Air Flow Heat Exchanger Standard Operating Procedure 10-2016 R.C

Safety

Before operating this equipment all operators must meet with the lab manager to review equipment operation.

The Fin-Fan heat exchanger poses a number of safety concerns as listed below:

Electricity and Water

Rotating equipment – Fan

Trip Hazards – power and signal cables

Do not modify the equipment or alter the wiring.

Exercise caution when draining and filling the ballast container.

Always wear safety glasses when operating this equipment.

Never leave this equipment operating unattended!

Equipment Description

1. The Fin-Fan Heat Exchanger consists of the following components:
   a. Water Heater
   b. Ballast Tank
   c. Pump
   d. Fan
   e. Fan Housing
   f. Copper and 304 Stainless Steel Tubing Assembly. Cu approximate dimensions: 0.42" i.d; 0.034' wall; 0.5" o.d.
      304 SS approximate dimensions: 0.4" i.d; 0.04" wall; 0.5" o.d.
   g. 2 – Valtec Control Valves
   h. Type – T Thermocouples
   i. EE65 Hot-wire anemometer. Range 0 -4000 ft/min
   j. Proteus Vortex Liquid Flow Meters. Range 0.48 to 8.5 GPM

The following parameters are measured and logged to the data file.

Water temperature into and out of the pipes

Air velocity inside the air chamber

Pump speed in percentage of power

PID parameters

The surface temperature of the copper and stainless steel rods may be measured by using a surface temperature device (RTD) or an infrared camera. Consult the lab manager for assistance with these devices.

Data is sampled once every second. All data points on the control window are saved to the data file.
Do not open the data file while you are logging data, doing so will crash the data acquisition program.
The PID algorithm is type Velocity (B). See the Opto22 PID documentation for more details on PID.

Do not unplug any of the power cords from the drop-down outlet.

Operating Procedure

1. Ensure that the ballast tank is filled to the fill line marked on the ballast tank.
2. Ensure that the tubing into and out of the ballast tank is secure.
3. Verify that the water heater power cord is plugged into the yellow power strip and that the power strip is turned on. Use the switch on the power strip to turn off the water heater when you are finished running the system.
4. The water heater temperature is set manually using the white rotary control located on top of the water heater. Set the temperature slightly less than the 100 degree Fahrenheit mark on the dial. You may need a flashlight to see the markings on the dial.
5. Log on to the Fin-Fan computer. The log on credentials are posted on the monitor.
6. Open the Fin-Fan, Opto control program by clicking on the desktop shortcut.
7. Using the Opto software, open the control valves to the copper and stainless steel tubing as desired. These valves must be open before the pump will start, an error will be displayed if you attempt to operate the pump with the valves closed.
8. Set the pump at the desired flowrate. The pump speed may be set by typing a value between 0-100% into the text area to the right of the pump flow control text or by adjusting the % flow slide control. *Note, with both valves open at 100% the flow through the copper and steel tubing will not be equal. You will need to adjust the valves to some offset value if you wish to have equal flow through both copper and steel tubing.*

9. While the pump is on, continuously monitor the system for leaks.
10. Click on the Emergency Pump Stop button to stop the pump in the event of an emergency.
11. Controlling the Fan Speed: Exercise caution when plugging in the fan and operating the Variac. Make sure your hands are not wet.
12. When the water side of the system has reached steady-state, plug the fan power chord into the Variac which is mounted on the metal cart next to the yellow power strip. The Variac should be plugged into the drop-down A.C outlet box.
13. With the fan plugged into the Variac switch the Variac to the 120 V position and then rotate the control knob on the Variac to the right to increase the voltage to the fan.
14. When running a heat transfer experiment the PID controls are not used. The PID should remain in manual mode.

Using the PID control

The PID controls the air temperature as measured at the outlet side of the metal tubes. This is accomplished by adjusting the water flow control valves for the copper and stainless steel tubing.

The system boots up in manual mode, the PID is not active. Manual mode is indicated by the (M) displayed to the right of the PID Mode text. To activate the PID control, click on the PID Mode text, the (M) will change to (A) – auto mode, indicating that the PID mode is now active. In PID mode you must enter a set point and at least a P term (the P term must be negative) in order for the PID to operate.

