

# TecPen MAP Oxygen and CO2 Analyzer



## User Manual

Version 3

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# Quick Start Guide

## Perform a measurement

1. Acclimatize the device to the surrounding temperature (1-2 hours).



2. Press ON/OFF to switch on the TecPen.



3. The PWR LED will light up green.

4. The TecPen will indicate the battery status and oxygen level with \*\*\*\*%.

5. The TecPen will take 2 minutes to warm up.

6. Connect the gas inlet of the TecPen to the provided filter and connect the sampling needle onto the filter using the Leur lock.

7. Optional: Connect the tubing to the TecPen. Put the filter onto the free end of the tubing. Then connect the needle to the filter.

8. Take a septum and place it on the package. Make sure that that the septum is placed on a place where enough gas is available to make the test.

9. Insert the needle into the gas-filled space to be measured.



10. Press START immediately after piercing the sample.



11. The "MEAS" will appear on the display. The oxygen value, will change continuously during measurement.

12. If "\*\*\*\*\*" appears your measured value is outside the measuring range.



13. Once the measurement stops changing, press START again to stop the measurement.



14. Press SAVE to save the measured value. The saving process is indicated by "LOG" on the display. The value is stored in the internal memory.

15. Press ON/OFF again to turn the TecPen off.

For additional settings and features refer to the sections in this manual.

## Introduction

The TecPen Handheld MAP Sensor is designed to provide fast, accurate measurements of oxygen and carbon dioxide gas concentrations in closed or pierce-able containers. It uses an optical gas sensor with OLED display as well as USB connectivity. This makes it an excellent tool for:

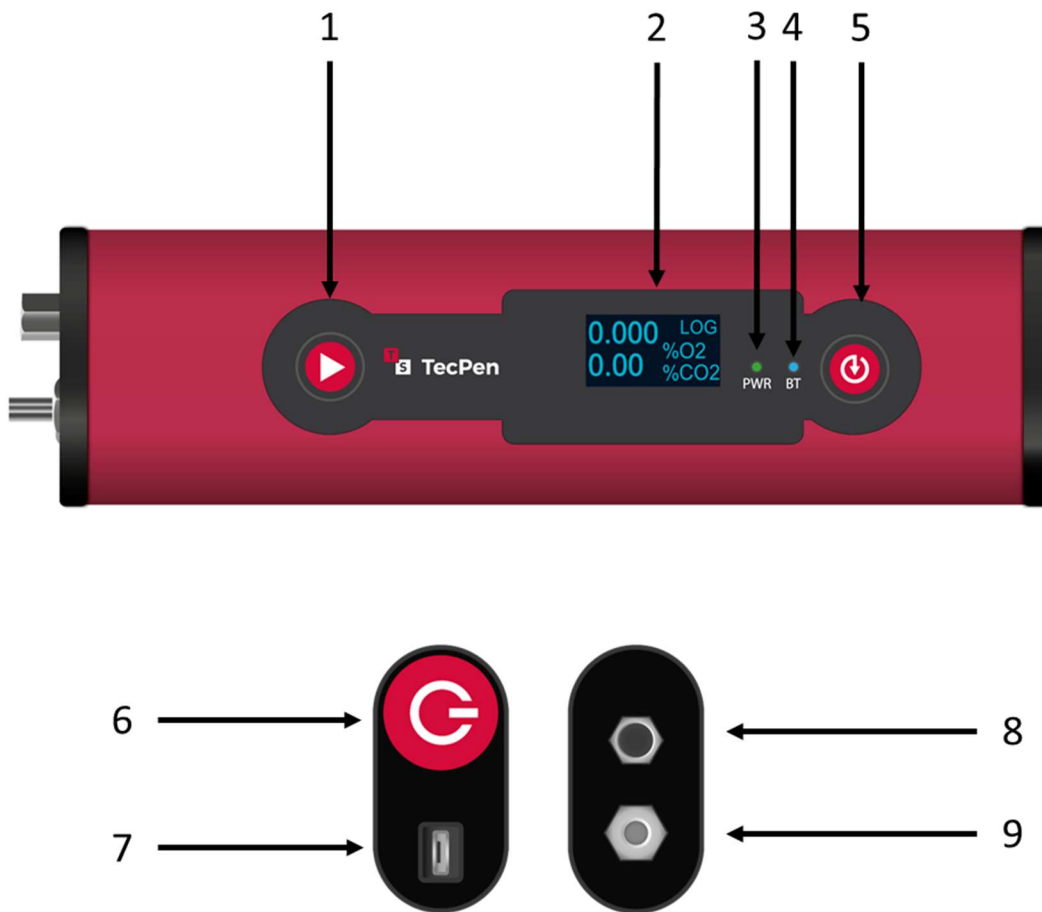
- Food packaging in protective gas atmosphere (MAP packaging)
- Headspace of vials, cell breeding vessels, infusion containers, syringes
- Micro-bioreactor systems

