DS-CM-QmB-eng
April, 2015

Data Sheet

Quantim® Series

Model QmB IP40

Coriolis Mass Flow

Low Flow Coriolis Mass Flow Measurement and Control

Overview

Brooks Instrument's Quantim® Series is the smallest, lowest flow Coriolis meter and controller available on the market. With a footprint the size of a handheld organizer, you can fit this instrument into any tight space. The heart of the device is a patented Coriolis sensor design which measures low flows independent of the fluid type or process variables. With a range of 0.001 to more than 27 kg/hr, you can measure mass or volume flow and density or temperature all in one compact package. Quantim offers unsurpassed accuracy and unmatched zero stability in demanding low flow applications.

Most critical processes require control as well as measurement, and Quantim offers an optional integrally mounted, in-line control valve. No remote electronics are required as all the transmitting and control electronics are contained within the product housing. A remote valve configuration is also available.

Available with a variety of options and global approvals the Brooks Quantim Coriolis mass flow meters and controllers provide unsurpassed performance, solving specific challenges in demanding low-flow applications.

Product Description

The Quantim family of Coriolis mass flow meters and flow controllers uses a proven mass flow measurement technology to provide direct mass flow measurement and control of liquids and gases that has been employed in a wide variety of markets and applications for more than 15 years. Brooks Quantim products are the smallest and lowest flow Coriolis mass flow meters and controllers available on the market. Coriolis mass flow devices have the option of using an integrally mounted or remote control valve in a miniaturized configuration. They can simultaneously measure mass or volumetric flow and fluid density or temperature.

Product Description

Precision for Even the Most Delicate or Lowest-Flow Processes

Quantim's Coriolis technology allows for precise, direct mass measurements even for very low flow processes. This technology enables for measurement accuracies within 0.2% of the rate for stainless steel construction and 0.5% of the rate for Alloy C-22 construction. Quantim is the lowest coriolis flow controller available. The configuration with the lowest flow capability allows for measurement down to 0.001kg/hr, which is perfect for extremely sensitive processes and costly components in any setting.

Process Flexibility

The Coriolis Effect is the deflection of moving objects with respect to a reference point, utilizing this effect allows measurement of flow while negating the need for calibration to a specific fluid or process conditions. The Coriolis technology gives Quantim its' industry-leading accuracy, and allows the direct measurement of mass flow. This allows Quantim to transition between process fluids without the need for recalibration, assuming the fluid change doesn't fall out of specification for the valve assembly.

Material Selection for Any Application

Quantim has material options to allow the best possible match for your needs. Quantim offers both stainless steel and Hastelloy as materials for sensor construction. This accommodates for processes with more corrosive fluids, and reduces maintenance due to corrosion of the mass flow meter/controller. Even more variety can be found in seal choices. Customers have the choice of using Viton® fluoroelastomer, Buna, Kalrez®, EPDM, and Nickel as their seals.

Enclosures to Meet Any Need

Different enclosure types enable equipment to be installed in any environment from an indoor non-hazardous area to an outdoor explosion risk area. Quantim is available in four different enclosure types. The IP40 is a basic enclosure, desired for most enclosed environments. IP66 is weather/waterproof, as well as Class 1, Division 2, Zone 2 certified for hazardous locations. The IP66XP is Division 1, Zone 1 certified for explosive environments. No matter the environment, Quantim can be tailored to fit your needs.

Features and Benefits

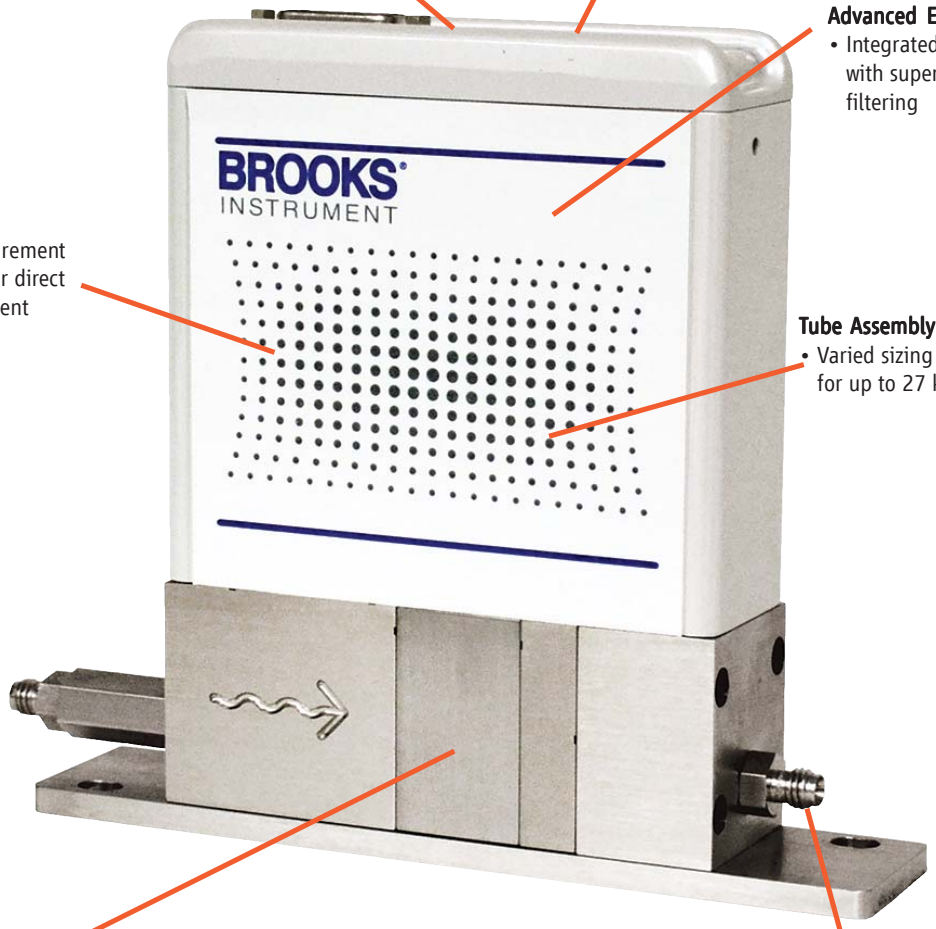
Features	Benefits
Integrated sensor, valve and PID control all in one small package	Simplifies purchase, installation, and start up by having everything available from one supplier in a single compact unit
Low mass tube drive and optical sensing	Enables accuracy at extreme low flow
Multivariable outputs 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
Industry leading mass flow measurement 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 and liquid measurement and control capability in one package	The ultimate in process flexibilty
Variety of options, enclosure types and area classifications available	The right product for your application

Features and Benefits

Diagnostic Alarms and Warnings
- Provides early indication of potential process issues for preventative action