The PID input is the air out temperature. The PID set point is also the air out temperature. The PID output is the percent open of both the copper and stainless steel water-flow control valves. Note that the PID output actuates both of these valves equally.

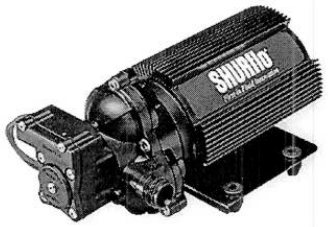
When operating in manual mode the percent open of the valves, pump speed and fan speed are controlled manually.

Viewing and saving the data

1. Once you have exited the Opto program, open Excel
2. In Excel go to: Open, then navigate to the data folder, C:/Air_Heat Ex Data. In the bottom right hand corner of the Excel window click on the drop-down window and select All Files, the data files should now be displayed. The data files are organized by date.
3. Double-click on the file you wish to open. The Text Import Wizard will open. Select delimited then click Next, then select Comma delimited, select Next, select the General data format option and then select Finish. The data should now be displayed in Excel.
4. Save this data to a flash drive after each lab.

Shutdown Procedure

1. Unplug the fan from the Variac.
2. Stop the pump.
3. Turn off the water heater at the water heater.
4. Switch off the power switch on the yellow power strip.
5. Log off the Opto 22 control software.
6. Do Not Shut Down The Computer.



How can we improve our **Product Images**?

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Pump, Diaphragm, 12 Vdc

SHURFLO

Your Price: $278.78 / each
List Price: $309.75/ each

Deliver one time only
Auto-Reorder Every 1 Month

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Availability for Qty 1 Go
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Ship to: **84112** (Change)

Add **Repair & Replacement Coverage for $68.36 each.**

Repair Parts Available for this item

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Item # **4UN18** Mfr. Model # **2088-313-145** UNSPSC # **40151548**
Catalog Page # **3772** Shipping Weight **7.35 lbs.**

Country of Origin **Mexico** | *Country of Origin is subject to change.*

Note: Product availability is real-time updated and adjusted continuously. The product will be reserved for you when you complete your order. More

Technical Specs

Item	**Electric Sprayer Pump**	Prime in Feet	**8**
Voltage	**12VDC**	GPM @ 0 PSI	**3.6**
Inlet/Outlet (In.)	**1/2-14 MSPT**	GPM @ 20 PSI	**2.82**
Body Material	**Polypropylene**	GPM @ 40 PSI	**2.15**
Diaphragm Material	**Santoprene(R)**	GPM Max.	**3.6**
Check Valve	**Viton(R)**	Max. Pressure (PSI)	**45**
Pressure Off	**45**	Self-Priming	**Yes**
Max. Temp. (F)	**140**	Fuse Amps	**15**
Length (In.)	**9.90**	Pressure Switch	**Operates on Demand**
Width (In.)	**5.00**	Diaphragm Design	**Three Chamber**
Height (In.)	**4.40**	Agency Compliance	**UL Listing and CSA**

STIEBEL ELTRON
Simply the Best

SHC Mini-Tank Electric Water Heaters

Description

SHC Mini-Tank installs right under or near a sink and provides hot water for hand washing or kitchen type applications either as a stand-alone hot water source or as a booster for remote central tank. Lightweight and compact, the SHC mounts to the wall (bracket included), draws 11.3 A and plugs into a 110–120 V outlet.

- T & P valve included
- Glass-lined tank
- ½" NPT black iron water connections
- Wall mounted
- Plugs into 120 V 15 A outlet
- 6-year warranty on tank /2-year on components
- Reduces standby losses
- Manufactured in Germany

› SHC mini-tanks are suitable for use as a stand-alone hot water source for a sink(s), as a booster for a long pipe run from a remote hot water source, or in a recirculation loop.

