



Turbine Meter

RQ

with pulse pick-up

AG81/82/83

with electronic flow indicator

Fxxx / Exxx

Operating Manual



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Foreword


I. Transport, delivery, storage

Devices must be protected from moisture, humidity, contamination, impact and damage.

Checking the delivery:

The shipment must be checked for completeness upon receipt. The device data must be compared with the information on the delivery note and the order documents.

Any transport damage must be reported immediately upon delivery. Damage reported at a later date cannot be accepted.

| | |
|---|--|
|  | <p>Please note:</p> <p><u>Turbine Meters of series 1</u> Delivery is made fully assembled</p> <p><u>Turbine Meters of series 2</u> Delivered in several parts – assembly on site required!</p> <p>For a definition of series 1 and 2, see point 8.2.1.</p> |
|---|--|

II. Warranty

The scope and period of the warranty are specified in the contractual terms of delivery.


A warranty claim requires professional assembly and commissioning in accordance with the operating instructions applicable to the device. The necessary assembly, commissioning and maintenance work may only be carried out by competent and authorised persons.


III. General safety instructions

1. Turbine Meters are reliable, high-precision volume measuring devices and may only be used for their intended purpose. The pressure and temperature limits specified on the type plate, as well as the other technical data of the devices and safety instructions, must be observed during installation, commissioning and operation of the devices.
2. National and international regulations for the operation of pressurised devices and systems must be observed.
3. Before installation, the operator must ensure that the pressure-bearing parts have not been damaged during transport.
4. Always observe the national and international regulations for the operation of devices in potentially explosive atmospheres.
5. The devices must be installed, operated and maintained by qualified personnel. The operator is responsible for ensuring that the personnel are sufficiently and appropriately qualified. In case of doubt, consult the manufacturer.
6. The operator must ensure that the materials used (parts in contact with the medium) in the device are chemically resistant to the measuring fluid.
7. The seals and sealing elements must be handled with care.

IV. Basic safety information

Description of symbols:


| | |
|---|---|
|  | <p>Important information!</p> <p>Please observe these notes carefully to ensure that the system functions reliably. The accompanying text contains important information about the product, how to use the product or a section of the documentation that is of particular importance.</p> |
|---|---|

| | |
|---|--|
|  | <p>WARNING!</p> <p>Failure to observe the prescribed precautions may result in death, serious injury or significant damage to property.</p> |
|---|--|

V. Intended use

Turbine Meters RQ are designed for the precise measurement of flow and volume of low and medium viscosity liquid products such as mineral oils, acids, alkalis, solvents, water, liquefied gases and liquid food and beverages.

Intended user

| | |
|---|---|
|  | <p>The intended user must not open, manipulate or dismantle the device. The device may only be serviced, maintained or opened by qualified service personnel.</p> |
|---|---|

1. Identification

| | |
|--------------|--|
| Manufacturer | Bopp & Reuther Messtechnik GmbH Am Neuen Rheinhafen 4 67346 Speyer / Germany Phone: +49 6232 657-0 Fax: +49 6232 657-505 |
| Product type | Indirect volume meter |
| Product | Turbine Meter series RQ with pulse pick-up AG81/82/83 and / or Fxxx / Exxx electronic flow indicator |
| Version | A-EN-02416-00A |

2. Area of application

The application range for all Turbine Meters series RQ is the volume measurement of liquids and liquid gases in the chemical and petrochemical industries, in the mineral oil industry and in loading facilities, especially at high operating pressures, high operating temperatures and low viscosities. The following media can be measured with the Turbine Meter: mineral oil, acids, alkalis, solvents, water, liquefied gases, refined oil products (petrol, kerosene, Jet A1, JP8, diesel), vinyl chloride, food and beverages.

Turbine Meters are approved for use in trade requiring calibration by the Physikalisch-Technische Bundesanstalt (PTB) and authorities in other European countries.



ATTENTION:

When installing in measuring systems for custody transfer, the approval requirements must be observed.

3. Measuring principle and system design

3.1 Measuring principle

The Turbine Meter is an indirect volume meter. It essentially consists of an axial turbine wheel that rotates freely in the liquid flow. The turbine wheel is set in rotation by the liquid and assumes a speed that corresponds to the average flow velocity of the liquid in the free cross-section of the Turbine Meter. The rotational speed of the turbine wheel is therefore proportional to the volume flow and the number of revolutions to the volume flow.

The rotational movement is transmitted to the outside through the housing wall without feedback by means of magnetic-inductive scanning. A sensor head located outside the housing is used for this purpose. An electromagnetic field is generated by a coil located in the sensor head.

Ferromagnetic components pass through this field and induce an electrical voltage. Depending on the Turbine Meter series, these consist either of the blades of the turbine wheel or of pins arranged around the cover band of the turbine wheel.

An electrical voltage pulse corresponding to a specific volume is thus generated per blade or pin. This value is the counter factor K (pulses/unit volume). The preamplifier integrated in the AG8x amplifies and converts the generated voltage pulses into a square-wave signal in accordance with NAMUR, which enables reliable transmission of up to 1000 metres. Alternatively, an electronic unit displays the value and provides output signals (4 ... 20 mA and / or pulses). Depending on the electronic unit, a HART signal is also available.

3.2 System structure

The Turbine Meters can be combined individually or together with the following components for efficient application:

Pulse pick-up AG81/82/83:



The pulse pick-up consists of the sensor housing with built-in sensor head and the connection box with built-in preamplifier and screw terminals. The intrinsically safe type of protection is Ex i. Three types are available for different liquid temperatures. They are approved for installation on Turbine Meters that can be used in custody transfer.

Electronic flow indicator Fxxx:



The on-site display series F is a user-friendly display with numerous functions. It offers various options for displaying the current flow rate as well as resettable and non-resettable volume values. The large display allows for easy configuration and intuitive operation.

The display is connected directly to the turbine wheel via a sensor. There are two sensor types (probe) to choose from: the T11 for measuring temperatures from -40°C to 80°C and the T15 for extended temperature ranges from -65°C to 250°C .

The on-site display can be operated using various power sources, including a battery-powered version. It is also suitable for use in potentially explosive areas (intrinsically safe design). A white backlight ensures good readability day and night, while a red flashing indicator is activated in the event of an alarm.

In addition, the device has analogue and digital outputs for transmitting flow data, volume pulses and alarm messages. The up to 15-point linearization serves to optimise the output signal. Optionally, it can be equipped with HART communication, a batch controller and a linearization function. It can be mounted directly on the Turbine Meter or installed in a more accessible area.

Electronic flow indicator Exxx:

The transmitter of the E series records the volume flow of the Turbine Meter. Operation is possible with the housing closed using optical buttons behind the glass pane.

The display is connected directly to the turbine wheel via a sensor. There are two sensor types (probe) to choose from: the T11 for measuring temperatures from -40°C to 80°C and the T15 for extended temperature ranges from -65°C to 250°C.

The transmitter can be used in explosion-proof areas (pressure-resistant, encapsulated design). Outputs include a 4 ... 20 mA output and digital outputs that can be used as pulse outputs or alarm signals. Up to 15-point linearization is used to optimise the output signal. HART communication is also available as an option.

