TecPen
Handheld Oxygen Sensor

User Manual

CONTENTS

Safety and Security

General Safety Instructions

- Before operating this device, read the operating instructions very carefully and keep them in a safe place.

- Use the device exclusively for commercial use and the intended purpose. This device is not intended for personal use. Do not use it outdoors (unless it is intended for conditional outdoor use). Keep it away from heat, direct sunlight, moisture (never immerse in liquid) and sharp edges. Do not use the device with wet hands. If the device has become damp or wet, switch off the device immediately and, if connected, disconnect the mains plug from the power supply. Don't reach into the water.

- Always turn off the appliance and unplug the appliance from the wall outlet (pull the plug, not the cable) when not in use, attaching accessories, for cleaning or in case of malfunction.

- Check the device and cable regularly for damage. Do not put a damaged device into operation.

- Do not repair the device yourself, but visit an authorized specialist company. In order to avoid hazards, only have the defective device or power supply replaced or exchanged by the manufacturer or our customer service.

- Only use original accessories.

- The device must not be opened during operation.

- Never immerse the device in water or other liquids.

- The device must be kept out of the reach of children.

- Do not fill with solvents, alcohol or cleaning agents, you may damage the device.

- If the device is brought into a room with a large temperature difference to the environment, an acclimatization period of 1-2 hours should be observed.

- Protect the device from dirt.

- Never store the cannula without protection.

- Be careful when using the cannula. Risk of injury!

- Never drop the appliance from a great height.

- The device is designed for the invasive measurement of closed containers. The object to be measured is subsequently damaged and must not be reused.

This device may not be modified, neither in terms of its construction nor with regard to the safety devices without the express written consent of the manufacturer. CO2Meter, Inc. is not liable for damage resulting from unauthorized modifications.

The operator must obtain the opinion of the manufacturer in order to make any modifications. As manufacturers, they have the legal responsibility for all these measures. Accordingly, the original manufacturer is released from his liability for any modifications made without express written consent.

Warning Symbols

Warnings used throughout this document can be classified according to the extent of a hazardous situation. The classification is based on an assumption as to how probable the occurrence of a hazardous situation is and what consequences are associated with it.

There are four classes of warnings.

Danger!

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ Warning!

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ Watch Out!

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor injury.

Watch your step!

CAUTION indicates a situation which, if not avoided, may result in machinery damage.

ℹ Reference

This symbol draws your attention to important, useful and helpful information.

Introduction

The TecPen Handheld 0-5% Oxygen Sensor is designed to provide fast, accurate measurements of oxygen content in closed or pierceable containers. It uses an optical gas sensor with LED display as well as Bluetooth and 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	Part number
1	TecPen	
1	Belt Bag	
2	Particulate Filters	TS R1 HH 001
2	Cannula 25/0.8	TS R1 HH 008
1	USB Cable	TS R1 HH 003
1	USB Protection Cover	TS R1 HH 004
1	USB Flash Drive	
1	Instruction Manual	On flash drive
12	Septum	TS R1 HH 006
1	Flexible Extension	TS R1 HH 007
1	Calibration Certificate	On flash drive
	DIN ISO Service	TS R1 HH 009

