

MT36xx Series

Variable Area

Metal Tube Variable Area Flowmeters

Overview

The Brooks® MT3601 and MT3602 armored flowmeters are designed to be reliable and economical high flow rate purge meters with 10% accuracy. These meters are especially useful for metering coolants, pump seal fluids, lubricants under pressure, and opaque fluids. The flow rate is measured by the movement of a tapered plug in a fixed orifice. Indication is by an external tubular follower coupled magnetically to an extension of the tapered plug. A certified explosion-proof/intrinsically safe alarm is optional.

Features & Benefits

Features	Benefits
Flanged or NPT customer connections	Meter can be easily adapted to customer's piping
No power required	Reduces installation cost and is a cost effective solution for use in hazardous areas
High pressure and temperature rating	Designed to work safely under difficult conditions
Wetted parts made from 316 stainless steel	Compatible for a wide range of fluids (liquids and gases)
Integral control valve	Read and control the flow rate
Integral flow controller	Compensates for varying inlet or outlet pressures to maintain steady flow rate
CSA approved flow alarm	Meter can be safely installed in hazardous areas
Disassembly for cleaning without removal from process line	Meter removal not required which minimizes down time

Model MT3602
Armored Flowmeter
with Indicator

Model MT3601
with XP Alarm

Product Specifications - Meter

Table 1 MT36xx Series, Meter Specifications

Meter Specifications	MT36xx Series
Capacities and Pressure Drops	See Table 2
Accuracy	Standard Flow Accuracy: $\pm 10\%$ Full Scale from 100% to 10% of scale reading Optional Flow Accuracy: $\pm 5\%$ accuracy
Repeatability	1.0% Full Scale
Pressure Ratings	Refer to Table 3 for maximum non-shock pressure
Scales	Standard: Detachable aluminum plate Length: 1.5 inches (38 mm) Graduations: Choice of direct reading units, milimeter or percentage of maximum flow with factor tag Optional: Dual scales
Connections	Model 3601: Flanged connections (150 lbs or 300 lbs RF ANSI B 16.5). Model 3602: NPT threaded connections.
Connection Orientation	Vertical inlet, horizontal outlet
Materials of Construction	
Metering Tube, Floats, Flanges, and Extension Well	316 stainless steel, NACE, Spec MR-01-75
Indicator Housing	Standard Housing: Aluminum with clear anodized finish and glass window Optional Housing: 316 polished stainless steel and glass window
Alarm Housing, Cover and Isolation Well	Standard: Cast aluminum alarm housing and cover with aluminum isolation well, gasket seal, polyurethane paint Type 4X
O-rings	Standard: Viton® fluoroelastomers Optional: Silicone, Buna-N, Kalrez, EPR, Teflon (Teflon is limited to Size 8 and 10), metal (metal is limited to Size 8)
Ambient Temperature Limits	-20°F to 122°F (-29°C to 50°C)
Operating Fluid Temperature Limits	Maximum: 500°F (260°C) Minimum: -20°F (-29°C) Buna O-ring: -20°F (-29°C) to 250°F (121°C) EPR O-ring: -20°F (-29°C) to 300°F (149°C) Kalrez® O-ring: -20°F (-29°C) to 400°F (204°C) Metal (316 stainless steel) O-ring: -20°F (-29°C) to 400°F (204°C) Silicone O-ring: -20°F (-29°C) to 400°F (204°C) Teflon® O-ring: -20°F (-29°C) to 400°F (204°C) Viton® fluoroelastomers O-ring: -20°F (-29°C) to 400°F (204°C) Optional all welded construction: 500°F (260°C) Note: Maximum Temperature Rating for all meters with alarm option is 250°F (121°C)
Maximum Fluid Pressure	1500 PSIG (100 Bar)
Meter Dimensions	Refer to Figures 1 and 2.
Ordering Information and Model Code	See Model Code Table
Pressure Equipment Directive (PED) 97/23/EC	Flow meter complies under Sound Engineering Practices (SEP), except for size 12. Size 12 does not conform to Pressure Equipment Directive 97/23/EC, therefore it cannot be sold or used in the EU/EFTA.
Reed Switches	1 or 2 switches - See Table 5
Agency Approvals	See Table 6

