OPERATION/MAINTENANCE MANUAL

Rev. 3
12 December 2019

PORTABLE TRITIUM LEAK DETECTOR

MODEL 2x200-LD

OVERHOFF TECHNOLOGY CORPORATION
1160 US ROUTE 50, MILFORD, OHIO, USA

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1.0. INTRODUCTION

The Model **2x200-LD** Tritium Leak Detector uses four matched measuring chambers to quantify T_2 and T_2O separately and in real time while providing gamma compensation. Matched sensitive electrometers and a special amplifier circuit eliminate radon interference. The sensitivity of the **2x200-LD** is better than ±5 µCi/m3 for T_2O (better than ±0.5 DAC T_2O). The sensitivity to T_2 is better than 0.02% of the T_2 DAC stated in 10CFR835. The two measurement channels are selected with a front panel toggle switch and appear on a single digital display.

1.1. PHYSICAL DESCRIPTION

The Model 2x200-LD uses four identical ionization chambers arranged in a cruciform pattern. Each electrometer channel uses two ionization chambers, each with a volume of 200 cc, one is for measurement, the other chamber is for compensation.

The sample stream is drawn through the ionization chambers by means of a small rotary vane pump which is plumbed to the exhaust of the furthest down stream ionization chamber. Entry of dust particulates is prevented by attaching a good quality particulate filter ahead of the instrument sampling inlet.

A large easy to read liquid crystal digital panel meter with a range from 0 to 19,999 µCi/m^3 is used for measurement display. Other units of measurement, such as MPCa, MBq/m^3 and µ Sv/hr, or others may be specified by the user at time of an requesting a unit. The instrument exhibits a basic sensitivity of the order of ±5 µCi/m^3 for T_2O which it is able to attain due to the fact that it is immune to response to both radon and cosmic ray noise.

A pair of “D” size NiMH batteries supplies power. NiCd batteries are not recommended, because of undesirable “memory” characteristics. Onset of battery depletion is signaled by illumination of an red LED located next to the meter face. An external power supply can be used by attaching to a small receptacle located on the side of the instrument case. When new, the batteries will fully charge in 12 hours time, and can power the 400AC for over 16 hours (with the pump on). The same LED also signals red when the high voltage power supply (HVPS) used for ionization chamber bias has a malfunction.

Notes:

1. **Do not use non-rechargeable batteries in the 400SBDγC.**
2. **DO NOT SUBSTITUTE, use only the recommended power supply.**

A ten position alarm level stepped attenuator, adjustable over partial scale (2-1,000 µCi/m^3) is located on the front panel. An OFF position is included. A steady tone is emitted by an acoustic signaler if the measurement exceeds the set point. An intermittent tone is heard if the sample air flow has been interrupted. The acoustic alarm is silenced by a “MUTE” push button. The alarms are non-latching.

External connections for remote display of the meter reading, and for a remote alarm status have been provided.

The instrument case is constructed of light weight aluminum. A handle is attached for hand held survey use.

A cartridge filled with desiccant interposed between the ionization chambers for each electrometer channel provides for the separate measurement of T_2O and T_2. The gas flow connections are made externally to the instrument by appropriate attachment of flexible plastic hose. See Figure 2A.

Additionally, the monitor will operate in a second mode by changing the connections of the tubing, excuding the desiccant and with the toggle switch in the T_2 position, the monitor will measure both forms of tritium as a standard survey meter would. See Figure 2B.

2.0. TECHNICAL SPECIFICATIONS

MEASUREMENT DISPLAY	0 – 19,999 Digits, LCD Panel Meter
MEASUREMENT RANGE	0 - 19,999 $\mu Ci/m^3$ Basic sensitivity of the order of ± 5 $\mu Ci/m^3$
T_2 and T_2O modes	Two channel measurement, switch selectable
ACCURACY	$\pm$ 10% of reading, $\pm$ 2 $\mu Ci/m^3$ (whichever is greater)
NOISE LEVEL	$\pm$ 2 $\mu Ci/m^3$ (10 second electronic time constant)
ZERO STABILITY	$\pm$ 2 $\mu Ci/m^3$ long term
GAMMA COMPENSATION	Multiple chambers in a cruciform pattern to completely eliminate errors due to external gamma radiation. Gamma response less than 0.2 $\mu Ci/m^3$ per mR/hr for any field direction.
APLHA PULSE SUPRESSION	a circuit provides recognition and cancellation of undesireable noise spikes attributed to airborn radon
RESPONSE RATE	30 seconds to reach 90 % of final reading,
ALARM (ACOUSTIC)	1. Ten position stepped attenuator set point for signal alarm 2 - 1,000 $\mu Ci/m^3$, steady tone. An OFF position is included. 2. Low flow produces an intermittent tone 3. Mute switch silences audible tone
ALARM (VISUAL)	LEVEL: red LED; when tritium level exceeds set point FLOW: yellow flashing LED; low pump flow LOW BAT: red LED; D-cell batteries need to be replace **-AND-** HVPS: red LED illuminates to indicate a malfunction with the high voltage power supply (HVPS) used to bias the ionization chambers
EXTERNAL CONNECTIONS	miniature DIN plug for measurement output signal, and for alarm status
DUST FILTER	in line disposable cartridge, Pall P/N 12082
SAMPLING SYSTEM	4 hose barb ports are located on the front panel
PUMP	miniature internal rotary vane pump for 3 to 5 volume changes per minute
FLOW RATE	nominal 1.5 - 2 LPM

IONIZATION CHAMBER VOLUME	effective volume: each chamber, 200 cm^3 port to port volume: 660 cm^3; use this volume when calculating expected readings with calibration gas. Use tubing connections shown in Fig. 2B, with the toggle switch in the T_2 mode.
POWER	two “D” size NiMH batteries, 10,000 mAh external jack available for re-charging
ENVIRONMENTAL	0° C to +40° C, 20 – 90% R.H. Non-Condensing
CASE	light weight aluminum
SIZE AND WEIGHT	7.6" [193mm] L, 5.2" [132mm] W, 6.9" [175mm] H excluding handle, 6.5 lbs [3 kg]

ACCESSORIES

- 2 “D” size NiMH batteries (installed)
- Sniffer Hose
- Dust Filter
- 2.3 meter long cable with pre-wire Mini-DIN plug for J2 output connector at one end
- Power converter:
  100-240 VAC, 50/60 Hz, .19 A to 3.3 Vdc @ 1.5 A
  5.5 mm O.D. x 2.1 mm I.D. Plug
  Center pin is positive

  Note: DO NOT SUBSTITUTE, use only the recommended power supply

- Desiccant column, filled with Silica Gel
  Quantity two provided, one for in-use while the other gets serviced

3.0. CIRCUIT DESCRIPTION

CAUTION: This instrument has not been designed for indiscriminate opening or disassembly of the internal parts. It contains highly sensitive semiconductors which are destroyed by even the slightest electrostatic discharge.

3.1. IONIZATION CHAMBERS

In its simplest form, an ionization chamber is an enclosed volume with two electrodes. Voltage is applied between the electrodes, generating an electric field which will segregate and collect electric charges which are created by nuclear events occurring inside the chambers. Nuclear events may consist of ionization of air molecules by external or internal alpha, beta or gamma radiation.

The 2x200-LD monitor is designed to measure tritium. Activity of tritium decay is such that a concentration of 1 $\mu Ci/m^3$ in a volume of one liter will generate an ionization current of about 0.95×10^{-15} amperes. This is a very weak current.

Alpha pulses from naturally occurring radon, are much more energetic, they can produce short current bursts of up to 10^{-13} coulumbs during decay, and therefore appear as large noise "spikes" which can seriously impair tritium measurement.

Gamma radiation also has a strong effect. In practice, a gamma radiation field of 1 mR/hr will create the same amount of ionization as 90 $\mu Ci/m^3$ of tritium.

A tritium monitor, in order to measure to low concentrations, must be able to respond only to tritium and be immune to alpha or gamma radiation. For this purpose, a second ionization chamber system has been included to balance out any ionization current contribution from external gamma radiation.

In the 2x200-LD monitor, the four ionization chambers are arrayed in a cruciform pattern, ensuring almost perfect gamma compensation in all directions and even for high gradient non uniform fields.

The ionization chamber polarizing voltage is supplied by a set of dry batteries with a long life. The surfaces of the ionization chambers themselves are bare, and, to avoid damage must NOT be touched by hand.

3.2. ELECTROMETER

Also known as a transimpedance amplifier, it serves the purpose of converting the extremely feeble ionization current into a voltage suitable for further signal processing and measurement display.

