sauermann®

USER MANUAL

SI-AQ COMFORT

MULTIFUNCTIONAL PORTABLE INDOOR AIR QUALITY MONITOR

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CHAPTER 1

TECHNICAL SPECIFICATIONS & SAFETY GUIDELINES

SI-AQ COMFORT - AIR QUALITY MONITOR

1. PHYSICAL
   - Material: Blue ABS plastic case
   - Dimensions (monitor): 8.6 x 3.9 x 2 inches / 220 x 100 x 52 mm (H x W x D)
   - Weight: (monitor): 1.6 lbs. / 0.725 kg
   - Shipping Dimensions & Weight (monitor & all accessories): 8 lbs. / 3.6 kg
   - 20 x 19 x 9″ / 50.8 x 48.2 x 22.8 cm

2. POWER
   - 12 Volt, 8 AH rechargeable Li-Ion battery pack
   - Operating time: 8 – 12 hours
   - 110/240 VAC input, 12 V/2.5A fast charger
   - Charging time: 3 hours maximum

3. DISPLAY
   - 2.6 x 1.4″ 128 x 64 graphic, chip on glass (white backlit) LCD display.
   - Small and large fonts, plus inverted background color for help messages
   - Battery condition & charger operation indicator

4. WIRELESS REMOTE PRINTER (Optional)
   - High resolution, high speed, graphic thermal printer, with charger, prints:
     - A. current set of data
     - B. stored data
     - C. periodic data printouts
     - D. calibration history and external messages

5. INTERNAL INSTRUMENT PUMP
   - Continuous Air sample pump: high quality diaphragm pump with long life motor
   - Pump flow: 500 cc/min

6. MEMORY STORAGE
   - 2000 Internal memory storage tags. A tag corresponds to a memory position
   - Each tag stores one complete set of data including all parameters measured and calculated

7. COMMUNICATIONS
   - Bluetooth® wireless: Class 1 (100m)
   - USB Cable

8. SOFTWARE
   - SI-AQ PCSOFT Windows PC Software

9. GENERAL FEATURES
   - Recommended operating temperature: 23 to 113°F (-5 to +45 °C)
   - Recommended operating relative humidity: 15 to 85% RH
   - Recommended storage temperature: 14 to 122°F (-10 to +50°C)
   - Standards & directives: 2014/30/EU; 2014/35/EU Low voltage; 2014/53/EU; 2011/65/EU; 2012/19/EU
   - Supply voltage: 110-240 VAC
   - Frequency range: 50-60 Hz
   - Power rating: 15 W
   - Ingress protection (IP) rating: IP40

SENSORS

1. AIR QUALITY SENSORS – ELECTROCHEMICAL

SENSOR		RANGE	RESOLUTION	ACCURACY*
CARBON MONOXIDE (CO)	**Std Range**	0 - 200 ppm	0.1 ppm	±1 ppm of rdg, ±0.2 ppm

2. AIR QUALITY SENSORS – NON-DISPERSIVE INFRARED (NDIR) SENSORS

SENSOR		RANGE	RESOLUTION	ACCURACY*
CARBON DIOXIDE (CO_2)	**Std Range**	0 - 5000 ppm	1 ppm	2% of rdg ±10 ppm

4. OTHER SENSORS

SENSOR	RANGE	RESOLUTION	ACCURACY*
Temperature Type K (T1)	0 - 2000 °F 0 - 1100 °C	1 °F 1 °C	5 °F / 3 °C or 2% rdg
Ambient Temperature	-40 – 257 °F -40 – 125 °C	0.1 °F 0.1 °C	±0.4 °F (32 - 140 °F) ±0.4 °C (0 - 60 °C)
Relative Humidity	5 - 95%	0.1%	±2% RH
Pressure	±80 mbar 0 - 32.0 inH_2O	0.1 mbar 0.1 inH_2O	±1% rdg
Air Velocity	0 - 300 ft/s 0 - 91 m/s	1 ft/s 1 m/s	

**Note: All Accuracies indicated above are under Laboratory Conditions*

MODEL SI-AQ COMFORT – SAFETY GUIDELINES

This section provides general rules which must be followed for product safety, avoiding personal injury, damage to equipment and preserving the manufacturer's warranty. Please take care to carefully observe the following instructions.

A. PRODUCT SAFETY INSTRUCTIONS:

NOTE: Please take special care when performing Span Calibration of the monitor. You cannot revert back to the factory setting after any adjustments!

NOTE: CO_2 should <u>ALWAYS</u> be Calibrated or Zeroed with a Cylinder of ZERO AIR. Do Not Use Ambient Air for CO_2 sensor calibration.

- Do not operate the instrument outside of the parameters specified in the technical specifications
- Do not use or store the instrument together with any solvents
- Do not block the two (2) exhaust ports in the back of the instrument
- Do not expose the monitor to extreme hot or cold temperatures outside of the stated range in this manual
- Do not abuse the charger cord. Do not use power cord for carrying, pulling. Keep cord away from heat, oil, sharp edges, or moving parts. Damaged or entangled cords can increase risk of electric shock
- Only use the supplied, appropriate AC Charger
- If the monitor enclosure is ever unscrewed and taken apart, avoid over-tightening the screws that hold the two main enclosure pieces together.
- Do not store or operate in dusty, dirty areas
- Always use the monitor with care and use the instrument properly
- Do not use force when disconnecting and reconnecting the Black external Temp, RH and Pressure Sensor (see photo below)
- Do not use instrument in the rain or high moisture areas to prevent water droplets on the black external Temp, RH, and Pressure Sensor.
- Remember to have the monitor checked and calibrated at least once a year to ensure sensor accuracy and compliance with existing standards
- Only accessories which meet the manufacturer's specifications shall be used.
- This device has been developed, produced and sold exclusively to trained and qualified experts in the field of air quality monitoring. Appropriate training is necessary in order to guarantee a riskless use of this instrument. Sauermann is not responsible for any possible accidents during its use.
- The device must not be used in ATEX zones according to applicable standards.
- Do not use the device next to explosive gases, vapors, or dust.
- Clean the product with a dry and clean cloth after each use.
- To avoid any risk due to voltage on the surface of the probe, it is important that the thermocouple is not subjected to a voltage.
- The power to the instrument is turned off by disconnecting the external power supply.
- Do not use the device if it is damaged or if it operates abnormally. Inspect the device before every use. In case of doubt, please contact Sauermann's after-sales service.

- **DO NOT LIFT OR HANDLE THE INSTRUMENT BY THE BLACK EXTERNAL TEMP, RH, PRESSURE SENSOR HOUSING! See photo below**

B. ELECTROMAGNETIC COMPATIBLITY

Complies with EN61326-1, Portable Equipment

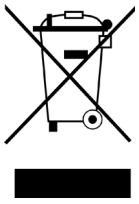
The Sauermann SI-AQ COMFORT Indoor Air Quality Monitor is a battery-operated Portable device designed to be used by a qualified engineer/technician to make measurements in buildings and residential facilities. For long-term testing, you may operate the unit connected to the supplied charger by carefully following the product safety instructions in Section A above.

C. ESD Protection

In extreme cases or abnormal applications, Electrostatic Discharge can potentially cause serious and immediate damage to the electronic circuits of the instrument.

