RS485 Sensor Cable
Sensirion-HDLC Command Set

Summary

This document describes the UART communication with the Sensirion sensor products via the RS845 Sensor Cable and its Sensirion-HDLC Command Set.

All commands and some basic descriptions of the Sensirion-HDLC protocol (SHDLC are described) for different types of sensors.

These commands are based on the generic protocoll definition of "Sensirion-HDLC" (SHDLC). (see separate documentation)

RECENT CHANGES ON THIS DOCUMENT

Date	Version	Author	Why
13.10.10		UKA	Initial Verion
16.12.10		LWI	Changes in all chapters
11.03.11		LWI	5.1.11 Change description
23.03.11		LWI	5.1.10 Add test in selftest 5.5.1 Changed response time for sensor reset 5.1.10 Changed response time for device reset
11.11.11	2	LWI	Add document version 5.2.8, 5.2.9, 5.2.10 Add Totalizator commands 5.2.12 Add auto detection measurement 5.2.1 Add Status Bit 2+3 5.1.10 Changed description in selftest
26.04.12	3	LWI	5.2.4 Add Start continuous Measurement command with set Resolution, add TriggerContinuousMeasurement 5.2.6 Add Get last Measurement without clear option 5.2.7Add Extended Measurement Buffer command 5.2.13 Add Advanced Measurement configuration 5.5.2 Add Autostart commands
27.08.12	4	LWI	General changes in descriptions 7 Add chapter measurement unit encoding

1   TABLE OF CONTENTS

2   COMMAND OVERVIEW SF04 FLOW SENSORS

This commands are available for flow sensor products based on the SF04 chip used for flow meters and differential pressure sensors. (Sensor type = 0)

2.1   SENSOR CABLE COMMANDS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0xD0	1	String	Get Device Information	Get name, article code and serial number of RS485 Sensor Cable	0	-
0xD1	1	7	Get Version	Get Firmware/Hardware/SHDLC version	0	-
0xD3	0	0	Device Reset	Execute a reset on RS485 Sensor Cable	0	-
0x90	0 / 1	1 / 0	Device Address	8 Bit Address of RS485 Sensor Cable	0	E
0x91	0 / 4	4 / 0	Baudrate	Baudrate of RS485 Interface	0	E
0x92	0	0	Factory Reset	Set back all settings to default values	0	E
0x93	0	4	System up Time	Get the time since device is powered up or reset	0	R
0x20	0 / 1	1 / 0	Termination	Enable or disable the Termination resistor	0	E
0x21	1 / 21	21 / 0	User Data	Save 20 bytes of Userdata in EEPROM	0	E
0x22	0	2	Device Selftest*	Execute an selftest with device	0	-
0x23	0 / 1	1 / 0	Sensor Voltage	Defines the sensor supply voltage	0	E
0x24	0 / 1	1 / 0	Sensor Type*	Defines the sensor type	0	E
0x25	0 / 1	1	Sensor Address*	I²C address for sensor access	0	E
0x26	0	2	Measure Sensor Voltage	Measure the sensor supply voltage of RS485 Sensor Cable	0	-

2.2   MEASUREMENT COMMANDS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0x30	0	1	Sensor Status	Get the status of sensor and continuous measurement.	0	-
0x31	0	0	Start Single Measurement*	Start single measurement	0	-
0x32	0	0 / 2	Get Single Measurement	Read out measurement from sensor if finished	0	-
0x33	0 / 1 / 2 / 3	0 / 2	Start Continuous Measurement*	Start continuous measurement with optional interval and resolution	0	-
0x34	0	0	Stop Continuous Measurement	Stop continuous measurement	0	-
0x35	0 / 1	0 / 2	Get last Measurement	Read out last measurement while continuous measurement	0	-

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0x36	0 / 1	0...254	Get Measurement Buffer	Read out all measurements from buffer	0	-
0x37	0 / 1	1 / 0	Totalizator Status	Enable or disable the totalizator,	0	-
0x38	0	8	Totalizator Value	Get the value of the totalizator	0	R
0x39	0	0	ResetTotalizator	Set the totalizator value to zero	0	-
0x3B	15/6	0	Start Auto Detection Measurement	Start auto detection measurement	0	-
0x3C	0/38	38/0	Advanced Measurement Configuration	Set advanced measurement configuration	0	-

2.3   SENSOR SETTINGS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0x40	0 / 1	1 / 0	Measurement Type*	Measurement type (Flow/Temp/Vdd)	0	R
0x41	0 / 1	1 / 0	Resolution*	Resolution of flow, temperature, and Vdd measurement	0	SR
0x42	0 / 1	1 / 0	Heater Mode*	Heater mode for the flow sensor	0	SR
0x43	0 / 1	1 / 0	Calib Field*	Calibration field of the flow sensor	0	SR
0x44	0 / 1	1 / 0	Factory Settings*	Factory settings of the flow sensor	0	SR
0x45	0 / 1	1 / 0	Linearization*	Linearization of measurement	0	SR

2.4   SENSOR INFORMATION

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0x50	0	21	Sensor Part Name*	Part name of the sensor	0	SE
0x51	0	13	Sensor Item Number*	Item number of the sensor	0	SE
0x52	0	2	Flow Unit*	Flow unit of sensor	0	SE
0x53	0	2	Scale Factor*	Scale factor of active measurement type and calibration field	0	SE
0x54	0	4	Sensor Serial Number*	Sensor serial number	0	SE
0x55	0	1	Measurement Data Type*	Get the datatype of the flow measurements (signed or unsigned)	0	SE

2.5 ADVANCED SENSOR COMMANDS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0x65	0	0	Sensor Reset*	Execute a reset on the sensor	0	-
0x66	0/1...n	101/0	Autostart	Define the command sequence to be executed after powerup	0	E

* Sensor must be idle for execution of this command

E: Eeeprom RS485 Sensor Cable (if a value is set, the continuous measurement is break while value is written to Eeprom)

R: RAM RS485 Sensor Cable

SR: Sensor Register

SE: Sensor Eeprom

3 COMMAND OVERVIEW HUMIDITY SENSORS

This Commands are available for SHTxx Humidity Sensors. (Sensor type = 1)