User Interface
- Easy installation, start-up, and operation

Advanced Electronics
- Integrated PID control with superior signal filtering



Optical Sensor
- Allows precise measurement of tube movement for direct mass flow measurement

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

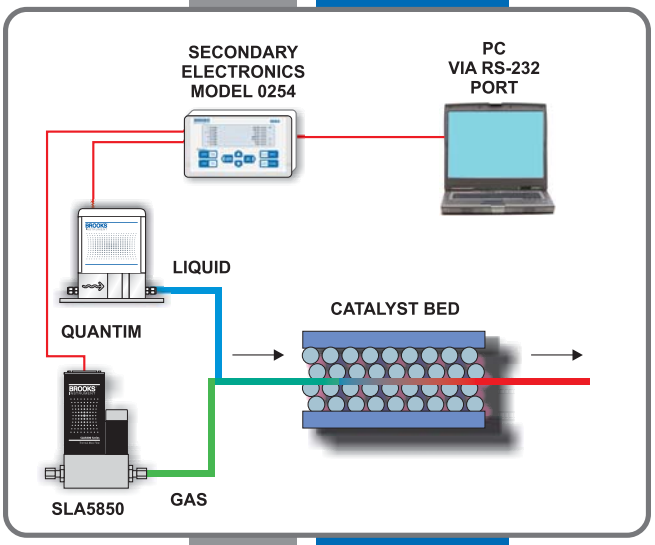
Coplanar Valve
- Super-fast response times (<400 msec typical)
- Minimum valve leak-by (<0.2% FS)

Liquid or Gas Connections
- Seals are available in Viton®, Kalrez®, Buna, EPDM and Nickel
- Flow-thru or Downported Configurations

Product Applications

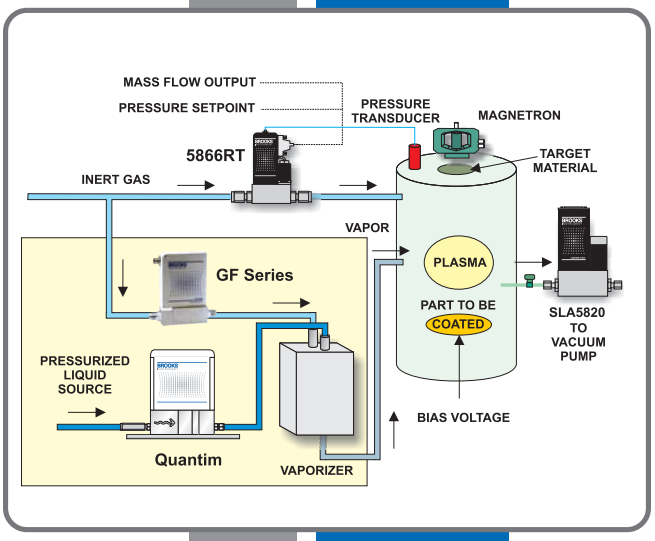
Catalyst Research

The Quantim coriolis mass flow controllers have been selected by many companies participating in catalyst research due to the precise measurement requirements for accurately calculated conversion rate and selectivity, which allows for successful scaling up of processes. Quantim is preferred due to its exceptional precision, wide dynamic range, and super stability. The coriolis technology within Quantim makes them extremely well suited for critical measurements where the composition or thermal properties of feeds vary. It is also available for extremely high pressure service, with appropriate area classifications, and wetted materials.



Vacuum Process

Brooks offers many exceptionally performing products for CVD, ALD, etch, diffusion, and other vacuum operations. The Quantim coriolis mass flow controller provides precision, accuracy, and repeatability for liquid precursor applications.

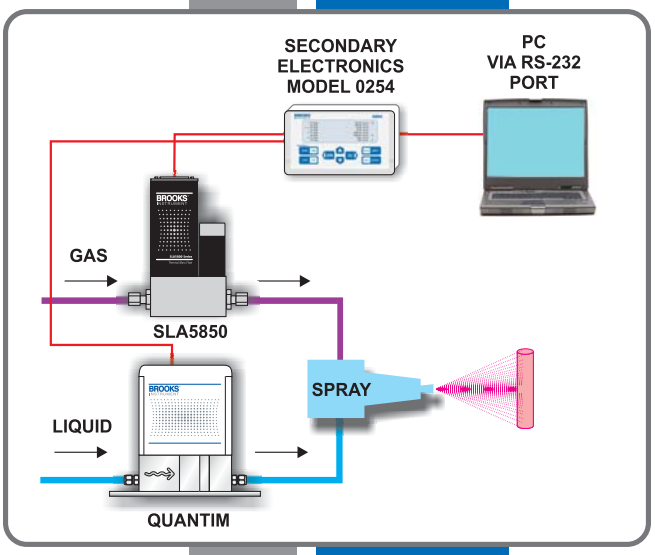


Precision Coating

Many coating processes use liquids that are sprayed onto substrates. The liquid delivery rate to the spray nozzles controls the film thickness on the substrate, while gas flow determines droplet size and spray pattern.

The Quantim mass flow controller is perfect for controlling the liquid flow rate to the spray nozzle. In addition, the instantaneous density output available from the Quantim Series can be employed diagnostically to detect the presence of gas bubbles in the liquid stream.

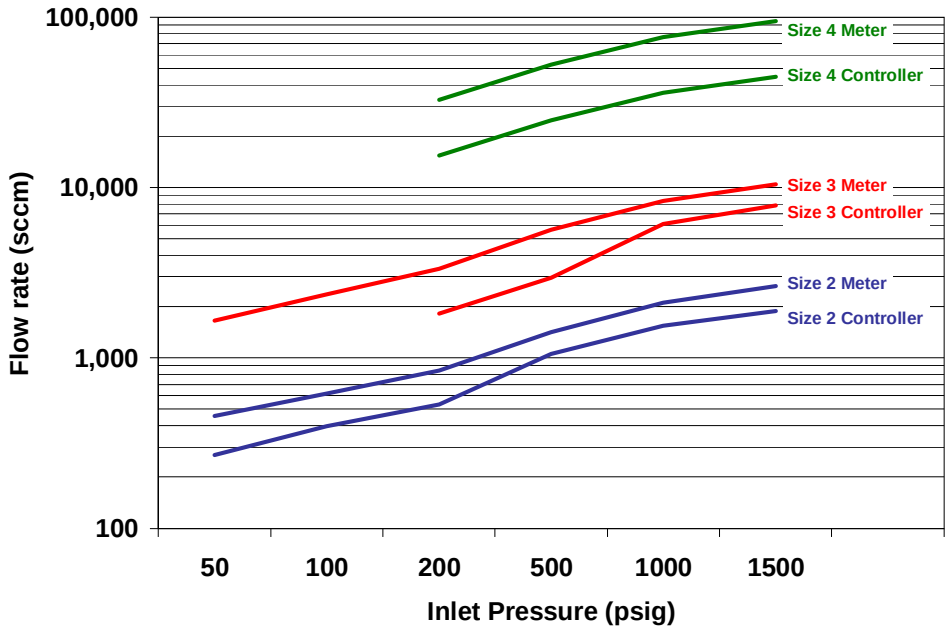
The Brooks Model 0254 secondary electronics may be used to provide power, local display, and setpoint for both flow devices. The liquid density measurement, used for quality control, is also displayed. A totalizer function may be used to track liquid inventory to ensure that the process supply does not run low.