Applications

Commercial > Industrial > Institutional

- › Office buildings
- › Stores
- › Malls
- › Warehouses
- › Gas stations
- › Schools
- › Hotels/Motels
- › Restaurants

Residential

- › Bathroom Sinks
- › Kitchen sinks
- › Laundry areas
- › Cabins/cottages

Models & Dimensions

Model	Voltage	Watts	Amps	Nominal Water Vol.	Max. Adj. Temperature	Recovery Time	Standby energy loss
SHC 2.5	120 V	1300 W	11.3 A	2.65 Gal / 10 L	140°F / 60°C	18 min.	0.37 kW/day[1]
SHC 4	120 V	1300 W	11.3 A	3.96 Gal / 15 L	140°F / 60°C	27 min.	0.39 kW/day[1]

[1] Measured at 131°F / 55°C set point temperature in 68°F / 20°C ambient air temperature.

SHC Model	SHC 2.5	SHC 4
Part number	233219	234046
Weight Empty (lbs / kg)	15.9 lbs / 7.2 kg	19.8 lbs / 9.0 kg
Height (inches/cm)	18 11/16 in / 47.5 cm	19 3/4 in / 50.1 cm
Width (inches/cm)	11 in / 28.0 cm	12 5/8 in / 32.0 cm
Depth (inches/cm)	10 5/8 in / 27 cm	12 1/2 in / 31.8 cm
Max. Operating Pressure	150 psi / 10 bar	150 psi / 10 bar
Cover Material and Color	Alpine White ABS	Alpine White ABS

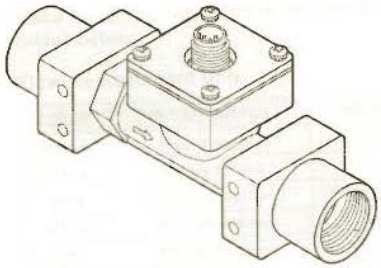
Intertek
Certified to ANSI/UL Std. 174
Conforms to CAN/CSA Std. C22.2 No. 110

Tested and certified by WQA against NSF/ANSI 372 for lead free compliance.

ISO 9001 CERTIFIED

rev. 2015.1 | Due to our continuous process of engineering and technological advancement, specifications may change without notice.

STIEBEL ELTRON 17 West St., W. Hatfield, MA 01088 | 800.582.8423 | 413.247.3380 | fax 413.247.3369 | info@stiebel-eltron-usa.com | www.stiebel-eltron-usa.com



V7000 Series
Vortex Flow Meters

CE RoHS REACH

This document describes the basic steps necessary to install and make operational your V7000 Series vortex flow meter. Additional product information is available on the Proteus Industries website at **www.proteusind.com/v7000.**

Flow Ranges, Frequency Ranges, and Connection Sizes

Flow Range (LPM)	1.8–32	3.5–50	5.0–85	9.0–150
Flow Range (GPM)	0.48–8.5	0.92–13	1.3–22	2.4–40
Frequency Range (Hz)	~25–385	~20–270	~15–230	~12–200
Connection Sizes	3/8" FNPT 1/2" FNPT 3/4" FNPT 1/2" MNPT 3/4" MNPT	1/2" FNPT 3/4" FNPT 3/4" MNPT 1" MNPT	3/4" FNPT 1" FNPT 1" MNPT	1" FNPT 1" MNPT 1¼" MNPT
Inner Diameter	12 mm / 0.47 in	16 mm / 0.63 in	20 mm / 0.79 in	26 mm / 1.02 in

Flow Meter Specifications

Output Type	Pulse	Current	Voltage
Output	Square wave	4–20 mA	0–10 VDC
Fluid Temperatures	-40–125 °C / -40–257 °F		
Ambient Temperature	-15–85 °C / 5.0–185 °F		
Pressure Limit*	1200 kPa at 40 °C / 174 psi at 104 °F 600 kPa at 100 °C / 87 psi at 212 °F		
Input Voltage	4.75–33 VDC	8–33 VDC	11.5–33 VDC

*Unrated.