## Package Contents

Quantity	Item
1	TecPen
1	Case
2	Particulate Filters
2	Sampling needle 25/0.8
1	USB Cable
1	USB Protection Cover
1	USB Flash Drive
1	Instruction Manual
12	Septum
1	Flexible Extension
1	Calibration Certificate O2 and CO2



## Layout & Controls



1. Start Device - Press button: start measurement / stop measurement
2. OLED Display
3. PWR (Power) LED - Lights up when the device is switched on
4. BT LED – Lights up when the device is connected to the charger during Power ON mode. Will not light up if the device is connected to charger during Power Off Mode.
5. Memory Button - saves measurement
6. ON/OFF Button - press briefly: switch on device, hold down: switch off
7. USB Port for charging, data collection
8. Sampling Gas Inlet
9. Gas Outlet

# Operation

**IMPORTANT! If the device is taken to a room with a significantly different ambient temperature, an acclimatization period of 1-2 hours is required.**

## Before You Begin

The TecPen can be charged with any 5V USB cable and adapter. Full charging takes place in under 2 hours.

If the device is taken to a room with a significantly different ambient temperature, an acclimatization period of 1-2 hours is required.

Before taking a measurement a filter should be attached to the TecPen to prevent contamination of the gas chamber. To do this, place the tubing on the gas inlet's male Luer lock fitting (8) and fasten the filter to the other end. Attach the sampling needle to the front of the filter.



Note: All connections are made with Luer lock fittings. These must be securely engaged for proper installation and seal.

## Turning the TecPen On

Press the ON/OFF button to turn on the unit. With switching on the device the pump will automatically start. Therefore, you must not connect the TecPen to any sample container. The device is adjusting the CO<sub>2</sub> sensor automatically every time. After adjustment period, the device will display a 0.00% value for O<sub>2</sub> and CO<sub>2</sub>.

1. After turning it on let the TecPen warm up for 2 minutes to insure accuracy.
2. The TecPen can only be switched on when it is not connected to the charging cable.
3. If no buttons are pressed within five minutes, the TecPen will switch itself off. The unit can also be switched off by pressing the ON/OFF button for at least two seconds.

## Taking a Measurement

The sampling needle is used to puncture the packaging to be measured. After inserting the sampling needle briefly press the START button to take a measurement. The pump will draw a sample until it reads the lowest stable group of measurements. If it cannot read a stable measurement the pump will automatically shut off after 10 seconds. To try another measurement press the START button again.

## ATTENTION: RISK OF INJURY.

Be careful when working with sharp needles. Cover the needles with the corresponding protective cap after each measurement.

## Saving a Measurement

Press the SAVE button. The measured value currently on the display is saved in the TecPen's internal memory. A separate data file is generated for each day a measurement is started. This file contains measurement data and time stamps.

## Turning the TecPen Off

Switch the unit off by pressing the ON/OFF button for at least two seconds.

## Transfer of saved data

Switch on your TecPen. Connect the TecPen to your computer using the USB cable. TecPen appears on your PC like a USB drive and can be transferred as a .txt file.

**IMPORTANT: Before removing your TecPen from the PC, make sure that it has been ejected correctly.**

## Menu Display

In normal use the TecPen has 5 screens that can be viewed by pressing and holding the SAVE button. It is not possible to switch through the screens in reverse order.

