Critical Environment Technologies™

Operation Manual

2018.05

Calibration Kit for Fixed Systems

www.critical-environment.com

STANDARD CALIBRATION KIT CONTENTS

P/N: CET-715A-CK1

#	Description	Part Number
①	Regulator for fixed flow @0.5 LPM for 34 L, 58 L, 74 L and 100 L cylinders	**REG-0715-CR2**
②	Teflon lined tube (2 ft / 61 cm, 3/16" ID, 5/16" OD) for calibrating sticky gases	**CET-8000-CTFT**
③	One length (2 ft / 61 cm, 3/16" ID, 5/16" OD) of standard tubing, comes attached to calibration adapter plug when the Calibration Kit is purchased	**CET-8000-CKFT**
③	Calibration adapter plug with O-ring and two zeroing port plugs (adapter plug fits industry standard internal sensor vents), comes attached to standard tubing when the Calibration Kit is purchased	**CET-7000-CAP**
④	Potentiometer screwdriver with an inset and protruding end for adjusting resistors	**CET-8000-PAS**
⑤	Magnetic wand for non-intrusive calibration (2 5/8" x 1/4" hexagon)	**CET-MW**
⑥	Brass fitting to convert fixed flow regulator for use on 15 L and 17 L cylinders	**REG-ADAPTER**
⑦	Calibration adapter cup for ESH remote sensor (dongle style), comes attached to standard tubing when the Calibration Kit is purchased	**CET-8000-ESH**
⑧	Sensor extracting tool for replacing used catalytic and solid state refrigerant sensors	**CET-8000-SRT**
⑨	Spare humidification sponge	**CET-8000-HCS**
⑩	Hard plastic, durable carrying case	**CET-715A-CK1**
⑪	Humidification chamber for calibrating solid state refrigerant sensors, comes attached to standard tubing when the Calibration Kit is purchased	**CET-8000-HC**
⑫	Cal Clip for hands free use when calibrating devices with a splash guard	**CET-SGC**

NOTE: The Calibration Kit is NOT suitable for use with our YES product line.

ITEMS REQUIRED TO CALIBRATE A STANDARD GAS DETECTOR USING A 34L, 58L, 78L OR 100L CYLINDER OF GAS:

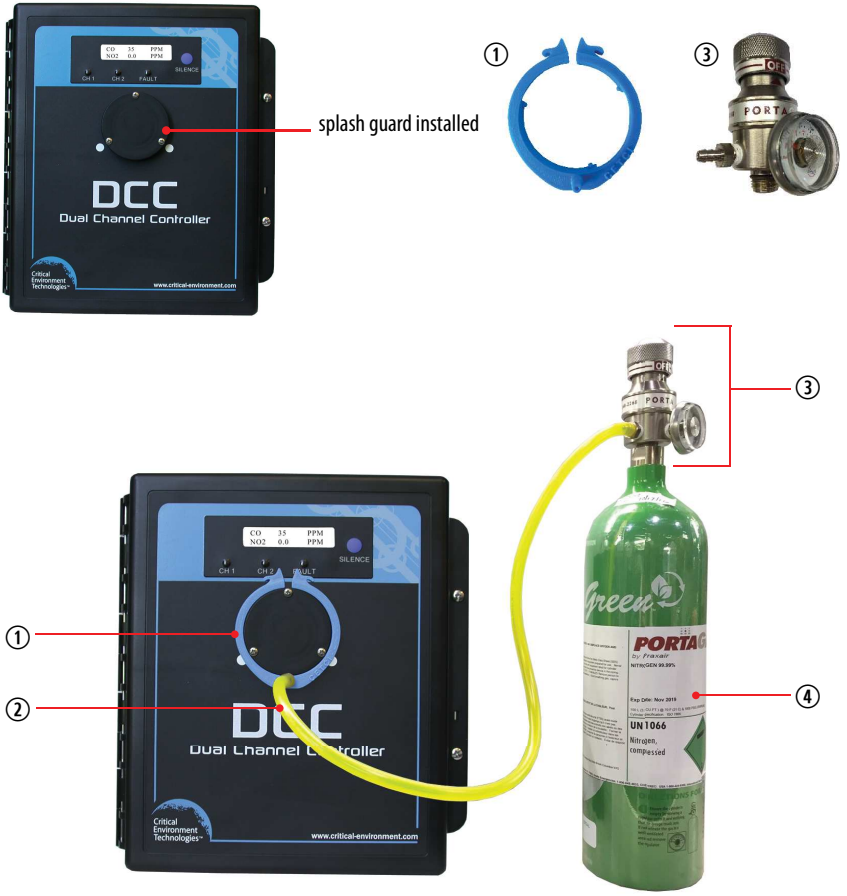
NUMBER	FUNCTION
①	Grey calibration adapter plug with o-ring and two zeroing port nozzles. Fits industry standard internal sensor vent openings.
②	Standard tubing (approx 61 cm / 2 ft long) attached to calibration adapter plug and regulator.
③	Regulator for fixed flow @0.5 LPM. Fits 34 L, 58 L, 74 L, and 100 L cylinders
④	Span Gas / Zero Gas cylinder, with air balance or nitrogen balance (electrochemical sensors), with air balance only (catalytic sensors)

