TECHNICAL DATA

FOAM RATIO CONTROLLER
MODEL VRC

1. GENERAL DESCRIPTION

The ratio controller accurately proportions foam concentrate into a water stream over a wide range of water flow rates. Ratio controllers are an integral part of an approved foam system. In addition to the ratio controller, the main components of the approved foam system are specific foam concentrates, a foam storage tank, a concentrate control valve and foam discharge devices.
The system must be designed so that the ratio controller can accurately proportion foam over the range of flow rates expected during the system operation.
Intended for use in Wet, Dry, Deluge, Preaction and Refrigerated Area applications.
Please refer to specific system manual(s) for further information. This technical data is intended for trained experts. For further information, please contact the appropriate sales office in Section 5 or refer to the technical documentation.
The contents of this publication are subject to modifications without notice.



Images are for illustration purposes only. Refer to drawings for actual design details.

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

2. LISTINGS AND APPROVALS

FM Approved – Low Expansion Foam Systems (FM5130)

UL Listed – GFGV.EX27255, GHXV.EX5002, GLKX.EX27844 (UL162)

Certificated by the Academy of the State Fire Service of the Ministry of Emergency Situations of Russia. 123FL (Russia)

"SFFF compatible" refers to this product as being part of a SFFF Foam system that has been tested to recognized standards. Not all configurations are available. Please consult technical data and/or the Approval/ Listing for usage requirements.

Other International approval certificates may be available upon request.

3. TECHNICAL DATA

3.1 Construction Features

- Available Grooved with 2" (DN50), 2.5" (DN65), 3" (DN80), 4" (DN100), 6" (DN150), 8" (DN200) connections and Flanged with 3" (DN80), 4" (DN100), 6" (DN150), 8" (DN200) connections
- Brass construction (Grooved only) or Nickel Aluminium Bronze construction for superior corrosion protection
- Horizontal or Vertical Installation
- Direction of flow indicator on body
- For use with Fresh or Salt Water
- Identification tag plate

3.2 Standard Materials

Table 3.2.1 - Standard Materials	
Nickel Aluminum Bronze Version (Grooved and Flanged connections)	
Body & Nozzle	Nickel Aluminum Bronze UNS C95800 – ASTM B148
Orifice	UNS-C36000 or C46400 or C95800
Snap Ring	Stainless Steel
Brass Version (Grooved only)	
Body & Nozzle	Cast Brass UNS C84400 – ASTM B584
Orifice	Brass UNS C36000
Snap Ring	Stainless Steel
*See notes in **Table 3.4.1** for ordering information*	

3.3 Standard Design Specifications

Table 3.3.1 - Standard Design Specifications	
All Versions	
Design Pressure	250 PSI / 17.2 bar (1.7MPa)
Design Temperature Range	14F to 120F (-10C to 49C)
Operating Temperature Range	35F to 120F (1.7C to 49C)
Minimum Operating Inlet Pressure	30 PSI / 2.1 bar (0.2MPa)
Maximum Operating Inlet Pressure	175 PSI / 12.1 bar (1.2MPa)
Proportioning Range	Refer to ***Table 3.4.1 or 3.4.2***

3.4 Ordering Information

1. Select connection type Grooved (Table 3.4.1) or Flanged (Table 3.4.2).
   Note: *Take care in selecting the correct part number due to different connection styles (different grooved outside diameters, flanges and threads)*
2. Select the Foam Concentrate Type in table 3.4.1 or 3.4.2
3. The minimum and maximum flow demand of the sprinkler/deluge system must be known to ensure correct selection of the ratio controller. The required minimum flow rate should be higher than the minimum flow rate shown in table 3.4.1 or 3.4.2 for the Foam Type selected in Step 2). The required higher flow rate should be lower than the maximum flow rate shown in table 3.4.1 or 3.4.2. If more than one size of ratio controller is suitable then size selection can then be based on the size of the riser or supply pipework into which the ratio controller will be installed.
   Note: *The flow rates in the FM Approval and UL Listing sometimes differ. Please check the flow range data in table 3.4.1 or 3.4.2 according to the FM Approval or UL Listing.*
4. After selecting the size, check the appropriate graph in section 7.2.1 to ensure the required flows are possible at the available system pressure. If not, it may be necessary to increase to the next pipe size.
   Note*: Grooved Nickel Aluminium Bronze Ratio Controllers are standard for EMEA and Asia sales regions and Brass is standard for the Americas. Flanged Ratio Controllers are only available in Nickel Aluminium Bronze.*

Ordering example: A Ratio Controller is required with a minimum flow rate of 65 GPM and maximum flow rate of 570 GPM using Fomtec LS xMax Foam Concentrate in a 3” Wet System. The ordering part number is VRC089JAN in EMEA/Asia and F20152N in the Americas.