Screen 1 Main screen	<div style="background-color: #cccccc; padding: 5px;">           0.000 %O2 0.00 %CO2         </div> <div style="background-color: #cccccc; padding: 5px; margin-top: 5px;">           0.000 LOG %O2 0.00 %CO2         </div> <div style="background-color: #cccccc; padding: 5px; margin-top: 5px;">           0.000 MEAS %O2 0.00 %CO2         </div>	Measured value  Temporary: Log Indicator  Indicator for current measurement
Screen 2 Recipe administration	<div style="background-color: #cccccc; padding: 5px;">           1234 Produktname 1234567891234         </div>	Consecutive / internal number Product name EAN code
Screen 3 Date & Time	<div style="background-color: #cccccc; padding: 5px;">           2018-01-01  12:12:12         </div>	Date Time
Screen 4 Measurement data display	<div style="background-color: #cccccc; padding: 5px;">           Ampl.[Isb]: 0 Tau[us]: 0.00 Temp.[°C]: + 0.0         </div>	Amplitude Life Temperature
Screen 5 Info screen	<div style="background-color: #cccccc; padding: 5px;">           Device info: TPV3DD20180 605IMTN001 Device state: 0         </div>	Serial number Device status code
Additional screen Zero-point adjustment	<div style="background-color: #cccccc; padding: 5px;">           Adjustment to 0%?  <b><u>NO</u></b> </div>	Selection option YES / NO



## Menu Options

In addition to the main screen the TecPen has 6 menu options screens that can be accessed by pressing and holding the SAVE button.

### Change Data File Format (Recipes)

1. Hold the SAVE button for 2 seconds to access the menu.
2. A list of preset product recipe/configurations will appear on the display.
3. Tap the SAVE button to scroll down or START button to scroll up to select a recipe.
4. Press the SAVE button for 2 seconds to confirm and save the setting.

### Set Date and Time

1. Press SAVE for two seconds. Repeat this step until the date and time display appears.
2. Press START for two seconds.
3. The year will be underlined.
4. To scroll down or decrease number press SAVE
5. To scroll up or increase number press START
6. After setting the year, press START for two seconds.
7. The year is saved when the month is underlined.
8. Repeat steps 4-7 until everything is set.
9. Press SAVE for 2 seconds to save the settings.

### View Measurement Data Display

1. Hold the SAVE button for 2 seconds to access the menu.
2. Press the SAVE button to switch to the View Data Display screen.
3. Press the SAVE button for 2 seconds to exit the menu.

### View Device Status

1. Hold the SAVE button for 2 seconds to access the menu.
2. Press the SAVE button to switch to view the Device Status code (see below).
3. Press the SAVE button for 2 seconds to exit the menu.

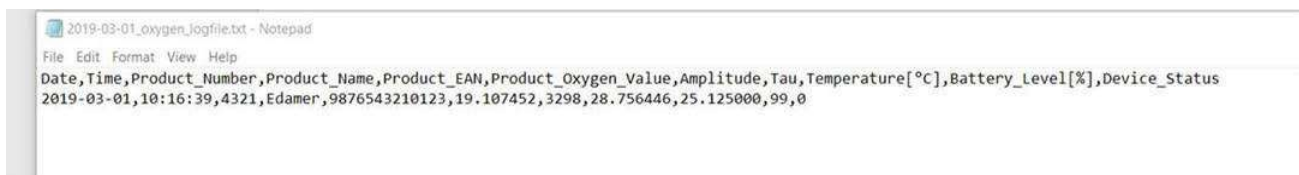
# Saving Data

## Default Operation

After each measurement is completed and the pump stops running, the currently displayed measured value can be stored in the internal memory of the TecPen by briefly pressing the SAVE button. By default, a new data file is created each day using the date as the file name and the measured oxygen level and a time stamp as data.

