

# Installation & Operation Manual

## **Sho-Rate™ Series Models 1350G/1355G Variable Area Flow Meters**

**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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**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 through 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.

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

	1350G	1355G
<b>Performance</b>		
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® per fluoroelastomers	
Float Materials	Glass, Sapphire, Stainless Steel, Carboloy®, 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	
Dimensions	See Dimension Drawings	
Alarm Availability	1 Inductive Ring Sensor/Switch	
	2 Inductive Ring Sensor(s)/Switch(es)	
Inductive Ring Sensor(s)/Switch(es) with Relay Options		
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 Materials (2.1)	

\* 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

		Full Scale - Water		Full Scale - Air		
Meter Size	Tube No.	Float Material	GPH	LPH	SCFH <sup>1</sup>	NLPH <sup>2</sup>
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
6	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
10	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

<sup>1</sup> Air flow rates in standard units are at 70°F & 14.7 PSIA. Reference conditions 70°F latm.<sup>2</sup> Air flow rates in normal units are at 20°C & 1.013 bar. Reference conditions 0°C latm.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"

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

Meter Size	Tube No.	Float Material	Full Scale Flow	
			Water (CC/Min)	Air <sup>1</sup>
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
6	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
6	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
	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
6	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

<sup>1</sup> Air flow rates in standard units are at 70°F & 14.7 PSIA. Reference conditions 70°F latm.

## 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](http://BrooksInstrument.com), select Documentation, Precision Valves & Flow Controllers, select Brooks-Line IV, CART, 8503 or 8504 valves.

### Flow Controllers

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](http://BrooksInstrument.com), select Documentation, Precision Valves & Flow Controllers, select FC8800, or FC8900.

## 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](http://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](http://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.

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.

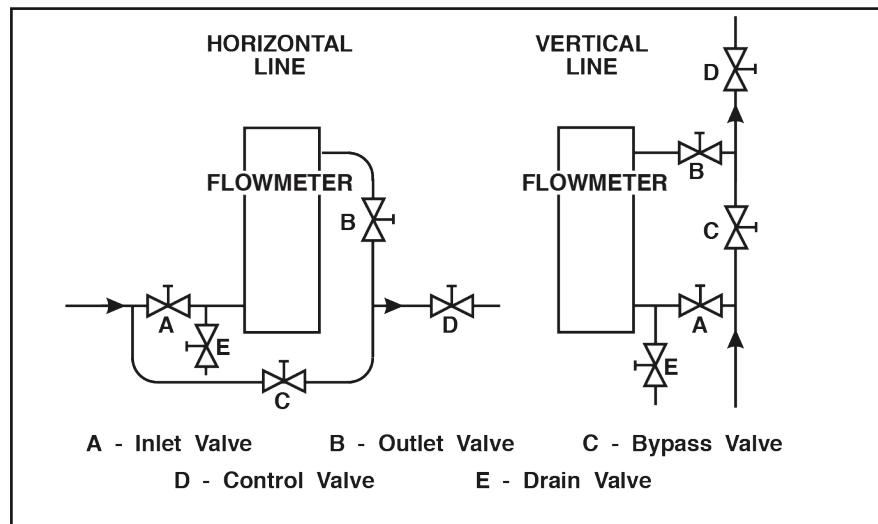


Figure 2-1 Typical Flowmeter Installation

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)

