Thermo GasTech

MODEL 1238ME

GASTECHTOR HYDROCARBON SURVEYOR WITH METHANE ELIMINATION SWITCH

INSTRUCTION MANUAL

MANUAL PART NUMBER
71-0114C
Version 001101

2922 – 3 Ave NE, Calgary, AB T2A 6T7 PH: (403) 291-4700 FX: (403) 291-2092
Website: www.gastechcanada.com email: info@gastechcanada.com

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THERMO GASTECH IS THE LEADING CANADIAN MANUFACTURER OF PORTABLE AND FIXED SYSTEM GAS DETECTION EQUIPMENT, FOR COMBUSTIBLE GASES, OXYGEN DEFICIENCY AND TOXIC GASES.

PERSONAL MONITORS

THERMO GASTECH'S PERSONAL MONITORS PROVIDE THE PROTECTION YOU NEED FOR FIELD WORK AND CAN BE HAND-HELD OR WORN CLIPPED TO A BELT. EACH UNIT FEATURES EASY OPERATION, CONTINUOUS MONITORING/READ-OUT, AUDIBLE/VISUAL ALARMS, AND INTRINSICALLY SAFE DESIGN TO MEET A WIDE RANGE OF DETECTION NEEDS.

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THESE SELF-CONTAINED PORTABLE INSTRUMENTS ARE DESIGNED TO BE WEATHERPROOF, STURDY, AND THEY ARE IDEALLY SUITED TO ROUGH FIELD CONDITIONS. COMBUSTIBLES, OXYGEN, CO_2, AND TOXIC GASES ARE QUICKLY, EASILY AND DEPENDABLY DETECTED BY THESE PORTABLE MONITORS.

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THE PRINCIPLES INHERENT IN THERMO GASTECH'S PERSONAL AND PORTABLE INSTRUMENTS ARE ALSO AVAILABLE IN A COMPLETE LINE OF FIXED SYSTEMS. AVAILABLE AS STAND ALONE, RACK, CABINET AND WALL-MOUNT CONFIGURATIONS, THESE VERSATILE SYSTEMS CAN BE TAILORED TO MEET THE MOST DEMANDING INDUSTRIAL APPLICATIONS. OUR FIXED SYSTEMS ARE DESIGNED FOR CONTINUOUS, MULTI-LOCATION MONITORING AND FEATURE RECORDER OUTPUTS FOR LONG TERM DATA STORAGE.

THERMO GASTECH'S COMMITMENT

OUR QUALITY AND SERVICE ARE UNCOMPROMISING. WE BACK EACH OF OUR INSTRUMENTS WITH A ONE YEAR WARRANTY ON ALL MATERIALS AND WORKMANSHIP. WE OFFER TECHNICAL SUPPORT, USER TRAINING AND ON-SITE SERVICE AND MAINTENANCE OF EQUIPMENT TO MEET THE NEEDS OF OUR CUSTOMERS.

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WARNING

EXPLOSIVE GAS MIXTURES CAN MAIM, DISFIGURE AND KILL. IT IS ESSENTIAL THAT USERS OF THIS INSTRUMENT READ, UNDERSTAND AND FOLLOW THE INSTRUCTIONS FOR OPERATION AND MAINTENANCE. THE PRECAUTIONS CONTAINED IN THIS MANUAL ARE TO ENSURE THAT THE INSTRUMENT WILL WARN OF EXPLOSIVE ATMOSPHERES.

****** DO NOT USE IN OXYGEN OR ACETYLENE ENVIRONMENTS. ******

NOTE

THIS INSTRUMENT HAS BEEN MODIFIED TO INCORPORATE A METHANE ELIMINATION SWITCH. CAREFULLY READ AND FOLLOW THE DIRECTIONS AND RECOMMENDATIONS FOR USING THIS FEATURE AS DESCRIBED IN THIS MANUAL.

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THERMO GASTECH WARRANTY

We warrant gas alarm equipment manufactured and sold by us to be free from defects in materials, workmanship and performance for a period of one (1) year from date of shipment from our factory. Any parts found defective within that period will be repaired or replaced, at our option, free of charge, FOB Factory. This warranty does not apply to those items which, by their nature, are subject to deterioration or consumption in normal service and which must be cleaned, repaired or replaced on a routine basis. Such items may include:

A. Catalytic, Oxygen Sensor Elements or Toxic Gas Sensors (these are covered by a standard warranty based on the specific application);
B. Fuses; and
C. Batteries: Thermo Gastech Battery Packs are warranted for one year from date of shipment. Individual NiCad batteries are warranted for 90 days from date of shipment from our factory.

Warranty is voided by abuse including rough handling, mechanical damage, alteration or repair procedures not in accordance with the Instruction Manual. This warranty indicates the full extent of our liability and we are not responsible for removal or replacement costs, local repair costs, transportation costs or contingent expenses incurred without our prior approval.

Thermo Gastech’s obligation under this warranty shall be limited to repairing or replacing and returning any product that has been returned to Thermo Gastech at its manufacturing facilities, with transportation charges prepaid; and which Thermo Gastech's Material Review Board examination shall disclose to its satisfaction to have been defective.

This warranty is expressly in lieu of any and all other warranties and representations, expressed or implied, and all other obligations or liabilities on the part of Thermo Gastech, including, but not limited to, the warranty of fitness for a particular purpose. In no event shall Thermo Gastech be liable for direct, incidental, or consequential loss or damage of any kind connected with the use of our products or failure of our product to function or operate properly.

THERMO GASTECH SERVICE POLICY

Thermo Gastech maintains a complete service facility at our factory in Calgary, Alberta. Fully trained technicians offer in-house repairs and field service for all equipment.

When sending an instrument into Thermo Gastech for repair, carefully pack the instrument and all its accessories, preferably in its original packaging and send, prepaid, to:

Thermo Gastech
2922 – 3rd Avenue N.E.
Calgary, Alberta
T2A 6T7
Phone: (403) 291-4700

Attention: Service Department

Include a contact name, shipping address, purchase order number, shipping instructions, billing information, and a description of the problem. Should there be a limit to the authorized repair cost, state a "not to exceed" amount. Please advise when a firm estimate is required, (this involves additional costs and handling delays). If no current account exists with Thermo Gastech, you will be asked to complete a credit application.

Our standard instrument service includes:

- Thorough cleaning and inspection of all equipment
- Upgrade, when possible, to the most current style
- Performing all needed repairs or modifications to restore the instrument to full operating condition
- Verifying (or resetting) alarms to current OSHA standards
- Providing recommendations on aging components and accessories
- Replacing sensors, as necessary
- Complete instrument calibration
- Verification of correct operation

To expedite the repair procedure, please call Thermo Gastech's Service Department in advance to inform us of an incoming repair. Our standard factory repair turn around is approximately 7 days from receiving the instrument (not including delays due to estimates, approvals or further customer information, etc.). Thermo Gastech also offers a "rush" service in which the instrument is repaired within 2 working days. An additional charge is applied for this service.

