

# VAF

INSTRUMENTS



# AQ-Rate Mass Flowmeter

Series 100/300

**121**

Product Bulletin

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**TO BE  
REALLY  
SURE**

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## Introduction

VAF Instruments is the most preferred supplier of the top 100 shipyards and market leader in maritime measurement systems today because we continuously strive to improve our products and service in order to serve you better.

For one, VAF Instruments offers her customers the best, longest and most comprehensive guarantee in the maritime industry. Secondly, with a global service organisation, VAF Instruments offers a unique level of customer service. When you look for reliability and service, VAF Instruments is the logical choice.

VAF Instruments is the leading specialist for the development, manufacturing and world-wide sales of measurement and control systems. We supply both the marine- and process industry.

Having more than 75 years of experience with flow measuring in both high demanding marine and industrial applications, the product range is expanded with a Coriolis mass flowmeter.

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## Principle of operation

A VAF AQ-Rate mass flowmeter is operating on the Coriolis principle. The process connection of the flowmeter is split internally into two identical v-shaped tubes, which are actuated at resonance frequency in opposite direction. When fluid flows through the tubes, the input legs of the v-shape will vibrate with the same frequency as the output legs, but they are behind in time. This difference in time, called phase shift, is a measure of the mass flow through the tubes. The magnitude of this phase shift is a measure of the mass flow rate, whilst the frequency of the complete system is a measure of the density of the fluid. The mass flow rate is the mass of the fluid per unit of time. When the mass flow rate is divided by the measured density, a volumetric flow rate can be obtained.

The AQ-Rate mass flowmeters have a digital signal processor based transmitter, enabling high precision measurements. Fast signal processing in combination with intuitive self diagnostics makes the sensor suitable for a large variety of applications. Various input and output options make the AQ-Rate mass flowmeters versatile in interfacing with other systems.

# Features & benefits

Features	Benefits
Obstruction-free measurement	No liquid filtering needed
Optional remote design	Electronics can be separated from a hot or aggressive environment
Intuitive operation	No training needed
Few moving parts	Maintenance free design
Insensitive for system lay-out	Flexible piping design
Design simplicity	Only few spare parts
Constructed to CE standards	Proven design
From ISO 9001 registered company	Guaranteed product reliability
Wetted parts from stainless steel	Applicable for a wide range of fluids
Ex transmitter available	Suitable for hazardous areas



# Technical specification

VAF AQ-Rate	Series 100		Series 300	
Basic model number	130	150	330	350
Meter sizes <sup>1</sup>	DN15 - DN150	DN15 - DN150	DN15 - DN150	DN15 - DN150
Flange type	DIN / JIS / ANSI			
Measuring accuracy <sup>2</sup> for liquids on rate				
Mass flow rate	0,4% / 0,25% (option)	0,15% / 0,10% (option)	0,4% / 0,25% (option)	0,15% / 0,10% (option)
Volumetric flow rate	0,4% / 0,25% (option)	0,15%	0,4% / 0,25% (option)	0,15%
Reproducibility	0,2% / 0,12% (option)	0,07% / 0,05% (option)	0,2% / 0,12% (option)	0,07% / 0,05% (option)
Density	0,010 kg/l	0,002 kg/l <sup>3</sup>	0,010 kg/l	0,002 kg/l <sup>3</sup>
Temperature	1 °C	0,5 °C	1 °C	0,5 °C
Wetted materials	stainless steel			
Liquid temperature range	-50 to 160 °C	-50 to 200 °C	-50 to 160 °C	-50 to 200 °C
Transmitter design	integral (no display)		remote / integral	
Connections	M20 x 1,5			
Display	-		LCD backlit, 2 configurable lines	
Power supply	11 - 30 VDC		100 - 230 VAC	
Power consumption	max. 25 VA			
Cable lenght remote transmitter	-		5 m standard	
Pulse output	passive		scalable and passive	
Analogue output	-		4-20 mA active / passive (option)	
Protection class	IP 65 / 67			
Ambient temperature	-20 to 60 °C/ -40 to 60 °C (option)			
Explosion protection	ATEX / IECEx zone 1 or 2 (option)			
Communication	Modbus RTU (RS485)		-	

Notes: <sup>1</sup> Process connection can be 1 size smaller or larger. <sup>2</sup> Based on measuring range of 20:1 based on water. <sup>3</sup> Special calibration 0,001 and 0,0005 kg/l available at temperature -10 to 50°C.