D. BATTERY DISPOSAL & RECYCLING

Recycle all applicable material properly. Take faulty/depleted batteries to proper collection/recycling centers



Dispose of batteries and the monitor according to statutory regulations. Do not dispose of with regular household items. After the monitor's useful life, please return to your local authorized Sauermann' distributor or send back to Sauermann directly. We will ensure that it is disposed of in an environmentally friendly manner

CHAPTER 2

INTRODUCTION

A. UNPACKING THE INSTRUMENT & PARTS IDENTIFICATION

SAUERMANN SI-AQ COMFORT kits (excluding SI-AQ COMFORT-2) include as standard equipment:

- IAQ Monitor Model SI-AQ COMFORT with CO_2, Temp, %RH, Dew point Temp, WBT, Differential Pressure and Differential Temperature
- Battery charger / AC adaptor for the monitor
- USB Thumb Drive including Instruction Manual
- Internal Wireless Bluetooth® module
- Calibration Certificate

C. PROPER SAFE USE

1. Follow all the instructions in the SI-AQ COMFORT manual.

2. Do not block the two (2) exhaust ports in the back of the instrument housing.

3. Do not expose the monitor to extreme temperatures outside the stated range

4. Do not store or operate in dusty, dirty areas

5. Do not use instruments in the rain or high moisture areas to prevent water droplets on the external Temperature and RH Sensor.

LIST OF ABBREVIATIONS

PARAMETERS

CO_2	Carbon Dioxide – NDIR measurement
CO	Carbon Monoxide
Ta	Ambient (room) Air Temperature
RH	Percentage of Relative Humidity
DPt	Dew Point Temperature
WBT	Wet Bulb Temperature
VEL	Air / Gas Velocity (measurement with optional pitot tube)
ΔP	Differential Pressure (with Velocity Probe turned OFF)
T1	Thermocouple Type K Temperature (T1 Input)
BAT	Battery Life / Voltage
NA	Parameter Not Available

UNITS

PPM	Parts (of pollutant) per million
°F	Temperature Measurement in Fahrenheit
°C	Temperature Measurement in Celsius
"WC	Inches of water (pressure measurement)
mmHg	Millimeters of Mercury (pressure measurement)
"Hg	Inches of Mercury (pressure measurement)
PSI	Pounds per Square Inch (pressure measurement)
mmWC	Millimeters of water (pressure measurement)
kPa	KiloPascals (pressure measurement)
mbar	Millibars (pressure measurement)
FPS	Feet per second (gas / air velocity measurement)
MPS	Meters per second (gas / air velocity measurement)
CMM	Cubic meters per minute (gas / air velocity measurement)
CFM	Cubic feet per minute (gas / air velocity measurement)
V	Voltage (battery)

CHAPTER 3

BASIC INSTRUMENT OPERATION

The SI-AQ COMFORT is operated by the 9 button keyboard located on the front of the monitor.

- The **POWER** key turns the instrument on and off.
- The **MEASURE** key shows the currently measured parameters.

  Displays the monitor's currently measured data in either of two (2) fonts:
  A. Small fonts (all data displayed simultaneously plus range indicated, battery condition and time)
  B. Large fonts (four data parameters displayed simultaneously)

Note: The SI-AQ COMFORT allows the user to ZOOM in and out of the screen by changing from Small to Large Fonts using the **MEASURE** key. Press Measure key again to zoom back out.

- Four (4) keys will bring up separate Menus: **SETUP**, **CALIB**, **STORE**, & **PRINT**.

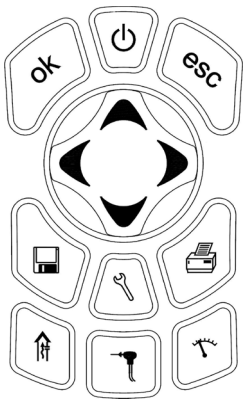
  SETUP Controls all customization parameters, such as measurement units, for the monitor

  CALIB Controls calibration settings and zeroing of the monitor's sensors.

  STORE Controls operation of the monitor's internal data storage

  PRINT Executes print commands for the monitor's optional remote Bluetooth® printer

- The menus are navigated with the **UP**, **DOWN**, **LEFT**, **RIGHT**, & **OK** keys.



INSTRUMENT OPERATION OVERVIEW

SI-AQ COMFORT STARTING INSTRUCTIONS

1. Turn the SI-AQ COMFORT on by pressing the **POWER** key. The instrument's internal pump will immediately turn on and the SAUERMANN logo will appear. The instrument will begin to draw in air from the center SAMPLE IN inlet "A" at the bottom of the unit.

2. If applicable, attach the optional probe and sampling line to the monitor.

3. Press the **MEASURE** key to view the Main Measuring Screen including ambient temperature, barometric pressure, relative humidity and dew point. The toxic gas readings you selected in your kit are also displayed: CO_2 & CO (CO will appear only if sensor was installed).

4. At initial startup, allow the CO_2 sensor up to 1 minute to warm up and stabilize.

```
CO2: 920PPM
CO:   0PPM
Ta: 79.1°F
RH: 46.9%
DPt:57.0°F  ΔP:  0.0mb


Sampling      12:45:00
```

NOTE: Depending on the options enabled for your Si-AQ COMFORT some of the entries in one or more of the displays shown above will be blank if that option is not available.

The **MEASURE** key allows the user to toggle/zoom between a small font and a large font screen.

The battery icon is displayed in the middle of the bottom line of the display. Its condition is marked by the shaded fraction of the icon. If the unit is powered by the battery charger a small "plug" icon will replace the battery icon.

NOTE: When connecting the battery charger to the monitor make sure that the "plug" icon appears on the **MEASURE** screen. This ensures a proper power connection and charging of the batteries.

Battery Full

Battery Empty

Battery Charger Connected

```
APR  1 '14  12:45:00
Temperature Units: F
Measure Units:  PPM
Pressure Units: inWC
Pumps: AUTO  750cc/m
Velocity Probe: OFF
Velocity Units: FPS
Duct Size:    0 in2
Display Contrast: 24
Baudrate: 115 kbps
Version:  1.02Li
```

5. If you are using the monitor for the first time, press the **SETUP** key to set the appropriate parameters (i.e.: measurement units) for your application. See Chapter 5 for an explanation of each parameter.

6. All sensor readings shown on the screen indicate ambient measurements. To ZERO the gas sensors, please see Calibration Chapter 9 of this manual.

7. To obtain a printout of the data displayed, press the **PRINT** key.

The cursor (reverse color) will point to:

```
Print Test Record
```

Press the **OK** key to execute a printout on the SI-AQ COMFORT's optional Bluetooth® remote printer.

8. Measured data can be stored in the monitor's internal memory. Please refer to Chapter 7 for more details about data storage.

CHAPTER 4

POWER REQUIREMENTS

The Sauermann SI-AQ COMFORT Indoor Air Quality Monitor is a battery-operated Portable device designed to be operated by a qualified engineer/technician to make measurements in buildings and residential facilities. For long-term testing please carefully follow the product safety instructions in Chapter 1.

Power is supplied by a Li-Ion rechargeable battery pack. The battery pack will supply power to the monitor for about at least 8 hours of continuous operation.

A 110 – 240 Volt AC charger having a 12 Volt DC / 2.5A output is supplied with the instrument. The battery charger will fully charge the battery pack in three hours.

You can check the condition of the batteries at any time:

1. By pressing the **MEASURE** key, (small font screen) and observing the battery icon, located at the bottom of the display.