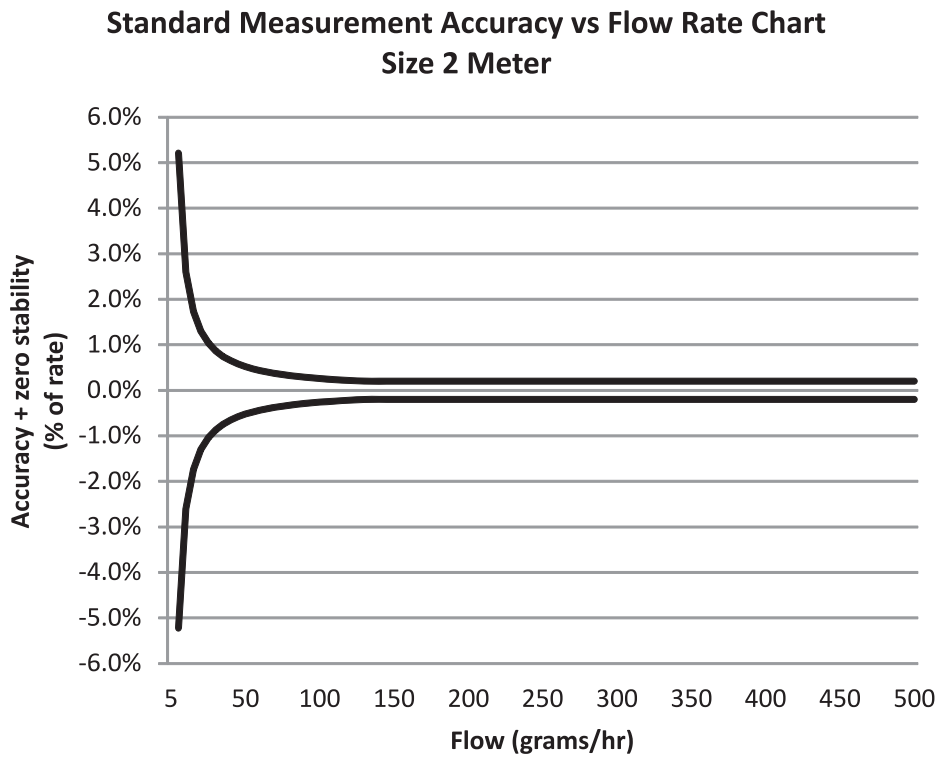


Product Specifications

Performance Specifications

Gas Flow Limits: Air, 70°F (21°C), 14.5 psi (1 Bar) pressure drop

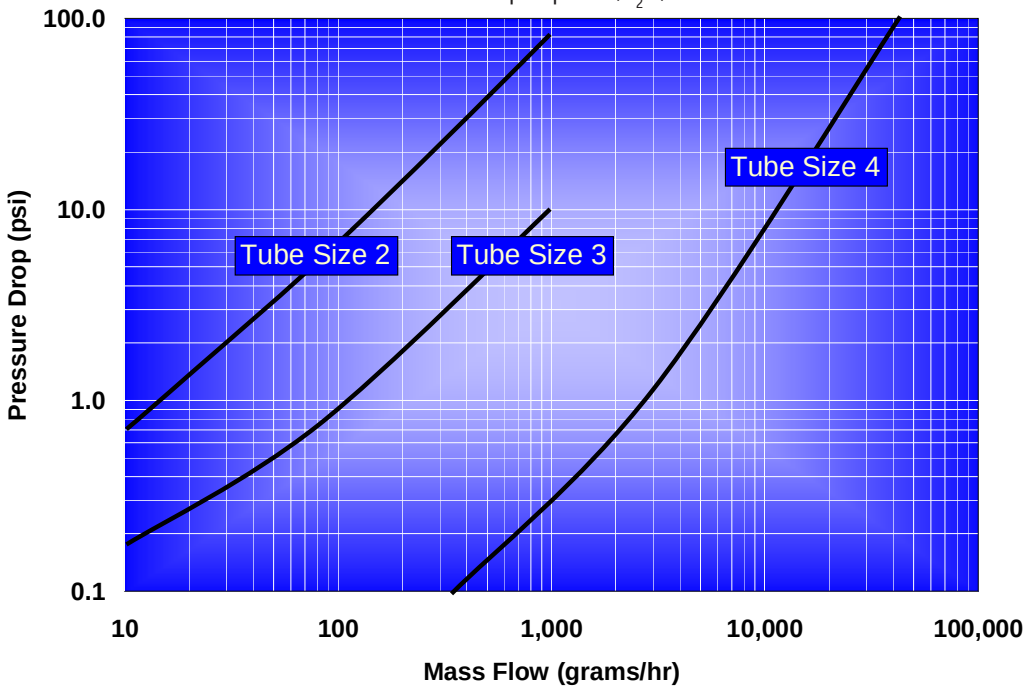




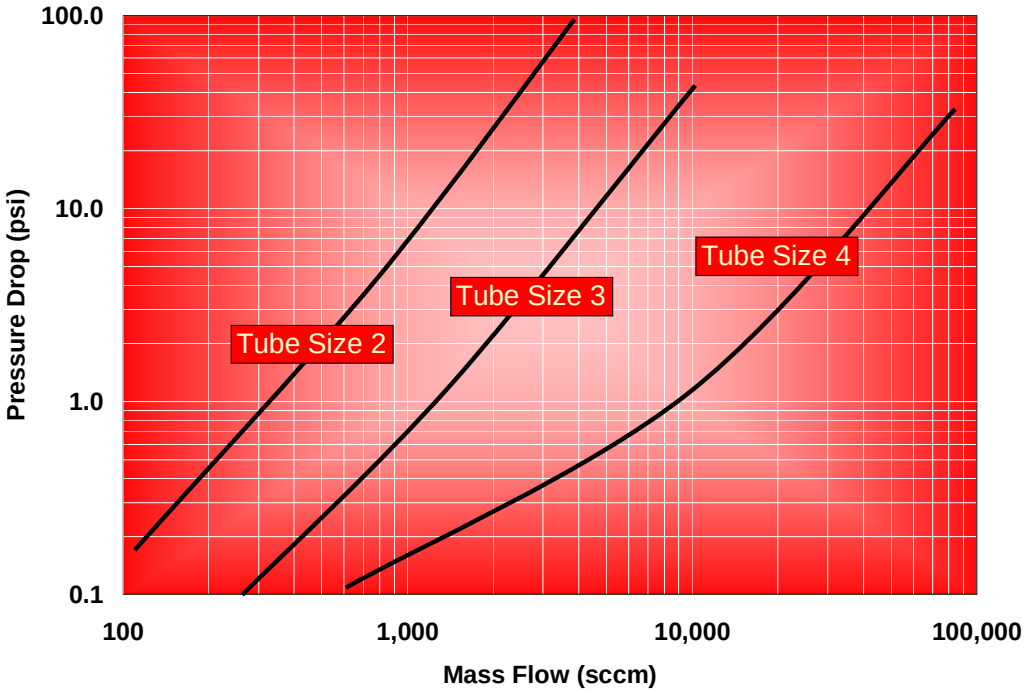
Product Specifications

Differential Pressure Requirements, Controller[9]

