

Micro flow sensor

I2C Specification v1.00



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1 Physical Layer

The sensors can be configured to be compatible with I²C protocol implemented with 3.3V levels.

2 Data Layer

2.1 Transmission Mode

The transmission of data is in binary format (hexadecimal) with 8 bits.

Data encoding is small endian.

2.2 Data byte format

Data type	Example hex	Byte 0	Byte 1	Byte 2	Byte 3
Int16	0x1234	0x34	0x12		
Int32	0x12345678	0x78	0x56	0x34	0x12

2.3 Checksum (CRC8)

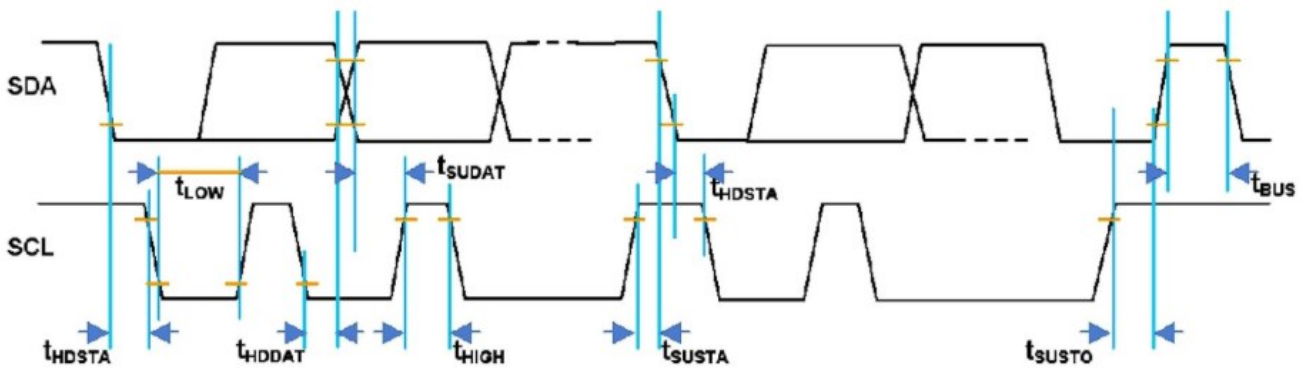
- TBD

2.4 Device Address

Default device address is 0x10.

2.5 I²C Interface and timing

The ultrasonic flow sensor has an I²C-compatible interface which supports 100 kHz bit rates. The I²C slave address is programmed by default on 0x10.



Parameter	Symbol	Min	Max	Unit
SCL clock frequency	fSCL	100	400	kHz
Start condition hold time relative to SCL edge	tHDSTA	0.1		μs
Minimum SCL clock low width 1	tLOW	0.6		μs
Minimum SCL clock high width 1	tHIGH	0.6		μs
Start condition setup time relative to SCL edge	tSUSTA	0.1		μs
Data hold time on SDA relative to SCL edge	tHDDAT	0		μs
Data setup time on SDA relative to SCL edge	tSUDAT	0.1		μs
Stop condition setup time on SCL	tSUSTO	0.1		μs

2.6 I2C Commands

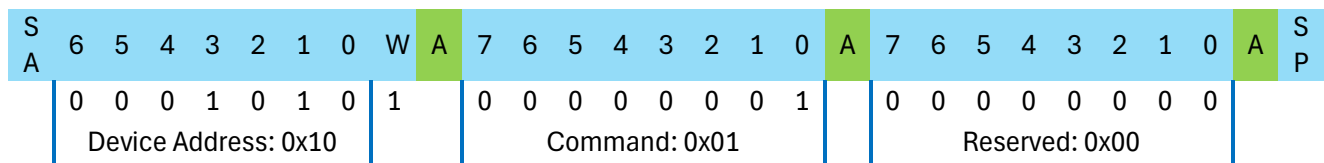
The device supports the following commands:

Command	Description
0x01	Read periodically updated data from the device without setting address counter