Table 3.4.1 - Ordering information (Grooved Connection)

Connection		Foam Type[5]	Part Number		Foam Inlet Orifice Size		FM Approved				UL Listed			
Body Grooved	Foam Inlet Grooved		Nickel Aluminium Bronze[2,4]	Brass[3]	Inch	mm	Minimum Flow Rate[1]		Maximum Flow Rate[1]		Minimum Flow Rate		Maximum Flow Rate	
							GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min
2" (51mm)	1.5" (48,3mm)	Fomtec Enviro USP, 3%	VRC060JAL	F20282L	0.221	5.61	95	360	309	1170	--	--	--	--
		Fomtec Enviro ARK, 3%	VRC060JP	F20282P	0.227	5.77	93	352	300	1136	--	--	--	--
		Fomtec Enviro USP, 3%	VRCS060JAL	F25332L	0.127	3.22	49	185	104	394	--	--	--	--
		Fomtec Enviro ARK, 3%	VRCS060JP	F25332P	0.127	3.22	40	151	101	382	--	--	--	--
2.5" (76,0mm)	1.5" (48,3mm)	Fomtec Enviro USP, 3%	VRC076JAL	--	0.276	7.01	155	587	502	1900	--	--	--	--
		Fomtec Enviro ARK, 3%	VRC076JP	--	0.278	7.06	165	625	475	1798	--	--	--	--
2.5" (73,0mm)	1.5" (48,3mm)	Fomtec Enviro USP, 3%	VRC073JAL	F20162L	0.276	7.01	155	587	502	1900	--	--	--	--
		Fomtec Enviro ARK, 3%	VRC073JP	F20162P	0.278	7.06	165	625	475	1798	--	--	--	--
3" (88,9mm)	1.5" (48,3mm)	Fomtec LS xMax	VRC089JAN	F20152N	0.362	9.19	--	--	--	--	50	189	740	2801
		Fomtec Enviro USP, 3%	VRC089JAL	F20152L	0.392	9.96	360	1363	775	2934	--	--	--	--
		Fomtec Enviro ARK, 3%	VRC089JP	F20152P	0.394	10.01	285	1079	770	2915	--	--	--	--
4" (114,3mm)	2" (60,3mm)	Fomtec LS xMax	VRC114JAN	F20217N	0.485	12.32	--	--	--	--	46	174	1600	6057
		Fomtec Enviro USP, 3%	VRCF114JAL	F20217L	0.529	13.44	370	1401	1250	4732	--	--	--	--
			VRC114JAL	F25331L	0.513	13.03	--	--	--	--	420	1590	1515	5735
		Fomtec Enviro ARK, 3%	VRC114JP	F20217P	0.513	13.03	400	1514	1350	5110	--	--	--	--
6" (165,1mm)	2" (60,3mm)	Fomtec LS xMax	VRC165JA	--	0.700	17.78	--	--	--	--	99	375	3050	11546
		Fomtec Enviro USP, 3%	VRC165JAL	--	0.738	18.75	845	3199	2350	8896	990	3748	2670	10107
		Fomtec Enviro ARK, 3%	VRC165JP	--	0.770	19.56	800	3028	2400	9085	--	--	--	--
6" (168,3mm)	2" (60,3mm)	Fomtec LS xMax	VRC168JAN	F20214N	0.700	17.78	--	--	--	--	99	375	3050	11546
		Fomtec Enviro USP, 3%	VRC168JAL	F20214L	0.738	18.75	845	3199	2350	8896	990	3748	2670	10107
		Fomtec Enviro ARK, 3%	VRC168JP	F20214P	0.770	19.56	800	3028	2400	9085	--	--	--	--
8" (219,1mm)	2.5" (76,1mm)	Fomtec LS xMax	VRC2196JAN	--	0.975	24.77	--	--	--	--	242	946	4942	19305
		Fomtec Enviro USP, 3%	VRC2196JAL	--	1.009	25.63	2010	7609	4640	17564	2000	7571	5050	19116
		Fomtec Enviro ARK, 3%	VRC2196JP	--	1.040	26.42	1900	7192	4250	16088	--	--	--	--
8" (219,1mm)	2.5" (73,0mm)	Fomtec LS xMax	VRC2193JAN	F20137N	0.975	24.77	--	--	--	--	242	946	4942	19305
		Fomtec Enviro USP, 3%	VRC2193JAL	F20137L	1.009	25.63	2010	7609	4640	17564	2000	7571	5050	19116
		Fomtec Enviro ARK, 3%	VRC2193JP	F20137P	1.040	26.42	1900	7192	4250	16088	--	--	--	--

NOTES:

[1] Please refer to graphs in section 7.2 for specific flow rate parameters.
[2] Nickel Aluminium Bronze (NAB) - Standard Offering in Viking EMEA & APAC Territories. Brass available on request with longer delivery.
[3] Brass - Standard Offering in Viking Americas Territories. Nickel Aluminium Bronze available on request with longer delivery.
[4] NAB 73mm and NAB 219mm with 73mm foam inlet are non standard and could be subject to additional lead time and price.
[5] All foam types comply with the requirements of the EPA 2010/2015 PFOA Stewardship Program.

