



Model QMC IP40

## Quantim<sup>®</sup> QMC Series

Low Flow Coriolis Mass Flow  
Controllers & Meters for Liquids & Gases

Brooks Instrument has developed the third generation of its small, low-flow Coriolis mass flow meter and controller – the new Quantim<sup>®</sup> QMC Series. Compatible in fit, form and function with second generation QMB models, the new QMC model features a modern digital architecture enabling fast response, expanded simultaneous multi-variable outputs and enhanced diagnostics to handle a wide range of challenging applications. A new easy-to-access service port and status LEDs on the top lid simplifies installation, setup and troubleshooting using our free BEST (Brooks Expert Support Tool) software.

The heart of the device is a unique high-performance Coriolis sensor which directly measures mass flow independent of fluid type and process variables. With a range of 0.001 to more than 27 kg/hr, this multi-variable device simultaneously measures and reports mass flow, volume flow, density and temperature along with other valuable diagnostic variables for optimized process control and predictive maintenance. Quantim<sup>®</sup> offers unsurpassed accuracy and zero stability in for demanding low flow applications.

Most critical processes require control as well as measurement, and Quantim<sup>®</sup> offers an integrally mounted, in-line control valve. The integrated control valve and on-board control electronics simplify the installation, setup, operation and maintenance versus other low flow measurement and control techniques. No remote electronics are required as all the transmitting and control electronics are contained within the product housing.

## Precision for Critical Low Flow Processes

Coriolis technology enables precise, direct mass measurement and control for very low flow processes. This technology enables measurement accuracies within 0.2% of rate for liquid applications and 0.5% of rate for gas applications. The configuration with the lowest flow capability allows for measurement and control down to 0.001 kg/hr, which is perfect for chemical and petrochemical research, semiconductor, industrial thin film and other critical low flow processes.

## Process Flexibility

The Coriolis flow measurement technique eliminates the need for calibration to a specific fluid or process conditions. The third generation sensor and electronics used on Quantim® QMC Series Coriolis mass flow meters and mass flow controllers provides industry-leading accuracy, and allows the direct measurement of mass flow. This means Quantim® Coriolis instruments can easily be used on different process fluids without the need for recalibration.

## Material Selection for Any Application

Quantim® has material options to allow the best possible match for your needs. With an all stainless steel construction, Quantim® is compatible with most process fluids. With the all metal valve construction, high alloy stainless steel valve stem and plunger and metal valve seat, maintenance due to corrosion is minimized. For process fluids sensitive to moisture or oxygen, an all metal seal construction using Nucleon seals is available. Other seal material selections including Viton® fluoroelastomer, Buna, Kalrez® or EPDM are also available.

## Diagnostics, Service Port and BEST Software

Quantim® Coriolis mass flow meters and mass flow controllers have an easy-to-access service port. This, coupled with our free downloadable Brooks Expert Support Tool (BEST) software, facilitates enabling the on-board alarms and diagnostics for enhanced process monitoring and predictive maintenance, simplifies installation, and supports troubleshooting. With the BEST software, the user is able to unlock the full potential of their Quantim® Coriolis mass flow controller.

# Features and Benefits

Features	Benefits
Integrated sensor, valve and PID control all in one small package	Simplifies purchase, installation, and start up by having everything available from one supplier in a single compact unit
Low mass tube drive and optical sensing	Enables accuracy and zero stability at extreme low flow
Multivariable outputs and true mass measurement	Improves and simplifies process monitoring and diagnostics, further reducing cost of ownership
Diagnostic alarms and warnings	Provides early indication of potential process issues so preventative actions can be taken
Direct mass flow measurement with industry leading precision	Process chemistry and/or process conditions can be altered without the need to change or recalibrate the measurement system, providing the user with maximum flexibility
No internal moving parts	Minimizes maintenance requirements and overall cost of ownership
Small physical size	Easily integrated into most intricate process systems
Gas or liquid measurement and control capability in one package	The ultimate in process flexibility
Easy-to-access service port and BEST software	Facilitates enhanced process monitoring and predictive maintenance, simplifies installation, and supports troubleshooting