VAF AQ-Rate series 100/300						
Basic model number	DN15	DN25	DN50	DN80	DN100	DN150
Flange connections [DN]	10, 15, 20	20, 25, 40	40, 50, 65	65, 80, 100	80, 100, 150	100, 150, 200
Flange types	DIN / JIS / ANSI					
Maximum flow [kg/h] <sup>4</sup>	8000	35000	90000	250000	520000	860000
Measuring range	1 to 100%					
Color sensor	stainless steel uncoated					
Color transmitter	RAL 7012 / 9002					
Weight [kg] Remote version <sup>5</sup>	5	10	25	69	125	205
Weight [kg] Integral version	7	12	27	71	128	207
Weight [kg] Modbus version	12	14	30	74	125	182

Notes: <sup>4</sup> Based on water. <sup>5</sup> Excluding remote transmitter

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## Options and accessories

AQ-Rate mass flowmeters can be equipped with a built-on totaliser/transmitter. For applications at elevated temperatures or in heavy vibrating environments, it is recommended to have a separate remote totaliser/transmitter.



For fuel systems with multiple flowmeters, VAF Instruments offers electronic systems to compute the signals of these flowmeters.

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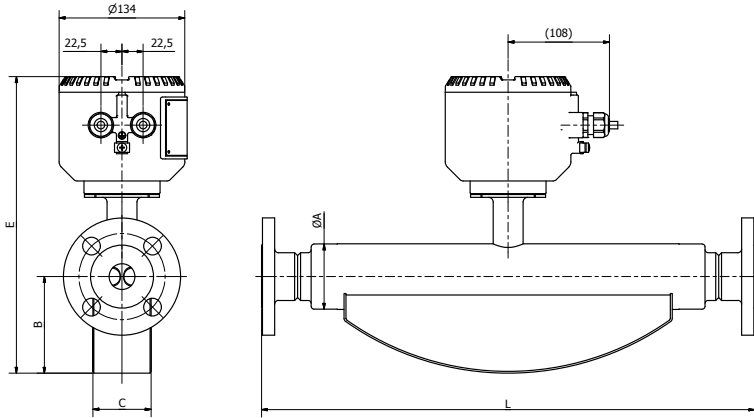
## Applications

- Fuel consumption measurement for combustion engines on board of a vessel or in a power plant facility.
- Fuel transfer measurement.
- Loading / unloading of various liquids.
- Bunkering



# Dimensions 100 series

Modbus design

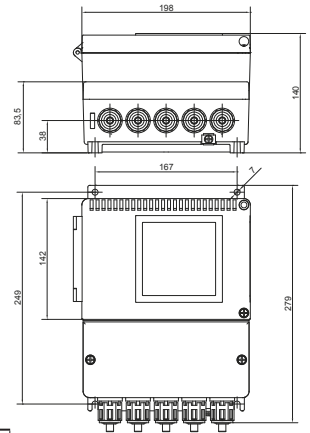
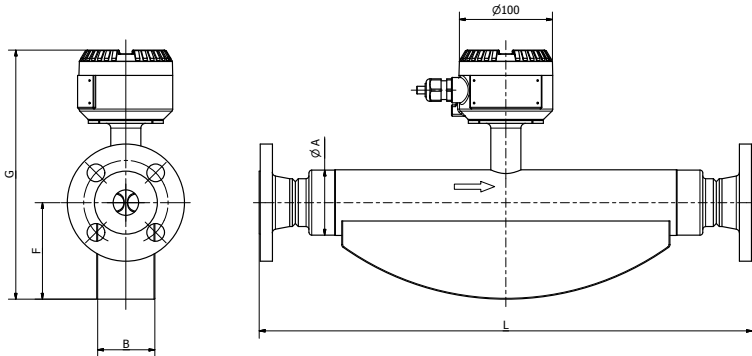


Meter size	L [mm]	E [mm]	B [mm]	C [mm]	A [Ømm]	Weight [kg]
FLANGE	PN 40 JIS 10-16K					
DN15	385	278	77	46	45	12
DN25	525	317	103	62	70	14
DN50	715	354	125	80	99	30
DN80	870	445	183	123	155	74
DN100	1144	668	261	168	195	122
DN150	1421	630	320	205	260	185