Table 3.4.2 - Ordering information (Flanged Connection)

Connection		Foam Type[4]	Part Number [2]		Foam Inlet Orifice Size		FM Approved				UL Listed			
Body Flanged[3]	Foam Inlet Threaded		ANSI	PN16	Inch	mm	Minimum Flow Rate [1]		Maximum Flow Rate [1]		Minimum Flow Rate [1]		Maximum Flow Rate [1]	
							GPM	l/min	GPM	l/min	GPM	l/min	GPM	l/min
3" (DN80)	1,5" NPT (ANSI) or BSP (PN16) Thread	Fomtec Enviro 3% XMAX	VRC080JAN	VRC080PJAN	0.362	9.19	--	--	--	--	50	189	740	2801
		Fomtec Enviro USP, 3%	VRC080JAL	VRC080PJAL	0.392	9.96	360	1363	775	2934	--	--	--	--
		Fomtec Enviro ARK, 3%	VRC080JP	VRC080PJP	0.394	10.01	285	1079	770	2915	--	--	--	--
4" (DN100)	2" NPT (ANSI) or BSP (PN16) Thread	Fomtec Enviro 3% XMAX	VRC100AJAN	VRC100PJAN	0.485	12.32	--	--	--	--	46	174	1600	6057
		Fomtec Enviro USP, 3%	VRCF100AJAL	VRCF100PJAL	0.529	13.44	370	1401	1250	4732	--	--	--	--
			VRC100AJAL	VRC100PJAL	0.513	13.03	--	--	--	--	420	1590	1515	5735
		Fomtec Enviro ARK, 3%	VRC100AJP	VRC100PJP	0.513	13.03	400	1514	1350	5110	--	--	--	--
6" (DN150)	2" NPT (ANSI) or BSP (PN16) Thread	Fomtec Enviro 3% XMAX	VRC150AJAN	VRC150PJAN	0.700	17.78	--	--	--	--	99	375	3050	11546
		Fomtec Enviro USP, 3%	VRC150AJAL	VRC150PJAL	0.700	17.78	845	3199	2350	8896	990	3748	2670	10107
		Fomtec Enviro ARK, 3%	VRC150AJP	VRC150PJP	0.700	17.78	800	3028	2400	9085	--	--	--	--
8" (DN200)	2,5" NPT (ANSI) or BSP (PN16) Thread	Fomtec Enviro 3% XMAX	VRC200AJAN	VRC200PJAN	0.975	24.77	--	--	--	--	242	946	4942	19305
		Fomtec Enviro USP, 3%	VRC200AJAL	VRC200PJAL	0.975	24.77	2010	7609	4640	17564	2000	7571	5050	19116
		Fomtec Enviro ARK, 3%	VRC200AJP	VRC200PJP	0.975	24.77	1900	7192	4250	16088	--	--	--	--

NOTES:
[1] Please refer to graphs in section 7.2 for specific flow rate parameters.
[2] Flanged ratio controller not available in Brass - Nickel Aluminium Bronze only.
[3] ANSI and PN16 flanges with Flat Face (FF) only.
[4] Relevant foam types comply with the requirements of the EPA 2010/2015 PFOA Stewardship Program.

4. SCOPE OF DELIVERY

Ensure that all components are complete and in good condition. The ratio controller is supplied boxed, with data plate and an integral sized orifice disc specific to its approved/listed concentrate. Grooved couplings are not included.

5. AVAILABILITY

The product is available directly from Viking and official distributors only.

6. PRODUCT VARIANTS

6.1 Options

- Suitable for Fomtec Foam Concentrates: LS xMax 3%, Enviro ARK 3%, and Enviro USP 3%
- Nickel Aluminum Bronze UNS C95800 or Brass UNS C84400 (see table 3.4.1)
- Pre-Assembled with Bladder Tank and water/foam pipe work

6.2 Dimensions and Equivalent Length

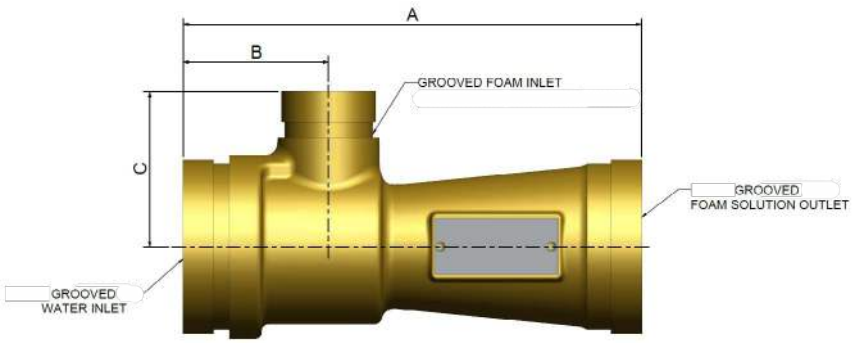


Figure 6.2.1 Model VRC Ratio Controller (Grooved)