ITEMS REQUIRED TO CALIBRATE A STANDARD GAS DETECTOR USING A 15L OR 17L CYLINDER OF GAS:

If there is a splash guard installed use the blue calibration adapter clip instead of the grey calibration adapter plug

NUMBER	FUNCTION
①	Grey calibration adapter plug with o-ring and two zeroing port nozzles. Fits industry standard internal sensor vent openings. Or, Cal Clip for calibrating with splash guard.
②	Standard tubing (approx 61 cm / 2 ft long) attached to calibration adapter plug and regulator
③	Regulator for fixed flow @0.5 LPM. Fits 34 L, 58 L, 74 L, and 100 L cylinders
④	Brass fitting to convert fixed flow regulator to attach to 15L and 17 L gas cylinders
⑤	Span Gas / Zero Gas cylinder, Electrochemical sensors require span gas with air balance or nitrogen balance. Catalytic sensors require span gas with air balance.

ITEMS REQUIRED TO CALIBRATE A GAS DETECTOR WITH A SPLASH GUARD USING A 34L, 58L, 78L OR 100L CYLINDER OF GAS:



NUMBER	FUNCTION
①	Cal Clip for calibrating with splash guard
②	Standard tubing (approx 61 cm / 2 ft long) attached to calibration clip and regulator
③	Regulator for fixed flow @0.5 LPM. Fits 34 L, 58 L, 74 L, and 100 L cylinders
④	Span Gas / Zero Gas cylinder, Electrochemical sensors require span gas with air balance or nitrogen balance. Catalytic sensors require span gas with air balance.

INSTRUCTIONS

NOTE: For complete instructions on the calibration procedure of CETCI's gas detectors, please refer to the specific product Operation Manual.

A bump test will help you determine if a sensor requires calibration. If the sensor still does not respond as it should after a successful calibration, it probably requires replacing.

Temperature affects calibration. It is important to ensure the gas is at the appropriate temperature during calibration. If the sensor is being used in an extreme temperature range, calibration should be done in that same temperature range.

When you replace a sensor in the field, it needs to be calibrated. Install the replacement sensor and let the it stablize for a minimum of 3 - 6 hours before calibrating. Catalytic, solid state, PID, infrared and electrochemical Ammonia, Ozone and Chlorine sensors take a long time to stabilize. Most electrochemical sensors take a shorter time to stabilize.

Regulators & Flow

Calibration gases that are lighter than (NH_3, H_2, CH_4 etc.) or the same weight as air (CO, O_2, NO, C_2H_4, etc.) should be flowed at 0.5 LPM. Gases heavier than air (NO_2, O_3, CL_2, C_3H_8, refrigerants, SO_2, F_2, etc.) should be flowed between 0.5 and 1.0 LPM. Fixed flow regulators provide more accuracy.

Calibration Adapters

The proper calibration adapter should be utilized to allow the gas to properly diffuse around the sensor. Refer to the chart on page 2, numbers ③ (standard adapter), ⑦ (dongle style remote sensor adapter) ⑫ (Cal Clip splash guard adapter).

Humidification Chamber

For solid state refrigerant and TVOC sensors, an inline humidifier is required for all operations with bottled gas (bump test, zero and span). Flowing dry gas over solid state refrigerant sensors can result in a negative reaction and inaccurate readings.

Catalytic, Electrochemical, Infrared and PID Sensors

Do not use the humidification chamber when calibrating catalytic, electrochemical, IR or PID sensors. Before flowing zero air and span gas, either remove the sponge from the humidification chamber (⑨) or use the tubing without the attached humidification chamber (③).

Catalytic sensors require oxygen to work and thus the user MUST flow clean air or oxygen to obtain a true zero and the span gas must have "air" balance, not N_2 balance.

If calibrating an infrared Carbon Dioxide CO_2 sensor, it must be zeroed with 100% Nitrogen (N_2). All other infrared sensors for combustibles and refrigerants, along with PIDs should be zeroed with air.