The heart of the electrometer consists of a specially selected dual ultra high impedance semiconductor device which has been chosen both for ultra low internal current leakage as well as long term d.c. stability. The semiconductors used in the 2x200-LD monitor are suitable for measurement of currents as low as10^{-16} amperes.

In the 2x200-LD monitor, the electrometer is directly attached to the ionization chamber cluster and is protected by a rectangular metal cover. The two pairs of chambers for the T_2 and T_2O channels are in a side by side arrangement. A front panel toggle selector switch controls the operation of the dual channel electrometer.

3.3. SIGNAL PROCESSING AMPLIFIER

A single printed circuit board attached directly to the front face of the instrument contains all power supply and signal processing electronics.

Proprietary circuitry is used for the recognition and elimination of transient signals due to radon or high energy cosmic ray pulses. The monitor uses a dedicated internal circuit to disable the pulse rejection circuit when the measured signal reaches approximately 30 $\mu Ci/m^3$.

An OFFSET control is furnished in order to adjust the reading to zero in case of offsets caused by tritium contamination of the chambers or otherwise.

A front panel control has been provided for adjustment of the set point (level) at which the acoustic alarm is desired to sound. The acoustic signaler has the second function of alerting the user that sample gas flow is impeded.

All power supplies are regulated, a small LED on the front panel will illuminate when the battery terminal voltage has dropped to about 2 V, signaling that the batteries should be replaced.

Plug and jack connections are found on the sides of the instrument for external power, as well as remote meter display and the acoustic signaler.

4.0. CONFIGURATION

4.1. EXTERNAL FEATURES

The front panel features include:

1. the digital panel meter, 0 - 19,999 μCi/m^3
2. function control knob
3. alarm level control knob, 2 - 1,000 μCi/m^3
4. T_2 or T_2O toggle switch selector
5. low battery LED
6. signal level alarm LED
7. low flow alarm LED
8. acoustic signaler
9. mute push-button
10. calibration potentiometer (under phillips head screw)
11. offset potentiometer (small knob)
12. sample IN/OUT hose barbs
13. toggle switch for T_2 and T_2O Modes
14. battery compartments

Side features include:

15. jack for external power, 3 V DC
16. jack for remote meter display and alarm status
17. snap holder for dust filter
18. snap holders for desiccant column

4.2. HOSE CONNECTIONS

The instrument may be operated in two modes. In the first mode, the instrument will respond to T_2 or T_20 according to the position of the channel selector toggle switch. In the second mode, the instrument will respond to any radioactive gas passing through the instrument as well as both forms of tritium. The hose attachments are selected to suit the mode in use. In addditon the the normal “IN” and “OUT” hose barbs there two special hose barbs are identified with the symbols ○ and ●.

FIRST MODE (refer to Figure 2a)

A sniffer hose is attached to a small in line dust filter, which is directly attached to the “IN” hose barb. The ○ hose barb is connected to a desiccant cartridge. The exhaust end of the desiccant cartridge is connected to the ● hose barb. The sample finally exits via the pump exhaust through the “OUT” hose barb.

SECOND MODE (refer to Figure 2b)

In this mode, the toggle switch is in the T_2 position, and a short loop of hose connects the ○ hose barb to the ● hose barb.

Note 1: Never operate the instrument without a dust filter in the sample stream.

note 2: The instrument must be in thermal equilibrium with its surroundings.

note 3: To avoid erratic response, the pump <u>must always</u> be placed downstream of the last ionization chamber in the sample path.

5.0. OPERATION

Ensure that a dust filter is connected in line ahead of this instrument flow inlet in use.

The following steps are necessary and sufficient to operate the instrument:

1. Set measurement alarm level to desired value.

2. Rotate mode switch to "MEASURE". The "low flow" LED will flash, since the pump is inactive. The "mute" switch will silence the intermittent tone if desired.

Allow 30 seconds for the instrument to stabilize, then readjust (if necessary) by gently turning the "OFFSET" control to achieve a zero reading on the meter.

Allow two to three minutes for the instrument to stabilize.

The instrument is now ready for use. In this mode the ionization chambers are active, but the pump is not. The instrument is in a so called "standby mode" ready to sample the instant the mode switch is advanced to the next position.

3. Rotate the mode switch to "SAMPLE". Now, the pump is operating and the low flow indication will be eliminated.

4. The Model **2x200-LD** can be configured as a "sniffer", providing real-time indication of the T_2 and T_2O concentration, allowing the user to quickly identify the source of leakage of tritium from containers. Once a reading is obtained with the toggle switch in the T_2O mode, change to T_2 mode to find the origin of the leak. Allow up to 1 minute for the combined pneumatic and electronic time constants.

If it is desired to operate the instrument continuously on an external power supply, only a source of 3.3 VDC with 1.5A current capacity should be used. Attaching the external power plug will automatically charge the batteries.

NOTE: If the acoustic signaler sounds an intermittent tone, the sampling hoses are obstructed, or, for whatever reason, sample flow through the chambers has ceased.

It is IMPERATIVE that the sample stream be free from dust, dirt or moisture. Not only will the instrument show erratic behavior, but it may cease to function entirely. If moisture is ingested, then continued pumping to evaporate and expel the moisture can be attempted. If this fails, the instrument must be returned to the factory for service.

Condensation can occur if an instrument is brought from a cold environment into warmer surroundings.

Furthermore, temperature changes to the instrument, both lower to higher as well as higher to lower will create transient currents in the electrometer which can appear as large phantom measurement signals.

The instrument must be allowed to thermally equilibrate to its surroundings prior to use.

If there is an OFFSET due to thermal disequilibrium, use the following procedure:

OFFSET COMPENSATION:

1. Switch the instrument into the measure mode
2. After approximately three minutes. The instrument should indicate 0000 on the digital panel meter. An offset of 4 - 6 $\mu Ci/m^3$ is typical for situations due to temperature changes. This offset should disappear as thermal equilibrium is attained.
3. Adjust the “offset” compensation potentiometer as required. The location is shown in Figure 1.

NOTE: The rotation direction for the adjustment is clockwise for change in a positive direction. Use very small amounts of rotation, the display will not react immediately because there is a 30 second time constant.

6.0. CALIBRATION

6.1. METHOD

Tritium monitors employing ionization chambers, such as the 2x200-LD instruments may be calibrated with either of two methods.

The first method consists of injecting a known activity of tritium gas; the second method uses external gamma radiation of a known field strength.

To ensure traceability to National Standards, the first method must be employed. This method is time consuming, and is quite difficult to perform with precision. This first method is, however, useful as a “type” test, and can serve as a basic accurate calibration from which the gamma response (the second method) can be cross correlated.

The second method uses an external gamma field. In this instance, the polarization of the compensation ionization chambers is reversed to coincide with that of the measurement ionization chambers.

In this condition, the effects of external gamma radiation now adds rather than cancels, and a known gamma field should produce a predetermined measurement indication.

6.2. GAS CALIBRATION

Since the instrument is essentially linear, a relatively high concentration is best for most accurate results. Values between 100 $\mu Ci/m^3$ to 1000 $\mu Ci/m^3$ are convenient, but any other values from 20 $\mu Ci/m^3$ to 5,000 $\mu Ci/m^3$ can be used.

Instructions for the use of gas calibrators are generally provided by the manufacturer of the gas calibrator, and these should be followed.

Some general hints can be given.

It is important that the calibration sample be well circulated through the entire calibration system loop.

Adequate time should be allowed for the system pressure and temperature to come to equilibrium, and that no excess pressure is built up.

The inclusion of a previously calibrated "master" or "reference" tritium monitor in the sampling loop is highly recommended.

The calibration can actually be repeated for several levels of tritium activity. This is not done to verify the linearity of the tritium monitor (which is highly linear) but to ensure that the calibration process itself is free from subtle errors.

For gas calibration, use a port to port volume of 660 cm^3 when calculating expected readings. Use tubing connections shown in Fig. 2B, with the toggle switch in the T_2 mode.

6.3. GAMMA CALIBRATION

If the unit has previously been calibrated with tritium gas, then it is sufficient to use a gamma radiation source to produce a response when placed at a specified location relative to the instrument under test. Lead shielding is advised since the compensation chambers will cancel the measurement. It is best to shield both of the compensation chambers plus one of the measurement chambers. Use a minimum of ½" thick lead. For the highest value response, the gamma source should be directed through the bottom of the case to minimize interaction with the compensation chambers. If the gamma source is long lived, no chronological correction is needed. To verify calibration at a future date, the original gamma source must be used. Records must be kept to identify relative location of the source and the expected result. Be sure that temperature and pressure variations are taken into account.