Battery Full

Battery Empty

Battery Charger Connected

2. By pressing the **MEASURE** key, (large font screen), the user can scroll all the way to the end using the **DOWN** arrow key to observe the battery life shown in Voltage. When the unit is operating on its internal batteries, the voltage displayed will vary from an initial 8.0 to 8.4 volts (fully charged) dropping slowly to approximately 7 volts (batteries nearly empty). When the battery voltage drops to 7.1 volts a "low battery" warning will appear on the display. Within a few minutes later the instrument will automatically turn off, to preserve the remaining battery power for the sensor bias voltages.

CHAPTER 5

SENSORS -TECHNICAL

The SI-AQ COMFORT Air Quality monitor's sensors are grouped into three categories based on their principle of operation:

1. Up to one (1) CO (Carbon Monoxide) electrochemical gas sensor
2. One (1) NDIR (infrared gas sensors) – CO_2
3. Non-gas sensors (Temperature, Humidity, Pressure, and Velocity) sensors

The main section of the monitor houses all the electrochemical and NDIR gas sensors, battery pack, and PC board. On the bottom of the unit, there is a black external sampling system for Ambient Temperature and Relative Humidity.

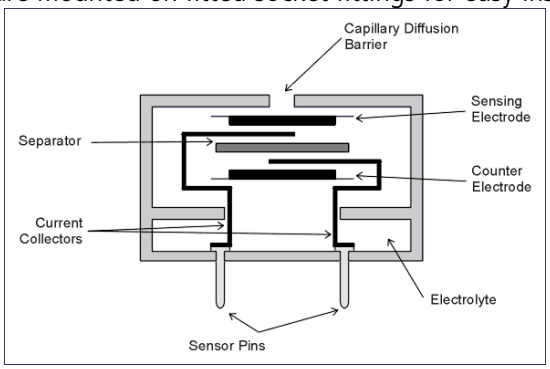
The figure below shows the internal manifold of the gas sensors inside the unit:

SENSOR LIST:

CO_2
CO

1. ELECTROCHEMICAL SENSORS

All electrochemical sensors are mounted on fitted socket fittings for easy installation and removal.



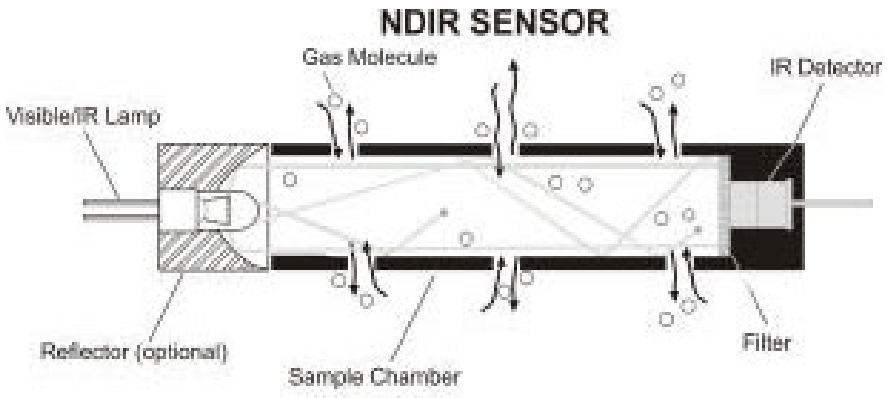
The electrochemical sensor is described here:

Carbon Monoxide sensor (CO)

This is also a three-electrode sensor that responds to carbon monoxide. It is equipped with an inboard filter to remove any interference from other acidic gases.

2. NDIR (INFRARED) SENSOR (CO_2)

A non-dispersive infrared (or NDIR) sensor is a simple spectroscopic device most commonly used to measure CO_2 in indoor air quality applications. The main components are an infrared source (lamp), a sample chamber or light tube, a wavelength sample chamber, and the CO_2 gas concentration is measured electro-optically by its absorption of a specific wavelength in the infrared (IR).



The SI-AQ COMFORT Air Quality Monitor is equipped with one standard NDIR infrared sensor capable of CO_2 measurement (standard range: 0 – 5000 ppm).

The NDIR sensor have the following specifications:

GAS	RANGE	ACCURACY
CARBON DIOXIDE (CO_2)	0 - 5000 ppm	2% of reading ±10 ppm

3. NON-GAS SENSORS

A. Ambient Temperature sensor

This is a NTC sensor located on the front panel of the monitor. The ambient temperature is displayed on the **MEASURE** screen in either °F or °C. The dew point is calculated from the ambient temperature and relative humidity. The dew point is displayed on the Small and Large Font **MEASURE** screens as DPt.

B. Humidity sensor

This is a capacitive sensor located on the front panel of the monitor. The relative humidity is displayed on the **MEASURE** screen in %RH (% Relative Humidity). The Wet Bulb is calculated from the ambient temperature, relative humidity, and barometric pressure. The wet bulb is displayed on the Large Font **MEASURE** screen only as WBT.

C. External temperature sensor (T1)

The thermocouple is located at the bottom right side of the monitor. It can be used with any optional or separate Type K thermocouple probe and/or wire. The T1 temperature measurements are displayed on the Large Font **MEASURE** screen only as T1.

D. Differential Pressure / Air Velocity sensor.

If the monitor comes with the Differential Pressure option and/or the air velocity option (optional separate L-type Pitot tube and pressure tubing), the internal pressure sensor is a very low range pressure sensor. The Velocity measurements are displayed on the **MEASURE** screen only as **VEL**. Differential Pressure is displayed on the **MEASURE** screen only as **ΔP**.

Connecting Differential Pressure Hoses:
Connect Metal Hose Connections to either P+ or P- Connection as shown. P+ only will give you Positive pressure; P- only will give you Negative pressure. Plug in both as shown below for Differential Pressure. All single & differential readings are shown on main MEASURE screen as ΔP.

SINGLE PRESSURE

DIFFERENTIAL PRESSURE

CHAPTER 6

SI-AQ COMFORT SETUP

The SETUP MENU allows the operator to change the instrument's parameters.

```
APR  1 '14  12:45:00
Temperature Units: F
Measure Units:  PPM
Pressure Units: mbar
Pumps: AUTO  750cc/m
Velocity Probe: OFF
Velocity Units: FPS
Duct Size:    0 in²
Display Contrast: 24
Baudrate:  115 kbps
Version:  1.02Li
```

Every parameter listed on the SETUP MENU screen can be changed as follows:

a. Use the **UP / DOWN** keys to move the highlighted line to the parameter you wish to change.

b. Press **OK** to edit the value. The parameter you have chosen will become highlighted on the right side of the screen. This indicates that you are in edit mode.

c. Use the **UP / DOWN** keys until the desired value of the selected parameter appears on the display.

d. Press the **OK** key to execute the change.

A more detailed explanation of each parameter follows:

1) DATE & TIME: The monitor's internal clock is displayed in the format month-day-year, hour-minute-second. Hours are always displayed using a 24-hour clock format.

2) TEMPERATURE UNITS: The **UP / DOWN** keys toggle between °F (Fahrenheit) and °C (Celsius). The T1 temperature reading and ambient temperature will be displayed, printed, and saved in the selected units.

3) PRESSURE UNITS: Pressure measurements can be shown in millibar (mbar), inches of water (inWC), millimeters of water (mmWC), millimeters of mercury (mmHG), inches of mercury (inHG), pounds per square inch (psi) or kilopascal (kPa).

