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LPT Low Power Transmitter *(Electrochemical Sensor)*

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1 POLICIES

1.1 Important Note

Read and understand this manual prior to using this instrument. Carefully read the warranty policy, service policy, notices, disclaimers and revisions on the following pages.

This product must be installed by a qualified electrician or trained technician and according to instructions indicated in this manual. This instrument should be inspected and calibrated regularly by a qualified and trained technician. For more information, refer to sections *10 Maintenance* and *8 Calibration* of this manual.

This instrument has not been designed to be intrinsically safe. For your safety, **do not** use it in classified hazardous areas (explosion-rated environments).

INSTRUMENT SERIAL NUMBER:

PURCHASE DATE:

PURCHASED FROM:

1.2 Warranty Policy

- Disconnect power before servicing
- Supply: 24 V

Critical Environment Technologies Canada Inc. (CETCI), also referred to as the manufacturer, warrants this instrument to be free from defects in materials and workmanship for a period of two **(2) years from the date of purchase.**

Individual sensor elements have different warranties. Please check with the manufacturer for specific sensor warranty.

The warranty status may be affected if the instrument has not been maintained and calibrated as per the instructions indicated in this manual or has been abused or damaged in any way. The manufacturer is not liable for auxiliary interfaced equipment or consequential damage. This instrument is only to be used for purposes stated herein.

Warranty does not include third party trouble-shooting costs or freight to / from the manufacturer's facility. CETCI's liability is limited to replacement or repair of the equipment manufactured.

Due to ongoing research, development and product testing, the manufacturer reserves the right to change specifications without notice. The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of this data.

All goods must be shipped to the manufacturer by prepaid freight. All returned goods must be pre-authorized by obtaining a return merchandise authorization (RMA) number. Contact the manufacturer for a number and procedures required for product transport.

1.3 Service Policy

CETCI maintains an instrument service facility at the factory. Some CETCI distributors / agents may also have repair facilities; however, CETCI assumes no liability for service performed by anyone other than CETCI personnel.

Repairs are warranted for 90 days after date of shipment (sensors have individual warranties).

Should your instrument require non-warranty repair, you may contact the distributor from whom it was purchased or you may contact CETCI directly.

Prior to shipping equipment to CETCI, contact our office for an RMA #. All returned goods must be accompanied with an RMA number.

If CETCI is to do the repair work, you may send the instrument, prepaid, to:

Attention: Service Department
Critical Environment Technologies Canada Inc.
Unit 145, 7391 Vantage Way
Delta, BC, V4G 1M3

Always include your Returned Merchandise Authorization (RMA) number, address, telephone number, contact name, shipping / billing information, and a description of the defect as you perceive it. You will be contacted with a cost estimate for expected repairs, prior to the performance of any service work.

For liability reasons, CETCI has a policy of performing all needed repairs to restore the instrument to full operating condition.

Pack the equipment well (in its original packing if possible), as we cannot be held responsible for any damage incurred during shipping to our facility.

1.4 Copyrights

This manual is subject to copyright protection; all rights are reserved. Under international and domestic copyright laws, this manual may not be copied or translated, in whole or in part, in any manner or format, without the written permission of CETCI.

1.5 Disclaimer

Under no circumstances will CETCI be liable for any claims, losses or damages resulting from or arising out of the repair or modification of this equipment by a party other than CETCI service technicians, or by operation or use of the equipment other than in accordance with the printed instructions contained within this manual or if the equipment has been improperly maintained or subjected to neglect or accident. Any of the forgoing will void the warranty.

Under most local electrical codes, low voltage wires cannot be run within the same conduit as line voltage wires. It is CETCI policy that all wiring of our products meet this requirement.

It is CETCI policy that all wiring be within properly grounded (earth or safety) conduit.

1.6 Revisions

This manual was written and published by CETCI. The manufacturer makes no warranty or representation, expressed or implied including any warranty of merchantability or fitness for purpose, with respect to this manual.

All information contained in this manual is believed to be true and accurate at the time of printing. However, as part of its continuing efforts to improve its products and their documentation, the manufacturer reserves the right to make changes at any time without notice. Revised copies of this manual can be obtained by contacting CETCI or visiting www.critical-environment.com.

Should you detect any error or omission in this manual, please contact CETCI at the following address:

Critical Environment Technologies Canada Inc.

Unit 145, 7391 Vantage Way, Delta, BC, V4G 1M3, Canada

Toll Free: +1.877.940.8741

Telephone: +1.604.940.8741

Fax: +1.604.940.8745

Email: marketing@cetci.com

Website: www.critical-environment.com

In no event will CETCI, its officers or employees be liable for any direct, special, incidental or consequential damages resulting from any defect in any manual, even if advised of the possibility of such damages.