Temperature Sensor Specifications

Output Type	Pulse	Current	Voltage
Measurement Range	-40–125 °C / -40–257 °F		-25–125 °C /-13–257 °F
Output	Resistance (DIN EN 60751 Class B)		0–10 VDC

Pressure Sensor Specifications

Output Type	Voltage
Measurement Range	0–1200 kPa / 0–174 psi
Output	0–8.7 VDC
Input Voltage	12–33 VDC

Calibration Certificate

Proteus Industries Inc.
340 Pioneer Way, Mountain View, CA, 94041
ph: 650-964-4163 fax: 650-965-9355 www.proteusind.com

Customer and Model Information

SO #:	105332	Model Type:	0V7008FI32	New Calibration or As Found	Certificate Name	Status	Next Cal Due
Customer Name:	HOLLY	Serial Number:	277908	New Calibration	277908_1019AM-10Mar2014.xls	Calibration Passes	10-Mar-2015
Designed for: Off-the-shelf		Customer P/N: n/a					

Flow Rate Measurement Details and Specification Checks

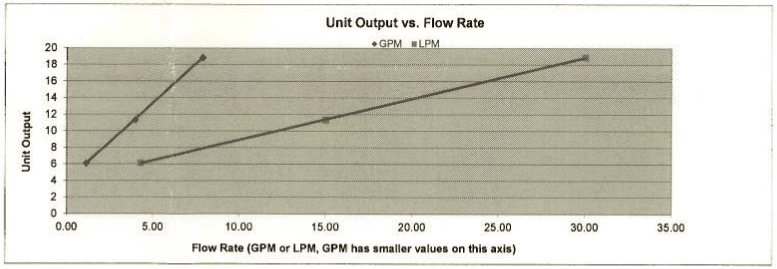
		Calibration Data			Process Verification		Linearity Verification			Fluid (Water) Conditions					
Flow Range Percentage	Target GPM	Actual GPM	Actual LPM	4-20mA Output for Flow Rate	Required Output (mA) with Process Tolerance	Process Tolerance Pass/Fail	Upper Tolerance (mA)	Lower Tolerance (mA)	Readings Within +/-2% Full Scale	Fluid Temperature C	Viscosity cP - calculated	Viscosity cSt - calculated	Density (g/cc) - calculated		
100%(1:1)	7.93	7.94	30.04	18.8485	20.01 (25.012 to 15.007	Pass	19.202	18.438	Pass	23.1688	0.93	0.93	0.9975		
50%(1:2)	3.96	3.97	15.03	11.339	11.99 (14.993 to 8.996	Pass	11.772	10.997	Pass	23.1491	0.93	0.93	0.9975		
14%(1:7)	1.13	1.13	4.28	6.1018	6.28 (7.852 to 4.711)	Pass	6.446	5.692	Pass	23.1681	0.93	0.93	0.9975		
					Passes Process Tolerance				Passes Linearity Check						

Best Fit Straight Line Equations for Calibration Data

Unit Output = (0.4952 * LPM) + 3.9506

Unit Output = (1.8745 * GPM) + 3.9506

Flow Rate vs. mA		
	LPM	GPM
Slope	0.4952	1.8745
Intercept	3.9506	3.9506



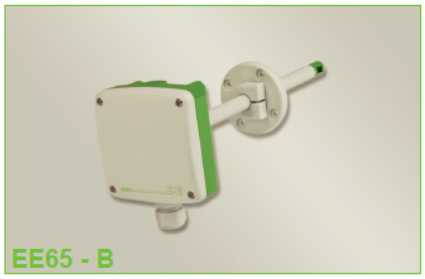
Personnel & Dates	
Status:	Calibration Passes
Calibrated by:	AVG
Date of Cal:	10-Mar-2014
Approved by:	SBZ
Next Cal Date:	10-Mar-2015

Equipment Used	
Flow Rate Calibrator Used:	FS#4 - P3.5 Coriolis Meter
Fluid used:	Water
Plumbing:	straight pipe

EE65

Air Velocity Transmitter for HVAC Applications

EE65 air velocity transmitters are ideal for accurate ventilation control applications. They are operating on an innovative hot film anemometer principle.
The E+E thin film sensor guarantees very good accuracy at low air velocity, which is not possible for conventional anemometers with commercial temperature sensors or NTC bead thermistors. Moreover, the E+E sensor is much more insensitive to dust and dirt than all other anemometer principles. This means high reliability and low maintenance costs.
EE65 series are available with current or voltage output, the measuring range and the response time can be selected with jumpers by the user.
Low angular dependence enables easy, cost-effective installation.
An integrated LC display and a version with
remote sensing probe are available.
The configuration equipment allows air velocity adjustment of the sensor.