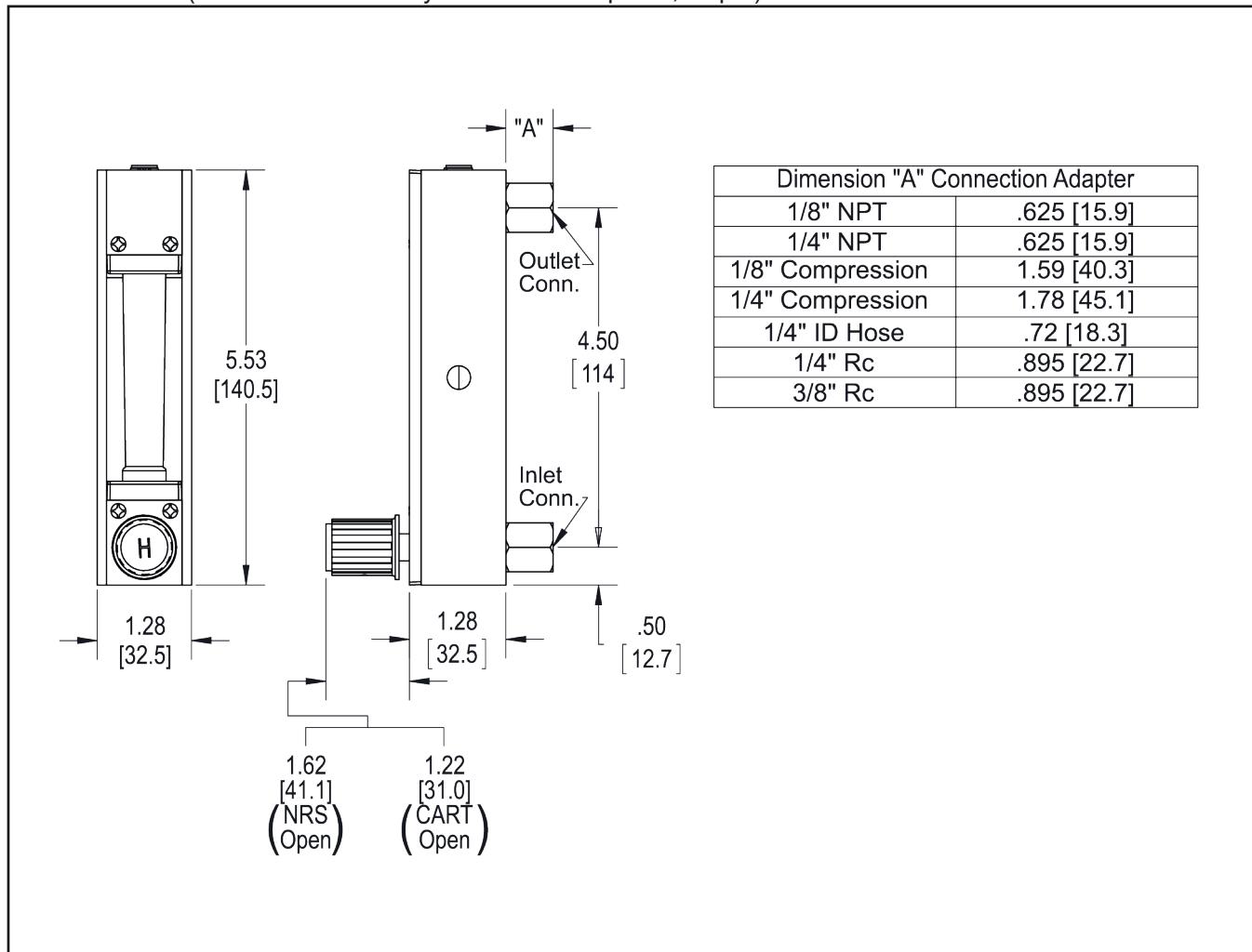


Figure 2-2 Dimensions - Sho-Rate 1350G

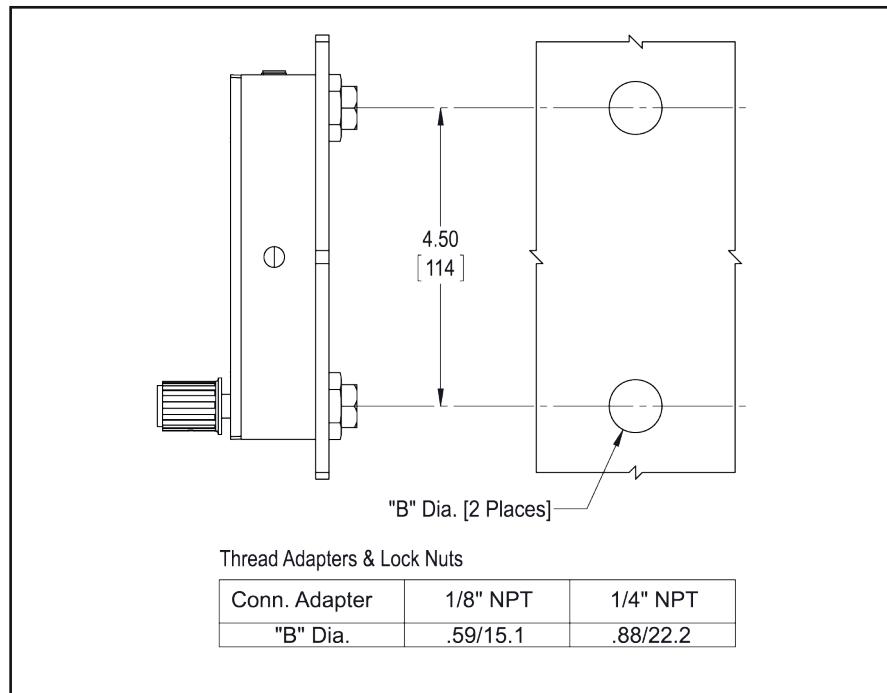


Figure 2-3 Dimensions - Sho-Rate 1350G Panel Mount

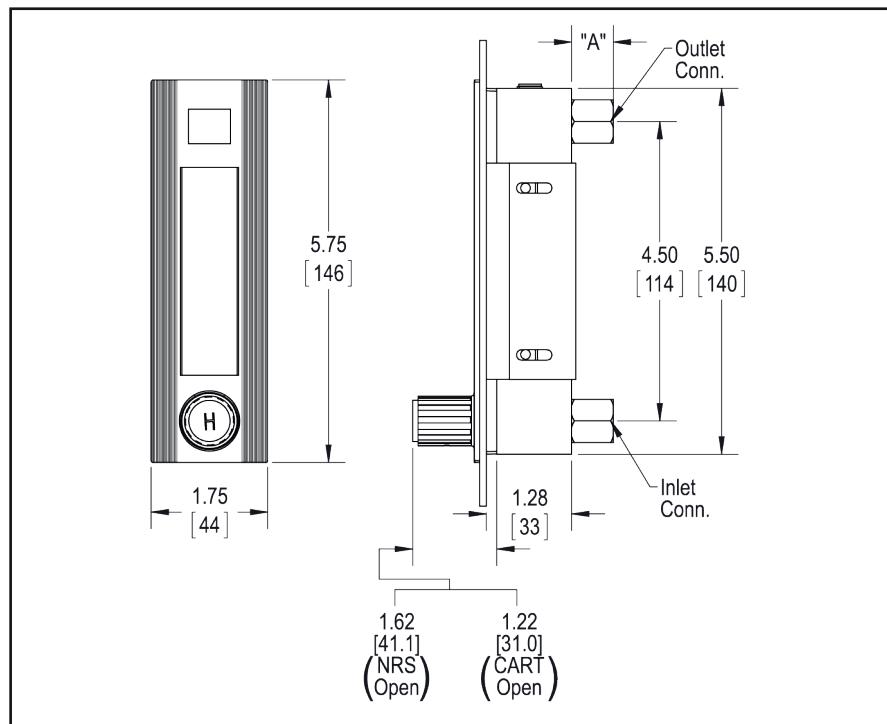


Figure 2-4 Dimensions - Sho-Rate 1350G Bezel

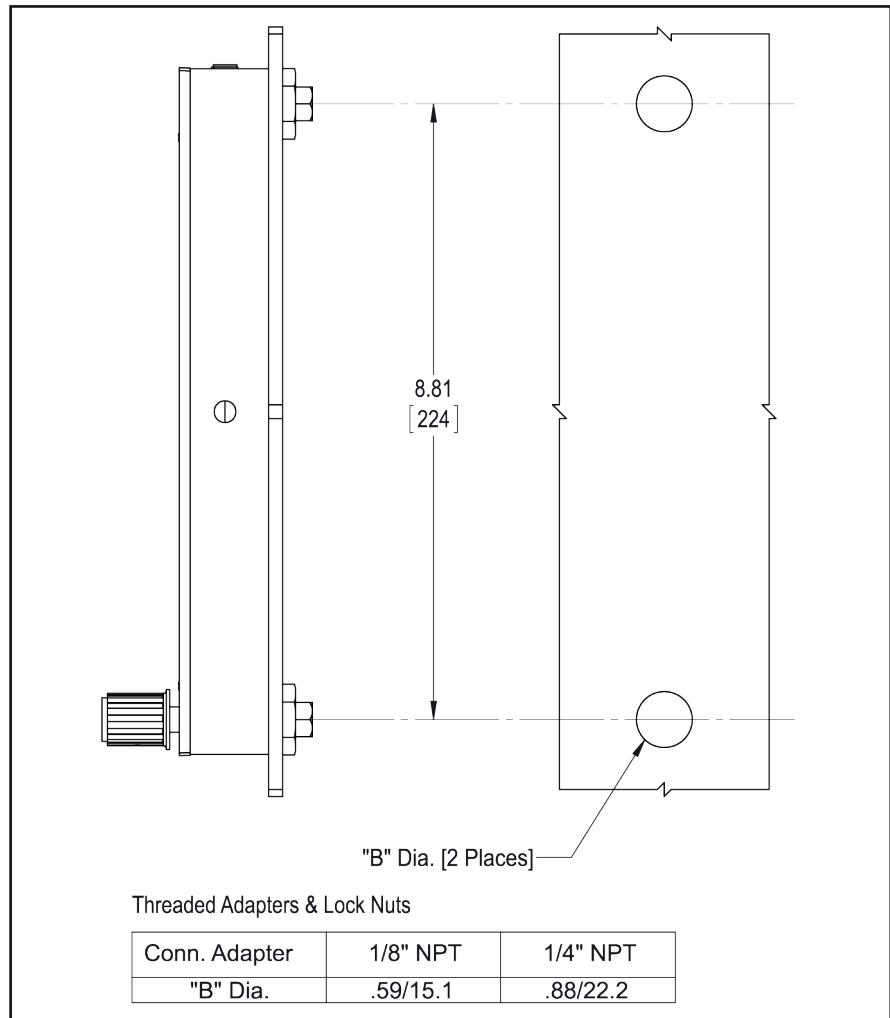


Figure 2-5 Dimensions - Sho-Rate 1355G Panel Mount