3.1 SENSOR CABLE COMMANDS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0xD0	1	String	Get Device Information	Get name, article code and serial number of RS485 Sensor Cable	0	-
0xD1	1	7	Get Version	Get Firmware/Hardware/SHDLC Version	0	-
0xD3	0	0	Device Reset	Execute a reset on the RS485 Sensor Cable	0	-
0x90	0 / 1	1 / 0	Device Address	8 Bit Address of RS485 Sensor Cable	0	E
0x91	0 / 4	4 / 0	Baudrate	Baudrate of RS485 Interface	0	E
0x92	0	0	Factory Reset	Set back all settings to default values	0	E
0x93	0	4	System up Time	Get the time since device is powered up or reset	0	R
0x20	0 / 1	1 / 0	Termination	Enable or disable the Termination resistor	0	E
0x21	1 / 21	21 / 0	User Data	Save 20 bytes of Userdata in EEPROM	0	E
0x22	0	2	Device Selftest*	Execute an selftest on the RS485 Sensor Cable	0	-
0x23	0 / 1	1 / 0	Sensor Voltage	Defines the sensor supply voltage	0	E
0x24	0 / 1	1 / 0	Sensor Type*	Defines the sensor type	0	E
0x26	0	2	Measure Sensor Voltage	Measure the sensor supply voltage of RS485 Sensor Cable	0	-

3.2 MEASUREMENT COMMANDS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0x30	0	1	Sensor Status	Get the status of sensor.	0	-
0x31	0	0	Start Single Measurement*	Start single measurement	0	-
0x3A	0	0 / 8	Get single Temperature and Humidity	Read out temperature and humidity from humidity sensor (SHT7x, SHT1x or SHT2x) if finished	0	-

3.3 SENSOR SETTINGS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0x41	0 / 1	1 / 0	Resolution*	Resolution of humitiy / temperature measurement	0	SR

3.4 ADVANCED SENSOR COMMANDS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0x65	0	0	Sensor Reset*	Execute a reset on the sensor	0	-
0x66	0/1...n	101/0	Autostart	Define the command sequence to be executed after powerup	0	E

* Sensor must be idle for execution of this command

E: Eeeprom RS485 Sensor Cable (if a value is set, the continuous measurement is break while value is written to Eeprom)

R: RAM RS485 Sensor Cable

SR: Sensor Register

4   COMMAND OVERVIEW SF05 FLOW SENSORS

This commands are available for flow sensor products based on the SF05 chip. (Sensor type = 2)

4.1   SENSOR CABLE COMMANDS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0xD0	1	String	Get Device Information	Get name, article code and Serial number of RS485 Sensor Cable	0	-
0xD1	1	7	Get Version	Get Firmware/Hardware/SHDLC version	0	-
0xD3	0	0	Device Reset	Execute a reset on the RS485 Sensor Cable	0	-
0x90	0 / 1	1 / 0	Device Address	8 Bit Address of RS485 Sensor Cable	0	E
0x91	0 / 4	4 / 0	Baudrate	Baudrate of RS485 Sensor Cable	0	E
0x92	0	0	Factory Reset	Set back all settings to default values	0	E
0x93	0	4	System up Time	Get the time since device is powered up or reset	0	R
0x20	0 / 1	1 / 0	Termination	Enable or disable the Termination resistor	0	E
0x21	1 / 21	21 / 0	User Data	Save 20 bytes of Userdata in EEPROM	0	E
0x22	0	2	Device Selftest*	Execute an selftest on the RS485 Sensor Cable	0	-
0x23	0 / 1	1 / 0	Sensor Voltage	Defines the sensor supply voltage	0	E
0x24	0 / 1	1 / 0	Sensor Type*	Defines the sensor type	0	E
0x25	0 / 1	1	Sensor Address*	I²C address for sensor access	0	E/R
0x26	0	4	Measure Sensor Voltage	Measure the sensor supply voltage of the RS485 Sensor Cable	0	-

4.2   MEASUREMENT COMMANDS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0x30	0	1	Sensor Status	Get the status of sensor and continuous measurement.	0	-
0x31	0	0	Start Single Measurement*	Start single measurement	0	-
0x32	0	0 / 2	Get Single Measurement	Read out measurement from sensor if finished	0	-
0x33	0 / 2 / 3	0 / 2	Start Continuous Measurement*	Start continuous measurement with interval and optional resolution	0	-
0x34	0	0	Stop Continuous Measurement	Stop continuous measurement	0	-
0x35	0 / 1	0 / 2	Get last Measurement	Read out last measurement while continuous measurement	0	-

0x36	0 / 1	0...254	Get Measurement Buffer	Read out all measurements from buffer	0	-
0x37	0 / 1	1 / 0	Totalizator Status	Enable or disable the totalizator	0	-
0x38	0	8	Totalizator Value	Get the value of the totalizator	0	R
0x39	0	0	ResetTotalizator	Set the totalizator value to zero	0	-

4.3 SENSOR SETTINGS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0x40	0 / 1	1 / 0	Measurement Type*	Measurement type (Flow/Temp)	0	R
0x41	0 / 1	1 / 0	Resolution*	Resolution of flow measurement	0	SR
0x45	0 / 1	1 / 0	Linearization*	Disable linearization of measurement or set default sensor setting for linearization	0	SR

4.4 SENSOR INFOS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0x51	0	13	Sensor Item Number*	Item number of the sensor	0	SE
0x52	0	2	Flow Unit*	Flow unit of sensor	0	SE
0x53	0	2	Scale Factor*	scale factor of current set measurement type	0	SE
0x54	0	4	Sensor Serial Number*	Sensor serial number	0	SE
0x55	0	1	Measurement Data Type*	Get the datatype of the Flow measurements (always unsigned for SF05)	0	SE
0x56	0	2	Offset*	Offset of linearized measurement data	0	SE

4.5 ADVANCED SENSOR COMMANDS

ID	Bytes send	Bytes receive	Name	Comment	Pw level	Storage
0x65	0	0	Sensor Reset*	Execute a reset on the sensor	0	-
0x66	0/1...n	101/0	Autostart	Define the command sequence to be executed after powerup	0	E

* Sensor must be idle for execution of this command

E: Eeeprom RS485 Sensor Cable (if a value is set, the continuous measurement is break while value is written to Eeprom)

R: RAM RS485 Sensor Cable
SR: Sensor Register
SE: Sensor Eeprom

5 COMMAND REFERENCE

If a setting can be set and get, the same Command ID is used with different MOSI Data length.