EE65 - B


EE65 - C

Typical Applications

HVAC
process and environmental control

Features

low angular dependence
easy installation
adjustable to application requirements

Technical Data

Measuring values

Working range[1]	0...10m/s (0...2000ft/min) 0...15m/s (0...3000ft/min) 0...20m/s (0...4000ft/min)	
Output[1] 0...10m/s / 0...15m/s / 0...20m/s	0 - 10 V 4 - 20 mA	-1 mA < I_L < 1 mA R_L < 450 Ω
Accuracy at 20°C (68°F), 45 % RH and 1013hPa	0.2...10m/s (40...2000ft/min) 0.2...15m/s (40...3000ft/min) 0.2...20m/s (40...4000ft/min)	± (0.2m/s / 40ft/min + 3 % of m. v.) ± (0.2m/s / 40ft/min + 3 % of m. v.) ± (0.2m/s / 40ft/min+ 3 % of m. v.)
Response time τ_{90} [1) 2)]	typ. 4 sec. or typ. 0.7 sec.	(at constant temperature)

General

Power supply	24V AC/DC ± 20 %	
Current consumption for AC supply for DC supply	max. 150 mA max. 90 mA	
Angular dependence	< 3 % of measurement at | Δα | < 10°	
Cable gland	M16x1.5	cable Ø 4.5 - 10 mm (0.18 - 0.39")
Electrical connection	screw terminals max. 1.5 mm² (AWG 16)	
Electromagnetic compatibility	EN61326-1 EN61326-2-3	CE
Housing material	Polycarbonate, UL94HB approved	
Protecting class	IP65, Nema 4; with LC display: IP40; remot sensor probe: IP20	
Temperature range	working temperature probe working temperature electronic storage temperature	-25...50°C (-13...122°F) -10...50°C (14...122°F) -30...60°C (-22...140°F)
Working range humidity	5...95 % RH (non-condensing)	

1) Selectable by jumper
2) Response time τ_{90} is measured from the beginning of a step change of air velocity to the moment of reaching 90% of the step.

G Badger research control valve

RCV
RESEARCH CONTROL® | ReCo® VALVES

Standard Control Valve

Type 807

DESCRIPTION

For over 60 years, the 807 has performed in some of the world's most demanding applications. If your application requires critical control of liquid, gas or steam, your choice of control valves is one of the most important decisions you will make.

When it comes to specifying a control valve, the variables are complicated and exacting. That is why Research Control Valves are available in a broad range of options—so we can design a truly engineered solution that matches your requirements.

APPLICATION

Processing plants, research facilities and government agencies worldwide rely on Research Control Valves for repeatable performance and durability. Built for applications 1" and under, our 807 control valve is an integral component in systems ranging from petrochemical to pharmaceutical manufacturing. It is an ideal choice for additive injection or flow and pressure control.

Shown with Type 754 Actuator

CONSTRUCTION

Body – Bonnet	
Standard	316/316L stainless steel, carbon steel (WCB)
Optional	Monel®, alloy 20, Hastelloy® C or ASTM equivalent, DIN 1.4581/1.4571. Other materials available upon request.
Innervalve	
Standard	316 stainless steel
Optional	Stellite®, Monel, alloy 20, Hastelloy C or B or ASTM equivalent
Packing	
Standard	TFE chevon rings
Optional	Graphite, Reduced Emissions Kalrez® (REK)
Actuator	
Standard	Die cast aluminum
Optional	316L stainless steel on 1/2", 3/4" and 1" models

ACTUATOR CHOICES

Standard	Air to open, fail close Air to close, fail open
Optional	With integral top-mounted positioner
Standard Signals	3-15#, 3-27#, 6-30#
Optional Signals	3-9#, 9-15#, with positioner
Accessories	Filter regulator, gauges, I/P converter, limit switches, handwheel, solenoids

STANDARD FEATURES

- 1/4", 1/2", 3/4" and 1" models
- Interchangeable trim sets
- Threaded bonnet for quick disassembly
- Trim characteristics: Linear, equal percent, quick open or double taper
- TFE chevron packing
- ANSI Class IV shutoff (size O and larger)