1 mbar = 0.10 kPa = 0.40 inWC = 10.2 mmWC = 12.95 inHg = 0.75 mmHg = 1.45 PSI

4) VELOCITY & AIRFLOW UNITS: (Velocity Option) Select between feet per second (FPS), meters per second (MPS), cubic feet per minute (CFM), or cubic meter per minute (CMM).

AIR VELOCITY AND DIFFERENTIAL PRESSURE CAN NOT BE MEASURED SIMULTANEOUSLY. USER MUST CHOOSE ONE OR THE OTHER.

To change the selection, hit the **SETUP** key. Using the **DOWN** arrow key, scroll Down to **VELOCITY PROBE** and hit **OK**. The **OFF/ON** selection will be highlighted. Use the Up & Down arrow keys to change the selection from OFF to ON or vice versa. With the Velocity Probe Selection **OFF**, the SI-AQ COMFORT will measure **Differential Pressure (ΔP)** automatically. With the Velocity Probe Selection **ON**, the SI-AQ COMFORT will measure **Air Velocity (VEL)** automatically. When you have your selection chosen, hit the **OK** button and the entire Velocity Probe will be highlighted again. Hit the **MEASURE** Button to get back to the Main Measurement screen once you are complete.

5) DUCT SIZE: (Velocity Option). Estimate the cross-section area of your Ducts in square inches (in^2) and set this value to obtain automatic & accurate Air Flow measurements in m/s or m^3/min.

NOTE: When using the Velocity Feature on the SI-AQ COMFORT it is recommended to ZERO the readings BEFORE using the Pitot tube to ensure proper Velocity measurements. See Chapter 9 for instructions on Zeroing the SI-AQ COMFORT. (Zero Gas Sensors)

Connecting Pitot Tube: In air conditioning, heating and ventilating work, it is helpful to understand the techniques used to determine air velocity. In this field, air velocity (distance traveled per unit of time) is usually expressed in meters per second (m/s). By multiplying air velocity by the cross section area of a duct, you can determine the air volume flowing past a point in the duct per unit of time. Volume flow is usually measured in cubic meters per minute (m^3/min). To make Air Velocity measurements using the SI-AQ COMFORT, you will need to use the Optional 12" Pitot tube. Follow Steps #5 & #6 above to (1) turn the Velocity Probe option ON (VEL will appear on the unit's main screen) and (2) set up your Duct Size. Connect the supplied hoses from the Pitot tube to the (-) and/or (+) PRESSURE connections on the bottom of the SI-AQ COMFORT.

6) PUMP: Pump status is displayed:
   a) AUTO - Automatic sample mode is selected
   b) OFF - The internal Pump is turned off.

7) DISPLAY CONTRAST: Select the best value for viewing the LCD screen.

8) BAUDRATE: The communication speed for both the USB port and the Bluetooth® connection is set here. The default setting is 115 kbps.

CHAPTER 7

INTERNAL DATA STORAGE

The STORE MENU allows the operator to store data and manage the internal storage tags.

```
Store Current Buffer
Select Buffer
Start Average Test
Start Periodic Store
Select Interval: 1m
Review Buffer
Name Buffers
Erase Buffers
00: TAG#00
```

The SI-AQ COMFORT has 2000 internal storage tags/memory spots. Each tag stores one complete set of air quality data. There are two ways to store air quality data to the monitor's buffer. You can either store data by selecting the option STORE CURRENT DATA after pressing the **STORE** key, or alternatively you can make use of the monitor's capability of storing data automatically on a periodic basis. You can set the time period between data storage. The STORAGE MENU shows the relevant display lines for the storage options.

1. STORE CURRENT BUFFER: The monitor will store one set of data into the tag currently selected. The index number and the name of this tag appear at the bottom of the screen.

2. SELECT BUFFER: Selecting this item will display an index of the monitor's 2000 internal storage tags. Tags that are used have an icon next to their index number. The selected storage tag is indicated by the reverse color line. When data is stored, this pointer will automatically advance to the next available tag. If you want to store data in a different location, use the UP, DOWN, & OK keys to select a new tag. As you scroll up and down, tags containing data show their date and time at the bottom of the display. Empty tags show the word empty.

3. START AVERAGE TEST: This will begin a period of data averaging, with the average values stored periodically in successive memory tags. The interval between each storage cycle is displayed below and can be set by the user. Once enabled, this line will read: STOP AVERAGE TEST.

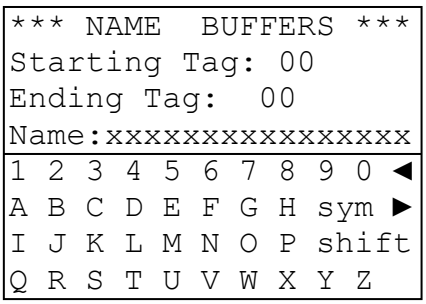
4. START PERIODIC: This will turn on the periodic store function. In this mode, the unit will continuously store data at an interval displayed on the next line. Once enabled, this line will read: STOP PERIODIC.

5. SELECT INTERVAL: The time between each store is set here. This can range from 10 seconds to 60 minutes.

6. REVIEW BUFFER: This choice allows you to view previously saved data. Press **OK**. The display will switch to the data screen, with the data in the first tag displayed. The time and date when

the data was saved will appear at the bottom of the display. Use the **UP / DOWN** keys to scroll through the tags.

7. NAME BUFFERS: This choice will take you to another screen where you can rename one or more tags. This is useful if you use several tags together to form a test series. Select the starting test index with the **UP / DOWN / LEFT / RIGHT** keys and press **OK**. Next, select the ending test index. The cursor will move to the first character of the first tag's name, and the alphanumeric keyboard will appear. Use the **UP / DOWN / LEFT / RIGHT** keys to navigate around the keyboard and press **OK** to select the letter or number. For lower-case letters, highlight `shift` and press **OK**, for symbols, highlight `sym` and press **OK**. The arrows in the corner will move the cursor forward or backward through the tag's name.



8. ERASE BUFFER: This option is used to erase stored data. Data that has been stored in the monitor's memory will be retained even after the instrument has been shut off and its batteries removed. To erase the contents of a specific tag, use the **UP / DOWN** keys to move the arrow to the desired tag. As you scroll up and down, tags containing data show their date and time at the bottom of the display. Empty tags show the word empty. If you wish to erase all 1000 of the monitor's stored data, move the arrow to the entry ALL TAGS and press **OK**.

CHAPTER 8

WIRELESS REMOTE PRINTER

The SI-AQ COMFORT uses an optional wireless Bluetooth® remote printer. The printer is powered by a rechargeable battery. An AC charger is supplied with the printer.

First you must turn the printer on. Then press **PRINT** to scan and connect with your wireless printer to establish communications between the monitor and the printer.

```
* WIRELESS PRINTERS *
 Scan for printers
 Press OK to search
```

→

```
* WIRELESS PRINTERS *
 Device Found
 Press OK to Connect
Device 1:001122334455
```

→

```
* WIRELESS PRINTERS *
 Device Connected
 Press OK to Continue
Device 1:001122334455
```

When you have connected successfully the printer's green status light will turn on. Pressing the **PRINT** key will now display the PRINT MENU.