If calibration by either of these methods is performed, and the instrument response is somewhat different from the expected value, then small adjustments can be made by turning the calibration potentiometer with a small screwdriver. The calibration potentiometer is accessed by removing the small Phillips head screw on the front panel located above the label **CAL**.

Large changes in calibration are evidence of malfunction. The factory should be consulted immediately.

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Telephone (513) 248-2400
Facsimile (513) 248-2402
Email: support@overhoff.com

6.4. GAMMA CHECK

If a tritium monitor has previously been calibrated by any other method, gas or gamma, a low intensity gamma radiation source check can be used as a quick verification of monitor performance. On the left side of the instrument case towards the front which is the defined location for "**GAMMA CHECK**". When using the identical gamma check source, at the defined spot, it should always produce the same instrument response, provided, of course, temperature and pressure variations are taken into account. This source check may be performed at a frequency of your choice, it could be daily, weekly or monthly. We recommend a low intensity gamma check source of the type which is commonly intended for G-M counters or other survey instruments. For example; a 10 μCi, Cesium-137 check source should be sufficient for a monitor reading of 100-200 $\mu Ci/m^3$.

IMPORTANT: Do not adjust the calibration when performing a gamma check.

7.0. MAINTENANCE

Overhoff 400 series portable instruments have been designed for many years of trouble free service. Very little maintenance is required, but some periodic attention may be necessary, especially if the instrument is to be used in adverse environments.

Pump life is in excess of 1000 hours of actual use; ensuring that the instrument is operated only with dust filters in line preserves its life.

When not in use, the monitor should be stored in a cool dry environment.

OPERATOR MAINTENANCE

The following operational checks may be performed at daily, weekly or monthly intervals to suit.

Inspect dust filter for excessive dust build up. Check the flow rate. Does the pump have sufficient flow such that the Low Flow Alarm is not indicated when 10ft of the sniffer hose is connected to the inlet of the dust filter?

GAMMA CHECK, If a tritium monitor has previously been calibrated by any other method, gas or gamma, a low intensity gamma radiation source check can be used as a quick verification of monitor performance. On the side of the instrument case towards the front which is the defined location for "**GAMMA CHECK**". When using the identical gamma check source, at the defined spot, it should always produce the same instrument response, provided, of course, temperature and pressure variations are taken into account. This source check may be performed at a frequency of your choice, it could be daily, weekly or monthly. We recommend a low intensity gamma check source of the type which is commonly intended for G-M counters or other survey instruments. For example; a 10 micro Curie, Cesium-137 check source should be sufficient for a monitor reading of 100-200 $\mu Ci/m^3$.

IMPORTANT: Do not adjust the calibration when performing a gamma check.

Manipulate the alarm set point to verify correct functioning of the alarm.

If the instrument is suspected of DRIFT, the zero reading may be verified. This should be done by an instrument engineer or technician.

SUPERVISORY MAINTENANCE

The following tasks are the responsibility of the supervisory engineering staff.

1. Calibration verification is to be performed at yearly intervals, or as otherwise specified.
2. Response checks (in case of need for cursory verification of the operational status of the ionization chambers and of the whole system), of the system may be tested by using a low strength gamma radiation check source. This must be done under the strict supervision of a health physicist. The gamma source is brought into proximity of each ionization chamber and the response is observed.

FACTORY MAINTENANCE

A determination that the system appears to have suffered a functional failure should require that the factory be notified (telephone (513) 248-2400, facsimile (513) 248-2402). Engineering assistance via telephone or facsimile, will be supplied by the manufacturer OVERHOFF TECHNOLOGY CORPORATION.

Should it appear to be necessary to return the instrument to our factory, authorization for the return must be obtained from Overhoff Technology Corporation prior to shipping. In-freight charges will be borne by the customer.

7.1. D-CELL BATTERY REPLACEMENT

The Model 400SBDγC uses (2) "D" size NiMH batteries. The batteries will need to be recharged within an hour after the low battery light illuminates. A cover has been installed over each battery holder for the purpose to minimize the chance of accidental replacement using non-rechargeable batteries. Do not use alkaline or carbon-zinc cells.

NOTE: USE ONLY NiMH BATTERIES IN THIS INSTRUMENT

Step 1. Remove Case
Remove the three Phillips head screws on the bottom of the Model 400SBDγC. The case can now be removed allowing access to the battery cover mounting screws. It may be necessary to disconnect the sample tube attached to the filter outlet.

⚠ This instrument contains components that are easily destroyed if the case is opened and handled without proper precaution. If damage occurs during battery replacement the repair will not be covered under warranty. Avoid touching the ionization chambers and the PCB to reduce the risk of damage.

Step 2. Remove Battery Covers
The battery covers are fastened in place by two Phillips head screws. Remove these two screws and the cover to gain access to the battery tube cap. Do not remove the two hex nuts.

Step 3. Replace Batteries
Access to the batteries is made by twisting off the caps located on the front panel of the instrument.

Step 4. Installation
Installation of the battery caps, battery covers and case is the reverse of Steps 1 and 2.

8.0. SERVICE AND SUPPORT

This instrument contains highly sensitive semiconductors which are destroyed by even the slightest electrostatic discharge if the case is opened and the instrument is handled without proper precaution.

Special training can be given to qualified technical personnel who are entrusted with instrument service and repair responsibility.

Warranty is void if maintenance or repair (other than that which is listed in this manual) is performed by an unauthorized repair facility.

OVERHOFF TECHNOLOGY CORPORATION
Telephone (513) 248-2400
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9.0. WARRANTY

All instruments built by Overhoff Technology Corporation are warranted to perform as claimed.

Defective components or workmanship of the instrument will be corrected free of charge for parts or labor within a period of one year from delivery. Nonperformance of the instrument as a result of negligence on behalf of the customer is not covered by this warranty.

Should it appear to be necessary to return the instrument to our factory, authorization for the return must be obtained from Overhoff Technology Corporation prior to shipping. In-freight charges will be borne by the customer.

10.0. REPLACEABLE PARTS

The following parts and components are consumable items and may be obtained from Overhoff Technology Corporation or from any original supplier:

Battery, primary power	"D" size, NiMH, 10,000mAh, (qty 2 req'd)

DO NOT SUBSTITUTE, use only rechargeable batteries

Dust Filter	P/N 12082
Ionization Chamber Can	P/N 1020686
Pump	P/N 50084
Hose Barb, Sample Inlet	Brass, P/N 22BH-4-2
Hose Barb, Sample Outlet	Brass, P/N 230-4-2
Panel Meter	P/N DMO-742W
Toggle Switch (T_2-T_2O)	P/N MTA-106D04
AC power converter	KTPS05-03315U

DO NOT SUBSTITUTE, use only the recommended power supply

Fuse, 2 Ampere	P/N MDL-2
J2 Cable, Remote Outputs	P/N J2-400SBDγC-2M (2.3 meter length cable is standard, a maximum length of 5 meters is available)
Adsorption Column	P/N 1021495, 80 psig maximum pressure, 160ml volume, filled with Silica Gel desiccant, see Safety Data Sheet at end of this manual

