

Sho-Rate Series Models 1350G/1355G (Sizes 2-6)

Glass Tube Variable Area Flow Meters

Installation & Operation Manual

*Sho-Rate
Model 1350G
(No Valve)*



*Sho-Rate
Model 1350G
with optional
integrated
flow controller*



*Sho-Rate
Model 1350G
with optional
needle valve*



*Sho-Rate
Model 1355G
(No Valve)*



*Sho-Rate
Model 1355G
with optional
integrated
flow controller*



*Sho-Rate
Model 1355G
with optional
needle valve*

BROOKS®
INSTRUMENT

Beyond Measure

Essential Instructions Read before proceeding!

Brooks Instrument designs, manufactures and tests its products to meet many national and international standards. These products must be properly installed, operated and maintained to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and integrated into your safety program when installing, operating and maintaining Brooks Instrument products.

- To ensure proper performance, use qualified personnel to install, operate, update, program and maintain the product.
- Read all instructions prior to installing, operating and servicing the product. If this instruction manual is not the correct manual, please see back cover for local sales office contact information. Save this instruction manual for future reference.

▲ WARNING: Do not operate this instrument in excess of the specifications listed in the Instruction and Operation Manual. Failure to heed this warning can result in serious personal injury and / or damage to the equipment.

- If you do not understand any of the instructions, contact your Brooks Instrument representative for clarification.
- Follow all warnings, cautions and instructions marked on and supplied with the product.

▲ WARNING: Prior to installation ensure this instrument has the required approval ratings to meet local and national codes. Failure to heed this warning can result in serious personal injury and / or damage to the equipment.

- Install your equipment as specified in the installation instructions of the appropriate instruction manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- Operation: (1) Slowly initiate flow into the system. Open process valves slowly to avoid flow surges. (2) Check for leaks around the flow meter inlet and outlet connections. If no leaks are present, bring the system up to the operating pressure.
- Please make sure that the process line pressure is removed prior to service. When replacement parts are required, ensure that qualified people use replacement parts specified by Brooks Instrument. Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look-alike substitutions may result in fire, electrical hazards or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place to prevent electrical shock and personal injury, except when maintenance is being performed by qualified persons.

▲ WARNING: For liquid flow devices, if the inlet and outlet valves adjacent to the devices are to be closed for any reason, the devices must be completely drained. Failure to do so may result in thermal expansion of the liquid that can rupture the device and may cause personal injury.

European Pressure Equipment Directive (PED)

All pressure equipment with an internal pressure greater than 0.5 bar (g) and a size larger than 25mm or 1" (inch) falls under the Pressure Equipment Directive (PED).

- The Specifications Section of this manual contains instructions related to the PED directive.
- Products described in this manual are in compliance with EN directive 2014/34/EU.
- All Brooks Instrument Flowmeters fall under fluid group 1.
- Products larger than 25mm or 1" (inch) are in compliance with PED category I, II or III.
- Products of 25mm or 1" (inch) or smaller are Sound Engineering Practice (SEP).

European Electromagnetic Compatibility (EMC)

The Brooks Instrument (electric/electronic) equipment bearing the CE mark has been successfully tested to the regulations of the Electro Magnetic Compatibility (EMC directive 2014/30/EU).

Special attention however is required when selecting the signal cable to be used with CE marked equipment.

Quality of the signal cable, cable glands and connectors:

Brooks Instrument supplies high quality cable(s) which meets the specifications for CE certification.

If you provide your own signal cable you should use a cable which is overall completely screened with a 100% shield.

"D" or "Circular" type connectors used should be shielded with a metal shield. If applicable, metal cable glands must be used providing cable screen clamping.

The cable screen should be connected to the metal shell or gland and shielded at both ends over 360 Degrees.

The shield should be terminated to an earth ground.

Card Edge Connectors are standard non-metallic. The cables used must be screened with 100% shield to comply with CE certification.

The shield should be terminated to an earth ground.

For pin configuration : Please refer to the enclosed Instruction Manual.

ESD (Electrostatic Discharge)

▲ CAUTION: This instrument contains electronic components that are susceptible to damage by static electricity. Proper handling procedures must be observed during the removal, installation or other handling of internal circuit boards or devices.

Handling Procedure:

1. Power to unit must be removed.
2. Personnel must be grounded, via a wrist strap or other safe, suitable means before any printed circuit card or other internal device is installed, removed or adjusted.
3. Printed circuit cards must be transported in a conductive container. Boards must not be removed from protective enclosure until immediately before installation. Removed boards must immediately be placed in protective container for transport, storage or return to factory.

Comments

This instrument is not unique in its content of ESD (electrostatic discharge) sensitive components. Most modern electronic designs contain components that utilize metal oxide technology (NMOS, SMOS, etc.). Experience has proven that even small amounts of static electricity can damage or destroy these devices. Damaged components, even though they appear to function properly, exhibit early failure.

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Section 1: Introduction

Description

The Sho-Rate Flowmeters are variable area, glass tube, flow rate indicating meters. The basic elements are a tapered glass metering tube and a metering float. Features include quick and simple removal or installation of the tube and float while the meter remains in the process piping.

Specifications (Reference Tables 1-1 thru 1-5)

WARNING

Do not operate this instrument in excess of the specifications listed below. Failure to heed this warning can result in serious personal injury and/or damage to the equipment.

WARNING

Glass metering tubes are designed for operation up to the maximum operating pressures and temperatures as specified herein. Due to the inherent brittle characteristics of glass and conditions beyond our control, tube breakage could result even within specified operating conditions. Do not use glass tube meters with fluids that are toxic, or chemically react with glass such as water above 140°F (60°C), steam, alkalis, fluorine, hydrofluoric acid, or molten metal. Failure to heed this warning can result in serious personal injury and/or damage to the equipment.

CAUTION

It is the user's responsibility to select and approve all materials of construction. Careful attention to metallurgy, engineered materials and elastomeric materials is critical to safe operation.

Section 1 Introduction

Table 1-1 Specifications for Sho-Rate Models 1350G and 1355G

Performance	1350G	1355G
Accuracy	±5% at reference conditions*	± 3% at reference conditions*
Repeatability	0.25% F.S.	
Pressure/Temperature	200 psig (33°F - 250°F) / 13.8 bar (1°C-121°C)	
Materials of Construction	Borosilicate glass, Brass, Aluminum, 316 Stainless Steel, Clear Polycarbonate, Milk White Polycarbonate, Teflon®	
End Block Options	Stainless Steel and Brass	
Elastomer Seals	Viton® fluoroelastomers, Teflon®, Buna, Kalrez® perfluoroelastomers	
Float Materials	Glass, Sapphire, Stainless Steel, Carboly®, Tantalum	
Connection Materials	Stainless Steel	
Connection Options	1/8" NPT (w/wo locknuts) 1/4" NPT (w/wo locknuts) 1/8" Compression (w/wo locknuts) 1/4" Compression (w/wo locknuts) 6 mm Compression (w/wo locknuts) 1/4" RC (w/wo locknuts) 3/8" RC (w/wo locknuts) 1/4" VCR® 1/4" ID Hose Swagelok® Converters	
Dimensions	See Dimension Drawings	
Alarm Availability	Low Alarm High Alarm Dual Alarm	
Valve Options	Cartridge III Valve and NRS™	
Valve Materials	Stainless Steel	
Flow Controller	Yes	
Certifications	International Calibration Certificate (ICC) CRN Pressure Equipment Directive (97/23/EC) RoHS (II) REACH (coming soon) Materials (2.2)	

* Reference conditions apply to air or water at 14.7 psia and 70 Degrees F/1.01 Bar and 21.1 Degrees C.