Pressure Drop Liquid - (H_2O)



Pressure Drop Air @ 500 psi Inlet Pressure



Product Specifications

Performance

	QMBC (Controller)			QMBM (Meter)		
Tube Size	**2**	**3**	**4**	**2**	**3**	**4**
Nominal Flow Range:						
Liquid (kg/hr)[5]:	0.15	0.78	7.97	0.19	1.00	13.50
Gas (kg/hr):	0.076	0.214	1.796	0.103	0.405	3.840
Gas (sccm)[2]:	1051	2955	24787	1432	5595	53116

Zero Stability:	QMBC (Controller)			QMBM (Meter)		
Stainless Steel Sensor (kg/hr):	0.00026	0.0020	0.0120	0.00026	0.0020	0.0120
Alloy C-22 Sensor (kg/hr):	0.0004	0.0030	0.0240	0.0004	0.0030	0.0240

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,	Stainless Steel: <2 seconds	<0.5 seconds
(per SEMI Guideline E17-91)	Alloy C-22: <12 seconds	<0.5 seconds

Flow Accuracy (Standard Flow):	Standard Flow Accuracy or [(zero stability/flow rate) x 100]% of rate, whichever is greater
Stainless Steel Sensor:	Liquid: 0.2% Gas: 0.5% of rate
Hastelloy Sensor:	Liquid: 0.5% Gas: 0.5% of rate

Ratings

Operating Temperature Range:	0 to 65°C
Temperature Accuracy:	± 0.5°C
Differential Pressure Range:	Liquid: 10 to 200 psi
	Gas: 10 to 150 psi
Density Range:	0 to 0.3 and 0.5 to 2.0 g/cc
Density Accuracy:	± 0.005 g/cc
Maximum Operating Pressure:	
Standard:	500 psi
Optional:	1500 psi
Optional:	4500 psi
Leak Integrity (external):	Elastomer: Outboard 1 x 10^{-9} atm. cc/sec., helium (max)
	Metal Seal: 1 x 10^{-10} atm. cc/sec., helium (max)

Mechanical

Materials of Construction	
Process Wetted:	316L, 316L VAR, High alloy ferritic stainless and 17-7PH
Optional:	Alloy C-22 sensor tube
Process Seals:	Elastomer Seal: Viton®fluoroelastomers, Buna, Kalrez or EPDM
	Metal Seal: stainless steel and nickel
Housing:	IP40: polyurethane painted aluminum
	IP66: polyurethane painted aluminum
	IP66XP: 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:	Housing IP40: 1.6 kg or 3.5 lbs.
	Housing IP66: 1.9 kg or 4.2 lbs.
	Housing IP66XP: 24 kg or 52 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:	1/16", 1/8", 1/4" or 6mm tube compression, VCR, VCO or NPT(F), 3.2 mm UPG, Downport ANSI/ISA 76.00.02 (See Model Code)
Electrical Connections:	IP40: 15 pin D-Type connector (See Figure 3).
	IP66: Unpluggable Terminal Block 28-16 Awg.
	IP66XP: 3/4" NPT wiring access to IP40 device with 15 pin D-Type connector.
Dimensions:	(See Figures 1 through 7)

Diagnostics

Status Lights:	Status and Alarm LEDs
Alarms:	Mass Flow, Density, Volumetric Flow, Temperature, Slug Flow, Diagnostic Failure, Setpoint Deviation, Valve Drive

Product Specifications

Electrical

Output Signals:	4-20 mA and 0-5 Vdc active output represents mass flow or volume flow[3]
	And simultaneously available 4-20 mA or 0-5 Vdc active ouput represents on-line density or temperature information
	Alarm output, max. voltage 30 Vdc, max. current 100 mA
Input Signals:	Command (setpoint) that drives the control valve, either 4-20 mA or 0-5 Vdc input signals
	Valve Override 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 forced closed
Power Requirements:	Voltage: +14 to 27 Vdc[12]
Nominal Current:	Controller: 300 mA to 400 mA Meter: 100 mA to 150 mA
Maximum Current:	Controller: 715 @ 14 Vdc Meter: 470 mA @ 14 Vdc
Maximum Power:	Controller: 10.0 W Meter: 6.6 W

Additional Functions and 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, Approvals and Compliance

IP40 Series:	*US and Canada*	
		UL Recognized E73889, Vol 3, Section 3. Non Incendive, Class I Division 2 Groups A, B, C and D; T4 per UL 1604, UL 508, and CSA 22.2 No. 213 1987; C-22.2 No. 14-M91 Ex nC IIC T4 per CSA E79-15
	Europe	
		KEMA 04ATEX1241 X II3G Ex nA II T4 per EN 60070-15: 2003
IP66 Series:	*US and Canada*	
		UL Recognized E73889, Vol 1, Section 26 (conduit entry) UL E73889, Vol. 3, Section 3 (cable gland entry) Non Incendive, Class I Division 2 Groups A, B, C and D; Dust Ignition-Proof, Class II, Division 2, Groups F and G; Suitable for Class III, Division 2, T4 per UL 1604, UL 508, and CSA 22.2 No. 213 1987; C-22.2 No. 14-M91 Ex nC IIC T4 per CSA E79-15 Class 1, Zone 2, AEx nC IIC T4 per ANSI/UL 60079-15
	Europe	
		ATEX 4 IECEx II 3 G Ex nA II T4 and II 3D T 135°C per EN 60079-0: 2006, EN 60079-15: 2005, EN 61241-0: 2006, EN 61241-1: 2004, IEC 60079-0: 2004, IEC 60079-15: 2005, IEC 61241-0: 2004, IEC 61241-1: 2004
IP66XP Series:	*US and Canada*	
		UL Recognized E73889, Vol 1, Section 21. UL E73889, Vol. 3, Section 3 (cable gland entry) Explosion-Proof, Class I Division 1 Groups C and D; Dust Ignition-Proof, Class I, Division 1, Groups E, F and G; Suitable for Class III, Division 1, T4 per ANSI/UL 1203 and CSA 22.2 No. 30 Ex nC IIC T4 per CSA E79-15 Class 1, Zone 2, AEx nC IIC T4 per ANSI/UL 60079-15
	Europe	
2006,		II 2 G Ex d IIB T6 and II 2 D T 85°C per EN 60079-0: 2006, EN 60079-1: 2007, EN 61241-0: EN 61241-1: 2004
Environmental Compliance		EMC Directive 2004/108/EC per EN 61326-1: 2006
Pressure Effects Compliance		Pressure Equipment Directive 97/23/EC "Sound Engineering Practice"

Product Specifications

Notes

(1) 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 twice nominal flow rate or the laminar to turbulent transition flow whichever is lower.