Layout & Controls
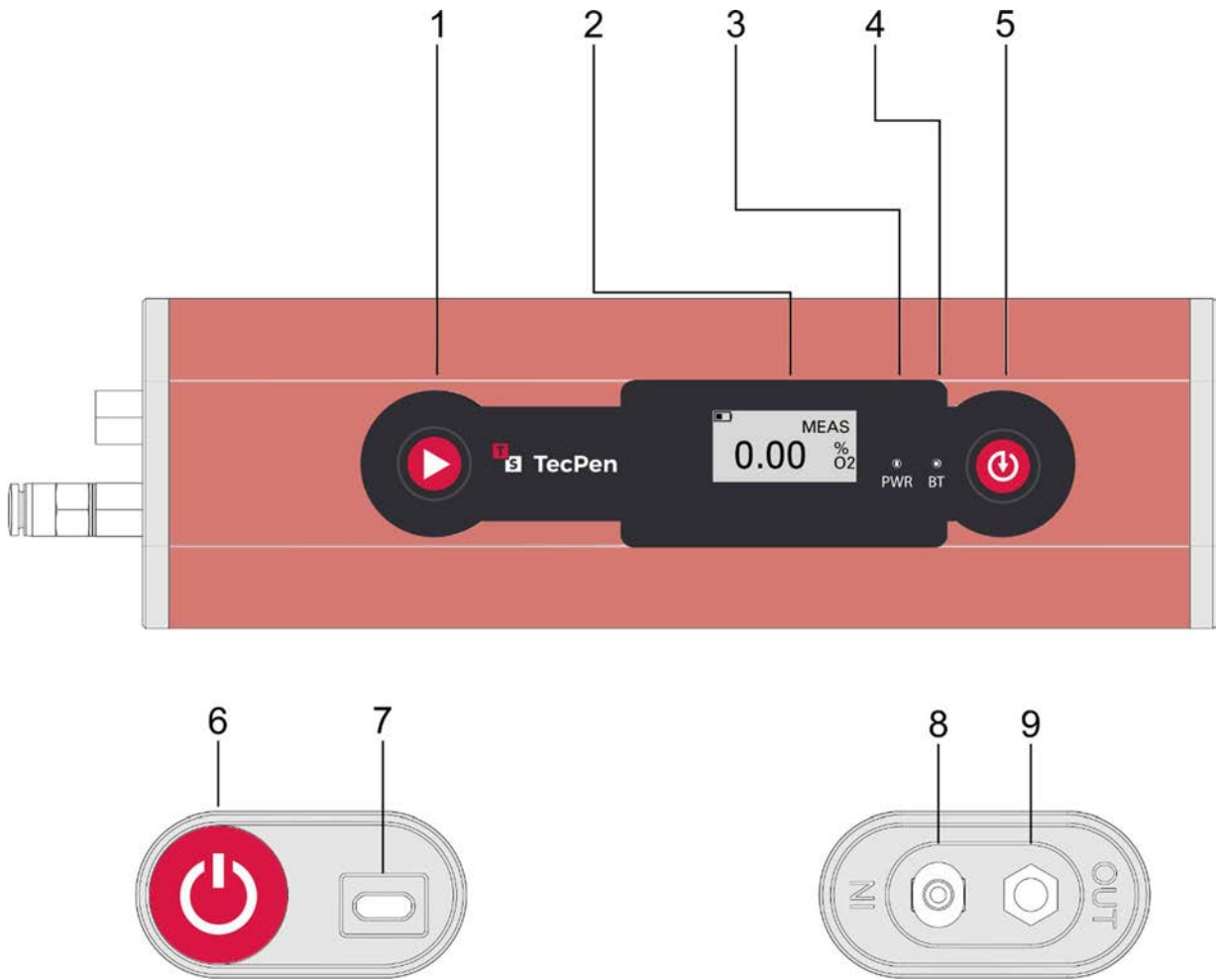
1. Start Button
2. OLED Display
3. PWR (Power) LED
4. BT (Bluetooth) LED
5. Memory Button
6. On/Off Button
7. USB Port
8. Sampling Gas Inlet (Cannula)
9. Gas Outlet

Operation

Operating Principle

The principle of opto-chemical oxygen detection using TecPen is based on the change in emission of fluorescent radiation from the fluorescent dye depending on the oxygen concentration. The dye is excited and the resulting fluorescence event is absorbed. The duration of this fluorescence event - the so-called lifetime - depends on the amount of adsorbed oxygen in the sensor layer and can therefore be used to determine the oxygen concentration.

Before You Begin

In a known gas with no particulate matter and no condensation the cannula (syringe) may be connected directly to the TecPen. However, in most cases before taking a measurement the hose and filter should be attached to the TecPen to prevent contamination of the gas chamber. To do this, place the hose on the gas inlet (8) and fasten the filter to the other end of the hose. Attach the cannula to the front of the filter.

Watch Your Step!

The back of the filter has a Luer lock closure. This must be turned into the intended connection of the hose for proper installation.