THERMO GASTECH ASSUMES NO LIABILITY FOR SERVICE PERFORMED BY OTHERS

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I. SPECIFICATIONS

MODEL	• MODEL 1238ME SERIAL NUMBER _____
CALIBRATED TO	• _____
GASES DETECTED	• COMBUSTIBLE GAS (response to methane may be eliminated using switch on control panel) • 0 - 100% LOWER EXPLOSIVE LIMIT (LEL) 5% LEL INCREMENTS • 0 - 500 PARTS PER MILLION (PPM) 25 PPM INCREMENTS AND RANGES
ALARM SETTINGS	• _____ % LEL (typically 10% LEL)* • _____ PPM (typically 100 PPM)*
DETECTION METHOD	• CATALYTIC
SAMPLING METHOD	• SAMPLE DRAW
SENSOR ACCURACY	• ± 5 % (in the mode in which the instrument was calibrated)
OPERATING TEMPERATURE	• -20◦C TO +40◦C (-4◦F TO +104◦F)
INTRINSIC SAFETY RATING	• CLASS I, DIV. 1, GROUPS C AND D,
POWER SOURCE	• INTERNAL RECHARGEABLE NICAD BATTERY PACK
BATTERY LIFE	• APPROXIMATELY 10 HOURS
CASE CONSTRUCTION	• MOULDED HIGH IMPACT FIBREGLASS, YELLOW.
DIMENSIONS	• 30.5 (L) X 9.5 (W) X 14.0 (H) cm (12 (L) X 3.7 (W) X 5.5 (H) inches)
WEIGHT	• 3.2 Kg (7 lbs.)
STANDARD ACCESSORIES	• DUAL RATE CHARGER • 25 cm (10 inch) PROBE • 1.5 m (5 ft) HOSE • SHOULDER STRAP
OPTIONAL ACCESSORIES	• HOSE EXTENSIONS • 85 cm (36 inch) PROBE • CALIBRATION KIT

*** ALARMS ARE USER ADJUSTABLE**

II. GENERAL DESCRIPTION

The Model 1238ME is a battery-powered, portable instrument designed to detect and measure concentrations of combustible gas in the atmosphere. It is equipped with two ranges of measurement, reading concentrations in the parts per million (0-500ppm) range or in percent lower explosive limit (0-100% LEL). LEL is a measure of the explosibility of the atmosphere with 100% LEL being the minimum concentration of gas required for ignition.

The Model 1238ME is also equipped with alarms to warn the operator should the concentration of gas reach preset limits. The two alarms, one for each range, are factory set, but can be changed. The 1238ME will also sound an alarm if an internal malfunction is detected or when the battery power begins to run down.

The 1238ME is designed to be a rugged field instrument capable of withstanding rough handling and severe exposure. It has been designed to be intrinsically safe for use in Class I, Div. 1, Groups C, & D atmospheres of combustible gases in air. The instrument is powered by a rechargeable battery pack that has sufficient capacity to operate for an entire day.

A unique feature of the 1238ME is its ability to eliminate response from methane. This feature is especially useful when the 1238ME is used to detect soil contamination in areas where methane occurs naturally but its response on gas detection equipment is undesirable.

III. DETAILED DESCRIPTION

A. HOUSING

The Model 1238ME is housed in a fibreglass case which is durable, shock-resistant and protected against the entry of water. The lower half, containing the batteries and sampling system, has no openings near the bottom and hence can safely be placed in mud or water up to 4 cm deep without hazard to the internal components.

The upper half contains all of the electronic circuitry and is provided with a substantial carrying handle. The lip of the upper case overlaps the lower, to shed water. The upper half is clamped to the lower by means of a heavy-duty knurled thumbscrew.

B. SENSOR

The combustible gas sensor is a replaceable assembly which is housed within an anodized aluminum enclosure or reaction chamber at the front of the instrument. The sensor is held in the chamber by means of a threaded retaining ring and sealed with an O-ring gasket. The air sample enters the chamber from the front, flows over the sensor and is then drawn out and exhausted to the surroundings by an electric pump.

Within the sensor is an electrically heated platinum filament. When a concentration of combustible gas comes in contact with the filament, the gas oxidizes, causing a temperature increase in the filament. This temperature increase is directly proportional to the concentration of combustible gas at the sensor. The temperature increase in the filament produces an increase in resistance which is used by the electronic circuitry of the 1238ME to generate a meter reading and activate alarms when required. A second, inactive, filament acts as a reference to compensate for various operating conditions.

The filaments are enclosed within a sintered stainless steel flame arrestor. This allows the air sample to enter the sensor, but prevents any outward propagation of flame, should an explosive atmosphere be sampled.

The methane elimination circuitry works by reducing the temperature on the platinum filament to below that of the ignition temperature of methane. Doing this prevents methane from oxidizing on the filament, however, other combustible gases which have lower ignition temperatures will still react.

The 1238ME combustible gas sensor is generally calibrated to hexane but will respond to most hydrocarbons. Refer to Figure D for conversion factors of the combustible gas sensor's response to gases other than the one to which it has been calibrated. Please note that these conversion factors are only applicable if the 1238ME has been calibrated and is operated in the full gas response mode.

WARNING

THE FOLLOWING SUBSTANCES WILL POISON AND AFFECT THE ABILITY OF THE COMBUSTIBLE GAS SENSOR TO ACCURATELY INDICATE COMBUSTIBLE GAS CONCENTRATIONS.

a) Silicone
b) Silicane
c) Halogenated Hydrocarbons
d) Antiknock compounds found in gasoline
e) High Levels of Combustible Gas

FOLLOWING EXPOSURE TO ANY ONE OF THESE SUBSTANCES, THE MODEL 1238ME MUST BE CALIBRATED USING THE PROCEDURES DETAILED IN SECTION V. OF THIS MANUAL.

C. CIRCUITRY

All circuit components are located on a printed circuit board. The circuit board extends the length of the instrument, and is exposed when the upper and lower halves of the instrument are separated. The circuit is entirely solid-state, using voltage regulation, switching, amplifying and logic components to accomplish specific functions.

The main circuit board contains five adjustment potentiometers that are accessible when the instrument is open (See Figure B). These five potentiometers are used to calibrate the instrument.

1. The COARSE ZERO potentiometer is used to zero the instrument when a new sensor is installed.

2. The LEL ALARM potentiometer sets the point at which the LEL audible alarm is activated.

3. The PPM ALARM potentiometer sets the point at which the PPM alarm is activated. Refer to Specifications, Section I., for factory settings of PPM and LEL range alarms.

4. The SPAN ADJ., LEL potentiometer changes the circuit sensitivity when the LEL range is selected.

5. The SPAN ADJ., PPM potentiometer changes the circuit sensitivity in the PPM range. Both of these adjustments must be set when an instrument calibration is performed. Refer to Calibration, Section V., for further details.

D. BATTERIES

The 1238ME is powered by a rechargeable battery pack. The battery pack consists of seven 4.0 ampere-hour nickel-cadmium cells connected in series. The cells are encapsulated as a unit, with threaded bushings in the bottom, used to attach the battery pack within the lower half of the instrument. Power output leads (red, orange and black) extend from the front end of the battery pack, and terminate in a plastic plug connector. This mates with a connector leading to the main circuit board. Charging leads (orange and black) extend from the back of the battery pack and terminate in a second plastic connector which plugs into a similar connector wired to an external charging socket. Current-limiting resistors encapsulated into the battery pack limit the maximum current that can be drawn on a short-circuit (intrinsically safe). The battery pack will power the instrument for approximately 10 hours.

A dual rate battery charger is provided, which plugs into a socket at the rear of the instrument. The charger provides current at a rate sufficient to recharge the battery pack overnight. After 16 hours, the current automatically reduces to a tackle charge and the charger can be left connected for several days without damaging the battery. However, charge periods longer than 24 hours should be avoided. The charger is CSA certified and is available for 115 VAC or 230 VAC, 50/60 Hz operation (see the nameplate on the charger for the voltage rating of the charger supplied with this instrument).