Table 2 Capacities and Pressure Drop

Size 8			Size 10 (1")		Size 12 (1-1/2")	
Air SCFH	Water GPH	Pressure Drop PSI	Water GPM	Pressure Drop PSI	Water GPM	Pressure Drop PSI
23	5	-	5	1.75	20	2.00
58	15	1.25	-	-	30	2.75
120	30	1.50	10	3.75	40	4.75
195	50	1.00	15	4.75	50	5.75
425	100	1.50	-	-	-	-
790	180	3.25	-	-	-	-
1660	300	5.00	-	-	-	-

- All air flows given are at 14.7 psia and 70°F.
- 1" and 1-1/2" meters not available for gas service, due to stability of float.
- Minimum operating pressure (downstream) on gas service is 35 psig for 1/2" size.

Table 3 Maximum Non-Shock Pressure Table

Maximum Pressure: Threaded: Up to 1500 psig at 200°F (93.3°C).
Maximum non-shock pressure (psi) vs temperature for ANSI standard pipe flanges:

Flange Rating	-20°F to 100°F (-29°C to 37.8°C)	200°F (93.3°C)	300°F (148.9°C)	400°F (204.4°C)
150 lb. (316 SS)	275	240	215	195
300 lb. (316 SS)	720	620	560	515

Table 4 MT36xx Series, Approximate Shipping Weight (lbs/kg)

Model	Size		
	8	10	12
3601	6 / 2.72	11 / 4.98	21 / 9.52
3602	5 / 2.26	7 / 3.17	12 / 5.44
w/Alarm - Add	6 / 2.72	6 / 2.72	6 / 2.72

Product Specifications - Optional Equipment

Table 5 MT36xx Series Optional Equipment Specifications

Optional Equipment

Alarm Limit Switches	Up to two reed switches provide initiation of alarm signal at preset flow values. Settings can be adjusted by removing the alarm housing cover, loosening, moving and retightening of the reed switch holders, and replacement of the alarm housing cover. For greater power handling capability, optional electromechanical relays are available.
Alarm Electrical Classification	All alarms are CSA; Canada and USA certified intrinsically safe, explosion-proof or in non-incendive. All alarm configurations are suitable for indoor and outdoor operation.
Electromechanical Relay Specifications	Coil operating voltage: 220 or 120 Vac -15% + 10%, 45-60 Hz Contact rating: 10 amps resistive, 7 amps inductive at 115 Vac Relay Configuration: Single channel (1) DPDT, Dual Channel (2) SPDT
Reed Switch Specifications	Voltage: 140 Vac maximum, 50-60 Hz, 200 Vdc maximum Power: 10 Watts maximum Current: Determined by calculation so that power does not exceed 10 watts, however the current is never to exceed 0.5 amps.
Reed Switches Only:	For Intrinsically safe and explosion proof applications, remotely mounted, switch isolator/power supplies are available in single channel or dual channel configuration with 110 or 220 Volt supply options. Output is via SPDT relays rated at 250 Vac, 4A, 24 Vdc, 4A.
Alarm Hysteresis	Approximately 4 mm (0.16 inch) of float travel
Alarm Humidity	50 - 80% Relative Humidity
Ambient Operating Temperature	-20°F to 122°F (-29°C to 50°C)
Operating Fluid Temperature Limits	-20°F (-29°C) to 250°F (121°C)
Alarm Dimensions	See Figure 2.
Control Valves	Model 3602: Size 8 only, 316 stainless steel material only- on inlet or outlet Minimum/maximum operating temperature: -20°F (-29°C) to 400°F (204°C) Cv factor: 1.2 Materials of Construction: 316 stainless steel body and stem, Kel-F™ seat, Teflon packing
Flow Controllers	Model MT3602: Size 8 only, 316 stainless steel material only- on inlet or outlet. Refer to DS-VA-FC-eng for Flow Controller information

Table 6 Hazardous Location Certifications

Model Type : Flame Proof (Exd)

Ambient -29°C to 50°C, IP65, NEMA 4X

Mark	Approvals	Approval Marking	Certificate/Status
	CSA	Class I, Div.1 Group C and D Class II, Div.1, Groups E, F, and G Class III, Div. 1	150464-1287562

