ENTER** to enter into the screen. This screen will allow the user to browse or delete stored data.

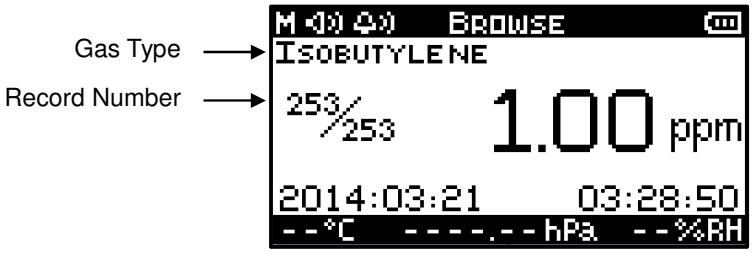

Figure 4: Browsing Screen

In the Browsing screen, use the arrow keys to advance through the stored data.

- Use the ▲ button to move to the next record.
- Use the ▼ button to move to the previous record.
- Use the **BACK** button to exit the Browsing Screen.

Gas Type

The Measurement Gas Setting is displayed for the type of gas that was measured. This value cannot be changed post-measurement.

Record Number

Record format is current record/total number of records. (e.g., 253/253). In Figure 4, the user is viewing record number 253 of a total 253 records.

Delete a Record

- Press the **UP** or **DOWN** key to select the record to be deleted and press the **ENTER** button.
- Use the **UP** or **DOWN** key to select ONE or ALL. Press the **ENTER** key to delete the current record or all records respectively. In the case of deleting a single record, the total number of records will be reduced by one while the next record number will be moved to replace the deleted record; see Figure Figure 5: Browse Screen with Delete Screen Shown.

Figure 5: Browse Screen with Delete Screen Shown

2.3 Setting Screen

The Setting Screen allows users to set or change the following items:

- Date
- Time
- Sample Interval
- Measurement Gas
- Alarm Level
- Sound Options
- Backlight Options
- LCD Contrast

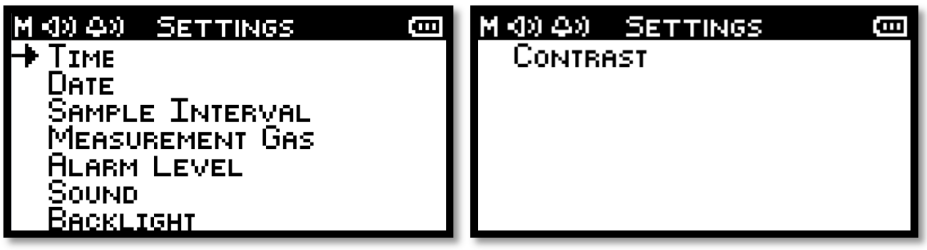

Figure 6: Settings Screens

Press the **ENTER** button to enter into the Settings Screen. An arrow will appear as in Figure 6. Use the **UP** and **DOWN** buttons to scroll through the different settings. Scroll to the desired setting and press the **ENTER** button to select that parameter. A new screen will appear that allows you to edit the selected parameter.

2.3.1 Modifying Parameters (Settings)

Time: **HH:MM:SS**

The time format is **HOURS:MINUTES:SECONDS**. To modify the time go into the time setting screen and use the **UP** and **DOWN** buttons to select either the hours, minutes, or seconds parameter and press **ENTER**. The selected parameter will now have a blinking underscore beneath it and using the **UP** and **DOWN** buttons will change the parameter. To cancel entering the parameter press the **BACK** button, or to validate the changes you have made press the **ENTER** button. When completed press the **BACK** button to exit the time setting screen.

Date: **DD:MM:YY**

The time format is **DAY:MONTH:YEAR**. To modify the date go into the date setting screen and use the **UP** and **DOWN** buttons to select either the day, month, or year parameter and press the **ENTER** button. The selected parameter will now have a blinking underscore beneath it and using the **UP** and **DOWN** buttons will change the parameter. To cancel entering the parameter press the **BACK** button, or to validate the changes you have made press the **ENTER** button. When completed press the **BACK** button to exit the date setting screen.