Table 1-2 Capacities - Rib Guide Tubes, Spherical Floats for use with 1350G Series Only

Meter Size	Tube No.	Float Material	Water		Air	
			GPH	LPH	SCFH	NLPH
2	R-2-65-A G	Glass	0.010	0.041	0.12	3.2
		Sapphire	0.021	0.079	0.19	5.0
		Stainless Steel	0.049	0.18	0.37	9.8
		Carboloy	0.10	0.36	0.65	17
		Tantalum	0.10	0.40	0.71	18
	R-2-65-B G	Glass	0.014	0.06	0.16	4.4
		Sapphire	0.028	0.10	0.25	6.7
		Stainless Steel	0.07	0.25	0.48	12
		Carboloy	0.12	0.48	0.80	21
		Tantalum	0.14	0.53	0.87	22
	R-2-65-C G	Glass	0.12	0.47	0.99	26
		Sapphire	0.22	0.83	1.3	35
		Stainless Steel	0.41	1.5	2.1	55
		Carboloy	0.65	2.4	3.1	81
		Tantalum	0.70	2.6	3.3	87
	R-2-65-D G	Glass	0.68	2.5	3.9	100
		Sapphire	0.99	3.7	5.1	130
		Stainless Steel	1.6	6.3	7.9	200
		Carboloy	2.5	9.5	11	290
		Tantalum	2.7	10.0	12	310
6	R-6-65-A G	Glass	2.2	8.5	13	340
		Sapphire	3.3	12	17	440
		Stainless Steel	5.6	21	25	660
		Carboloy	8.3	31	36	940
		Tantalum	8.8	33	38	1000
	R-6-65-B G	Glass	8.7	33	46	1200
		Sapphire	12	47	59	1500
		Stainless Steel	20	76	86	2200
		Carboloy	29	100	110	3100
		Tantalum	30	110	120	3300

Air flows are at 14.7 psia and 70 Degrees F/1.01 Bar and 21.1 Degrees C

Table 1-3 Tube and Float Code - Seventh Digit in Model Code for Scale Configuration

Code	Model 1350 Tube	Model 1355 Tube
A		R-2-15-A G
B		R-2-15-B G
C		R-2-15-C G
D		R-2-15-D G
F		R-6-15-B G
G	R-2-65-A G	R-2-15-AAAA G
H	R-2-65-B G	
J	R-2-65-C G	
K	R-2-65-D G	
L	R-6-65-A G	
M	R-6-65-B G	
N	No Tube	No Tube

Table 1-4 Tube and Float Code - Eighth and Ninth Digit in Model Code for Scale Configuration

Meter Accuracy	Float Material	Decal Scale Inscription			
		MM Scale	Linear Scale	Custom Decal	Percent Scale
Standard (1350-10%) (1355-5%)	Glass	1A	2A	3A	4A
	Stainless Steel	1B	2B	3B	4B
	Sapphire	1C	2C	3C	4C
	Carboloy	1D	2D	3D	4D
	Tantalum	1E	2E	3E	4E
Calibrated (1350-5%) (1355-2%)	Glass	1G	2G	3G	4G
	Stainless Steel	1H	2H	3H	4H
	Sapphire	1J	2J	3J	4J
	Carboloy	1K	2K	3K	4K
	Tantalum	1L	2L	3L	4L

*Note: Code for No Float/No Scale = "ZZ"

Section 1 Introduction

Table 1-5 Capacities - Rib Guide Tubes, Spherical Floats for use with 1355G Series Only

Meter Size	Tube No.	Float Material	Maximum Flow Rate*	
			Water (CC/Min)	Air
2	R-2-15-AAAA G	Glass	0.59	50 SCC/M
		Sapphire	1.1	79 SCC/M
		Stainless Steel	2.6	150 SCC/M
		Carboloy	5.2	280 SCC/M
		Tantalum	5.8	310 SCC/M
	R-2-15-D G	Glass	5.5	370 SCC/M
		Sapphire	10	520 SCC/M
		Stainless Steel	20	830 SCC/M
		Carboloy	34	1200 SCC/M
		Tantalum	36	1300 SCC/M
	R-2-15-A G	Glass	17	0.82 SLPM
		Sapphire	26	1.0 SLPM
		Stainless Steel	46	1.6 SLPM
		Carboloy	70	2.4 SLPM
		Tantalum	75	2.5 SLPM
	R-2-15-B G	Glass	53	2.3 SLPM
		Sapphire	80	3.0 SLPM
		Stainless Steel	130	4.6 SLPM
		Carboloy	200	6.7 SLPM
		Tantalum	210	7.1 SLPM
	R-2-15-C G	Glass	90	4.0 SLPM
		Sapphire	130	5.2 SLPM
		Stainless Steel	220	7.9 SLPM
		Carboloy	340	11 SLPM
		Tantalum	360	11 SLPM
6	R-6-15-A G	Glass	210	9.5 SLPM
		Sapphire	320	12 SLPM
		Stainless Steel	540	18 SLPM
		Carboloy	790	25 SLPM
		Tantalum	840	26 SLPM
	R-6-15-B G	Glass	560	23 SLPM
		Sapphire	820	29 SLPM
		Stainless Steel	1300	43 SLPM
		Carboloy	1900	60 SLPM
		Tantalum	2000	63 SLPM

Air flows are at 14.7 psia and 70 Degrees F/1.01 Bar and 21.1 Degrees C

Optional Equipment

Standard Needle Valve

The standard needle valve can be supplied integrally mounted to the inlet or outlet of the instrument. For more details on the needle valve go to our website: BrooksInstrument.com, select Documentation, Precision Valves & Flow Controllers, select Brooks-Line IV, CART, 8503 or 8504 valves.

Flow Contollers

Flow controllers can be supplied integrally mounted to the inlet or outlet of the instrument. For the flow controller's complete instruction manual go to our website: BrooksInstrument.com, select Documentation, Precision Valves & Flow Controllers, select FC8800, or FC8900.

Section 2: Installation

General

This section provides installation instructions for the Brooks® Sho-Rate Models 1350G/1355G Flowmeters. Refer to Section 1 of this manual for connections.

Receipt of Equipment

When the equipment is received, the outside packing case should be checked for damage incurred during shipment. If the packing case is damaged, the local carrier should be notified at once regarding his liability. A report should be submitted to the nearest Brooks Instrument location listed on the Global Service Network page on our website:

BrooksInstrument.com/GlobalSupportCenters

Remove the envelope containing the packing list. Carefully remove the instrument from the packing case. Make sure spare parts are not discarded with the packing materials. Inspect for damaged or missing parts.

Unpacking

Carefully unpack the meter and inspect it for any damage that may have occurred during shipment. The flowmeters are shipped completely assembled and tested. It should not be necessary to tighten or adjust any of the parts when it is received.

Return Shipment

Prior to returning any instrument to the factory for any reason, visit our website for instructions on how to obtain a Return Materials Authorization Number (RMA #) and complete a Decontamination Statement to accompany it: BrooksInstrument.com/Service. All instruments returned to Brooks also require a Material Safety Data Sheet (MSDS) for the fluid(s) used in the instrument. Failure to provide this information will delay processing of the instrument.

Instrument must have been purged in accordance with the following:

WARNING

Before returning the device, purge thoroughly with a dry inert gas such as Nitrogen before disconnecting process connections. Failure to correctly purge the instrument could result in fire, explosion or death. Corrosion or contamination may occur upon exposure to air.

Recommended Storage Practice

If intermediate or long term storage is required for equipment, as supplied by Brooks Instrument, it is recommended that said equipment be stored in accordance with the following:

- Within the original shipping container.
- Stored in a sheltered area, preferably a warm, dry heated warehouse.
- Ambient temperature: 70°F (21.0°C) nominal, 110°F (43°C) maximum, 45°F (7.1°C) minimum.
- Relative humidity 45% nominal, 60% maximum, 25% minimum.

Section 2 Installation

Upon removal from storage, a visual inspection should be conducted to verify the condition of equipment is “as received”. If the equipment has been in storage for an excess of two (2) years or in conditions in excess of those recommended, all pressure boundary seals should be replaced and the device subject to a hydrostatic/pneumatic pressure test to 150% of rated pressure.

Installation

The flowmeter should be mounted within 6° of true vertical. The inlet connection to the flowmeter is in the bottom end fitting. The connections are normally horizontal, female NPT. Be sure the piping is adequately supported to prevent undue strain on the meter.

WARNING

If the inlet and outlet valves adjacent to the flowmeter are to be closed for any reason, the flowmeter must be completely drained. Failure to do so may result in thermal expansion of the liquid which can cause rupture of the meter and possible personal injury.

CAUTION

Care must be taken in the system piping to this instrument to prevent sudden excessive pressure or flow surges. Protective devices should be installed upstream from this instrument, such as flow controllers, pressure regulators, pressure snubbers and rupture discs.

CAUTION

Any sudden change in system pressure may cause mechanical damage to elastomer materials. Damage can occur when there is a rapid expansion of fluid that has permeated elastomer materials. The user must take the necessary precautions to avoid such conditions.

