

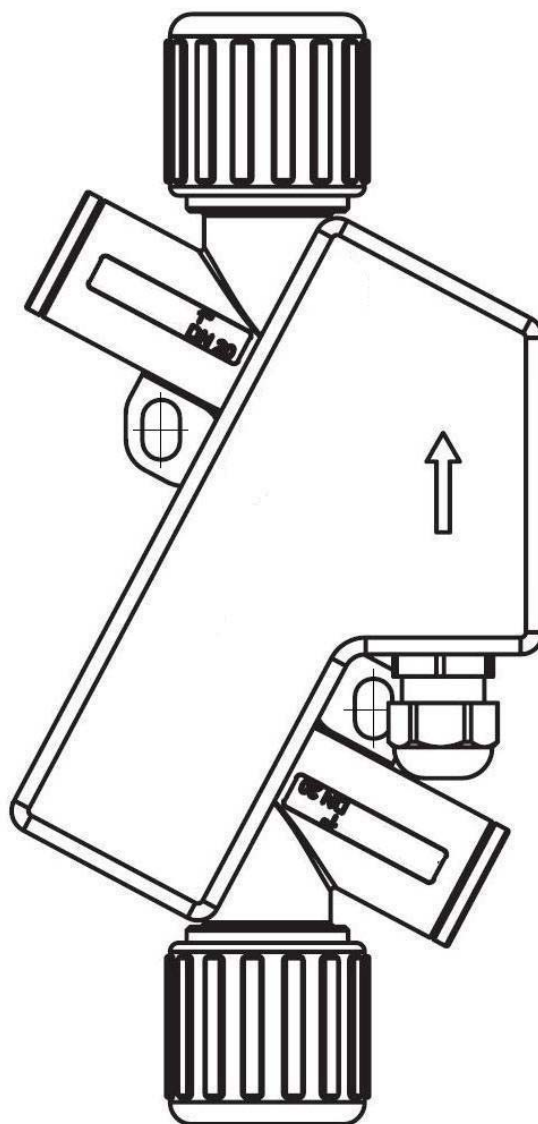
BA 008D/SM400i/05.08

Valid starting from Hardware V 1.3 ff  
Software V 9.5 ff

# Speedmax<sup>®</sup> 400i

## Sonic Speed- / Concentration- measuring device

### Manual



## General Safety Instructions

Always observe the following safety instructions!



### Intended use

- The Speedmax 400i flowmeter may only be used for flow measurement of pure single-phase liquids.
- The Speedmax 400i flowmeter is designed to meet the state-of-the-art safety requirements and complies with the relevant specifications of EN 61010 (corresponding to VDE 0411 "Protection Measures for Electronic Equipment for Measurement, Control, Regulation and Laboratory Procedures").

Please carefully note the information provided in this Operating Manual indicated by the following pictograms:



Hinweis!



Achtung!



Warnung!

- The manufacturer assumes no liability for any damage caused by incorrect use. Modification of the measuring instrument is not permitted unless explicitly specified in this operating manual

### Personnel for installation, start-up and operation

- Mounting, electrical installation, start-up and maintenance of the measuring instrument may only be carried out by trained and qualified personnel authorized by the operator of the facility. Personnel must absolutely and without fail read and understand this operating manual and must observe all instructions contained in the manual.
- The installer must make sure that the flowmeter is correctly wired according to the wiring diagrams

### Technological progress

The manufacturer reserves the right to modify technical data without prior announcement. **MIB** will supply you with all current information and any updates to this operating manual.

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## 1. Planning information

### 1.1 Areas of operation

Speedmax 400i is a measuring device which has especially been developed for measuring the sonic velocity of fluids. Based on the result of this measurement the concentration of two pure fluids can be determined.



Speedmax 400i has the following features:

- No moving parts and, thus, no wear
- High repeatability
- Easy cleaning
- Compact design
- Integrated empty-pipe detection
- Excellent chemical durability

### 1.2 Cleaning

The Speedmax 400i has to be cleaned according „Technische Regeln für Getränkeschankanlagen TRSK 501“. While cleaning the Speedmax 400i is allowed to stay in the pipe. The connections need not to be loosened.

### 1.3 Operational safety

Extensive self tests ensure maximum operational safety.

The degree of protection of the Speedmax 400i is IP 65.

