

## Datasheet Evaluation Kit EK-H4

For SHT7x and SHT2x Humidity and Temperature Sensors

- Ready to use Hard and Software
- Suitable for data-logging experiments
- Programmable Interface
- Dew Point and Energy Calculation
- Multiple Multiplexer Boxes with Sensors lockable

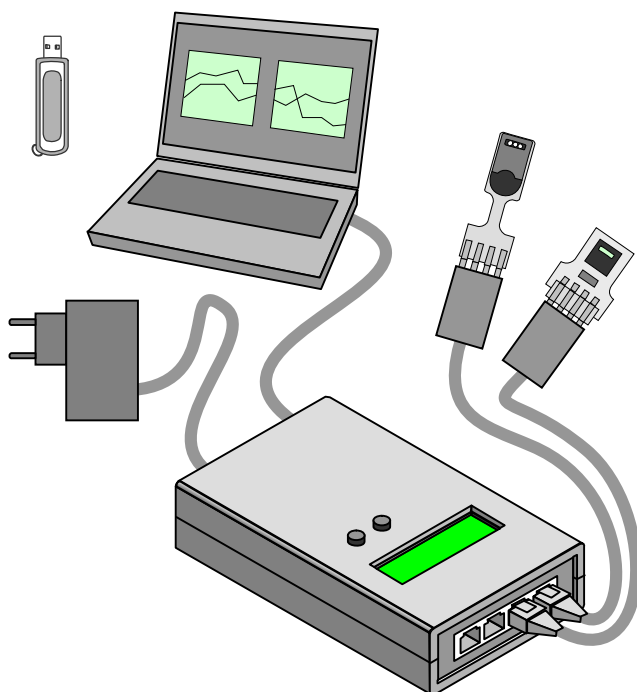


### Product Summary

The evaluation kit EK-H4 is made for running Sensirion's humidity and temperature sensors and display measured values. It is able to communicate with SHT1x, SHT7x as well as the new generation SHT2x and display the measurement values on a display on the multiplexer. The main purpose of the evaluation kit is demonstrating the unique performance of Sensirion's humidity and temperature sensors without any own hard or software design work.

In connection with a computer and specific software supplied with the evaluation kit it may also be used as a data-logger for simple experimental measurements. The multiplexer with 4 ports is connected to the computer via USB interface. The software may record and display humidity and temperature values as well as calculated values of dew point and power consumption. Various multiplexer boxes with sensors may be run by same software across various USB interfaces.

### Set Up



**Figure 1** Schematic of Evaluation Kit EK-H4. Multiplexer box works without connection to computer but using a power plug. Optionally, the multiplexer box may be connected to computer with data-logger software for recording and displaying data readings.

### Material Contents

EK-H4 contains the following components, enclosed in a handy suitcase:

- **1 EK-H4 multiplexer box:** Providing 4 channels for sensor cables, one port for power supply cable and one port for optional USB interface with a computer. Measured values may be read from a display on the multiplexer.
- **4 SHT71 sensors:** Pin type sensor with version 4B sensor chip. Please refer to datasheet SHT7x for more details.
- **4 SHT21 sensors:** SMD type, DFN 3-0 packaged sensors with version 4C sensor chip mounted to small PCB with connector. Please refer to datasheet SHT21 for more details.
- **4 Sensor cables** with RJ45 plug for connecting sensors with multiplexer box of 3m length.
- **1 USB cable** for connection to computer.
- **1 Power supply unit** with US, EU, AU adapter.
- **1 Memory Stick** with multi viewer software for running EK-H4 as a data-logger.

### Device Certification

The Evaluation Kit EK-H4 is RoHS and WEEE compliant.

## Specification

### Electrical specification:

Parameter	min	typ	max	Unit	
External Supply	Input Voltage	8	9	10	V
	Input Voltage Ripple			0.5	V
	Supply Current		170	280	mA
USB Supply	Input Voltage	4.75	5	5.25	V
	Supply Current		170	280	mA
Sensor Supply Voltage	Range	2.1	3.0	3.6	V
	Resolution		0.1		V
	Accuracy		2	5	%
	Output current		40	110 <sup>1</sup>	mA
Temperature Resolution	11		14	Bit	
Humidity Resolution	8		12	Bit	
Measurement interval	1		1440	s	
Communication	USB (via Virtual Com Port (VCP))				
Operating Temperature	0 – 50°C (multiplexer box) -20 – 70°C (cables, sensor)				

### Default Configuration

Initial configuration set for the default mode (values can be changed by using the measurement software)