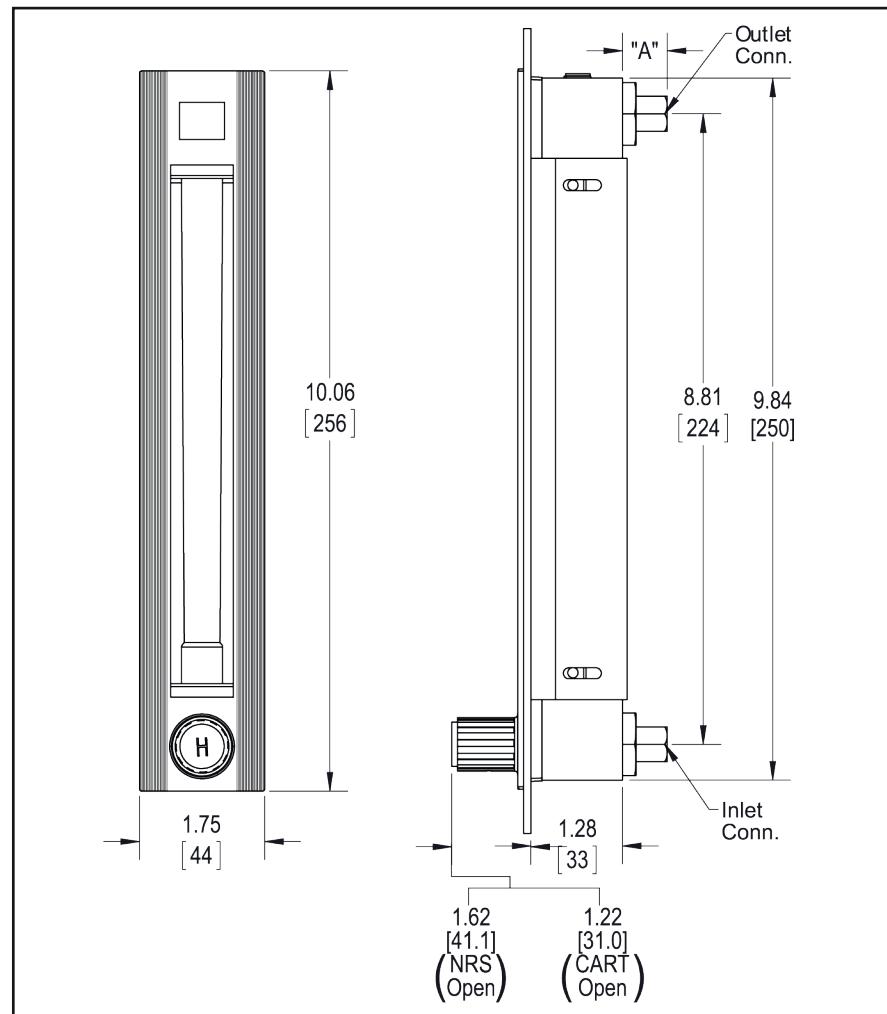


Figure 2-6 Dimensions - Sho-Rate 1355G Bezel

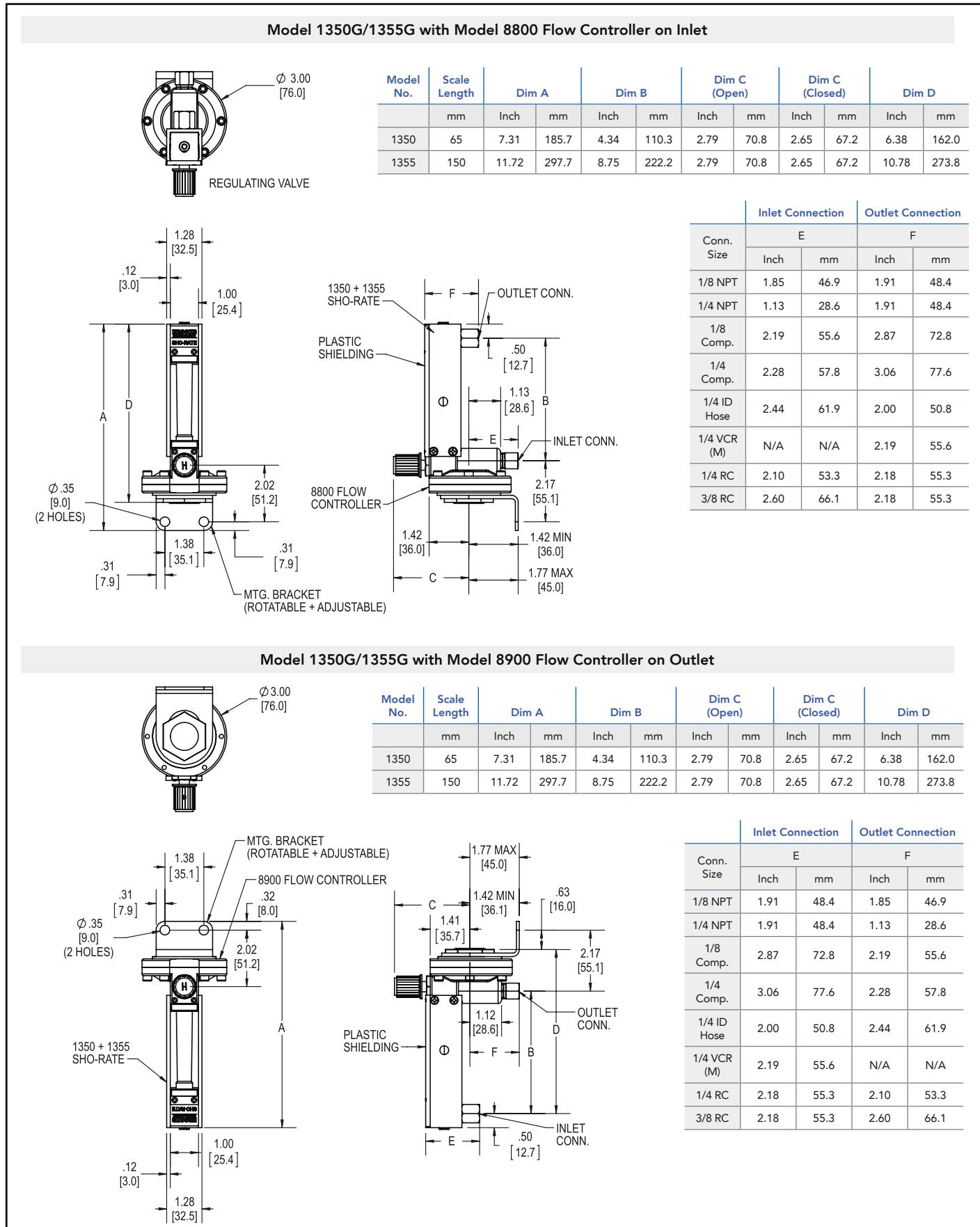


Figure 2-7 Dimensions - Model 1350G/1355G with Flow Controller

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 signaling 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 <sup>2</sup> (#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	Limax = 70 µH
Self Capacitance	Cimax = 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	Limax = 120 µH
Self Capacitance	Cimax = 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)

## 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. 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".

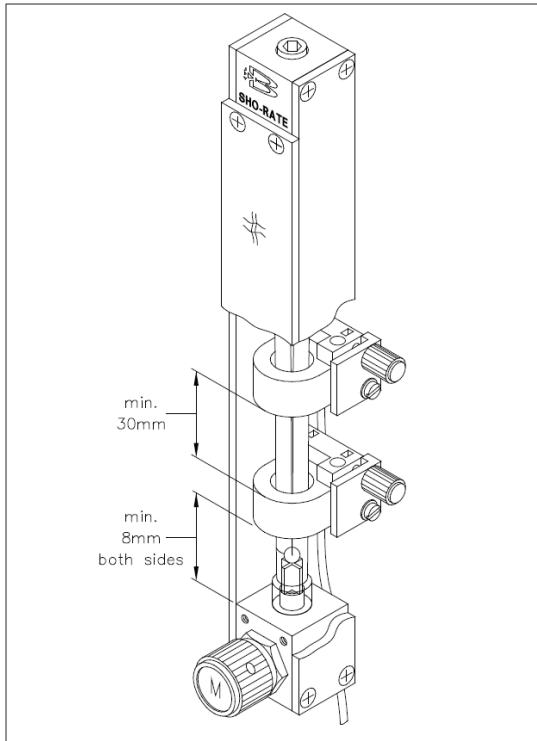


Figure 5-1: Alarm settings

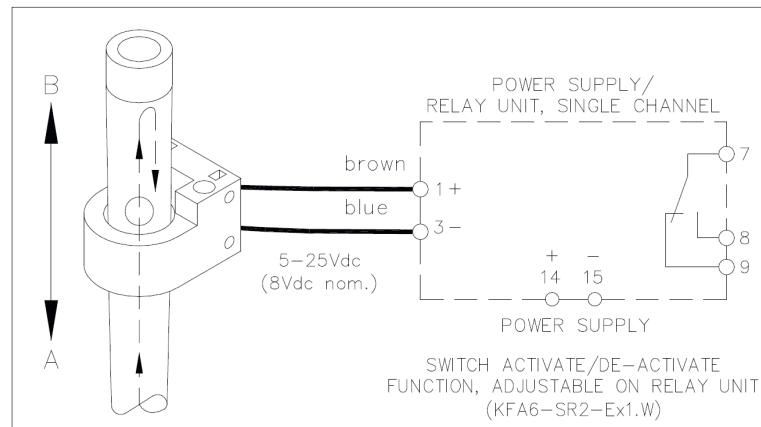


Figure 5-2: Standard bistable alarm

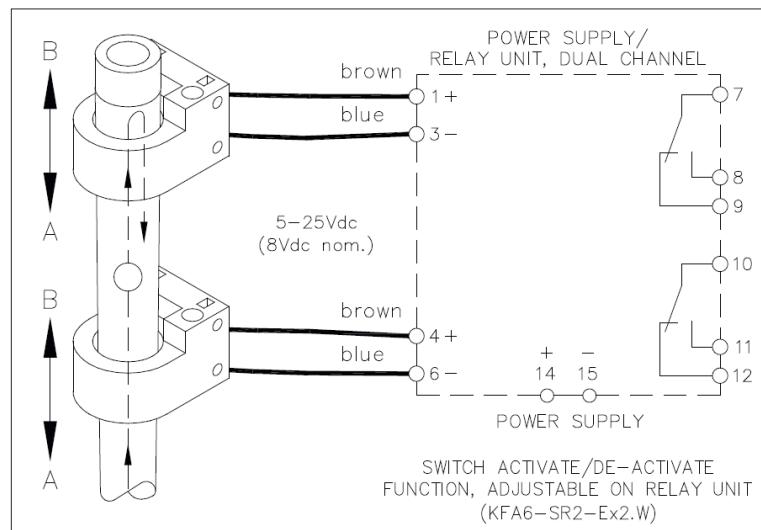


Figure 5-3: Bistable low and high flow alarm

## Disassembly and Cleaning



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.