2 INTRODUCTION

2.1 General Description

Thank you for purchasing our single sensor, analog LPT Low Power Transmitter.

The LPT transmitters are rugged, user-friendly analog gas detection transmitter for use in non-hazardous (non-explosion rated) environments such as, vehicle exhaust type applications, commercial HVAC and light industrial applications.

A standard transmitter features a green colored LED indicating light for power and fault condition (refer to section 3.1 *Technical Specifications*), an analog output signal and a standard water / dust tight enclosure.

Either carbon monoxide (CO) and nitrogen dioxide (NO₂) electrochemical sensors are available for use with this gas detector which operates by diffusion. The sensors used in this device are accurate enough to measure to Occupational Health & Safety (OHS) hazardous levels for toxic gases.

If after reading through the manual, you have any questions, please do not hesitate to contact our service department for technical support.

2.2 Key Features

- 2-wire loop, 3-wire VDC or 4-wire VAC power
- Linear 4 - 20 mA output signal
- Standard water / dust tight enclosure (drip proof)
For splash or hosedown applications, add splash guard
- Single sensor: carbon monoxide (CO) or nitrogen dioxide (NO₂)
- RoHS compliant circuit boards
- Easy maintenance
- Economical
- Includes sensor CEF (calibration extending firmware)
- Auto resetting fuse
- Automated calibration procedure

3 INSTRUMENT SPECIFICATIONS

3.1 Technical Specifications

GAS TYPE

Carbon Monoxide (CO)

Nitrogen Dioxide (NO₂)

MECHANICAL

Enclosure ABS / Polycarbonate

Weight 400 g (14 oz)

Size 5.0" x 5.0" x 1.91" (127 mm x 127 mm x 48 mm)

ELECTRICAL

Power Requirement

2-wire mode 12 – 30 VDC, 1 Watt

3-wire mode 12 – 30 VDC, 1 Watt

4-wire mode 12 – 27 VAC, 1 VA

Use Class 2 transformer. See pages 22-23.

Current Draw Maximum 25 mA

Outputs Linear 4 - 20 mA
Maximum 216 Ω load (wiring plus termination resistor) at 16 VDC
Maximum 316 Ω load (wiring plus termination resistor) at 12 VAC

Wiring	VDC two or three conductor shielded 18 awg (or larger) stranded within conduit VAC four conductor shielded 18 awg (or larger) stranded within conduit (refer to Section 6.3.2 <i>Wire Gauge vs. Run Length</i>)
Fuse	Automatic resetting thermal
Indicator	Solid Green: Power ON Flashing Green (50% duty cycle): Warm up Flashing Green (short OFF, long ON): Fault mode LED OFF: No Power or 4-20 mA "Open Loop" (unit won't operate)

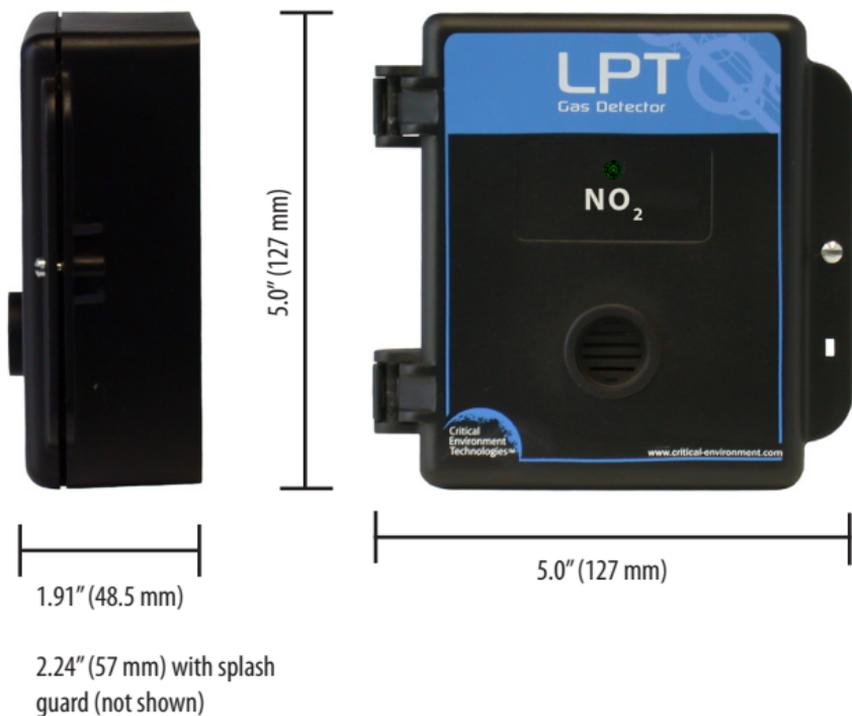
ENVIRONMENTAL (*sensor dependant*)