Table 6.2.2 - Equivalent Length, Weight & Dimension Data

Nominal Size	Equivalent Length (friction loss)*		Approximate Weight				Approximate Dimensions							
			NAB Version		Brass Version		A		B		C		Grooved Foam Inlet	
	Feet	Metre	LBS	KGs	LBS	KGs	Inch	mm	Inch	mm	Inch	mm	Inch	mm
2” (DN50) Grooved	46	14.02	4.9	2.2	6.5	3.0	8-1/4	210	3	76	2-9/16	65	1.5	48.3
2” (DN50) VRCS Grooved	941	286.82	4.9	2.2	6.5	3.0	8-1/4	210	3	76	2-9/16	65	1.5	48.3
2.5” (DN65) Grooved	39	11.89	6.0	2.7	7.5	3.4	8-3/4	222	2-15/16	75	2-13/16	71	1.5	48.3
3” (DN80) Grooved	31	9.45	8.6	3.9	11.0	5.0	9-1/4	235	2-15/16	79	3-1/8	79	1.5	48.3
4” (DN100) Grooved	37	11.28	13.9	6.3	25.0	11.3	11	279	3-5/16	84	3-9/16	91	2	60.3
6” (DN150) Grooved	88	26.82	30.6	13.9	37.0	16.8	15	381	3-5/16	84	4-5/8	118	2	60.3
8” (DN200) Grooved	114	34.75	51.8	23.5	63.0	28.5	16-3/4	426	3-11/16	94	5-5/8	143	2.5	76.1
8” (DN200) Grooved	114	34.75	51.8	23.5	63.0	28.5	16-3/4	426	3-11/16	94	5-5/8	143	2.5	73.0

* Expressed in equivalent length of schedule 40 pipe based on Hazen & Williams C=120

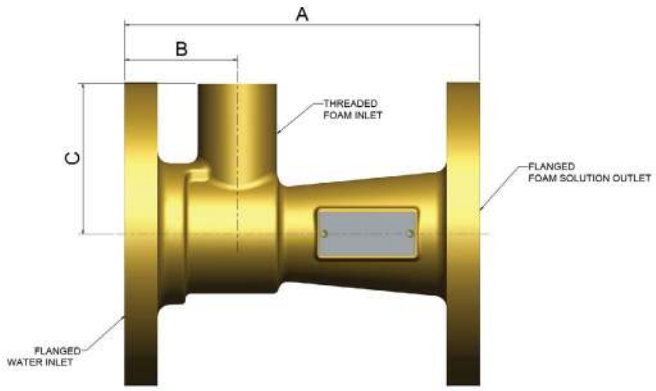


Figure 6.2.3 Model VRC Ratio Controller (Flanged)

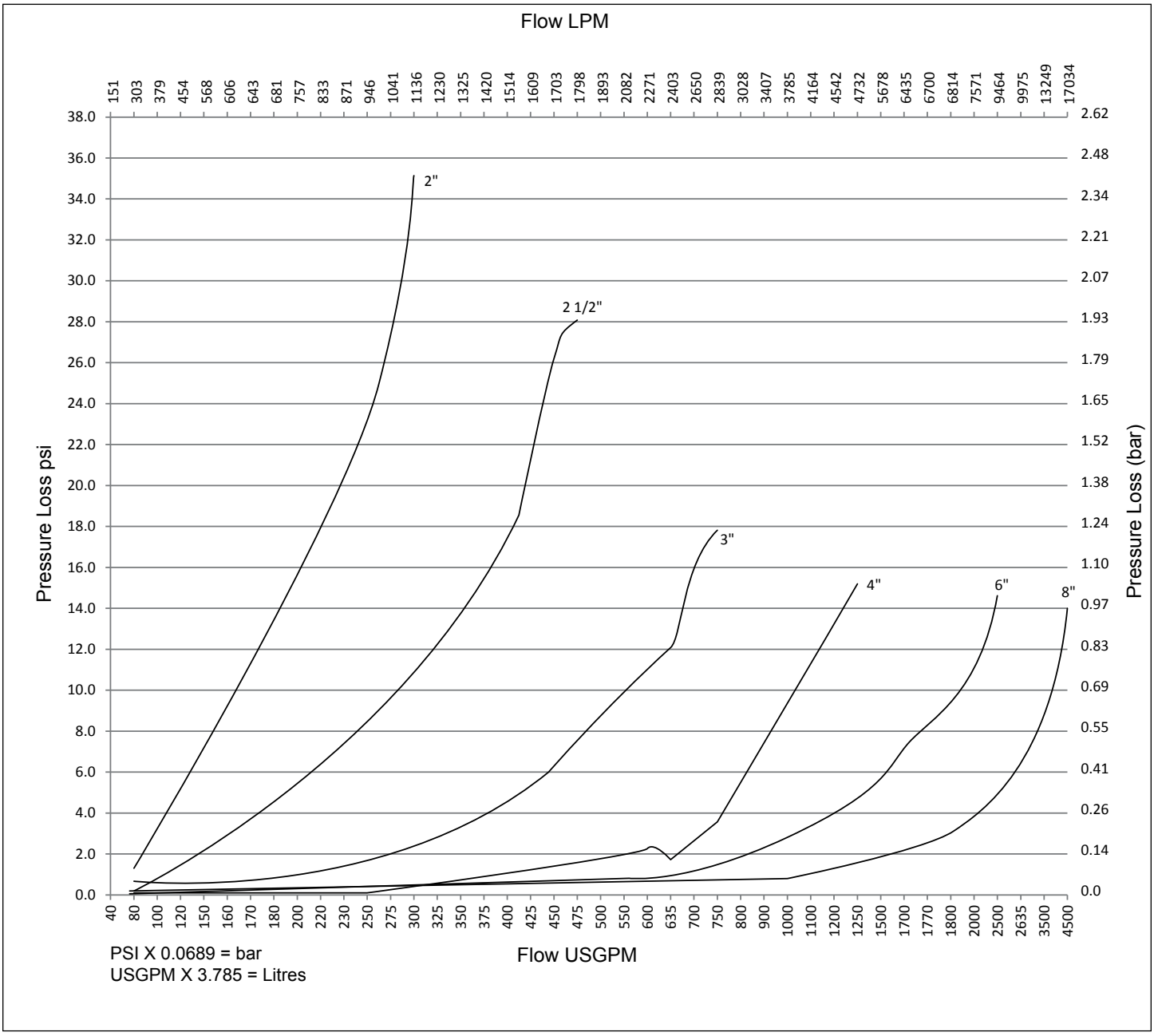
Table 6.2.4 - Equivalent Length, Weight & Dimension Data