WARNING

THE BATTERY CHARGER MUST NOT BE OPERATED IN A HAZARDOUS AREA.

E. CONTROLS AND INDICATIONS

The five controls used in the normal operation of this instrument are arranged on the left side of the instrument as viewed from the rear. These controls are recessed to minimize the possibility of accidental operation.

The POWER switch is an alternate-action pushbutton switch which starts the instrument when pressed. An orange indicator dot is exposed when the switch is in the "ON" position.

The BATT. CK. switch is a momentary contact switch, which, when pressed, connects the instrument's meter as a voltmeter for checking the battery condition.

The LEL/PPM switch is an alternate-action pushbutton that is used to select the instrument's operating range. When in the "OUT" position, the instrument is in the LEL range. When in the "IN" position, as shown by the coloured indicator dot, the circuit is in the PPM range.

The ZERO control is used to zero the instrument when it is in a fresh air environment (Refer to Operation, Section IV., for further detail.).

The METHANE ELIMINATION SWITCH is an alternate-action push button that is used to enable the methane elimination circuitry within the 1238ME. When this switch is pressed "IN", as shown by the orange indicator dot, the 1238ME is in the Methane Elimination Mode. When the switch is in the "OUT" position (no indicator dot) the instrument is in the Full Gas Response Mode.

The 1238ME continuously monitors the gas concentration present at the sensor and displays this value on an analog meter. The meter is visible through a window on the top face of the instrument. The meter has two scales marked on its face for LEL and PPM ranges. When switched to the LEL range (LEL/PPM switch is in the "OUT" position), the scale that runs from 0 to 100 is to be used to read the percent LEL value. In the PPM range (LEL/PPM switch is in the "IN" position), the scale that runs from 0 to 500 is used to read the PPM value.

Also found on the meter face is the "BATT CK" mark, which is used when the BATT CK switch is pressed. After pressing the switch, the needle must rise above the "BATT CK" mark on the meter scale, ensuring an adequate charge in the battery pack.

The 1238ME is equipped with an audible alarm. A solid-state electronic buzzer is mounted at the rear of the instrument, behind perforations in the instrument's housing. The buzzer gives a pulsed tone upon the detection of a combustible gas concentration higher than the preset alarm points. The buzzer sounds a steady tone when battery voltage is low or when the combustible gas sensor causes a downscale reading on the meter scale.

F. SAMPLE DRAW SYSTEM

The sample draw system consists of the flow path, from the probe inlet to the final exhaust point. The components that constitute this system are described below:

1. The probe is a 25 cm length of teflon semi-rigid tubing with a cotton filter element within the probe's handle. The handle uses a threaded connection to attach to the hose.

2. The hose is 1.5 m of flexible polyurethane with threaded connections at both ends. Extension of hoses of various lengths are available from Thermo Gastech.

3. The sensor housing is an anodized aluminum chamber in which the combustible gas sensor is held with a threaded retaining ring. The air sample enters the sensor housing at the inlet fitting, flows through the sensor, and exits the rear of the housing and on to the pump.

4. The pump is a diaphragm type, driven by a small electric motor. It is located in the lower case just in front of the battery. It draws the air sample through the sensor housing and exhausts it within the instrument.

G. OPTIONAL ACCESSORIES

The 1238ME is supplied as a complete unit, ready for operation. Several options, however, are available to fulfil various customer requirements.

1. 80 cm Probe

For frequent tests at ground level, in manholes or in tanks, an 80 cm aluminium probe is available. The probe is cross drilled 10 cm from the end, so that water will not be drawn into the instrument even if the end of the probe is inadvertently immersed. Also available is an 80 cm non-conductive fibreglass probe.

2. Extension Hoses

Additional lengths of hose may be used, up to 15 meters for sampling from deep tanks or manholes. Allow approximately 3 seconds sampling time for each meter of extension hose.

3. Moisture Trap

Where there is danger of water being drawn into the instrument, a moisture trap should be used. This glass-bodied trap with sintered metal filter connects at the instrument's inlet fitting and will collect any water that is drawn into the sample hose.

A hydrophobic filter is available install in the sample line where liquid water is the primary concern. The filter assembly includes a porous Teflon membrane which is not wetted by water and hence will not pass liquid. The hydrophobic filter has inlet and outlet fittings to match the instrument and hose.

4. Calibration Kit

The 1238ME must be calibrated on a regular basis in accordance with the procedures detailed in Section V. of this manual. Thermo Gastech offers a calibration kit especially for the Model 1238ME. This kit consists of disposable pressurized cylinder of calibrating gases and all the accessories required to calibrate the instrument. Replacement cylinders of gas are also available.

IV. OPERATION

A. NORMAL USE

Use the following procedure to operate the 1238ME:

1. Connect the hose and probe to the instrument.

2. Place the LEL/PPM switch into the LEL position ("out" position) with the black indicator showing.

3. Press the power switch to turn the instrument on. The orange indicator dot will be visible and the hum of the pump will be heard. The meter will normally rise upscale and the pulsing gas alarm may sound. Allow the instrument to warm up until the meter stabilizes (about ten minutes).

4. Press the BATT CK button and note the meter reading. If the reading is on or below the BATT CK mark, the battery pack must be recharged.

5. Ensure that the METHANE ELIMINATION SWITCH is in the desired position. Pressing the switch in (orange indicator dot showing) places the instrument in the No Methane Response Mode.

6. With the instrument drawing in a known gas free air sample, adjust the ZERO control to bring the meter needle to the zero mark. If it is not possible to bring the needle to zero, the course zero control must be adjusted. Refer to Calibration and Adjustment, Section V.

7. The 1238ME is now ready to read gas concentrations in the 0 - 100% LEL range.

WARNING

ANY RAPID UP-SCALE READING FOLLOWED BY A DECLINING OR ERRATIC READING MAY INDICATE A GAS CONCENTRATION BEYOND 100% LEL AND MAY BE DANGEROUS. HIGH OFF-SCALE READINGS MAY INDICATE AN EXPLOSIVE CONCENTRATION.

8. To read gas concentrations in the 0-500 ppm range, push the range selector switch into the PPM position. Allow an additional 5 minutes for the instrument to thoroughly warm up and the meter to stabilize on this more sensitive range.

9. With the instrument drawing a KNOWN GAS FREE sample, re-zero the meter needle, using the ZERO control. Again, if it is not possible to bring the needle to zero, the instrument must be calibrated.

   NOTE: The combustible gas sensor is somewhat sensitive to humidity, particularly when operating on the PPM range. It is therefore important that the instrument be zeroed in an atmosphere with a humidity level similar to the atmosphere in which it will be operated.

10. The 1238ME is now ready to read gas concentrations in the 0-500 ppm range. Because of the high sensitivity of this range, it is normal for the meter reading to drift over time. Therefore, the reading should be taken as soon after zeroing the instrument as possible. Thermo Gastech offers a combustible sensor with enhanced performance (P/N 61-0120TT) which reduces the drifting encountered while operating in the PPM range.

B. ALARMS

The 1238ME is equipped with two combustible gas alarms, one for each of the instrument's two ranges. In addition, a trouble alarm will sound if there is a problem in the combustible gas sensor circuit or if the battery pack becomes discharged.