Turning the TecPen On

Press the On/Off button 🔵 to turn on the unit. The TecPen shows the battery status and an oxygen value of 0.00%. This is a placeholder and not an actual measurement result.

The unit can be switched off by pressing the On/Off button 🔵 for at least two seconds.

Taking a Measurement

The cannula is used to puncture the packaging to be measured. After inserting the cannula briefly press the start button to ▶ to take a measurement. The measurement is automatically terminated after 10 seconds. If the measuring time needs to be extended after the first measurement has been completed press the start button again.

⚠ Watch Out!

After each measurement is completed put the protective cap on the cannula to avoid injury.

Turning the TecPen Off

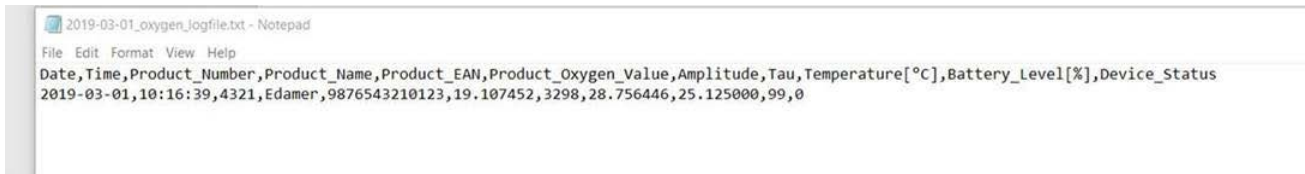The unit can be switched off by pressing the On/Off button 🔵 for at least two seconds.

Saving Data

Default Operation

After each measurement is completed, the currently displayed measured value can be stored in the internal memory of the TecPen by briefly pressing the memory key ⏻ . 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:


```
2019-03-01_oxygen_logfile.txt - Notepad

File  Edit  Format  View  Help
Date,Time,Product_Number,Product_Name,Product_EAN,Product_Oxygen_Value,Amplitude,Tau,Temperature[°C],Battery_Level[%],Device_Status
2019-03-01,10:16:39,4321,Edamer,9876543210123,19.107452,3298,28.756446,25.125000,99,0
```

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

Data log files can be exported via USB:
1. Connect the TecPen to a PC using the supplied USB cable.
2. Press the On/Off button ⏻ to turn on the unit.
3. Copy the files from the TecPen using your PC's file manager.
4. Remove the TecPen USB device following the operating system instructions.

Watch Your Step!

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 Data File Format

The Product_Number, Product_Name and Product_EAN fields can be customized so that multiple TecPens can be used and all will have different names in the data files. All data files can be further customized by selecting different "recipes" from the menu.

To get started, you must have a file named **Rezepte.csv** loaded on the TechPen's internal memory card (Rezepte is German for Recipe). The sample file may be modified, or you can create a rezepte.csv file in any spreadsheet program that can save a .csv file. For example:

	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 be used. If you want to select a different recipe, you must do so from the menu options after you have turned the TecPen on and before you begin collecting data.

Menu Options

In addition to the main screen the TecPen has 4 menu options screens that can be accessed by pressing and holding the memory button.

Change Data File Format (Recipes)

1. Hold the memory button 🔵 for 2 seconds to access the menu.
2. Tap the memory button 🔵 to scroll down or the start 🔵 button to scroll up to select a recipe.
3. Press the memory button 🔵 for 2 seconds to confirm and save the setting.

Set Date and Time

1. Hold the memory button 🔵 for 2 seconds to access the menu.
2. Press the memory button 🔵 to switch to the date and time screen.
3. Press the start button 🔵 for 2 seconds; the year is underlined.
4. Press the memory button 🔵 to scroll down or the start button 🔵 to scroll up to select the year.
5. Press the start button 🔵 for 2 seconds to save and go to the next field
6. Press the memory button 🔵 for 2 seconds to confirm and save the setting.

View Measurement Data Display

1. Hold the memory button 🔵 for 2 seconds to access the menu.
2. Press the memory button 🔵 to switch to the View Data Display screen.
3. Press the memory button 🔵 for 2 seconds to confirm and save the setting.