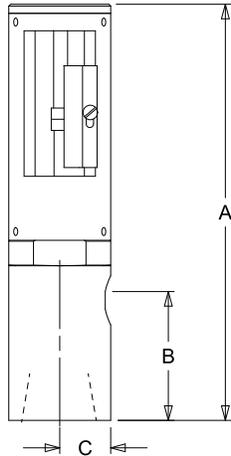
Model Type : Intrinsic safety (ia) / non-sparking (nA) / Enclosure dust (tc)

Ambient -29°C to 50°C, IP65, NEMA 4X

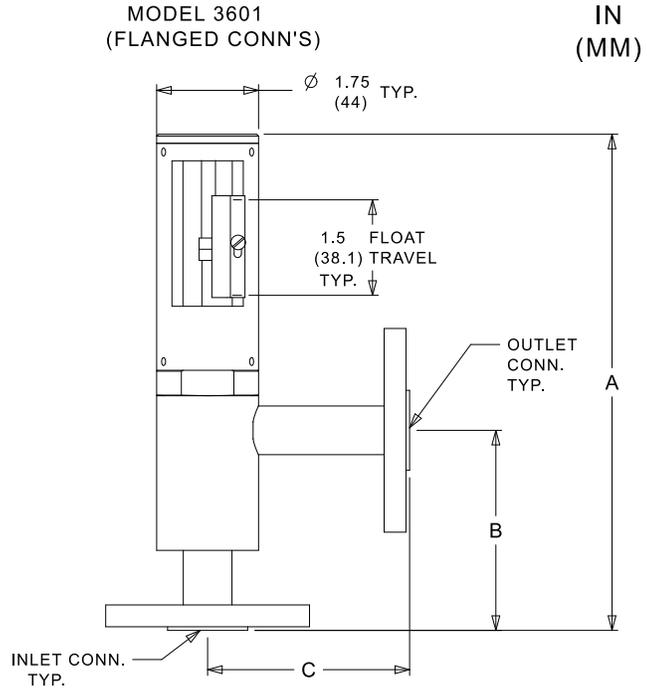
Mark	Approvals	Approval Marking	Certificate/Status
	CSA	Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III Hazardous Locations Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; Class III Hazardous Locations	150464-1287562

Product Dimensions - Flanged & Threaded Connections with Indicator Only

MODEL 3602
(SCREWED CONN'S)



MODEL 3601
(FLANGED CONN'S)



IN
(MM)

CONN. SIZE	3602			3601 (150/300#)		
	A	B	C	A	B	C
1/2"	7.25 [184]	2.06 [52.4]	.88 [22.2]	8.68 [220]	3.5 [88.9]	3.5 [88.9]
1"	9.68 [246]	3.75 [92.3]	2.13 [54]	12.06 [306]	6.13 [155]	4.0 [101]
1 1/2"	12.63 [320]	5.94 [151]	1.88 [47.6]	16.81 [427]	10.13 [257]	6.13 [155]

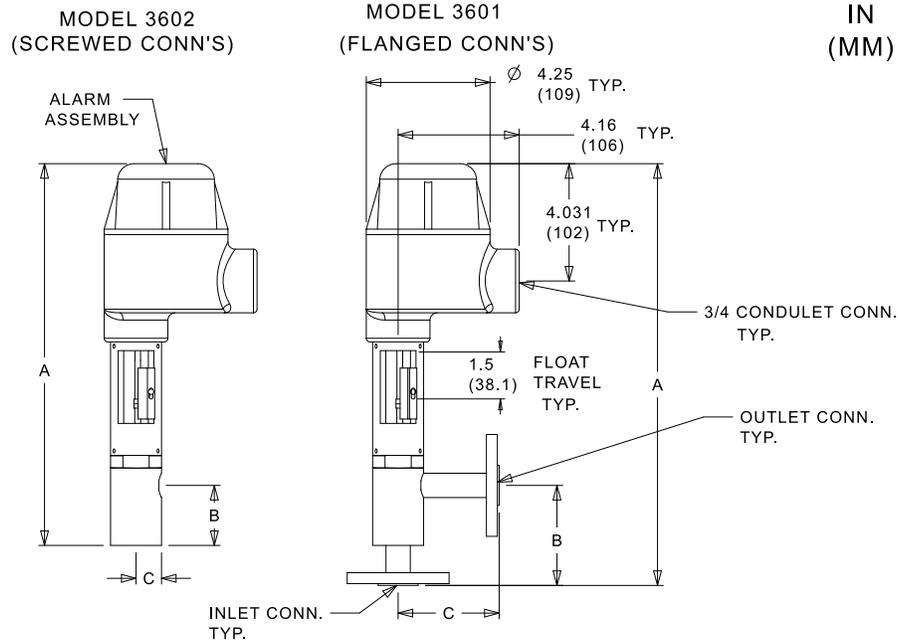
NOTES:

1. FLANGES CAN BE RAISED FACE, PER ANSI B16.5
2. BOLT HOLES TO STRADDLE CENTER LINE.
3. PROVIDE ADDITIONAL 4.25 INCH OF CLEARANCE OVER TOP OF METER FOR METER DISASSEMBLY, IF REQUIRED FOR CLEANING.
4. INDICATOR IS ROTATABLE 360°.
5. DIMENSIONAL TOLERANCES ARE $\pm .125$ [3.17]
6. ONE OR TWO SCALES AVAILABLE.

Ref. No. 3600049 Rev D

Figure 1 Dimensions, MT36xx Series with Indicator

Product Dimensions - Flanged & Threaded Connections with Alarm



CONN. SIZE	3602			3601 (150/300#)		
	A	B	C	A	B	C
1/2"	13.18 [335]	2.06 [52.4]	.88 [22.2]	14.63 [371]	3.5 [88.9]	3.5 [88.9]
1"	15.63 [397]	3.75 [92.3]	2.13 [54]	18.0 [457]	6.13 [155]	4.0 [101]
1 1/2"	18.56 [471]	5.94 [151]	1.88 [47.6]	22.75 [577.8]	10.13 [257]	6.13 [155]

NOTES:

1. FLANGES CAN BE RAISED FACE, PER ANSI B16.5
2. BOLT HOLES TO STRADDLE CENTER LINE.
3. PROVIDE 6.00 INCH CLEARANCE OVER TOP OF METER ASS'Y TO PERMIT REMOVAL OF COVER FOR WIRING AND SWITCH ADJUSTMENT.
4. PROVIDE 12.00 INCH CLEARANCE OVER TOP OF METER FOR METER DISASSEMBLY, IF REQUIRED FOR CLEANING.
5. INDICATOR AND/OR ALARM ARE ROTATABLE 360°.
6. DIMENSIONAL TOLERANCES ARE ± .125 [3.17]
7. ONE OR TWO SCALES AVAILABLE.