5.1 SENSOR CABLE COMMANDS

5.1.1 GET DEVICE INFORMATION

Get Device Information		
Description	On this command, the device will return an identification string which contains device type, article code and serial number.	
Command ID	0xD0	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	-
MOSI Data	**Byte #**	**Description**
	0	*Information Type : u8t* This parameter defines which information is requested: 1: Product Name → Name of the connected device 2: Article code 3: Serial number
MISO Data	**Byte #**	**Description**
	0 … n	*Identification : string* String which contains the requested information

5.1.2 GET VERSION

Get Version		
Description	Returns version information of hardware, firmware and SHDLC protocol version.	
Command ID	0xD1	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	-
MOSI Data	no data	
MISO Data	**Byte #**	**Description**
	0	*Firmware Major Version Number : u8t [0…255]*
	1	*Firmware Minor Version Number : u8t [0…99]*
	2	*Firmware in Debug State : bool* If the debug state is set, the firmware is in development state, based on the previous defined version.
	3	*Hardware Major : u8t [0…255]*
	4	*Hardware Minor: u8t [0…99]*
	5	*SHDLC protocol version Major : u8t [0…255]*
	6	*SHDLC protocol version Minor : u8t [0…99]*

5.1.3 DEVICE RESET

Device Reset			
Description	Execute a reset on the device. The device will reply and then do the reset. If the command is sent with broadcast, the reset is done immediately after reception of the command. Wait 100ms before sending the next command to give time to reboot.		
Command ID	0xD3	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	250ms	**Storage**	-
MOSI Data (0 Bytes)	no data		
MISO Data (0 Bytes)	no data		

5.1.4 DEVICE ADDRESS

Set Device Address			
Description	Change the RS485 slave address of the device. The device will reply with old address, then the new address is activated. If the command is sent with broadcast, the new address is activated immediately after reception of the command.		
Command ID	0x90	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	25ms	**Storage**	Device EEPROM
MOSI Data (1 Bytes)	**Byte #**	**Description**	
	0	*Slave Address : u8t [0…254]*	
MISO Data (0 Bytes)	no data		

Get Device Address			
Description	Get the RS485 slave address of device.		
Command ID	0x90	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	Device EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	**Byte #**	**Description**	
	0	*Slave Address: u8t [0…254]*	

5.1.5 BAUDRATE

Set Baudrate	
Description	Change the baudrate of device. The device will reply with old baudrate, then the new baudrate is activated. If the command is sent with broadcast, the new

	baudrate is activated immediately after reception of the command.		
Command ID	0x91	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	25ms	**Storage**	Device EEPROM
MOSI Data (4 Bytes)	**Byte #**	**Description**	
	0…3	*Baudrate: u32t[baud]* The default baudrate is 115200 baud. Available baudrates are: 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200.	
MISO Data (0 Bytes)	no data		

Get Baudrate

Description	Get the Baudrate of the RS485 interface.		
Command ID	0x91	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	Device EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (4 Bytes)	**Byte #**	**Description**	
	0…3	*Baudrate: u32t[baud]*	

5.1.6 FACTORY RESET

Factory Reset

Description	Set back all settings to default values and do a reset. Wait 100ms before sending the next command to give time to reboot. The Factory Reset sets back the following parameter to default values: Baudrate: 115200 Baud RS485 Address: 0 Termination: off Userdata: all to 0x00 I2C Address for Sensor type 0: 64 I2C Address for Sensor type 1: 64 I2C Address for Sensor type 2: 64 I2C Delay: 2 Autostart Commands: 0		
Command ID	0x92	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	100ms	**Storage**	-
MOSI Data (0 Bytes)	no data		
MISO Data (0 Bytes)	no data		

5.1.7 SYSTEM UP TIME

Get System up Time

Description	Get the time since device power up or last reset.		
Command ID	0x93	for Sensor Type	0, 1, 2
Access Level	0	Availability	Always
Response Time max	1ms	Storage	RAM
MOSI Data (0 Bytes)	no data		
MISO Data (4 Bytes)	Byte #	Description	
	0…3	*System up time: u32t[s]*	

5.1.8 TERMINATION

Set Termination

Description	Enable or disable the Termination resistor (120 Ohm) of the RS485 interface and save it in EEPROM.		
Command ID	0x20	for Sensor Type	0, 1, 2
Access Level	0	availability	always
Response Time max	25ms	Storage	Device EEPROM
MOSI Data (1 Bytes)	Byte #	Description	
	0	*Termination : bool*	
MISO Data (0 Bytes)	no data		

Get Termination

Description	Get the Status (enabled / disabled) of the Termination.		
Command ID	0x20	for Sensor Type	0, 1, 2
Access Level	0	Availability	Always
Response Time max	1ms	Storage	Device EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	Byte #	Description	
	0	*Termination : bool*	

5.1.9 USER DATA

Write User Data

Description	Save 20 bytes of Userdata in the EEPROM, there can be stored 5 x 20 bytes in EEPROM		
Command ID	0x21	for Sensor Type	0, 1, 2
Access Level	0	Availability	Always
Response Time max	15ms	Storage	Device EEPROM
MOSI Data (21 Bytes)	Byte #	Description	
	0	*Block Number: u8t [0…4]*	
	1…21	*User Data: 20 x u8t*	

MISO Data (0 Bytes)	no data

Read User Data

Description	Read 20 bytes of Userdata stored in given block number		
Command ID	**0x21**	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	Device EEPROM
MOSI Data (1 Bytes)	**Byte #**	**Description**	
	0	*Block Number: u8t [0…4]*	
MOSI Data (21 Bytes)	**Byte #**	**Description**	
	0	*Block Number: u8t [0…4]*	
	1…21	*User Data: 20 x u8t*	

5.1.10 DEVICE SELFTEST

Device Selftest

Description	Execute a self test of the device. Test the Microcontroller and Sensor supply voltage, EEPROM functionality and Short circuits on I2C Line. During the self test the sensor supply voltage is turned off for testing which produces a hard reset of the sensor.		
Command ID	**0x22**	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Sensor idle
Response Time max	250ms	**Storage**	Device EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (2 Bytes)	**Byte #**	**Description**	
	0,1	*Selftest Result : u16t [bit encoded]* Bit 0: Error with EEPROM Bit 1: Microcontroller supply voltage too high or low Bit 2: Failure on I2C Line Bit 3: Failure on sensor supply voltage	