1. LEL ALARM

The alarm level for combustible gas while operating in the LEL range is typically factory preset at 10% LEL (See Specification, Section I.). This gives a safety factor of 10, or one tenth of the concentration required to produce an explosion. When gas concentration exceeds the preset alarm level, the buzzer will sound a pulsing tone. This alarm is non-latching and will silence when the concentration of combustible gas being monitored falls below the alarm level. Note that the PPM alarm is inactive while the 1238ME is being operated in the LEL range.

2. PPM ALARM

The alarm level for combustible gas while operating in the PPM range is typically factory preset at 100 PPM (See Specification, Section I.). When gas concentration exceeds the preset alarm level, the buzzer will sound a pulsing tone. Like the LEL alarm, the PPM alarm is also non-latching.

3. TROUBLE ALARM

The 1238ME will also sound an alarm if there is a problem in the combustible gas sensor circuit or if the battery pack becomes discharged. the trouble alarm is signalled by a continuous tone from the buzzer. To verify the cause of the alarm, press the BATT CK switch and note the position of the needle on the meter scale. If the needle does not rise to the BATT CK mark on the meter, the battery pack voltage is low and it must be recharged. The low battery alarm will sound for approximately one half hour before the battery pack is completely exhausted.

If the needle rises above the BATT CK mark with the switch pressed, the alarm has been caused by a downscale drift (ie, below 10% LEL) in the meter reading. The following are possible. Causes for a downscale drift alarm:

a) incorrect zero adjustment
b) sensor disconnected
c) faulty sensor
d) internal circuit malfunction

C. PRECAUTIONS AND NOTES ON OPERATION

1. Heated Samples

When sampling spaces such as hot tanks that are warmer than the instrument, remember that condensation can occur as the sample passes through the cooler sample line. Water vapour condensed in this way can cause improper operation of the instrument. If heated hydrocarbon vapours of the heavier hydrocarbons (flash point 90◦F or above) are present, they may also condense in the sample line and fail to reach the instrument. This could result in an erroneous low reading.

2. Combustible Sensor Poisoning

Certain gases have the ability to desensitize the platinum filament within the combustible gas sensor. These gases are known as "poisons". The following is a list of common encountered poisons:

a) silicone
b) silicane
c) halogenated hydrocarbons
d) anti-knock compounds found in gasoline
e) high concentrations of combustible gas

It is important to note that following a suspected exposure to any of the above substances, the 1238ME should be calibrated using the procedures detailed in Section V. of this manual.

Certain gases need special consideration. When in doubt as to response, consult Thermo Gastech. Some gases known to require special attention are:

3. Acetylene

This gas is very active catalytically and may tend to give a reaction on the reference element within the combustible sensor. This can nullify the signal from the active element, resulting in inaccurate meter readings.

4. Chlorinated vapours

These gases (trichloroethylene is a typical example) are not truly flammable, but nonetheless, produce a catalytic response within the combustible gas sensor.

Severe exposure to chlorinated compounds may permanently damage the combustible sensor.

5. Response to other gases

Although the instrument is calibrated for use in detecting a particular gas, it responds to other combustible gases in a relative proportion. Refer to Figure D at the end of this manual for relative response to various gases. It is very important to note that these relative response conversion factors apply only while the instrument is operated and has been calibrated in the full gas response mode.

6. Rich Mixtures

When sampling rich mixtures, the following instrument operation can be expected:

a) Mixtures up to 100% LEL - Normal display reading

b) Mixtures between LEL and Upper Explosive Limit (UEL) - Display reading fully upscale

c) Mixtures above UEL - As sampling continues, the display first indicates above 100%, then returns into range below 100%. Very rich mixtures will give close to a zero reading.

7. Oxygen Deficient Mixtures

Samples which do not have the normal proportion of oxygen may tend to read low, as there is not enough oxygen to react with all of the combustible gas present in the sample. As a general rule, samples containing 10% oxygen or more, have enough oxygen to give a full reading on any combustible gas sample within the LEL or ppm range.

8. Heavy Hydrocarbons

Heavy hydrocarbons (C9 or greater) generally have high vapour pressures, and as such, do not fully vaporize at normal ambient temperatures. Therefore, they cannot produce a significant response from the 1238ME which monitors vapours only and cannot detect liquids. For this reason, the 1238ME is not recommended for testing soil contamination from heavy hydrocarbons such as diesel fuel.

D. OPERATION IN METHANE ELIMINATION SWITCH

Use the following procedure to operate the 1238ME in the Methane Elimination Mode:

1. Place the METHANE ELIMINATION SWITCH in the "IN" position (orange indicator dot showing). Allow the instrument to stabilize for at least 10 minutes.

2. Use the ZERO control to bring the meter needle to zero. It is normal for the 1238ME to require rezeroing when the position of the METHANE ELIMINATION SWITCH is changed.

3. When operating in the No Methane Response Mode, more than 99% of any methane present in the air sample will be removed.

4. Response from all other combustible gases will be significantly lower while operating in the No Methane Response Mode than they are in the full gas response mode. For this reason, it is recommended that the 1238ME be calibrated (see Section V.) in the same mode in which it will normally be used.

V. CALIBRATION AND ADJUSTMENT

The 1238ME must be calibrated regularly using known gas samples, representative of the gases being detected. The instrument must also be calibrated following exposure to any of the following poisoning agents:

1) Silicone
2) Silicane
3) Halogenated Hydrocarbons
4) Antiknock Compounds found in gasoline
5) High Levels of Combustible Gas

Calibration consists of exposing the instrument to the known gas sample and adjusting the electronic circuitry to generate a display reading equal to the concentration of the calibrating gas. This adjustment is done using the potentiometers described in the following sections of this manual.

For maximum accuracy, the concentration of the calibrating gas should be a significant percentage of the measuring range. Prepared gas mixtures in pressurized disposable cylinders and calibration accessories are available from Thermo Gastech.

The frequency of calibration is dependent upon how often the instrument is used and in what type of environment it is being used. A good indication of how often the instrument should be calibrated is the amount of adjustment required when a calibration is performed. If the instrument must consistently be adjusted a significant amount, the calibration interval should probably be shortened.

Located in Section IX of this manual are calibration forms in which information should be recorded every time the 1238ME is calibrated. This information will be useful for establishing a calibration interval and keeping track of individual instrument performance.

WARNING

CALIBRATION MUST BE PERFORMED IN A KNOWN GAS FREE ENVIRONMENT.

A. COMBUSTIBLE GAS CALIBRATION

1. Place the METHANE ELIMINATION SWITCH in the position that the instrument will most often be used.

2. Loosen the thumbscrew on the top and near the front of the instrument. Lift the upper half of the instrument's case slightly and move it to the rear, in order to disengage the rear latch bar. Separate the two halves of the instrument.

3. Turn the instrument on and ensure that the battery pack is sufficiently charged to read above the BATT CK mark. Allow the instrument to warm up and stabilize, preferably for 10 minutes.

4. Record the instrument's serial number and the current date on the calibration form. Record the calibration gas concentration from the calibration cylinder. Also record the position of the METHANE ELIMINATION SWITCH.

5. After stabilization and with the instrument sampling gas free air, turn the external ZERO knob to the centre of it's adjustment range. Press the LEL/PPM range switch to select the PPM range (button in, coloured dot showing). Locate the internal COARSE ZERO potentiometer which is on the main circuit board near the external ZERO potentiometer (See Figure B). Using a small, slotted screwdriver, adjust this potentiometer to bring the meter needle to the zero mark.