Sample Interval

The sample interval parameter can be set to either take a sample every n minutes (where n can be 1 through 9) or to only take manual measurements when the **ENTER** button is pressed (**M** or manual mode). To modify the sample interval press **ENTER** at the sample interval settings screen and the underscore will begin blinking. Use the **UP** and **DOWN** buttons to change the parameter. To cancel entering the parameter press the **BACK** button, or to validate the changes you have made press the **ENTER** button. For example, to set the automatic saving to five minutes, set the sample interval to 5. To turn off automatic saving and only take manual measurements, scroll through the parameters until M appears and press the **ENTER** button. When completed press the **BACK** button

to exit the sample interval setting screen.

NOTICE

- Even with automatic sampling on, the user can still press the **ENTER** button to save the current measurement.

Alarm level setting

The user may turn on or off the excess exposure limit warning. The user may input any value between 0 and 999.9 ppm. A value of 0 ppm will disable the alarm. The alarm level can be set by entering into the alarm level settings screen from the main Settings Screen. Use the **UP** and **DOWN** keys to choose a digit to modify and press **ENTER**. An underscore below the selected digit will begin blinking. Use the UP and DOWN keys to modify the digit. To cancel entering the digit press the **BACK** button, or to validate the changes you have made press the **ENTER** button. When completed press the **BACK** button to exit the alarm level setting screen.

NOTICE

- An alarm setting of 0 ppm will disable the alarm.

Measurement gas

The user may select one of the many measurement gasses listed in Section *4. Gas List* Selecting the appropriate gas sets the sensor response correctly. The measurement gas can be set by entering into the measurement gas setting screen from the main Settings Screen. Use the **UP** and **DOWN** keys to move between gasses. No button presses are necessary to change the gas, simply scroll to the appropriate gas and use the **BACK** button to exit the measurement gas setting menu.

NOTICE

- If the gas type is unknown, select Isobutylene. The response factor for Isobutylene is 1.0, and data taken with Isobutylene as the gas type can be converted to any of the other VOCs by multiplying by the appropriate response

factor. Response factors are listed in Section *4.* Gas List

Sound

This options allows the user to set the keypad sound options. Neither the alarm indicator nor the power up sounds will be affected by this setting. To modify the button sounds option go into the sound setting screen and press the **ENTER** button. The currently selected option will have a blinking underscore beneath it and using the **UP** and **DOWN** buttons will change the option. To cancel selecting **ON** or **OFF** press the **BACK** button, or to validate the changes you have made press the **ENTER** button. When completed press the **BACK** button to exit the sound setting screen

Backlight

This options allows one to set the backlight behaviour while the unit is taking measurements. Regardless of this setting, if the unit is not taking measurements the LCD backlight will turn off after 60 seconds of inactivity to conserve power. To modify the LCD backlight behaviour during measurements go into the backlight setting screen and press the **ENTER** button. The currently selected option will have a blinking underscore beneath it and using the **UP** and **DOWN** buttons will change the option from **ON** to **OFF** or vice versa. To cancel entering the parameter press the **BACK** button, or to validate the changes you have made press the **ENTER** button. When completed press the **BACK** button to exit the backlight setting screen

Contrast

This options allows the user to set the contrast of the LCD. To modify the LCD contrast go into the contrast setting screen and press the **ENTER** button. The currently selected option will have a blinking underscore beneath it and using the **UP** and **DOWN** buttons will change the option between 1 and 9. To cancel entering the parameter press the **BACK** button, or to validate the changes you have made press the **ENTER** button. When completed press the **BACK** button to exit the contrast setting screen

2.4 Calibration

After turning on the instrument, use the **UP** or **DOWN** buttons to go to the Calibrate Screen and press **ENTER** (Figure 7). Users may calibrate the instrument at their volition after a period of use or if a drift in sensor accuracy is suspected.