The Speedmax 400i complies with the general EMV interference immunity requirements in accordance with CE, EN 50081-2 and EN 50082-2.

With regard to the low-voltage guideline, the Speedmax 400i complies with the safety requirements according to EN 60601-1.

## 2. Assembly and installation

### 2.1 Installation instructions

An arrow is printed on the nameplate on the front of the Speedmax 400i. The measuring instrument must be mounted so that the product flows through it in the direction of the arrow.



Achtung!

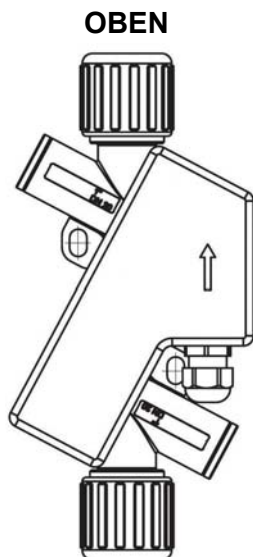


Abb. 2: Installation position of Speedmax 400i

For fastest possible gas detection it is important to keep the pipe distance from tank to Speedmax 400i as short as possible. Accurate measurement can only be guaranteed, if the pipe is completely filled and if it is ensured that the liquid does not outgas.

**Please note that it is absolutely necessary to have a back pressure of at least 0.3 bar rel. (corresponds to 3 m water column) at the outlet of the Speedmax 400i.**



Achtung!

Solid matter particles that are carried along may result in measuring errors.

When using pumps, Speedmax 400i must be installed in flow direction behind the pump, on the pressure side, in order to ensure sufficient pressure. Regard the maximum pressure step of the Speedmax 400i.

## 2.2 Assembly of the measuring device

Speedmax 400i has two ears with 8 mm x 13 mm elongated holes (for dimensions see p. 13, technical specifications) for attachment to a fixed base. These elongated holes allow attachment to on-site constructions.



## 2.3 Electrical wiring

The flow meter must not be installed, wired or disassembled when live (operating voltage). For any of these activities interrupt power supply of Speedmax 400i.

### Connector cable configuration with outlets defined by manufacturer

The outlets may be re-programmed for specific applications

| Cable color  | Funktion  | Beschreibung   |
|--------------|---|--|
| black<br>red | L-<br>L+  | <b>Versorgungsmasse: 0 V</b><br><b>Spannungsversorgung: 20...30 VDC</b>  |
| brown        | Alarm1<br><br>Alternatively:<br>Empty pipe<br>detection,<br>Frequency<br>corresponding to<br>the sonic velocity | Digital output 1 (O1)<br>Limit1 reached<br><br>opto-coupler connecting to Gnd, max. load 80mA.<br>In case of inductive load a freewheeling diode has to be connected antiparallely to the coil.<br>When connecting to a PLC a 5...10 kOhm Pull-Up-Resistor has to be used.<br>(see section 3.2., measuring device functions) |
| orange       | Alarm2<br><br>alternatively:<br>Empty pipe<br>detection   | Digital output 2 (O2)<br>Limit2 reached<br><br>opto-coupler connecting to Gnd, max. load 80mA.<br>In case of inductive load a freewheeling diode has to be connected antiparallely to the coil.<br>When connecting to a PLC a 5...10 kOhm Pull-Up-Resistor has to be used.<br>(see section 3.2., measuring device functions) |
| purple       | Current +   | 4...20 mA<br>Example: 800 m/s => 4 mA,<br>2000 m/s => 20 mA (depending on the<br>adjusted measuring range<br>Alarm => 2 mA   |
| blue         | Current -   | Connected to supply-ground   |
| yellow       | RS 485 A  | Interface for setting parameters, update function,<br>dosing, line A   |
| green        | RS 485 B  | Interface for setting parameters, update function,<br>dosing, line B   |
| white        | Reserve   | No function  |
| grey         | GND O1 und O2   | Common ground for outputs 1 and 2, separated from<br>supply-ground   |

### 3. Commissioning

Attention: while commissioning take care to run the Basic Trim (FlowSoft Medium) with filled device. Repeat this action until Phasewindow and Receiving Amplitude reach a steady value.



#### 3.1 Operation

If necessary the pre-set parameters can individually be adjusted with the help of the integrated interface and the FlowSoft service software. This requires the USB to RS485-Converter Sonic.

