

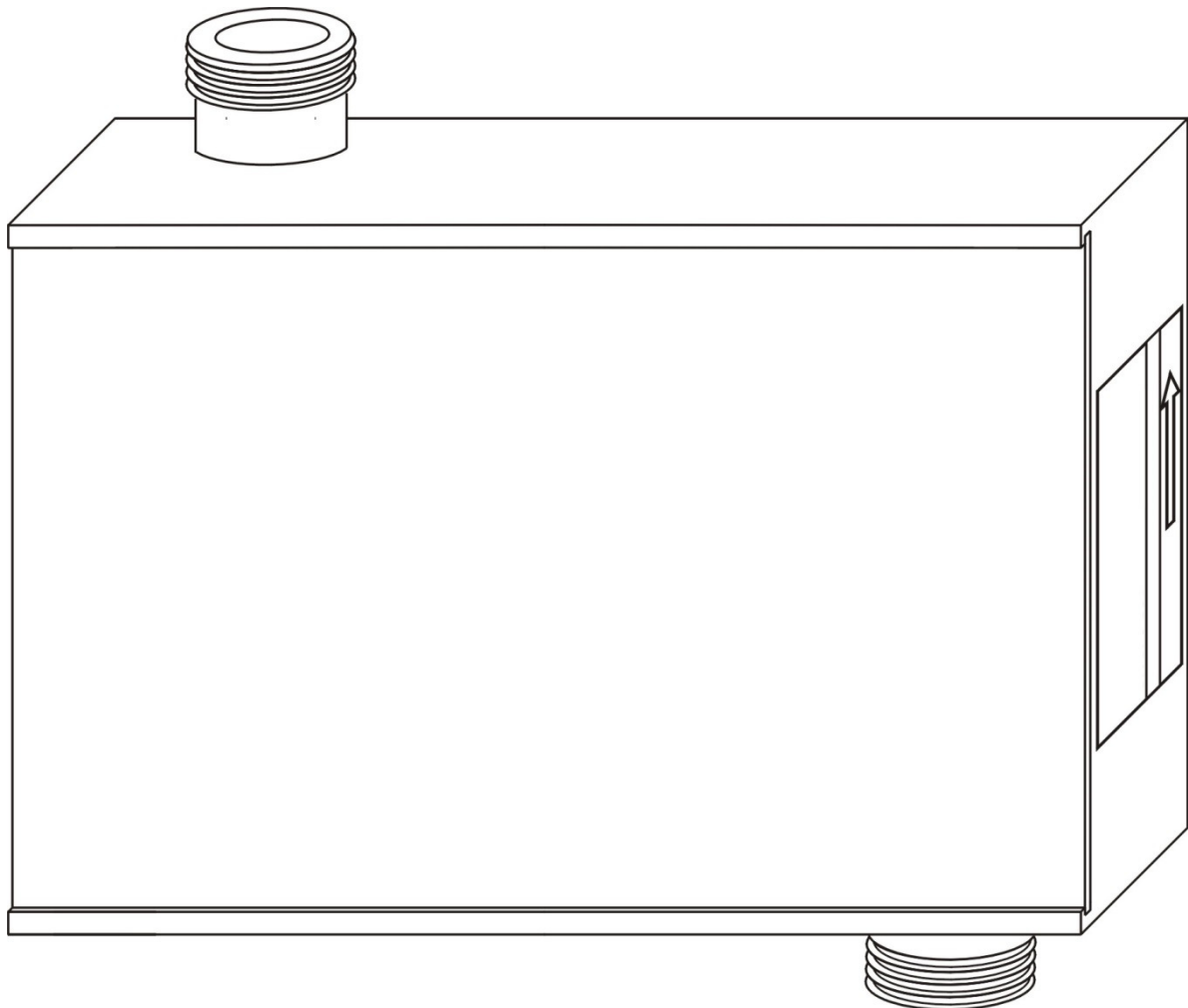
BA 010E/FM30S/01.18

Valid starting from
Hardware V 2.0
Software V 129

Flowmax[®] 30S

Ultrasonic Flowmeter

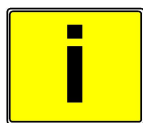
Operating manual



General safety instructions

Please always observe the following safety instructions!