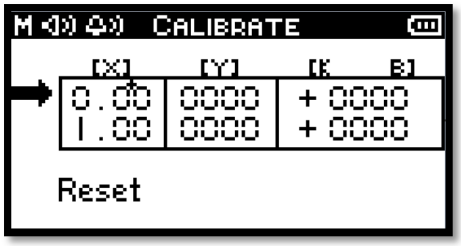

Figure 7: Calibration Screen

The recommended calibration method is the standard Zero-Span technique. The X values in the first column represent the concentration of the calibration gas in ppm. The Y values in the second column represent the response of the sensor to be calibrated. The values in the third column are the calibration coefficients. An example calibration procedure is described below:

A zero air and 5.00 ppm vapour concentration gas cylinder are used for the calibration.

1) Enter into the calibration screen by pressing the **ENTER** button.
2) Connect the inlet of the instrument to a glass container and then introduce the zero air to the glass container.
3) Make sure that the left arrow is pointing at the first row of 0 ppm concentration (refer to Figure 7).

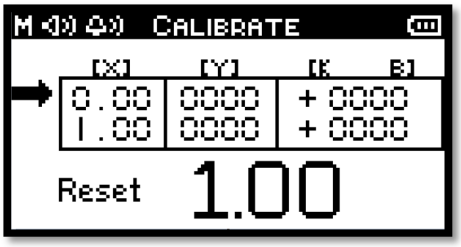

Figure 8: Calibrate Screen with Zero Measurement Complete

4) Press the **RUN/STOP** button to start sampling for the zero measurement. Wait for the Y value for 0 ppm to stabilize and then press the **RUN/STOP** button again.
5) Connect the inlet to a glass container that is connected a standard Isobutylene gas

cylinder (e.g., 5.00 ppm isobutylene gas cylinder).

6) Move the cursor to the second row (Refer to Figure 8) and then press the **ENTER** button. Use **UP** and **DOWN** buttons to select the element to be changed. When the element of the X column becomes highlighted, use the **UP** and **DOWN** buttons to change the number and press **ENTER** to confirm the change. Set the number as the concentration level of the standard gas concentration to be tested (e.g., 5.0 ppm). Press the **BACK** button to return to the calibrate screen as shown in Figure 8.
7) Press the **RUN/STOP** button to start sampling. Wait for Y value to stabilize and then press the **RUN/STOP** button again.
8) After finishing both samplings on standard gases, move the cursor back to the first row. Press and hold the **ENTER** button for about two seconds. The instrument will automatically calculate and update the calibration coefficients based on the new calibration.
9) After finishing the calibration procedure, press **BACK** to exit.

NOTICE

- To restore the default settings from the factory calibration, move the cursor and highlight **RESET**. Press **ENTER** and **RESET** will begin blinking. Press **ENTER** again and the instrument calibration will be reset back to its factory defaults.
- One can always bypass the zero-air calibration if it is not necessary. In order to do so, move the cursor back to the first row after taking the non-zero gas calibration measurement. Press and hold the **ENTER** button for about two seconds. The instrument will automatically calculate and update the calibration coefficients based on the new non-zero gas calibration (SPAN calibration) only.

3. Warrantee

Hal Technology provides a one-year limited warranty of the Model HVX501 Handheld Volatile Organic Compound meter, but not including the necessary calibration service.

- Warranty begins from the shipping date.
- The user is responsible for the cost of shipping if any service or repair is required.
- The warranty is limited to the HVX501 instrument and HAL TECHNOLOGY does not extend this liability to accessories or any other equipment damage, body injury, and loss of properties due to abnormal use.

The following are not included in the warranty:

- Improper connection to a power source, resulting in damage of the instrument.
- Any physical damage due to mechanical forces (e.g., collision or dropping) that may cause any damage of the front panel, LCD screen, switch and internal components, etc.
- Unauthorized opening of the instrument.
- Damage due to operation in an un-specified environmental condition.
- Abnormal operation due to required instrument calibration.