**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)

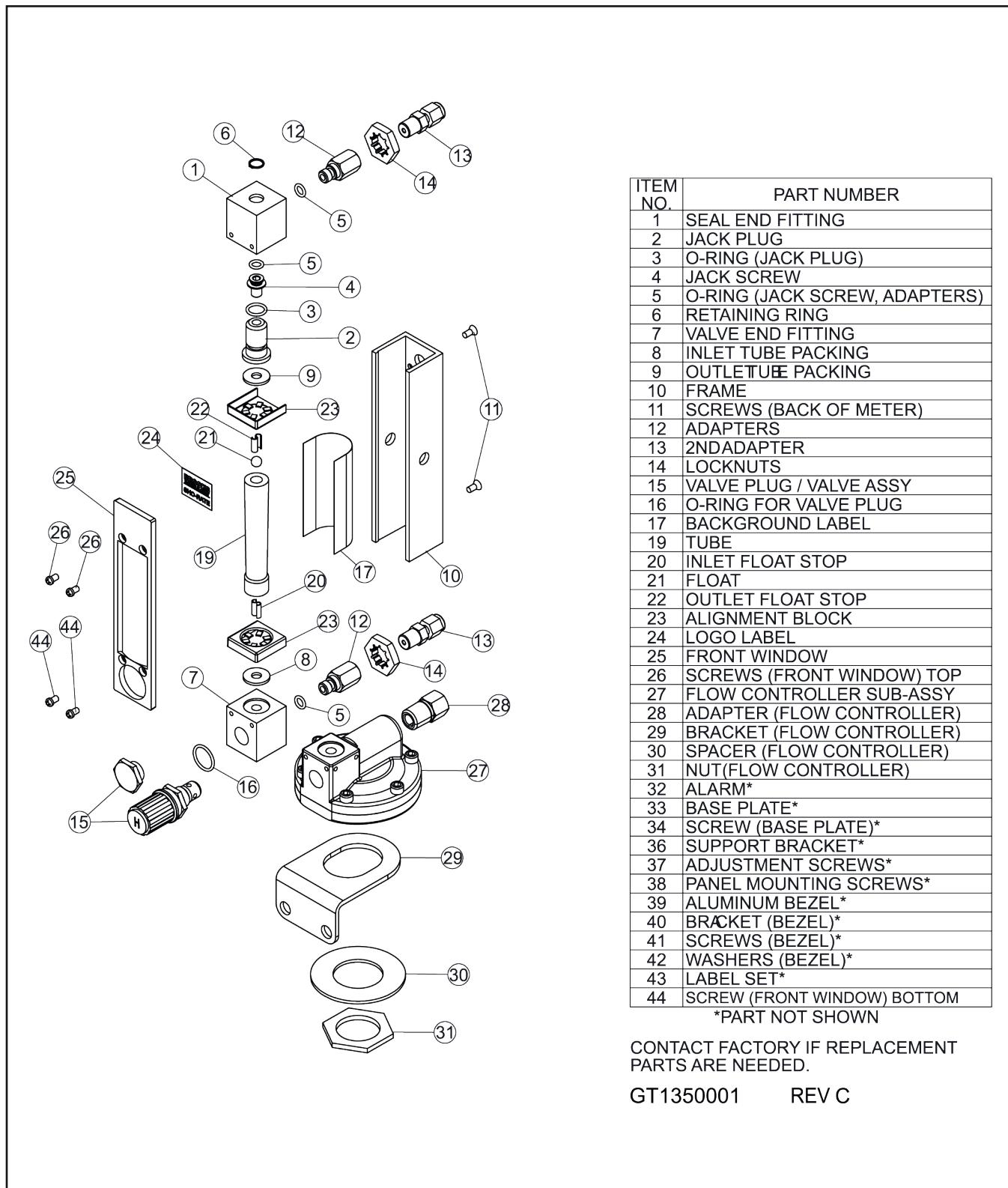


Figure 7-1 Parts Drawing Sho-Rate Models 1350G and 1355G

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

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

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

		COMPONENT PART NUMBER for		
PART DESCRIPTION		QTY.	1350G	1355G
12	ADAPTERS from End Fitting (to 5/16-24 UNF) NONE (Integral 5/16-24 UNF Thds)	2 of 1	**2 if no FCA, 1 if with FCA	
	TH'D - 1/8" (F) NPT also use for 1/8" Compression		NO PART	NO PART
	SS		014C363BMA	014C363BMA
	TH'D - 1/4" (F) NPT also use for 1/4" Compression		014C364BMA	014C364BMA
	SS		014B283BMA	014B283BMA
	5/16-24 to 1/4" Compression SS		014B283BMA with FCA	014B283BMA
	TH'D - 1/4" Rc		014C365BMA	014C365BMA
	TH'D - 3/8" Rc		014C366BMA	014C366BMA
	1/4 I.D. HOSE		014H236BMA	014H236BMA
	1/4" VCR		014C367BMA	014C367BMA
13	2nd ADAPTER - required for Compression Ftg & Locknut option 1/8" M-NPT to 1/8" Compression SS	2	**2 for compression fittings, 1 if FCA no FCA with FCA	320B016BMA 320B016BMA
	1/4" M-NPT to 1/4" Compression SS		no FCA with FCA	320B001BMA 320B001BMA
	1/4" M-NPT to 6mm Compression SS		no FCA with FCA	014Z387BMA 014Z387BMA
	1/4" NPT to 1/4 I.D. HOSE SS		no FCA with FCA	318Z068BMA 318Z068BMA
				318Z068BMA
14	LOCKNUTS	2		573Z260AAA
	for 1/8" ADAPTER			573Z004GGJ
	for 1/4" ADAPTER			573B018AC0
15	VALVE PLUG or VALVE ASSEMBLY	1		
	Plug		SS	618J019BNA
16	VALVE ASSEMBLY	1		618J019BNA
	Valve Assembly			See Valve assembly Tab for Cart III & NRS
17	O RING for VALVE PLUG only	1	Viton Buna Teflon Butyl EPR Kalrez	375B015QTA 375B015SUA 375B015QMA 375B015SAA 375B015SYA 375B015TTA
				375B015QTA
				375B015SUA
				375B015QMA
				375B015SAA
				375B015SYA
18	Background Label	1	Std	502Y939AAA
			w/Flow Controller	502Y939AAA
	Only for Alarm Configurations (RELEASE TBD)			502Y942AAA
19	TUBE DIRECT READ	1	R-2-65-AG R-2-65-BG R-2-65-CG R-2-65-DG R-6-65-AG R-6-65-BG	925R799WA8 925R800WA8 925R801WA8 925R802WA8 925X903WA8 925X904WA8
			R-2-15-AAAAG R-2-15-AG R-2-15-BG R-2-15-CG R-2-15-DG R-6-15-AG R-6-15-BG	925R807WA8 925R803WA8 925R790WA8 925R804WA8 925R805WA8 925X905WA8 925X906WA8