## NEW Easy-to-Access Service Port

Easy installation, start-up and operation

## Diagnostic Alarms and Warnings

Provides early indication of potential process issues for preventative action

## Optical Sensor

Allows precise measurement of tube movement for direct mass flow measurement

## Advanced Electronics

Integrated PID control with superior signal filtering

## Tube Assembly

Varied sizing allows for up to 27 kg/hr of flow

## Coplanar Valve

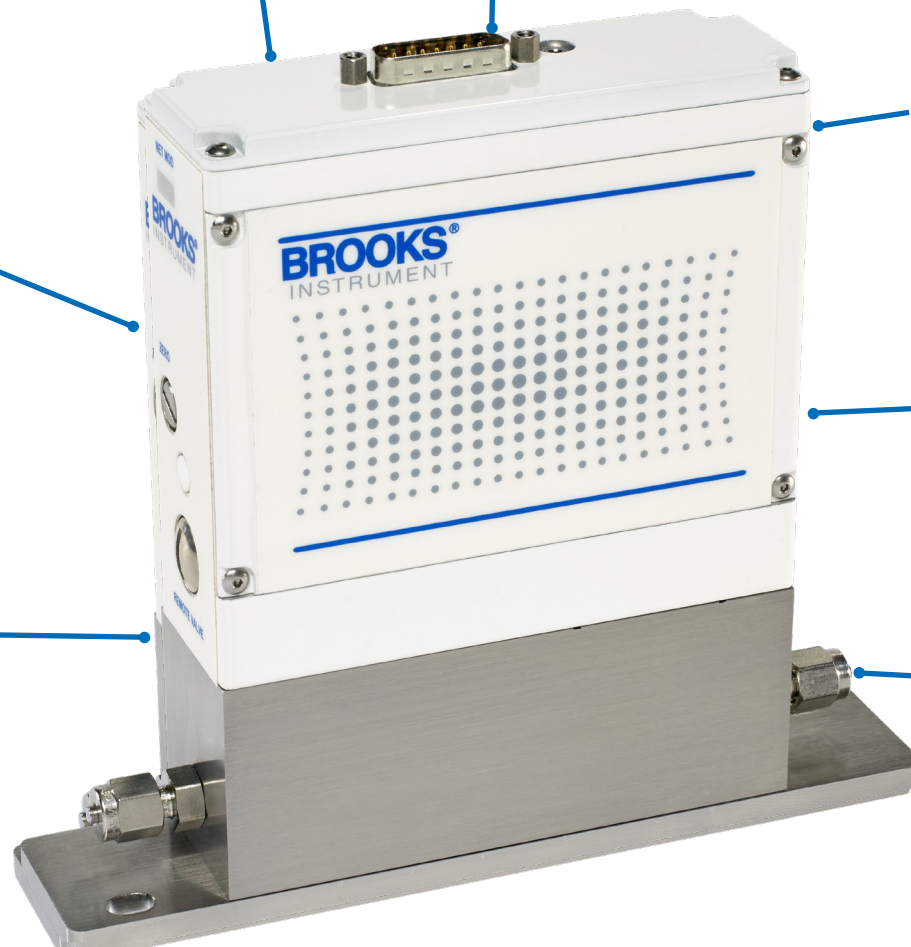
Super-fast response times (<400 msec typical)

Minimum valve leak-by (<0.2% FS)

## Liquid or Gas Connections

Seals are available in Viton®, Kalrez®, Buna, EPDM and Nickel

Flow-thru or downported configurations



	QMBC (Controller)			QMBM (Meter)		
<b>PERFORMANCE</b>						
Tube Size:	2	3	4	2	3	4
Nominal Flow Range <sup>(1)</sup> :						
Liquid (kg/hr):	0.15	0.78	7.97	0.19	1.30	13.50
Gas (kg/hr):	0.076	0.214	1.796	0.103	0.53	3.840
Gas (sccm) <sup>(2)</sup> :	1051	2955	24787	1432	7207	53116
Minimum Measurable Flow Liquid (kg/hr)	0.001	0.010	0.100	0.001	0.010	0.100
Zero Stability Stainless Steel Sensor (kg/hr):	0.00013	0.0010	0.0040	0.00013	0.0010	0.0040
Repeatability & Reproducibility:	±0.05% or ±[0.5 x (zero stability/flowrate) x 100]% of rate whichever is greater					
Response Time (Settling Time): 2% F.S. of final value, (per SEMI Guideline E17-91)	<2 seconds			<0.5 seconds		
Flow Accuracy <sup>(3,4)</sup> : Standard Flow Accuracy:	Standard Flow Accuracy or [(zero stability/flow rate) x 100]% of rate, whichever is greater Liquid: 0.2% Gas: 0.5% of rate					