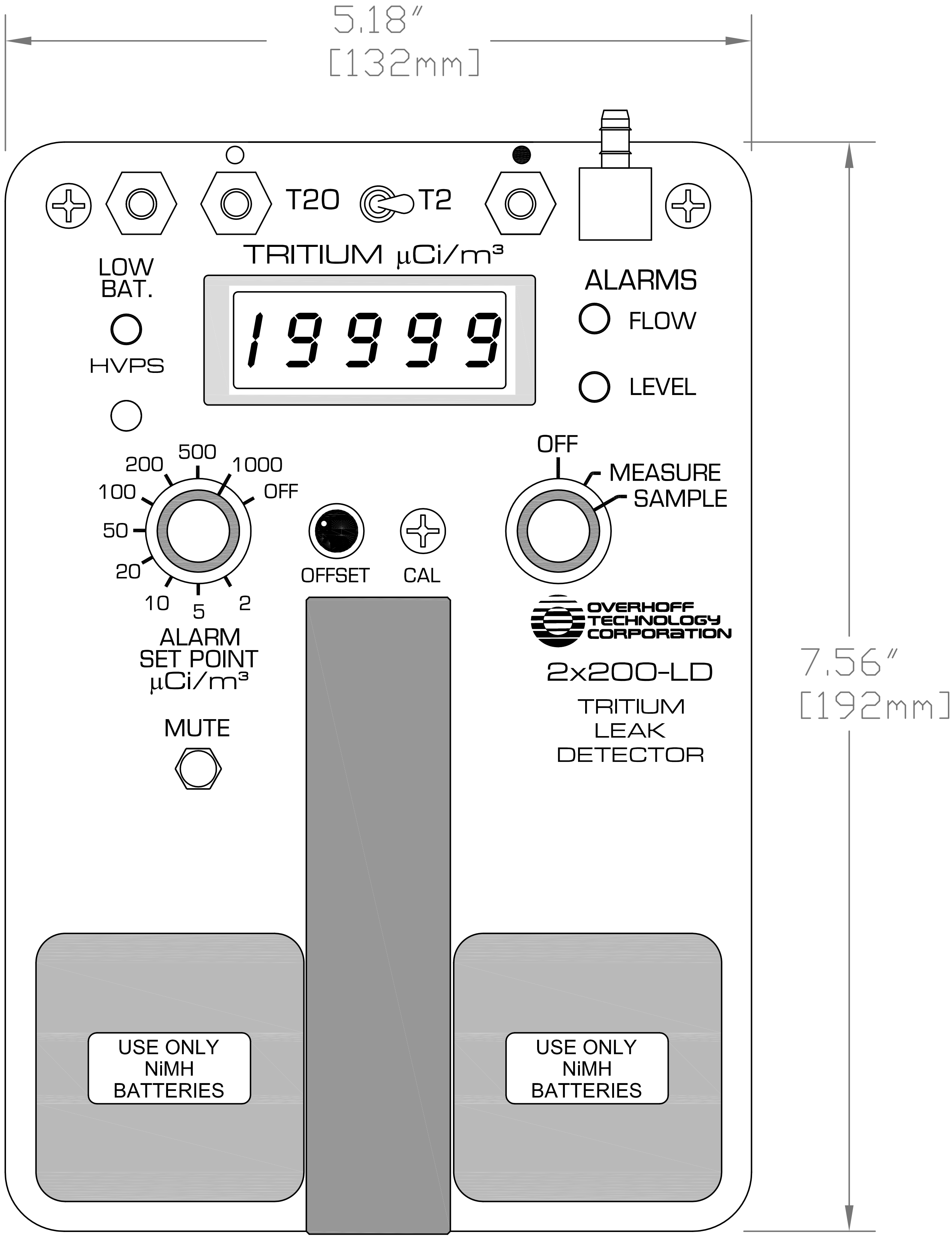


FIGURE 1
FRONT PANEL CONTROLS
MODEL 2x200-LD

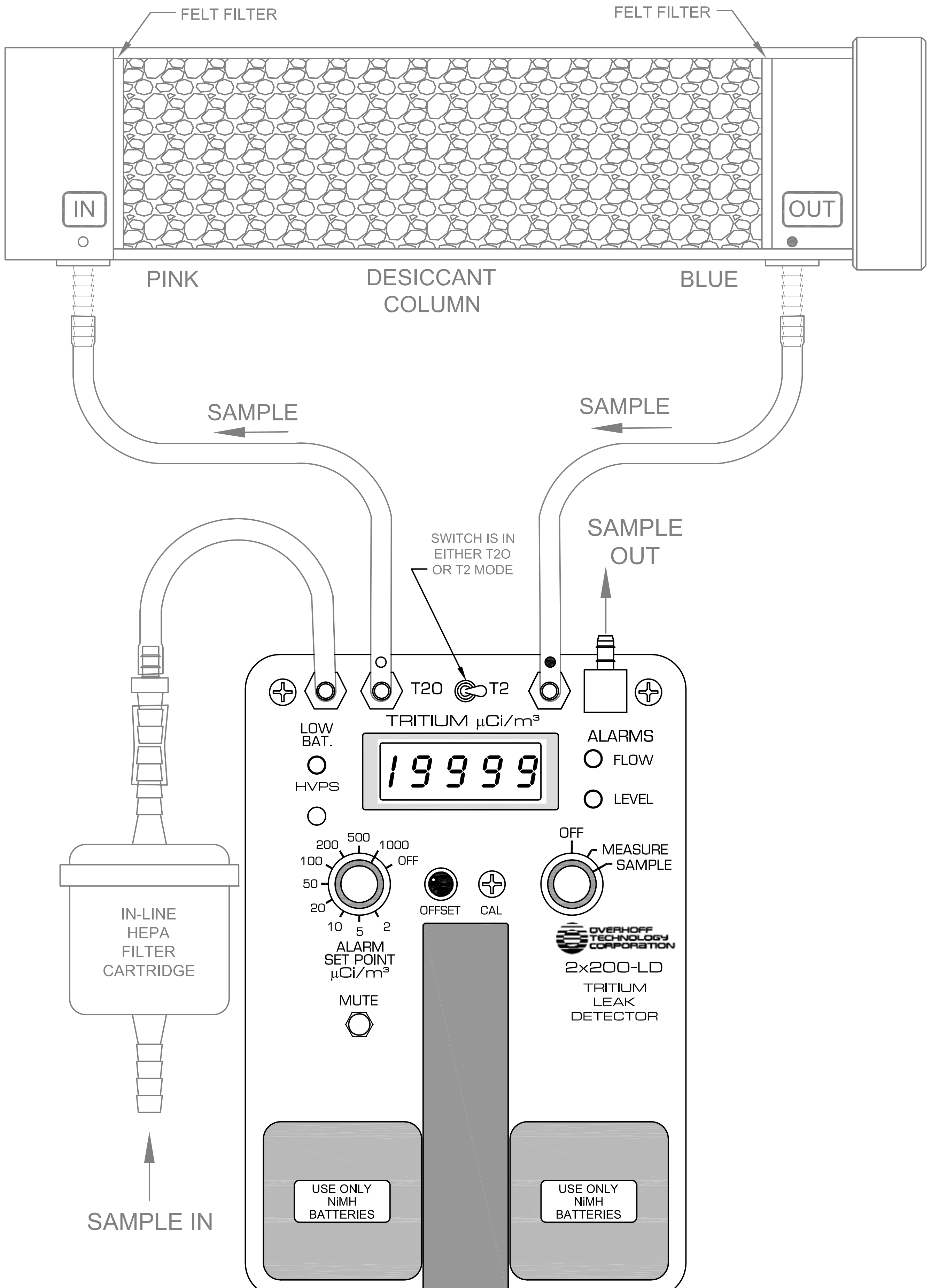


FIGURE 2A
HOSE BARB CONNECTIONS
DUAL MODE OPERATION
MODEL 2x200-LD

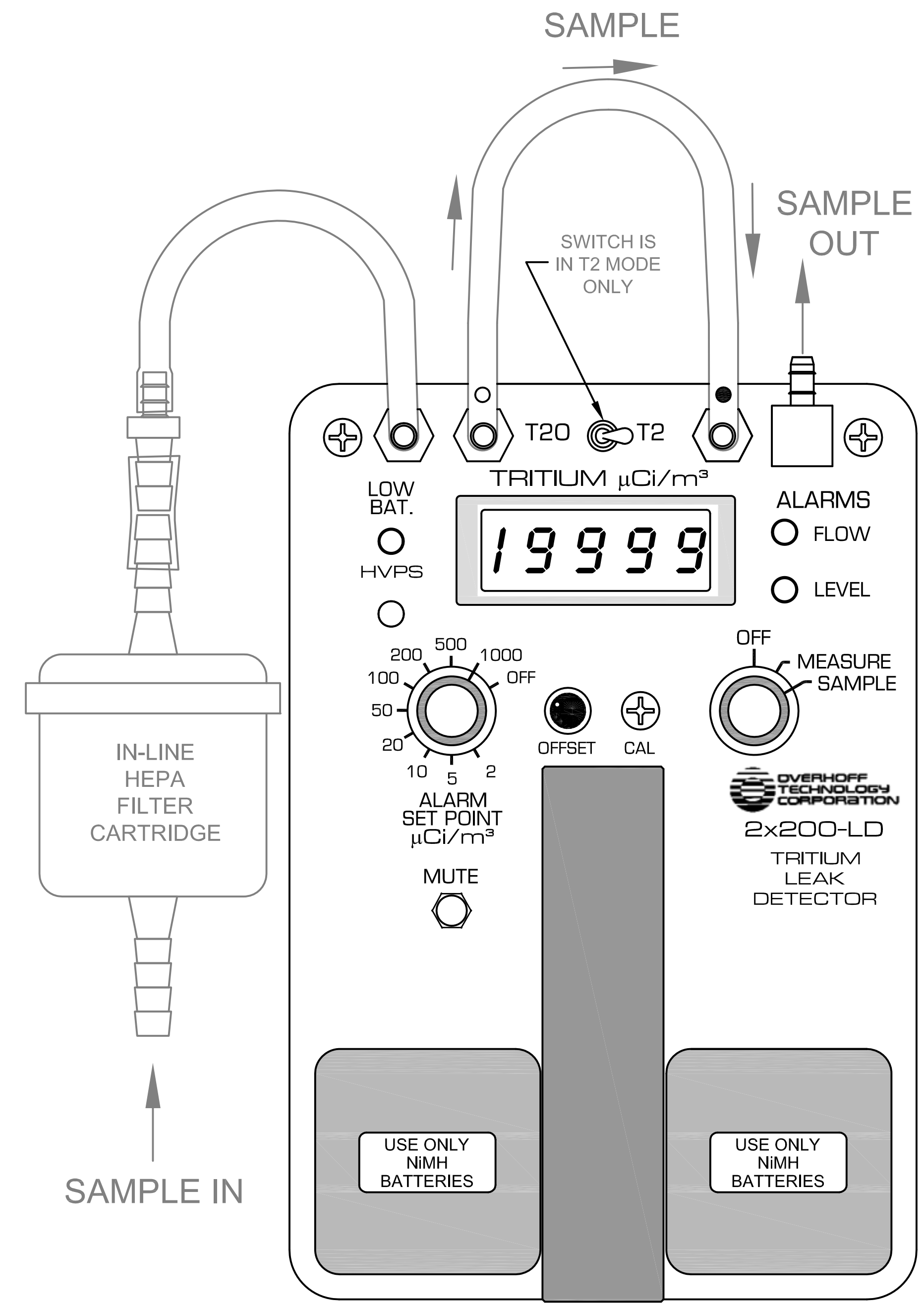
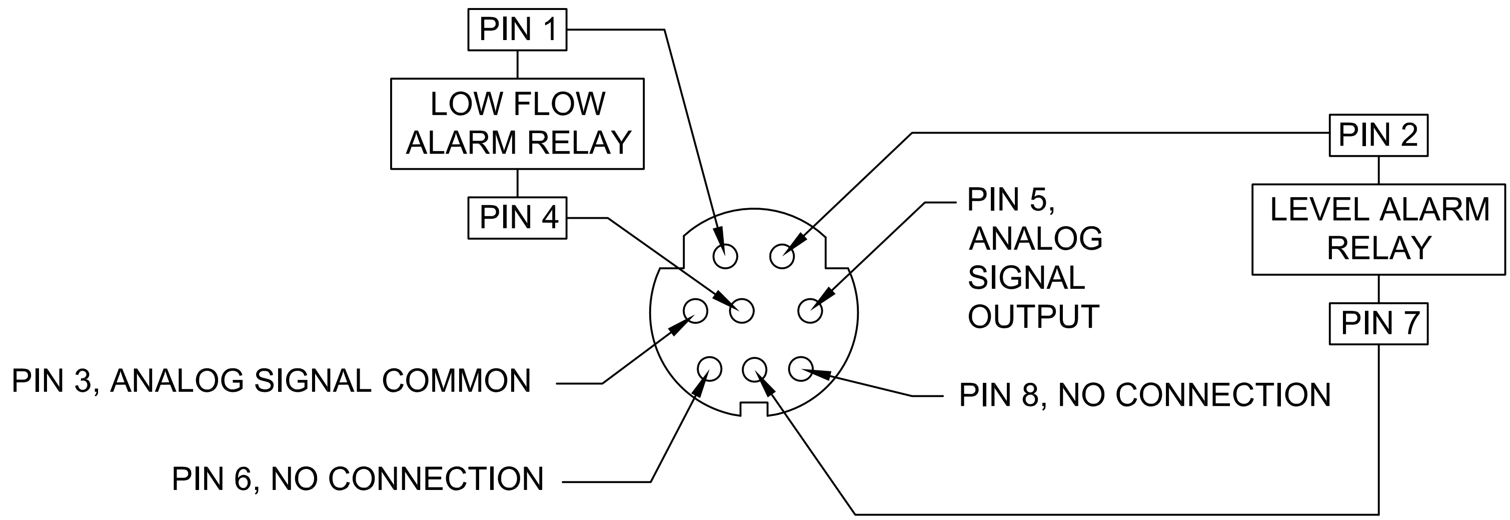


FIGURE 2B
HOSE BARB CONNECTIONS
SINGLE MODE (T2 ONLY) OPERATION
USED DURING CALIBRATION WITH TRITIUM GAS
MODEL 2x200-LD



8 PIN MIN DIN CONNECTOR
LOOKING AT RECEPTACLE FROM
OUTSIDE OF INSTRUMENT

NOTES:

1. ANALOG OUTPUT; 0-3.5VDC = 0-19,999 uCi/m^3 DISPLAYED ON PANEL METER

2. ALARM RELAYS ARE SOLID STATE OPTO-COUPLER DEVICES
WITH THE FOLLOWING OUTPUT CHARACTERISTICS;
VOLTAGE, 250VDC OR AC (PEAK) MAX.