Please pay attention to the safety instructions with the following pictograms and signal words in these operating instructions:



IMPORTANT!

IMPORTANT! indicates situations or cases which, if not avoided, could result in damage or failure of the Flowmax 30S equipment.



WARNING!

WARNING! indicates general hazardous situations or cases which, if not avoided, could result in serious injury or death.

NOTICE!

NOTICE! is used to lead users to helpful information not related to personal injury.

Intended use

- The flowmeter Flowmax 30S may only be used for measuring the flow of pure, homogeneous liquids.
- The Flowmax 30S is not intended for use in medical applications.
- The volume flowmeter Flowmax 30S is built operationally safe in accordance with the latest state of the art technologized developments and industry standard EN 61010 regulations (corresponds to VDE 0411 "Safety specifications for electrical measurement, control and laboratory devices").
- The manufacturer is not liable for any injury, damage or harm due to inappropriate or unintended use or modifications of the flowmeter. Conversions and/or changes to the flowmeter may only be made, if they are expressly performed in accordance with the operating instructions in this operating manual.

Personnel for installation, commissioning and operation

- **Assembly, electrical installation, commissioning and maintenance of the flowmeter must be carried out by qualified, trained personnel. The qualified personnel must have read and understood the operating instructions in this operating manual and must follow the operating instructions in this manual.**
- **The installer has to ensure that the flowmeter is correctly connected according to the electrical connection diagrams in this operating manual.**
- **Serious injury or death from electric shock may occur if wiring, installation, disassembly or remove of wires is performed while electrical power is energized**



WARNING!

Technological progress

The manufacturer reserves the right to revise, alter, or modify the flowmeter to the most current technology without special prior notice. Further information about the latest updates and potential additions to these operating instructions are available from the manufacturer.

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1. Planning information

1.1 Areas of application

The flowmeter Flowmax 30S is particularly suitable for the measurement of dynamic processes of liquids in a pipe. It is used in beverage dispensing systems

Its performance features are characterized by the following characteristics:

- no moving parts and therefore no wear
- high reproducibility
- easy cleaning
- safe against manipulation
- compact design
- integrated foam-/empty pipe detection
- excellent chemical resistance

1.2 Measuring principle

It usually takes more energy to swim against the flow than with the flow. The ultrasonic flow measurement is based on the phase-difference approach:

Two ultrasonic-sensors located opposite from each other alternatively transmitting and receiving ultrasonic signals. If there is no liquid flow both sensors receive the transmitted ultrasonic signals in the same phase, i.e. without phase difference. If liquid is flowing there is a phase shift. It differs when measured in direction of the flow than when measured against the direction of the flow. This phase difference is directly proportional to the flow rate.

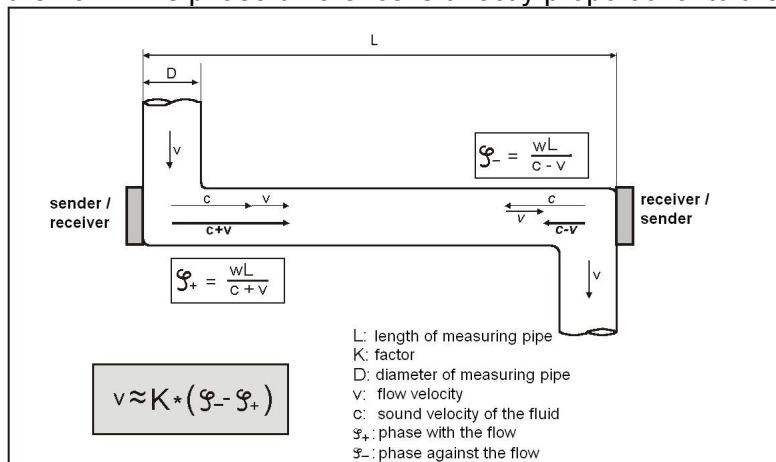


Figure 1: Presentation of the principle of ultrasonic flow measuring

1.3 Cleaning

Flowmax 30S has to be cleaned according technical Rules for beverage dispensing systems TRSK 501“. While cleaning the Flowmax 30S is allowed to stay in the pipe. The connections need not to be loosened.