The transmitter can be mounted directly on the Turbine Meter or installed in a more accessible area.

This function is currently in preparation!

4. Input**4.1 Measured variable**

Volume and volume flow

4.2 Measuring range

| Nominal | | Flow m ³ /h | | Impulses | | | Inlet length (mm) | Outlet distance (mm) |
|---------|------|---------------------------|-------------|----------|-------|-------------------|----------------------|-------------------------|
| DIN | ANSI | 1:10 | 1:30 | Imp/n | Imp/l | Hz _{max} | | |
| DN15 | ½" | 0.6 ... 6 | 0.2 ... 6 | 4 | ~310 | 517 | 180 (12xDN) | 160 |
| DN25 | 1" | 1.8 ... 18 | 0.6 ... 18 | 4 | ~105 | 525 | 240 (12xDN) | 160 |
| DN32 | 1¼" | 3 ... 30 | 1 ... 30 | 4 | ~58 | 467 | 320 | 160 |
| DN40 | 1½" | 4.2 ... 42 | 1.4 ... 42 | 4 | ~22 | 257 | 400 | 200 |
| DN50 | 2" | 7.2 ... 72 | 2.4 ... 72 | 4 | ~12.4 | 248 | 500 | 250 |
| DN65 | 2½" | 12 ... 120 | 4 ... 120 | 4 | ~6 | 200 | 650 | 325 |
| DN80 | 3" | 18 ... 180 | 6 ... 180 | 12 | ~15 | 750 | 800 | 400 |
| DN100 | 4" | 30 ... 300 | 10 ... 300 | 10 | ~6 | 500 | 100 | 500 |
| DN150 | 6" | 60 ... 600 | 20 ... 600 | 18 | ~3.4 | 567 | 1500 | 750 |
| DN200 | 8" | 120 ... 1200 | 40 ... 1200 | 24 | ~1.84 | 613 | 2000 | 1000 |
| DN250 | 10" | 180 ... 1800 | 60 ... 1800 | 40 | ~1.24 | 60 | 2500 | 1250 |
| DN300 | 12" | 240 ... 2400 | 80 ... 2400 | 44 | ~0.78 | 520 | 3000 | 1500 |

5. Output**5.1 Output signal**

AG8x: The output signals available are a NAMUR pulse output in 2-wire technology (in the AG 8x integrated PV10).

Electronic flow indicator Fxxx: A 4 ... 20 mA and / or pulse output is available as output signals

5.1.1 Pulse outputs

The pulse pick-ups consist of the probe housing with built-in probe and the connection box with built-in PV10 preamplifier and connection terminals.

5.1.2 Electronic flow indicator Fxxx

Please refer to the separate operating instructions for the electronic outputs of the flow indicator Fxxx.

6. Characteristic Parameters

6.1 Reference conditions

The Turbine Meters are calibrated on test benches monitored by the calibration authority.

Pressure: 2 to 7 bar

Temperature: 10°C to 30°C

6.2 Measurement deviation

High accuracy: $\leq 0.15\%$ of the measured value in the limited measuring range with flow straightener*

Standard accuracy: $\pm 0.3\%$ of the measured value in the standard measuring range (1:10) with straightener *

$\pm 1\%$ of the measured value in the standard measuring range (1:30) with flow straightener*

$\pm 0.15\%$ of the measured value (optional for restricted measuring range and only with inlet section)

*The specifications refer to liquids with a viscosity of 0.2 to 6 mPa·s

The measurement deviation depends on the viscosity of the measuring range and the selected nominal diameter.

6.3 Repeatability

$\pm 0.02\%$ of the measured value

7. Operating conditions

7.1 Installation instructions



Warning

Before installation and commissioning, read and observe the operating instructions. Before installing or dismantling the device, the system must be depressurised and cooled down.

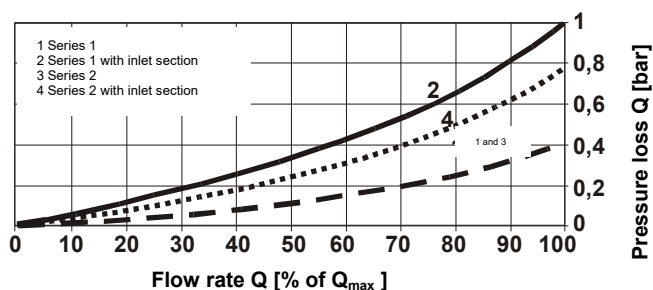
7.1.1 General

- Only trained specialists authorised by the plant operator may carry out assembly, electrical installations, commissioning, maintenance work and operation.
- Bopp & Reuther Messtechnik Turbine Meters are precision volume measuring devices. Only remove the protective caps immediately before use.
- Observe the operating data specified on the Turbine Meter. Observe factory number.

- The medium to be measured must be supplied.
- Ensure an even flow profile at the meter inlet..
- Install behind a straight, undisturbed pipe section of at least 1.0 nominal diameter or use a flow straightener (Turbine Meters for use in trade require verification are supplied with an inlet section and built-in flow straightener).
- Possible inclusions of air or gas can lead .- / air separator is therefore strongly recommended.
- Undisturbed, non-reactive outlet (installation of a straight, undisturbed pipe section of at least 5 x DN behind the meter).
- Install flow control and/or
- Observe the minimum operating pressure in the meter to prevent cavitation:

$$P_{\min} \geq 2 \times \Delta P_{RQ} + 1,25 \text{ pv}$$

where: ΔP_{RQ} = pressure loss of the Turbine Meter
 pv = vapour pressure of the measured medium



As a guideline, an operating pressure approximately 2 bar above the saturated steam pressure at the corresponding operating temperature can be used.

- The specified lengths must be observed for the inlet and outlet sections (see table in point 8.1.2).
- For legal metering, the inlet and outlet pipe sections specified in accordance with national guidelines outlet sections must be included in this.

7.1.2 Installation instructions

Before installing the Turbine Meter, please note the following information:

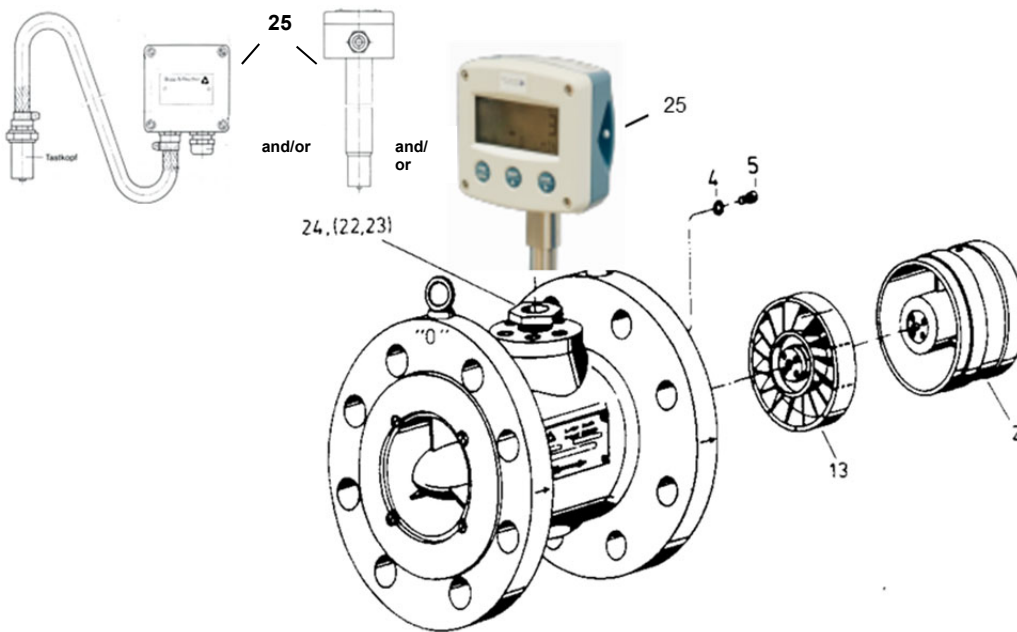
Series 1:

Meter delivered fully assembled

Series 2:

Meter delivered in several parts that must be assembled on site

Assembly of Turbine Meter RQ series 2 with AG8x and / or electronic flow indicator Fxxx / Exxx



- Place the measuring device on its front flange
- Remove the downstream bearing cross (2) by loosening the cylinder head screws (5)
- Check that the serial number of the measuring device matches the serial number of the rotor (13)
- Carefully place the rotor (13) on the shaft of the upstream bearing cross
- Replace the downstream bearing cross (2)



The position of the downstream bearing cross must correspond to the mark 1 on the housing

- Secure with hexagon socket screws (5) and washers (4).
- Check that the rotor moves freely and evenly; press down with a suitable non-magnetic tool
- Install Pulse pick-up and/or electronic flow indicator (25).



The pin on the probe and the hole in the housing must be free of metal chips or dirt

- Secure AG8x and / or electronic flow indicator Fxxx / Exxx (25) with clamping element (22, 23) and pressure screw (24)
- Flush the pipe using a fitting instead of the Turbine Meter
- Install the Turbine Meter, including the inlet pipe section, taking into account the flow direction and installation position
 - Series 1 (DN15 – DN65) horizontal or vertical
 - Series 2 (DN80 – DN300) horizontal
- Use of appropriate flange seals and their correct installation (no protrusion into the pipeline)

7.1.3 Installation of the measuring transducer

Inlet and outlet sections

Proper metrological function requires a fully developed, undisturbed velocity profile at the inlet of the meter. The lengths of the inlet and outlet pipe sections (see table in section 8.1.2) must be at least:

Inlet pipe section: 10 x nominal diameter
Outflow pipe section: 5 x nominal diameter

Flow conditioners

The installation of flow straighteners can reduce the influence of installation disturbances and the length of the required inlet section. If high demands are placed on measurement accuracy, the flow straightener must be taken into account during calibration.

Pressure and temperature compensation

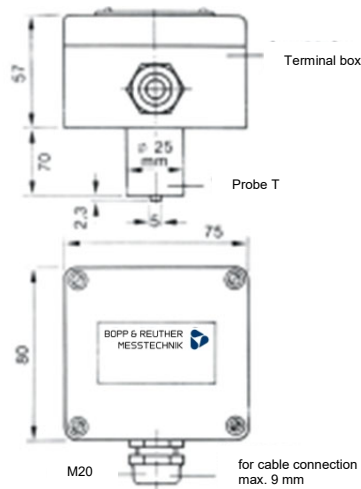
If pressure and temperature measuring points are provided, they must be installed in the outlet section behind the meter housing at a distance of 3 x nominal diameter for pressure and 5 x nominal diameter for temperature.

7.2 Ambient conditions

7.2.1 Permissible ambient temperature

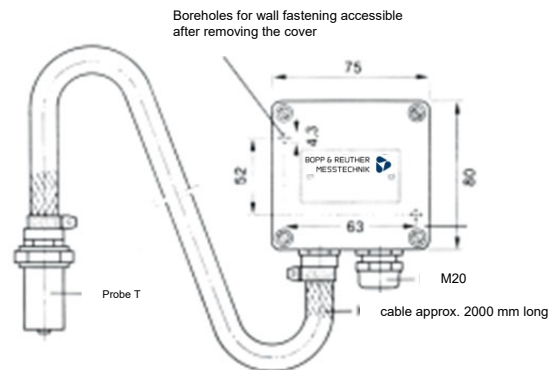
AG81:

| Terminal box distance 0 mm | | |
|----------------------------|----------------|------------------------------|
| Class | T _U | T _{measured medium} |
| T4 | 85°C | 85°C |
| T5 | 75°C | 75°C |
| T6 | 60°C | 60°C |
| minimum for all classes | -40°C | -40°C |



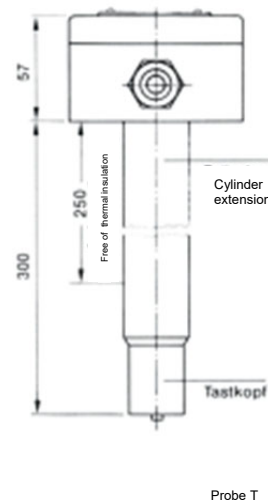
AG82:

| Terminal box via hose | | |
|-------------------------|----------------|------------------------------|
| Class | T _U | T _{measured medium} |
| T3 | 85 | 180°C |
| T4 | 85°C | 135°C |
| T5 | 75°C | 100°C |
| T6 | 60°C | 85°C |
| minimum for all classes | -40°C | -65°C |



AG83:

| Terminal box spacing 250 mm | | |
|-----------------------------|----------------|------------------------------|
| Class | T _U | T _{measured medium} |
| T2 | 88°C | 250°C |
| T3 | 72°C | 200°C |
| T4 | 79°C | 135°C |
| T5 | 72°C | 100°C |
| T6 | 60°C | 60°C |
| minimum for all classes | -40°C | -200°C |



Fxxx: -40°C ... 70°C
 Exxx: -40°C ... 70°C

7.2.2 Storage temperature

Turbine Meter RQ: -25°C ... 100°C

Pulse pick-up AG8x: -40°C ... 70°C

Electronic flow indicator: -40°C ... 70°C

7.2.3 Protection class

IP67

7.2.4 Electromagnetic compatibility

AG8x: EN61000-6-2, EN61000-6-3, and NAMUR NE21

Fxxx: Directive 2014/30/EU, FCC 47CFR part15

Electromagnetic compatibility is only guaranteed when the electronics housing is closed.