(2) Standard volumetric conditions are 14.696 psia and 70ºF.

(3) 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.

(4) Accuracy includes combined repeatability, linearity, and hysteresis. Specifications are based on reference test conditions of water/nitrogen at 68 to 77ºF (20 to 25ºC) and 15 to 30 psig (1 to 2 bar).

(5) Differential pressures are based on reference conditions of water and air at 68 to 77ºF (20 to 25ºC).

(6) The density measurement at temperatures other than 21ºC (70ºF) has an additional error of approximately 0.0005 grams/cc per ºC.

(7) A temperature rise of up to 20ºC (68ºF) from internal heating can occur in an open environment where ambient temperature is 23ºC (73ºF). 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

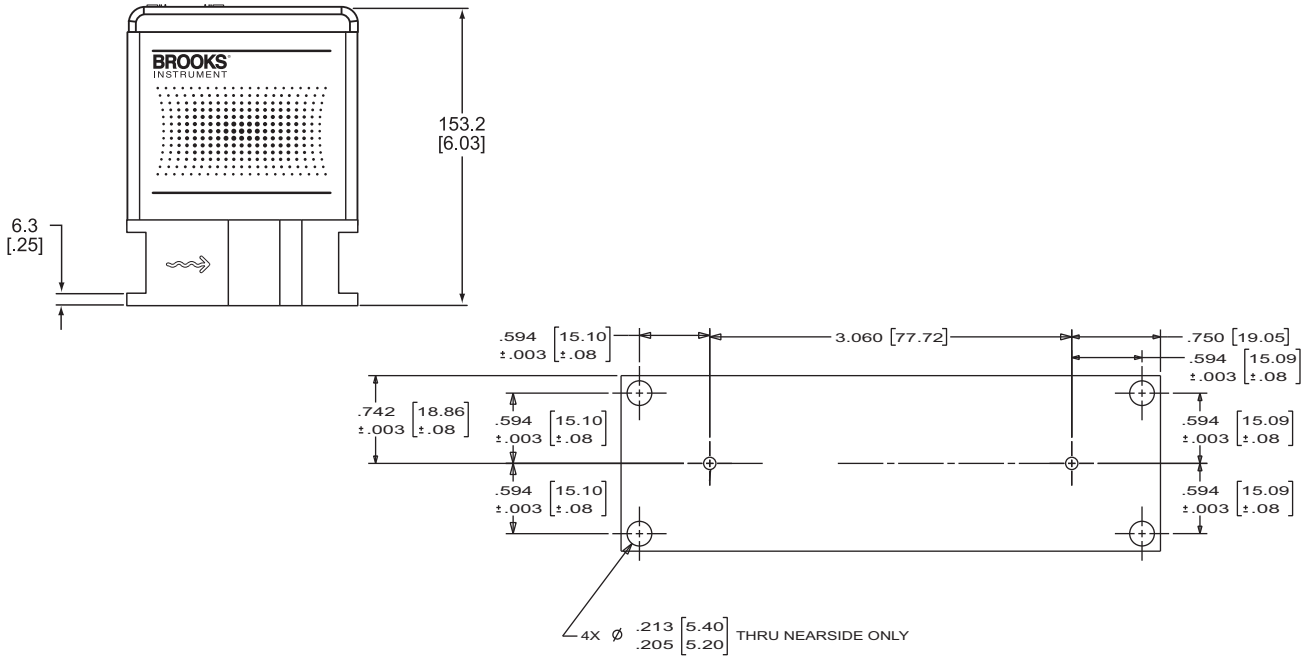


Figure 1 Dimensional Drawing QmB IP40 Downported

Quantim Patent Numbers as follows:

ArgentinaAR026329B1, ... AR021594B1
Australia 778137, 771345, 782183
Canada 2389433
China ZL00817949.2, 171140
Federation of Russia 2272257, 2263284, 2277227
Germany 40004270.3
Hong Kong HK1051720
India 199406
Indonesia 3660/2006, ID0015789
Japan 1111950, 3904926
Malaysia MY-128330-A
Mexico 242129, 244688, 231280
Singapore 122105, 123306, 88632, 81430
South Korea 678430
Switzerland 127118
UK 2092458
US ..... D436876, 4843890, 4996871, 5231884, 5295084, ... 5555190, 5687100, 5929344, 6226195, 6476522, 6487507, ... 6505131, 6505135, 6512987, 6513392, 6526839, 6748813, ... 6769301, 7032462, 7111519, 7117751
Counterparts in other countries and other patents pending

Product Dimensions

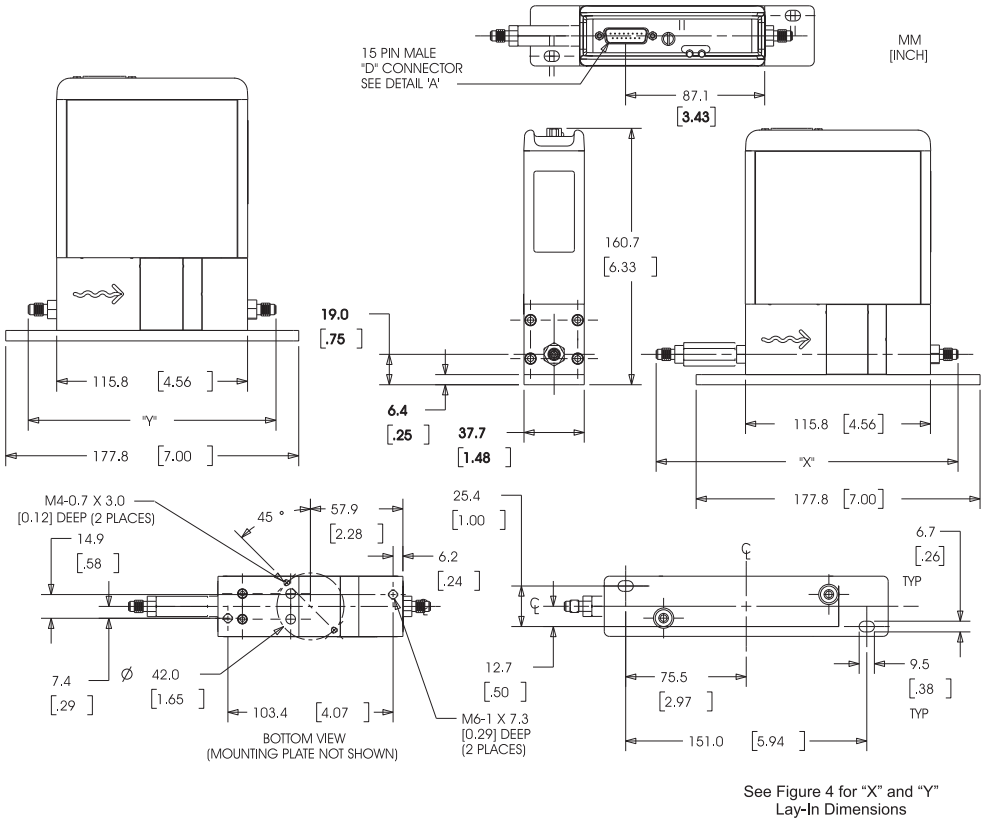
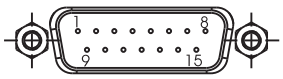