1.4 Operational safety

Comprehensive self-tests ensure highest possible safety. Faults (process or system errors) are output on a digital output or displayed on the display menu.

The protection class is IP 65.

Flowmax 30S meets the general EMC immunity requirements according to CE, EN 61000-6-3, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6.

Flowmax 30S meets the safety requirements concerning the Protective Extra Low Voltage directive according to EN 50178, SELV, PELV.

**Attention: a max. wire length of 30m has to be complied!
For longer cables a special protection circuit is required!**



IMPORTANT!

2. Assembly and installation

2.1 Installation instructions

An arrow is printed on the nameplate on the front of the Flowmax 30S. The measuring instrument must be mounted so that the product flows through it in the direction of the arrow. For fastest possible gas detection it is important to keep the pipe distance from tank to Flowmax 30S 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.



IMPORTANT!

Notwithstanding it may be advantageous for dosing applications to place the Flowmax 30S as close as possible to the dosing valve, since tubes increase their cross-section depending on the system pressure. This may lead to repeatable differences.

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 Flowmax 30S.



IMPORTANT!

Solid matter particles that are carried along may result in measuring errors. When using pumps, Flowmax 30S 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 Flowmax 30S.

For correct volume flow measurements straight and unobstructed inflow and outflow zones for Flowmax 30S have to be observed. Starting from the connection thread these have to be at least:

	DN 7	DN 10	DN 15
inlet	5 cm	5 cm	40 cm
outlet	0 cm	0 cm	20 cm

2.2 Assembly of the flowmeter

In order to fasten the Flowmax 30S to a solid ground it has two bores with female threads M4 at the front face (for dimensions see section 5, Technical specifications). The housing of the DN15 version has additional bores on its backside. Thus, the mounting to an existing construction is possible. Suitable fixing material for the mounting, e.g. to a wall, can be delivered on demand.



To insulate all surfaces between the connector parts of the hydraulic pipes and the Flowmax elastic gaskets, e.g. of PVC or silicone, should be used. The union nuts must be tightly fastened.



2.3 Electrical wiring

Serious injury or death from electric shock may occur if wiring, installation, disassembly or remove of wires is performed while electrical power is energized.



Always shut off or disconnect electrical power at service panel and lock switch or breaker and tag to prevent energizing electrical power during work or while Flowmax 30S is not assembled and installed.

Wiring installation, disassembly and removal must be performed by qualified persons experienced and knowledgeable about electrical work.



If the original plug is cut attention must be paid to connection polarity and operating voltage!

Take care of the plug position when plugging it into the socket!

Pin configuration of the plug

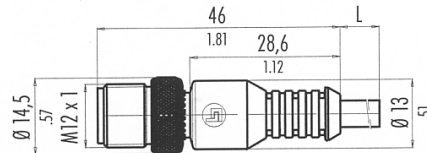
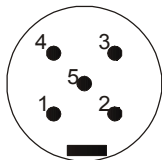


Figure 2: Connection plug / dimensions

Cable colour / PIN	Parameter	Description
white / 2 grey / 5	L+ L-	Power supply: 20...30 VDC / 2 W Ground: 0 V
brown / 1	Pulse output	npn- and pnp-transistor, max. load 100mA. With inductive load use freerun diode antiparallel to coil
blue / 3	Empty pipe alarm	npn-transistor, max. load 100mA. With inductive load use freerun diode antiparallel to coil
black / 4	Communication	Data and configuration port

* with electronic overload protection

3. Commissioning

3.1 Operation

If Flowmax 30S is used as a flow meter in beverage dispensing systems, it does not require any operation on site since the following parameters are in a factory setting which ensures an optimum function. The Flowmax 30S can also be supplied with customer-specific settings.