6. Using flexible tubing and a fitting suitable for attachment to the 1238ME, connect the 1238ME to the outlet of a Y-connector (Refer to Figure E.). Connect one inlet of the Y-connector to a gas collecting sample bag. Connect the other inlet of the Y-connector to the adjustable valve. Attach this valve to the calibration gas cylinder. When all the connections are made, air flow to the instrument will be cut off and the sound of the pump will noticeable change.

7. Press the LEL/PPM switch to select the LEL range (button out, no indicator showing). Open the valve on the calibration gas cylinder. Initially set the flow high enough so the sample bag begins to fill. After the sample bag is partially full, turn the flow down to maintain the level in the sample bag. Periodic adjustment of the flow may be required to prevent the sample bag from becoming overly full or empty.

8. The meter will indicate the concentration of the combustible gas being applied. Allow at least one minute for the reading to stabilize. Record this reading on the calibration form in the column labelled "Reading Before Adjustment".

9. Locate the LEL SPAN potentiometer on the underside of the circuit board, toward the front. Using a small slotted screwdriver, turn the LEL SPAN potentiometer fully counter-clockwise. The indicated concentration will increase. Allow at least one minute for the meter to stabilize. Record this reading on the calibration form in the column labelled "Maximum Reading with Adjustment".

10. Slowly turn the LEL SPAN potentiometer clockwise until the meter's needle aligns with the value of the calibrating gas. Record this reading on the calibration form in the column labelled "Final Adjusted Value".

11. Close the valve on the calibrating gas and allow the 1238ME to draw out the gas in the sample bag. When this bag is empty, remove the adjustable valve from the calibration gas cylinder. Remove the tubing from the front of the instrument and allow gas free air to purge the sensor. The meter should return to zero. If the instrument does not return to zero after 5 minutes, repeat steps 4 to 10, until proper readings are obtained.

12. After the sensor is purged, and is indicating zero, press the LEL/PPM switch in, to select the PPM range. After allowing the instrument to warm up for 10 minutes, use the external ZERO knob to carefully bring the meter needle to zero.

13. Attach the adjustable valve to a cylinder of calibration gas suitable for calibrating the PPM range of the 1238ME. Install a humidifier in the line running from the Y-connector to the instrument's inlet nozzle. Pull the humidifier apart and add water to the glass wool, completely wetting the wool. Shake the glass wool to remove enough liquid so that the gas can pass through the humidifier. This should ensure that the humidity of the calibration gas is very close to the same as the ambient atmosphere used to zero the instrument. Differences in humidity between the two gases lead to significant offsets in the calibration of the PPM range.

14. Attach the hose to the inlet of the 1238ME. Open the valve and initially set the flow high enough so the sample bag begins to fill. After the sample bag is partially full, turn the flow down to maintain the level in the sample bag. Periodic adjustment of the flow may be required to prevent the sample bag from becoming overly full or empty.

15. The meter will indicate the concentration of gas currently being measured by the sensor. Allow at least one minute for this reading to stabilize. Record this reading on the calibration form in the column labelled "Reading Before Adjustment".

16. Locate the PPM SPAN potentiometer on the underside of the main circuit board, near the front. Using a small slotted screwdriver, turn this potentiometer until the meter needle aligns with the value of the calibrating gas. Record this reading on the calibration form in the column labelled "Final Adjusted Value."

17. Close the valve on the calibrating gas and allow the 1238ME to draw out the gas in the sample bag. When this bag is empty, remove the tubing from the front of the instrument and allow gas free air to purge the sensor. The meter should return to zero. If the instrument does not return to zero after 5 minutes, repeat steps 11 to 15 until proper values are obtained. This completes the calibration of the 1238ME.

18. Reassemble the instrument by locating the upper half of the housing above and slightly to the rear of the bottom half. Lower the back end and slide it forward to engage the rear latch bar. Lower the front of the upper section, being sure not to pinch any wires or other components. Engage and tighten the large thumbscrew to complete the closure.

NOTE: IF THE DESIRED SPAN READING COULD NOT BE OBTAINED USING THE LEL OR PPM SPAN POTENTIOMETERS, OR IF THE INSTRUMENT COULD NOT BE PROPERLY ZERO ADJUSTED. THE COMBUSTIBLE GAS SENSOR **MUST** BE REPLACED. MAKE NOTE OF THIS ON THE CALIBRATION FORM IN THE COLUMN LABELLED "COMMENTS". THEN REFER TO SECTION VI FOR INSTRUCTIONS ON HOW TO REPLACE THE COMBUSTIBLE GAS SENSOR.

The "Maximum Reading With Adjustment" is a good indication of the amount of life remaining in the combustible gas sensor. As a sensor ages, its maximum span decreases.

B. ALARM SETTINGS

WARNING

THE ALARM LEVELS SET AT THE FACTORY HAVE BEEN CAREFULLY SELECTED. CHANGING THESE LEVELS COULD LEAD TO INSUFFICIENT WARNING OF DANGEROUS GAS CONCENTRATIONS. THESE ALARMS SHOULD ONLY BE CHANGED AFTER CAREFUL CONSIDERATION. IF IN DOUBT, CONTACT THERMO GASTECH FOR ADVICE ON THIS MATTER.

The level at which the alarm is actuated in each range can be set by adjusting the corresponding ALARM potentiometer (Refer to Figure B.). To change the alarm levels, carry out the following steps:

1. LEL Range

   a) Open the instrument by loosening the thumbscrew at the front of the instrument and separating the two halves. Put the instrument into the LEL range (indicator dot on LEL/PPM switch is black).

   b) Using the ZERO control, bring the meter needle to the desired alarm setting. If the needle cannot be aligned with the desired value using the ZERO control, use the Coarse ZERO potentiometer to align the needle with the desired value. (See Figure B.)

   c) Locate the LEL ALARM potentiometer on the underside of the main circuit board, near the centre. Using a small, slotted screwdriver, adjust the potentiometer to the point where the alarm just operates. Clockwise rotation will lower the alarm setting.

   d) Verify the alarm setting using the ZERO control to bring the meter needle into and out of the alarm zone. The alarm should sound when the needle reaches the desired alarm value.

   e) After the alarm has been properly set, re-zero the instrument. If the COARSE ZERO potentiometer has been changed, refer to the combustible sensor calibration procedure to reset.

2. PPM Range

   a) Open the instrument, by loosening the thumbscrew at the front of the instrument and separating the two. Put the instrument into the PPM range. (Indicator dot on LEL/PPM switch is orange.)

   b) Using the ZERO control, carefully bring the meter needle to the desired alarm setting.

   c) Locate the PPM ALARM potentiometer on the underside of the main circuit board, near the centre (Refer to Figure B.). Using a small slotted screwdriver, adjust the potentiometer to the point where the alarm just operates. Clockwise rotation will lower the alarm setting.

   d) Verify the alarm setting using the ZERO control to bring the meter needle into and out of the alarm zone. The alarm should sound when the needle reaches the desired alarm value.

   e) After the alarm has been properly set, re-zero the instrument.

VI. MAINTENANCE

A. BATTERIES

While using the 1238ME, battery voltage should be checked periodically using the BATTERY CHECK switch. The battery pack should be recharged before it's voltage falls below the BATT CK mark on the meter scale.

Use the following procedure to recharge the 1238ME battery pack:

WARNING

DO NOT RECHARGE OR REMOVE BATTERIES IN A HAZARDOUS LOCATION.

1) Connect the charging plug from the dual rate charger into the socket located at the rear of the instrument.

2) Verify that a charge is actually entering the battery pack. Hold down the BATTERY CHECK switch and observe the meter reading. Plug the charger into a wall socket. The meter reading should increase slightly, indicating that the charger is operating properly.