Sticky Gases

Ozone (O_3), Chlorine (Cl_2), Hydrogen Chloride (HCl), Ammonia (NH_3) and Nitrogen Dioxide (NO_2) are considered to be sticky gases, which means they adhere to surfaces. When calibrating these gases, use the Teflon lined tubing (②)so the gas doesn't saturate and adhere to the tubing, weakening the concentration of the flow of gas. Also, keep the length of the Teflon tubing to no more than 2 - 3 ft so the gas flow concentration doesn't lessen over the distance from the gas cylinder to the sensor.

ITEMS REQUIRED TO CALIBRATE A GAS DETECTOR WITH A STICKY GAS (CL_2 HCl, OR O_3) SENSOR USING A 34L, 58L, 78L OR 100L CYLINDER OF GAS:

When calibrating sticky gases use Teflon tubing (no more than 91 cm / 3 ft in length) so the gas doesn't saturate and adhere to the tubing, weakening the concentration of the flow of gas and causing an inaccurate calibration.

NUMBER	FUNCTION
①	Grey calibration adapter plug. Fits industry standard internal sensor vent openings.
②	Teflon lined, special non-absorbent tubing (approx 61 cm / 2 ft long) attached to the grey calibration adapter plug and regulator

③	Regulator for fixed flow @0.5 LPM. Fits 34 L, 58 L, 74 L, and 100 L cylinders
④	Span Gas / Zero Gas cylinder, Electrochemical sensors require span gas with air balance or nitrogen balance.

NOTE: For accurate calibration of Chlorine sensors, use a Chlorine gas generator such as the GENIE-EC and for Ozone sensors, use the GENIE-03. Cylinders of these types of gases can be unstable and difficult to get accurate readings from as a calibration gas source.

NOTE: CETCI does not use or sell cylinders of Chlorine gas due to the instability of the gas and the difficulty to get accurate readings from that source. We recommend that you use a Chlorine gas generator. Contact CETCI or your Regional Sales Manager for more information.

NOTE: After a substantial warm up period, an Ethylene Oxide sensor should be zeroed on site if the ambient temperature is above 22°C (71.6°F). This particular sensor has a drift factor that can be as much as 1 ppm if the temperature rises to 25°C (77°F). With the low set point you could experience false alarms.

NOTE: During calibration, when flowing span gas on an Ammonia sensor, if the reading climbs higher than the calibration point after applying gas for 3 minutes, use that reading as the calibration point. It should be around 300 ppm.

Oxygen Sensors

When calibrating an Oxygen sensor, the process is reversed. You need to do the span first and then the zero.

Flow Nitrogen (N_2) over Oxygen (O_2) sensors before attempting to null adjust them. If the service person is confident of air quality and is careful (do not exhale in the direction of the Oxygen sensor being serviced while span adjusting), oxygen in the breathing environment can be used as a fairly accurate source of span gas (20.9% volume) "in a pinch". It is not recommended to use this procedure for all span adjustments of Oxygen sensors.

Solid State Refrigerant and TVOCs Sensors

Solid-state sensors require oxygen to work and thus the user MUST flow clean air or oxygen to obtain a true zero and the span gas must have "air" balance, not N_2 balance.

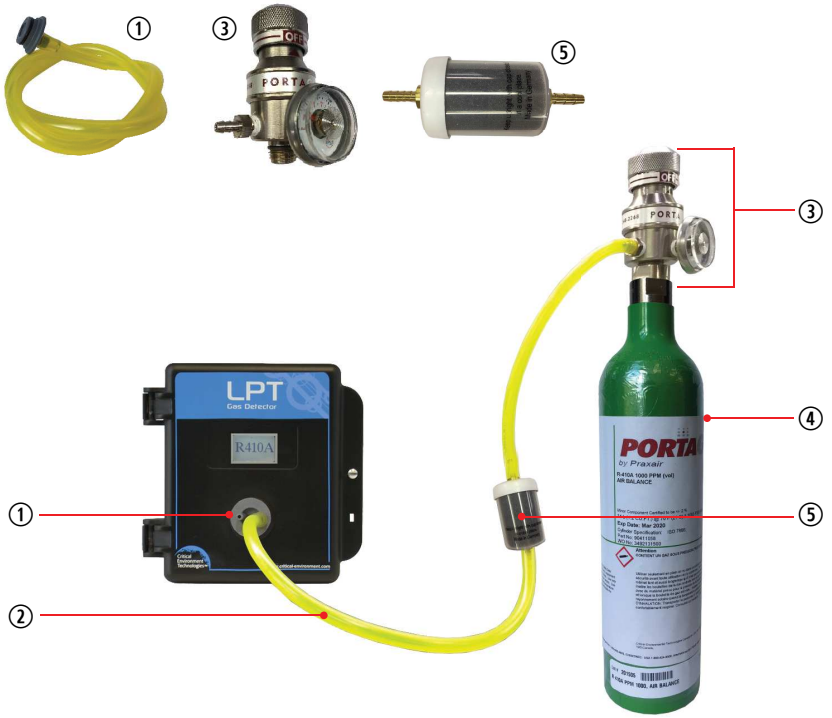
Flowing dry gas over solid state refrigerant sensors can result in a negative reaction and inaccurate readings. Using a humidification chamber increases the humidity and recreates a real-world environment for the sensor. Wet the sponge with water and gently squeeze out the excess. It should be quite damp before reinserting it into the humidification chamber (⑨).