The following parameters may be changed to settings suitable for the individual conditions:

- Digital output 1 (O1), frequency, Empty pipe alarm, value limit alarm
- Digital output 2 (O2), Empty pipe alarm, Limit reached
- Analog output, range of sonic velocity 4...20 mA
- Among others, see FlowSoft operating instructions

#### 3.2 Measuring device functions and factory settings

##### Digital output 1 (O1)

Digital output 1 may be used as frequency output, empty pipe alarm or for signaling a reached value limit.

It is designed as an optocoupler with npn-transistor and is grounded together with digital output 2. This common ground of the two outputs is galvanically separated from the supply ground.

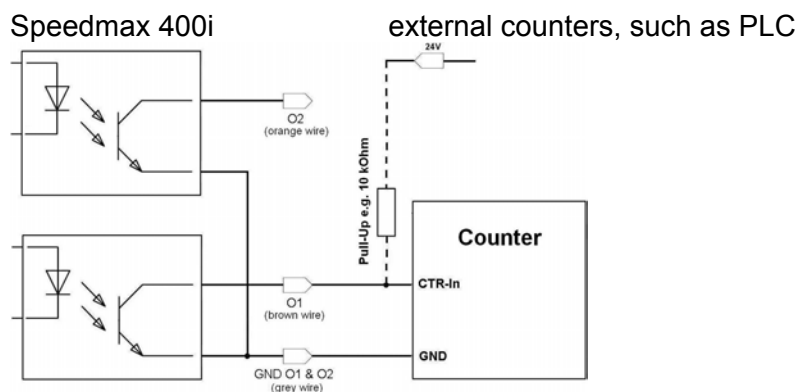


Fig. 3: Connection of output 1 at counter input

- Setting range:
- limit value1
  - Output of frequency [1Hz = 1m/s]
  - Empty pipe alarm

Default setting: - limit value



**Digital output 2 (O2)**

Digital output 2 may be used as empty pipe alarm or for signaling a reached value limit.

It is designed as an optocoupler with npn-transistor and is grounded together with digital output 1. This common ground of the two outputs is galvanically separated from the supply ground.

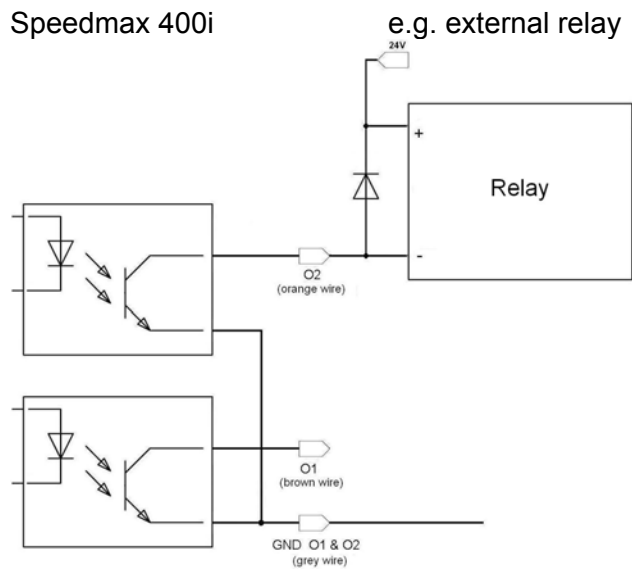


Fig. 4: Connection of output 2 to relay input

Setting range: - limit value2  
 - Empty pipe alarm  
 Default setting: limit value2

## Analog output

The analog output is available as current output or voltage output. Type depending on purchase order. As a standard it comes with current output. It can also be switched off with by using the FlowSoft operating software. This reduces the need off current of the Speedmax 400i.



Note!

The current output outputs flows from 2 to 20mA as measure for the flow or the state of the measuring pipe.

The values here signify

- 20 mA the upper limit of the relevant measuring area
- 4 mA the lower limit of the relevant measuring area
- 2 mA signalizes an empty measuring pipe.

Upper and lower limit parameters can be set freely within the type-specific measuring area of the device. By default 800m/s are set at 4 mA and the 2000 m/s are set at 20 mA.

Setting range: current output, off  
Default setting: current output

Konfiguration: 0...20mA / 4...20mA  
Default setting: 4...20mA

Upper limit: 800...2000 m/s  
Default setting: 2000 m/s

Lower limit: 800...2000 m/s  
Default setting: 800 m/s

## 4. Exchange of measuring device

- Switch off power supply before disconnecting the electrical connections.
- Please note that after exchanging the flow meter
  - a) potentially the programming of the previous flow meter should be taken on.
  - b) a SET quantity has to be set when using the dosing function.



