

The device and its accessories must only be used for their intended purpose and comply with safety regulations. Aquametro devices are manufactured according to valid standards and guidelines. Aquametro guarantees the quality of the product in the context of its General Terms of Business. The owner or operator will be liable for the correct installation as well as the appropriate handling of the equipment upon its receipt. The instructions for assembly and operation are to be followed exactly.

Safety instructions

- The design of the plant must ensure that the meter cannot be damaged, especially from the effects of frost, torsion in the piping, excessive heat expansion of the piping, misaligned pipes during installation, intrusion of foreign bodies or silt-up.
- The clearance distance of the piping must be adhered to when mounting the meter. If using flanged connections, the correct number of connector elements must be fitted and they must be tightened with the correct torque in accordance with the screw manufacturer's instructions.
- Comply with the permissible operating data as defined on the type plate. Pressure test with a maximum of 1.5 x the nominal pressure (PN).
- Make sure that no hazardous fumes can build up in the piping and in the meter during commissioning, decommissioning and dismantling.
- The meter must at all times be completely filled with liquid during operation.
- Check the meter periodically for tightness of the connections and for proper functioning.
- If work is to be done on the installation, before each intervention:
 - a) Release the pressure in the installation
 - b) If hazardous fluids are used, wear protective clothing and safety goggles
 - c) Place collecting vessel underneath the installation.

Recommendation

For optimal results from the differential measurement, you should only use meters of types VZEA or VZOA with special calibration.

1. Plant design

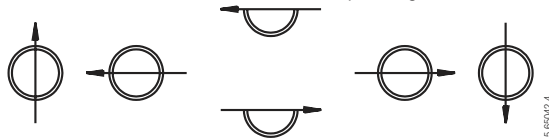
1.1

Layout of piping

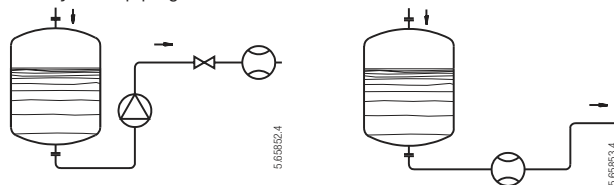
Easy access for reading the meter and controlling the ancillary equipment is important.

Mounting position

Do not mount the meter with the head pointing downwards. Straight stabilisation pipes are not necessary.



The layout of piping must ensure that the meter is at all times filled with liquid and that no inclusions of air or gas may occur.



The quantities consumed by all the users must be registered by the meter.

1.2

Layout of meter and accessories

If you use the meter for viscosities in excess of 5 mPa.s, or if it is mounted on the suction side, the pressure loss and the flow rate that can still be attained should be determined with the help of the pressure loss curves (see Technical Information CONTOIL®).

Select the meter and the ancillaries according to the max. working conditions.

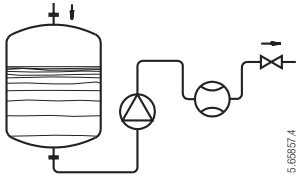
- Operating pressure and temperature
- Ambient temperature $-10^{\circ}\text{C} \dots 60^{\circ}\text{C}$
- Resistance of the material against: liquid to be metered, working conditions
- Flow rate

Flow meters are to be selected according to the flow rate and not according to the pipe diameter. If necessary, adapt the pipework.

1.3

Shut off devices

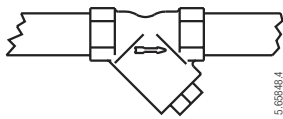
In order to avoid backflows and drainings, shut off devices have to be mounted after the meter. Backflows and drainings cause measuring errors and can damage the meter.



1.4

Impurities in plant or liquid

Filters should be fitted to prevent any damage caused by impurities in the liquid.



Maximum mesh width for strainers				
Nominal width	Meter type			
	VZE	VZO	VZEA	VZOA
DN15	0,250 mm	0,250 mm	0,100 mm	0,100 mm
DN20	0,400 mm*	0,400 mm*	0,100 mm	0,100 mm
DN25	0,400 mm*	0,400 mm*	0,250 mm	0,250 mm
DN40	0,600 mm	0,600 mm	0,250 mm	0,250 mm
DN50	0,600 mm	0,600 mm	0,250 mm	0,250 mm

* Consider 2.4

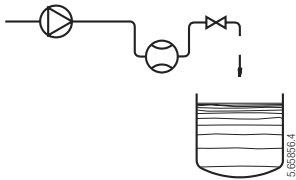
The filter mounted in the meter inlet is only a safety filter and is too small to act as a strainer.