<b>RATINGS</b>	
Operating Temperature Range <sup>(6)</sup> :	0 to 60°C
Temperature Accuracy (Device):	± 0.5°C
Differential Pressure Range:	Liquid: 10 to 200 psi Gas: 10 to 150 psi
Maximum Operating Pressure:	Standard: 500 psi Optional: 1500 psi
Density Range:	0 to 2.0 g/cc
Density Accuracy <sup>(5)</sup> :	± 0.005 g/cc
Leak Integrity (external):	Elastomer: Outboard 1 x 10 <sup>-9</sup> atm. cc/sec., helium (max) Metal Seal: 1 x 10 <sup>-10</sup> atm. cc/sec., helium (max)

<b>MECHANICAL</b>	
Materials of Construction Process Wetted: Process Seals:	316L, 316L VAR, High alloy ferritic stainless and 17-7PH Elastomer Seal: Viton®fluoroelastomers, Buna, Kalrez® or EPDM Metal Seal: stainless steel and nickel
Housing:	IP40: polyurethane painted aluminum
Inlet Filter:	Tube size 2 controller: 1 micron or 10 micron inlet filter recommended Tube size 3 or 4: 10, 20, 30 & 40 micron filters available
Weight:	2.4 kg (5.4 lbs.)
Moisture Content:	Purged to exhaust dew point less than -40°C (-40°F) prior to shipment to remove calibration liquid, to prevent process contamination. Then vacuum bagged at ambient room conditions.
Process Fitting Options:	Elastomer Seal: 1/16", 1/8", 1/4" or 6mm tube compression, 1/8" or 1/4" NPT(F), 1/8" or 1/4" VCR, 1/4" VCO Metal Seal: 1/8" VCR, 1/4" VCR, 3.2 mm UPG
Electrical Connections:	15 pin D-Type connector (See Figure 2).
Dimensions:	(See Figures 1 through 3)
Vibration:	Tested per: IEC 60068-2-64 Ed 2.1, Table A.3, Category 1, per ETSI EN 300 019-2-3, T 3.2., 30 min / axis, 1.1m/s <sup>2</sup> (0.1g), 5 to 100Hz IEC 60068-2-6, Table A.1, 75min / axis, Peak Acceleration of 9.8m/s <sup>2</sup> (1g), 5 to 2,000Hz, 5 Sweeps

## DIAGNOSTICS

Status Lights:

Status and Alarm LEDs

Alarms:

Mass Flow, Density, Volumetric Flow, Temperature, Slug Flow,  
Diagnostic Failure, Setpoint Deviation, Valve Drive

## ELECTRICAL

Output Signal:

Digital:

RS485 S-Protocol (See RS485 Supplemental Manual – QMC for additional details)

Analog:

Primary: 0-20 mA, 4-20 mA, 0-5 Vdc, or 0-10 Vdc active output represents mass flow or volume flow(3)

Secondary: 0-20 mA, 4-20 mA 0-5 Vdc or 0-10 Vdc active output represents density or temperature.

Alarm output, max. voltage 30 Vdc, max. current 100 mA

Input Signals:

Digital:

RS485 S-Protocol (See RS485 Supplemental Manual – QMC for additional details)

Analog:

Command (setpoint): 0-20 mA, 4-20 mA, 0-5 Vdc or 0-10 Vdc input signals

Valve Override (VOR) Function: Left floating/unconnected - instrument controls flow at setpoint Connected to signal at or above 5.0 volts - valve is forced open Connected to signal at or below 0.0 volts - valve is closed

Power Requirements:

Voltage: +14 to 27 Vdc

Nominal Current:

Controller: 300 mA to 400 mA

Meter: 100 mA to 150 mA

Max Current:

Controller: 715 @ 14 Vdc

Meter: 470 mA @ 14 Vdc

Max Power:

Controller: 10.0 W

Meter: 6.6 W

## ADDITIONAL FUNCTIONS & OUTPUTS

Damping:

Factory set time constant from 0 to 10 seconds

LED's:

'STAT' solid green: system operative

'AL' solid red: system fault

Pushbutton:

'ZERO' setting pushbutton

## CERTIFICATIONS AND COMPLIANCE

Environmental Compliance

EMC Directive 2014/30/EU per EN 61326-1: 2013  
ROHS Directive 2011/65/EU and 2015/863