Parameter	Default value	
Sensor Supply Voltage	3.0 V	
Temperature Resolution	12 Bit	
Humidity Resolution	12 Bit	
Measurement interval	1 s	
Heater	off	
OTP reload	SHT7x	on
	SHT2x	off

### Power Supply

Used Connection	EK-H4 supplied from
DC	DC (9V)
DC and USB	DC (9V)
USB	USB (5V)

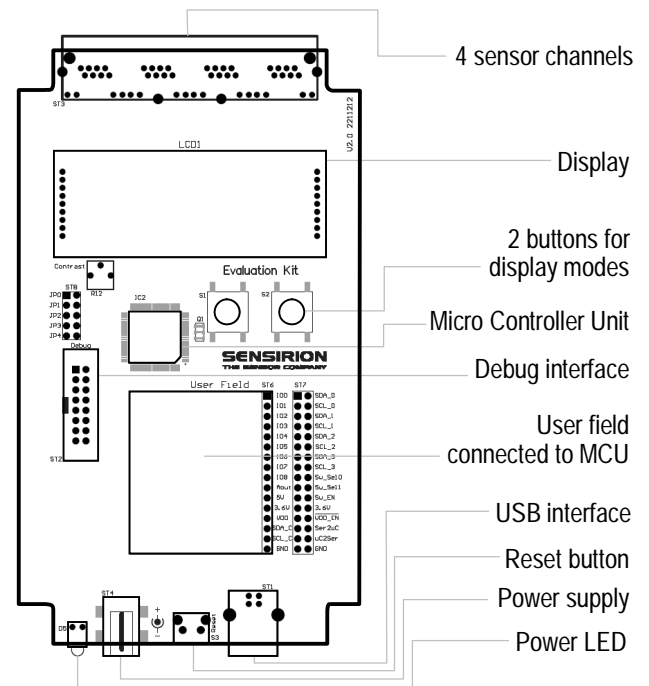
The EK-H4 may be supplied by DC Power Supply Unit at 9V or USB connection at 5V. Power supply by USB is only possible if USB driver is installed correctly.

Pin	Name	Comment
-	GND	Ground
+	Positive Voltage	9V Supply

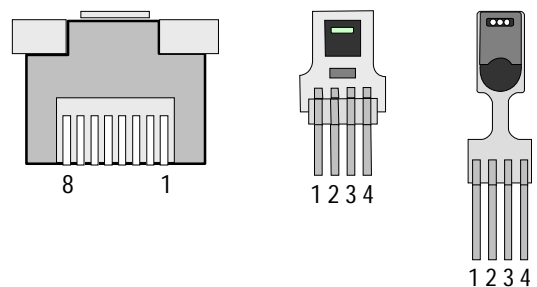
**Table 1** DC Power Supply: Pin Diagram

<sup>1</sup> short circuit current

### EK-H4 Circuit Board



### EK-H4 Pin Assignment



RJ45 Pin	Sensor Pin	Name	Description
1	3	VSS	Ground
3	1	SCL	Serial clock
5	2	VDD	Supply voltage
7	4	SDA	Serial data

**Table 2** Pin Assignments: Female RJ45 pin diagram on the left – SHT21 and SHT71 sensors on the right of the upper panel.

### LED Functions

LED	Function	
Power LED	LED off denotes low supply voltage (DC < 8V, USB < 4.75V) or not connected.	
RJ45 Connector	Green LED	Sensor detected
	Orange LED	Measurement is in progress

# EK-H4 Users Guide

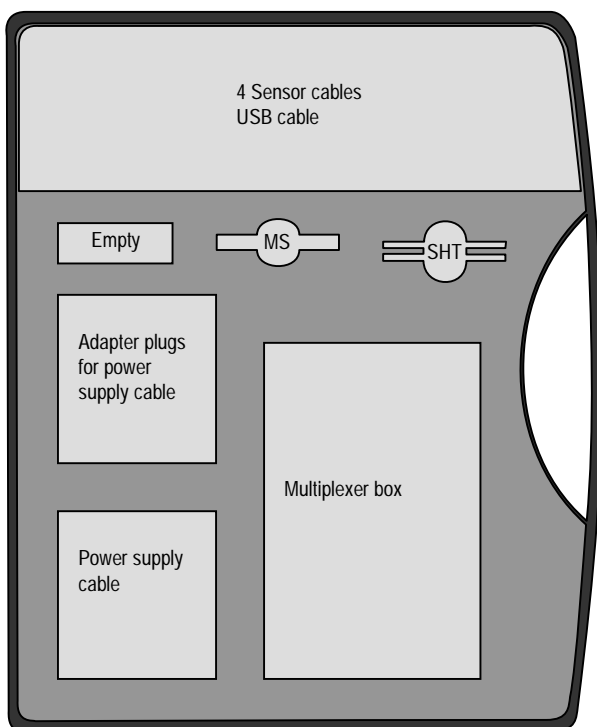
## 1 Evaluation Kit Features

The Evaluation Kit EK-H4 may be used as a stand-alone device, displaying measured values on the screen on the multiplexer box or – connected to a computer – as a data-logger run by multi-viewer software.