If necessary, this presetting can be changed individually using the integrated interface. The external display and programming unit FlowCon 200i is required for this purpose (see chapter 6, Accessories).

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

Output O1 and O2

- pnp-logic
- npn-logic

Configuration output 1

- pulse output (pulse value)

Configuration output 2

- empty pipe alarm
(delay time, switching state with gas or empty pipe)

Creeping suppression

3.2 Functionalities of flowmeter and default settings

3.2.1 pnp-/ npn-logic

Here, a determination is made as to whether a positive signal (pnp) or a mass signal (nnp) is output at the outputs 1 or 2.

pnp-logic => the output switches to 24V, the LOW level is defined by the master device. HIGH potential corresponds to the supply voltage.

nnp-logic => the output switches to 0V, the HIGH level is defined by the master device

bipolar (only for output 2) => the output switches both to HIGH (supply voltage) and to LOW

The following figure shows how pnp or npn logic works for the configuration

output 1 : pulse output
output 2 : empty pipe alarm

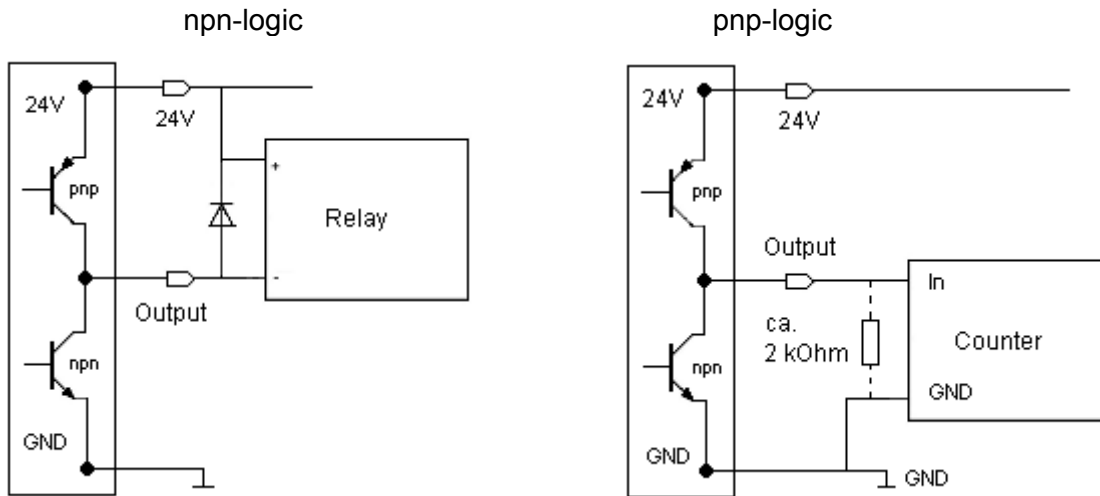


Figure 3: outputs O1 and O2 are used in npn- and pnp-logic

Setting range: pnp-logic, npn-logic
Default setting: npn-logic

3.2.2 Configuration output 1

Output 1 can be used as a pulse or empty pipe alarm output. When pulse output is selected, the pulse value can be set

Setting range: pulse output, empty pipe alarm
Default setting: pulse output

3.2.2.1 Pulse value

The pulse value determines the flow volumes for which an output pulse will be emitted.

Choose a configuration which will neither exceed the maximum output frequency of the Flowmax 30S (10kHz) nor the maximum input frequency of the control. The pulse / pause ratio is 1:1. The pulse length is limited to 1s.