Figure 2 Dimensional Drawing QmB IP40



D-CONNECTOR CONNECTIONS

PIN #	FUNCTION
1	SETPOINT COMMON
2	0-5 VDC FLOW SIGNAL OUTPUT
3	(TTL) OPEN COLLECTOR ALARM OUTPUT
4	*4-20 MA FLOW SIGNAL OUTPUT
5	+14.0 VDC TO +27 VDC POWER SUPPLY
6	NOT USED
7	*4-20 MA SETPOINT INPUT (+)
8	0-5 VDC SETPOINT INPUT (+)
9	POWER SUPPLY COMMON
10	SIGNAL OUTPUT COMMON
11	+5 VOLT REFERENCE OUTPUT
12	VALVE OVERRIDE INPUT
13	*4-20 MA OR 0-5 VDC DENSITY OR TEMPERATURE
14	NOT USED
15	NOT USED

*DO NOT APPLY POWER TO THESE PINS.

Figure 3 D-Connector Electrical Pin Connections

LAY-IN DIMENSIONS	INTEGRAL VALVE		REMOTE VALVE	
FITTING	"X" Dimension	"Y" Dimension	"X" Dimension	"Y" Dimension
1/16" Tube Compression	184.1 [7.25]* 167.3 [6.59]**	151.9 [5.98]* 135.1 [5.32]**	340.1 [13.39] 323.3 [12.73]	307.9 [12.12] 291.1 [11.46]
1/8" Tube Compression	192.7 [7.59]* 167.3 [6.59]**	160.5 [6.32]* 135.1 [5.32]**	348.7 [13.73] 323.3 [12.73]	316.5 [12.46] 291.1 [11.46]
1/4" Tube Compression	197.3 [7.77]* 166.8 [6.57]**	165.1 [6.50]* 134.6 [5.30]**	353.6 [13.92] 323.1 [12.72]	321.4 [12.65] 290.9 [11.45]
6 mm Tube Compression	197.6 [7.78]* 167.0 [6.78]**	165.4 [6.51]* 134.8 [5.31]**	353.9 [13.93] 323.2 [12.72]	321.7 [12.67] 291.0 [11.46]
1/8" NPT (F)	179.9 [7.08]	147.7 [5.81]	335.9 [13.22]	303.7 [11.96]
1/4" NPT (F)	189.3 [7.45]	157.1 [6.19]	345.3 [13.59]	313.1 [12.33]
1/8" VCR	182.6 [7.19]	150.4 [5.92]	338.6 [13.33]	306.4 [12.06]
1/4" VCR	200.9 [7.91]	168.7 [6.64]	356.2 [14.02]	324.0 [12.76]
1/4" VCO	188.2 [7.41]	156.0 [6.14]	344.2 [13.55]	312.0 [12.28]
3.2MM UPG	N/A	150.3 [5.92]	N/A	N/A
ANSI/ISA 76.00.02	N/A	Contact Factory	Not Available	

* OVERALL LENGTH FINGER TIGHT
** OVERALL LENGTH DIMENSION IS TO THE INTERNAL TUBE LOCATING SHOULDER

MM
[INCH]