	MILLIMETER		R-2-65-AG R-2-65-BG R-2-65-CG R-2-65-DG R-6-65-AG R-6-65-BG	925R813WA8 925R814WA8 925R815WA8 925R816WA8 925X909WA8 925X910WA8
			R-2-15-AAAAG R-2-15-AG R-2-15-BG R-2-15-CG R-2-15-DG R-6-15-AG R-6-15-BG	925R812WA8 925R808WA8 925R809WA8 925R810WA8 925R811WA8 925X907WA8 925X908WA8

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	1	846B141QMA	
		R-2-65-DG		846B144QMA	
		R-6-65-AG		846B147QMA	
		R-6-65-BG		846B150QMA	
		R-2-15AAAAG,AG,DG		846B143QMA	
		R-2-15-BG,CG		846B146QMA	
		R-6-15-AG		846B149QMA	
		R-6-15-BG		846B152QMA	
21	FLOAT	1/8"	1	345C054WYA	345C054WYA
				345C067BMA	345C067BMA
				345C068VGA	345C068VGA
				345C069CKA	345C069CKA
				345C051JNA	345C051JNA
		1/4"	1	345G055WYA	345G055WYA
				345G072BMA	345G072BMA
				345G071VGA	345G071VGA
22	OUTLET FLOAT STOP			345G073CKA	345G073CKA
		R-2-65-AG,BG,CG	1	345G051JNA	345G051JNA
		R-2-65-DG		846B142QMA	
		R-6-65-AG		846B145QMA	
		R-6-65-BG		846B148QMA	
		R-2-15-AAAAG,AG,DG		846B151QMA	
		R-2-15-BG,CG		846B142QMA	
		R-6-15-AG		846B145QMA	
23	ALIGNMENT BLOCK	R-6-15-BG		846B153QMA	
		R-2-65-AG,BG,CG,DG	2	846B153QMA	
		R-2-15-AAAAG,AG,BG,CG,DG		079C117AAA	
		R-6-65-AG		079C117AAA	
		R-6-15-AG		079C118AAA	
		R-6-65-BG		079C118AAA	
		R-6-15-BG		079C119AAA	
				079C119AAA	
24	LOGO LABEL for Front Window		1	502C635AAA NO PART	502C635AAA NO PART
25	FRONT WINDOW	Std w/Flow Controller w/Bezel	1	794A299NZA 794A407NZA 794A408NZA	794B083NZA 794B088NZA 794B089NZA
26	SCREWS - for Front Window (TOP)	Std w/Flow Controller	2	753N265AWA 753N261AWA	753N265AWA 753N261AWA
27	FLOW CONTROLLER SUB-ASSY	w/o Flow Controller	1	NO PART	NO PART
		Brass Body		211B028FIA 211B028HIA	211B028FIA 211B028HIA
		S/S Body		211B028DAA 211B028FUA	211B028DAA 211B028FUA
		Brass Body		211E027FIA 211E027HIA	211E027FIA 211E027HIA
		S/S Body		211E027DAA 211E027FUA 211E028FUA 211E029FUA	211E027DAA 211E027FUA 211E028FUA 211E029FUA
		Brass Body		211G027FIA 211G027HIA	211G027FIA 211G027HIA
		S/S Body		211G027DAA 211G027FUA	211G027DAA 211G027FUA
		Brass Body		211J027FIA 211J027HIA	211J027FIA 211J027HIA
		S/S Body		211J027DAA 211J027FUA	211J027DAA 211J027FUA