Pressure Effects Compliance

Pressure Equipment Directive 2014/34/EU  
"Sound Engineering Practice"

Additional Certifications (Optional)

Material 2.1 EN10204, Material 3.1B EN10204, Calibration Traceability,  
Oxygen Clean, Certificate of Conformance

### Notes

- <sup>(1)</sup> The nominal flow rate is the flow rate at which water at reference conditions causes approximately 1 bar of pressure drop or the laminar to turbulent transition flow whichever is lower. Maximum flow rate is higher than the nominal flow rate and is dependent upon process fluid and process conditions.
- <sup>(2)</sup> Standard volumetric conditions are 14.696 psia and 70°F.
- <sup>(3)</sup> Actual volumetric flow is a function of the mass flow and the density measurements; therefore the accuracy of actual volumetric flow is a function of the mass flow and density accuracy.
- <sup>(4)</sup> Accuracy includes combined repeatability, linearity, hysteresis and calibration system uncertainty. Specifications are based on reference test conditions of water/nitrogen at 68 to 77°F (20 to 25°C) and 15 to 30 psig (1 to 2 bar).
- <sup>(5)</sup> The density measurement at temperatures other than 21°C (70°F) has an additional error of approximately 0.0005 grams/cc per °C.
- <sup>(6)</sup> A temperature rise of up to 20°C (68°F) from internal heating can occur in an open environment where ambient temperature is 23°C (73°F). The device temperature is affected by the ambient and process temperature as well as warming when the device is powered. The device should be maintained in the specified temperature range at all times.