Nominal Size (Water Inlet/Foam Solution Outlet)	Equivalent Length (friction loss)*		Approximate Weight		Approximate Dimensions							
			NAB Version		A		B		C		Threaded Foam Inlet	
	Feet	Metre	LBS	KGs	Inch	mm	Inch	mm	Inch	mm	Inch	Type
3” PN16	31	9.45	27.2	12.3	9-1/4	235	2-15/16	79	3-15/16	100	1.5	BSP
3” ANSI	31	9.45	27.4	12.4	9-1/4	235	2-15/16	79	3-15/16	100	1.5	NPT
4” PN16	37	11.28	36.7	16.6	11	279	3-5/16	84	4-3/8	111	2	BSP
4” ANSI	37	11.28	37.1	16.8	11	279	3-5/16	84	4-3/8	111	2	NPT
6” PN16	88	26.82	62.7	28.4	15	381	3-5/16	84	5-7/16	138	2	BSP
6” ANSI	88	26.82	63.2	28.6	15	381	3-5/16	84	5-7/16	138	2	NPT
8” PN16	114	34.75	98.9	44.8	16-3/4	426	3-11/16	94	6-11/16	170	2.5	BSP
8” ANSI	114	34.75	99.6	45.1	16-3/4	426	3-11/16	94	6-11/16	170	2.5	NPT

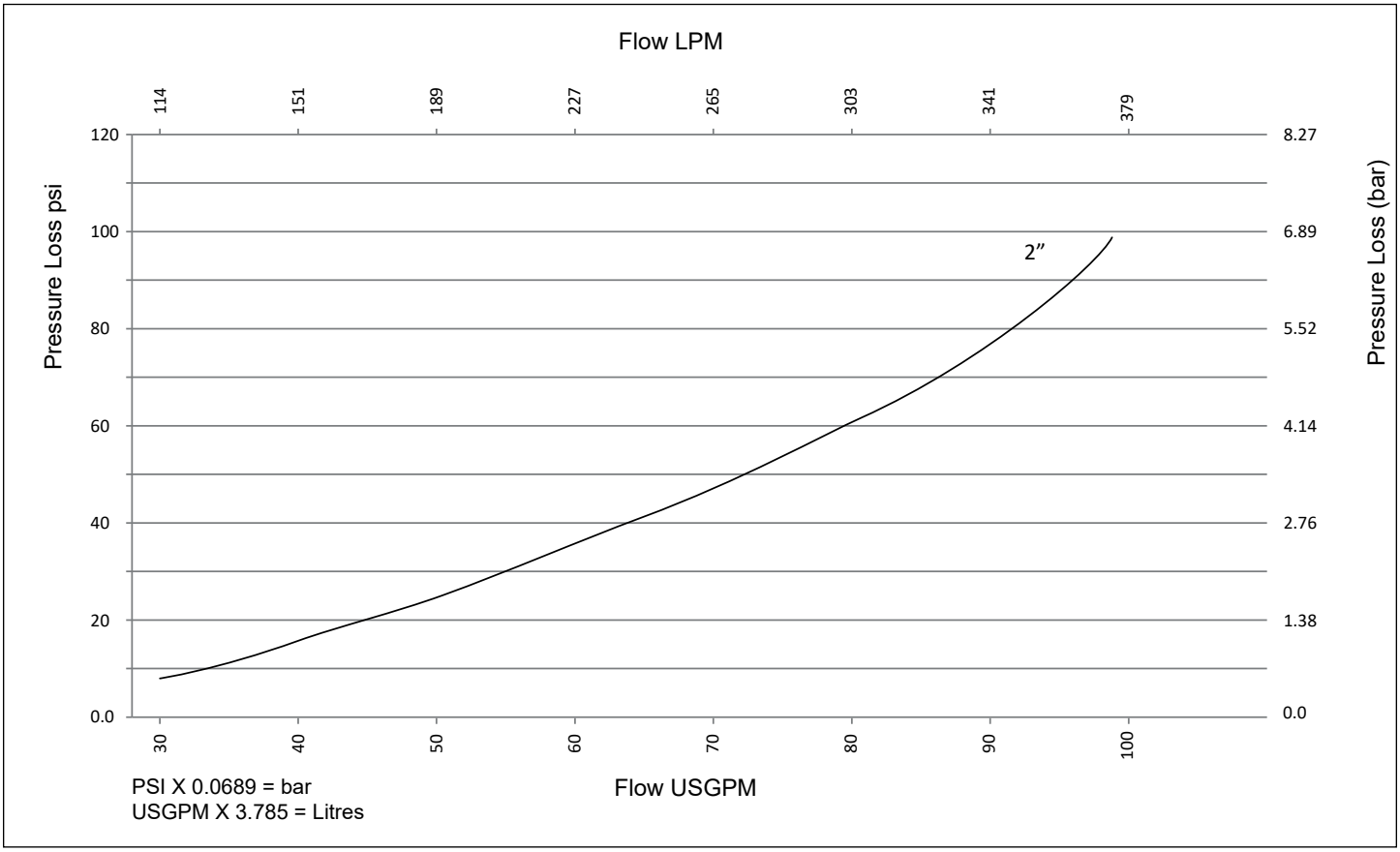
* Expressed in equivalent length of schedule 40 pipe based on Hazen & Williams C=120