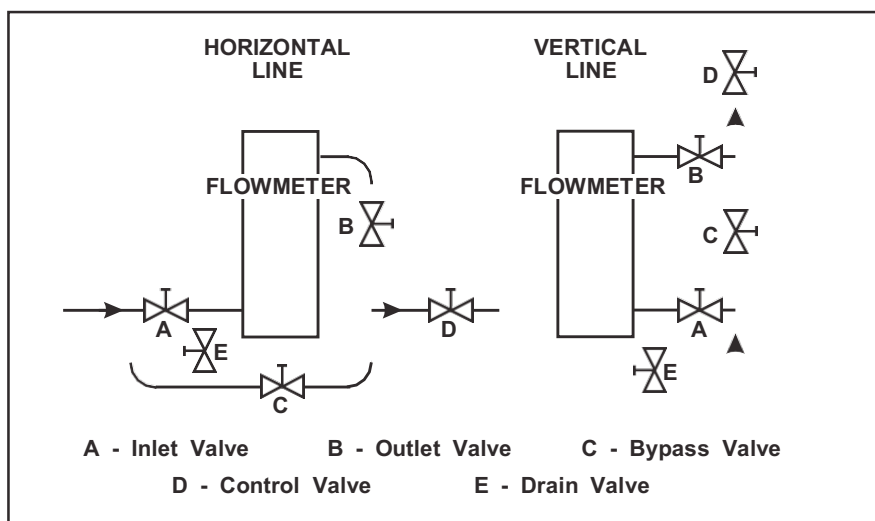


Figure 2-1 Typical Flowmeter Installation

It is recommended that a final leak test of the system plumbing and meter be performed before subjecting it to process fluid.
(See "4-2 Reassembly Procedure" on p. 4-2, step 6)