# Product Dimensions - QMC IP40 - Thru-Flow

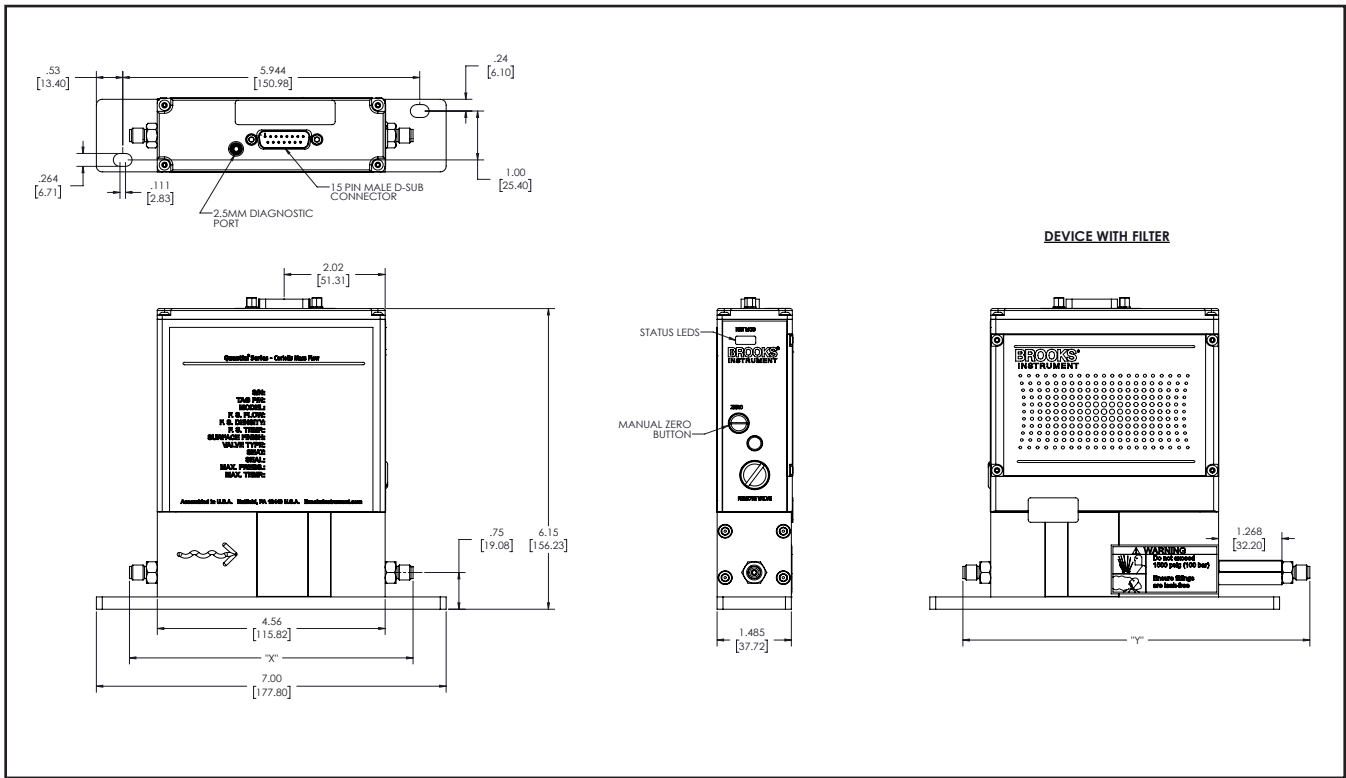


Figure 1 Dimensional Drawing QMC IP40

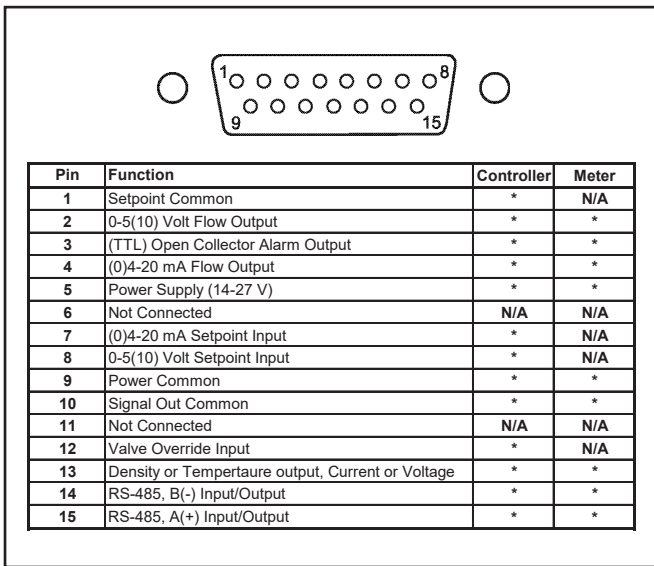


Figure 2 D-Connector Electrical Pin Connections

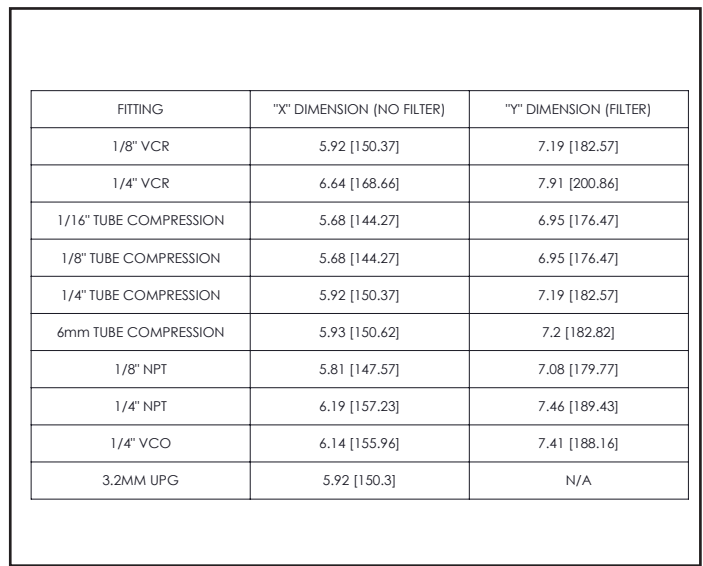


Figure 3 Lay-In Dimensions Integral Valve

Code Position	Code Description	Code Option	Option Description			
1-4	Base Model	QMCC	Flow Controller			
		QMCM	Flow Meter			
5	Tube Size	Meter Nominal Flow		Controller Nominal Flow		
			Liquid	Gas	Liquid	Gas
		2	190 grams/hr	1430 sccm	150 grams/hr	1051 sccm
		3	1300 grams/hr	7.27 slpm	780 grams/hr	2.96 slpm
4	13.5 kg/hr	53.1 slpm	7.97 kg/hr	24.79 slpm		
6	Fluid Type	L	Liquid			
		G	Gas			
7	Reserved	1	Standard			
8	Valve Type	A	No Valve (Flow meter)			
		B	Normally Closed Valve			
9	Accuracy	2	0.2% of rate	Standard for Liquid		
		3	0.5% of rate	Standard for Gas, optional for Liquid		
		4	1.0% of rate	Optional for Gas		
10	Enclosure Type and Safety Certification	A	NEMA 1 / IP 40	Safe Area		
11	Surface Finish	1	Standard Surface Finish (32 Ra)			
12	Sensor Tube Material	A	316L Stainless Steel			
13	Maximum Pressure	1	500 psi (35 bar)			
		2	1500 psi (100 bar)			
14	Reserved	A	Standard			
15-16	Process Connections	1A	Standard Body Connection - 5/6"-24 UNF			
		1B	1/16" Tube Compression			
		1C	1/4" Tube Compression			
		1D	1/8" Tube Compression			
		1G	6mm Tube Compression			
		1J	1/8" NPT(F)			
		1K	1/4" NPT(F)			
		1L	1/8" VCR	Available with Metal Seals		
		1M	1/4" VCR	Available with Metal Seals		
		1P	1/4" VCO			
		2A	3.2mm UPG	Available with Metal Seals		
		17	Input Output Signals / Communications	Primary I/O		Secondary Output
A	0-5 VDC			4-20 mA		
B	4-20 mA			4-20 mA		
C	0-5 VDC			0-5 VDC		
S	RS485			RS485		
T	0-10 Volt			0-10 Volt		
U	0-10 Volt			0-5 Volt		
V	0-10 Volt			4-20 mA		
W	0-10 Volt			0-20 mA		
1	0-20 mA			0-10 Volt		
2	0-20 mA	0-5 Volt				
3	0-20 mA	4-20 mA				
4	0-20 mA	0-20 mA				
18	Electrical Connection	1	15 Pin D Type Connector			

Code Position	Code Description	Code Option	Option Description
19	Seals		Sensor, Valve Stem and End Fitting
		A	Viton
		B	Buna
		C	Kalrez 4079
		D	Kalrez 6375
		E	EPDM
20	Valve Seat Material	1	None(Meter)
		7	Metal 17-7pH Stainless Steel
21	Special Processing	A	NONE
		B	2.1 EN 10204 Material Certificate
		C	3.1B EN 10204 Material Certificate