Operating Temperature	-20°C to 40°C (-4°F to 104°F)
Operating Humidity	15 - 90% RH non-condensing

CERTIFICATION

CE	EMC - EN 50270 : 2006
CSA & UL	C22.2 No.205 - M1983 (R2009) / UL 508 (Edition 17) : 2007

3.2 Standard Enclosure Dimensions



4 SENSOR SPECIFICATIONS

4.1 Sensor Specifications

Carbon Monoxide (CO)

Type	Electrochemical
Range	0 - 200 ppm
Sensor Response Time (T_{90})	60 seconds
Operating Temperature	-10°C to 60°C (14°F to 140°F)
Operating Humidity	5 – 95% RH non-condensing
Operating Pressure	N/A
Repeatability	< 2% of signal
Maximum Zero Shift	N/A
Clean Air Output Drift	< 10 ppm equivalent per year
Expected Life Span	6 - 7 years in air (under normal conditions)
Calibration	Every 6 months or once a year (depending on application)
Cross Sensitivity	$H_2S @ 20 \text{ ppm} = < 0.1 \text{ ppm}$ $NO_2 @ 10 \text{ ppm} = < 0.1 \text{ ppm}$ $Cl_2 @ 10 \text{ ppm} = < 0.1 \text{ ppm}$ $NO @ 50 \text{ ppm} = < 5 \text{ ppm}$ $SO_2 @ 20 \text{ ppm} = < 0.1 \text{ ppm}$ $H_2 @ 20^\circ C (68^\circ F) @ 400 \text{ ppm} = < 60 \text{ ppm}$ $C_2H_4 @ 400 \text{ ppm} = < 25 \text{ ppm}$ $NH_3 @ 20 \text{ ppm} = < 0.01 \text{ ppm}$

Resolution	0.5 ppm
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Nitrogen Dioxide (NO₂)

Type	Electrochemical
------	-----------------

Range	0 - 10 ppm
-------	------------

Response Time (T ₉₀)	< 30 seconds
----------------------------------	--------------

Operating Temperature	-20°C to 50°C (-4°F to 122°F)
-----------------------	-------------------------------

Operating Humidity	15 – 90% RH non-condensing
--------------------	----------------------------

Operating Pressure	Atmospheric ± 10%
--------------------	-------------------

Resolution	0.02 ppm
------------	----------

Repeatability	< 2% of signal
---------------	----------------

Maximum Zero Shift	± 0.2 ppm equivalent
--------------------	----------------------

Clean Air Output Drift	< 2% signal loss / year
------------------------	-------------------------

Expected Life Span	2 – 3 years in air (under normal conditions)
--------------------	----------------------------------------------

Calibration	Every 6 months or once a year (depending on application)
-------------	----------------------------------------------------------

Cross Sensitivity	H ₂ S @ 20 ppm = < -40 ppm
	Cl ₂ @ 10 ppm = 100 ppm
	NO @ 50 ppm = < 0.5 ppm
	SO ₂ @ 20 ppm = < -2.5 ppm
	CO @ 400 ppm = < 0.1 ppm
	H ₂ @ 400 ppm = < 0.1 ppm
	C ₂ H ₄ @ 50 ppm = < 0.1 ppm
	NH ₃ @ 20 ppm = < 0.1 ppm
	CO ₂ @ 5% volume = < 0.1 ppm

NOTE: Response time will be slower with a splash guard installed.

4.2 Calibration Extending Firmware (CEF) and Sensor Aging

LPT systems with integral electrochemical sensors have been programmed with our CEF (Calibration Extending Firmware). This firmware takes into consideration the aging of the electrochemical CO and NO₂ sensors so that less frequent calibrations are acceptable in non-critical applications such as parking garages. The system tracks the age of the sensor and automatically compensates for the reduced output of the sensor as it ages.