5.1.11 SENSOR VOLTAGE

Set Sensor Voltage

Description	Set the output voltage for sensor supply to 3.5V or 5V and save to EEPROM.		
Command ID	**0x23**	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	25ms	**Storage**	Device EEPROM
MOSI Data (1 Bytes)	**Byte #**	**Description**	
	0	*Voltage Setting : u8t[0,1]* 0: Sensor Voltage = 3.5V 1: Sensor Voltage = 5V	
MISO Data (0 Bytes)	no data		

Get Sensor Voltage

Description	Get the sensor supply voltage setting.		
Command ID	**0x23**	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	Device EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	**Byte #**	**Description**	
	0	*Voltage Setting : u8t[0,1]* 0: Sensor Voltage = 3.5V 1: Sensor Voltage = 5V	

5.1.12 SENSOR TYPE

Set Sensor Type

Description	Set the Sensor Type and save to EEPROM.		
Command ID	**0x24**	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Sensor Idle
Response Time max	25ms	**Storage**	Device EEPROM
MOSI Data (1 Bytes)	**Byte #**	**Description**	
	0	*Sensor Type: u8t[0…2]* 0: Flow Sensor (SF04 based products) 1: Humidity Sensor (SHTxx products) 2: Flow Sensor (SF05 based products)	
MISO Data (0 Bytes)	no data		

Get SensorType

Description	Get the Sensor Type.		
Command ID	**0x24**	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	Device EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	**Byte #**	**Description**	
	0	*Sensor Type: u8t[0...2]* 0: Flow Sensor (SF04 based products) 1: Humidity Sensor (SHTxx products) 2: Flow Sensor (SF05 based products)	

5.1.13 SENSOR ADDRESS

Set Sensor Address

Description	Set the I^{2}C sensor address to access the flow sensor and save it to Eeprom.

Command ID	0x25		for Sensor Type	0, 1(for Firmware ≥1.4), 2
Access Level	0		Availability	If sensor idle
Response Time max	25ms		Storage	Device EEPROM
MOSI Data (1 Bytes)	Byte #	Description		
	0	*Sensor Address: u8t[0…127]* default: 64		
MISO Data (0 Bytes)	no data			

Get Sensor Address

Description	Get the I²C sensor address to access the flow sensor.			
Command ID	0x25		for Sensor Type	0, 1(for Firmware ≥1.4), 2
Access Level	0		Availability	Always
Response Time max	1ms		Storage	Device EEPROM
MOSI Data (0 Bytes)	no data			
MISO Data (1 Bytes)	Byte #	Description		
	0	*Sensor Address: u8t[0…127]*		

5.1.14 MEASURE SENSOR VOLTAGE

Measure Sensor Voltage

Description	Measure the output voltage of the Sensor Cable, typical accuracy is ±100mV, max. ±400mV.			
Command ID	0x26		for Sensor Type	0, 1, 2
Access Level	0		Availability	always
Response Time max	1ms		Storage	-
MOSI Data (0 Bytes)	no data			
MISO Data (2 Bytes)	Byte #	Description		
	0…1	*Output Voltage in mV : u16t*		

5.2 SENSOR COMMANDS: MEASUREMENTS

5.2.1 SENSOR STATUS

Get Sensor Status			
Description	Get the status of the sensor and continuous measurement.		
Command ID	**0x30**	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	Device RAM
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	**Byte #**	**Description**	

	0	*Sensor Status : u8t [bit encoded]*
		Bit 0: 0: Sensor idle
		           1: Sensor Busy
		Bit 1: 0: Continuous Measurement disabled
		           1: Continuous Measurement enabled
		Bit 2: (for Firmware ≥ 1.3)
		           0: Auto detection Measurement disabled
		           1: Auto detection Measurement enabled
		Bit 3: (for Firmware ≥ 1.3)
		           0: No Auto Measurement since last read out Status
		           1: Auto Measurement finished since last read out
		              Status, is set back to 0 after read out	

5.2.2 START SINGLE MEASUREMENT

Start Single Measurement			
Description	Start single Measurement, result must be read out with "get single Measurement". For Sensortype 1 the command "Get single Temperature and Humidity" must be used for readout.		
Command ID	**0x31**	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	Sensor Idle
Response Time max	1ms	**Storage**	-
MOSI Data (0 Bytes)	no data		
MISO Data (0 Bytes)	no data		

5.2.3 GET SINGLE MEASUREMENT

Get Single Measurement			
Description	Read out measurement result from sensor if finished. A single measure must be started before, the finish of measurement can be polled with this command.		
Command ID	**0x32**	**for Sensor Type**	0, 2
Access Level	0	**Availability**	After start single Measurement

Response Time max	1ms		Storage	-
MOSI Data (0 Bytes)	no data			
MISO Data (0 Bytes)	no data (measurement not yet finished or Error)			
MISO Data (2 Bytes)	Byte #	**Description**		
	0,1	*Measurement result : u16t/i16t (if measurement finished)*		

5.2.4 START CONTINUOUS MEASUREMENT

Start Continuous Measurement				
Description	Start continuous measurement with given interval and clear measurement buffer. The measurements are saved in a buffer, which can be read out with the "Get Measurement Buffer" command. Single measurements while continuous measurement can be read out with command "Get last Measurement". The interval is 0 for measuring as fast as possible, else the minimum interval depends on the selected Resolution.			
Command ID	**0x33**		for Sensor Type	0, 2
Access Level	0		**Availability**	Sensor Idle
Response Time max	1ms		**Storage**	Device Ram
MOSI Data (2 Bytes)	Byte #	**Description**		
	0,1	*Measurement interval: u16t [ms]* 0: as fast as possible **Sensortype 0**: 9 Bit : min. 1ms 10 Bit : min. 2ms 11 Bit : min. 3ms 12 Bit : min. 6ms 13 Bit : min. 10ms 14 Bit : min. 20ms 15 Bit : min. 40ms 16 Bit : min. 80ms **Sensortype 2**: 12/14 Bit: min. 1ms		
MISO Data (0 Bytes)	no data			

Start Continuous Measurement and Set Resolution				
Description	(for Firmware ≥1.4) Start continuous measurement with given interval and Resolution.			
Command ID	**0x33**		for Sensor Type	0
Access Level	0		**Availability**	Sensor Idle
Response Time max	1ms		**Storage**	Device Ram
MOSI Data (3 Bytes)	Byte #	**Description**		

