

# Testing Sensirion Devices: Set/Get Address

## Step-by-step guide

### Task:

The task was to change the address of the Sensirion RS485. The first step of this process was to get the current address with the 'GetAddress' file. Information to fulfill the MOSI (master Out Slave In) Frame was found in the Sensirion-HDLC Command Set document and SHDLC Protocol Implementation document. The following shows the methodology done for retrieving the MOSI Frame values for 'GetAddress' and 'SetAddress'. The devices tested were the SLG-0075 and SLI-0430 flow meters; which when in precision mode has a .005 ml/min and .08 ml/min max flow rate, respectively.

### Test Setup:

1. Setup a reliable and previously tested HPLC pump.
2. Connect Sensirion device to HPLC with appropriate hardware.
3. Connect RS485 sensor cable from the Test Station interface to the Sensirion device
4. Open USB/RS485 Sensirion Sensor View software
  - a. From dropdown menu
    - i. Sensor Product: Liquid flow sensor
    - ii. COM Hardware: RS485/USB Sensor Cable
      1. COM Port: COM6
      2. Select 'Scan until first device found'
  - b. In 'Liquid Flow Viewer' page
    - i. Calibration Field allows you to choose in between the two different sensing modes
      1. 0: Precision
      2. 1: Extended
      3. Under measurement Control, select 'Run'
  - c. Compare HPLC readings to values shown in either the Beckhoff software or the Sensirion Sensor View software.

### Methodology:

1. Change portNumber, which is in relation to the USB port
  - a. portNumber = "COM6"
2. To retrieve the MOSI Frame values needed the following was done.
  - a. MOSI Frame Definition:
3. Start:
  - a. **0x7E** (binary 01111110)
4. Adr:
  - a. Need to send command 'GetAddress' to address **0**
  - b. In the future, when more than one Sensirion flow meter is connected, the address will either be 0 or 1.
5. CMD ID:
  - a. Value retrieved from 'Command Set' document, in Section 2.1
  - b. 8 bit Address of RS485 Sensor Cable = **0x90**
6. Length:
  - a. Value retrieved from from 'Command Set' document, in Section 2.1
  - b. Bytes sent = 0/1
  - c. When receiving or requesting, length value = **0**
7. Data
  - a. For SetAddress
  - a. For GetAddress
  - a. MISO Data Byte # = 0
  - b. MOSI Data Byte # = **No data**
  - c. For GetAddress purposes, this line in the text file is deleted.
8. Checksum (0x90):  
  
9:  
  
$$9:2 = 4 + 1$$
$$4:2 = 2 + 0 \quad \text{Binary} = 1001$$
$$2:2 = 1 + 0 \quad \text{Inverse} = 0110 = \mathbf{6}$$
$$1:2 = 0 + 1$$
  - a. Since F=15
    - i.  $6 \times 15 = 90$
    - ii. Checksum = **6F**
9. Stop:
  - a. **0x7E** (binary 01111110)

### Example:

For Sensirion RS485, the following SPECS were inputted from the method shown above. These were then inserted into their respective .txt file.

**GetAddress:**

```
SetResolutionTo14bit = bytearray([0x7E, # Start byte
                                0x00, # Device address
                                0x90, # Command ID
                                0x00, # Data Length, RECEIVING/REQUESTING=0
                                0x6F, # Checksum
                                0x7E])# Stop byte
```

**SetAddress:**


```
SetResolutionTo14bit = bytearray([0x7E, # Start byte
                                0x00, # Device address
                                0x90, # Command ID
                                0x01, # Data Length, RECEIVING/REQUESTING=0
                                0x01, # Data
                                0x6D, # Checksum
                                0x7E])# Stop byte
```

**Note:**

To ensure calibration, the flow meters were connected to a HPLC LC-20AD instrument in the ICL setup room. The HPLC instrument had been previously serviced and calibrated. A range of flow rates were inserted into HPLC device, and the flow meter readouts can be either analyzed through the *Beckhoff Software* or the *Sensirion Sensor View Software*. The values are then compared for accuracy. The following table showcases the calibration run, on 05/20/21, for the SLG-0075 flow meter; which when in precision mode has a .005 ml/min max flow rate. As seen below, the values demonstrated the device was accurate and functioning properly.

HPLC Flow Rate (mL/min)	Software Flow Rate (mL/min)
.005	.0049
.004	.0042
.003	.0034
.002	.0018
.001	.0013

The SLI-0430 liquid flow meter has a max flow rate of .08 ml/min. When tested on 05/20/21 it was determined it was not accurate in the *Beckhoff Software*.



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