Thread the cylinder regulator (①) onto the cylinder of zero air or span gas, being careful not to cross thread it. Do not over tighten. If the gas cylinder is the 15 or 17 liter size, apply a little Teflon tape to the threads of the brass fitting (⑥) and thread the fitting onto the cylinder regulator (①). Open the valve of the cylinder regulator by pushing down and turning less than half a turn; zero air or span gas will start flowing automatically at approximately 0.5 LPM.

Start flow of zero air approximately 1-minute prior to making zero adjustment of circuit allowing sensor to stabilize. Start flow of span gas at least 2-minutes prior to making span adjustment of circuit. When calibration is complete, remove cylinder regulator from cylinder. If using the humidification chamber, remove the sponge and allow it dry out.

For an R11 refrigerant sensor, allow 30 minutes after calibration before considering the readings valid. The sensor's response to R11 refrigerant and to humidity levels can affect the readings and can take up to 30 minutes after calibration to recover and stabilize.

ITEMS REQUIRED TO CALIBRATE A GAS DETECTOR WITH A SOLID STATE REFRIGERANT OR TVOC SENSOR USING A 34L, 58L, 78L OR 100L CYLINDER OF GAS:



NUMBER	FUNCTION
①	Grey calibration adapter plug with o-ring and two zeroing port nozzles. Fits industry standard internal sensor vent openings.
②	Standard tubing (approx 61 cm / 2 ft long) attached to calibration adapter plug and humidfier
③	Regulator for fixed flow @0.5 LPM. Fits 34 L, 58 L, 74 L, and 100 L cylinders
④	Span Gas / Zero Gas cylinder, with air balance ONLY (nitrogen balance could cause a negative sensor response)
⑤	Humidification chamber with sponge for calibrating solid state refrigerant and TVOC sensors

Flowing dry gas over solid state sensors can result in a negative reaction and inaccurate readings. Use the humidification chamber to increase the humidity and recreate a real-world environment for the sensor. Wet the sponge with water and gently squeeze out the excess. It should be quite damp before reinserting it into the humidification chamber. Remember to remove and dry out the sponge after use.

CALIBRATION GASES

Gas Cylinders

CETCI offers a range of gas types and concentrations in 17 L, 58 L and 100 L size cylinders. Cylinders of zero air and / or span gas must be ordered separately. They are not included in the Calibration Kit. Contact CETCI or your Regional Sales Manager for more information on the available types of gas cylinders. **Gas cylinders cannot be shipped from Canada to other countries, including the USA**.

GENie Calibration Gas System

The GENie Calibration Systems are an alternative to calibration gas cylinders, offering a family of integrateable and expandable calibration gas instruments that will generate a variety of gases from one modular instrument.

Features:

» Hand-held and easy to transport
» User adjustable gas concentration created on demand
» Long lasting gas sources
» Traceable to NIST standards
» Non-hazardous for shipping

GENie-EC Electrochemical Calibration Gas System for calibrating Chlorine, Chlorine Dioxide, Hydrogen, Hydrogen Sulphide and Hydrogen Cyanide sensors.
http://www.critical-environment.com/products/genie-ec.html

GENie-O3 Ozone Calibration Gas System for calibration Ozone sensors.
http://www.critical-environment.com/products/genie-o3.html

GENie-NH3 Ammonia Calibration Gas System for calibration Ammonia
http://www.critical-environment.com/products/genie-nh3.html

TROUBLESHOOTING

If you require a Sample Draw Regulator or if you require more information or clarification regarding the calibration procedure or required tools, please contact your Regional Sales Manager or CETCI head office for more information.

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