	0,1	*Measurement interval: u16t [ms]* 0: as fast as possible 9 Bit : min. 1ms 10 Bit : min. 2ms 11 Bit : min. 3ms 12 Bit : min. 6ms 13 Bit : min. 10ms 14 Bit : min. 20ms 15 Bit : min. 40ms 16 Bit : min. 80ms
	2	*Resolution: u8t[9…16]*
MISO Data (0 Bytes)	no data	

Trigger Continuous Measurement

Description	(for Firmware ≥1.4) Start the continuous Measurements with the active advanced measurement configuration.		
Command ID	**0x33**	**for Sensor Type**	0
Access Level	0	**Availability**	Sensor Idle
Response Time max	1ms	**Storage**	Device Ram
MOSI Data (1 Bytes)	**Byte #**	**Description**	
	0	*Measurement Mode: u8t* 0: Start measurement with advanced measurement configuration.	
MISO Data (0 Bytes)	no data		

Get Continuous Measurement Status

Description	Get the interval or status of the Continuous Measurement		
Command ID	**0x33**	**for Sensor Type**	0, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	Device Ram
MOSI Data (0 Bytes)	no data		
MISO Data (0 Bytes)	no data (continuous measurement not started)		
MISO Data (2 Bytes)	**Byte #**	**Description**	
	0,1	*Measurement interval: u16t [ms]* (continuous Measurement started) 0: as fast as possible >0: Measurement interval in ms	

5.2.5 STOP CONTINUOUS MEASUREMENT

Stop Continuous Measurement

Description	Stop continuous measurement after the current measurement is finished. The measurement buffer is saved until it is read out or a new continuous measurement is started.

Command ID	0x34	for Sensor Type	0, 2
Access Level	0	Availability	Always
Response Time max	1ms	Storage	Device Ram
MOSI Data (0 Bytes)	no data		
MISO Data (0 Bytes)	no data		

5.2.6 GET LAST MEASUREMENT

Get Last Measurement			
Description	Read out last measurement during continuous measurement. Start continuous measurement before using this command.		
Command ID	0x35	for Sensor Type	0, 2
Access Level	0	Availability	Always
Response Time max	1ms	Storage	Device Ram
MOSI Data (0 Bytes)	no data		
MISO Data (0 Bytes)	no data (Continuous measure not started, first measurement not yet finished or no new measurement available since last command "Get Last Measurement")		
MISO Data (2 Bytes)	Byte #	Description	
	0,1	*Measurement result: u16t/i16t (if new Measurement available)*	

Get Last Measurement without clear			
Description	(for Firmware ≥1.4) Read out last measurement during continuous measurement with configurable clear after read out. Start continuous measurement before using this command.		
Command ID	0x35	for Sensor Type	0, 2
Access Level	0	Availability	Always
Response Time max	1ms	Storage	Device Ram
MOSI Data (1 Bytes)	Byte #	Description	
	0	*Clear Measurement after read out: bool* True: Measurement is cleared after read out (same as "Get last Measurement") False: Measurement is not cleared after read out	
MISO Data (0 Bytes)	no data (Continuous measure not started or first measure not yet finished)		
MISO Data (2 Bytes)	Byte #	Description	
	0,1	*Measurement result: u16t/i16t*	

5.2.7 GET MEASUREMENT BUFFER

Get Measurement Buffer	
Description	Read out the newest 127 measurements and clear the buffer. Use the "Extended Buffer Command" to work with more than 127 buffered measurements. If the returned length is 0, no new measurements are available.

Command ID	0x36		for Sensor Type	0, 2
Access Level	0		Availability	Always
Response Time max	1ms		Storage	Device Ram
MOSI Data (0 Bytes)	no data			
MISO Data	Byte #	Description		
(0…254 Bytes)	0, 1	*Measurement result 0 : u16t/i16t*		
	2, 3	*Measurement result 1 : u16t/i16t*		
	2*x, 2*x+1	*Measurement result x : u16t/i16t*		

Extended Measurement Buffer command

Description	(for Firmware ≥1.4) Commands for read out, clear and get number of available samples in extended buffer. The size of extended buffer is 1000.			
Command ID	0x36		for Sensor Type	0, 2
Access Level	0		Availability	Always
Response Time max	1ms		Storage	Device Ram
MOSI Data (1 Byte)	Byte #	Description		
	0	*Define function: u8t* 0: Get 127 oldest value from extended Buffer 1: Get actual used extended Buffer size 2: Clear extended Buffer		
MISO Data Function 0	Byte #	Description		
(0…254 Bytes)	0, 1	*Measurement result 0 : u16t/i16t*		
	2, 3	*Measurement result 1 : u16t/i16t*		
	2*x, 2*x+1	*Measurement result x : u16t/i16t*		
MISO Data Function 1	Byte #	Description		
(4 Bytes)	0, 1	*Actual used extended Buffer size : u32t*		
MISO Data Function 2 (0 Bytes)	no data			

5.2.8 TOTALIZATOR STATUS

Set Totalizator Status

Description	Enable or disable the Totalizator. The value of the Totalizator is not changed with this command.			
Command ID	0x37		for Sensor Type	0, 2
Access Level	0		Availability	Always
Response Time max	1ms		Storage	Device Ram
MOSI Data (1 Bytes)	Byte #	Description		
	0	*Totalizator Status : bool* false(default): disabled true: enabled		
MISO Data (0 Bytes)	no data			

Get Totalizator Status

Description	Get the Status (enabled / disabled) of the Totalizator.		
Command ID	**0x37**	**for Sensor Type**	0, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	Device Ram
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	**Byte #**	**Description**	
	0	*Totalisator Status: bool*	

5.2.9 TOTALIZATOR VALUE

Get Totalizator Value

Description	Get the value of the Totalizator. This value is the sum of all unscaled measurements while in continuous measurement.		
Command ID	**0x38**	**for Sensor Type**	0, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	Device Ram
MOSI Data (0 Bytes)	no data		
MISO Data (8 Bytes)	**Byte #**	**Description**	
	0…7	*Totalisator: i64t*	

5.2.10 RESETTOTALIZATOR

Reset Totalizator

Description	Set the Totalizator value to zero, the Totalizator Status (enabled/disabled) is not changed. The Totalizator can be reset anytime.		
Command ID	**0x39**	**for Sensor Type**	0, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	Device Ram
MOSI Data (0 Bytes)	no data		
MISO Data (0 Bytes)	no data		