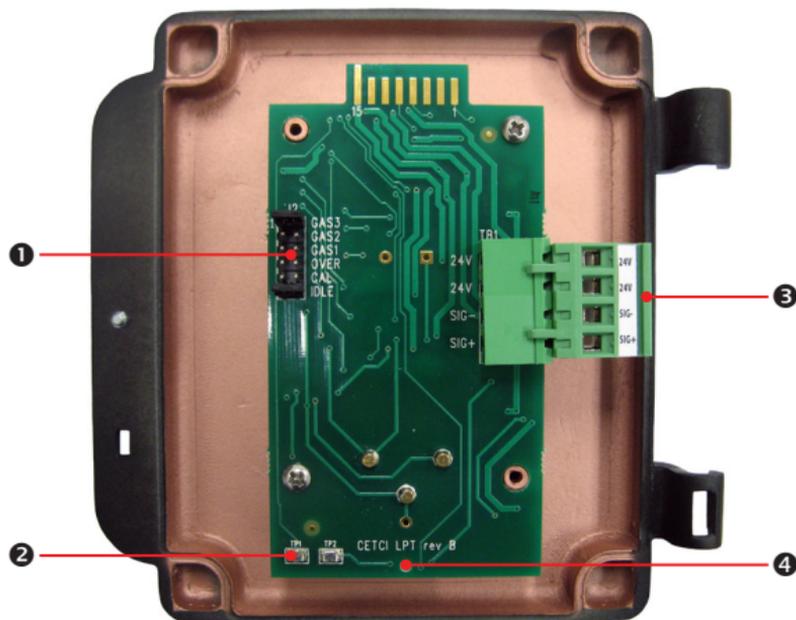
5 FEATURES & FUNCTIONS

5.1 Exterior Enclosure



NUMBER	FEATURE	FUNCTION
1	Door Hinge	Secures door
2	LED Indicator	Indicates Power & Fail
3	Door Screw	Secures door
4	Sensor Opening	To monitor diffused air and gas
5	Padlock Opening	For padlock

5.2 Interior System Layout



NUMBER	FEATURE	FUNCTION
1	Jumpers	For calibrations & test functions
2	Test Points: TP-1 & TP-2	For measuring voltage output
3	Wiring Terminal	Pluggable wiring terminal
4	Internal LED	Calibration status indicator

6 INSTALLATION

The LPT should be installed on a flat vertical surface using the four 0.175" (4.4 mm) diameter mounting holes provided. Care should be taken to ensure that the face of the LPT is not obstructed in order to maximize the sensor's exposure to the environment being monitored.

If LPT is to be installed in a potential "wash down" application or any application whereby liquid could be directed towards the sensor opening, the LPT should be ordered with an attached splash guard.

Two conduit entry points are provided in the ABS / Polycarbonate enclosure. Both are located in the enclosure base. One in the rear of the base and one on the bottom edge of the base. See photos on the following pages.

If used in a wet or wash down application, the conduit hub entering the LPT enclosure must be liquid tight type.

The clearance from the PCA to the base enclosure is 1/2" (12.7 mm). Do not use a conduit connector that has more than 1/2" (12.7 mm) thread.

NOTE: When mounting the enclosure, allow enough room to allow the end user to open the door fully to access the internal adjustments.

The door of the ABS / Polycarbonate enclosure can be removed if absolutely necessary to facilitate installation of the base but it is not recommended on this version. **Extreme care and caution must be exercised when removing the door to avoid damaging the hinges. The door should only be removed when absolutely required.**

Simply grasp the door with one hand, being careful not to make contact with any of the internal components (circuit board), grasp the base with your other hand. Tug on the base and pull straight

apart. **DO NOT TWIST.** The section of the hinges located on the base should “snap” apart from the part of the hinges located on the door.

After installation, simply locate the lid hinges over the installed base hinges and pull toward you. The hinges should easily “snap” back into place.

The ABS / Polycarbonate enclosure has one screw securing the door to the base for electrical safety and provides an opening to allow the user to apply a padlock or tie wrap if they desire the transmitter to be locked. See photo reference on preceding pages.