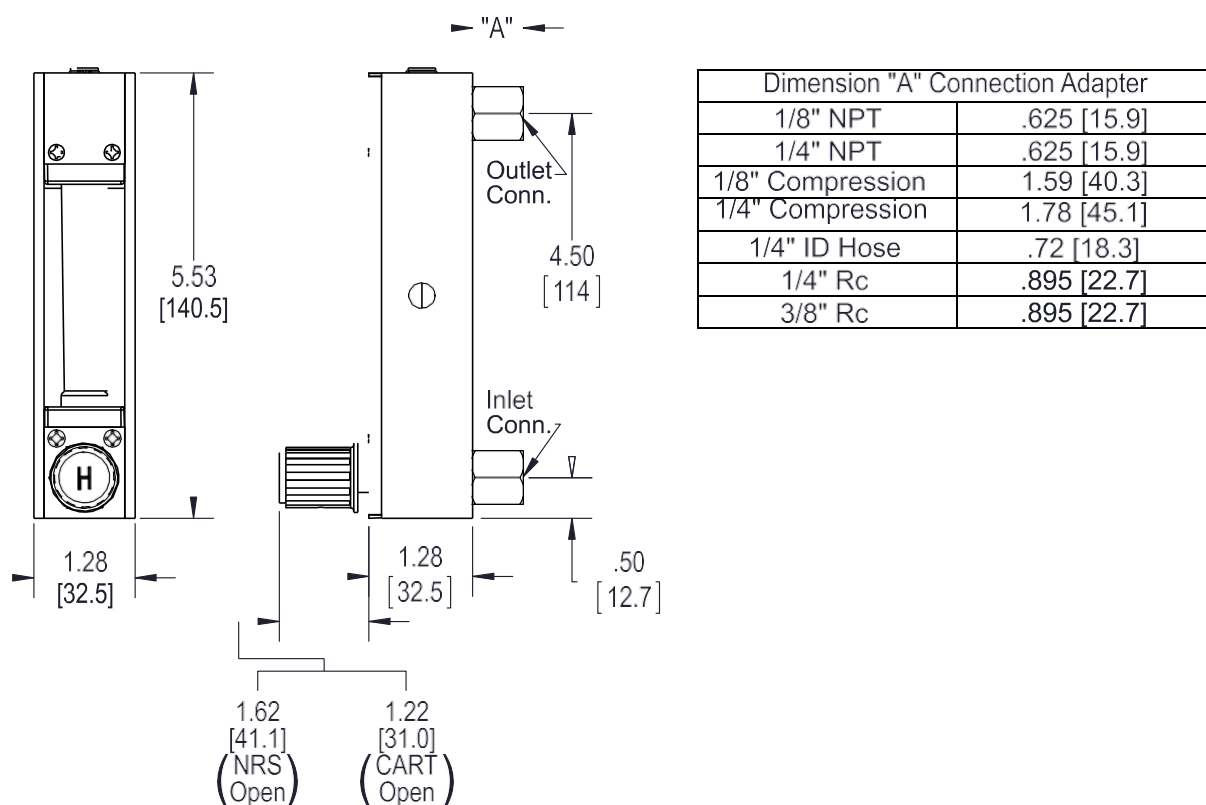


Figure 2-2 Dimensions - Sho-Rate 1350G

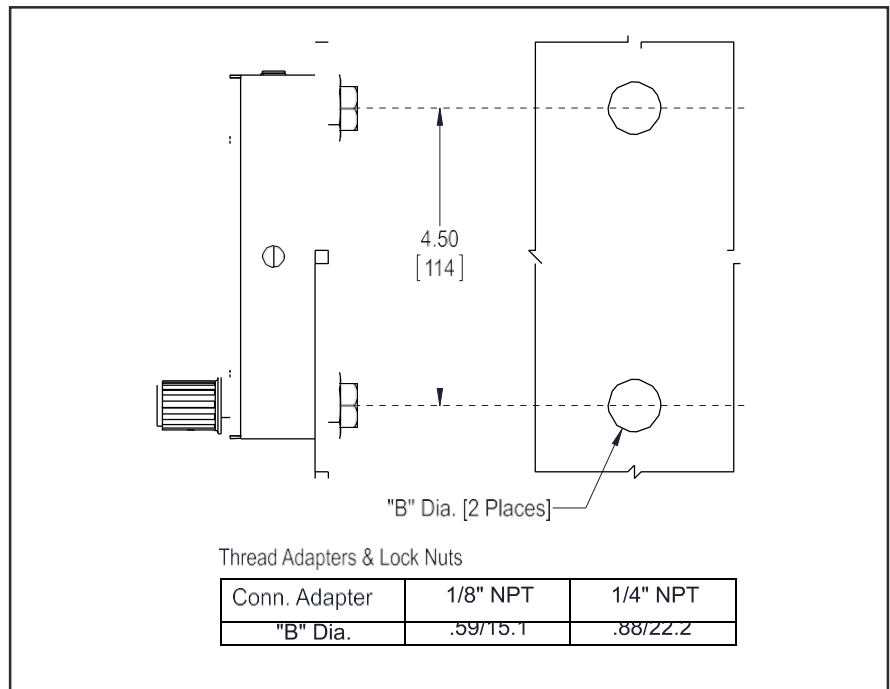


Figure 2-3 Dimensions - Sho-Rate 1350G Panel Mount

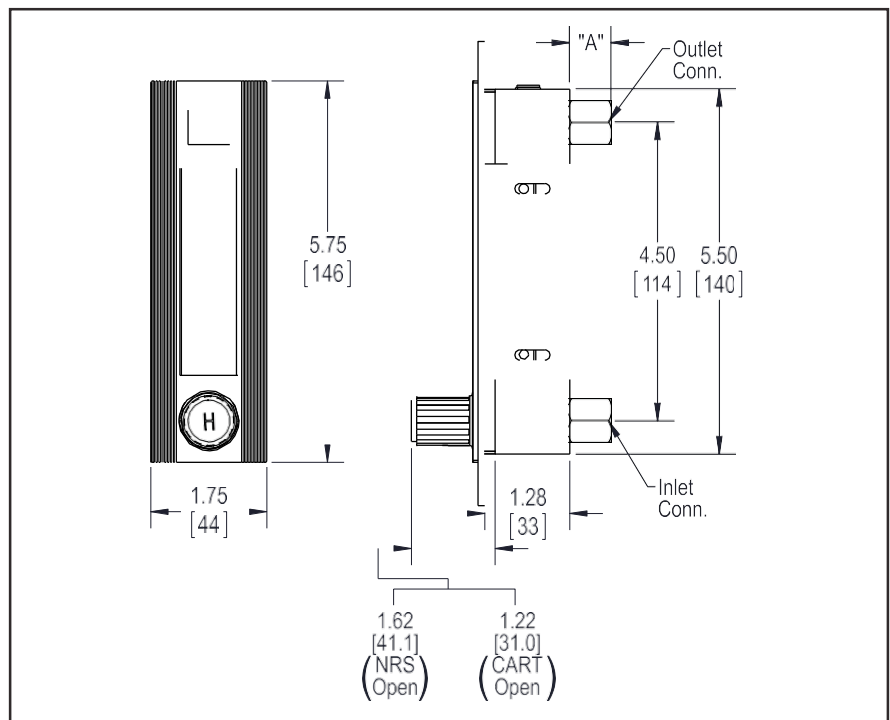


Figure 2-4 Dimensions - Sho-Rate 1350G Bezel

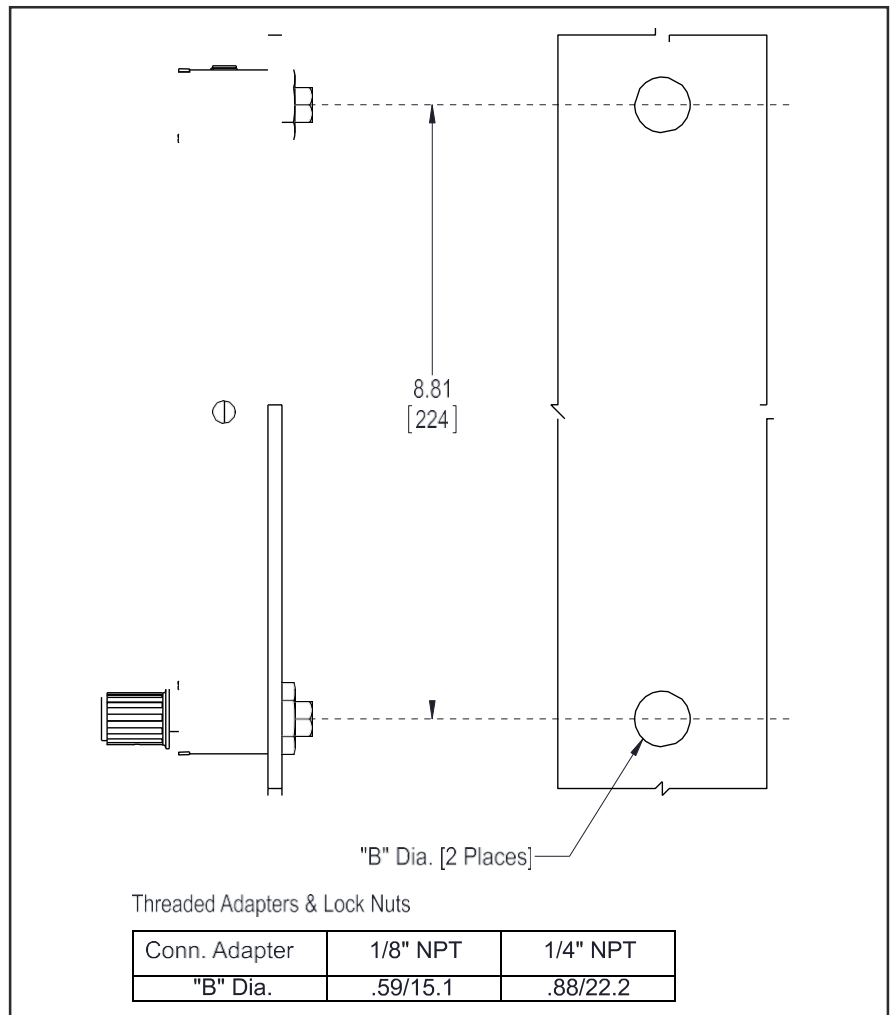


Figure 2-6 Dimensions - Sho-Rate 1355G Panel Mount

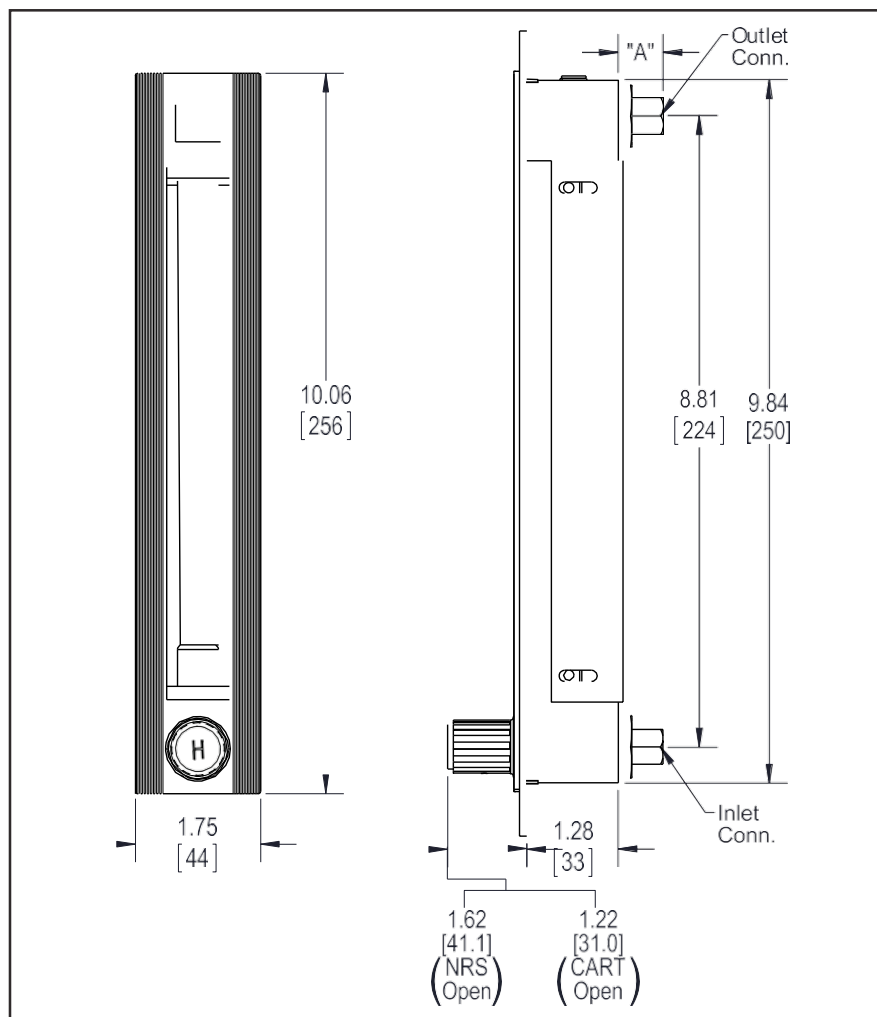


Figure 2-7 Dimensions - Sho-Rate 1355G Bezel

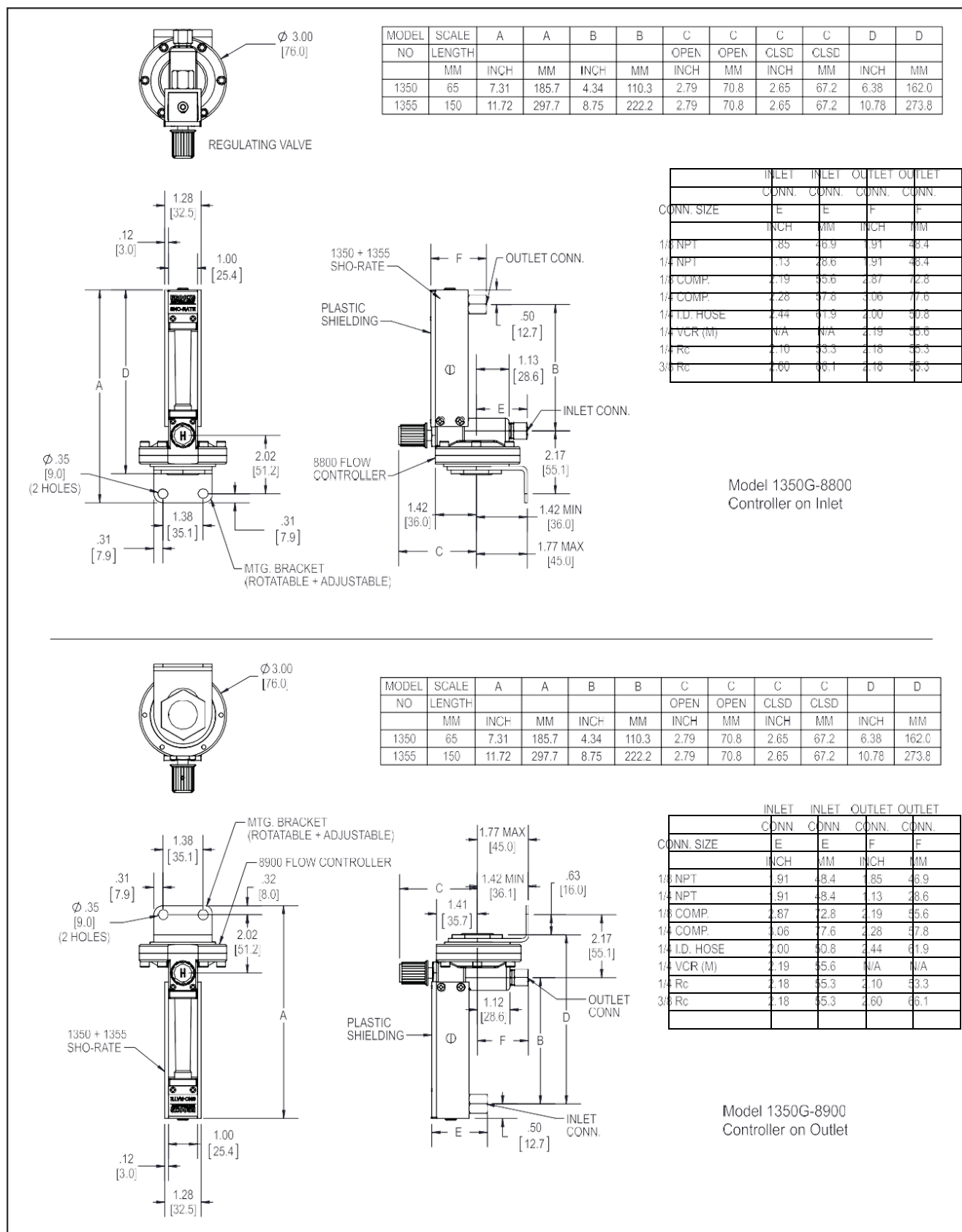


Figure 2-8 Dimensions - Model 1350G/1355G with Flow Controller

Section 3: Operation

After the flowmeter has been installed in the flow system, it is ready for operation. An optional built-in needle control valve may be provided to control the flow through the flowmeter. These control valves are designed for fine control. Excessive tightening may damage the valve seat and limit its effectiveness as a control valve. If tight shut-off is required, it is recommended that a separate shut-off valve should be installed in the line immediately before the flowmeter.

Flow indication is measured using the center of the spherical float as the reference point.

Description

The Brooks bistable limit switches are inductive ring initiators designed to be slipped over the glass tube. The switch operates as a coil that is inductively actuated by a 316 Stainless Steel or Carboloy ball float. The limit switches can be set to any desired limit values, by sliding the switch along the metering tube. The Brooks ring initiators create a highly sensitive, stable latching signalling on high or low flows, or deviations from a controlled flow.

Technical data limit switch

Switch type	Inductive
Function	bistable (latching)
Repeatability	≤ 0.5 mm
Input voltage	8Vdc nominal
Current consumption	≤ 1 mA (direction A to B) ≥ 3 mA (direction B to A)
Max. float speed	10 m/s
Ambient temperature	0°C to 40°C
Protection to IEC 60529	IP67
Cable specification	2 conductor , 2m PVC-covered
Conductor cross section	0,14 mm ² (#23 AWG)
Housing material	Crastin (PBT)

Hazardous area for size 2 tube

Ring initiator	RC 10-14-N3 (size 2 tube)
PTB 99ATEX2128 X	Ⓔ II 2 G EExia IIC T6
EMC to	EN 60947-5-2
In compliance with	EN 50227
Self inductance	L _{imax} = 70 μ H
Self Capacitance	C _{imax} = 90 nF

Hazardous area for size 6 tubes

Ring initiator	RC 15-14-N3 (size 6 tube)
PTB 99ATEX2128 X	Ⓔ II 2 G EExia IIC T6
EMC to	EN 60947-5-2
In compliance with	EN 50227
Self inductance	L _{imax} = 120 μ H
Self Capacitance	C _{imax} = 90 nF

Power supply/relay unit