7. PERFORMANCE DATA

7.1 Friction Loss vs Foam Solution Flow



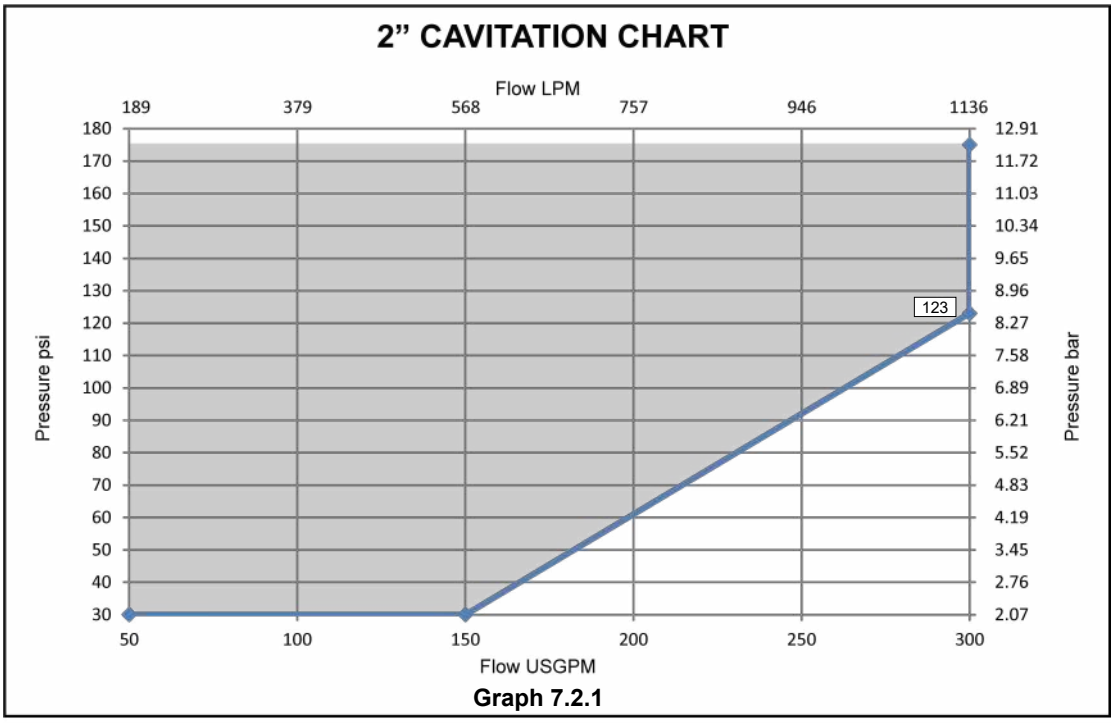
Graph 7.1.1
Friction Loss vs Foam Solution Flow (Model VRC, all sizes)