7.3 Process conditions

7.3.1 Media temperature

Compact design: -40°C ... 80°C

Wall construction: -65°C ... 180°C

High-temperature version: -196°C ... 250°C (depending on material design)

7.3.2 Physical state

Suitable for liquid media

7.3.3 Viscosity

0.2 to 50 mPa·s

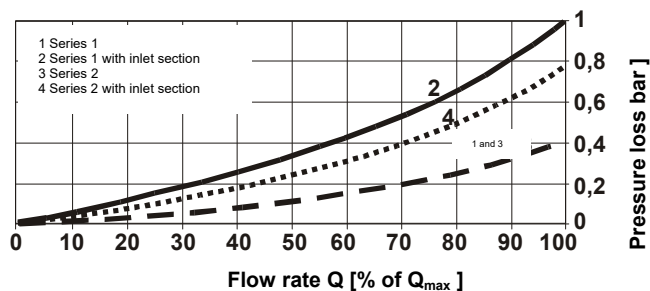
7.3.4 Medium pressure limit

Depending on the device design

7.3.5 Pressure loss

$$P_{\min} \geq 2 \times \Delta P_{RQ} + 1.25 \text{ pv}$$

where: ΔP_{RQ} = pressure loss of the Turbine Meter
 pv = vapour pressure of the measured medium

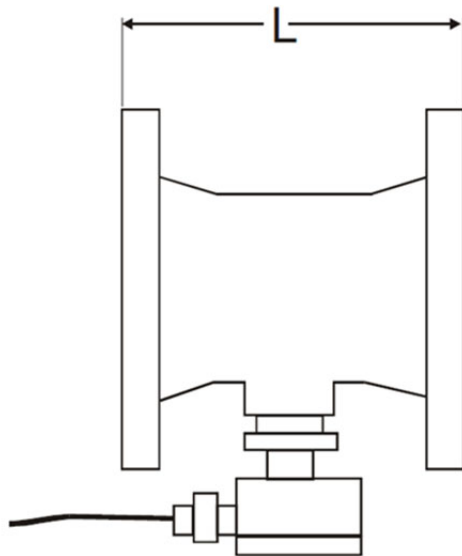


For a definition of series 1 and 2, see point 8.2.1

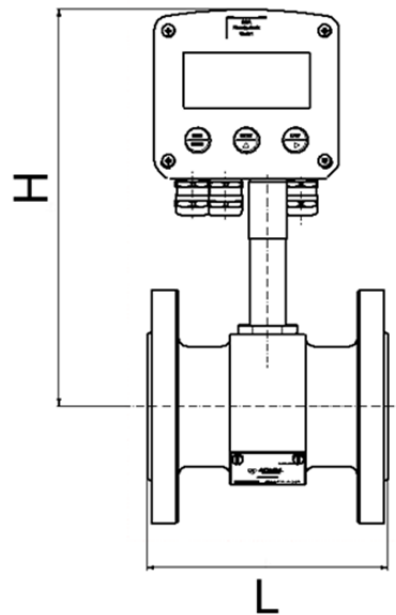
8. Design

8.1 Design / Dimensions

8.1.1 Turbine Meter



RQ with AG8x

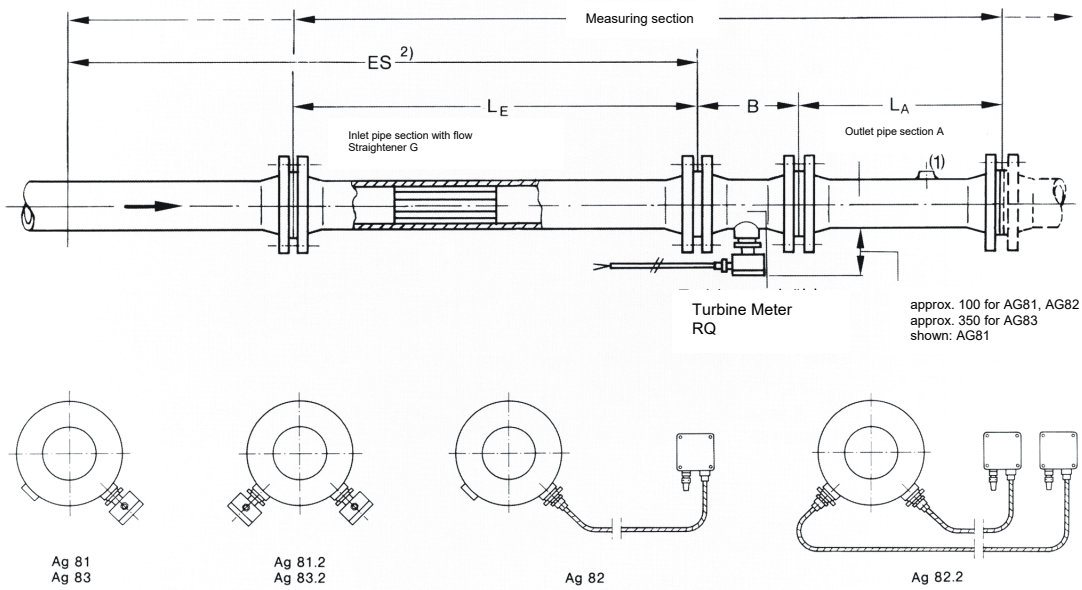


RQ with Fxxx

| Type | L (mm) | Standard temperature version with Fxxx H (mm) | High-temperature version with Fxxx H (mm) | Weight (kg) |
|-------|--------|--|--|-------------|
| RQ15 | 140 | 238 | 470 | 4 |
| RQ25 | 150 | 240 | 472 | 6 |
| RQ32 | 160 | 255 | 487 | 8 |
| RQ40 | 170 | 250 | 482 | 10 |
| RQ50 | 170 | 254 | 486 | 12 |
| RQ65 | 190 | 262 | 494 | 15 |
| RQ80 | 200 | 269 | 501 | 19 |
| RQ100 | 200 | 282 | 514 | 28 |
| RQ150 | 300 | 306 | 538 | 62 |
| RQ200 | 400 | 331 | 563 | 110 |
| RQ250 | 500 | 309 | 541 | 170 |
| RQ300 | 600 | 380 | 612 | 240 |