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

PART DESCRIPTION		QTY.	COMPONENT PART NUMBER for	
			1350G	1355G
28	ADAPTER: Flow Controller to Cust Connection (1/4" M-NPT to)	1	315T050BMA	315T050BMA
	1/8" (F) NPT		NO PART	NO PART
	1/4" (F) NPT		320B209BMA	320B209BMA
	1/8" Compression		320B001BMA	320B001BMA
	1/4" Compression		014Z387BMA	014Z387BMA
	6mm Compression		014B102BNA	014B102BNA
	1/4" Rc		014B271BMA	014B271BMA
	3/8" Rc		318Z068BMA	318Z068BMA
	1/4 I.D. HOSE			
29	BRACKET for Panel Mounting of FC	1	106Z032AC0 106Z032BFA	106Z032AC0 106Z032BFA
30	SPACER for FC Panel Mounting Bracket	1	810Z038AC0 810Z038BFA	810Z038AC0 810Z038BFA
31	NUT for FC Panel Mounting Bracket	1	573Z015AC0 573Z015BMA	573Z015AC0 573Z015BMA
32	ALARM (RELEASE TBD) BISTABLE INITIATOR+MNTG KIT #2 BISTABLE INITIATOR+MNTG KIT #6		273-G-006-ZZZ 273-G-007-ZZZ	273-G-006-ZZZ 273-G-007-ZZZ
33	BASE PLATE Base Plate Assembly Tripod Base Plate Bubble Level	1	ASM163 PLA010 PHW064	ASM163 PLA010 PHW064
34	SCREW - Bracket to Base Plate	1	PHW094	PHW094
36	SUPPORT BRACKET	1	106Y554ADD	106Y554ADD
37	ADJUSTMENT SCREWS - Corners of Base Plate	3	PHW065	PHW065
38	PANEL MOUNTING SCREWS	6-32 x .5" LG	754Z033AC0	754Z033AC0
39	ALUMINUM BEZEL w/ Valve w/o Valve	1 1	075B032FEG 075B031FEG	075D041FEG 075D040FEG
40	BRACKET for bezel	2	106Y665FEG	106Y666FEG
41	SCREWS - Bracket to Bezel	4	751C263AWA	751C263AWA
42	WASHERS - Bezel	4	962A006AWA	962A006AWA
43	LABEL SET	1	502Y799AAA	502Y799AAA
44	SCREWS - for Front Window (BOTTOM) Std w/Flow Controller	#6-32 X 1/4" Lg Phillips Fillister Hd 1/8" Lg Phillips Fillister Hd	753N265AWA 753N261AWA	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 Valve on outlet No Valve with 8800 with 8900		GT1350002 GT1350003 GT1350004 GT1350005 GT1350006	GT1355002 GT1355003 GT1355004 GT1355005 GT1355006
REF3	LABEL PRINTING INSTRUCTIONS		502Y805	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

\*Sizing Based on Sizing Tab

\*\*Existing valve, using for initial release

\*\*CART II valve no longer being offered

\*\*Size 7 no longer being offered

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 (SCCM 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 Valve High	Glass	550	Med	#6
Ruby	28000	High	Use Cart Valve High	Ruby	790	High	Use Cart Valve High
Stainless	40000	High	Use Cart Valve High	Stainless	1200	High	Use Cart Valve High
Tungsten	56000	High	Use Cart Valve High	Tungsten	1800	High	Use Cart Valve High
Tantalum	59000	High	Use Cart Valve High	Tantalum	1900	High	Use Cart Valve High
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 Valve High	Tungsten	790	High	Use Cart Valv High
Tantalum	26000	High	Use Cart Valve High	Tantalum	840	High	Use Cart Valv High
R-6-15-BG				R-6-15-BG			
Glass	23000	High	Use Cart Valve High	Glass	560	Med	#6
Ruby	29000	High	Use Cart Valve High	Ruby	820	High	Use Cart Valve High
Stainless	43000	High	Use Cart Valve High	Stainless	1300	High	Use Cart Valve High
Tungsten	60000	High	Use Cart Valve High	Tungsten	1900	High	Use Cart Valve High
Tantalum	63000	High	Use Cart Valve High	Tantalum	2000	High	Use Cart Valve High

SCCM AIR, 10 PSIG INLET		
CART	NRS	
Low	3700	1
Med	18000	2
High	75000	3
		600
		2400
		6800
		12200

SCCM WATER, 10 PSIG INLET		
CART	NRS	
Low	175	1
Med	687	2
High	1984	3
		20
		80
		200
		650

## LIMITED WARRANTY

Visit [www.BrooksInstrument.com](http://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.

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 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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Installation-Manual-1350G-EN/541B205AAG/2025-09



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