Exampel: 5.0 ml/pulse
This means: a pulse is output every 5.0 ml
Setting range: 0.1...3000 ml/pulse, in steps of 0.1 ml/pulse
Default setting: 1.0 ml/pulse

3.2.3 Output 2

Output 2 is used as line B for RS485 operation, and the vacant state of the measuring channel can be signaled via the line

For the operation of the RS485 interface, the lines A and B are required, i.e. output 2 can not be used as a switching output in this case.

Setting range: empty pipe alarm
 Default setting: empty pipe alarm



IMPORTANT!

3.2.4 Creeping suppression

The creeping suppression excludes flow measurements that result from convection in a narrow band around zero, even with a closed valve. At the factory, the creeping suppression is set at a standard value in relation to the cross-section of the flowmeter.

Creeping suppression works with a hysteresis of - 25%.

Example: Creeping suppression = 5.0 ml/s

If the flow rate is lower than 3.75 ml/s the pulse output becomes inactive. If the flow rate exceeds 5 ml/s a pulse is output again and added to the totalizer.

Setting range: 0.0...400 ml/s, in 0.1 ml/s steps

	DN7	DN10	DN15
Default setting:	3.5 ml/s	5.0 ml/s	15.0 ml/s

NOTICE!

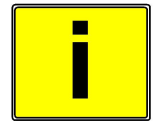
3.3 Overview of default settings

Function	Default setting
a) pnp-/ npn-logic	nnp-logic
b) configuration output 1	pulse output
pulse value	1 ml/pulse
c) output 2	empty pipe alarm
d) creeping suppression	3.5 ml/s for DN 7 5.0 ml/s for DN 10 15.0 ml/s for DN 15

3.4 General information

Please check the following before powering the flowmeter for the first time:

- Check the electrical connections and cable allocations.
- Check the installation position of the flowmeter. Is the direction of the arrow on the housing/name plate and the actual flow direction in the pipe congruent?
- Is the measurement pipe completely filled with fluid?
- Check the back pressure in the system.



IMPORTANT!

When everything has been checked, switch on power. After 30 minutes with power running the measuring device reaches the maximum accuracy.

Flowmax 30S is operational!

4. Exchange of flowmeter

- **Switch off power before disconnecting the electrical connections!**
- **Wiring installation, disassembly and removal must be performed by qualified persons experienced and knowledgeable about electrical work.**
- **Serious injury or death from electric shock may occur if wiring, installation, disassembly or remove of wires is performed while electrical power is energized**

- Please note that after replacing the flowmeter
 - a) Specific programming of the previous flowmeter should be noted and programmed to the new flowmeter
 - b) when using the dosing function, set a quantity

If the device requires a configuration change, the display and programming unit FlowCon 200i may be required (see section 6. Accessories).

Repair, hazardous substances

Before sending the flowmeter Flowmax 30S for repair, the following precautions must be taken:

- **Clean all process chemicals from the device. Fully rinse the flow path. Please pay close attention to the process fittings. All media must be removed before returning. This is particularly important, if the medium to be measured is health hazardous.**

Devices judged to be insufficiently cleaned will be returned to sender. No inspection of device will be done until proper cleaning is completed by user.

Costs due to inadequate cleaning of the instrument for possible disposal or injury (burns, etc.) will be charged to the sender of the flowmeter into account!

- **With the flowmeter send a detailed report describing the failure, the application and the physical-chemical properties of the medium parameters. (e.g. a decontamination declaration).**

In order to be able to process your repair order quickly and smoothly it is important that you provide a technical contact person including phone and fax number as well as e-mail address.



WARNING!



WARNING!