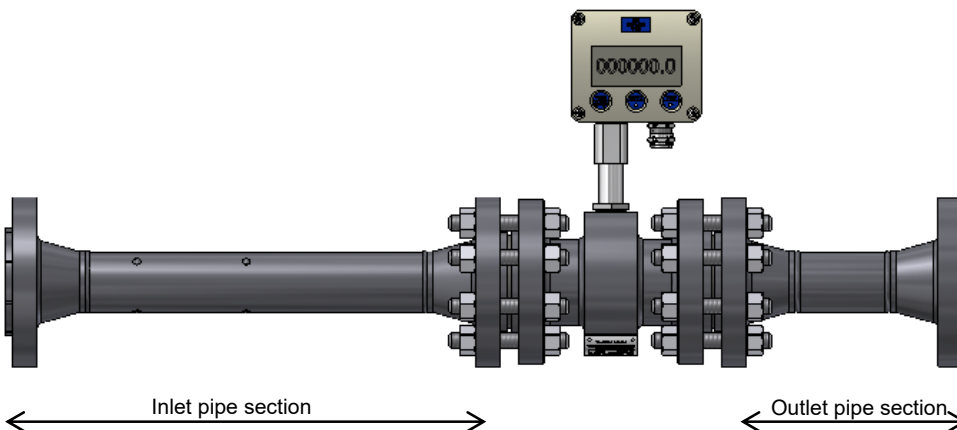
Specifications for PN10 to PN100

8.1.2 Inlet and outlet pipe section

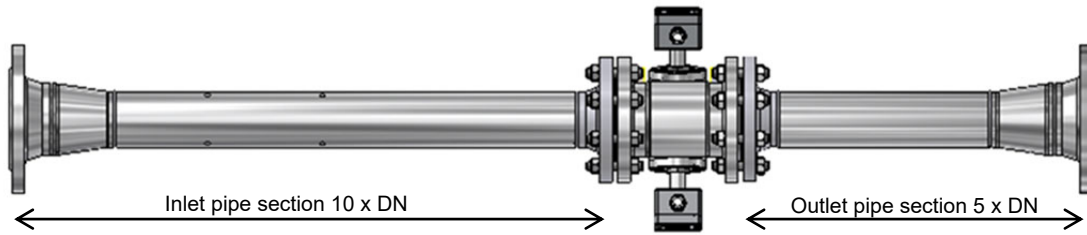


| Nominal diameter | | Inlet pipe section (mm) | Outlet pipe section (mm) |
|------------------|--------|-------------------------|--------------------------|
| DIN | ANSI | | |
| DN15 | 1/2 | 180 (12 x DN) | 160 |
| DN25 | 1 | 300 (12 x DN) | 160 |
| DN32 | 1 1/4" | 320 | 160 |
| DN40 | 1 1/2" | 400 | 200 |
| DN50 | 2 | 500 | 250 |
| DN65 | 2 1/2" | 650 | 325 |
| DN80 | 3 | 800 | 400 |
| DN100 | 4 | 1000 | 500 |
| DN150 | 6 | 1500 | 750 |
| DN200 | 8 | 2000 | 1000 |
| DN250 | 10 | 2500 | 1250 |
| DN300 | 12 | 3000 | 1500 |

Example: Inlet and outlet pipe section with electronic flow indicator Fxxx



Example: Inlet and outlet pipe section with 2 x pulse pick-up AG8x



The specified lengths must be adhered to. National guidelines are mandatory for official trade. When calibrating the meter at the manufacturer's factory, the inlet and outlet pipe sections must be included in this.

8.2 Material

8.2.1 Turbine Meter

Series 1 (DN15 to DN65): Stainless steel 1.4429

Series 2 (DN80 to DN300): Housing: steel or stainless steel 1.4571, cast, welded or forged
 Sensor holder: Stainless steel 1.4429

Other materials on request (e.g. Hastelloy, etc.)

8.2.2 Inlet and outlet pipe section

| Material group | Materials | | | |
|----------------|------------------|--------|-------------|----------|
| | Flanges | Pipe | Tube bundle | |
| | | | Series 1 | Series 2 |
| F | 1.4571 | 1.4571 | 1.4571 | |
| F2 | 1.0425 1.0432 | 1.0305 | 1.4571 | 1.0305 |

8.3 Process connection

Flange: DN10 to DN300 (½" to 12")
 PN6 to PN320
 Class 150 to 2500 according to DIN2501 or ANSI B16.5

8.4 Electrical connection

8.4.1 Pulse pick-up

AG8x output: NAMUR pulse output

Terminal connection:

EC type examination certificate: DMT 00 ATEX E 062 X

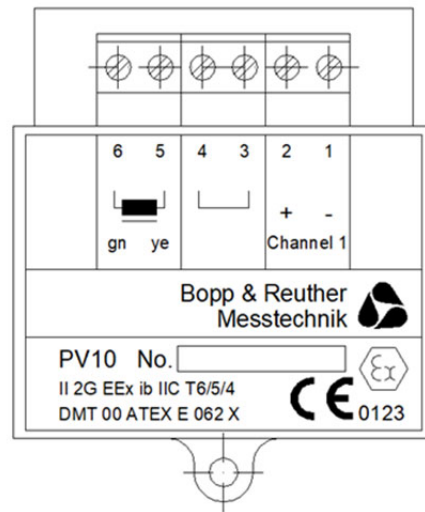
Type of protection: Ex II 2G EEx ib IIC T6/5/4
 Supply circuit intrinsically safe
 U_i = 20 V
 I_i = 50 mA
 P_i = 160 mW
 L_i = 1 mH
 C_i = 25 nF

Enclosure protection class: IP 65 according to DIN 40050

Cable specification:

Type LiYCY 2 x 0.75, twisted, shielded
max. 150 ohms/core, max. length 1000 m
Colour: Sky blue, RAL 5015

Cable clamp: M20 x 1.5



The sensor is connected internally to terminals 5 and 6.

Overview of pulse values

| Type | DN | Imp/litre | f _{max} (Hz) |
|--------|-----|-----------|-----------------------|
| RQ 15 | 15 | 310 | 517 |
| RQ 25 | 25 | 105 | 525 |
| RQ 32 | 32 | 58 | 467 |
| RQ 40 | 40 | 22 | 257 |
| RQ 50 | 50 | 12.4 | 248 |
| RQ 65 | 65 | 6 | 200 |
| RQ 80 | 80 | 15 | 750 |
| RQ 100 | 100 | 6 | 500 |
| RQ 150 | 150 | 3.4 | 567 |
| RQ 200 | 200 | 1.84 | 613 |
| RQ 250 | 250 | 1.24 | 600 |
| RQ 300 | 300 | 0.78 | 520 |

8.4.2 Electronic flow indicator Fxxx / Exxx

All data on the electronic flow indicator Fxxx / Exxx can be found in the separate operating instructions.

Appendix

A. Commissioning

The Turbine Meter RQ is designed to be operationally safe in accordance with the latest state of the art. It has been tested and left the factory in a condition that is safe to use. The meters are factory-set to the operating conditions specified in the order. The set values can be found in the configuration data sheet.



Improper or unintended use may result in hazardous situations.

The venting and filling with the liquid measuring medium must be carried out **slowly**.

If available, the bypass valve must be opened first.

While the valves **downstream** of the turbine wheel meter are fully open, the shut-off valve **upstream** of the turbine wheel meter must be carefully opened partially and left in this position until the air and gases in the turbine wheel meter and in the downstream pipeline to the next shut-off valve have been completely displaced by liquid. This prevents liquid surges, which occur because compressed gases flow through partially open valves faster than liquids.



Fluid slugs or gases flowing too quickly can damage the meter and cause mechanical or electrical sparks.

B. Maintenance, repairs, hazardous substances

The following measures must be taken before sending the turbine meter to Bopp & Reuther Messtechnik GmbH for repair:

- Always enclose a note with the device describing the fault, the application and the chemical and physical properties of the measuring medium.
- Remove all adhering medium residues. Pay particular attention to sealing grooves and crevices where medium residues may adhere. This is particularly important if the medium is hazardous to health, e.g. corrosive, toxic, carcinogenic, radioactive, etc.
- Please refrain from returning the device if you cannot be absolutely certain that you have completely removed any substances that are hazardous to health.



ATTENTION!

Without a completed decontamination declaration (see point C, page 22), which must be affixed to the outside of the package in a visible manner, we will not open the meter sent in, let alone process it.



ATTENTION!