CURRENT, 190mA MAX.

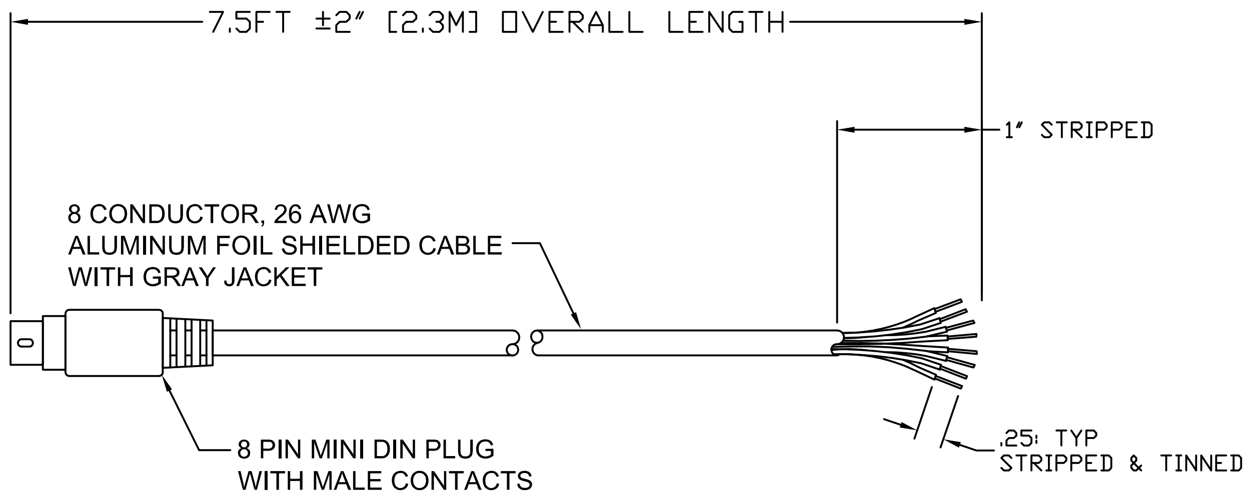
UNIT POWER	ALARM CONDITION	ALARM RELAY CONNECTION	
		LEVEL	FLOW
ON	ALARM	OPEN	OPEN
ON	NO ALARM	CLOSED	CLOSED
OFF		OPEN	OPEN

OUTPUT CONNECTIONS FOR MODEL SERIES 2x200-LD

APPLIES TO MONITORS BUILT AFTER SEPT. 2013 WITH P.C. BOARD No. 400AC.MB.R1

FIGURE 3
OUTPUT CONNECTIONS
MODEL 2x200-LD

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	RELEASED FOR PRODUCTION	DW	01-11-10



J2 OUTPUT CONNECTOR
8 PIN MINI DIN PLUG

Function	Pin	Wire color
LOW FLOW ALARM RELAY	1	BLUE
LEVEL ALARM RELAY	2	GREEN
COMMON	3	VIOLET
LOW FLOW ALARM RELAY	4	WHITE
ANALOG SIGNAL OUTPUT	5	ORANGE
NO FUNCTION	6	YELLOW
LEVEL ALARM RELAY	7	BROWN
NO FUNCTION	8	RED