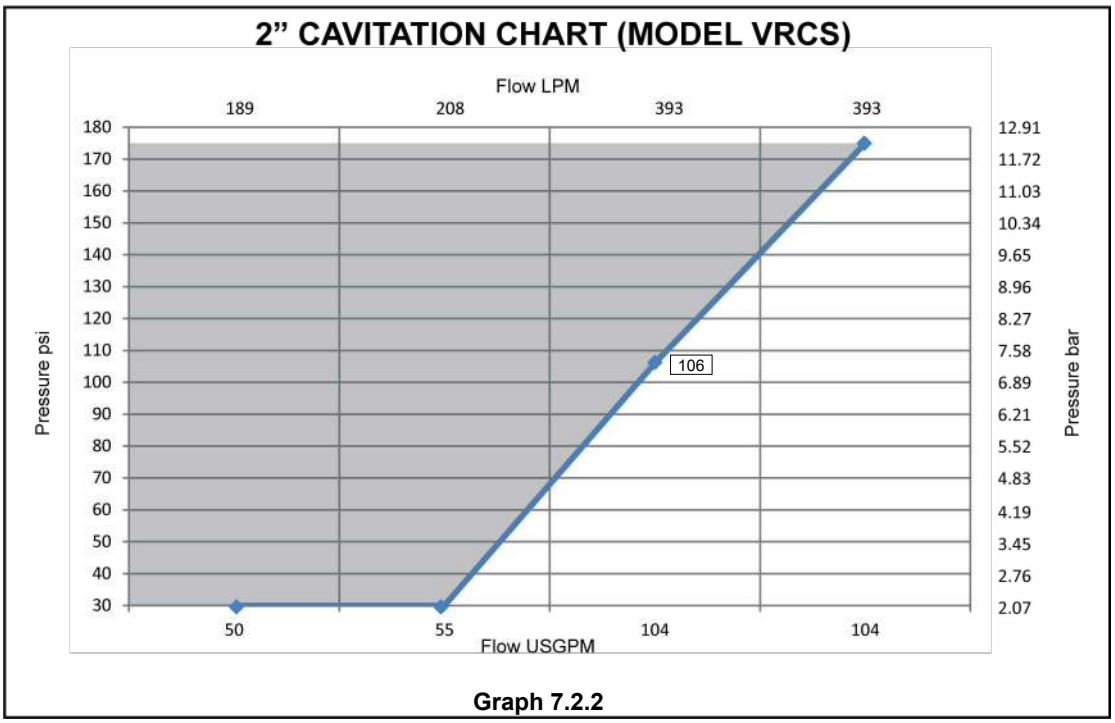
Graph 7.1.2
Friction Loss vs Foam Solution Flow (2” Model VRCS)

7.2 Inlet Pressure vs Foam Solution Flow

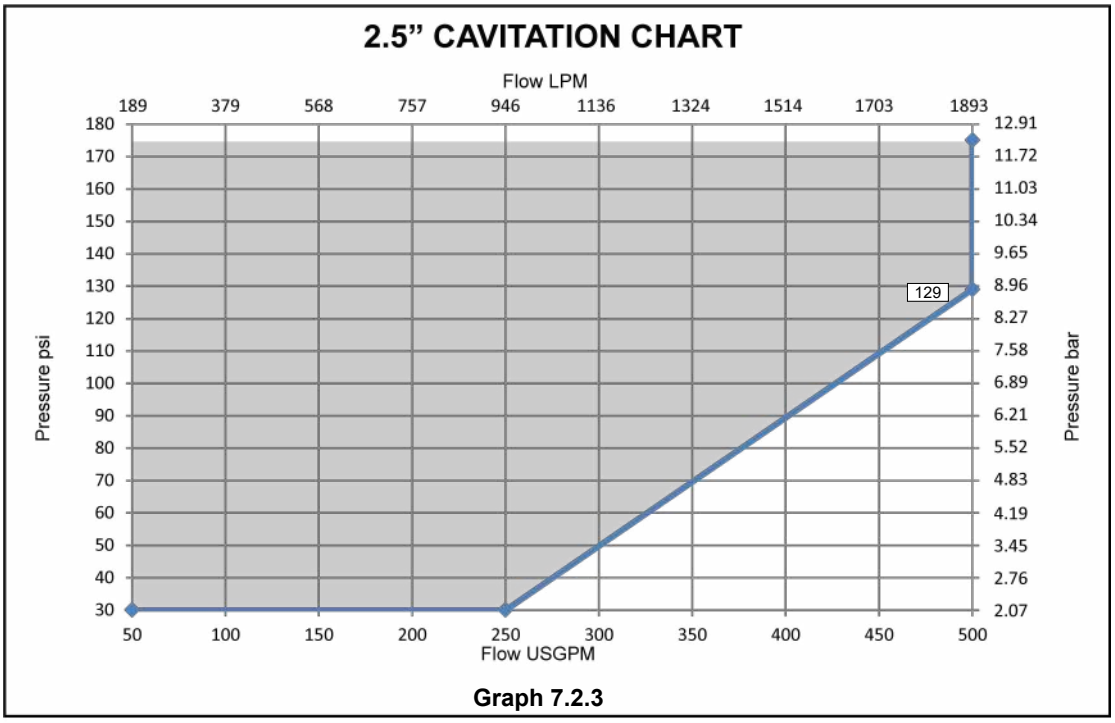
Ratio Controller must be used within the shaded flow and pressure conditions