The PRINT MENU allows the user to print test records.

```
Print Test Record
Start Test Log
  Log Interval: 60s
Print Buffer
Configure Record
Edit Customer Name
Calibration Record
Paper Feed On/Off
Mobile Printer...
```

```
sauermann®

Serial #: 000000
Company Name
   TEST RECORD

AUG  1 '14  12:45:00

        CO2: XX.X %
         CO: XXXX PPM
T ambient: XXX °F
         RH: XX.X %
        DPt: XXX °F
        WBT: XXXX °F
         BP: XXXX psi
        VOC: XXX PPM
```

PRINT TEST RECORD: This option will print a test record of the current air quality parameters.

PRINT TEST LOG: This option begins a log of the following air quality parameters: CO_2, Temperature, %RH, Wet Bulb, Dew Point, and Carbon Monoxide.

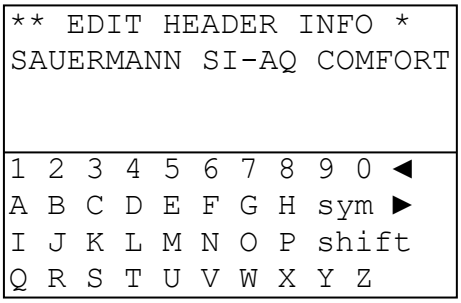
LOG INTERVAL: This selects the interval between each log entry. The interval can be set between 1 and 60 seconds.

PRINT BUFFER: This option is used to print data stored in the monitor's memory. Each line corresponds to one storage tag. Tags containing data show an icon next to the index number. When you scroll up and down, the date (mm/dd) and time (hh/mm) when the data was stored appear at the bottom; empty tags show the word "empty". To print the contents of a specific tag, use the **UP / DOWN** keys

to move the arrow to the desired tag and press **OK**. If you wish to print the entire monitor's stored data in sequence, move the arrow to the entry ALL TAGS and press **OK**.

CONFIGURE RECORD: This option allows the user to add, delete, or change the order of the parameters that appear on the paper print out.

EDIT CUSTOMER NAME: This will display a screen where you can change the information printed at the top of each printout. Usually the customer's name or the operator's name appears here. To edit this information, use the **UP / DOWN / LEFT / RIGHT** keys to navigate around the keyboard, and press **OK** to select the letter or number. For lower-case letters, highlight `shift` and press **OK**, for symbols, highlight `sym` and press **OK**. The arrows in the corner will move the cursor forward or backward through the name.



CALIBRATION RECORD: This option will print a record of each sensor's last calibration, including the date of calibration and span gas value used.

PAPER FEED: This toggles the printer's motor on and off, advancing the paper out the top of the printer as needed. The motor will not turn on if there is no paper present.

MOBILE PRINTER: The WIRELESS PRINTERS screen will appear. You can disconnect your current Bluetooth® connection and connect to another printer in range.

CHAPTER 9

CALIBRATION

NOTE: CO_2 should <u>ALWAYS</u> be Span Calibrated or Zeroed with a Cylinder of ZERO AIR. Do Not Use Ambient Air for CO_2 sensor calibration.

Every instrument must occasionally be tested against some known value or standard in order to make sure that its accuracy has not deteriorated. If the instrument is reading outside of the stated accuracies in this manual, the unit should be calibrated.

If the unit is returned to Sauermann for Span Calibration, the unit will be shipped back after Calibration with a new Calibration Certificate valid for one (1) year. If the unit is Span Calibrated in the field, the original calibration certificate is no longer valid.

NOTE: Please take special care when performing Calibration of the monitor. You cannot revert back to the factory setting after any adjustments!

```
**** CALIBRATION ****
 Zero Gas Sensors
 Zero CO2 Sensor
 Zero Thermocouples
 Zero Errors
 Zero Time:  60sec
 Span Time: 120sec
 ** Span Lockout **
 Sensor History
 Span CO:  xxxx PPM
 Span CO2: xxxx PPM
 Span Velocity: xx "
 Span ΔP:  xx "
 Span AmbT: xx.x C
 Span RH:  xx.x %
 Cal Thermcple :xxxF
```

The CALIBRATION MENU lets you set span calibration values for each sensor and performs all sensor calibrations. The CALIBRATION MENU is shown below.

A brief explanation of the parameters shown follows below:

ZERO GAS SENSORS: This will set the zero point of CO, Pressure & Velocity values.

ZERO CO_2 SENSOR: This will set the zero point of CO_2.

ZERO THERMOCOUPLE: This calibrates the external thermocouple input (T1) to ambient temperature.

ZERO ERRORS: This will display a list of sensors that were out of the monitor's acceptable range during the last zero countdown.

ZERO TIME: This is the countdown time for the zero procedure. The zero cycle time should set at 20-60 seconds.

SPAN TIME: When carrying out a span calibration, you must introduce the span gas for an appropriate amount of time before the monitor executes the span calibration. This setting, which is the same for all sensors, controls this time interval. The span time is indicated in seconds.

SPAN LOCKOUT: This controls access to the remaining span calibration menu options. Span lockout prevents accidental or mistaken calibrations. Span lockout is enabled and disabled by entering a 4-digit code. See section D below for the code.

SENSOR HISTORY: The date that each sensor was installed is displayed, along with the date the sensor was last calibrated and the span gas concentration used.

SPAN XXXX: The remaining lines of the CALIBRATION MENU are used for carrying out span calibrations of the CO and CO_2 sensors. For detailed use of these settings, please refer below.

ZEROing Sensors using OUTDOOR FRESH AIR (with the exception of CO_2)

If you are *not* using bottled ZERO AIR, it is important to select a location where the ambient environment of the monitor is clean from traces of carbon monoxide or other toxic gases. The user should be at least 20-30 feet (6-10 meters) away from any buildings, parking lots, highways, and any other possible exhaust sources. If in doubt of the ambient air, please use the ZERO AIR cylinder.

When you turn the instrument on in clean ambient air, wait at least one (1) minute to allow the monitor to warm up before carrying out the zero calibration.

ZERO GAS SENSORS: This will set the zero point of CO, Pressure and Velocity values based on the clean ambient conditions.

Have the cursor (reverse color) point to the line:

```
Zero Gas Sensors
```

Press the **OK** key to execute a zero cycle of all the gas sensors. This procedure should last 60 seconds.

At the end of the zero period, the SI-AQ COMFORT reads the output of all gas sensors and sets them all to zero.

If no error messages appear at the end of the countdown, proceed with your measurements.

CHAPTER 10

SI-AQ PCSOFT SOFTWARE

1. COMMUNICATIONS

The SI-AQ COMFORT Monitor communicates with a PC either using the USB cable or wirelessly using its internal Bluetooth® (BT) module.

The communication protocol is as follows:

BAUD RATE: 115000 baud
FORMAT: 8 bits, 1 stop bit, no parity
HANDSHAKE: None

USB CONNECTION

For USB connections, use the A-to-B type USB cable supplied with the instrument. To establish a USB connection, the FTDI USB driver must first be installed on your computer. The USB drivers for Windows computers are located on the SAUERMANN USB Thumb Drive:

- When you plug the USB cable from the computer to the monitor, you should hear a small "da-ding" sound indicating that the USB connection has been made.
- If you have the FTDI USB driver already installed in your computer, the computer will know and will NOT initialize the "New Hardware Wizard".
- If the New Hardware Wizard appears you need to install the FTDI USB driver. To install this driver:
  1. Locate the FTDI USB driver on the CD and save it to your desktop.
  2. Follow the instructions in the New Hardware Wizard
  3. You will have to go through the wizard **twice**, once to install the ftdiport.inf file and once for the ftdibus.inf file.