Limitation of Warranty

A. Hal Technology warrants that all equipment shall be free from defects in material and workmanship under normal use for a period of one year from the date of shipment to Buyer except that Hal Technology does not warrant that operation of the software will be completely uninterrupted or error free or that all program errors will be corrected. Buyer shall be responsible for determining that the equipment is suitable for Buyer's use and that such use complies with any applicable local, state, or federal law. Provided that Buyer notifies Hal Technology in writing of any claimed defect in the equipment immediately upon discovery and any such equipment is returned to the original shipping point, transportation charges prepaid, within one year from date of shipment to Buyer and upon examination Hal Technology determines to its satisfaction that such equipment is defective in material or workmanship, i.e. contains a defect arising out of the manufacture of the equipment and not a defect caused by other circumstances, including,

but not limited to accident, misuse, unforeseeable use, neglect, alteration, improper installation, improper adjustment, improper repair, or improper testing, Hal Technology shall, at its option, repair or replace the equipment, shipment to Buyer prepaid. Hal Technology shall have reasonable time to make such repairs or to replace such equipment. Any repair or replacement of equipment shall not extend the period of warranty. If the Instrument is modified or in any way altered without the explicit written consent of Hal Technology then the warranty is null and void. This warranty is limited to a period of one year, except as noted below, without regard to whether any claimed defects were discoverable or latent on the date of shipment.

B. If Buyer shall fail to pay when due any portion of the purchase price or any other payment required from Buyer to Hal Technology under this contract or otherwise, all warranties and remedies granted under this Section may, at Hal Technology's option, be terminated.

C. Warranty repairs shall be completed at a Hal Technology authorized service location, by an authorized service technician, or on site at buyer's facility by a Hal Technology authorized employee. Buyer pays shipping costs to factory; seller will pay standard return shipping costs during the warranty period. A buyer may select a faster method of shipment at his/her own expense.

Warranty of Repairs after Initial One (1) Year Warranty

A. Upon expiration of the initial one-year warranty, all parts and repairs completed by an authorized Hal Technology repair technician are subject to a six (6) month warranty.

B. Other than the above, Hal Technology makes no warranty of any kind, expressed or implied, except that the products manufactured and sold by Hal Technology shall be free from defects in materials and workmanship and shall conform to Hal Technology's specifications; Buyer assumes all risk and liability resulting from use of the products whether used singly or in combination with other products. If instrument is modified or in any way altered without the explicit written consent of Hal Technology, then the warranty is null and void.

C. Warranty repairs shall be completed at a Hal Technology authorized service location, by an authorized service technician, or on site at buyer's facility by a Hal Technology

authorized employee. Buyer pays shipping costs to factory; seller will pay standard return shipping costs during the warranty period. Buyers may select a faster method of shipment at their own expense.

Contact

HAL TECHNOLOGY, LLC

7970 Cherry Avenue, Suite 303

Fontana, CA 92336 USA

Phone: (855) 438-4258 (toll-free)

Fax: (866) 402-9190 (toll-free)

Email: info@haltechnologies.com

URL: http://www.haltechnologies.com

Information Record

Model _____

Serial No. _____

Purchase Place _____

Address _____

_____

Phone _____

Service Place _____

Address _____

_____

Phone _____

Preferred Contact Method

□ E-mail □ Mail □ Phone

Please fill out the Registration form below and send to:

HAL TECHNOLOGY, LLC

7970 Cherry Avenue, Suite 303

Fontana, CA 92336 USA

Phone: (855) 438-4258 (toll-free)

Or send relevant registration information to the email address below:

services@haltechnologies.com

User Registration Form

Company _____

Contact Person _____

Address _____

_____

City _____State/Province_____Country _____

Postal Code_____

Phone _____

Fax _____

E-mail _____

Product Model _____

Serial No. _____

Purchase Date_____

Purchase Place _____

Preferred Contact Method

□ E-mail □ Mail □ Phone

4. Gas List

The relative factor is given so that, if necessary, a user can calculate the VOC concentration post-measurement. The user can default to Isobutylene and multiply the response by the factor below for the specific gas type.