5.2.11 GET SINGLE TEMPERATURE AND HUMIDITY

Get single Temperature and Humidity

Description	Read out temperature and humidity from humidity sensor (SHT7x, SHT1x or SHT2x) if finished. A single measure must be started before, the finish of measurement can be polled with this command. The measurement with high resolution requires a time of max. 400ms(SHT1x, SHT7x) or 110ms(SHT2x), low resolution requires 100ms(SHT1x, SHT7x) or 27ms(SHT2x).		
Command ID	**0x3A**	**for Sensor Type**	1
Access Level	0	**Availability**	After start single Measurement

Response Time max	1ms		Storage	-
MOSI Data (0 Bytes)	no data			
MISO Data (0 Bytes)	no data (measurement not yet finished or Error)			
MISO Data (8 Bytes) (measurement finished)	Byte #	Description		
	0…3	*Temperature in °C : ft*		
	4…7	*Humidity in %RH : ft*		

5.2.12 START AUTO DETECTION MEASUREMENT

Start Auto Detection Measurement Advanced

Description	(for Firmware ≥1.3) Start auto detection measurement for liquid flow dosing applications. This function measures with low precision/power and after detection of a flow above the detection limit, switches automatically to accurate measure mode for the given duration. During accurate measurement the bit 1 of the Sensor Status (5.2.1) is high. After the measurement duration is finished, the Bit 3 in the Sensor Status is set until the Sensor Status is read out the next time. During or after the accurate measurement is running, the measurements can be read out with Get Measurement Buffer command (5.2.7). If enabled, the Totalizator (5.2.8) increases with the measured values only during accurate measurement.			
Command ID	**0x3B**		for Sensor Type	0
Access Level	0		**Availability**	Sensor Idle
Response Time max	tbd. ms		**Storage**	-
MOSI Data (15 Bytes)	Byte #	Description		
	0, 1	*Trigger Limit : u16t [ticks]* Activate measurement if sensor signal in detect mode is greater or equal this value		
	2…5	*Measurement Duration : u32t [ms]*		
	6	*Power Setting: u8t [0…31]* Define following bits in Userregister for Search measurement: (V1.3) Bit 7+8 (factory settings) (≥V1.4) Bit 4…8 (calibfield and factory settings)		
	7, 8	*Search Interval: u16t [ms]*		
	9	*Search Resolution: u8t [9…16 Bit]*		
	10, 11	*Measurement Interval: u16t [ms]*		
	12	*Measurement Resolution: u8t [9…16 Bit]*		
	13, 14	*Pulse Confirmation Period: u16t [ms]* 0: Pulse Confirmation disabled >0: Pulse Confirmation enabled with given time		
MISO Data (0 Bytes)	no data			

Start standard Auto Detection Measurement

Description	(for Firmware ≥1.3) Same function as "Start Auto Detection Measurement Advanced", but the followings setting are set to default values: Power Setting: 0 Search Interval: 10 ms

	Search Resolution: 10 Bit Measurement Interval: 20 ms Measurement Resolution: 14 Bit Pulse Confirmation Period: 100 ms		
Command ID	**0x3B**	**for Sensor Type**	0
Access Level	0	**Availability**	Sensor Idle
Response Time max	1 ms	**Storage**	-
MOSI Data (6 Bytes)	**Byte #**	**Description**	
	0, 1	*Trigger Limit : u16t [ticks]*	
	2…5	*Measurement Duration : u32t [ms]*	
MISO Data (0 Bytes)	no data		

5.2.13 ADVANCED MEASUREMENT CONFIGURATION

Set Advanced Measurement Configuration

Description	(for Firmware ≥1.4) Set the advanced measurement configuration to configure continuous measurement, auto detection, and advanced measurement features. See the dedicated application note for details on the parameters. Note: The commands 'Start Continuous Measurement', 'Start Continuous Measurement and Set Resolution', ' Start Auto Detection Measurement Advanced', and ' Start standard Auto Detection Measurement' will overwrite these settings.

Command ID	**0x3C**	for Sensor Type	0
Access Level	0	Availability	Sensor Idle
Response Time max	tbd. ms	Storage	Device Ram
MOSI Data (38 Bytes)	**Byte #**	**Description**	
	0, 1	*Measurement Config 0:*	*u16t*
	2, 3	*Measurement Config 1:*	*u16t*
	4, 5	*Measurement Config 2:*	*u16t*
	6, 7	*Measurement Config 3:*	*u16t*
	8, 9	*Measurement Config 4:*	*u16t*
	10, 11	*Measurement Config 5:*	*u16t*
	12, 13	*Measurement Config 6:*	*u16t*
	14, 15	*On Trigger Confirmation Time: u16t[ms]*	
	16…19	*Measurement Duration: u32t[ms]* 0 = infinite Measurement duration	
	20, 21	*Off Trigger Confirmation Time: u16t[ms]*	
	22, 23	*On Trigger level:*	*u16t [ticks]*
	24, 25	*Off Trigger level*	*u16t [ticks]*
	26, 27	*High Range:*	*u16t [ticks]*
	28, 29	*Low Range:*	*u16t [ticks]*
	30, 31	*Lowest calibrated Flow:*	*u16t [ticks]*
	32, 33	*Detection Period Time:*	*u16t[ms]*
	34, 35	*Measurement Period Time:*	*u16t[ms]*
	36, 37	*Measurement Selector:*	*u16t*
MISO Data (0 Bytes)	no data		

Get Advanced Measurement Configuration

Description	(for Firmware ≥1.4) Get the actually set measurement configuration. Note: the modes 'Continuous Measurement', 'Auto Detection Measurement Advanced' and 'Standard Auto Detection Measurement' are internally mapped to special cases of the advanced configuration. Their parameter settings can be read out with this command as well.		
Command ID	**0x3C**	for Sensor Type	0
Access Level	0	Availability	Sensor Idle
Response Time max	1 ms	Storage	Device Ram
MOSI Data (0 Bytes)	no data		
MISO Data (38 Bytes)	**Byte #**	**Description**	
	0…37	*For definition see "Set Advanced Measurement Configuration"*	