The stand-alone device displays temperature and humidity values of each connected sensor plus dew-point derived from the two measured values.

Besides the above mentioned values the data-logger software displays calculated absolute humidity and power consumption. Furthermore, supply voltage, sensor resolution and measurement frequency can be chosen in a certain range and the on-chip heater may be plugged on and off. Eventually measured data can be exported for data processing.

## 2 EK-H4 Suitcase



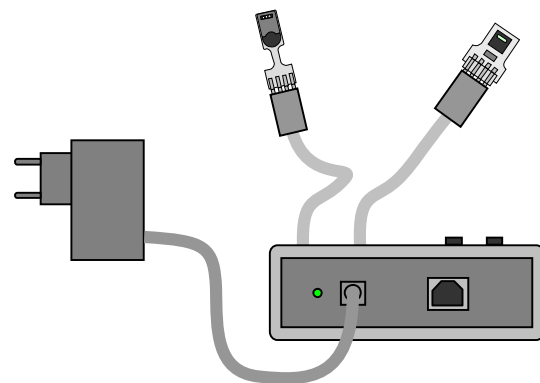
**Figure 2** Contents of EK-H4 suitcase: Respective adapter plug needs to be mounted to power side of power supply cable. Make sure protective plastic cap on power supply cable is removed before doing this. MS = Memory Stick with EK-H4 software and datasheets. SHT = humidity and temperature sensors, SHT71 and SHT21. Sensors are connected to sensor cables and those to the multiplexer box. USB cable is needed to connect the multiplexer box to a computer for data-logging function. One cavity remains empty.

## 3 Stand-Alone Evaluation Kit

### 3.1 Getting Started

Set up and application of the stand-alone device is straight forward:

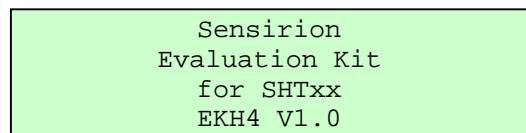
1. Select multiplexer box, power supply cable, sensors with sensor cables as many as needed.
2. Connect sensors via sensor cables to the multiplexer box.
3. Connect multiplexer box via power supply cable to power (voltage supply also may occur via USB cable from a computer). Please note: The specific plug needs to be connected to the power supply cable – the plastic protection cap on cable side must be removed before connecting the plug.
4. As soon as the green LED light is shining, the measurement starts automatically.



**Figure 3** Stand-Alone Evaluation Kit. Voltage supply to be set in the range of AC 80 ... 250V.

### 3.2 Display Information

After powering the EK-H4 as standalone measurement tool the screen shows following information:



The first screen shows an overview over the connected sensors. In the first row the sensor number, which can be matched with the printed number on the cover, is visible. In the second column the temperature is displayed in °C. The third column shows the relative humidity. Not connected sensor ports are displayed with "--.--".

1	25.45°C	45.32%RH
2	--.--°C	--.--%RH
3	24.98°C	46.27%RH
4	25.71°C	45.46%RH

By pressing the buttons the displayed information can be switched from all sensors to the respective single sensors:

Right button: Sensor 1 → 2 → 3 → 4 → all → 1

Left button: Sensor 4 → 3 → 2 → 1 → all → 4

The displayed information by choosing only one sensor is as following:

Sensor 1:	SHT7x
Temperature:	25.45°C
Humidity RH:	45.32%
Dew Point:	16.76°C

If no sensor is connected to the chosen port sensor designation is replaced with "no sens".

To execute a self test for testing the sensor ports and voltage supply both buttons must be pressed for longer than one second. For a successful self test each port requires a sensor to be connected. If no sensor is connected the corresponding port will show an error.

Sens 1: OK	3: OK
Sens 2: OK	4: OK
Sensor Supply	: OK
EKH4 Supply	: OK

By pressing one of the buttons the display information will switch back to the measurement.

## 4 Data-Logger with Software

Using the EK-H4 system as a data-logger requires the installation of the read-out software on a computer and connecting multiplexer box and computer via USB cable. Prior to this a driver installation may be necessary.