## Output Data File Format

The TecPen outputs a comma-delimited text file (.txt) with a header row that can be imported into any spreadsheet program. The data file format is as follows:



Data Label	Example
Date	2019-03-15 (YYYY-MM-DD format)
Time	14:33:30 (hours:minutes:seconds 24 hr. clock)
Product_Number	123456 (user defined)
Product_Name	NAME56789ABCD (user defined)
Product_EAN	0123456789ABC (user defined)
Product_Oxygen_Value	0.53472 (range 0-5%)
Amplitude	14016 (signal strength for error checking)
Tau	64.610248 (signal life for error checking)
Temperature[°C]	25.187500 (Centigrade only)
Battery_Level[%]	86 (range 0-100%)
Device Status	0=Normal (see device status codes)

## Exporting Saved Data Files

1. Press the ON/OFF button to turn on the unit.
2. Connect the TecPen to a PC using the supplied USB cable.
3. The TecPen appears on your PC like a USB drive with one or more saved data files.
4. Copy the files from the TecPen using your PC's file manager.
5. Disconnect the TecPen properly before removing the USB device from your PC

## USB Data Safety

Before unplugging the USB cable, the TecPen MUST be ejected properly like any other standard USB device to avoid damaging the TecPen's internal file system.

If the TecPen is unplugged from the USB port without first selecting the "Safely Remove Hardware and Eject Media" option, all data still on the device may be lost.

## Customizing the Output Data File

The Product\_Number, Product\_Name and Product\_EAN fields can be customized so that multiple Tec Pens can be used and all will have different names in their data files. The TecPen can be further customized by selecting different “recipes” from the menu depending on the job.

To get started, you need to modify a file named **Rezepte.csv** loaded on in TechPen’s internal memory. The file can be downloaded via USB, modified and uploaded, or you can create a new Rezepte.csv file in any spreadsheet program that can save a .csv file. The required format is:

	A	B	C
1	100ABC	Scanner1	12345
2	200DEF	Scanner2	67890

The 3 alpha-numeric fields (do not use commas) in the table will replace the Product\_Number, Product\_Name and Product\_EAN fields in your output data files. By default, the first row will always be loaded when the TecPen is turned on. If you want to select a different recipe, you must do so from the menu options after you turn the TecPen on and before you start collecting data.

## Zero Point Adjustment

The TecPen uses 100% 5.0 pure nitrogen gas for zero oxygen adjustment. To calibrate the TecPen, it must be first be purged of any remaining gas from previous use by running the pump for several seconds until the device is filled with pure nitrogen. Follow the steps below:

1. Connect the TecPen to pure nitrogen at 1L/min flow and perform 2 measurements to insure the device is completely devoid of oxygen.
2. Press and hold the START button, then press the SAVE button until the calibration screen appears.
3. A screen will appear with the text "Recalibration 0%?" followed by "NO".
4. Press SAVE to switch to "YES".
5. If "NO" is selected, the operation is aborted.
6. If "YES" is selected, let the unit calibrate for at least 5 minutes.
7. Hold the the SAVE button until the screen shows “recalibrated.” The oxygen level on the screen should now show 0.00%. If not, set the zero point again.

A video with these instructions is available at <https://www.youtube.com/watch?v=FYy08FOLNYc>

### IMPORTANT!

Zero point adjustment may only be carried out with class 5.0 or purer nitrogen or the quality of the oxygen measurement results cannot be guaranteed.

After zero point adjustment the original factory values are overwritten. If the adjustment has not been carried out incorrectly, the original factory values can be restored by following the instructions on this video

<https://www.youtube.com/watch?v=FYy08FOLNYc>

# Maintenance

## Cleaning

- The unit can be cleaned externally with isopropanol and a fine, soft cloth. Never immerse the device in water or other liquids.
- Do not clean the unit with ultrasonic cleaner.
- Do not fill with solvents, alcohol, or cleaning agents, they may damage the device.

## Battery

LiPo batteries are used for the TecPen. The duration per battery charge depends on how and under what circumstances the devices are used. Charge the battery using the supplied USB cable. Once the battery is fully charged, remove the battery from the charging cable.

Do not charge the battery longer than necessary (overnight). This may cause the charging capacity to decrease more quickly, the battery to overheat or become defective.

Should the charging capacity decrease unusually quickly within one year or with a maximum of 300 charge cycles (whichever is reached first) due to a production error, please contact GasLab.

## ISO Certification

The instrument must be returned annually to the manufacturer for recalibration in accordance with ISO:9000 certification.