Proximity switches may only be connected to a power supply/relay unit certified EEx ia IIB or EEx ia IIC, EEx ib IIB or EEx ib IIC. The switch adopts the same classification as the power supply/relay unit. The power supply/relay unit must fulfill NAMUR requirement, EN 50227 (DIN 19234).

Maximum operating temperature

The maximum fluid temperature for the Sho-Rate series with the inductive switches is 70°C.

Recommended spares

Model	Size	Description	Part number
Sho-Rate	Size 2	Bistable alarm incl. mounting parts	273-G-006-ZZZ
Sho-Rate	Size 6	Bistable alarm incl. mounting parts	273-G-007-ZZZ

Pressure Equipment Directive (PED)97/23/EC

Flow meter complies under Sound Engineering Practices (SEP)

Section 5: Alarm Settings

Alarm Settings

The minimum setting distance of a switch and a fitting is 8 mm, and the minimum setting distance between 2 switches is approx. 30 mm, see figure 1. The standard alarm function is a bistable (latching) function, see figure 2. Once the ball float moves inside the inductive switch, the alarm function is activated, it remains activated, even if the float continues to move towards the alarm zone, thus leaving the inductive switch. The relay will drop out as soon as the float crosses the switch from the opposite direction, and moves back the alarm from the alarm zone into the normal operating range. The actual float position above or below the alarm switch is precisely indicated. Figure 3 displays low and high flow alarm settings.

The intrinsically safe power supply/relay unit from Pepperl+Fuchs (KF series) gives the customer the ability to switch over the alarm function in "Normally open" or "Normally closed".

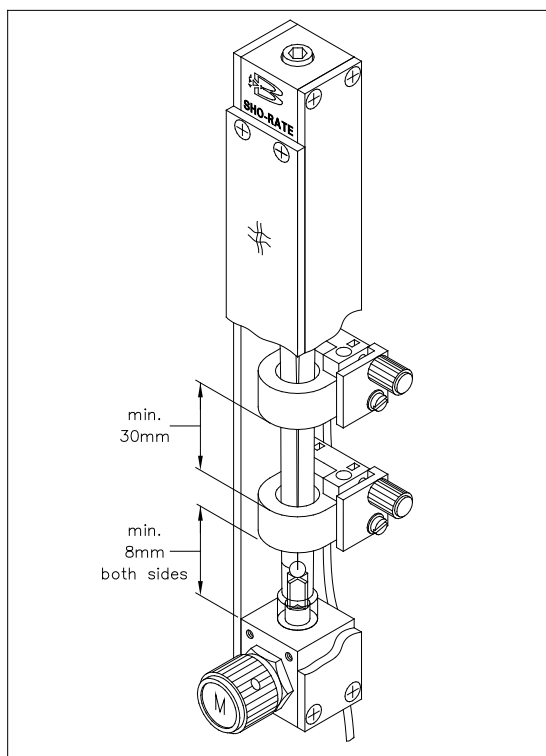


Figure 5-1: Alarm settings

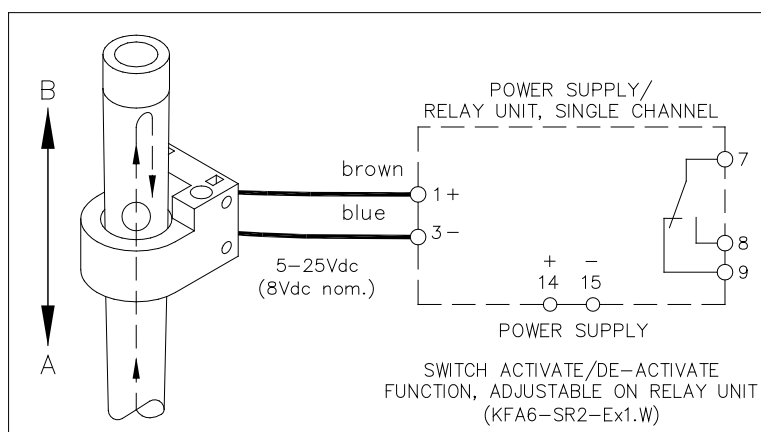


Figure 5-2: Standard bistable alarm

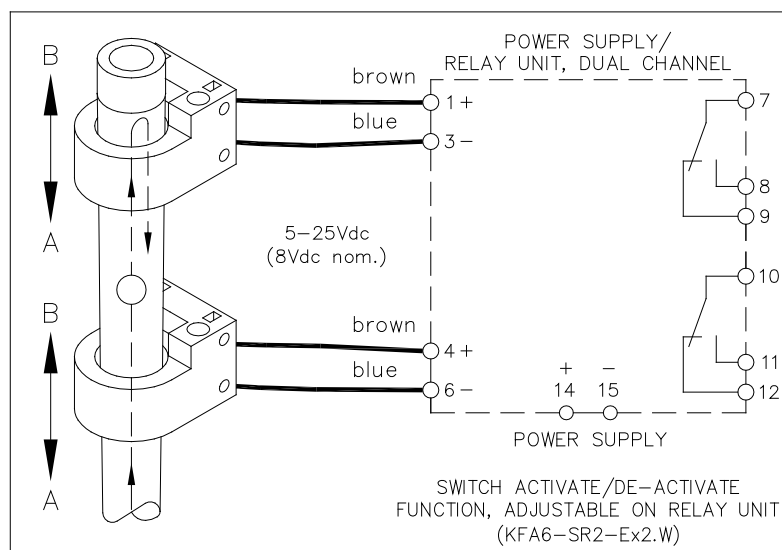


Figure 5-3: Bistable low and high flow alarm

Section 6: Maintenance

Disassembly and Cleaning

	⚠ WARNING METER/CONTROLLER SEAL COMPATIBILITY
Products in this manual may contain metal or elastomeric seals, gaskets, O-rings or valve seats. It is the "user's" responsibility to select materials that are compatible with their process and process conditions. Using materials that are not compatible with the process or process conditions could result in the Meter or Controller leaking process fluid outside the pressure boundary of the device, resulting in personnel injury or death. It is recommended that the user check the Meter or Controller on a regular schedule to ensure that it is leak free as both metal and elastomeric seals, gaskets, O-rings and valve seats may change with age, exposure to process fluid, temperature, and /or pressure.	