OPTIONAL FEATURES FOR 1/2", 3/4", AND 1" MODELS

- Butt and socket weld ends, BSPP, tube connection and others
- Bonnet extensions for temperature extremes
- Bellows packing solutions
- Angle pattern bodies
- Reduced Emissions Kalrez (REK), graphite, spring loaded chevron and others
- Exotic alloys for complete valves or trims
- Stellited trims & soft seats (PTFE & Kel-F)
- TiN coating of innervalve stem and seat
- Purge or leak ports

Badger Meter

RCV-DS-00576-EN-02 (December 2013)

Product Data Sheet

SPECIFICATIONS

The pressure/temperature ratings listed here are based on material cross sections at the joint between the body and bonnet where a gasketed screw type bonnet is used. When the proper torque levels are used, the valve should not experience rupture of the joint or the material. The listed torque levels were used in hydrostatic tests at the factory at 70° F at maximum body rating and were found to provide acceptable seating. Other factors, such as high or cyclic temperatures, light process gases, or poor gasket surfaces can dictate the ability of a seal to be made. Under such conditions, the only way to be sure of tight sealing is to perform a test under the actual process conditions.

These charts are not intended as an indication of functionability or suitability for control service. Other charts are available to assist in the choosing of valve type, bonnet type, trim type and actuator.

When flanges, fittings or other pressure containing elements are added to the valve, the pressure rating of the total valve assumes the rating of the weakest component.

1/4" Research Control Valve
Pressure vs Temperature Rating for Valve Superstructure
Excluding Packing or End Fittings

Temp	316 S/S	Carbon Steel	Hastelloy B or =	Hastelloy C or =	Monel	Alloy 20
100° F	5000	4000	5000	5000	4000	5000
200° F	5000	3700	5000	5000	4000	5000
300° F	4750	3500	5000	5000	3880	4850
400° F	4190	3200	5000	5000	3770	4700
500° F	4000	2900	4900	4900	3740	4500
600° F	3820	2600	4850	4850	3740	4200
700° F	3640	2300	4800	4800	3640	3900
800° F	3580	—	4750	4750	3580	3700
900° F	2840	—	—	4500	2280	3000
1000° F	1160	—	—	4000	940	1500
1100° F	Consult factory for higher temperatures.			3500	—	—
1200° F				3000	—	—
Rec. Torque ft-lb (+/- 2 ft-lb)	37	37	39	37	31	35

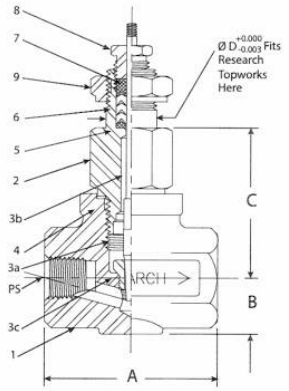
1/2" Research Control Valve
Pressure vs Temperature Rating for Valve Superstructure
Excluding Packing or End Fittings

Temp	316 S/S	Carbon Steel	Hastelloy B or =	Hastelloy C or =	Monel	Alloy 20
100° F	5000	4000	5000	5000	4000	5000
200° F	4750	3800	5000	5000	3780	5000
300° F	4310	3600	5000	5000	3520	4950
400° F	3860	3300	5000	5000	3420	4850
500° F	3640	3100	4900	4900	3390	4600
600° F	3470	2900	4850	4870	3390	4300
700° F	3310	2700	4800	4610	3310	4200
800° F	3255	—	4750	4430	2090	4000
900° F	3190	—	—	4200	2070	3000
1000° F	1860	—	—	4000	850	1500
1100° F	Consult factory for higher temperatures.			3400	—	—
1200° F				3000	—	—
Rec. Torque ft-lb (+/- 2 ft-lb)	122	122	131	124	102	117

3/4" and 1" Research Control Valve
Pressure vs Temperature Rating for Valve Superstructure
Excluding Packing or End Fittings