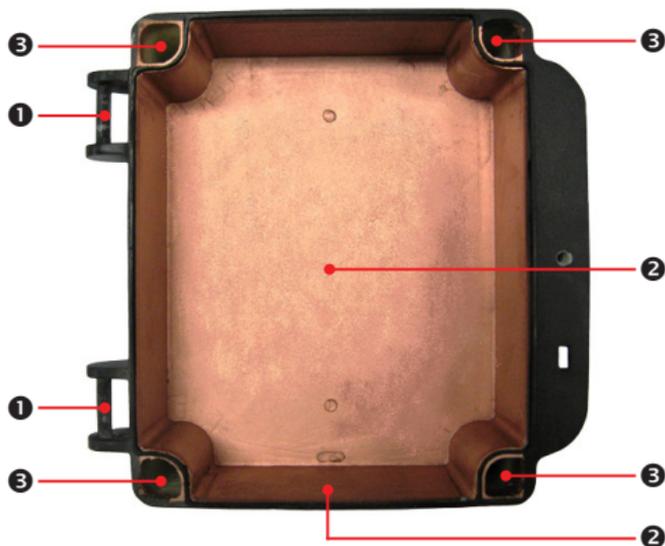
6.1 Sensor Mounting Heights

GAS	APPLICATIONS / TYPES	SUGGESTED MOUNTING HEIGHT
Carbon Monoxide (CO)	Gas engine exhaust	4 - 6 ft from the floor
Nitrogen Dioxide (NO ₂)	Diesel engine exhaust	

NOTE: CETCI considers 4 - 6 ft from the floor as the “Breathing Zone” when it applies to sensors installed for vehicle exhaust applications.

6.2 Enclosure Mounting Components

6.2.1 Enclosure Base



NUMBER	FEATURE
1	Door Hinge
2	Conduit Entry
3	Mounting Holes

6.2.2 Enclosure Bottom



NUMBER	FEATURE
1	Door Hinge
2	Conduit Entry

6.3 Wiring Connections

All wiring should be run within properly grounded (earth or safety) conduit. Signal output and supply should be in shielded cable.

The remote sensor wiring should be done with four conductor shielded 18 awg stranded wire in a separate conduit from all other wiring.

6.3.1 Power & Output Connection

The LPT series analog transmitter is a low voltage powered device. Any application of operating

voltages higher than indicated in the specification may result in damage. Double check wiring connections prior to powering the transmitter. Damage from incorrect wiring connections or from too much voltage applied is not covered under warranty. Refer to *Wiring Examples*.

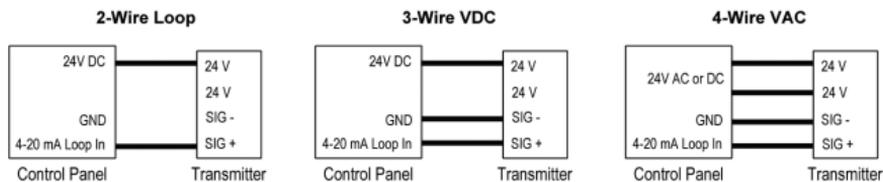
If the installer is powering the LPT with 24 VAC, both VAC wires should be connected to the terminal “one” and terminal “two”, from the top down.

If the installer is powering the LPT with 24 VDC three wire, the “positive” wire should be connected to terminal “one” and the negative wire should be connected to terminal “three”. The “signal” wire is **always** connected to terminal “four”. With 24 VDC two wire the “Positive” wire should be connected to terminal “one” and the “signal” wire is **always** connected to terminal “four.” Refer to *Wiring Examples*.

NOTE: DO NOT USE SOLID-CORE WIRE AT THE WIRING TERMINAL STRIP. The rigidity of solid-core wire can pull a soldered terminal strip completely off a circuit board “this will not be covered under warranty”.

System power: **The main wiring terminal strip on the LPT circuit board can be unplugged for easier wiring installation. Grasp the two sides of the terminal strip and pull sideways.**

Wiring Examples



Device must be used with rated equipment. External power to LPT must be supplied by a Class 2 or better transformer. For loop-powered applications, the controller must conform to CSA, UL & CE safety standards.

6.3.2 Wire Gauge vs Run Length

SUPPLY VOLTAGE	MAXIMUM LOAD (Wire + Termination Resistor) (ohms)	WIRE GAUGE (awg)	MAXIMUM CABLE LENGTH (feet)
24 VDC	592	20	4,400
		18	7,100
		16	10,700
16 VDC	216 (assume a 200 Ω termination resistor)	20	700
		18	1,200
		16	1,800
24 VAC	1,060	20	27,100
		18	43,200
		16	65,500
12 VAC	316 (assume a 200 Ω termination resistor)	20	5,600
		18	8,900
		16	13,583

NOTES: The termination resistor could be as high as 500 Ω (10 volt measurement at 20 mA). A poor quality 24 VAC transformer might supply as little as 14 volts at low line conditions.

Upon application of power, the green LED light indicator will illuminate and will be flashing and the current output is fixed at 4.0 mA for 5 minutes for a system warm up period. After the warm up period, the system may exhibit gas alarm condition if the sensor has not completely stabilized during the warm up period. This is normal and the length of time the gas alarms exist is dependent upon the length of time since the unit was last powered up and the state of the environment it is installed in. After warm up the green power LED illuminates continuously indicating normal operation.