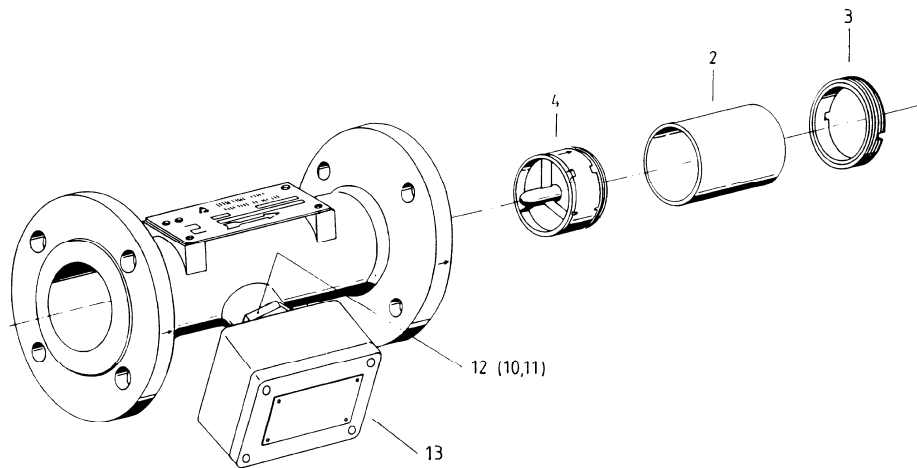
The operator will be held liable for any damage to property or personal injury resulting from inadequate cleaning of the device, as well as for any costs incurred for disposal.

In the event of malfunctions of the Turbine Meter, please contact our service department:

Bopp & Reuther
 Messtechnik GmbH
 Service
 Am Neuen Rheinhafen 4
 67346 Speyer
 Phone: +49 6232 657-420
 Fax: +49 6232 657-561
 Email: service@bopp-reuther.com

B.1 Replacement of measuring mechanism and / or bearings

B1.1 Series 1



Parts list

| Item | Quantity | Designation |
|------|----------|--------------------------------|
| 2 | 1 | Spacer tube |
| 3 | 1 | Pressure nut |
| 4 | 1 | Measuring mechanism, complete |
| 10 | 1 | Spring tensioning element |
| 11 | 1 | Ring |
| 12 | 1 | Pressure screw |
| 13 | 1 | Probe head with preamplifier * |

* For Turbine Meters with 2 probe heads, the number of items 10 ... 12 is doubled.

Disassembly

- Remove the pressure nut (3)
- Remove the spacer tube (2)
- Remove the complete measuring mechanism (4)

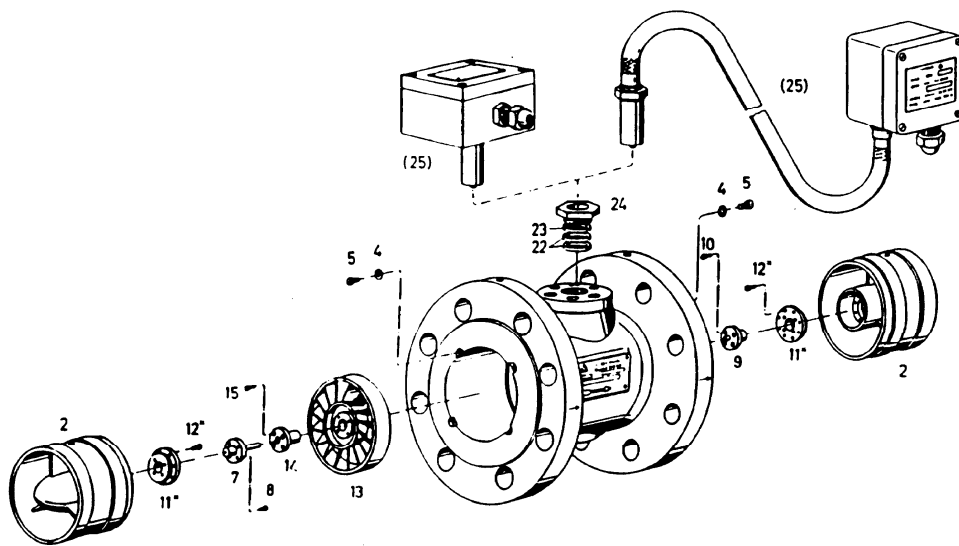
Reassembly in reverse order



ATTENTION!

During assembly, ensure that the arrows on the measuring mechanism and the meter housing point in the same direction.

B1.2 Series 2



Parts list


| Item | Quantity | Designation |
|------|----------|--------------------------------|
| 2 | 2 | Bearing cross |
| 13 | 1 | Bucket wheel |
| 7 | 1 | Bearing axle |
| 8 | 4 | Cylinder screw |
| 9 | 1 | Counter bearing |
| 10 | 4 | Cylinder screw |
| 14 | 1 | Bearing bushing |
| 15 | 4 | Cylinder screw |
| 25 | 1 | Probe head with preamplifier * |
| 24 | 1 | Pressure screw |
| 22 | 1 | Ring |
| 23 | 1 | Spring tensioning element |

* For Turbine Meters with 2 sensor heads, the number of items 22 ... 25 is doubled.

Disassembly

- Place the meter on its inlet flange
- Loosen and remove the rear cylinder screws (5) and washers (4)
- Remove the rear bearing cross (2)
- Remove the paddle wheel (13).
- Loosen and remove the front cylinder screws (5) and washers (4)
- Remove the front bearing cross (2)
- Loosen the cylinder screws (10, 15)
- Removing the counter bearing (9) and the bearing bush (14)
- Loosen the cylinder screws (8)
- Remove the bearing axle (7)

The spare parts are installed in the reverse order as specified in 3.4.2

| | |
|---|---|
|  | <p>ATTENTION! The position of the bearing crosses (marked "0" and "1") must correspond to the markings on the housing.</p> |
|---|---|

C. Decontamination declaration

Bopp & Reuther Messtechnik GmbH
 Am Neuen Rheinhafen 4
 67346 Speyer
 Germany

BOPP & REUTHER
MESSTECHNIK 

Telephone: +49 (0) 6232 / 657 420
 Fax: +49 (0) 6232 / 657 561
 Mail: service@bopp-reuther.com
 Web: www.bopp-reuther.com

ERA number:

DECLARATION ON DECONTAMINATION OF METERS AND COMPONENTS

Please complete this form and return in advance by email or by Fax to +49(0)6232 / 657 561 in order to receive an Equipment Return Authorisation (ERA) number (not necessarily required). No action to repair or examine the meter will be done, until a valid declaration of decontamination has been received.

Contact information

| | | | |
|------------------|----------------------|-----------------|----------------------|
| Company Name: | <input type="text"/> | Contact Person: | <input type="text"/> |
| Company Address: | <input type="text"/> | Name: | <input type="text"/> |
| | | Phone: | <input type="text"/> |
| | | Email: | <input type="text"/> |


Meter information

| | | | |
|----------|----------------------|-------------|----------------------|
| Type: | <input type="text"/> | Serial no.: | <input type="text"/> |
| Id. no.: | <input type="text"/> | | |

Reason for return (e.g. calibration, repair). Please describe in detail.