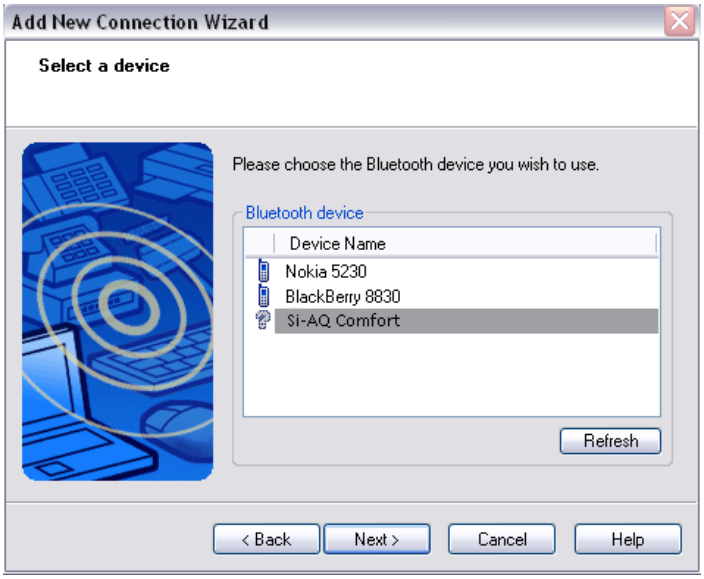
BLUETOOTH® CONNECTION

For Bluetooth® connections, the connection process varies with different Bluetooth® devices. Follow your manufacturer's instructions for adding a device. The
SAUERMANN' Bluetooth® modem is a Class 1 device, with a maximum range of 100 m. Obstacles such as walls and equipment will reduce the effective range.

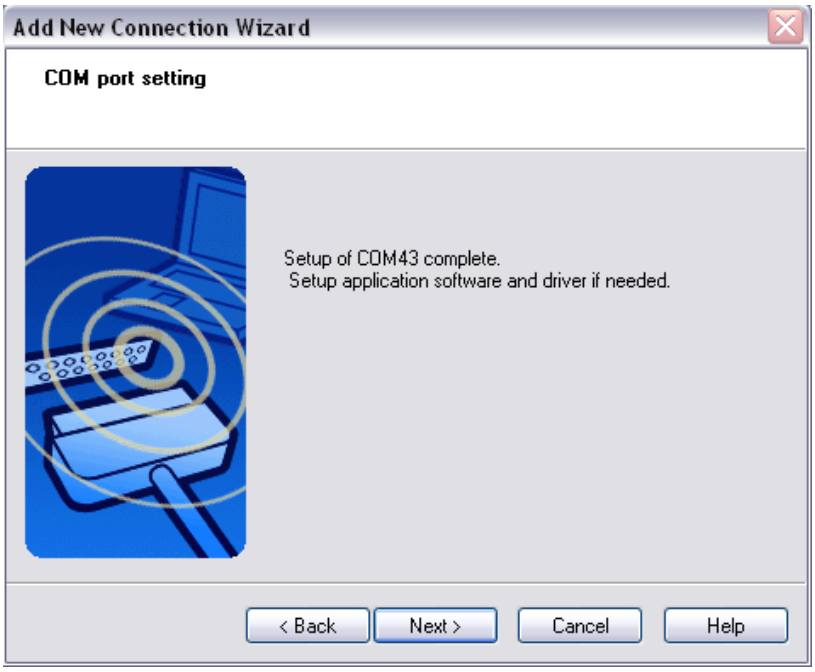
The SI-AQ COMFORT is supplied with a Bluetooth® Dongle to make connections to PC's without internal Bluetooth® capabilities.

1. Power on your SI-AQ COMFORT.
2. Select "Express Mode" and click next.

3. Your instrument will appear as "SI-AQ COMFORT-xxxxx". (The "xxxxx" will be the serial number of the SI-AQ COMFORT.) You may have to click on "refresh". Select your SI-AQ COMFORT, and then click next.



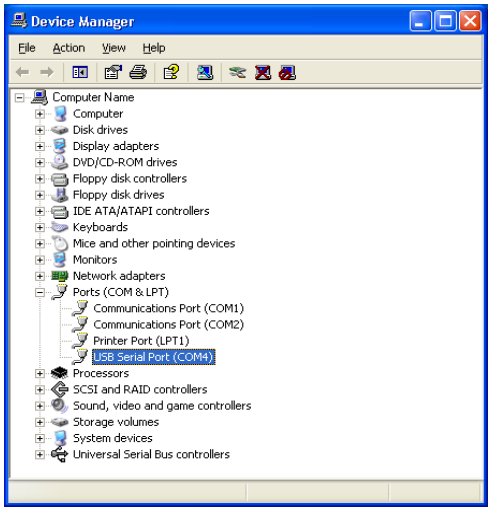
4. You will automatically be connected to your SI-AQ COMFORT. If a passkey is required it is either "1234" or "0000" (four zeroes).
5. The next prompt will give you the COM Port number, please make note of this as you will need it to communicate with the SI-AQ PCSOFT software. Then click "Next".



6. The Bluetooth® Settings window will now appear with your SI-AQ COMFORT listed with serial number shown. Double click on the icon to connect. Once successfully connected, your icon should change from the one below on the left to the one below on the right.

7. Run the SI-AQ PCSOFT software and add the Bluetooth® COM Port number to begin communicating with your SI-AQ COMFORT.

ALL CONNECTIONS



When you connect your SI-AQ COMFORT to your computer for the first time, the connection will be assigned a unique comport number. Remember the c*omport* number as it will be needed to open an SI-AQ PCSOFT session.

You can find the *comport* associated with your SAUERMANN in the Windows Device Manager.

To open the Device Manager:

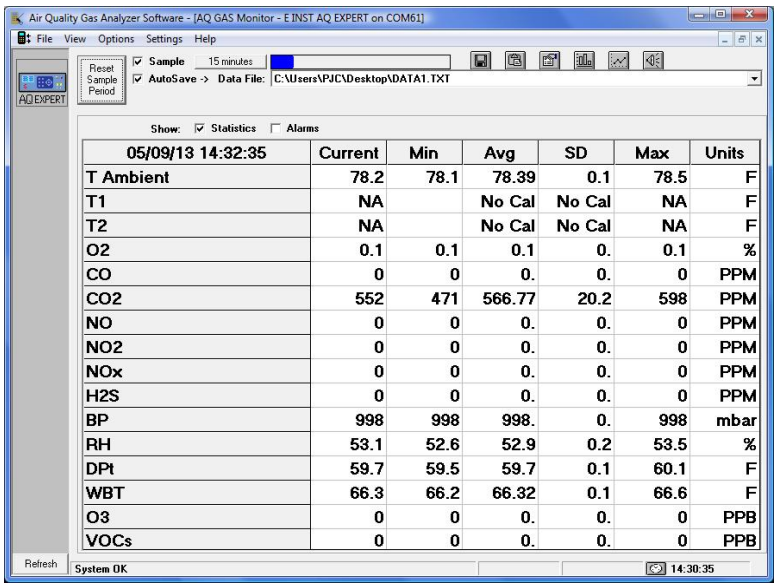
- Go to the Windows "START" menu, click "RUN" and type **devmgmt.msc** (Or go to the Control Panel, choose the System icon, then the Hardware tab, and click the Device Manager Key).
- A window will open that will list "PORTS" among other items. Click on "PORTS".
- The comport will be listed as:
    - USB Serial Port **(USB)**
    - Standard Serial over Bluetooth® link **(Bluetooth®)**

2. USING SI-AQ PCSOFT SOFTWARE

You can enhance the performance and versatility of the SAUERMANN SI-AQ COMFORT by using the SI-AQ PCSOFT software program. SI-AQ PCSOFT is available for most Windows operating systems.

