

TURBINE METER RQ

Series 1 and 2

1. IDENTIFICATION

Manufacturer	Bopp & Reuther Messtechnik Am Neuen Rheinhafen 4 67346 Speyer / Germany Phone: +49 6232 657-0 Fax: +49 6232 657-505
Product type	Indirect volume meter
Product name	Turbine meter RQ, Series 1 and 2

2. RANGE OF APPLICATION

The turbine meter is used for flow and volume measurement of liquid media of low and medium viscosity (e.g. thin crude oils, mineral oils, acids, alkalis, solvents, water, liquefied gases, vinyl chloride, naphtha...).

Turbine meters of series RQ are available in nominal sizes 15 to 300. Depending on the nominal size, they can be used from PN 6 to PN 320;

the max. permissible operating pressure is PN 6. temperature of the medium can be up to 250°C, depending on the version.

Turbine meters are approved for custody transfer metering by the Physikalisch-Technische Bundesanstalt (PTB) in accordance with 2014/32/EU (MID) and authorities in other countries.

3. SYSTEM CONFIGURATION

3.1 Measuring principle

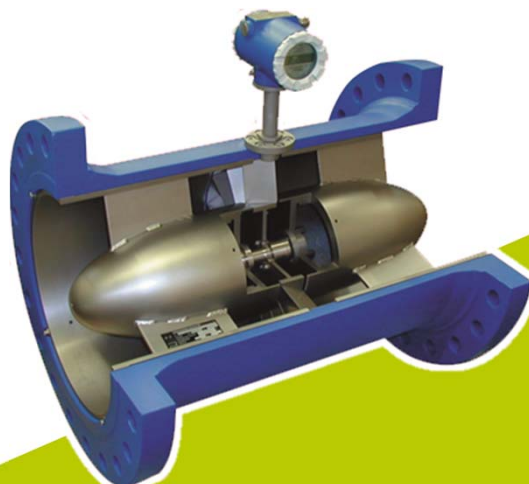
The turbine meter is an indirect volume meter. It consists essentially of a flow meter which is freely rotating axial turbine wheel. The turbine wheel is set in rotation by the liquid and assumes a speed which corresponds to the average speed of the turbine wheel.

Flow velocity of the liquid in the free cross-section of the turbine meter. The rotary motion is detected by magnetic-inductive scanning through the housing wall without any feedback. to one or more pulse pick-ups. This provides the user with volume - proportional pulses are available.

3.2 System configuration

The turbine meter consists of a transducer and one or more output electronics. Various pulse pick-ups (single and dual channel, different temperature ranges),

Smart Transmitters (4-20mA/HART®, pulse output) and flow computers are available for batch operation or pipeline applications.



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3.2.1 Pulse pick-up or Universal Smart Transmitter UST

Type	Function	Supply	Cable-specification / length	Temperature	Ex	Protection class
Pulse pick-up AG8x						
AG81	Pulse output acc. to NAMUR for connection to SPS/PLS (single or dual channel)	via NAMUR power supply unit	Type LiYCY 2 x 0.75, twisted, shielded max. 150 Ohm/wire, max. length 1000 m	-40 to 80°C	Exi	IP67
AG82	Pulse output acc. to NAMUR for connection to SPS/PLS (single or dual channel)			-60 to 180°C		
AG83	Pulse output acc. to NAMUR for connection to SPS/PLS (single or dual channel)			-60 to 250°C		
Universal Smart Transmitter with 8-digit LCD, resettable and non-resettable totalizer, flow display						
UST I	Smart Transmitter with 4-20mA output Pulse output acc. to NAMUR and HART [®] -communication	14 - 30VDC	4-20mA: Depending on the cross-section and material of the cable Pulse output according to NAMUR: as for AG8x	according to design*: K: -40° to +80°C W: -60° to +180°C H: -196° to +250°C	Exi	IP67
UST X	Smart Transmitter with 4-20mA output and HART [®] -communication	14 - 30VDC	4-20mA: Depending on the cross-section and material of the cable	according to design*: K: -40° to +80°C W: -60° to +180°C H: -196° to +250°C	Exd	
UST D	Smart Transmitter with 4-20mA output, Pulse output acc. to NAMUR and HART [®] -communication	14 - 30VDC	4-20mA: Depending on the cross-section and material of the cable Pulse output according to NAMUR: as for AG8x	according to design*: K: -40° to +80°C W: -60° to +180°C H: -196° to +250°C	Exd	

Design: K = compact design, W = wall construction, H = high / low version

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3.2.2 Measuring ranges

RQ Series 1	Measuring range	Pulses		
Nominal size	m ³ /h	Imp/n	Imp/l	Hz _{max}
DN15 / ½"	0,6 – 6	4	~310	517
DN25 / 1"	1,8 – 18	4	~105	525
DN40 / 1 ¼"	4,2 – 42	4	~22	257
DN50 / 2"	7,2 – 72	4	~12,4	248
DN65 / 2 ½"	12 - 120	4	~6	200