1.5

Filling, dosing

For filling and dosing the valve has to be mounted between meter and discharge.

The shorter the pipe section between valve and discharge, the higher the accuracy. Fast opening and shutting of the valve should be avoided (pressure hammer). Pressure hammers damage the meter.



1.6

Remote processing, ancillaries

Any backflow must be avoided on meters equipped with pulsers for remote processing.

If this cannot be achieved by appropriate plant design, a non-return valve should be fitted.

1.7

Electrical circuit

Electrical circuits and installations are subject to legal prescriptions which must be observed when planning the installations.

Electrical installations must only be executed by professional experts.

In the layout of the installation, the following factors should be taken into account during plant design:

- ancillary connected to or after the meter
- maximum cable lengths with/without amplifier
- connection boxes, cable guides
- environmental disturbances

Electrical installations are subject to special requirements.

2. Mounting

2.1

Place of mounting

Easy access for reading the meter and controlling ancillary equipment is essential.
Observe the operating temperature range ($-10^{\circ}\text{C} \dots 60^{\circ}\text{C}$).
The meter may not be packed up in thermal insulation.
Observe plant conception points 1.1 ... 1.7.

For the differential measurement on meters VZEA and VZOA, please make sure that each meter is mounted in the correct pipe (supply flow meter in the supply pipe to the consumer, return flow meter in the return pipe).

2.2

Mounting position according to point 1.1

2.3

Preparation for the mounting

Check meters and mounting material.

Compare the data of the meter with the expected maximum conditions in the installation. They may not exceed the meter data:

- Flow rate max. (Q_{max} l/h)
- Service pressure max. (PN bar)
- Temperature max. (T)
- Threaded connections, flanges and seals (gaskets)
- Fixations for the meter
- Resistance to measured liquid and temperature.

Only in case of modifying an existing plant:

Rinse previously the installation and put it out of service. Close the valves shutting the insertion section.

Make sure that a starting-up by other persons is impossible while mounting.

When handling matters hazardous to people protect absolutely eyes, skin and clothes.

Place a collecting trough under the installation.

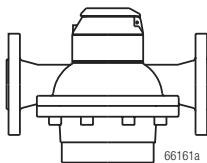
No chemicals, oils or other matter dangerous to the environment may reach neither the water nor the soil.

Cut the pipeline and prepare it for the insert of the flow meter.

In case of welding, cutting and grinding pay attention to the risk of fire/deflagration.

Remove inflammable matter and liquids from the place of operation.

Prepare the pipe section for the length prescribed for the measuring unit (see 8. dimensional sketches).



When using copper- or thinwalled steel tubes fasten the meter additionally.

Install the strainer/pre-filter, if necessary a distance piece.

Put the installation into operation. Open the shut valves slowly.

Proceed to a pressure and tightness check.

Rinse the installation properly.

Remove the pressure and put the installation out of service.

2.4

Mounting of the meter into the pipeline, pressure check

When mounting the meter into the pipeline pay attention to point 2.3.

Remove protection plugs on the meter.

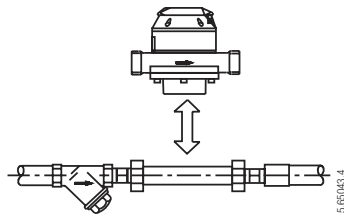
Measurement of heavy fuel oil with VZE/VZO 20 or 25:

If a strainer with a mesh width of max. 0.5 mm is installed, the safety filter may be removed from the meter inlet.

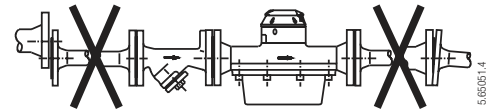
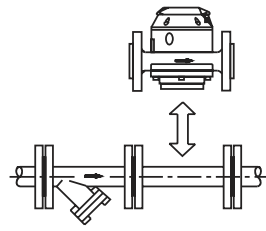
Insert the meter into the pipeline in the prescribed position and flow direction.