	316 S/S		Carbon Steel	
Temp	3/4"	1"	3/4"	1"
100° F	1500	1500	1500	1500
200° F	1450	1450	1350	1350
300° F	1325	1325	1325	1325
400° F	1175	1175	1275	1275
500° F	1100	1100	1200	1200
600° F	1050	675	1100	1100
700° F	840	250	1075	1075
800° F	575	—	—	—
3/4" and 1" Torque = 290 ft-lb				

DIMENSIONS



1. Valve Body
2. Valve Bonnet
3. Trim Set (innervalve)
4. Body Bonnet Gasket
5. Packing Adaptor
6. Packing (CV ring)
7. Packing Follower
8. Packing Gland
9. Yoke Lock Nut

Dimensions in Inches (mm)

PS	A	B	C	D	Stroke
0.25 in. (6 mm)	2.12 in. (54 mm)	0.68 in. (17 mm)	1.87 (47 mm)	0.625 (16 mm)	0.437 (11 mm)
0.50 in. (13 mm)	2.75 in. (70 mm)	1.00 in. (25 mm)	2.85 (72 mm)		
0.75 in. (19 mm)	3.37 in. (86 mm)	1.18 in. (30 mm)	3.84 (98 mm)	0.875 (22 mm)	0.562 (14 mm)
1 in. (25 mm)	4.00 in. (102 mm)	1.50 in. (38 mm)	3.95 (100 mm)		

INNERVALVE CHART

Valve Size	Trim Designation	Max Cv	Orifice Dia. (in.)	Orifice Area (sq. in.)	Nominal Rangeability Linear	Equal %
1 in.	6.0	6.0	0.6250	0.3068	50:1	60:1
	5.0	5.0	0.6250	0.3068	50:1	60:1
	4.5	4.5	0.5000	0.1963	50:1	60:1
3/4 in. and 1 in.	4.0	4.0	0.5000	0.1963	50:1	60:1
	3.5	3.5	0.5000	0.1963	50:1	60:1
1/2 in., 3/4 in. and 1 in.	A	2.5	0.3750	0.1104	40:1	50:1
	B	2.0	0.3750	0.1104	40:1	50:1
	C	1.25	0.2810	0.0620	40:1	50:1
	D	0.8	0.2500	0.0491	40:1	50:1
	E	0.5	0.2500	0.0491	40:1	50:1
1/4 in., 1/2 in., 3/4 in. and 1 in.	F	0.32	0.1560	0.0191	30:1	40:1
	G	0.2	0.1560	0.0191	30:1	40:1
	H	0.13	0.1560	0.0191	30:1	40:1
	I	0.08	0.1560	0.0191	30:1	40:1
	J	0.05	0.1560	0.0191	30:1	40:1
	K	0.03	0.0860	0.0058	25:1	NA
	L	0.02	0.0860	0.0058	25:1	NA
	M	0.01	0.0860	0.0058	25:1	NA
	N	0.006	0.0860	0.0058	25:1	NA
	O	0.003	0.0860	0.0058	25:1	NA
1/4 in. and 1/2 in.	P1	0.002	0.0625	0.0031	15:1	NA
	P2	0.0013	0.0625	0.0031	15:1	NA
	P3	0.001	0.0625	0.0031	15:1	NA
	P4	0.0006	0.0625	0.0031	15:1	NA
	P5	0.0004	0.0625	0.0031	15:1	NA
	P6	0.00027	0.0625	0.0031	15:1	NA
	P7	0.00018	0.0625	0.0031	15:1	NA
	P8	0.00012	0.0625	0.0031	15:1	NA
	P9	0.00008	0.0625	0.0031	15:1	NA
1/4 in.	P10	0.00005	0.0420	0.0014	15:1	NA
	P11	0.000036	0.0420	0.0014	15:1	NA
	P12	0.000024	0.0420	0.0014	15:1	NA
	P13	0.000016	0.0420	0.0014	15:1	NA
	P14	0.00001	0.0420	0.0014	15:1	NA
	P15	0.000006	0.0420	0.0014	15:1	NA
	P16	0.000004	0.0420	0.0014	15:1	NA
	P17	0.0000027	0.0420	0.0014	15:1	NA
	P18	0.0000018	0.0420	0.0014	15:1	NA

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