It is recommended the user periodically inspect the tube and float, and clean if necessary. Dirt or foreign materials adhering to the tube and float may cause inaccuracy and sticking of the float. The metering tube (Borosilicate glass) and related parts may be cleaned with any solvent which does not attack glass. To disassemble use the following procedures:

1. Remove the front shield.
2. Loosen the jack screw by turning it counterclockwise with a 5/32" hex wrench. The tube may now be removed from the meter housing.
3. On meter sizes 1 through 6, the tube, float and float stops may be cleaned as an assembly or may be disassembled for cleaning. Using a small hook, remove either Teflon® float stop from the metering tube and remove the float. Be careful not to chip the tube.
4. Packing seats may now be removed.
5. The needle control valve assembly may be removed by turning the valve body counterclockwise. The valve seat, stem and packing then may be removed easily from the valve body for cleaning or replacement.

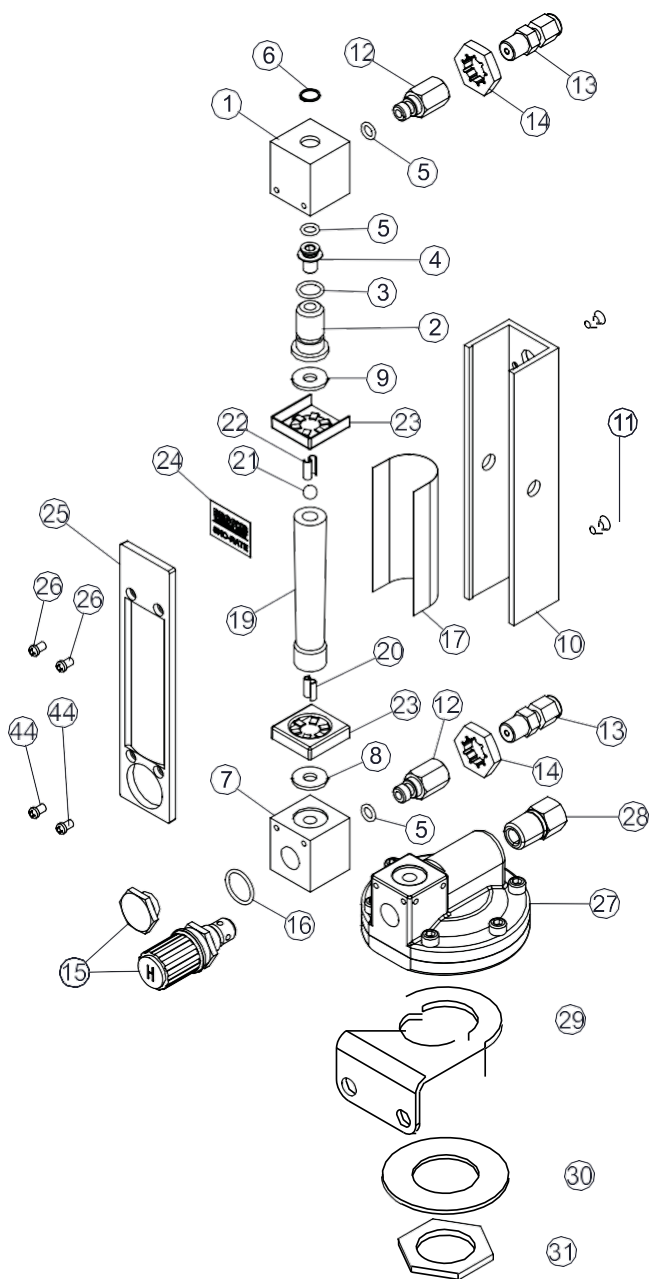
Reassembly Procedure

1. Use the reverse of Steps 1 through 5 of the disassembly procedure to reassemble the meter.
2. Prior to installing the needle control valve assembly make certain that the valve stem is turned completely counterclockwise (full open position) to prevent damage to the valve seat. Packing seats should be examined for damage or deterioration and replaced if necessary.
3. Make sure that the tube seats firmly on the packing seats and does not overlap onto the end block.
4. The jack screw and plug serve to axially compress the tube seat gasket and exert a uniform pressure on the metering tube to prevent any possibility of leakage. Do not overtighten the jack screw.
5. After the flowmeter has been reassembled, it is important that it be leak tested with air at a minimum pressure of 15 psig at room temperature.
6. To detect leaks, brush soapy water around all possible leak points (tube packing, connections, and seal spindle) and check if bubbles are being formed. Should a leak be detected, tighten that particular joint to see if the leak can be stopped. If the leak persists, disassemble the area involved and check for dirt or damaged elastomer. Clean and replace elastomer.

Section 7: Parts List

General

When ordering parts please specify:
Brooks Serial Number
Model Number
Part Number
Description and Quantity
(Refer to Figure 5-1 and Table 5-1)



ITEM NO.	PART NUMBER
1	SEAL END FITTING
2	JACK PLUG
3	O-RING (JACK PLUG)
4	JACK SCREW
5	O-RING (JACK SCREW, ADAPTERS)
6	RETAINING RING
7	VALVE END FITTING
8	INLET TUBE PACKING
9	OUTLET TUBE PACKING
10	FRAME
11	SCREWS (BACK OF METER)
12	ADAPTERS
13	2ND ADAPTER
14	LOCK NUTS
15	VALVE PLUG / VALVE ASSY
16	O-RING FOR VALVE PLUG
17	BACKGROUND LABEL
19	TUBE
20	INLET FLOAT STOP
21	FLOAT
22	OUTLET FLOAT STOP
23	ALIGNMENT BLOCK
24	LOGO LABEL
25	FRONT WINDOW
26	SCREWS (FRONT WINDOW) TOP
27	FLOW CONTROLLER SUB-ASSY
28	ADAPTER (FLOW CONTROLLER)
29	BRACKET (FLOW CONTROLLER)
30	SPACER (FLOW CONTROLLER)
31	NUT (FLOW CONTROLLER)
32	ALARM*
33	BASE PLATE*
34	SCREW (BASE PLATE)*
36	SUPPORT BRACKET*
37	ADJUSTMENT SCREWS*
38	PANEL MOUNTING SCREWS*
39	ALUMINUM BEZEL*
40	BRACKET (BEZEL)*
41	SCREWS (BEZEL)*
42	WASHERS (BEZEL)*
43	LABEL SET*
44	SCREW (FRONT WINDOW) BOTTOM

*PART NOT SHOWN

CONTACT FACTORY IF REPLACEMENT PARTS ARE NEEDED.