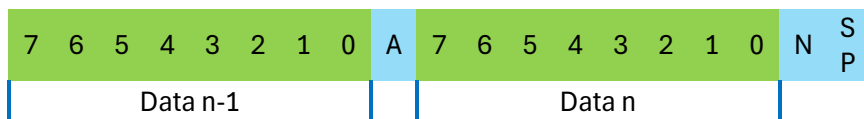
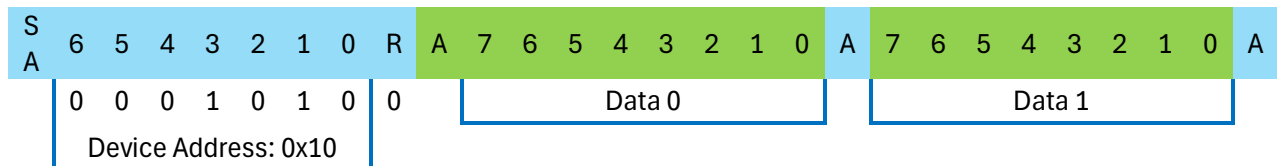
2.6.1 Read periodically updated values

Periodically updated values can be read out by writing 2 bytes (0x01 0x00) to the device and reading out 24 bytes of data from it.

Write command with 2 data bytes to prepare the data for reading:



Read the data from the device (Register map is described in 3.1, number of bytes = 24)



	Master	SA	Start condition	A	Acknowledge
	Slave	W	Write bit	N	Not acknowledge
		R	Read bit	SP	Stop condition

3 Register map

This section describes the register access type and addresses.

3.1 Periodically updated values

Values that are updated after every measurement can be read using 01 function. These registers are read-only.

Register details are presented in the table below:

Address	Register name	Range	Resolution	Unit	Comments
0	Flow rate	Int32	0.01	l/h	
4	Temperature PT1000	Int16	0.01	°C	Physical measured temperature with PT1000
6	Temperature SoS	Int16	0.01	°C	Instant temperature measured out of speed sound
8	Speed of sound	Int16	0.1	m/s	
10	Signal amplitude	Int16	0.1	mV	
12	Bubble detection level	UInt8			0 – No air 1 – Small amount of air 2 – Medium amount of air 3 – High amount of air 4 – Severe / completely air
13	Air Bubble signal	UInt8			0 – No air 1 – Air detected
14	Reserved	Int16			
16	Totalizer 1 Sum volume	Int32	0.1	ml	Long term volume counter
20	Totalizer 2 Sum short volume	Int32	0.01	ml	Short term volume counter that automatically starts from 0ml when flow ≠ 0 L/h

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4 Changelog

Date	Version	Description
2024-05-10	V1.00	<ul style="list-style-type: none">Initial release



About Us

Allengra GmbH, with headquarters in Germany and Romania, was established in 2005 and specializes in the design and production of standard or OEM ultrasonic flow sensors and control valves for liquids and gases, tailored to meet the specific needs of each end client application. Our company manages the entire development process, from concept to serial production, with various engineering departments and prototyping skills at our disposal.

Allengras core technology, ultrasonic metering, has been refined over the years to a level where both high-end device integration and cost-effective applications are achievable. Allengra provides metering and regulating solutions for various industries, including gas heating boilers, automatic coffee machines, robotic scrubbers, and industrial automation, among others.

Über Uns

Die 2005 gegründete Allengra GmbH mit Sitz in Deutschland und Rumänien entwickelt und produziert sowohl Standard- als auch maßgeschneiderte Ultraschall-Durchflusssensoren und Regelventile für Flüssigkeiten und Gase. Allengra vereint alle notwendigen Engineering und Prototyping Fähigkeiten, um die Produkte interdisziplinär und ganzheitlich zu entwickeln. So können auch neue und innovative Ideen schnell und flexibel in robuste Serienprodukte überführt werden.

Allengras Kernkompetenz, die Ultraschall-Durchflussmessung, kann durch die umfangreiche und langjährige Erfahrung mit der Technologie problemlos sowohl in High-End-Produkte als auch in robuste und kostengünstige Serienlösungen integriert werden. Allengra bietet Mess- und Regelungslösungen für Anwendungen in Gasheizkesseln, Kaffeefullautomaten, Bodenreinigungsmaschinen, dem Motorsport, der industriellen Automatisierung und vieles mehr.