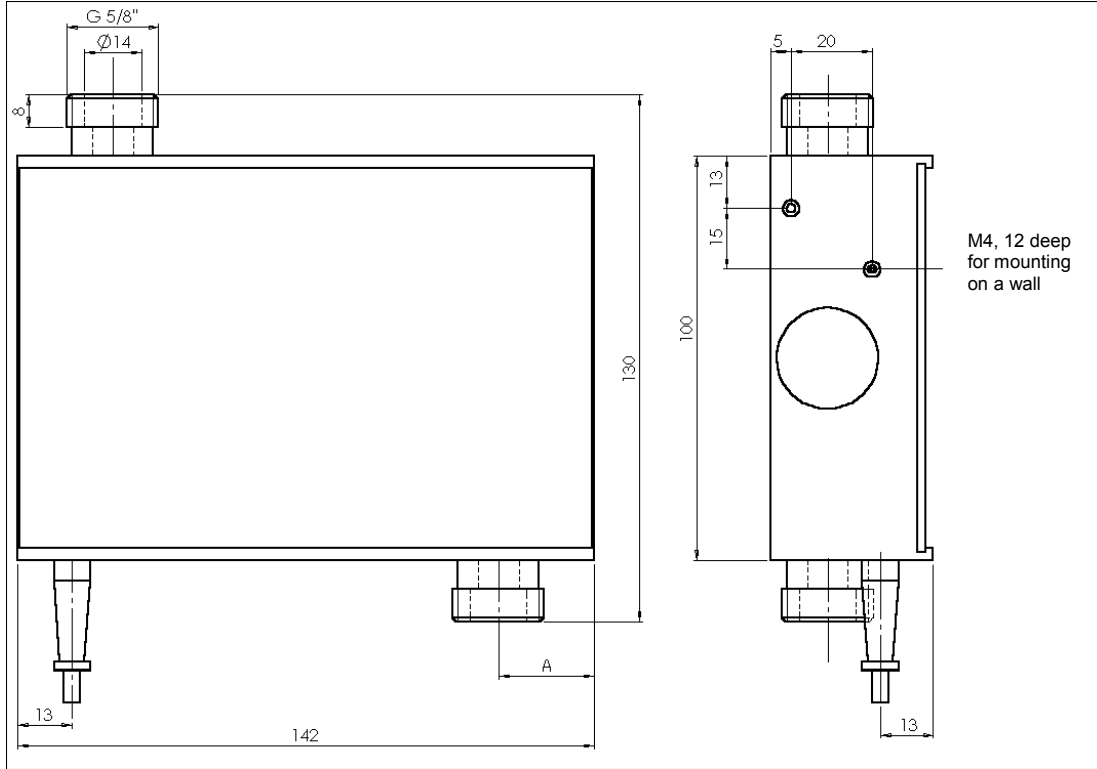


WARNING!