Name	RF
1,2,3-trimethylbenzene	0.49
1,2,4-trimethylbenzene	0.43
1,2-dibromoethane	11.70
1,2-dichlorobenzene	0.50
1,3,5-trimethylbenzene	0.34
1,4-dioxane	1.40
1-butanol	3.40
1-methoxy-2-propanol	1.40
1-propanol	5.70
2-butoxyethanol	1.30
2-methoxyethanol	2.50
2-pentanone	0.78
2-picoline	0.57
3-picoline	0.90
4-hydroxy-4-methyl-2-pentanone	0.55
4-methylbenzyl alcohol	0.80
acetaldehyde	10.80
acetic acid	11.00
acetone	1.20
acetophenone	0.59
acrolein	3.90
allyl alcohol	2.50
ammonia	9.40
amylacetate	3.50
arsine	2.60
benzene	0.53
bromoform	2.30
bromomethane	1.80
butadiene	0.69
butyl acetate	2.40
carbon disulfide	1.20
chlorobenzene	0.40
cumene (isopropylbenzene)	0.54
cyclohexane	1.50
cyclohexanone	0.82
decane	1.60
diethylamine	1.00
dimethoxymethane	11.30

dimethyl disulfide	0.30
diesel fuel #1	0.90
diesel fuel #2	0.75
epichlorhydrin	7.60
ethanol 10	10.00
ethyl acetate	4.20
ethyl acetoacetate	0.90
ethyl acrylate	2.30
ethyl ether (diethyl ether)	1.20
ethyl mercaptan	0.60
ethylbenzene	0.51
ethylene	10.10
ethylene glycol	15.70
ethylene oxide	19.50
gasoline	1.10
heptane	2.50
hydrazine	2.60
hydrogen sulfide	3.20
isoamyl acetate	1.80
isobutanol	4.70
isobutyl acetate	2.60
isobutylene	1.00
isooctane	1.30
isopentane	8.00
isophorone	0.74
isoprene (2-methyl-1,3-butadiene)	0.60
isopropanol	5.60
isopropyl acetate	2.60
isopropyl ether	0.80
isopropylamine	0.90
Jet A fuel	0.40
JP-5 fuel	0.48
JP-8 fuel	0.48
mesityl oxide	0.47
methyl acetate	7.00
methyl acetoacetate	1.10
methyl acrylate	3.40
methyl benzoate	0.93
methyl ethyl ketone	0.90
methyl isobutyl ketone	1.10
methyl mercaptan	0.60
methyl methacrylate	1.50
methyl tert-butyl ether	0.86
methylamine	1.20
m-xylene	0.53

naphtalene	0.37
n,n-dimethylacetamide	0.73
n,n-dimethylformamide	0.80
n-hexane	4.50
nitric oxide	7.20
n-nonane	1.60
n-pentane	9.70
n-propyl acetate	3.10
octane	2.20
o-xylene	0.54
phenol	1.00
phosphine	2.80
pinene, alpha	0.40
pinene, beta	0.40
propionaldehyde (propanal)	14.80
propylene	1.30
propylene oxide	6.50
p-xylene	0.50
pyridine	0.79
quinoline	0.72
styrene	0.40
tert-butyl alcohol	3.40
tert-butyl mercaptan	0.55
tert-butylamine	0.71
tetrachloroethylene	0.56
tetrahydrofuran	1.60
thiophene	0.47
toluene	0.53
trans-1,2-Dichloroethene	0.45
trichloroethylene	0.50
trimethylamine	0.83
turpentine - crude sulfite	1.00
turpentine - pure gum	0.45
vinyl acetate	1.30
vinyl bromide	0.40
vinyl chloride	1.80
vinylcyclohexane (VCH)	0.54
vinylidene chloride (1,1-DCE)	0.80