NOTE: THE SHIELD IS CONNECTED TO COMMON WHEN THE CABLE IS ATTACHED TO THE J2 RECEPTACLE

STANDARD J2 OUTPUT CABLE
FOR ACCESS TO ALL CONNECTIONS
MODEL 400SBDγC

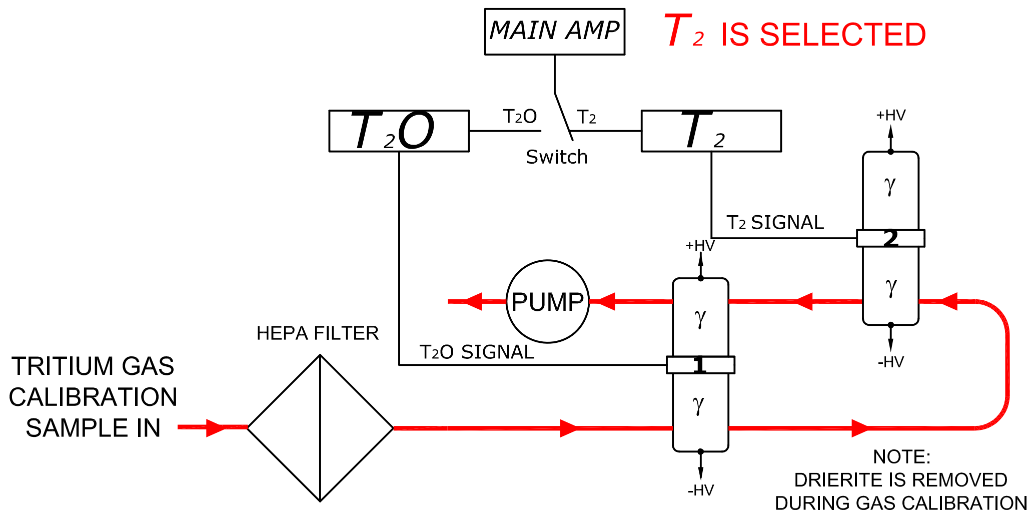
NOTE: THIS CABLE IS MADE FROM L-COM PART No. DK238MM

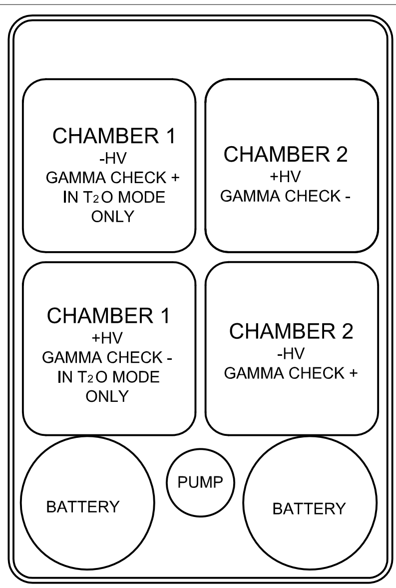
OVERHOFF TECHNOLOGY CORPORATION
MILFORD, OHIO 45150 U.S.A.

J2 CABLE FOR STANDARD OUTPUT CONNECTIONS ON MODELS 400SBDγC

DRAWN	DATE	SIZE	FILE NAME	DWG NO.	REV
D.WILLIAMSON	01-11-10	A	J2-400.DWG	J2-STD-400-L-COM	0
APPROVED	DATE	SCALE .66		SHEET 1 OF 1	
D.WILLIAMSON	01-11-10				