## Device Status Codes

1. normal operation
2. UART buffer overrun
3. Temperature sensor error
4. Not specified
5. SD card does not recognize

## IMPORTANT

If error codes 1, 2, 4 or 5 appear, switch off the device, wait a few moments and then switch it back on. If the same error message appears after switching it back on, contact the manufacturer immediately

**If the TecPen displays error code 3 during operation turn off the device and contact GasLab immediately.**

## Troubleshooting Guide

	<b>Problem</b>	<b>Solution</b>
1	The Display measurement shows ***** after a sample	Value is higher than 5% oxygen. You cannot measure oxygen in fresh air (21%).
2	The PWR lights do not light up after switching on	Does the display show the main screen? The LED light may be broken, but unless there is an error on the LCD in most cases the device is not charged.
3	The Display shows BATT	Battery is uncharged.
4	The Display remains black after switching it on	Charge the device and try to switch it on again  Did you disconnect your device properly from the Computer the last time? Yes: The battery might be empty. No/ I do not know: Contact GasLab.
6	The device is connected to the power supply, but the BT light does not light up	If the device is switched off while connected to a power outlet, the BT light does not light up while the device is charging.
7	The device is connected to the Computer, but I cannot find it	You must switch on the device before connecting to the computer. If the device is switched on but you cannot find it, check for available COM ports.
8	The measured value is not saved	Did you press the LOG button? Did you observe the LOG sign on the display? If yes, contact GasLab.
9	The log file shows a wrong date The log file shows a wrong time	Check the date and time on the device is set. To change date/time see the manual.
10	The measured value varies between two measurements	Give the TecPen time to acclimatize between different rooms or temperatures.
11	The device is not measuring	Example: Can you hear the pump? Yes: Did you follow operation procedure? Yes: Contact GasLab.  Is the display showing MEAS? No: Start the measurement. Yes: Check screen 4 if there is a value of amplitude higher than 0. If yes, contact GasLab.com

# Specifications

TS-System	TecPen MAP O2/CO2 Combo		
Measurement range	0-5%		0-100% CO2
	<b>Range</b>	<b>Accuracy</b>	Accuracy
	0-0.5%	± 2% Mev**	±70 ppm +/- 5% of measuring value
	0.5-2.5%	±3% Mv*	(100% Range ±300 ppm +/-5% of measuring value
	2.5-5%	±5% Mv*	
Resolution	0.001%		0.01%
Response time at 25°C/ 77°F	<150ms		10s
Pump flow max.	67 mL		
Temp. range Min./Max	-10°C/ +60°C		-25°C/55°C
	14°F/140°F		-13°F/ 131°F
Medium	Gas		
Power supply	5V USB and LiPo battery		
Rechargeable battery lifetime	> 3 hours per charge		
Data Interface	USB	USB	
Temperature compensation	10-30°C		10-30°C
	50-86 °F		50-86°F
Display	OLED Display		
Cleaning housing	no organic solvents. 40% EtOH		
Parts touching sample	St.1.4404/ PTFE/ Glas		
Case	aluminum anodized		
Protection	IP65		
Full service interval by Manufacturer (includes necessary retrofitting)	3 years		
Life time of sensor spot (protective atmosphere; 0-40°C)	24 months	24 months	
Sensor cap replacement interval	2 years	n.a	
Recommended zero-point adjustment interval by customer	6 months	adjustment to air at power on	
Warranty	1 Year ex works		

\*\*Mev = measured end value

\*Mv = measured value

TecSense sensors are CE, FCC, IC, KC and MIC marked, meet the requirements of ASTM F2714-08, and the European and Canadian standards for food safety. The company is DIN ISO 9001/2015 certified.

## Support

The quickest way to obtain technical support is via email. Please include a clear, concise definition of the problem and any relevant troubleshooting information or steps taken so far, so we can duplicate the problem and quickly respond to your inquiry.

## Warranty

The sensor comes with a 1-year warranty starting from the date it was shipped to the buyer. The TecPen sensor cap comes with a 90 day warranty. For more information visit our website:

<https://www.gaslab.com/pages/terms-conditions>

## Contact Us

If the troubleshooting guide above does not help you solving your problem or for more information, please contact us using the information below.



[Info@GasLab.com](mailto:Info@GasLab.com)

(386) 872-7668 (M-F 9:00am–5:00pm  
EST)

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