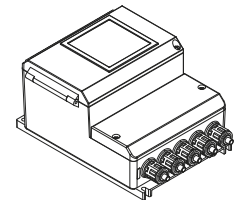


# Dimensions 300 series

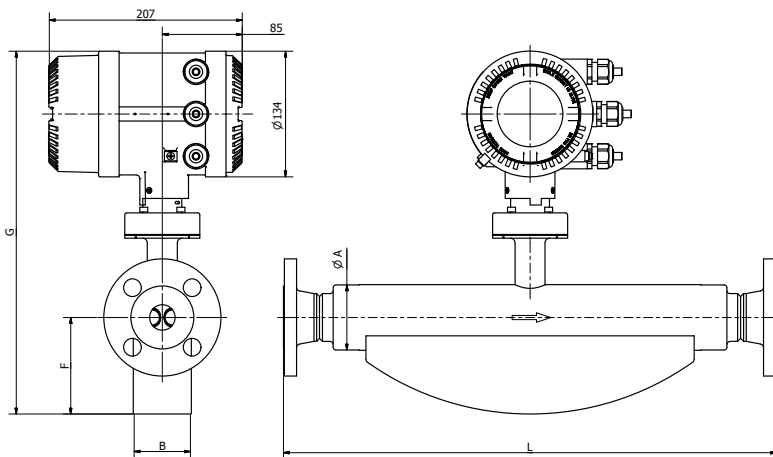
## Remote design



Meter size	L [mm]	L [mm]	G [mm]	F [mm]	B [mm]	A [Ømm]	Weight [kg]
	DIN PN 40/ JIS 10K-6K	ANSI 150#					
DN15	385	435	227	77	46	45	5
DN25	525	575	266	103	62	70	10
DN50	715	715	303	125	80	100	25
DN80	870	880	381	183	123	155	69
DN100	1144	1144	485	260	163	195	126
DN150	1461	-	700	205	260	230	205
DN150 ANSI	-	1485	821	320	205	260	205



## Integral design



Meter size	L [mm]	L [mm]	G [mm]	F [mm]	B [mm]	A [Ømm]	Weight [kg]
	DIN PN 40/ JIS 10-16K	ANSI 150#					
DN15	385	435	350	77	46	45	7
DN25	525	575	387	103	62	70	12
DN50	715	715	424	125	80	100	27
DN80	870	880	502	183	123	155	71
DN100	1144	1144	606	260	163	195	128
DN150	1461	1461	821	320	205	260	207

### Quotation & ordering information

For proper selection of the suitable AQ-Rate mass flowmeter the following data should be determined:

#### Liquid data:

- |  |                                |
|--|--------------------------------|
| 1. <b>Process liquid</b> (trade name or chemical composition): |                                |
| 2. <b>Flowrate</b> [l/min] minimum:                            | continuous: maximum:           |
| 3. <b>Operating pressure range</b> [bar]:                      | allowable pressure drop [bar]: |
| 4. <b>Operating temperature range</b> [°C] process liquid:     | ambient:                       |
| 5. <b>Specific gravity at operating conditions</b> [kg/l]:     | viscosity [m/Pas]:             |

#### Flowmeter data:

- |   |   |  |                           |                           |
|---|---|--|---------------------------|---------------------------|
| 6. <b>Basic model number:</b>             | <input type="radio"/> 130   | <input type="radio"/> 150                              | <input type="radio"/> 330 | <input type="radio"/> 350 |
| 7. <b>Accuracy:</b>                       | <input type="radio"/> standard  | <input type="radio"/> high                             |                           |                           |
| 8. <b>Diameter liquid piping:</b>         |   |  |                           |                           |
| 9. <b>Connection flanges:</b>             |   |  |                           |                           |
| 10. <b>Required output</b> [p/kg]         | <input type="radio"/> Modbus (100 series)   | <input type="radio"/> pulse p/kg (300 series)          |                           |                           |
| 11. <b>Inspection:</b>                    | <input type="radio"/> inspection by classification authority:<br><input type="radio"/> material certificate acc. EN 10204 3.1<br><input type="radio"/> other: |  |                           |                           |
| 12. <b>Tagging:</b>                       | <input type="radio"/> paper tag   | <input type="radio"/> stn. stl. tag fixed to flowmeter |                           |                           |
| 13. <b>Other options and accessories:</b> |   |  |                           |                           |

Name: \_\_\_\_\_

Place and date: \_\_\_\_\_

For further information see relevant Product Bulletins  
or [www.vaf.nl](http://www.vaf.nl)

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