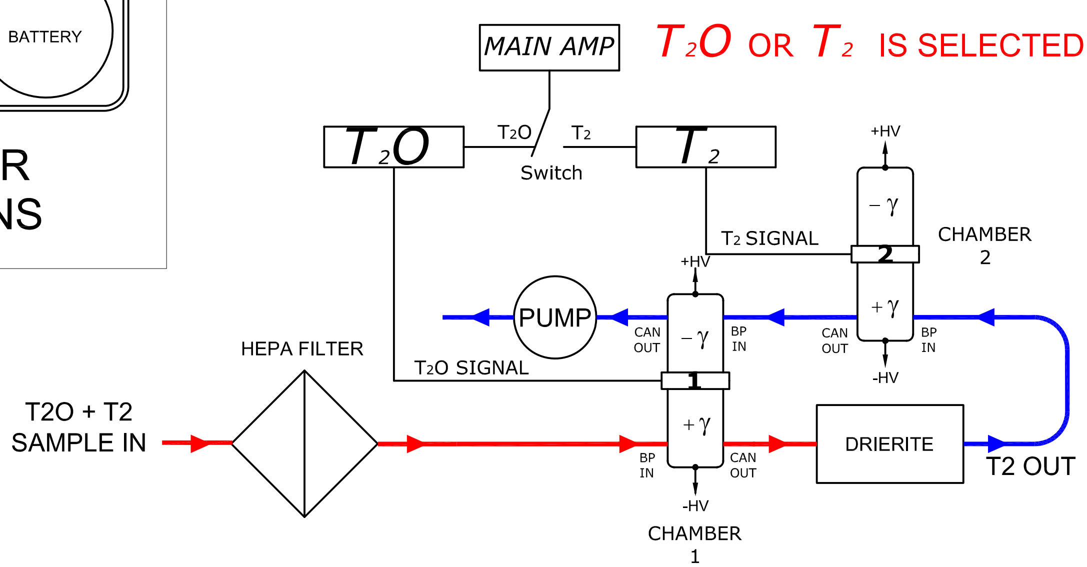
MODEL 2x200
CONFIGURED TO MEASURE TOTAL TRITIUM DURING GAS CALIBRATION



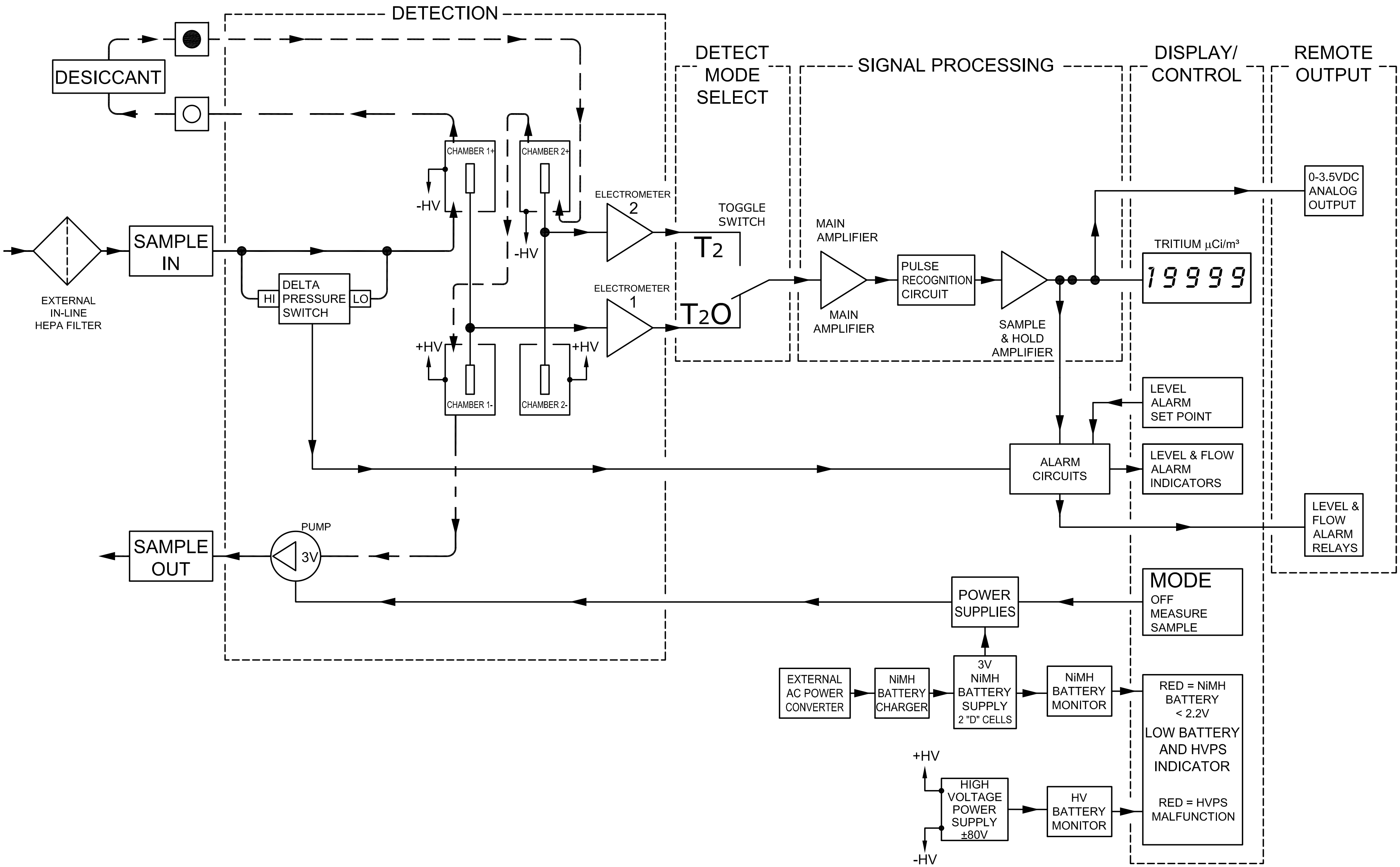


CHAMBER POSITIONS

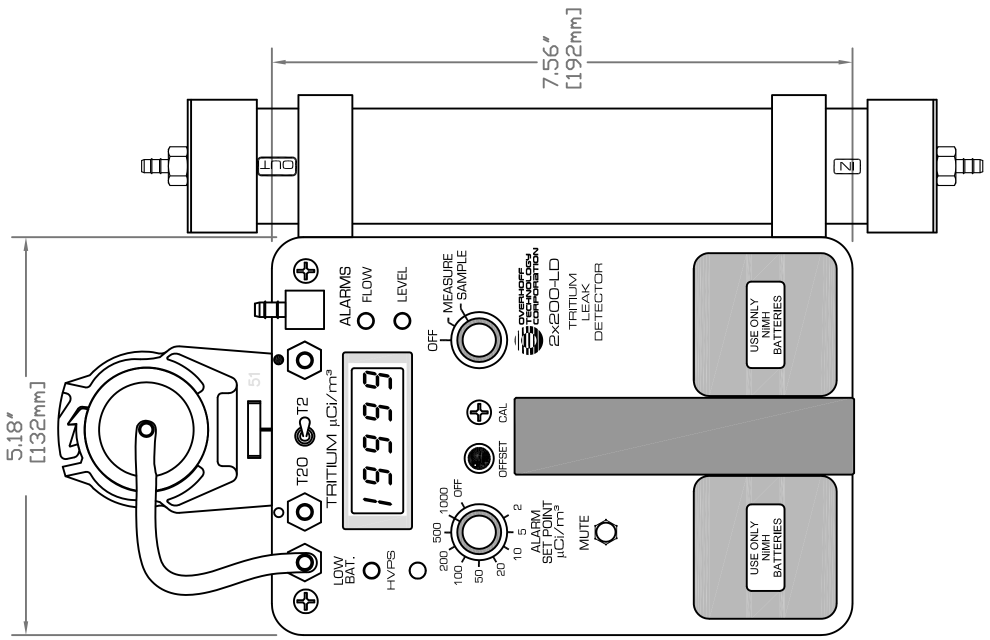
MODEL 2x200
CONFIGURED FOR NORMAL, DUAL MODE OPERATION



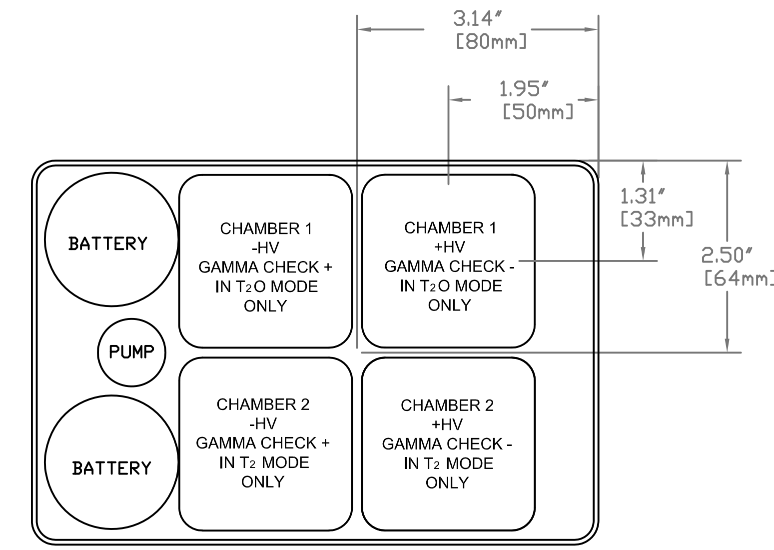
OVERHOFF
TECHNOLOGY
CORPORATION



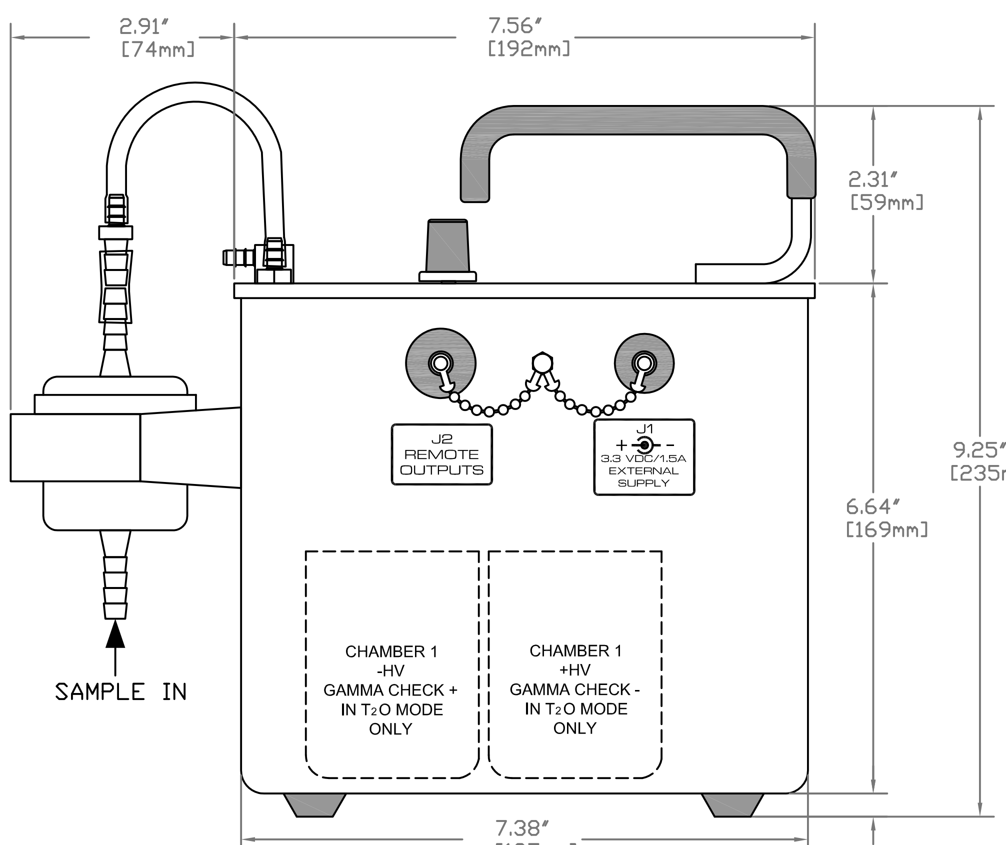
OVERHOFF TECHNOLOGY CORPORATION



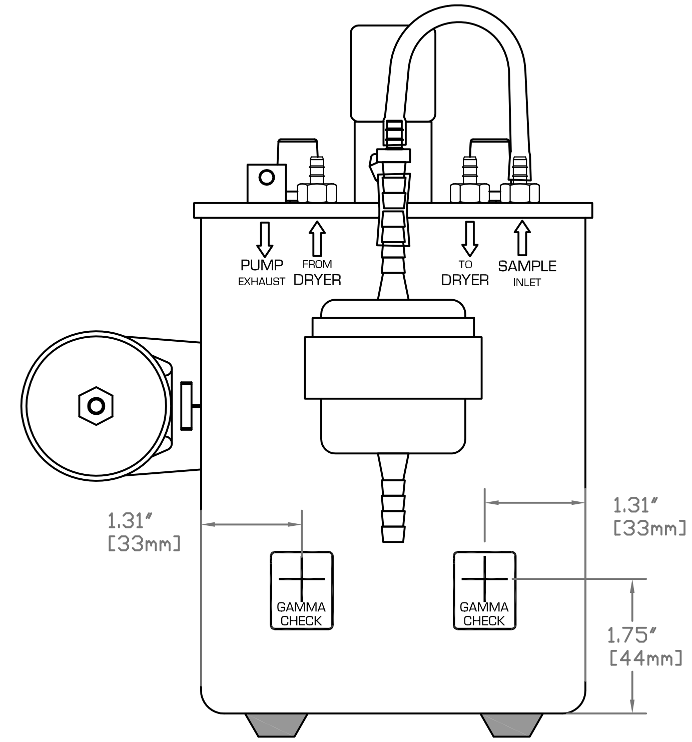
TOP VIEW
FRONT PANEL



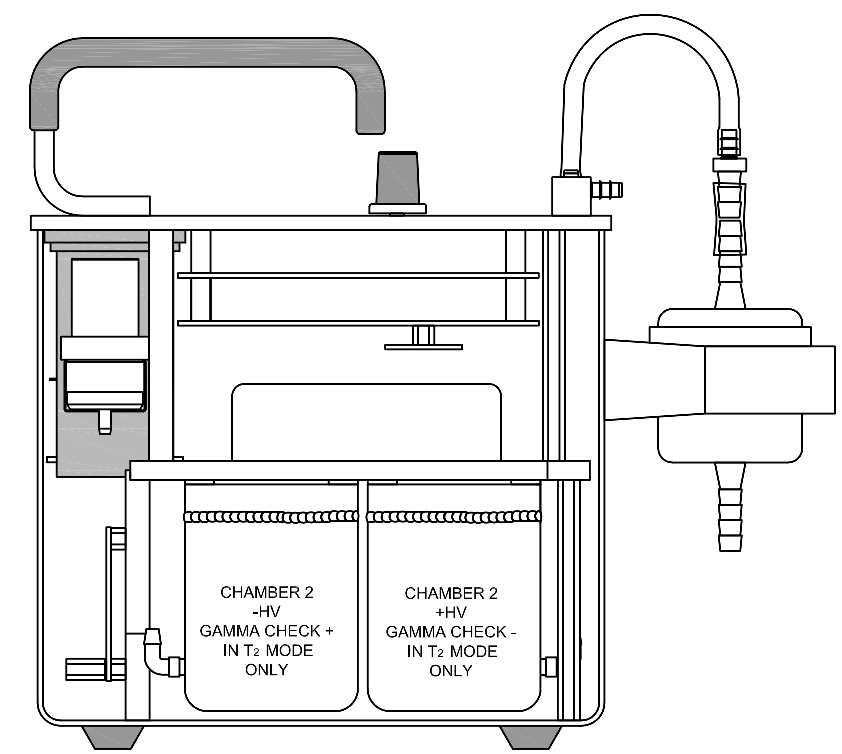
TOP VIEW
CHAMBER POSITIONS



LEFT SIDE



FRONT SIDE VIEW
GAMMA CHECK POSITIONS



SECTION VIEW
RIGHT SIDE

NOTES:

1. DIMENSIONS: INCHES[MM], FOR REFERENCE ONLY
2. WEIGHT: 6 LBS. (2.7KG)
3. MODEL 2x200-LD, DWG NO.1021485, DESCRIPTION: PORTABLE LEAK DETECTOR WITH TWO SETS OF DUAL CHAMBERS (GAMMA COMPENSATED), 200 cm³ (NOMINAL VOLUME)
   MEASUREMENT RANGE: 5 - 19999 μCi/m³
   DISPLAY: 4½ DIGIT LCD INDICATES 1 - 19999 μCi/m³
4. INCLUDES THESE FEATURES:
   a. J2 Connector Receptacle with Remote Outputs
   b. Electronic High Voltage Power Supplies
   c. Pump Control Circuit Board
   d. Rechargeable NiMH Battery
   e. Adsorption Column

REVISIONS

REV	DESCRIPTION	DATE	APPD
1	UPDATES FOR WO 4075 CHAMBER POSITIONS RE-IDENTIFIED. MODEL DESCRIPTION CLARIFIED.	12-23-19	DW