Figure 4 Lay-In Dimensions Integral and Remote Valves

Product Dimensions

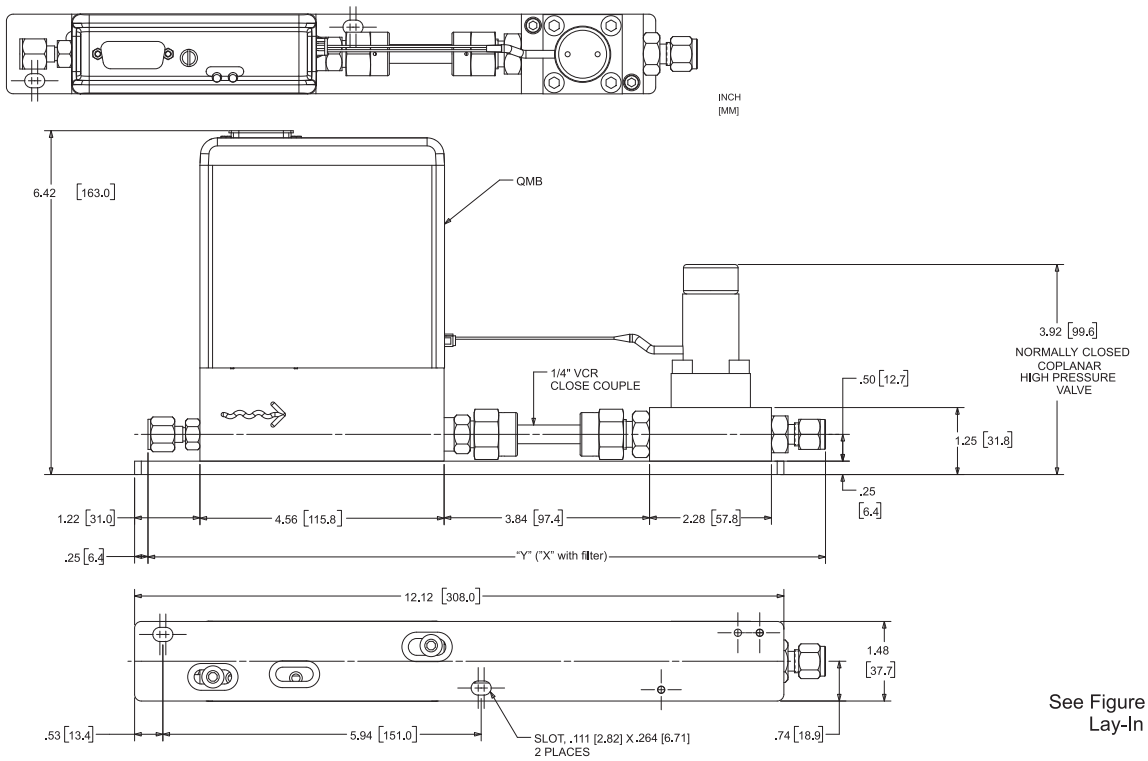


Figure 5 Dimensional Drawing QmB IP40 with Remote Valve

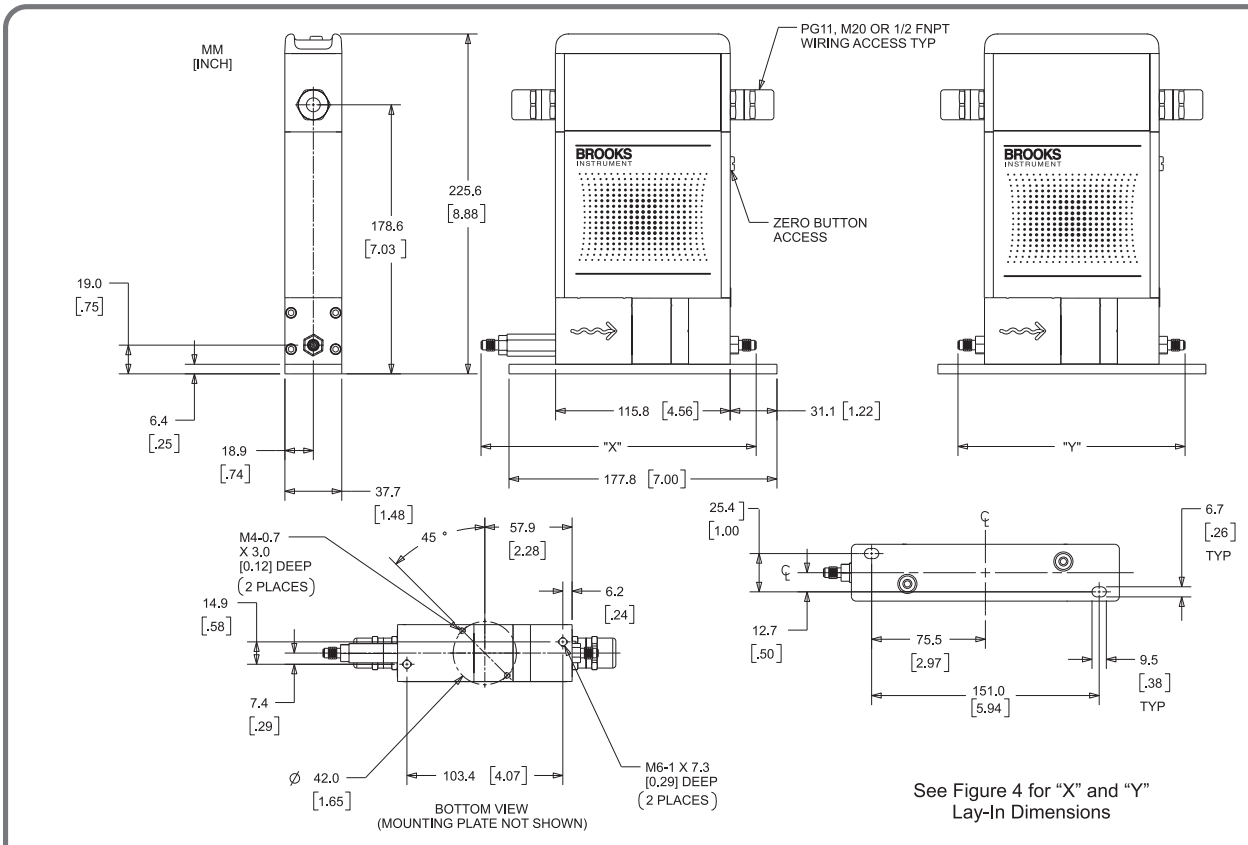


Figure 6 Dimensional Drawing QmB IP66

Product Dimensions

FITTING	"X" DIMENSION
1/8 TUBE COMP	442 (17.4)*
1/4 TUBE COMP	446.5 (17.58)*
1/8 NPT	443 (17.44)
1/4 NPT	439 (17.27)