GT1350001 REV C

Figure 7-1 Parts Drawing Sho-Rate Models 1350G and 1355G

Table 7-1 Sho-Rate 1350G/1355G Parts List

			COMPONENT PART NUMBER for	
	PART DESCRIPTION	QTY.	1350G	1355G
1	SEAL END FITTING	1		
	Brass		325A110GGJ	325A110GGJ
	SS/STEEL	Std Mat'l	325A109BMA	325A109BMA
2	JACK PLUG	1		
	SS	Std Mat'l	817A088BMA	817A088BMA
3	O RING (Jack Plug)	1	375B012QTA	375B012QTA
			375B012SUA	375B012SUA
			375B012SAA	375B012SAA
			375B012SYA	375B012SYA
			375B012TTA	375B012TTA
4	JACK SCREW	1		
	SS	Std Mat'l	817A087BMA	817A087BMA
5	O RING (Jack Screw and Adapters)	3	375B009QTA	375B009QTA
			375B009SUA	375B009SUA
			375B009QMA	375B009QMA
			375B009SAA	375B009SAA
			375B009SYA	375B009SYA
			375B009TTA	375B009TTA
6	RETAINING RING	1		
	SS	Std Mat'l	724Z438AAA	724Z438AAA
7	VALVE END FITTING	1		
	BRASS		325B120GGJ	325B120GGJ
	SS/STEEL	Std Mat'l	325B119BMA	325B119BMA
8	INLET TUBE PACKING	1		
			589B308SUA	589B308SUA
			589B308QTA	589B308QTA
			589B310QMA	589B310QMA
			589B308SAA	589B308SAA
			589B308SYA	589B308SYA
	ALL R-6-65- TUBES ALL R-6-15- TUBES	1	589B309SUA	589B309SUA
			589B309QTA	589B309QTA
			589B311QMA	589B311QMA
			589B309SAA	589B309SAA
			589B309SYA	589B309SYA
9	OUTLET TUBE PACKING	1		
			589B308SUA	589B308SUA
			589B308QTA	589B308QTA
			589B310QMA	589B310QMA
			589B308SAA	589B308SAA
			589B308SYA	589B308SYA
	ALL R-6-65- TUBES ALL R-6-15- TUBES	1	589B309SUA	589B309SUA
			589B309QTA	589B309QTA
			589B311QMA	589B311QMA
			589B309SAA	589B309SAA
			589B309SYA	589B309SYA
10	Frame	1		
		Standard	614A179EAJ	614B239EAJ
		SS	614A182BMA	614B242BMA
		w/Alarm	614A181EAJ	614B241EAJ
	w/Flow Controller	Alum	614A180EAJ	614B240EAJ
		SS	614A183BMA	614B243BMA
11	SCREWS (BACK OF METER)			
	W/O FLOW CONTROLLER, ALUM FRAME	316 SST 6-32 x 5/16" Lg Phillips Flat Hd	753Z221BMZ	753Z221BMZ
	W/ FLOW CONTROLLER, ALUM FRAME	316 SST 6-32 x 5/16" Lg Phillips Flat Hd	753Z221BMZ	753Z221BMZ
	W/O FLOW CONTROLLER, SS FRAME	316 SST 6-32 x 5/16" Lg Phillips Flat Hd	753C267BMA	753C267BMA
	W/ FLOW CONTROLLER SS FRAME	316 SST 6-32 x 5/16" Lg Phillips Flat Hd	753C267BMA	753C267BMA

Table 7-1 Sho-Rate 1350G/1355G Parts List (Continued)

PART DESCRIPTION			QTY.	COMPONENT PART NUMBER for	
				1350G	1355G
20	INLET FLOAT STOP	R-2-65-AG,BG,CG	Std Teflon	1	846B141QMA
		R-2-65-DG	Std Teflon		846B144QMA
		R-6-65-AG	Std Teflon		846B147QMA
		R-6-65-BG	Std Teflon		846B150QMA
		R-2-15AAAAG,AG,DG	Std Teflon		846B143QMA
		R-2-15-BG,CG	Std Teflon		846B146QMA
		R-6-15-AG	Std Teflon		846B149QMA
		R-6-15-BG	Std Teflon		846B152QMA
21	FLOAT	1/8"	Glass	1	345C054WYA
			SS		345C067BMA
			Sapphire		345C068VGA
			Carboloy		345C069CKA
			Tantalum		345C051JNA
		1/4"	Glass		345G055WYA
			SS		345G072BMA
			Sapphire		345G071VGA
22	OUTLET FLOAT STOP	R-2-65-AG,BG,CG	Std Teflon	1	846B142QMA
		R-2-65-DG	Std Teflon		846B145QMA
		R-6-65-AG	Std Teflon		846B148QMA
		R-6-65-BG	Std Teflon		846B151QMA
		R-2-15-AAAAG,AG,DG	Std Teflon		846B142QMA
		R-2-15-BG,CG	Std Teflon		846B145QMA
		R-6-15-AG	Std Teflon		846B153QMA
		R-6-15-BG	Std Teflon		846B153QMA
23	ALIGNMENT BLOCK	R-2-65-AG,BG,CG,DG		2	079C117AAA
		R-2-15-AAAAG,AG,BG,CG,DG			079C117AAA
		R-6-65-AG			079C118AAA
		R-6-15-AG			079C118AAA
		R-6-65-BG			079C119AAA
		R-6-15-BG			079C119AAA
24	LOGO LABEL for Front Window		Std Brooks No Logo	1	502C635AAA NO PART
25	FRONT WINDOW	Std w/Flow Controller w/Bezel		1	794A299NZA 794A407NZA 794A408NZA
26	SCREWS - for Front Window (TOP)	Std #6-32 X 1/4" Lg Phillips Fillister Hd		2	753N265AWA
		w/Flow Controller 1/8" Lg Phillips Fillister Hd			753N261AWA
27	FLOW CONTROLLER SUB-ASSY	w/o Flow Controller		1	NO PART
		8800 Brass Body	Buna Diaphragm		211B028FIA
			Viton Diaphragm		211B028HIA
		S/S Body	Viton Diaphragm		211B028DAA
			Teflon Diaphragm		211B028FUA
		8840 Brass Body	Buna Diaphragm & Quad		211E027FIA
			Viton Diaphragm & Quad		211E027HIA
		S/S Body	Viton Diaphragm & Quad		211E027DAA
			Teflon Diaph/ Viton Quad		211E027FUA
			Teflon Diaph/ Buna Quad		211E028FUA
			Teflon Diaph/ EPR Quad		211E029FUA
		8900 Brass Body	Buna Diaphragm		211G027FIA
			Viton Diaphragm		211G027HIA
		S/S Body	Viton Diaphragm		211G027DAA
			Teflon Diaphragm		211G027FUA
		8940 Brass Body	Buna Diaphragm		211J027FIA
			Viton Diaphragm		211J027HIA
		S/S Body	Viton Diaphragm		211J027DAA
			Teflon Diaphragm		211J027FUA

Table 7-1 Sho-Rate 1350G/1355G Parts List (Continued)

PART DESCRIPTION			COMPONENT PART NUMBER for	
			1350G	1355G
28	ADAPTER: Flow Controller to Cust Connection (1/4" M-NPT to) 1/8" (F) NPT ----- 1/4" (F) NPT ----- 1/8" Compression ----- 1/4" Compression ----- 6mm Compression ----- 1/4" Rc ----- 3/8" Rc ----- 1/4 I.D. HOSE	SS SS SS SS SS SS SS SS	1	315T050BMA NO PART 320B209BMA 320B001BMA 014Z387BMA 014B102BNA 014B271BMA 318Z068BMA
29	BRACKET for Panel Mounting of FC	Steel S/S	1	106Z032AC0 106Z032BFA
30	SPACER for FC Panel Mounting Bracket	Steel S/S	1	810Z038AC0 810Z038BFA
31	NUT for FC Panel Mounting Bracket	Steel S/S		573Z015AC0 573Z015BMA
32	ALARM (RELEASE TBD) BISTABLE INITIATOR+MNTG KIT #2 BISTABLE INITIATOR+MNTG KIT #6			273-G-006-ZZZ 273-G-007-ZZZ
33	BASE PLATE Base Plate Assembly Tripod Base Plate Bubble Level		1	ASM163 PLA010 PHW064
34	SCREW - Bracket to Base Plate		1	PHW094
36	SUPPORT BRACKET		1	106Y554ADD
37	ADJUSTMENT SCREWS - Corners of Base Plate		3	PHW065
38	PANEL MOUNTING SCREWS 6-32 x .5" LG		4	754Z033AC0
39	ALUMINUM BEZEL w/ Valve w/o Valve		1 1	075B032FEG 075B031FEG
40	BRACKET for bezel		2	106Y665FEG
41	SCREWS - Bracket to Bezel		4	751C263AWA
42	WASHERS - Bezel		4	962A006AWA
43	LABEL SET		1	502Y799AAA
44	SCREWS - for Front Window (BOTTOM) Std #6-32 X 1/4" Lg Phillips Fillister Hd w/Flow Controller 1/8" Lg Phillips Fillister Hd		2	753N265AWA 753N261AWA
45	Decal Paper All Models		0.1	998E150AAA
46	Decal Overcoat All Models		0.1	998E151AAA
REF1	FINAL ASSEMBLY DRAWING			GT1350001
REF2	OUTLINE DRAWINGS			
	Valve on inlet			GT1350002
	Valve on outlet			GT1355003
	No Valve			GT1355004
	with 8800			GT1355005
	with 8900			GT1355006
REF3	LABEL PRINTING INSTRUCTIONS			502Y805

Table 7-1 Sho-Rate 1350G/1355G Parts List (Continued)