3) Check the two indicator lights on the charger. The yellow light should be on, indicating that the battery is receiving a charge. If the green light is lit, the battery pack is ready for use.

4) Turn the instrument off and allow the battery pack to charge overnight. The battery charger provides a full charge over a 16 hour period, and then automatically cuts back to a trickle charge.

5) When the yellow light and green light are lit, the charger may be disconnected and the instrument is ready to be used.

B. COMBUSTIBLE GAS SENSOR

The combustible gas sensor must be replaced if:

1) It can no longer be calibrated to a known gas sample within the range of the LEL SPAN potentiometers (LEL or PPM range).

2) A meter reading of 0% cannot be obtained using the ZERO control while in a known gas-free area.

To replace the combustible gas sensor, perform the following steps. (See Figure C):

1) Loosen the thumbscrew on the top and near the front of the instrument. Lift the upper half of the instrument's case slightly and move it to the rear, in order to disengage the rear latch bar. Separate the two halves of the instrument.

2) Locate the combustible sensor's wires, which are red, green and white, and are connected at the terminal block on the front of the main circuit board. Remove these wires from the terminal block.

3) The sensor itself is located in the reaction chamber which is mounted toward the front of the lower half of the instrument's case. To remove the sensor, unscrew the gold-coloured retaining ring on the back of the black reaction chamber. Then pull the sensor and retaining ring straight back and out.

4) Insert the new sensor by pushing it straight into the opening in the reaction chamber and then screwing on the gold retaining ring. This ring should only be tight enough to ensure a proper seal.

5) Reconnect the sensor's wires to the instrument's terminal block. The wires are colour coded with the proper orientation being marked on the main circuit board.

6) After replacing the combustible gas sensor, the 1238ME must be calibrated according to the instructions in Section V.

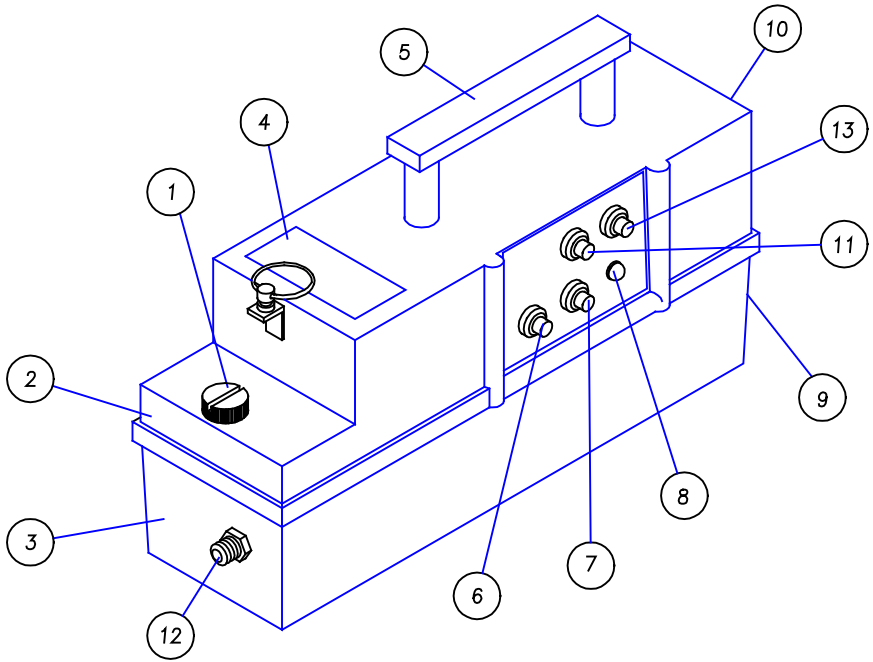
VII. PARTS LIST

Stock Number	Description
13-0110	SHOULDER STRAP
33-1031	FILTER ELEMENT, PKG OF 24 COTTON REPLACEMENTS
49-1571	BATTERY PACK, RECHARGEABLE NI-CAD
49-2133	BATTERY CHARGER, 115 VAC, DUAL RATE
49-2134	BATTERY CHARGER, 240 VAC, DUAL RATE
61-0120H	COMBUSTIBLE SENSOR
61-0120TT	COMBUSTIBLE SENSOR, ENHANCED PERFORMANCE
80-0002	EXTENSION HOSE, 1.5 meter
80-0010	EXTENSION HOSE, 3 meter
80-0015	EXTENSION HOSE, 5 meter
80-0025	EXTENSION HOSE, 7.5 meter
80-0030	EXTENSION HOSE, 10 meter
80-0050	EXTENSION HOSE, 15 meter
80-0150	PROBE, 25 cm
80-0155	PROBE, 80 cm, Aluminium
80-0156	PROBE, 80 cm, Fibreglass
80-0203	MOISTURE TRAP
80-0221	HYDROPHOBIC FILTER
81-0222	CALIBRATION KIT
81-0007	REPLACEMENT GAS CYLINDER, 40% LEL HEXANE*
81-0083C	REPLACEMENT GAS CYLINDER, 400 PPM HEXANE*

VIII. DRAWING SECTION

Figure	Description
A	MODEL 1238ME
B	MODEL 1238ME INTERNAL ADJUSTMENTS
C	MODEL 1238ME, COMBUSTIBLE SENSOR REPLACEMENT
D	COMBUSTIBLE GAS SENSOR, RELATIVE RESPONSE CHART
E	CALIBRATION TUBING CONNECTIONS

1. THUMBSCREW FOR OPENING INSTRUMENT
2. UPPER CASE
3. LOWER CASE
4. ANALOG DISPLAY
5. CARRYING HANDLE
6. POWER SWITCH
7. BATTERY CHECK SWITCH
8. ZERO ADJUST KNOB
9. ALARM BUZZER
10. BATTERY GHARGER SOCKET
11. PPM/LEL RANGE SWITCH
12. INLET FITTING
13. METHANE ELIMINATION SWITCH