The SI-AQ PCSOFT software is a robust package that allows you to:

1. Monitor all Air Quality parameters.
2. Record maximum, minimum, average for all Air Quality parameters.
3. Select a variety of saving and printing options.
4. Retrieve stored data.
5. Set alarms for every air quality parameter including recording the time duration that alarms have been exceeded.



05/09/13 14:32:35	Current	Min	Avg	SD	Max	Units
T Ambient	78.2	78.1	78.39	0.1	78.5	F
T1	NA		No Cal	No Cal	NA	F
T2	NA		No Cal	No Cal	NA	F
O2	0.1	0.1	0.1	0.	0.1	%
CO	0	0	0.	0.	0	PPM
CO2	552	471	566.77	20.2	598	PPM
NO	0	0	0.	0.	0	PPM
NO2	0	0	0.	0.	0	PPM
NOx	0	0	0.	0.	0	PPM
H2S	0	0	0.	0.	0	PPM
BP	998	998	998.	0.	998	mbar
RH	53.1	52.6	52.9	0.2	53.5	%
DPt	59.7	59.5	59.7	0.1	60.1	F
WBT	66.3	66.2	66.32	0.1	66.6	F
O3	0	0	0.	0.	0	PPB
VOCs	0	0	0.	0.	0	PPB

6. Plot bar graphs and time plots of all air quality parameters.

The SI-AQ PCSOFT software can be downloaded from the included USB Thumb Drive.

Windows 8 users may have to load drivers from the following link:
http://www.makeuseof.com/tag/how-can-i-install-hardware-with-unsigned-drivers-in-windows-8/

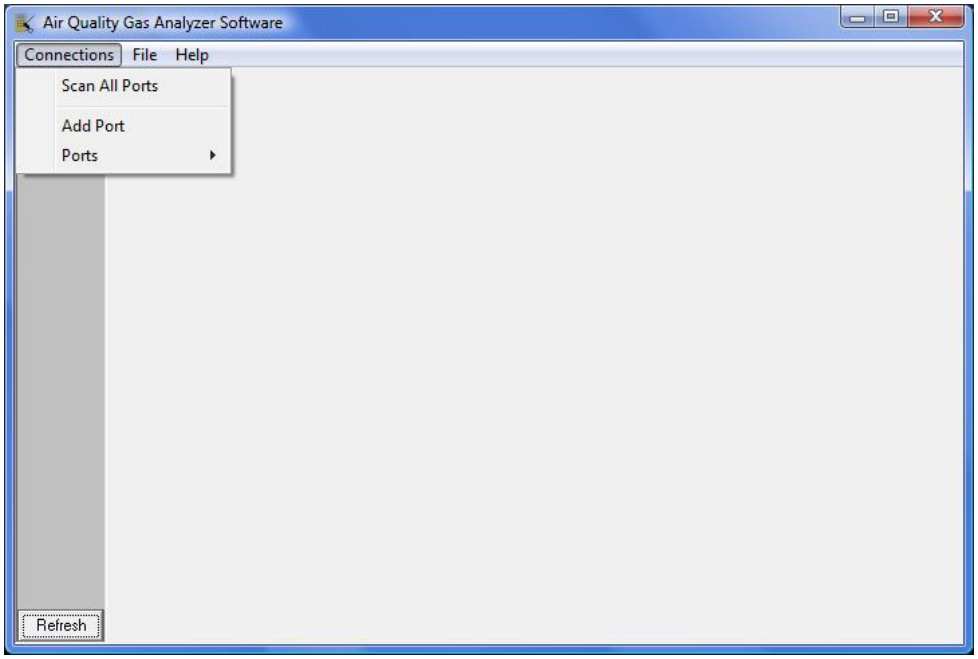
Consult the SI-AQ PCSOFT manual for details on installing and operating the program. The manual can be accessed by clicking on "Help" and then "How Do I…" in the SI-AQ PCSOFT software program.

STARTING SI-AQ PCSOFT

1 Before starting SI-AQ PCSOFT, have your SI-AQ COMFORT turned on and connected via USB or Bluetooth®.

2 Start the SI-AQ PCSOFT Software program. If you have connected before, the monitor icon will automatically appear. If this is the first time you are connecting, you will need to add a new port.

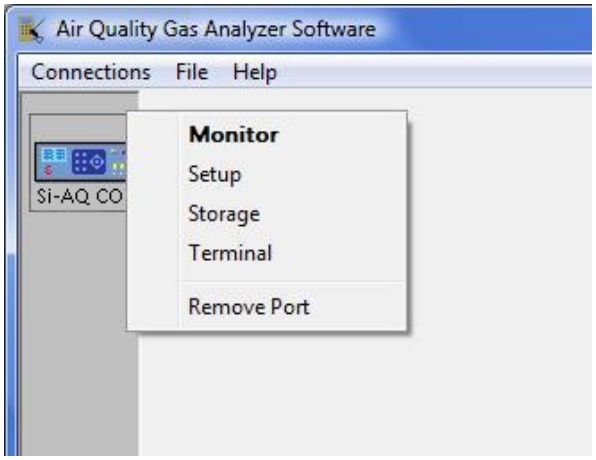
3 On the SI-AQ PCSOFT window click on "Connections", then click on "Add Port".



4 Enter the COM port number which appeared in the Device Manager and click "OK".

5 The COM port with its number should appear on the left side of the SI-AQ PCSOFT window. SI-AQ PCSOFT will look for a monitor on this port. After a moment the SAUERMANN monitor icon should appear. You are now connected to your monitor.

6 Click on the SAUERMANN icon. A menu will appear. Choose "Monitor" from the menu. *(Follow the SI-AQ PCSOFT manual for further instructions).*



CHAPTER 11

MAINTENANCE

The SI-AQ COMFORT Indoor Air Quality Monitor is a sophisticated analytical instrument designed to perform accurate air quality measurements. However, because the monitor is a portable, field/lab used instrument that can be used in many environments, care must be taken to prevent physical and environmental abuse to help maintain trouble-free operation.

There are some components that will require periodic inspection and/or replacement.

INTERVAL*	**ITEM**	**PROCEDURE**
Weekly	ZERO Check of ALL Gas Sensors	Perform using ZERO AIR
Annually	SPAN Calibration of ALL Gas Sensors	Send to Sauermann service center

**Note: These stated intervals are dependent on the unit's usage and applications*

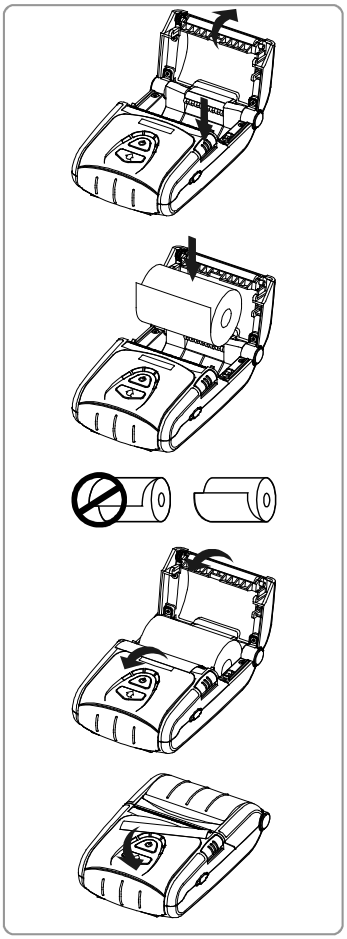
A. Sensor Replacement

Send to Sauermann service center

B. Printer Paper Replacement

The external printer uses a high quality 2" thermal paper. Keep any spare paper rolls in a cool dark place to prevent paper discoloration.