Install mating flanges parallel and without bias in pipe.

Meter with threaded ends



Meter with flanges



If another pressure test is done after mounting the meter, following pressure is admitted for a short period:

Nominal pressure (PN)	test load
16 bar	25 bar
25 bar	40 bar
40 bar	64 bar

Operating start as described in point 4.

3. Electrical connections

3.1

Electrical connections

Pay attention to plant design point 1.7.

Remove main plug and fuses. Before working on electrical circuits make sure that nobody can put the installation under power.

Pay attention to installation instructions for electric units:

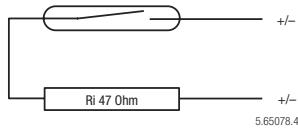
- power data, operation data
- maximum transmission length
- cable cross section, length
- ambient temperature, mounting position

3.2

Wiring diagram, technical data for pulsers Pulse transmitter type RV

Cable 3 m

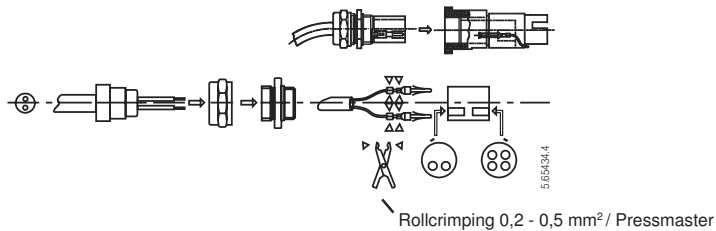
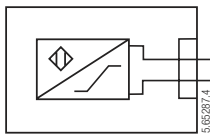
Polarity choice free



- ambient temperature $-10^{\circ}\text{C} \dots 70^{\circ}\text{C}$
- switching element Reed contact
- switching voltage max. 48 V DC/AC
- switching current max. 50 mA (Ri 47 Ω)
- switching capacity max. 2 W
- static current nil
- pulse value see type plate

Pulse transmitter type IN and INA

Pay attention to polarity when connecting the plug.



- ambient temperature $-10^{\circ}\text{C} \dots 70^{\circ}\text{C}$
- switching element slot initiator acc. to DIN 19234
- switching voltage 5 – 15 V DC
- residual ripple < 5 %
- switching current > 3 mA (at 8 V, 1 k Ω)
- static current < 1 mA (at 8 V, 1 k Ω)
- pulse value see type plate
- connection cable min. 2 x 0,35 mm² and 4...6 mm external diameter, on plug supplied with product or use option pn 80019 with cable mounted.

3.3

Ancillary units

Some ancillary units require a programming for pulse values or frequency (see their service instructions).

Pulse values of the meters: see type plates.

The frequency is calculated with the following formula:

$$\frac{\text{max. flow rate in litres / hour}}{\text{pulse value in litres} \times 3600} = \text{frequency in Hz}$$

3.4

Function control

Put installation into operating points 4.1 ... 4.4.

Check functioning of ancillaries.

4. Operating start

VZE/VZEA IMPORTANT!

Press the button briefly to activate the electronic register so that the flow rate can be recorded and displayed. To protect the battery, the device is switched off when it is delivered to you.

4.1

Put installation into operation

Open valves slowly, fill pipeline network gradually.

Vent the installation well.

Pressure shocks must be avoided in order not to damage the meter. Inclusions of air cause measuring errors in all types of meter and in operation they may damage them.

4.2

Proceed to a check of the tightness of the connections of the unit

4.3

Check the flow of the installation.

VZE/VZEA: the flow rate is read from the electronic display

VZO/VZOA: the flow volume is measured for 30 ... 60 seconds using the roller counter. The flow rate is calculated using the following formula:

$$\frac{\text{Totalised volume in liters} \times 3600}{\text{Measuring time in seconds}} = \text{Liters per hour}$$

Should the established flow rate lie over and above the specification of the meter (Q_{\max}), either a flow control choke (Throttle) must be inserted behind the measuring unit or a bigger measuring unit must be used.

4.4

Electrical equipment and ancillaries

Check proper functioning.