		D	Certified Clean for Oxygen Service
		E	Certified Clean for Oxygen Service & 2.1 EN 10204 Material Certificate
		F	Certified Clean for Oxygen Service & 3.1B EN 10204 Material Certificate
22	Quality Certifications	1	None
		2	Calibration Certification Traceable to NIST
		4	Certificate of Conformance
		5	Calibration Certification Traceable to NIST and Certificate of Conformance
23	In-line Filter	A	None
		B	In-Line Cartridge Filter, 10 Micron
		C	In-Line Cartridge Filter, 20 Micron
		D	In-Line Cartridge Filter, 30 Micron
		E	In-Line Cartridge Filter, 40 Micron
		F	In-Line Cartridge Filter, 1 Micron
		Z	Filter Housing Only / No Filter Element
24	OEM Code	A	Brooks
		N	No Logo

### Sample Model Code

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX
QMCC	2	G	1	A	2	A	1	A	1	A	1A	A	1	A	1	A	1	A	A



# Service and Support

Brooks is committed to assuring all of our customers receive the ideal flow solution for their application, along with outstanding service and support to back it up. We operate first class repair facilities located around the world to provide rapid response and support. Each location utilizes primary standard calibration equipment to ensure accuracy and reliability for repairs and recalibration and is certified by our local Weights and Measures Authorities and traceable to the relevant International Standards.

Visit [www.BrooksInstrument.com](http://www.BrooksInstrument.com) to locate the service location nearest to you.

## START-UP SERVICE AND IN-SITU CALIBRATION

Brooks Instrument can provide start-up service prior to operation when required. For some process applications, where ISO-9001 Quality Certification is important, it is mandatory to verify and/or (re)calibrate the products periodically. In many cases this service can be provided under in-situ conditions, and the results will be traceable to the relevant international quality standards.

## SEMINARS AND TRAINING

Brooks Instrument can provide customer seminars and dedicated training to engineers, end users, and maintenance persons. *Please contact your nearest sales representative for more details.* Due to Brooks Instrument's commitment to continuous improvement of our products, all specifications are subject to change without notice.

### TRADEMARKS

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