Sensirion RS485 and USB Sensor Cable
SCC1-RS485 and SCC1-USB

- Robust RS485 Interface for bus and long distance communication in demanding environments
- Easy to use USB Interface for laboratory and desktop use
- Applicable to digital SLQ, SLI and SLG64 liquid flow sensors

1 Introduction

The SCC1 sensor cable for Sensirion flow sensors allows the installation and use of I²C based sensors in a demanding industrial automation environment. In addition to the standard commands available in the I²C interface of the sensor, the incorporated microcontroller of the cable provides more complex logic such as a dispense volume totalizer, automatic dispense detection, automatic heater control and data buffer for asynchronous read-out.
Sensirion provides a driver DLL with convenient access functions for use under Microsoft Windows.

2 Pigtail RS485 and USB Versions

The digital SCC1 sensor cable is available in a pigtail variant and in a version with integrated USB plug. The pigtail cable provides an RS485 interface and needs to be powered by 5 V. The USB cable converts the RS485 to the USB interface and is directly powered by the USB port of the host PC.

Both variants are connected to the 4-Pin M8 connector of Sensirion's liquid flow sensors. The interface electronics are molded into the cable. The SCC1-USB has a total length of about 2 meters, the SCC1-RS485 is available with a total length of 2 m or 5 m .

Picture: SCC1 sensor cable connected to sensor with pig tail cable (left) and with USB plug (right). Communication interfaces shown in small print.

3 Available Driver DLL

For use under Microsoft Windows®, Sensirion supplies a driver DLL that offers simple C type functions for direct access from any programming language capable of opening DLLs.

Documentation and sample code for the DLL is available on request

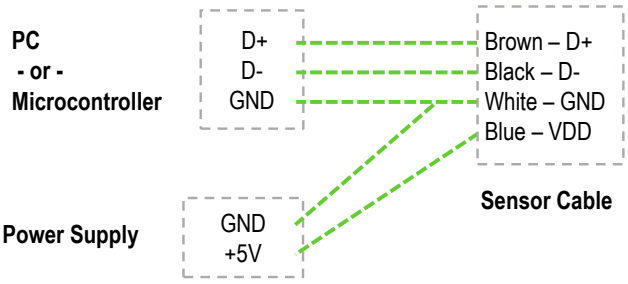
4 Specifications for the SCC1-RS485 Sensor Cable with Pigtail End

RS485 commands in S-HDLC
For use of the cable and sensor with a microcontroller, the Sensirion-HDLC (high level data link control) protocol is used. See separate documentation for SHDCL commands with the RS485 interface.

Pig Tail Pin Assignment
The ends of the pig tail cable can be connected to the RS485 interface of the master system. The assignment is as follows:

Blue	Black	Brown	White
VDD (5V)	RS485 D-	RS485 D+	GND

Warning: Incorrect connection of the cables can cause damages to the cable and the sensor.



Electrical Specifications

Supply Voltage*	5 V (3.5 V - 7 V)
Voltage Stability	+/- 0.3 V < 10 kHz
Typical Power Consumption	100 mW
Maximal Power Consumption	500 mW

*: The minimum supply voltage depends on the sensor the cable is used with.

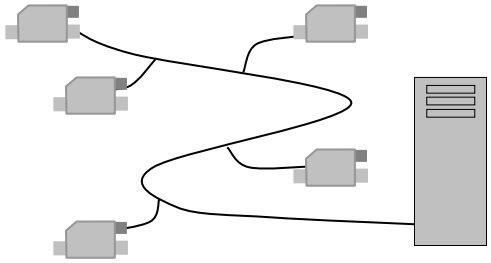
Ground connection
It is necessary to connect the ground of the sensor cable to the ground of the power supply and to the ground of your system's RS485 interface. The sensor cable is not equipped with an opto-coupler or other electrical isolation between the power supply and the communication lines.

Baud Rate and RS485 Address
Available baud rates are: 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200 baud, with a default of 115200.
The default address of the SCC1-RS485 cable is 0.

A configuration software for Windows PC to change the baud rate and/or RS485 address is available on request.

Maximal Number of Devices
The theoretical maximum of devices that can be connected on one bus is 255. However, a large number of devices on the same bus requires a well-designed network layout. Depending on the chosen data-resolution/sampling time of the sensor (e.g. 9-bit data values every 1 ms, or 13-bit data values every 10 ms), the bus bandwidth may limit the number of devices to about 3-5 devices (9-bit) or 30 or more devices (13-bit and above) for a bus with 115'200 kbit/s.

Network Topology
The network has to be designed to suit the application's requirements. The recommended network topology for the RS485 network is a linear, multi-drop configuration with short (1-2 m) branch lines to the sensors.