RQ Series 2	Measuring range	Pulses		
Nominal size	m ³ /h	Imp/n	Imp/l	Hz _{max}
DN80 / 3"	18 – 180	12	~15	750
DN100 / 4"	30 – 300	10	~6	500
DN150 / 6"	60 – 600	18	~3,4	567
DN200 / 8"	120 – 1200	24	~1,84	613
DN250 / 10"	180 – 1800	40	~1,24	600
DN300 / 12"	240 – 2400	44	~0,78	520

4. INPUT

4.1 Measured value

Volume and volume flow rate

5. CHARACTERISTIC PARAMETER

5.1 Reference conditions

The turbine meters are calibrated on test benches that are traceable to national / international standards with the following reference conditions:

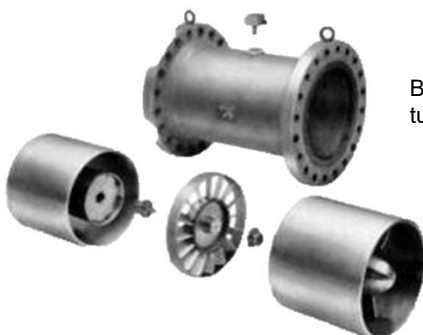
Pressure: 2 to 7 bar
 Temperatur: 20°C
 Viscosity: 3 mPa·s

5.2 Accuracy

± 0.3 % of measured value
 ± 0.15 % of the measured value (optional with restricted measuring range and only with inlet section)
 (The data refer to liquids with a viscosity of 0.2 - 0.7 mPa·s)
 The measuring deviation depends on the viscosity, the measuring range and the selected nominal diameter.

5.3 Repeatability

± 0.02%



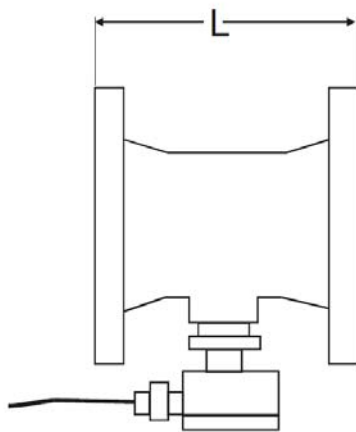
Basic structure of turbine meter RQ Series 2

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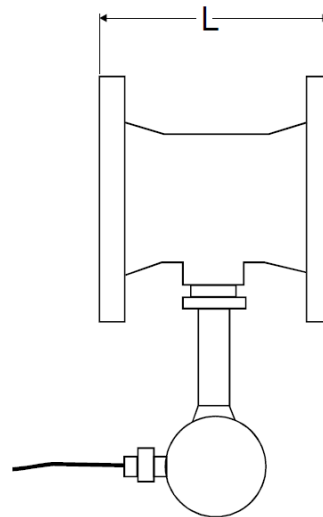
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6. CONSTRUCTION DETAILS

6.1 Design / dimensions / weights



RQ...AG8x...



RQ...UST...

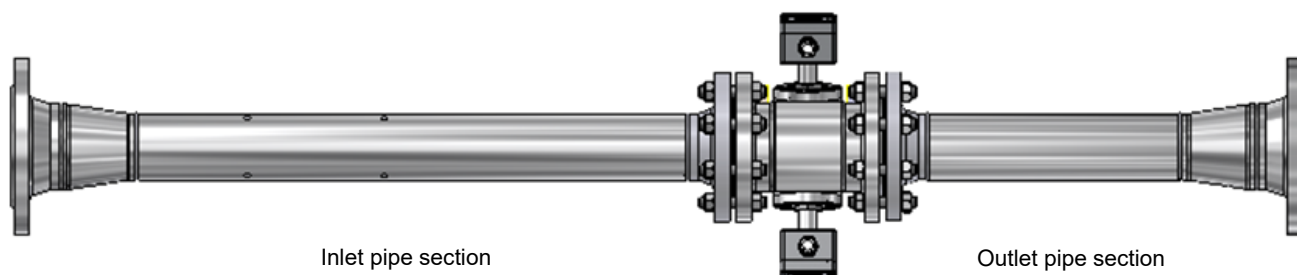
Type	AG8x L (mm)	UST L (mm)	with AG8x weight (kg)	with UST weight (kg)
RQ15	140	140	4	4
RQ25	150	150	6	6
RQ40	170	170	10	10
RQ50	170	170	12	12
RQ65	190	190	15	15
RQ80	200	200	19	19
RQ100	200	200	28	28
RQ150	300	300	62	62
RQ200	400	400	110	110
RQ250	500	500	170	170
RQ300	600	600	240	240

Details for PN 10 – PN100

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6.2 Type inlet and outlet pipe section



Nominal size	Inlet pipe section (mm)	Outlet pipe section (mm)
DN15 / ½"	180 (12 x DN)	160
DN25 / 1"	300 (12 x DN)	160
DN40 / 1¼"	400	200
DN50 / 2"	500	250
DN65 / 2½"	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

The inlet pipe section is executed according to API MPMS.