5. Technical specifications

5.1 Dimensions and weight

DN 7 and DN 10



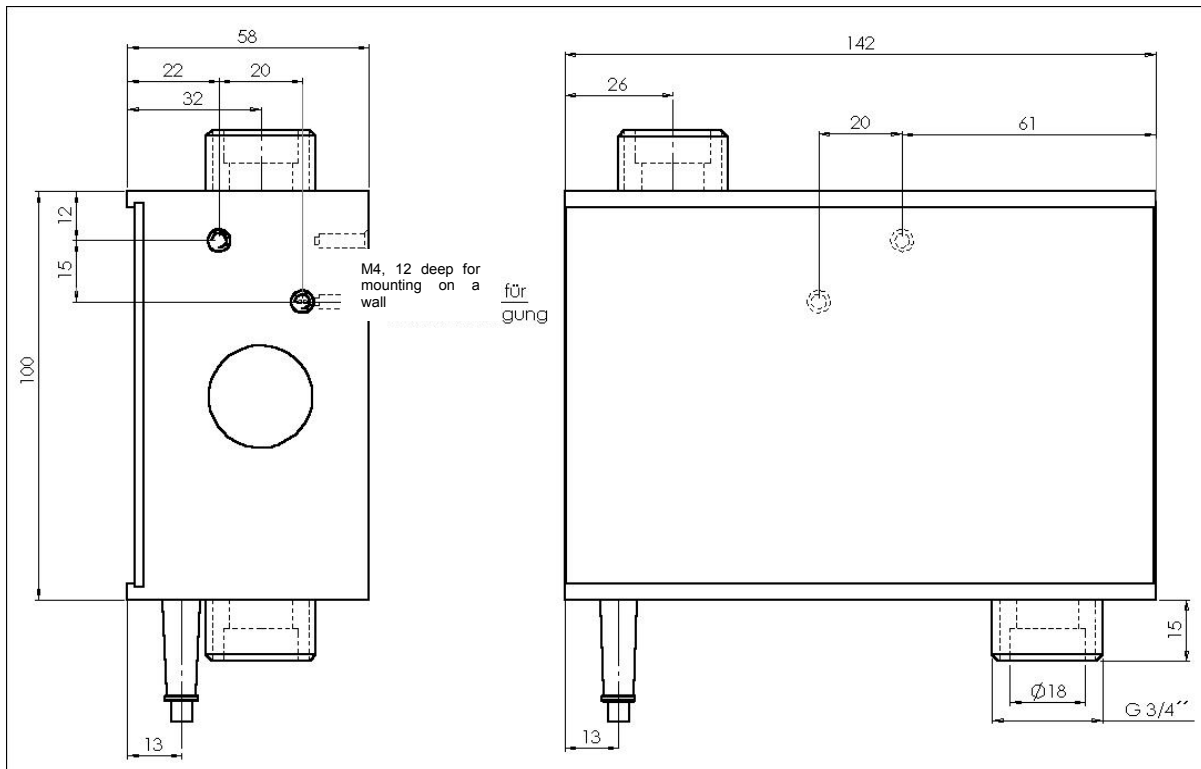
Weight: 700g

All dimensions in [mm]:

DN7: A = 22

DN10: A = 23.5

DN 15



Weight: 800g

5.2 Technical specifications

Housing

Nominal Diameter	DN 7, DN 10, DN 15	
Connection	DN 7, 10: G $\frac{5}{8}$ " DN 15: G $\frac{3}{4}$ "	
Dimensions incl. connections	DN 7, 10: H: 40.0mm; B: 130.0mm; T: 142.0mm DN 15: H: 58.0mm; B: 130.0mm; T: 142.0mm	
Temperature medium	0...+60°C	
Protection class	IP 65	
Material	all parts connected with medium are made of polyethylene (PE)	
Weight	DN 7, 10:	700g
	DN 15:	800g
Nominal pressure	PN6	

Electronics

Power supply	20...30VDC, 2W	
Connection	5-wired cable with plug, length: 5.0m	
Temperature environment	-20...+60°C	
Output 1	Transistor, npn- and pnp-logic, max. 100mA Configured as: pulse output	
Output 2	Transistor, npn- and pnp-logic, max. 100mA Configured as: empty pipe alarm	
Data interface	One-wire interface for parametrize	
Measuring deviation	$\pm 2\%$ o.r. $\pm 3\text{mm/s}$ (o.r. = of reading), option $\pm 1\%$ o.r. $\pm 3\text{mm/s}$, Reference conditions (VDE/VDI 2642)	
Measuring range	DN 7	100 ml/s
	DN 10	200 ml/s
	DN 15	1000 ml/s
Repeatability	0.5%	

The measuring system Flowmax 30S meets the general EMC immunity requirements according to CE, EN 61000-6-3, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6. It is in conformity with the requirements of the EC directives and has the CE label.

6. Accessories

Flowview 2S

Display and supply unit for up to 2 ultrasonic flowmeters Flowmax 30S

Order code 908750

FlowCon 200i

External display and programming unit for use in combination with ultrasonic flowmeters Flowmax. FlowCon 200i can be used as separated display as fixed installation for Flowmax.

Order code 908875 (FlowCon 200i for Flowmax 30S)

MPAC-141X

Multi-channel processor display with data logger, bus-interfaces and various inputs and outputs. Datatransmission via USB stick / Ethernet possible.

Order code on request

Tank Disposition MPAC DAQ-Manager

Software for evaluation of the flow rates registered in the MPAC-141X, further processing e.g. in Excel

Order code 908720

7. Shipment

- Flowmax 30S

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