Picture: Linear, multi-drop topology with short branch lines

Termination Resistor
Termination in RS485 networks is used to avoid signal reflections that cause communication errors. Short networks with few cables may also work without termination but with increasing length and number of sensors the termination of the last sensor of the chain should be turned on. Consult the RS485 user's guide for more details.
It is also possible to terminate the network manually with a 120 Ohm resistor.

5 Specifications for the SCC1-USB Sensor Cable with integrated USB plug

PC Driver
When plugging in the USB cable, the necessary Virtual Com-Port (VCP) driver should be installed automatically. After the driver has been successfully installed, the device appears in the device manager as USB Serial Port. If this does not happen, please install the VCP driver from this place:
http://www.ftdichip.com/Drivers/VCP.htm

COM Port and Baud Rate
The host computer will assign a COM port address to the USB cable. The baud rate is 115'200, Echo is Off, RS485 address is 0.
If more than one USB cable is connected to the same computer, each USB cable will have its own COM port but all cables will have the same RS485 address (0).

6 General Specifications

Temperature Specifications

Operating Temperature*	-25 – +85 °C
Storage Temperature	-40 – +105 °C

*: Check also sensor specifications for operating temperature of sensor.

Placing of incorporated electronics
The electronics of the sensor cable are housed in the molded bulge of the cable. Because of the power consumption of the electronics, the cable can heat up minimally at the bulge when in use. To avoid disturbing the flow sensor's measurement it is not advised to attach the bulge to the flow sensor housing.

Bending and Forces on Cable
Excessive, repetitive bending of the cable at the connections to the molded bulge may lead to cable breakage. Fasten the cable/bulge properly.

Device Certification
The SCC1 sensor cable is RoHS and WEEE compliant. The combination of the RS485 or USB cable with flow meters from the digital SLI-series, SLQ-series and SLG64-series is CE certified, see datasheet of specific flow meter.

7 Ordering Information

Please use the following Product Names and Article Numbers when ordering the SCC1 sensor cable.

Product Name	Product	Article No
SCC1-RS485 2m	SCC1-RS485 Sensor Cable (pigtail end), 2 m length	1-100804-01
SCC1-RS485 5m	SCC1-RS485 Sensor Cable (pigtail end), 5 m length	1-101122-01
SCC1-USB	SCC1-USB Sensor Cable	1-101007-01

8 Important Notices

8.1 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.

8.2 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.

8.3 Warranty

SENSIRION warrants solely to the original purchaser of this product for a period of 12 months (one year) from the date of delivery that this product shall be of the quality, material and workmanship defined in SENSIRION's published specifications of the product. Within such period, if proven to be defective, SENSIRION shall repair and/or replace this product, in SENSIRION's discretion, free of charge to the Buyer, provided that:

- notice in writing describing the defects shall be given to SENSIRION within fourteen (14) days after their appearance;
- such defects shall be found, to SENSIRION's reasonable satisfaction, to have arisen from SENSIRION's faulty design, material, or workmanship;
- the defective product shall be returned to SENSIRION's factory at the Buyer's expense; and
- the warranty period for any repaired or replaced product shall be limited to the unexpired portion of the original period.

This warranty does not apply to any equipment which has not been installed and used within the specifications recommended by SENSIRION for the intended and proper use of the equipment. EXCEPT FOR THE WARRANTIES EXPRESSLY SET FORTH HEREIN, SENSIRION MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE PRODUCT. ANY AND ALL WARRANTIES, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY EXCLUDED AND DECLINED.

SENSIRION is only liable for defects of this product arising under the conditions of operation provided for in the data sheet and proper use of the goods. SENSIRION explicitly disclaims all warranties, express or implied, for any period during which the goods are operated or stored not in accordance with the technical specifications.

SENSIRION does not assume any liability arising out of any application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages. All operating parameters, including without limitation recommended parameters, must be validated for each customer's applications by customer's technical experts. Recommended parameters can and do vary in different applications.

SENSIRION reserves the right, without further notice, (i) to change the product specifications and/or the information in this document and (ii) to improve reliability, functions and design of this product.

8.4 CE, RoHS, REACH and WEEE Statement

The SCC1 series complies with requirements of the following directives and regulations:

CE

- The devices fully comply with norm EN 50081-2 (Emission Test Series), EN 50082-2 (Immunity Test Series) and ESD protection.
- Directive 2011/65/EU of the European Parliament and of the Council of 08.06.2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (**RoHS**); OJ L 174, 01.07.2011, p. 88.
- Regulation 2006/1907/EC of the European Parliament and of the Council of 18.12.2006 on the Registration, Evaluation, Authorisation and Restriction of Chemicals (**REACH**); OJ L 396, 30.12.2006, p.1.
- EU Directive 2002/96/EC on waste electrical and electronic equipment (**WEEE**), OJ13.02.2003; esp. its Article 6 (1) with Annex II.

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