VALVE		O-RING MATERIAL					
TYPE	SIZE	BUNA	VITON	KALREZ	EPR/EPM	KALREZ/TEFLON	BUTYL
CARTRIDGE 3 SS	LOW	947N091BMA	947N092BMA	947N095BMA	947N094BMA	947N096BMA	947N093BMA
	MED	947N097BMA	947N098BMA	947N101BMA	947N100BMA	947N102BMA	947N099BMA
	HIGH	947N103BMA	947N104BMA	947N107BMA	947N106BMA	947N108BMA	947N105BMA
CARTRIDGE 2 SS	LOW	947N063BNA	947N060BNA	947N064BNA	947N065BNA	INVALID	INVALID
	MED	947N069BNA	947N061BNA	947N070BNA	947N071BNA	INVALID	INVALID
	HIGH	947N077BNA	947N062BNA	947N078BNA	947N079BNA	INVALID	INVALID
NRS SS	1	947L301BMA	947L302BMA	947L305BMA	947L304BMA	947L306BMA	947L303BMA
	2	947L307BMA	947L308BMA	947L311BMA	947L310BMA	947L312BMA	947L309BMA
	3	947L313BMA	947L314BMA	947L317BMA	947L316BMA	947L318BMA	947L315BMA
	4	947L319BMA	947L320BMA	947L323BMA	947L322BMA	947L324BMA	947L321BMA
	5	947L325BMA	947L326BMA	947L329BMA	947L328BMA	947L330BMA	947L327BMA
	6	947L331BMA	947L332BMA	947L335BMA	947L334BMA	947L336BMA	947L333BMA
	7	947L337BMA	947L338BMA	947L341BMA	947L340BMA	947L342BMA	947L339BMA

**Existing valve, using for initial release

**CART II valve no longer being offered

**Size 7 no longer being offered

*Sizing Based on Sizing Tab

Section 7 Parts List

Table 7-1 Sho-Rate 1350G/1355G Parts List (Continued)

Sho-Rate G Valve Sizing - AIR				Sho-Rate G Valve Sizing - WATER			
Tube/Float Combo	Max Flow (SCCM Air @ STP) Sho-Rate G	Recommended Valve (CART) (10 PSIG inlet Pressure)	Recommended Valve (NRS) (10 PSIG inlet Pressure)	Tube/Float Combo	Max Flow (GPH Water @ STP) Sho-Rate G	Recommended Valve (CART) (10 PSIG inlet Pressure)	Recommended Valve (NRS) (10 PSIG inlet Pressure)
R-2-65-AG				R-2-65-AG			
Glass	59	Low	#1	Glass	0.68	Low	#1
Ruby	91	Low	#1	Ruby	1.3	Low	#1
Stainless	170	Low	#2	Stainless	3.1	Low	#1
Tungsten	300	Low	#2	Tungsten	6	Low	#2
Tantalum	330	Low	#2	Tantalum	6.7	Low	#2
R-2-65-BG				R-2-65-BG			
Glass	80	Low	#1	Glass	0.93	Low	#1
Ruby	120	Low	#1	Ruby	1.8	Low	#1
Stainless	220	Low	#2	Stainless	4.2	Low	#2
Tungsten	370	Low	#3	Tungsten	8	Low	#2
Tantalum	410	Low	#3	Tantalum	8.8	Low	#2
R-2-65-CG				R-2-65-CG			
Glass	460	Low	#3	Glass	7.9	Low	#2
Ruby	630	Low	#4	Ruby	13	Low	#3
Stainless	990	Low	#4	Stainless	26	Low	#4
Tungsten	1400	Low	#4	Tungsten	41	Low	#4
Tantalum	1500	Low	#4	Tantalum	44	Low	#4
R-2-65-DG				R-2-65-DG			
Glass	1800	Low	#4	Glass	43	Low	#4
Ruby	2400	Low	#4	Ruby	62	Low	#4
Stainless	3700	Low	#5	Stainless	100	Low	#5
Tungsten	5300	Med	#5	Tungsten	150	Low	#5
Tantalum	5600	Med	#5	Tantalum	170	Low	#5
R-2-15-AG				R-2-15-AG			
Glass	820	Low	#4	Glass	17	Low	#3
Ruby	1000	Low	#4	Ruby	26	Low	#4
Stainless	1600	Low	#4	Stainless	46	Low	#4
Tungsten	2400	Low	#5	Tungsten	70	Low	#4
Tantalum	2500	Low	#5	Tantalum	75	Low	#4
R-2-15-BG				R-2-15-BG			
Glass	2300	Low	#4	Glass	53	Low	#4
Ruby	3000	Low	#5	Ruby	80	Low	#4
Stainless	4600	Med	#5	Stainless	130	Low	#5
Tungsten	6700	Med	#5	Tungsten	200	Med	#5
Tantalum	7100	Med	#6	Tantalum	210	Med	#6
R-2-15-CG				R-2-15-CG			
Glass	4000	Med	#5	Glass	90	Low	#5
Ruby	5200	Med	#5	Ruby	130	Low	#5
Stainless	7900	Med	#6	Stainless	220	Med	#6
Tungsten	11000	Med	#6	Tungsten	340	Med	#6
Tantalum	11000	Med	#6	Tantalum	360	Med	#6
R-2-15-DG				R-2-15-DG			
Glass	370	Low	#3	Glass	5.5	Low	#2
Ruby	520	Low	#3	Ruby	10	Low	#2
Stainless	830	Low	#4	Stainless	20	Low	#3
Tungsten	1200	Low	#4	Tungsten	34	Low	#4
Tantalum	1300	Low	#4	Tantalum	36	Low	#4
R-2-15-AAAAG				R-2-15-AAAAG			
Glass	50	Low	#1	Glass	0.59	Low	#1
Ruby	79	Low	#1	Ruby	1.1	Low	#1
Stainless	150	Low	#1	Stainless	2.6	Low	#1
Tungsten	280	Low	#2	Tungsten	5.5	Low	#2
Tantalum	310	Low	#2	Tantalum	5.8	Low	#2
R-6-65-AG				R-6-65-AG			
Glass	6600	Med	#5	Glass	150	Low	#5
Ruby	8600	Med	#6	Ruby	220	Med	#6
Stainless	12000	Med	#6	Stainless	380	Med	#6
Tungsten	18000	Med	#6	Tungsten	560	Med	#6
Tantalum	19000	High	#6	Tantalum	600	Med	#6
R-6-65-BG				R-6-65-BG			
Glass	22000	High	Use Cart Valv Hi	Glass	550	Med	#6
Ruby	28000	High	Use Cart Valv Hi	Ruby	790	High	Use Cart Valv Hi
Stainless	40000	High	Use Cart Valv Hi	Stainless	1200	High	Use Cart Valv Hi
Tungsten	56000	High	Use Cart Valv Hi	Tungsten	1800	High	Use Cart Valv Hi
Tantalum	59000	High	Use Cart Valv Hi	Tantalum	1900	High	Use Cart Valv Hi
R-6-15-AG				R-6-15-AG			
Glass	9500	Med	#6	Glass	210	Med	#6
Ruby	12000	Med	#6	Ruby	320	Med	#6
Stainless	18000	Med	#6	Stainless	540	Med	#6
Tungsten	25000	High	Use Cart Valv Hi	Tungsten	790	High	Use Cart Valv Hi
Tantalum	26000	High	Use Cart Valv Hi	Tantalum	840	High	Use Cart Valv Hi
R-6-15-BG				R-6-15-BG			
Glass	23000	High	Use Cart Valv Hi	Glass	560	Med	#6
Ruby	29000	High	Use Cart Valv Hi	Ruby	820	High	Use Cart Valv Hi
Stainless	43000	High	Use Cart Valv Hi	Stainless	1300	High	Use Cart Valv Hi
Tungsten	60000	High	Use Cart Valv Hi	Tungsten	1900	High	Use Cart Valv Hi
Tantalum	63000	High	Use Cart Valv Hi	Tantalum	2000	High	Use Cart Valv Hi

SCCM AIR, 10 PSIG INLET

CART	NRS
Low	3700 1 150
Med	18000 2 350
Hi	75000 3 600
	2400 4 2400
	5 6800
	6 12200

CCM WATER, 10 PSIG INLET

CART	NRS
Low	175 1 4
Med	687 2 10
Hi	1984 3 20
	4 80
	5 200
	6 650

LIMITED WARRANTY

Visit www.BrooksInstrument.com for the terms and conditions of our limited warranty.

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 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.

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Global Headquarters

Brooks Instrument

407 West Vine Street
Hatfield, PA
19440-0903 USA

Toll-Free (USA): 888-554-FLOW
T: 215-362-3500

BrooksAM@BrooksInstrument.com

A list of all Brooks Instrument locations and contact details can be found at www.BrooksInstrument.com

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