* OVERALL LENGTH FINGER TIGHT

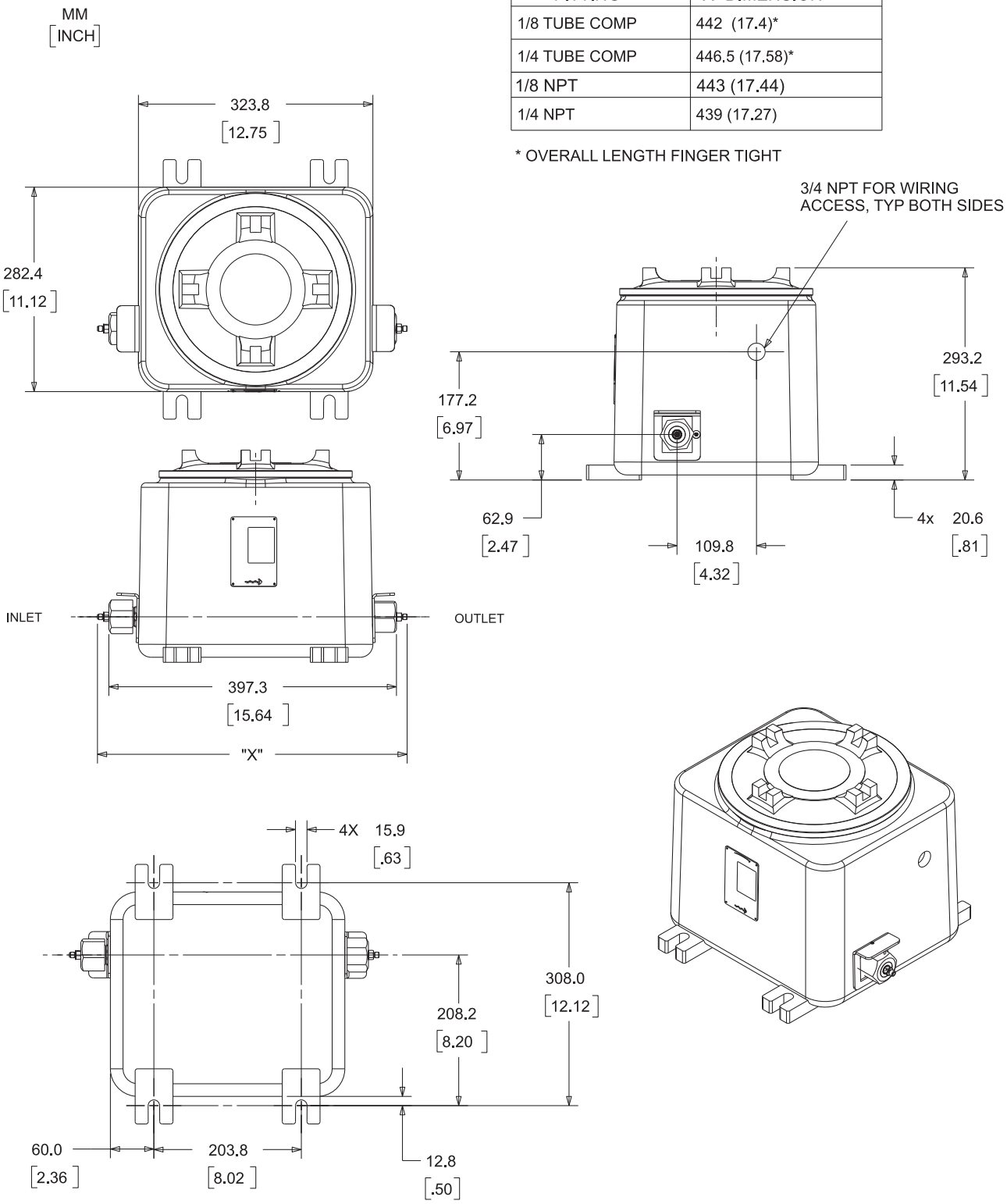


Figure 7 Dimensional Drawing QmB IP66XP

Model Code

Code	Description	Code Option	Option Description
I.	Base Model Code	**QMBC**	flow controller
		QMBM	flow meter

II.	Tube Size		meter nominal flow		controller nominal flow	
			liqud	gas	liquid	gas
		2	190 grams/hr	1432 sccm	150 grams/hr	1051 sccm
		3	1.00 kg/hr	5.595 slpm	780 grams/hr	2.96 slpm
		4	13.5 kg/hr	53.12 slpm	7.97 kg/hr	24.79 slpm

III.	Fluid Type	**G**	gas	Note: select primary fluid type. User can switch from
		L	liquidliquid to gas and vice-versa. Rezeroing is required.	

IV.	Pressure Transducer	**1**	no transducer

V.	Valve Type	**A**	no valve (product type = flow meter)
		B	normally closed internal valve
		C	remote normally closed high pressure

VI.	Accuracy	**2**	standard 0.2% of rate	liquid & stainless steel
		3	optional 0.5% of rate	liquid & stainless steel
		3	standard 0.5% of rate	gas or Hastelloy
		4	optional 1.0% of rate	gas or Hastelloy

VII.	Enclosure		Type	Area Classification
		A	NEMA 1/ IP40	
		B	NEMA 1/ IP40	Class 1 Div 2 Zone 2
		C	NEMA 4X/ IP66	
		D	NEMA 4X/ IP66	Class 1 Div 2 Zone 2
		E	NEMA 4X/ IP66XP	Div 1 Zone 1

VIII.	Surface Finish	**1**	standard surface finish (32 rA)

IX.	Sensor Tube Material	**A**	stainless steel 316L
		B	Alloy C-22 (tubes only)

X.	Maximum Pressure Rating	**1**	35 bar or 500 psi
		2	100 bar or 1500 psi
		3	300 bar or 4500 psi	tube material - Alloy C-22 (meter)

XI.	Maximum Temperature Rating	**A**	65 Deg. C (149 Deg F)

XII.	Process Connections	**1A**	standard body connections 5/16" -24 UNF
		1B	1/16" tube compression fittings
		1C	1/4" tube compression fittings
		1D	1/8" tube compression fittings
		1G	6mm tube compression fittings
		1J	1/8" NPT
		1K	1/4" NPT
		1L	1/8" VCR
		1M	1/4" VCR
		1P	1/4" VCO
		1Y	downport ANSI/ISA - 76.00.02
		2A	3.2mm UPG

XIII.	Electrical I/O - Communications		Primary Output	Secondary Output
		A	0-5 Vdc	4-20 mA
		B	4-20 mA	4-20 mA
		C	0-5 Vdc	0-5 Vdc
		H	HART/4-20mA	HART/4-20mA

XIV.	Electrical Connection	**1**	15 pin D-type	Enclosure NEMA 1/ IP40
		3	PG11 cable gland	Enclosure NEMA 4X/ IP66
		4	1/2" FNPT conduit	Enclosure NEMA 4X/ IP66
		6	M20 FNPT conduit	Enclosure NEMA 4X/ IP66
		8	3/4" FNPT conduit	Enclosure NEMA 4X/ IP66XP

XV.	Seals		Sensor	Valve Stem	Fitting	Orifice Seal
		A	Viton	Viton	Viton	Stainless Steel
		B	Buna	Buna	Buna	Stainless Steel
		C	Kalrez 4079	Kalrez 4079	Kalrez 4079	Stainless Steel
		D	Kalrez 6375	Kalrez 6375	Kalrez 6375	Stainless Steel
		E	EPDM	EPDM	EPDM	Stainless Steel
		F	Nickel	Nickel	Viton	Stainless Steel
		G	Nickel	Nickel	Buna	Stainless Steel

Model Code continued

XV. Seals (continued)		Sensor	Valve Stem	Fitting	Orifice Seal
	H	Nickel	Nickel	Kalrez	Stainless Steel
	J	Nickel	Nickel	EPDM	Stainless Steel
	K	Nickel	Nickel	Nickel	Stainless Steel

XVI. Valve Seat Material	**1**	none (meter)
	7	material 17-7PH Stainless Steel (controller)

XVII. Special Processing	**A**	none
	B	certified material 2.2 EN 10204
	C	certified material 3.1 EN 10204
	D	cleaning for oxygen service
	E	cleaning for oxygen service + certified material 2.2 EN 10204
	F	cleaning for oxygen service + certified material 3.1 EN 10204

XVIII. Quality Certifications	**1**	none
	2	calibration certificate traceble to NIST
	3	calibration measurement capability certificate (NMI)
	4	certificate of conformance
	5	calibration certificate traceble to NIST + certificate of conformance
	6	calibration measurement capability certificate + certificate of conformance

XIX. Inline Filter	**A**	none (metal seal or downport)
	B	inline filter cartridge filter, 10 micron (recommended for QMBC2)
	C	inline filter cartridge filter, 20 micron
	D	inline filter cartridge filter, 30 micron
	E	inline filter cartridge filter, 40 micron
	F	inline filter cartridge filter, 1 micron (recommended for QMBC2)

XX. 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
QMBC	2	G	1	A	2	A	1	A	1	A	1A	A	1	A	1	A	1	A	A

HELP DESK

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TRADEMARKS
Brooks ..... Brooks Instrument, LLC
DeviceNet ..... Open DeviceNet Vendors Association, Inc.
HART ..... HART Communication Foundation
Kalrez ..... DuPont Performance Elastomers
ODVA ..... Open DeviceNet Vendors Association, Inc.
Quantim ..... Brooks Instrument, LLC
VCO ..... Cajon Co.
VCR ..... Cajon Co.
Viton ..... DuPont Performance Elastomers

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