5.3 SENSOR COMMANDS: SETTINGS

5.3.1 MEASUREMENT TYPE

Set Measurement Type

Description	Set the Measurement Type		
Command ID	**0x40**	**for Sensor Type**	0, 2
Access Level	0	**Availability**	If sensor idle
Response Time max	1ms	**Storage**	Device Ram
MOSI Data (1 Bytes)	**Byte #**	**Description**	
	0	*Measurement Type: u8t[0…2]* 0: Flow (default) 1: Temp 2: VDD	
MISO Data (0 Bytes)	no data		

Get Measurement Type

Description	Get the Measurement Type		
Command ID	**0x40**	**for Sensor Type**	0, 2
Access Level	0	**Availability**	Always
Response Time max	1ms	**Storage**	Device Ram
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	**Byte #**	**Description**	
	0	*Measurement Type: u8t[0…2]* 0: Flow (default) 1: Temp 2: VDD	

5.3.2 RESOLUTION

Set Resolution			29/36

Description	Sensortype 0: Set the resolution of the flow measurement. The resolution of Temp and Vdd measurement is (Resolution-3) Bit .
	 Sensortype 1: Set the resolution of the measurement.
	     Temperature: 12Bit, (Humidity: 8Bit)
	     Temperature: 14Bit, (Humidity: 12Bit)
	 Sensortype 2: Set the resolution of the Flow measurement.		

Command ID	0x41	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	If sensor idle
Response Time max	1ms	**Storage**	Sensor Register
MOSI Data (1 Bytes)	**Byte #**	**Description**	
	0	*Sensortype 0: Resolution: u8t[9…16]* *Sensortype 1: Resolution: u8t[12,14]* *Sensortype 2: Resolution: u8t[12,14]*	
MISO Data (0 Bytes)	no data		

Get Resolution			
Description	Get the resolution of the measurement		
Command ID	0x41	**for Sensor Type**	0, 1, 2
Access Level	0	**Availability**	If sensor idle
Response Time max	1ms	**Storage**	Sensor Register
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	**Byte #**	**Description**	
	0	*Sensortype 0: Resolution: u8t[9…16]* *Sensortype 1: Resolution: u8t[12,14]* *Sensortype 2: Resolution: u8t[12,14]*	

5.3.3 HEATER MODE

Set Heater Mode			
Description	Set the heater mode for the flow sensor		
Command ID	0x42	**for Sensor Type**	0
Access Level	0	**Availability**	If sensor idle
Response Time max	2ms	**Storage**	Sensor Register
MOSI Data (1 Bytes)	**Byte #**	**Description**	
	0	*Heater Mode: u8t[0…2]* 0: always off 1: always on 2: only on for Measurement	
MISO Data (0 Bytes)	no data		

Get Heater Mode

Description	Get the heater mode of the flow sensor		
Command ID	**0x42**	**for Sensor Type**	0
Access Level	0	**Availability**	If sensor idle
Response Time max	1ms	**Storage**	Sensor Register
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	**Byte #**	**Description**	
	0	*Heater Mode: u8t[0…2]* 0: always off 1: always on 2: only on for Measurement	

5.3.4 CALIB FIELD

Set Calib Field

Description	Set the active calibration field of the flow sensor		
Command ID	**0x43**	**for Sensor Type**	0
Access Level	0	**Availability**	If sensor idle
Response Time max	1ms	**Storage**	Sensor Register
MOSI Data (1 Bytes)	**Byte #**	**Description**	
	0	*Calib Field: u8t[0…4]*	
MISO Data (0 Bytes)	no data		

Get Calib Field

Description	Get the active calibration field of the flow sensor		
Command ID	**0x43**	**for Sensor Type**	0
Access Level	0	**Availability**	If sensor idle
Response Time max	1ms	**Storage**	Sensor Register
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	**Byte #**	**Description**	
	0	*Calib Field: u8t[0…4]*	

5.3.5 FACTORY SETTINGS

Set Factory Settings

Description	Set the active factory settings of the flow sensor		
Command ID	**0x44**	**for Sensor Type**	0
Access Level	0	**Availability**	If sensor idle
Response Time max	1ms	**Storage**	Sensor Register
MOSI Data (1 Bytes)	**Byte #**	**Description**	
	0	*Factory Settings: u8t[0…3]*	
MISO Data (0 Bytes)	no data		

Get Factory Settings

Description	Get the active factory settings of the flow sensor		
Command ID	**0x44**	**for Sensor Type**	0
Access Level	0	**Availability**	If sensor idle
Response Time max	1ms	**Storage**	Sensor Register
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	**Byte #**	**Description**	
	0	*Factory Settings: u8t[0…3]*	

5.3.6 LINEARIZATION

Set Linearization

Description	Enable or disable linearization of the flow measurement.		
Command ID	**0x45**	**for Sensor Type**	0, 2
Access Level	0	**Availability**	If sensor idle
Response Time max	1ms	**Storage**	Sensor Register
MOSI Data (1 Bytes)	**Byte #**	**Description**	
	0	*Linearization: bool* false: Raw measurement true: Linearized measurement (for sensor type 2 startup settings are set)	
MISO Data (0 Bytes)	no data		

Get Linearization

Description	Get the Linearization setting of the flow sensor		
Command ID	**0x45**	**for Sensor Type**	0, 2
Access Level	0	**Availability**	If sensor idle
Response Time max	1ms	**Storage**	Sensor Register
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	**Byte #**	**Description**	
	0	*Linearization: bool* false: Raw measurement true: Linearized measurement	

5.4 SENSOR INFORMATION

5.4.1 SENSOR PART NAME

Get Sensor Part Name

Description	Get the part name of the sensor		
Command ID	**0x50**	**for Sensor Type**	0

Access Level	0	Availability	If sensor idle
Response Time max	3ms	Storage	Sensor EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (21 Bytes)	Byte #	Description	
	0…20	*Part Name: String*	

5.4.2 SENSOR ITEM NUMBER

Get Sensor Item Number			
Description	Get the item number of the sensor		
Command ID	**0x51**	for Sensor Type	0, 2
Access Level	0	Availability	If sensor idle
Response Time max	2ms	Storage	Sensor EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (13 Bytes)	Byte #	Description	
	0…12	*Item Number: String*	