### 4.1 EK-H4 Driver Installation

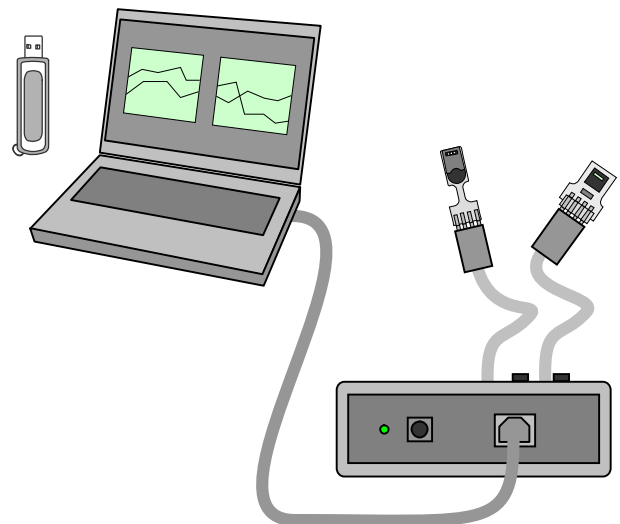
Connect the EK-H4 multiplexer box to the computer via USB cable. EK-H4 uses a Silicon Laboratories CP210x USB to UART bridge controller. If a driver for this controller is not installed yet, a dialog pops up which helps you to search for a driver on the internet. Alternatively, the driver software may be installed from the EK-H4 memory stick.

### 4.2 Read-Out Software Installation

EK-H4 read-out software requires the .NET framework 2.0 or later. If it is not already installed on the computer, it may be downloaded from

<http://www.microsoft.com/downloads/>.

To install the EK-H4 software, simply copy the EK-H4 folder from the memory stick to the hard drive of the computer.

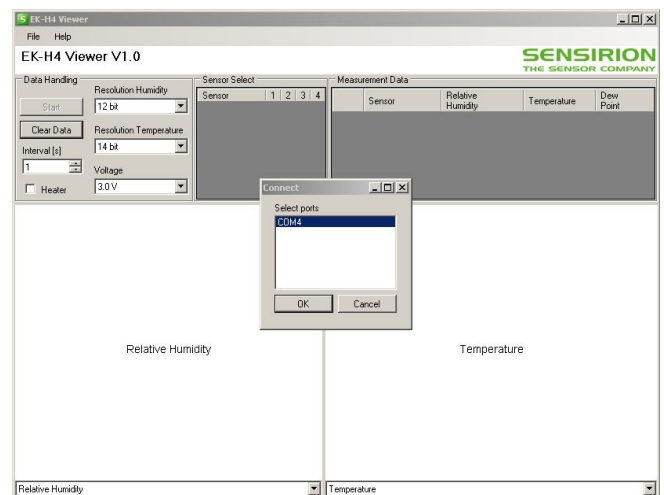


**Figure 4** EK-H4 configuration with connection to read-out software on computer. No additional power supply is needed.

### 4.3 Starting a Measurement

Connect the EK-H4 multiplexer box with a USB cable to the computer and then start the software by double-clicking on **EKH4Viewer.exe**. The connect dialog displays the COM ports to which EK-H4 multiplexer boxes are connected – see Figure 5.

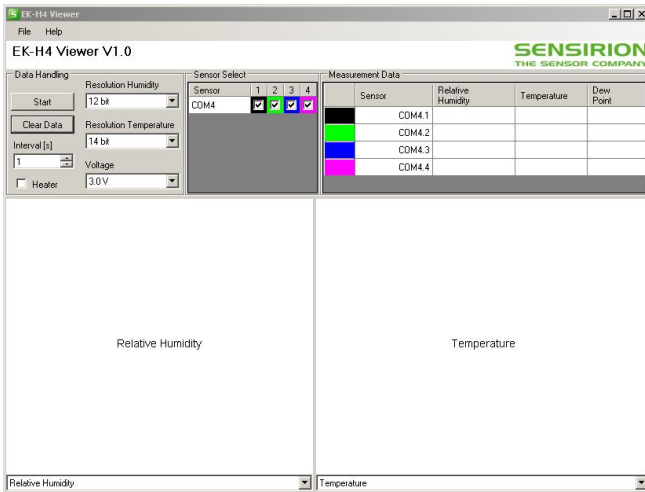
After clicking OK, a connection to the multiplexer box is established and the sensors are listed in the *Sensor Select* and *Measurement Data* sections – see Figure 6.



**Figure 5** Connect dialog of read-out software. Window in the center displays COM ports with multiplexer boxes connected.

### 4.4 Multiple EK-H4 Devices

EK-H4 read-out software is able to read sensors from various EK-H4 multiplexers. The different systems are selected via connect dialog at start-up or using the menu item *File/Connect*. To disconnect EK-H4 systems use the menu item *File/Disconnect*.