6.3.3 Open Loop

If the 4 - 20 mA signal loop has not been connected properly or has been damaged in some manner between the analog transmitter and the device to which it is sending its signal output, the LPT will not run or function at all. At this point, the wiring should be inspected for potential problems.

7 OPERATION

7.1 System Operation

Normal operation is indicated by a solid light on the external LED.

During normal operation, the gas level will be reported through the current loop, and a rough reading can be obtained from the voltage test points. The LED will remain solid when the device is in working order, and is not affected by gas concentration.

7.2 Fault Detection

The LPT has built in fault detection, and in the event of a problem with the measurement circuitry the transmitter will indicate a fault condition by flashing the external green LED (short OFF and long ON time). At this point, the transmitter will output 20 mA on the current loop. Normal operation will resume once the fault condition has been rectified.

NOTE: While faults in the circuitry can be detected, a dead or damaged sensor will usually appear to the transmitter as a zero gas reading. To ensure safe operation, periodic bump tests are required.

7.3 Test Functions

During warm up and normal operation, the current loop and the voltage output can be tested by using Jumpers on J2 (refer to Section 7.4 *Jumpers*).

Place the first Jumper to set the gas output level (GAS3, GAS2, GAS1), then place the second Jumper to the OVER pins. The current output will match the corresponding span gas level, and will remain at that level for 5 minutes.

After 5 minutes, the unit will return to normal operation. Please return the Jumper placed on the OVER location back to IDLE when testing is completed. (Refer to the table on page 26 for preset gas levels).

Voltage Output to Test Points “TP-1” and “TP-2”:

NOTE: This output is intended as a rough indication of the gas level and has not been precisely calibrated.

Attach the meter leads to the two test points (TP-1 & TP-2) located on the lower left corner on the back of the circuit board. Set the meter to volts DC with one decimal point. The range of 0 - 4.0

VDC is equal to the full measurement range of the sensor. Eg. HVAC CO sensor has a standard measurement range of 0 - 200 ppm. Therefore $4.0 \text{ VDC} = 200 \text{ ppm}$.

7.4 Jumpers

There are two jumpers on J2 located at the back of LPT PCA. These jumpers allow the user to perform a range of set up, test and calibration functions.

The following table details the jumper settings and explains the function enabled when these jumper positions are selected.

FUNCTION DESIRED	J2 JUMPER-1	J2 JUMPER-2
Setting Span Gas Value (CO = 200 ppm, NO ₂ = 10 ppm)	GAS3	IDLE
Setting Span Gas Value (CO = 100 ppm, NO ₂ = 5 ppm)	GAS2	IDLE
Setting Span Gas Value (CO = 50 ppm, NO ₂ = 3 ppm)	GAS1	IDLE
Perform Zero (Null) and Span Calibration	GAS1 or GAS2 or GAS3	CAL
To override the calibration if the zero and span value is over range high or low	OVER	CAL
During warm up and normal mode, check the voltage and current output	GAS1 or GAS2 or GAS3	OVER

GAS1, Gas2 and GAS3 allows setting the calibration gas level. The OVER setting allows overriding the value if out of range during calibration but still at a “reasonable” value.

Jumper-2 allows setting the calibration and checking the voltage and current output.



The three upper jumper's (GAS1-GAS3) allow setting the calibration gas value. The OVER jumper setting allows overriding the value if out of range during calibration but still at a “reasonable” value.

Lower jumper set (CAL). This jumper allows setting the calibration and checking the voltage and current output.

NOTE: In this photo, the upper jumper (Jumper-1) is in the GAS3 position and the lower jumper (Jumper-2) is in the IDLE position. These are the default (factory set) locations.



Test Points: TP-1 & TP-2

7.4.1 Voltage & Gas Concentration Level Reference Table:

SENSOR / GAS	JUMPER-1 SETTING	GAS CONCENTRATION LEVEL	VOLTAGE READING
CO	GAS3	200 ppm	4.00 VDC
	GAS2	100 ppm	2.00 VDC
	GAS1	50 ppm	1.00 VDC
NO ₂	GAS3	10 ppm	4.00 VDC
	GAS2	5 ppm	2.00 VDC
	GAS1	3 ppm	1.20 VDC

8 CALIBRATION

8.1 Calibration Specifications

8.1.1 Gas

Calibration span gases should have at least $\pm 5\%$ accuracy and have a current date stamp. Gas generators should have a current dated cell installed. Service personnel should flow zero emissions air or 20.9% volume O₂ (scrubbed of hydrocarbons) before attempting to null adjust toxic gas sensors. In some cases N₂ can be substituted for zero air. Contact CETCI for clarification.