5.4.3 FLOW UNIT

Get Flow Unit			
Description	Get the flow unit of the sensor		
Command ID	**0x52**	for Sensor Type	0, 2
Access Level	0	Availability	If sensor idle
Response Time max	1ms	Storage	Sensor EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (2 Bytes)	Byte #	Description	
	0,1	*Flow Unit: u16t* for definition see section 7 *Measurement Unit Encoding*	

5.4.4 SCALE FACTOR

Get Scale Factor			
Description	Get the scale factor of the sensor for the active measurement type and calibration field		
Command ID	**0x53**	for Sensor Type	0, 2
Access Level	0	Availability	If sensor idle
Response Time max	1ms	Storage	Sensor EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (2 Bytes)	Byte #	Description	
	0,1	*Scale Factor: u16t*	

5.4.5 SENSOR SERIAL NUMBER

Get Sensor Serial Number

Description	Get the serial number of the sensor		
Command ID	0x54	for Sensor Type	0, 2
Access Level	0	Availability	If sensor idle
Response Time max	2ms	Storage	Sensor EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (4 Bytes)	Byte #	Description	
	0…3	*Sensor Serial Number: u32t*	

5.4.6 MEASUREMENT DATA TYPE

Get Measurement Data Type

Description	Get the datatype of the flow measurements (signed or unsigned)		
Command ID	0x55	for Sensor Type	0, 2
Access Level	0	Availability	If sensor idle
Response Time max	1ms	Storage	Sensor EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (1 Bytes)	Byte #	Description	
	0	*Data Type : bool* false: (signed i16t) true: (unsigned u16t)	

5.4.7 OFFSET

Get Offset

Description	Get the offset for the flow or temperature measurements.		
Command ID	0x56	for Sensor Type	2
Access Level	0	Availability	If sensor idle
Response Time max	1ms	Storage	Sensor EEPROM
MOSI Data (0 Bytes)	no data		
MISO Data (2 Bytes)	Byte #	Description	
	0,1	*Offset: u16t*	

5.5 ADVANCED SENSOR COMMANDS

5.5.1 SENSOR RESET

Sensor Reset

Description	Execute a hard reset on the sensor and check for correct response.		
Command ID	0x65	for Sensor Type	0, 1, 2
Access Level	0	Availability	Sensor Idle

Response Time max	250ms		Storage	-
MOSI Data (0 Bytes)	no data			
MISO Data (0 Bytes)	no data			

5.5.2 AUTOSTART

Set Autostart

Description	(for Firmware ≥1.4) Define a command sequence to be executed upon start up of the device.			
Command ID	**0x66**		**for Sensor Type**	0, 1, 2
Access Level	0		**Availability**	If sensor idle
Response Time max	50ms		**Storage**	Device EEPROM
MOSI Data (1…101 Bytes)	**Byte #**	**Description**		
	0	*Nbr of Autostart commands : u8t* 0 for disable autostart		
	1…N	*Startup Commands: u8t[]* Max 100 Bytes Structure of Commands | Byte Nr	Descriprion | |---|---| | 0 | Command ID 1 | | 1 | Nbr of Data | | … | Data for command ID 1 | | n | Command ID 2 | | n+1 | Nbr of Data | | … | Data for command ID 2 | | … | … |		
MISO Data (0 Bytes)	no data			

Get Autostart

Description	(for Firmware ≥1.4) Get commands executed after startup of device.			
Command ID	**0x66**		**for Sensor Type**	0, 1, 2
Access Level	0		**Availability**	Always
Response Time max	5ms		**Storage**	Device EEPROM
MOSI Data (0 Bytes)	no data			
MISO Data (101 Bytes)	**Byte #**	**Description**		
	0	*Nbr of Autostart commands : u8t* 0 autostart disabled		
	1…100	*Startup Commands: u8t[]* See "Set Autostart" for Structure		

6 ERRORS

6.1 RS485 COMMUNICATION ERRORS

Code	Name	Meaning
0x00	no error	No error occurred on device/command execution
0x01	wrong data size	A MOSI frame had the wrong size for selected command
0x02	unknown command	Command not supported from device
0x03	no access rights for command	You need higher access rights to execute command
0x04	invalid parameter	One of the parameters for command execution was illegal or out of range
0x05	Wrong checksum	The checksum in MOSI was wrong. (Note: the device will not response in case of this error)

6.2 SENSOR ERRORS

Code	Name	Meaning
0x20	Sensor Busy	command could not be executed because sensor is busy
0x21	No Ack from Sensor	Sensor gives no I2C acknowledge
0x22	I2C CRC false	CRC error while communication with sensor
0x23	Sensor Timeout	Timeout of sensor while measurement
0x24	No Measurement Started	No measure is started
0x25		
0x26		
0x27		
0x28		
0x29		

7 MEASUREMENT UNIT ENCODING

The 16bit flow unit code includes different types of information:

1. Dimensions (e.g. milli, 0.001) (16 possibilities)
2. Time base (e.g. per second) (16 possibilities)
3. Unit (e.g. standard liter) (32 possibilities)

Bit <3:0> (x*1)	Dimension	Prefix
0 – 2	reserved	
3	1e-9	n
4	1e-6	u
5	0.001	m
6	0.01	c
7	0.1	d
8	1	1
9	10	-
10	100	h
11	1000	k
12	1e6	M
13	1e9	G
14 – 15	reserved	

Bit <7:4> (x*16)	Time Base	Comment
0	no time base	e.g. pressure / totalized flow
1	per microsecond	us
2	per millisecond	ms
3	per second	s
4	per minute	min
5	per hour	h
6	per day	day
7 – 15	reserved	

Bit <12:8> (x*256)	Volume / Pressure	Comment
0	norm liter (0°C, 1013 hPa)	nl, typically for gas flow
1	standard Liter (20°C, 1013 hPa)	sl, typ. gas flow
2 – 7	reserved	
8	liter (liquid)	l, typ. liquid flow
9	gram	g, typ. liquid flow
10 – 15	reserved	
16	pascal	Pa, pressure
17	bar	bar, pressure
18	meter H_2O	m H_2O, pressure
19	inch H_2O	in H_2O, pressure
20 – 31	reserved	

Bit <15:13> (x*8192) are reserved

1.1 EXAMPLES

Unit	Code
nl/s	8*256 + 3*16 + 3 = 2099
m³/s	8*256 + 3*16 + 11 = 2107
mln/min	0*256 + 4*16 + 5 = 69
hPa	16*256 + 0*16 + 10 = 4106