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6.3 Material

Turbine meter

Code	Housing	Measuring unit	Encampment
FG	Stainless steel	Stainless steel	Graphite
FS	Stainless steel	Stainless steel	Sapphire
FW	Stainless steel	Stainless steel	Tungsten carbide
F2W	Forged steel	Stainless steel	Tungsten carbide

The rotor can be made of stainless steel or nickel.

Inlet and outlet pipe section

Code	Flange DIN / ANSI	Pipe	Pipe bundle	
F5	Stainless steel	Stainless steel	Stainless steel	
F2	Steel	Steel	Stainless steel (≤ DN65)	Steel (≥ DN80)

7. OPERATING CONDITIONS

7.1 Operating temperature limit

Compact version -40...+80 °C
Wall construction -60...+180 °C
High / low-version -60...+250 °C

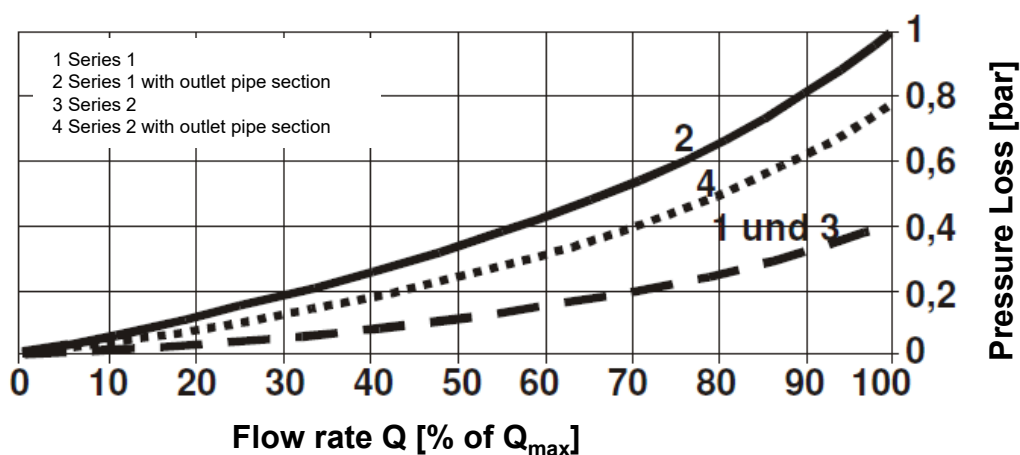
7.2 Operating medium pressure limit

PN6 – 320 / Class 150 – 2500, others on request

7.3 Viscosity

0.1 bis 50 mPa·s

7.4 Pressure loss



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8. SOLUTIONS

Custody measuring system with gas separator, turbine meter and loading computer for the measurement of ethanol



Measuring section with turbine meter, density measurement and flow computer for measurement of low-viscosity raffinates



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9. CERTIFICATES AND APPROVALS

**EC-certificate of conformity,
Bopp & Reuther Messtechnik GmbH**

Directive 2014/34/EU (Ex-Directive)

USTI – DMT 99 ATEX E 014 X
USTD – DMT 00 ATEX E 025 X
USTX – BVS 04ATEX E 022 X
AG8x (PV10) – DMT 00ATEX E 062 X

Directive 2014/30/EU (EMV-Directive)

EN 61000-6-2:2005, EN 61000-6-3:2011

**Directive 97/23/EG and 2014/68/EU (PED – Pressure
Equipment Directive)**

acct. to EC-Type Examination Certificate Directive 97/23/EC
(Module B)

Namur
NAMUR NE 21

Directive 2011/65/EU (RoHS)

**OIML R117 test report for class 0.5 and class 0.3 (in
general)**

CE-mark:

The measuring system complies with the legal requirements of the EC Directives 2014/30 / EU and 2014/34 / EU, including the amendments and supplements published to date. Bopp & Reuther Messtechnik GmbH confirms the successful testing of the device by affixing the CE mark.

10. DOCUMENTATION

Manuals

A-EN-02411-00 Manuals RQ with pulse pick up AG81/82/83
A-EN-02412-I0 Manuals RQ with Universal Smart Transmitter UST Ex ia
A-EN-02412-D0 Manuals RQ with Universal Smart Transmitter UST Ex d