View Device Status

1. Hold the memory button 🔵 for 2 seconds to access the menu.
2. Press the memory button 🔵 to switch to view the Device Status code (see below).
3. Press the memory button 🔵 for 2 seconds to confirm and save the setting.

Calibration

The TecPen uses pure nitrogen gas for zero point calibration.

1. In order to adjust the zero point, a gas volume with overflow must be pierced and the TecPen purged with nitrogen.
2. Press and hold the start button and the memory button are alternately until the pump is activated
3. A screen will appear with the text "Recalibration 0%?" followed by "NO".
4. Briefly press the start button to switch between "YES" and "NO".
5. If "NO" is selected, the operation is aborted by pressing and holding the memory key .
6. If "YES" is selected, let the unit calibrate for at least 5 minutes.
7. Press and hold the memory key   to confirm.

Watch your step!

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

Watch your step!
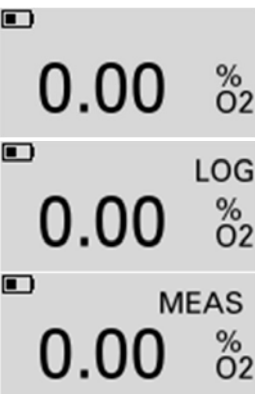
After zero-point calibration the original calibration values are overwritten. If the calibration has not been carried out correctly, the original values can only be restored by CO2Meter support.

Reference

While calibration can be carried out by the user, adjusting the zero-point may only be carried out by CO2Meter Service.

Display

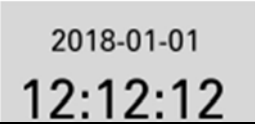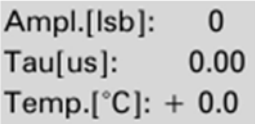|		
Screen 1 main screen	0.00 %O2 LOG 0.00 %O2 MEAS 0.00 %O2	battery level measured value Temporary: Memory/Log Indicator Indicator for current measurement
Screen 2 recipe administration	1234 Produktname 1234567891234	Consecutive / internal number product name, EAN code
Screen 3 Date & Time	2018-01-01 12:12:12	date time (24 hour clock)
Screen 4 measurement data display	Ampl.[lsb]: 0 Tau[us]: 0.00 Temp.[°C]: + 0.0	amplitude life temperature
Screen 5 info screen	Device info: TPV3DD20180 605IMTN001 Device state: 0	serial number device status code
Zero point adjustment	Recalibration 0%? NO	Selection Option YES / NO

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.

ISO Certification

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

Device Status Codes

0. normal operation
1. UART buffer overrun
2. Temperature sensor error
3. Not specified
4. SD card not recognized

Watch your step!

If the TecPen displays one of the error codes above during operation turn off the device and contact the manufacturer immediately.

Specifications

TecPen Specification	Value
Measuring range	0.0-5.0%
Precision:	
Range 0.0 - 0.5%	+/- 0.01%
Range 0.5 - 1.0%	+/- 0.03%
Range 1.0 - 5.0%	+/- 0.05%
Response time at 25°C	< 150 ms
Maximum pressure	10 bar
Temperature range Min / Max	-10°C / +50°C
Medium	Gaseous, no solvents
Power supply	Battery, charged via USB
Charging Time	< 2 hours
Battery	Not user serviceable
Data interface	USB and BT4.0 via Android
Withdrawal volume	< 5ml
Temperature compensation	Yes, 10 to 30°C
Pressure compensation	N/A
Industry certificates	On request
Cleaning	70% ethanol, No organic solvents
	Needle is stainless steel
Wetted parts	St.1.4404
Degree of protection	IP54

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 ninety (90) day warranty starting from the date it was shipped to the buyer. For more information visit our website:
https://www.co2meter.com/pages/terms-conditions

Contact Us

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

Support@CO2Meter.com | Sales@CO2Meter.com
(386) 256-4910 (M-F 9:00am–5:00pm EST)
www.CO2Meter.com

131 Business Center Drive Ormond Beach, FL 32174 (386) 872 - 7665

Ref. No.:062017