Attention!



Note!

If a change of the configuration of the device is necessary, the FlowSoft programming software and a USB to RS485-Converter as well as a PC are required (see section 6. Accessories).

### Repair, hazardous substances

Before sending the flow meter Speedmax 400i to MIB for repair, the following measures have to be taken:

- Remove any adhering residues of the medium. Fully rinse measuring pipe. Please pay special attention to the area of the process fittings to which residues of the medium to be measured may adhere. This is particularly important, if the medium to be measured is health hazardous.



Attention!

**Not or just insufficiently cleaned devices will be returned to the sender for cleaning without having been checked.**

- Please send a note with the flow meter with a precise description of the error, the application as well as the physical-chemical properties of the medium to be measured.



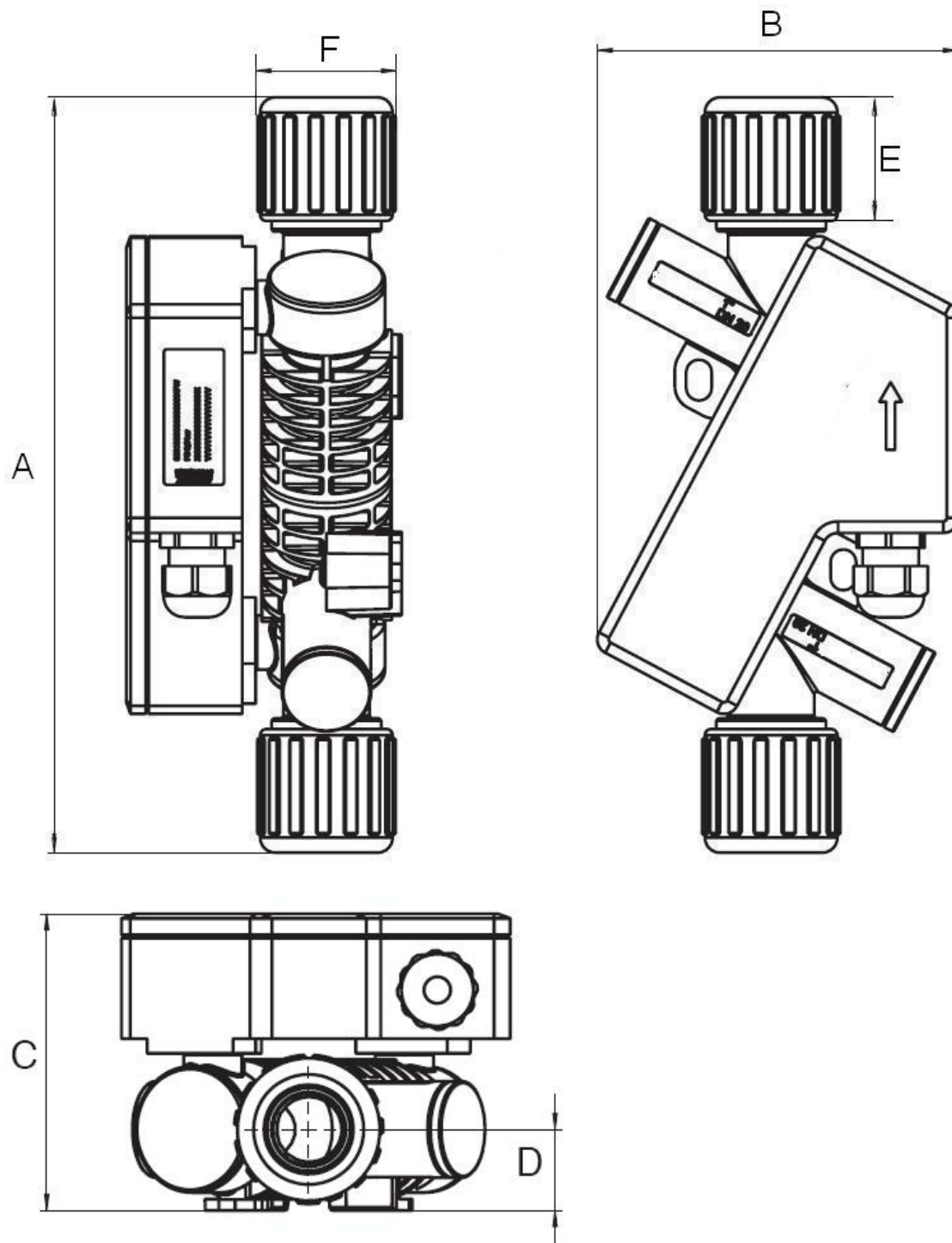
Attention!