Contamination information

The meter was contaminated with:

| | | |
|--|--|--|
| <input type="checkbox"/> poisonous  | <input type="checkbox"/> corrosive, irritant  | <input type="checkbox"/> flammable  |
| <input type="checkbox"/> hazardous  | <input type="checkbox"/> oxidizing  | <input type="checkbox"/> cancer-causing, harmful  |
| <input type="checkbox"/> explosive  | <input type="checkbox"/> environmental hazardous  | <input type="checkbox"/> other: <input type="text"/> |

The meter was cleaned with:

Packaging and shipping Instructions

- Remove all cables, connectors, separate filters and mounting materials
- Please pack each item in two suitable sealed protective foil bags
- Transport in suitable shipping package (e.g. original Bopp & Reuther Messtechnik shipping package)
- Include a copy of this declaration form along with the shipping documents on the outside

By signing this form, you are accepting the full responsibility for its contents and confirming that appropriate decontamination has taken place in accordance with legal regulations.

Print name: Date:

Legally valid signature:

D. Certificates

D.1 Explosion protection certificates

D.1.1 PV10: EC type examination certificate DMT 00 ATEX E 062 X

See homepage: <https://www.bopp-reuther.com/de/download/> Explosion protection certificates Bopp & Reuther Messtechnik

D.2 Pressure Equipment Directive

ZERTIFIKAT ◆ CERTIFICADO ◆ CERTIFICAT ◆ СЕРТИФИКАТ ◆ 認証証書 ◆ CERTIFICATE ◆ ZERTIFIKAT ◆



ZERTIFIKAT

Certificate



Industrie Service

EG-Baumusterprüfung (Modul B) nach Richtlinie 97/23/EG
EC Type-examination (Module B) according to Directive 97/23/EC

Zertifikat-Nr.: IS-DDB-MAN-05-01-13461050-002
Certificate No.:

| | |
|--|--|
| <p>Name und Anschrift des Herstellers: <small>Name and postal address of manufacturer:</small></p> | <p>Bopp & Reuther Messtechnik GmbH Am Neuen Rheinhafen 4 D-67346 Speyer</p> |
|--|--|

Hiermit wird bescheinigt, daß das unten genannte EG-Baumuster die Anforderungen der Richtlinie 97/23/EG erfüllt.
We herewith certify that the type mentioned below meets the requirements of the Directive 97/23/EC.

| | |
|---|---|
| <p>Prüfbericht Nr.: <small>Test report No.:</small></p> | <p>BB-DDB-MAN-P-02-03-13461050-220</p> |
|---|---|

| | |
|--|---|
| <p>Geltungsbereich: <small>Scope of examination:</small></p> | <p>Turbinenradzähler / turbine meter: RQ 32, RQ 40, RQ 50, RQ 65, RQ 80, RQ 100, RQ 150, RQ 200, RQ 250, RQ 300</p> |
|--|---|

| | |
|--|--|
| <p>Fertigungsstätte: <small>Manufacturing plant:</small></p> | <p>Bopp & Reuther Messtechnik GmbH Am Neuen Rheinhafen 4 D-67346 Speyer</p> |
|--|--|

Mannheim, 25. Juli 2005
(Ort, Datum)
Bitte beachten Sie die Hinweise auf der zweiten Seite.
Please note the remarks on the second page.

TÜV Industrie Service GmbH
 TÜV SÜD Gruppe
 TÜV-CERT-Zertifizierungsstelle für Druckgeräte



Benannte Stelle, Kennnummer 0036
Notified Body, No. 0036

TÜV Industrie Service GmbH
 TÜV SÜD Gruppe
 Abteilung Druckbehälter
 Dudenstraße 28
 D-68167 Mannheim

Tel.: (06 21) 395-257
 Fax: (06 21) 395-594
 www.tuev-sued.de

Mitglied der
 CONFÉDÉRATION EUROPÉENNE

 D'ORGANISMES DE CONTROLE

Zertifikat-2-ModulB-Turbinenradzähler.doc
DGR Zertifikat Modul B.dot

ZERTIFIKAT ◆ CERTIFICADO ◆ CERTIFICAT ◆ СЕРТИФИКАТ ◆ 認証証書 ◆ CERTIFICATE ◆ ZERTIFIKAT



Industrie Service

ZERTIFIKAT Certificate

**Konformität mit der Bauart (Modul C1)
nach Richtlinie 97/23/EG**
Conformity to Type (Module C1) according to Directive 97/23/EC

Zertifikat-Nr.: Z-IS-DDB-MAN-15-05-100067376-007

Certificate No.:

Gültigkeit / Validity: 10 Jahre / 10 Years

**Name und Anschrift
des Herstellers:**

Name and postal address of manufacturer:

**Bopp & Reuther Messtechnik GmbH
Am Neuen Rheinhafen 4
D-67346 Speyer**

**Der Hersteller ist nach Prüfung der Voraussetzungen berechtigt, die von ihm im
Rahmen des Geltungsbereichs hergestellten Druckgeräte mit unserer Kenn-
nummer gemäß dem abgebildeten CE-Kennzeichen zu kennzeichnen:**

*The manufacturer is - after examination of the prerequisites - authorised to provide his pressure equip-
ment manufactured within the scope of the examination our identification number to the CE-mark as
illustrate:*

CE 0036

Prüfbericht Nr.:
Test report No.:

P-IS-DDB-MAN-15-05-100067376-009

Geltungsbereich:
Scope of examination:

**Durchfluss Messgeräte (Ovalradzähler
OI, OUI, OaP, OuaP, OV, OK, OT, Turbi-
nenradzähler RQ, Wirbeldurchflussmes-
ser VTX2, Kompaktblende Oriflow und
Oriflow PVDF, Filter (Na, NC, N, Nu)**

Fertigungsstätte:
Manufacturing plant:

**Bopp & Reuther Messtechnik GmbH
Am Neuen Rheinhafen 4
D-67346 Speyer**

**Mannheim, 08. Juni 2015
(Ort, Datum)**
(Place, date)

*Bitte beachten Sie die Hinweise auf der zweiten Seite.
Please note the remarks on the second page..*



Benannte Stelle, Kennnummer 0036
Notified Body, No. 0036
TUV SUD Industrie Service GmbH
Westendstr. 199
80686 München
GERMANY

D.3 EU Declaration of Conformity

EU - Konformitätserklärung
EU - Declaration of conformity
UE - Déclaration de conformité

Hiermit erklärt der Hersteller in alleiniger Verantwortung, dass die nachfolgend bezeichnete Baueinheit den Anforderungen der zutreffenden EU-Richtlinien entspricht. Bei nicht mit uns abgestimmten Änderungen verliert diese Erklärung ihre Gültigkeit.

The manufacturer herewith declares under sole responsibility that the unit mentioned below complies with the requirements of the relevant EU directives. This declaration is no longer valid if the unit is modified without our agreement.