1) Press the open key on the printer to open the paper cover
2) Insert the paper as shown in the image. Remove any remaining core of a used paper roll.
3) Make sure to align the paper roll properly.
4) Pull the paper out as shown in the image and close the cover.
5) Tear off any excess paper in the direction of the side of the printer.



CHAPTER 12

SI-AQ COMFORT OPTIONS

The SAUERMANN' SI-AQ COMFORT is an extremely versatile Indoor Air Quality (IAQ) measurement system that meets many Air Quality measurement requirements. It has been designed as a modular system, permitting the installation of most of the various available options. This manual describes the complete instrument equipped with all the options.

The SI-AQ COMFORT's standard capabilities include one (1) NDIR CO_2 sensor (0-5,000 ppm), Ambient Temperature, Relative Humidity, Wet Bulb, Dew Point, one (1) separate Type K (TcK) thermocouple temperature measurement input, Air Velocity measurements, differential pressure measurements, 1000 internal storage tags, Bluetooth® wireless PC communications, REAL-TIME Data Logging capabilities using the Optional SI-AQ PCSOFT Windows software, USB Cable, and extensive user-friendly help screens. The available additional gas sensor options and accessories are:

1. AIR QUALITY MONITOR SENSORS

- Carbon Monoxide (CO) – electrochemical sensor (0-200 ppm)

2. OPTIONAL VINYL CARRYING CASE (Part #: Si-AQ Vinyl case)

Vinyl Carrying Case which protects the SI-AQ COMFORT and any accessories from damage during transportation. Extra inserts for other instruments and accessories.

3. OPTIONAL EXTERNAL MEASURING PROBE (Part #: Si-AQ Probe with Hose)

Certain applications might have the need for the optional probe (12" long stainless steel probe with 10' ft long hose) for hard to reach places, separate areas, etc. The probe consists of the stainless steel extraction probe, the sampling line and a Type K thermocouple for external temperature measurements with the probe.

This standard probe (Part # Si-AQ Probe with Hose) is suitable for temperatures up to 800ºC/1470ºF.

The end of the probe's sampling line connects to the "A" inlet connector on the bottom of the SI-AQ COMFORT and the thermocouple connector connects to the TcK TEMPERATURE 1 input on the bottom of the SI-AQ COMFORT.

4. OPTIONAL L-SHAPED PITOT TUBE (Part #: Si-AQ Pitot Tube)

Pitot tube – This optional L-shaped pitot tube consists of stainless steel tubing with the tips open and bent at a certain angle to properly measure air and/or gas velocities. The Pitot tube must always be oriented with the open tips parallel to the direction of the air flow. The end of the Pitot tube assembly is connected by means of two flexible hoses to a very accurate pressure transducer located inside the monitor.

5. OPTIONAL DIFFERENTRIAL PRESSURE HOSES (Part #: Si-AQ Diff. Press. Kit)

This optional PRESSURE HOSES consist of two (2) clear hoses for either (1) single positive pressure connection, one (1) single negative pressure connection, or (2) hoses for differential pressure using both connections simultaneously. The hoses connect to the (-) and/or (+) PRESSURE connections on the Bottom of the SI-AQ COMFORT.

6. OPTIONAL WIRELESS REMOTE PRINTER (Part #: Si-AQ Bluetooth® Printer)

The SI-AQ COMFORT uses a wireless Bluetooth® remote printer. The printer is powered by a rechargeable battery. An AC charger is supplied with the printer. The printer is optional with the SI-AQ COMFORT. See Chapter 8 for more information

7. OPTIONAL CALIBRATION KIT (ZERO AIR) (Part #: Si-AQ Calibration Kit)

The SI-AQ COMFORT uses a bottled Cylinder of ZERO AIR for ZERO Calibration.

Part #: **Si-AQ Calibration Kit** comes with (1) 17L ZERO AIR Cylinder & (1) Regulator

Part #: **Si-AQ Air** is replacement (1) 17L ZERO AIR Cylinder only

CHAPTER 13

BASIC TROUBLESHOOTING

ZERO ERRORS		
Channel	**Possible Causes**	**Resolution**
(Electrochemical sensors) CO	Sensor has been recently exposed to gas and has not yet returned to zero.	Purge for 10 minutes with fresh air, monitor sensor voltage, and re-zero.
	Insufficient Warm Up	Allow the sensors to warm up after 10 minutes
	Incorrect ZERO calibration	Repeat ZERO cal in fresh air or with ZERO AIR cylinder
	Pump Failed	Check pump flow, if pump failed replace
	Battery was dead, sensor has destabilized.	Charge battery, wait up to 24 hours for sensors to stabilize, and re-zero.
	Sensor cell life has expired.	Call SAUERMANN replacement.
Temperature Thermocouple	Thermocouple is not connected	Check electrical connections running to the probe
Infrared CO_2	No response from infrared system	Zero period must be at least 45 seconds. **Zero the instrument again with a cylinder ZERO AIR**.
	Infrared system is reporting error code	Infrared system may need maintenance.
Velocity	Velocity probe/Pitot Tube is not connected	Check probe and connections.
Bluetooth® connection failure	Connection Failed	Redo connection process
Monitor will not turn on. (Screen is off)	Battery is discharged.	Plug in the charger. Monitor should turn on.
	Battery is not charging.	Check the charger and jack. Check the case for excessive heat.
	Internal initialization problem.	Reset the monitor.
Monitor turns on but screen is blue or faded.	Internal initialization problem.	Reset the monitor.
	Monitor is overheating.	Unplug charger. Turn on & off to reinitialize.

CHAPTER 14

REPLACEMENT PARTS

PART NUMBER	**DESCRIPTION**
Si-AQ CO2 Sensor (0-5000 ppm)	NDIR CO_2 Sensor (0-5000 ppm)
Si-AQ CO Cell (0-200 ppm)	CO Sensor (0-200 ppm)
Si-AQ PCSoft	SI-AQ PCSOFT PC Software Kit with USB cable
Si-AQ Calibration Kit	Calibration KIT – ZERO AIR Cylinder w/ Regulator
Si-AQ Air	Replacement ZERO AIR Cylinder ONLY
Si-AQ Vinyl Case	Vinyl Carrying Case with Shoulder Strap
Si-AQ Bluetooth® Printer	Remote Bluetooth® Wireless Printer
Si-AQ Probe with Hose	12" Probe and 10' hose
Si-AQ Diff. Press. Kit	Differential Pressure Hoses

BE CAREFUL! Material damages can happen, so please apply the precautionary measures indicated.

Once returned, required waste collection will be assured in the respect of the environment in accordance to guidelines relating to WEEE.

www.sauermanngroup.com

NTang – Si-AQ Comfort – 14/11/19 – Non-contractual document – We reserve the right to modify the characteristics of our products without prior notice.