Every LPT transmitter is calibrated in a chamber by true diffusion method prior to leaving our facility. This method more closely emulates actual "real world" conditions. Field calibration using gas cylinder, regulator and hose directing span gas into the sensor may result in slightly higher readings. It is important to note that the type of gas mixture, how old the gas is and what temperature it has been stored at will also affect repeatability during field calibration.

8.1.2 Regulators & Flow

Calibration gases that are lighter than or the same weight as air (CO, O₂, etc.) should be flowed at 0.5 LPM. Gases heavier than air (NO₂, etc.) should be flowed between 0.5 and 1.0 LPM. Fixed flow regulators provide more accuracy.

8.1.3 Adapters

The proper calibration adapter should be utilized to allow the gas to properly diffuse around the sensor. They are available from CETCI under part number **CET-7000-CAP**.

8.2 Calibrating Sensors

8.2.1 Calibration Frequency

- Parking garage detectors: Once every 12 months
- OHS applications: Once every 6 months (OHS: Occupational Health & Safety)

8.2.2 Gas Testing Frequency (Bump Testing)

For the purpose of safety in OHS applications, sensors should be gas tested (bump tested) once every month to confirm response and alarm activation.

NOTE: A calibration label should be applied after every calibration to confirm work performed and the date it was confirmed. If a controller is involved, the alarm set points should be indicated on a label on the front door of the enclosure so anyone working in the environment can be aware.

Required Equipment: Calibration kit, Calibration gases

Optional: Digital multi-meter

Users can order the calibration kit, calibration accessories and / or gases from any CETCI authorized

distributor or they can supply their own gas and equipment as long as the gas meets the minimum specifications.

8.3 Calibration Procedure

The calibration procedure within the LPT is jumper automated (there are no potentiometers to adjust). Monitoring the calibration with a volt meter is optional. The range of 0 - 4.0 VDC is equal to the full measurement range of the sensor. e.g. CO sensor has a standard measurement range of 0 - 200 ppm. Therefore, 4.0 VDC = 200 ppm.

NOTE: If an inappropriate concentration of span gas is applied during calibration, calibration may succeed but it does not mean the equipment has been calibrated properly. CETCI is not responsible for improperly calibrated transmitters. Follow the manual instructions carefully.

To achieve calibration, the user must go through the following steps:

Step 1:

Indicate what concentration of span gas used to flow over the sensor by putting Jumper-1 into gas position (GAS1, GAS2 or GAS3). Refer to *Voltage and Gas Concentration Level Reference Table* in section 7.4 *Jumpers* for standard gas concentration level.

If the reference table is unavailable, the gas level for each jumper position can be determined by placing Jumper-1 into one of the GAS positions and Jumper-2 into the OVER position. This will cause the LPT to output the corresponding signal on both the current loop and the voltage test points.

Step 2:

Attach regulator to cylinder of zero air, insert calibration adapter into the sensor opening in the front of the enclosure door, and open regulator valve fully allowing zero air to flow over sensor

for one minute. Use a slight twisting motion as you gently push the calibration adapter into the sensor opening. If the calibration adapter is hard to insert, moisten the O-ring seal slightly then try re-inserting it.

If the optional splash guard is installed use the large cup adapter (part number **CET-4700-SCC**) and place it over the splash guard.

Step 3:

Move the Jumper-2 on J2 to position "CAL".

Step 4:

If this level (possible residual gas) is too high, the internal LED will flash with a short OFF time and long ON time. This indicates that an override is needed. To override, move the Jumper-1 to the OVER position. If Jumper-1 is not moved to the OVER position in 30 seconds, the zeroing will be cancelled and will return to normal mode. After using the OVER position, Jumper-1 should be returned to the gas selection position (GAS1, GAS2 or GAS3).

Step 5:

Once zeroed, the internal LED will first flash 8 times, and then repeatedly flash 4 times and then pause with the LED off. This indicates that it is time to flow the gas.

If the digital multi-meter leads are attached to test points TP-1 and TP-2, the voltage should be 0.0 VDC.

Step 6:

Attach regulator to cylinder of span gas.

Step 7:

Insert the calibration adapter into the sensor opening in the front of the enclosure door.