The owner of the flow meter will be charged for costs incurred because of inadequate cleaning of the flow meter, for potential disposal or personal injury such as chemical burns etc.

In order to be able to process your repair order fast and smoothly it is important that you name a contact person including phone and fax number as well as e-mail address, who is able to answer potential technical questions of our service and support staff.

## 5. Technical specifications

### 5.1 Dimensions and weight



| Nominal width | Length A [mm] | Width B [mm] | Height C [mm] | Height of axis D [mm] | Nut [mm] | Height Nut [mm] | Weight [kg] |
|---------------|---------------|--------------|---------------|-----------------------|----------|-----------------|-------------|
| 3/8"          | 218,0         | 120,0        | 79,0          | 16                    | 24       | 28              | 1,1         |
| 1/2"          | 219,5         | 120,0        | 79,0          | 16                    | 27       | 31,5            | 1,1         |
| 3/4"          | 227,0         | 120,0        | 82,0          | 19                    | 35       | 33              | 1,1         |
| 1"            | 251,0         | 120,0        | 91,5          | 25                    | 46       | 41,5            | 1,3         |

## 5.2 Technical specifications

### Housing

|                    |  |
|--------------------|--|
| Nominal Diameters  | 3/8", 1/2", 3/4", 1"   |
| Connection         | Flare  |
| Medium temperature | 0...+60°C  |
| Protection class   | IP 65  |
| Pressure nominal   | PN 6   |
| Material           | all parts in contact with medium made of PFA<br>Flare nut: PFA<br>Elektronic Housing: PP |

### Elektronics

|                     |   |
|---------------------|---|
| Power supply        | 20...30VDC, 2W  |
| Connection          | 10-wire Teflon cable, length: 5.0m  |
| Ambient temperature | -20....+60°C  |
| Current output      | 4...20 mA, start and end values adjustable, ground connected to supply ground   |
| Frequency output O1 | via optocoupler galvanically separated switching output, max. 30VDC, max. 80mA, common ground with O2, independent from supply ground |
| Alarm output O2     | via optocoupler galvanically separated switching output, max. 30VDC, max. 80mA, common ground with O1, independent from supply ground |
| Data interface      | RS 485  |
| Measurement error   | ± 1% v.M  |
| Measuring range     | all nominal diameters<br>800...2000 [m/s]   |
| Repeatability:      | 0.5%  |

The measuring system Speedmax 400i complies with the EMC requirements EN 50081 parts 1/2 as well as EN 50082 parts 1/2. It is in conformity with the requirements of the EC directives and has the CE label.

## 6. Accessories

### Flowview 2i

Evaluation and management unit for up to 2 ultrasonic volume flow meters Speedmax

Ordercode 908760

To connect a Speedmax 400i to a Flowview 2i a Flowmax-Plug is needed.

### Flowview 10S

Evaluation and management unit for up to 10 ultrasonic volume flow meters Speedmax

Ordercode 908751

To connect a Speedmax 400i to a Flowview 2i a Flowmax-Plug is needed.

### Flowmax-Plug

To connect a Speedmax 400i to a Flowview 10S or Flowview 2i use a Speedmax-Plug.

Ordercode 507330

### Connecting the Plug

| Cable Color | Pin-No. | Function          |
|-------------|---------|-------------------|
| Red         | 2       | Power Supply +24V |
| Black       | 5       | Power Supply 0V   |
| Yellow      | 4       | RS485 – A         |
| Green       | 3       | RS485 – B         |

### Tank Disposition

Windows software for retrieving the volume flows registered in Flowview 10S, can be processed e.g. with Excel or Access

Ordercode 908720

### USB-to-RS485-Converter Sonic

Interface converter from USB to RS485 with spring terminal connection for quick-connection of Speedmax 400i and **FlowSoft / part 1**, PC software for configuration of ultrasonic volume flow meter Speedmax 400i

Ordercode 908726



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