Par la présente, le fabricant déclare sous sa seule responsabilité que les appareils décrits ci-dessous, correspondent aux exigences de la réglementation UE qui les concerne. Toute modification des appareils sans notre accord entraîne la perte de validité de cette déclaration de conformité

| | |
|---|--|
| Hersteller Manufacturer Fabricant | Bopp & Reuther Messtechnik GmbH Am Neuen Rheinhafen 4 67346 Speyer / Germany |
| Bezeichnung Description Description | Turbinenradzähler Turbine Meter Compteur à turbine |
| Typ, Modell Type, model Type, modèle | RQ mit <i>with</i> avec, AG, T11Fxxx, T15Fxxx |

| | |
|---|---|
| Richtlinie Directive Directive | 2014/30/EU /UE L 96/79 Elektromagnetische Verträglichkeit Electromagnetic interference Compatibilité électromagnétique |
| Normen und normative Dokumente Standards and normative documents Normes et documents normatifs | EN IEC 61000-6-2:2019 EN IEC 61000-6-3:2021 |

| | |
|---|---|
| Richtlinie Directive Directive | 2014/34/EU /UE L 96/309 Explosionsschutz Explosion protection Protection contre les explosions |
| Baumusterprüfbescheinigung Type examination certificate Certificat d'approbation de type | DMT 00 ATEX E 062 X AG81/82/83 (PV10) |
| Notifizierte Stelle Notified Body Organisme Notifié | BVS, DMT, DEKRA 0158 |
| Normen und normative Dokumente Standards and normative documents Normes et documents normatifs | EN IEC 60079-0:2018 PV10 EN 60079-11:2012 PV10 |

Bopp & Reuther Messtechnik GmbH, Am Neuen Rheinhafen 4, D-67346 Speyer
Telefon: +49(0)6232 657-0, Telefax: +49(0)6232 657-505, Email: info@bopp-reuther.com, Internet: www.bopp-reuther.com

Z-ML-KE RQ-V9 2026-01-12

| | | |
|--|---|--------------------|
| Richtlinie <i>Directive</i> Directive | 2014/68/EU /UE 93/23/EG /EC /CE Druckgeräte <i>Pressure equipment</i> Équipements sous pression | L 189/164 L 181 |
| Konformitätsbewertungsverfahren <i>Conformity assessment procedure</i> Procédures d'évaluation de la conformité | Modul B + Modul C1 | |
| Notifizierte Stelle <i>Notified Body</i> <i>Organisme Notifié</i> | 0036 TÜV SÜD Industrie Service GmbH Dudenstraße 28, D-68167 Mannheim | |
| Normen und normative Dokumente <i>Standards and normative documents</i> Normes et documents normatifs | AD 2000 Regelwerk <i>AD 2000 Code</i> Code AD 2000 | |
| Klassifizierung <i>Classification</i> Classification | Rohrleitungsteil <i>Pipe</i> Tuyauterie | |
| Fluid Kategorie ; Diagramm <i>Fluid category ; Diagramm</i> Dangerosité du fluide ; Tableau | Gruppe 1 ; Anhang II / 6 <i>Group 1 ; Attachment II / 6</i> Groupe 1 ; Appendice II / 6 | |
| Einstufung Druckgerät <i>Classification équipement sous pression</i> Classification pressure equipment | Kategorie III <i>Category III</i> Catégorie III | |

Die Angaben zur Richtlinie 2014/68/EU ist nur gültig für Druckgeräte die unter Artikel 4 Absatz 1 und 2 fallen, alle anderen unterliegen der guten Ingenieurspraxis nach Artikel 4 Absatz 3.

The information on Directive 2014/68 / EU is only valid for pressure equipment that falls under Article 4 Paragraph 1 and 2, all others are subject to good engineering practice according to Article 4 Paragraph 3.

Les informations sur la directive 2014/68 / UE ne sont valables que pour les équipements sous pression relevant de l'article 4, paragraphes 1 et 2, tous les autres sont soumis aux bonnes pratiques d'ingénierie conformément à l'article 4, paragraphe 3.

| | | |
|--|---|----------|
| Richtlinie <i>Directive</i> Directive | 2011/65/EU /UE Beschränkung gefährlicher Stoffe <i>Restriction of hazardous substances</i> Limitation de substances dangereuses | L 174/88 |
| Delegierte Richtlinie <i>Delegated Directive</i> Directive Déléguée | (EU /UE) 2015/863 Änderung Anhang II der Richtlinie 2011/65/EU <i>Amending Annex II to Directive 2011/65/EU</i> Modifiant l'annexe II de la directive 2011/65/UE | L 137/10 |
| Normen und normative Dokumente <i>Standards and normative documents</i> Normes et documents normatifs | EN IEC 63000:2018 | |

Ort, Datum / Place, Date / Lieu, Date:

Speyer, 2026-01-12


Dr. J. Ph. Herzog
Geschäftsführer
Managing director / Gérant

Bopp & Reuther Messtechnik GmbH, Am Neuen Rheinhafen 4, D-67346 Speyer
 Telefon: +49(0)6232 657-0, Telefax: +49(0)6232 657-505, Email: info@bopp-reuther.com, Internet: www.bopp-reuther.com

Z-ML-KE RQ-V9 2026-01-12

D.4 Declaration of the manufacturer

Herstellererklärung
Declaration of the manufacturer
Déclaration du fabricant

Hiermit erklärt der Hersteller in alleiniger Verantwortung, dass die nachfolgend bezeichnete Baureihe konzipiert, hergestellt und getestet wurde gemäß den unten erwähnten Normen.

The manufacturer herewith declares under sole responsibility that the unit mentioned below was designed, produced and tested according to the standards stipulated below.

Par la présente, le fabricant déclare sous sa seule responsabilité que les appareils décrits ci-dessous a été conçue, produite et testée selon les normes indiquées ci-dessous.

| | |
|--|--|
| Hersteller <i>Manufacturer</i> Fabricant | Bopp & Reuther Messtechnik GmbH Am Neuen Rheinhafen 4 67346 Speyer / Germany |
| Bezeichnung <i>Description</i> Description | Turbinenradzähler <i>Turbine Flowmeter</i> Compteur à turbine |
| Typ, Modell <i>Type, model</i> Type, modèle | RQ |
| Normen und normative Dokumente <i>Standards and normative documents</i> Normes et documents normatifs | ISO 2715:2017 |

Ort, Datum / Place, Date / Lieu, Date:

Speyer, 2026-01-19


Dr. J. Ph. Herzog
Geschäftsführer
Managing Director / Gérant


i. A. J. zur Nedden
Konstruktionleiter
Design Manager / Responsable conception

Our product portfolio:

Volume flow meters:

- Oval wheel meters
- Turbine Meters
- Magnetic-inductive flow meters

Mass flow meters:

- Vortex meters
- Compact orifices
- Coriolis mass flow meter

Density and concentration meters

Dosing measurement technology

- Magnetic-inductive flow meters
- Coriolis mass flow meters
- Oval wheel meters
- Dosing control systems

Energy measurement technology

Accessories

- Evaluation electronics
- Mechanical displays
- Pulse pick-ups
- Filters, gas separators

Measuring and testing systems

Conformity assessment according to MID Directive 2014/32/EU

Customer service

Bopp & Reuther Messtechnik GmbH
Am Neuen Rheinhafen 4
67346 Speyer
Germany
Tel. +49 6232 657-0
Fax +49 6232 657- 505
Email: info@bopp-reuther.com
<https://www.bopp-reuther.com>

BOPP & REUTHER
MESSTECHNIK