Ref. No. 3600050 Rev D

Figure 2 Dimensions, MT36xx Series Meter with Alarm

Model Code

Code Description	Code Option	Option Description			
I. Base Model Number	3601B	Flange Connection			
	3602B	Threaded Connection (Female)			
II. Meter & Connection Size	2	Size 8 (1/2")			
	3	Size 10 (1")			
	4	Size 12 (1-1/2")			
III. Connection Type*	B	NPT (Female) (Model selection 3602 only)			
	C	ANSI 150# RF (Model selection 3601 only)			
	D	ANSI 300# RF (Model selection 3601 only)			
<i>*Contact factory for availability of high alloy construction and/or 600# flange option.</i>					
IV. Float & Orifice Capacity (Capacities shown are Air @ STP or Water)		Size 8	Size 8	Size 10*	Size 12*
	A	23 SCFH	5 GPH	5 GPM	20 GPM
	B	58 SCFH	15 GPH	-	-
	C	120 SCFH	30 GPH	10 GPM	30 GPM
	D	195 SCFH	50 GPH	15 GPM	-
	E	425 SCFH	100 GPH	-	40 GPM
	F	790 SCFH	180 GPH	-	50 GPM
	G	1660 SCFH	300 GPH	-	-
<i>* Size 10 and Size 12 not available for gas service</i>					
V. Body & Float Material*	2	All 316 Stn. Stl.			
	A	316 Stn. Stl. w/CRN Certification (All Provinces except Alberta)			
	<i>*Contact factory for availability of high alloy construction and/or 600# flange option.</i>				
VI. Indication Configuration	A	Standard Indicator only (Aluminum)			
	K	Stn. Stl. Indicator only			
	L	Aluminum Indicator w/XP Alarm, 1 Switch & No Relay			
	M	Aluminum Indicator w/XP Alarm, 2 Switch & No Relay			
	N	Aluminum Indicator w/XP Alarm, 1 Switch & 1 Relay (Note 1)			
	P	Aluminum Indicator w/XP Alarm, 2 Switch & 2 Relay (Note 2)			
	<i>Note 1: Internally mounted DPDT electromechanical relay but may be wired for SPDT. Note 2: Internally mounted SPDT electromechanical relay only.</i>				
VII. Scale/Meter Accuracy	E	SCFH Air @ Standard 10% Accuracy			
	F	GPH or GPM Water, Standard 10% Accuracy			
	G	MM Scale			
	H	% Scale			
	J	Special Inscription, Liquid (Uncalib.) Standard 10% Accuracy			
	K	Special Inscription, Gas (Uncalib.) Standard 10% Accuracy			
	M	Special Inscription, Gas Calibration, 5% Accuracy			
	N	Special Inscription, Liquid Calibration, 5% Accuracy			

Model Code continued on next page.

Sample Standard Model Code

I	II	III	IV	V	VI	VII	VIII	IX
3601B	2	C	A	2	K	E		

Model Code (continued)

Code Description	Code Option	Option Description
VIII. O-ring Material	A	Buna
	B	Silicone
	C	Viton
	G	Kalrez
	N	EPR
	P	Teflon (Size 8 & 10. Size 12 use all welded construction)
	Q	Metal (Size 8. Sizes 10 & 12 use all welded construction)
	R	All Welded (No O-ring, all welded, Hi Temp designs)
IX. Accessories (Choose up to three digits)	A	None
	H	Integral 1/2" Needle Valve on Inlet (Optional for Size 8 only)
	J	Integral 1/2" Needle Valve on Outlet (Optional for Size 8 only)
	K	Hardware for mounting to Flow Controller (Note 3)
	M	NACE Spec. MR-0175
	N	All Welded Construction
	P	International Calibration Certificate
	Q	Dual Scales
	R	High Temperature Design
	S	1 Channel Relay, SPDT, 120 Vac (Note 4)
	T	2 Channel Relay, SPDT, 120 Vac (Note 4)
	U	1 Channel Relay, SPDT, 220 Vac (Note 4)
	V	2 Channel Relay, SPDT, 220 Vac (Note 4)
		<i>Note 4: NOT available for alarms with internally mounted relay(s).</i>

Sample Standard Model Code

I	II	III	IV	V	VI	VII	VIII	IX
3601B	2	C	A	2	K	E	C	A

Brooks 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 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.

CUSTOMER 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.

HELP DESK

In case you need technical assistance:

Americas	 1 888 554 FLOW
Europe	 +31 (0) 318 549 290
Asia	 +81 3 (0) 5633 7100

Due to Brooks Instrument's commitment to continuous improvement of our products, all specifications are subject to change without notice.

TRADEMARKS

Brooks Brooks Instrument, LLC
All other trademarks are the property of their respective owners.



Brooks Instrument
407 West Vine Street
P.O. Box 903
Hatfield, PA 19440-0903 USA
T (215) 362 3700
F (215) 362 3745
E-Mail BrooksAm@BrooksInstrument.com
www.BrooksInstrument.com

Brooks Instrument
Neonstraat 3
6718 WX Ede, Netherlands
T +31 (0) 318 549 300
F +31 (0) 318 549 309
E-Mail BrooksEu@BrooksInstrument.com

Brooks Instrument
ITW Japan Ltd.
1-4-4 Kitasuna Koto-Ku
Tokyo, 136-0073 Japan
T +81 3 5633 7100
F +81 3 5633 7101
E-Mail Sales-Japan@BrooksInstrument.com