Step 8:

Open regulator valve fully and allow span gas to flow over sensor. If no gas is detected after one minute, the transmitter returns to normal operation and the procedure will need to be performed from Step 2.

Step 9:

Once gas flow is detected, the internal LED pattern will change to flash four times and then pause with the LED on. During this time the current loop will follow the gas level based on the ideal span of the sensor.

The spanning can be cancelled by removing the Jumper-2 from the CAL position and move to IDLE position before the spanning is finished and the transmitter will return to normal operation (solid green light on the front).

Step 10:

After the span is completed and passed, the transmitter will return to normal operation.

If the span is out of range but within the override range, the LED will flash as it did for zero override range. To override, move the concentration jumper to the OVER position. If Jumper-1 is not moved to the OVER position in 30 seconds, the current loop will output 20 mA and will stay there until you move the Jumper. After using the OVER position, Jumper-1 should be returned to the gas selection position (GAS1, GAS2 or GAS3).

If the sensitivity of the sensor is calculated out of range more than the OVER can compensate for, the internal LED will turn on solid, the front LED will remain off and the current loop will output 20 mA indicating the sensor cannot be calibrated. You can try to recalibrate, starting from step 2, to confirm the procedure was followed correctly and this may correct the fault.

If this does not correct the fault, please contact our service department at service@cetci.com.

To exit calibration mode, remove Jumper-2 from the CAL position and return it to the IDLE position. If the digital multi-meter leads are attached to test points TP-1 and TP-2, the measured voltage will start moving towards the voltage calculated for the span gas value.

9 ACCESSORIES

9.1 Splash Guard



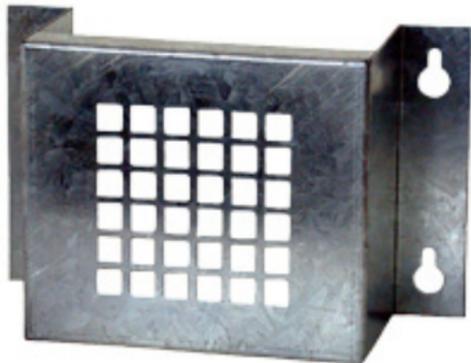
Splash guard attaches to the front of the enclosures. Factory installed only.

9.2 Calibration Kit



Calibration kits and gases are available from the CETCI factory. Many gases are carried in inventory but not all. Check with any CETCI authorized distributor for availability of specific gas types. Gas cylinders cannot be shipped overseas. Part number **CET-715A-CK1**.

9.3 Metal Protective Guard



The metal protective guard is heavy duty metal protective guard to help protect against abrasive damage, theft and vandalism to the transmitters. This is an added preventative in addition to the product enclosure.

It is made from 16-gauge galvanized steel and has $\frac{1}{2}$ " (13 mm) square openings in the front to allow gas and air to flow through to the sensor. With only four slotted mounting holes, installation and removal for gas detector servicing is easy.

Enclosure	16 gauge galvanized steel
Weight	800 g (28 oz)
Size	7.0" W x 6.3" H x 3.6" D (178 mm W x 160 mm H x 91 mm D)

10 MAINTENANCE

The LPT transmitter requires virtually no maintenance other than regular calibration of the sensor.

The transmitter should be monitored for possible damaging conditions.

1. The sensor port should be kept free of dirt or soot build up.
2. If in a damp location source of water should be shed from contacting the top of the transmitter.
3. If located in a working area the front of the transmitter should be kept clear.
4. If painting is to be conducted in the transmitters location the transmitter needs to be protected from over spray and the sensor port should not receive paint fumes – these fumes may damage or reduce the life of the sensor.

11 TROUBLE SHOOTING

LPT won't power up. (Outer LED is OFF)

Is the power properly connected? Refer to Wiring examples.

4 - 20 mA signal loop has not been connected properly. Check the connections.

Outer LED will flash with a short OFF time and long ON time and the current loop will output 20mA.

The LPT is in fault mode. If re-calibrating the sensor fails, replace the transmitter.

Outer LED will flash four times then pause.

The LPT is in Uninitialized mode. Return the LPT to factory.

During calibration, the internal LED will blink constantly.

Jumper-1 is missing. Install the jumper to desired gas concentration.

During calibration the internal LED will blink long ON and short OFF.

The sensor needs override. Move Jumper-1 to OVER position.

The internal LED turn solid green and the outside LED remains OFF.

It failed calibration. Try to recalibrate the sensor again.

LPT powered up (outer LED is ON) but the control panel will display “Fault”.

4 - 20 mA signal loop has not been connected properly. Check the connections and refer to wiring examples.



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