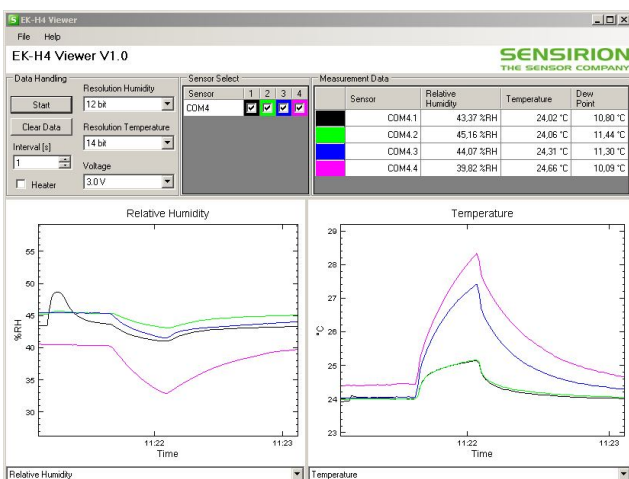


**Figure 6** EK-H4 software window before measurement starts. Sensors are displayed in different colors.

### 4.5 Temperature and Humidity Measurement

Measurements are started and stopped by the *Start/Stop* button. The measured data are displayed in the *Measurement Data* table. The measurements which are displayed in this table can be selected in the context menu which appears when the right mouse button is clicked on the table.

Two plots are available, which display the progress of a measurement over time. The measurement can be selected in the list below the plot. The scale of the axes can be altered by pressing the left mouse button on the axis and moving the mouse. The plot can be dragged using the left mouse button. The right mouse button can be used to display a context menu, which offers functions to print or copy the plot, or to set auto-scale options for the axes.



**Figure 7** Software surface during measurement. Displayed values may be selected via menus at the bottom of the window.

### 4.6 Calculated Values

Relative humidity and temperature data are measured by the sensors. From this data **dew point** and **absolute humidity** values are derived.

**Power consumption** values are calculated based on sensor type and setting parameters. All these entities may be displayed in the graphs – to be selected by the menus at the bottom of the window. Please note: These data are not measured but simulated.

### 4.7 Settings

The *Data Handling* section contains controls for settings which affect all connected sensors. If SHT7x and SHT2x sensors are connected simultaneously only features from SHT7x sensors apply. By using only SHT2x sensors the full range of settings can be used. After disconnection default configuration is put in place.

	SHT2x	SHT7x
Sensor Voltage	2.1...3.6 V	2.1...3.6 V
Temp. resolution	11, 12, 13, 14 Bit	12, 14 Bit
Humidity resolution	8, 10, 11, 12 Bit	8, 12 Bit
Heater	On, Off	On, Off
Measurement interval	1 ... 1440 s	1 ... 1440 s

**Table 3** Parameter ranges for the different sensor types.

### 4.8 Data Logging and Data Export

The data displayed in the measurement plots is kept in memory. The measured values can be exported to a CSV file using the menu item *File/Export Data*. The measurement data can be cleared with the *Clear Data* button. Because the data memory is limited, long-running measurements should be logged directly to disk. Logging can be started and stopped using the menu item *File/Log to File*.

### 4.9 Sensor and EK-H4 Properties

Information about the sensors and evaluation kits can be displayed with the *Properties* command in the context menu of the cells in the *Sensor Select* table.

#### 4.10 License Information

The EK-H4 viewer software uses the NPlot charting library, to which the following license applies:

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## Revision History

Date	Version	Page(s)	Changes
August 2009	1.0	1 – 7	Initial release
May 2010	1.1	2	Operating temperature ranges are defined – replacement for storage conditions

## Important Notices

### Warning, Personal Injury

**Do not use this product as safety or emergency stop devices or in any other application where failure of the product could result in personal injury. Do not use this product for applications other than its intended and authorized use. Before installing, handling, using or servicing this product, please consult the data sheet and application notes. Failure to comply with these instructions could result in death or serious injury.**

If the Buyer shall purchase or use SENSIRION products for any unintended or unauthorized application, Buyer shall defend, indemnify and hold harmless SENSIRION and its officers, employees, subsidiaries, affiliates and distributors against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if SENSIRION shall be allegedly negligent with respect to the design or the manufacture of the product.

### ESD Precautions

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take customary and statutory ESD precautions when handling this product.

See application note "ESD, Latchup and EMC" for more information.

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- such defects shall be found, to SENSIRION's reasonable satisfaction, to have arisen from SENSIRION's faulty design, material, or workmanship;
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