MODEL 2X200-LD
PORTABLE TRITIUM MONITOR
LEAK DETECTOR

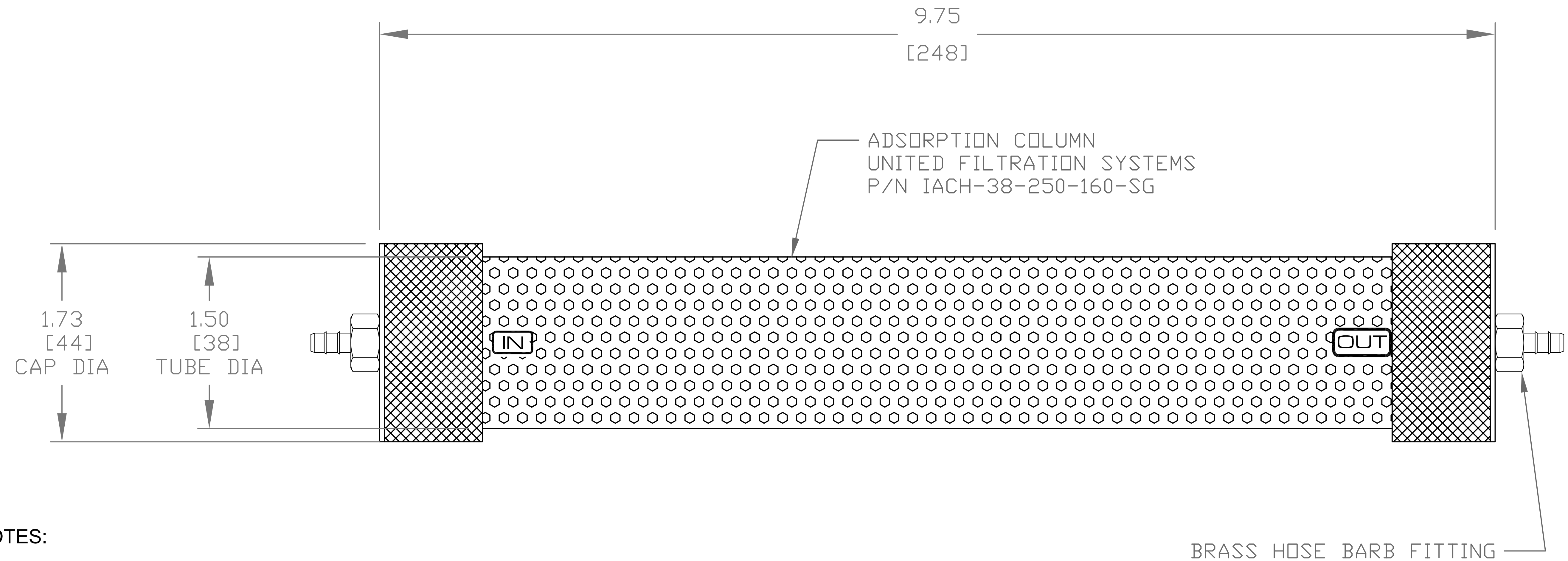
OVERHOFF TECHNOLOGY CORPORATION

MILFORD, OHIO 45150 U.S.A.

TRITIUM MONITOR MODEL 2X200-LD
GENERAL ARRANGEMENT

DRAWN	DATE	SIZE	FILE NAME	DWG NO.	REV
J. CREECH	10-29-18	B	1021485-4075-1.DWG	1021485	1
APPROVED	DATE	SCALE 0.4		SHEET 1 OF 1	
D. WILLIAMSON	10-29-18				

REVISIONS			
REV	DESCRIPTION	DATE	APPD
–	–	–	–



NOTES:

1. Dimensions: Inches[mm], FOR REFERENCE ONLY
2. Internal volume: 160 ml approx.
3. Weight: 0.9 lbs. (0.4 kg)
4. Overhoff re-order Part No.1021495,
   Description: Adsorption (Desiccant) Column
5. Materials of construction:
   a. Tube: Acrylic Plastic
   b. End Caps: Acrylic Plastic
   c. Spring and Perforated Disc: Stainless Steel
   d: Filter Pad: Felt, 5 micron
   e. Hose barb fitting: Brass, ¼ NPT, 0.125" ID tubing
6. Adsorbent: Desiccant, Silica Gel
   Bead size: 3 - 5 mm
   Color change: blue to pink

MODEL 2X200-LD PORTABLE TRITIUM MONITOR LEAK DETECTOR		**OVERHOFF TECHNOLOGY CORPORATION** MILFORD, OHIO 45150 U.S.A.			
		ADSORPTION COLUMN FOR PORTABLE TRITIUM LEAK DECTECTOR MODEL 2X200-LD			
DRAWN J. CREECH	DATE 03-18-19	SIZE B	FILE NAME 1021495-4075-1.DWG	DWG NO. 1021495	REV 0
APPROVED D. WILLIAMSON	DATE 03-18-19	SCALE 1:1		SHEET 1 OF 1	