MODEL 1238ME

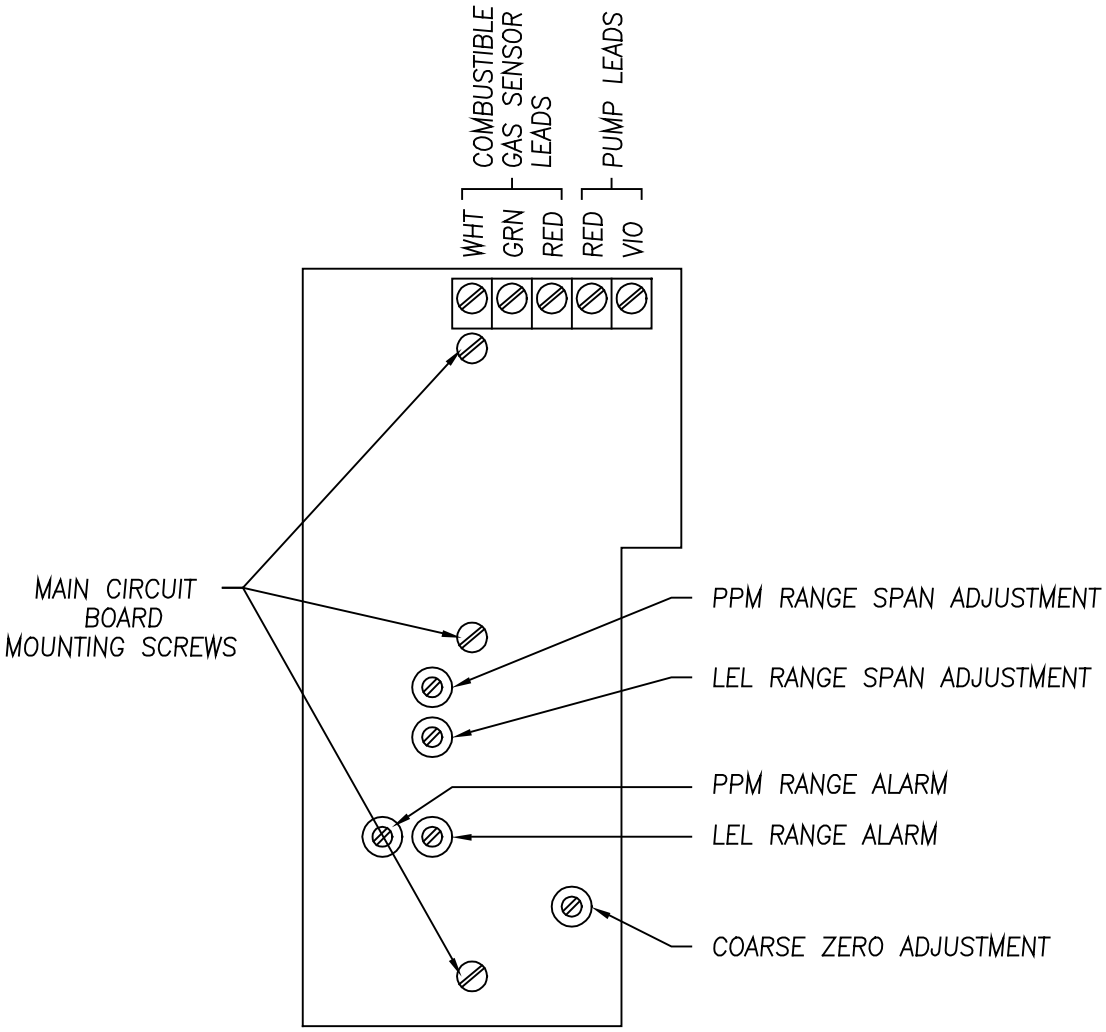
NO.	REVISION	BY / CHKD.	DATE
A	RELEASED	JTF / RK	JUNE 14/93

GASTECH INSTRUMENTS CANADA LTD.
1721 – 27th AVENUE N.E.
CALGARY, ALBERTA
T2E 7E1
PHONE: (403) 291-4700 FAX: (403) 291-2092

SCALE: NONE	DESIGN BY:	REVISED BY:
DATE: JUNE 6, 1993	DRAWN BY: J. FRANCIS	APPROVED BY:

MODEL 1238ME

SIZE:	DRAWING NO.	REVISION:
B	GTC-2052-B11	A



NO.	REVISION	BY / CHKD.	DATE
A	RELEASED	JTF / RK	JUNE 14/93

GASTECH INSTRUMENTS CANADA LTD.
1721 – 27th AVENUE N.E.
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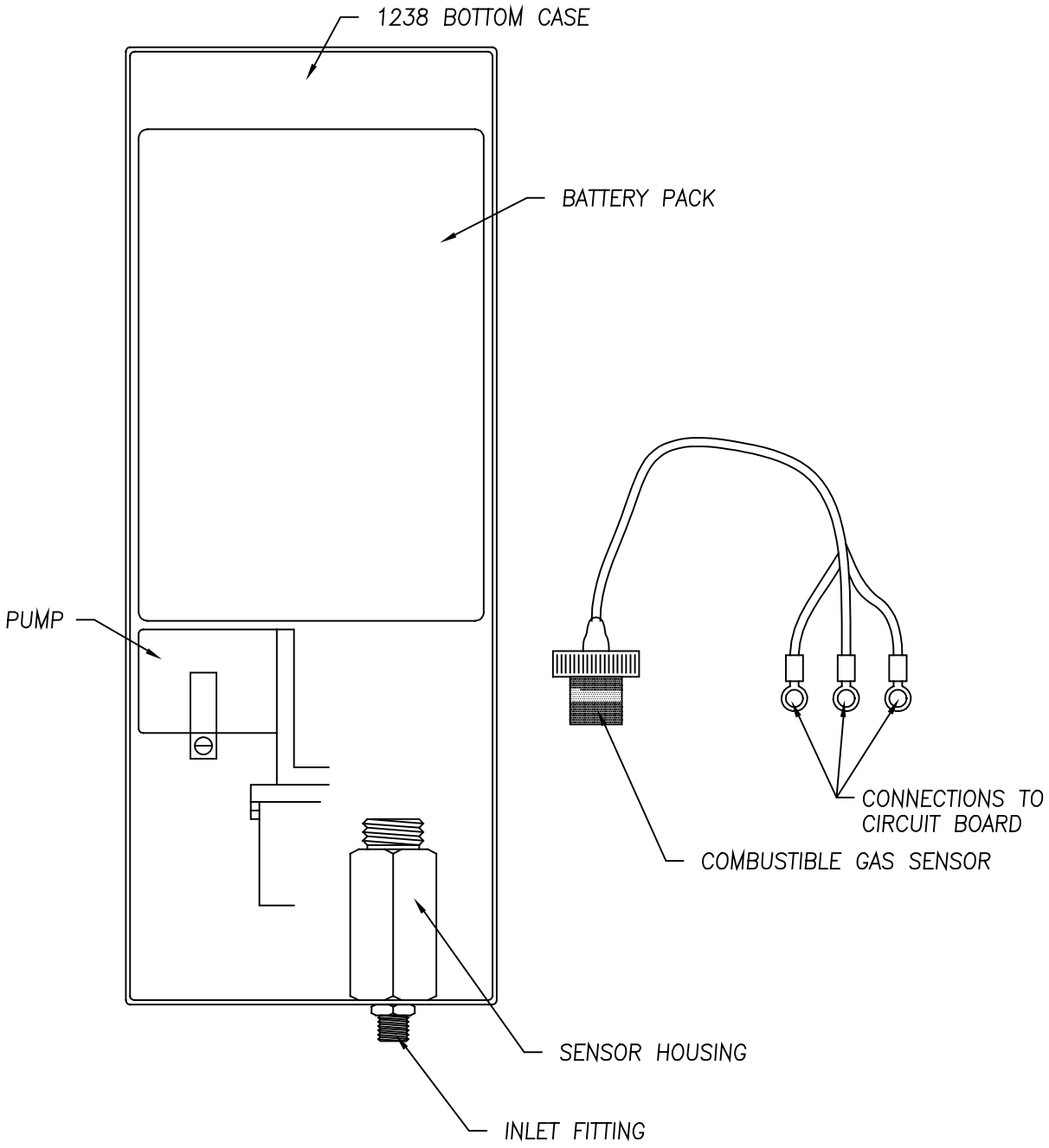
SCALE: NTS	DESIGN BY:	REVISED BY:
DATE: JUNE 14, 1993	DRAWN BY: J. FRANCIS	APPROVED BY:

MODEL 1238 INTERNAL ADJUSTMENTS

SIZE: A	DRAWING NO. GTC–2052–A18	REVISION: A



NO.	REVISION	BY / CHKD.	DATE
A	RELEASED	JTF / RK	JUNE 14/93

GASTECH INSTRUMENTS CANADA LTD.
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SCALE: NTS	DESIGN BY:	REVISED BY:
DATE:	DRAWN BY: J. FRANCIS	APPROVED BY:

MODEL 1238, COMBUSTIBLE GAS SENSOR REPLACEMENT

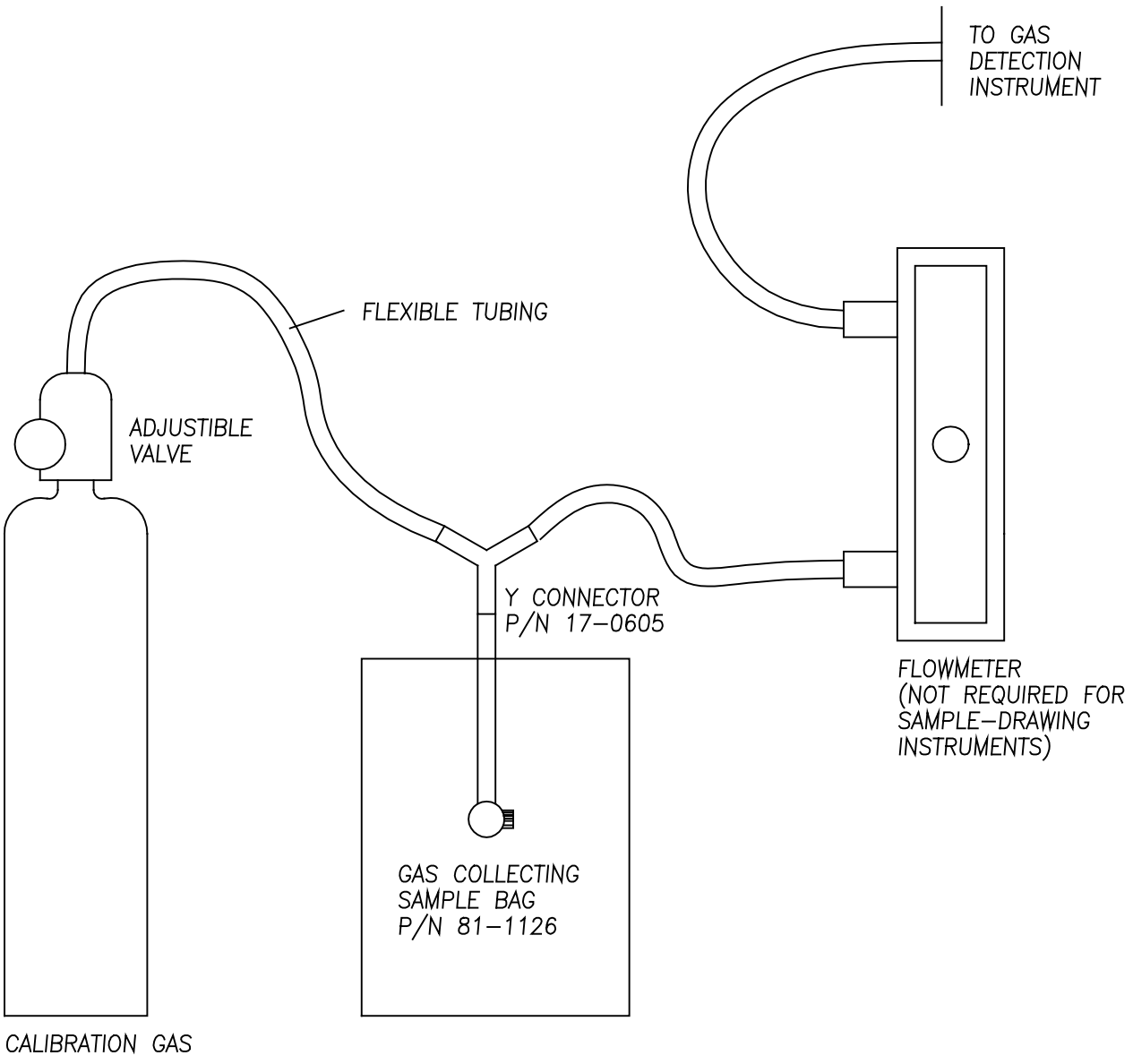
SIZE: A	DRAWING NO. GTC–2052–A17	REVISION: A

MODEL 1238ME
RELATIVE RESPONSE CONVERSION FACTORS (REFERENCED TO HEXANE)

GAS	LEL SCALE CONVERSION FACTOR	PPM SCALE CONVERSION FACTOR
Acetone		1.55
Acrylonitrile	-	1.31
Benzene	0.87	1.11
Butadiene	0.88	2.0
Chloroform	-	8.0
Carbon Monoxide	0.60	4.4
Ethyl Monoxide	0.81	1.61
Ethyl Alcohol	0.60	2.0
Formaldehyde	1.96	7.4
Heptane	1.03	0.98
Hexane	1.00	1.00
Hydrogen Sulphide	1.96	5.0
Methyl Chloroform	-	3.7
Methyl ethyl Ketone	0.84	1.3
Methylene Chloride	2.78	4.4
Methane	0.42	2.4
Pentane	0.71	1.81
Perchloroethylene	-	4.5
n-Propyl Acetate	0.77	1.36
n-Propyl Alcohol	0.80	1.52
Styrene	1.24	1.31
Toluene	1.03	1.19
Trichloroethylene	0.59	4.4

Please note, that response varies from one sensor to another and the relative response of a sensor can change with age. This data should be used for estimation purposes only. Assuming an instrument calibrated directly for hexane, but used to observe a different gas, the equivalent response in %LEL (or ppm) for that gas is secured by multiplying the observed %LEL (or ppm) reading by the LEL (or ppm) scale conversion factor.

These conversion factors are valid only when the 1238ME is operated, and has been calibrated, in the full gas response mode.



NO.	REVISION	BY / CHKD.	DATE
A	RELEASED	JTF / RK	JAN 13/93

GASTECH INSTRUMENTS CANADA LTD.
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SCALE: NTS	DESIGN BY:	REVISED BY:
DATE: JAN 13, 1993	DRAWN BY: J. FRANCIS	APPROVED BY:

CALIBRATION TUBING CONNECTIONS

SIZE: A	DRAWING NO. GTC-2052-A12	REVISION: A

IX. THERMO GASTECH

CALIBRATION FORMS

MODEL 1238ME

IX. THERMO GASTECH CALIBRATION FORM

MODEL 1238ME SERIAL NUMBER _____

DATE	METH ELIM MODE (Y/N)	CAL GAS USED		READING BEFORE ADJUST.		MAX. READING W/ ADJ.		FINAL ADJUSTED VALUE		COMMENTS
		LEL	PPM	LEL	PPM	LEL	PPM	LEL	PPM	

IX. THERMO GASTECH CALIBRATION FORM

MODEL 1238ME SERIAL NUMBER _____

DATE	METH ELIM MODE (Y/N)	CAL GAS USED		READING BEFORE ADJUST.		MAX. READING W/ ADJ.		FINAL ADJUSTED VALUE		COMMENTS
		LEL	PPM	LEL	PPM	LEL	PPM	LEL	PPM	

IX. THERMO GASTECH CALIBRATION FORM

MODEL 1238ME SERIAL NUMBER _____

DATE	METH ELIM MODE (Y/N)	CAL GAS USED		READING BEFORE ADJUST.		MAX. READING W/ ADJ.		FINAL ADJUSTED VALUE		COMMENTS
		LEL	PPM	LEL	PPM	LEL	PPM	LEL	PPM	