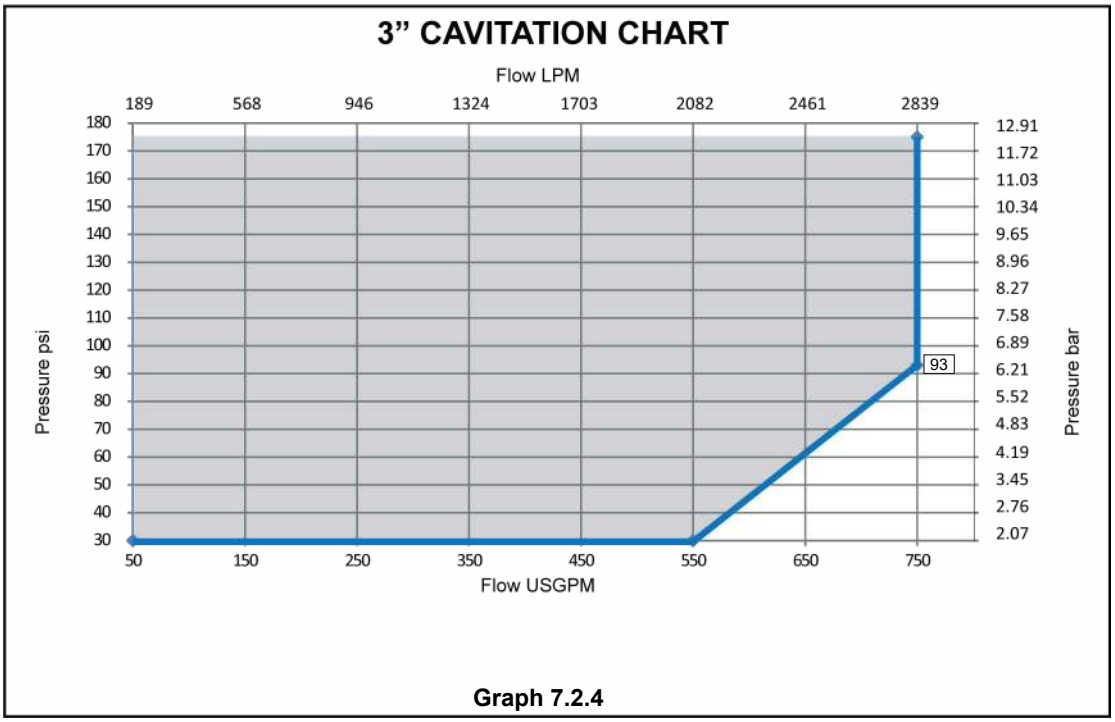
Graph 7.2.1



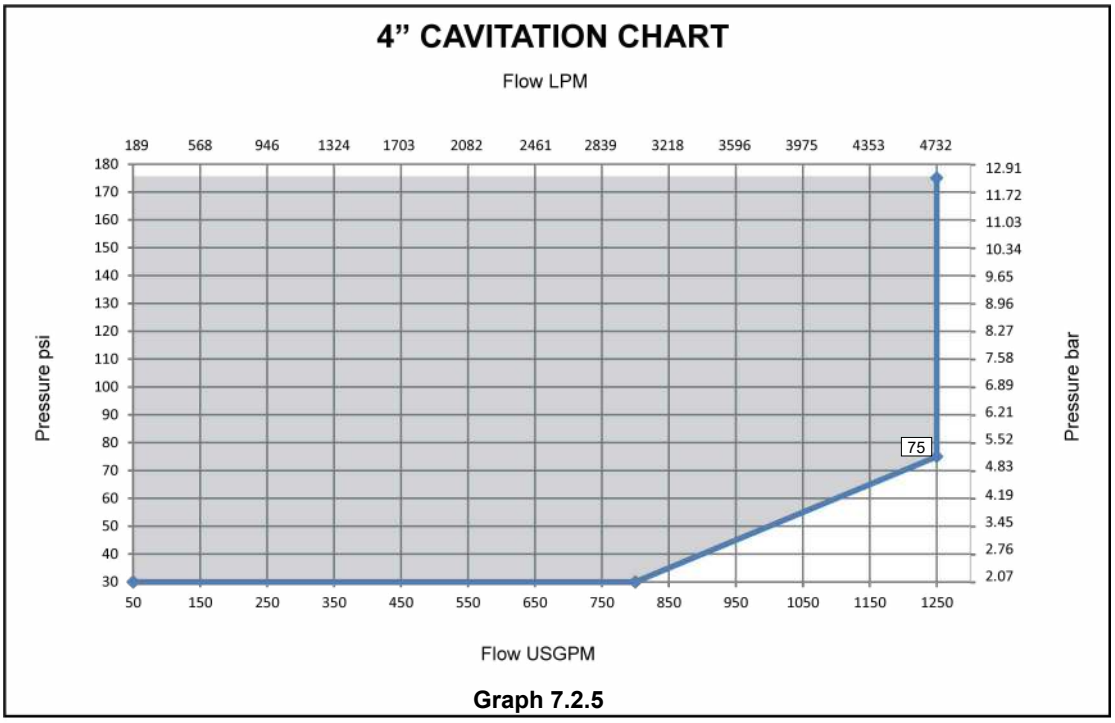
Graph 7.2.2



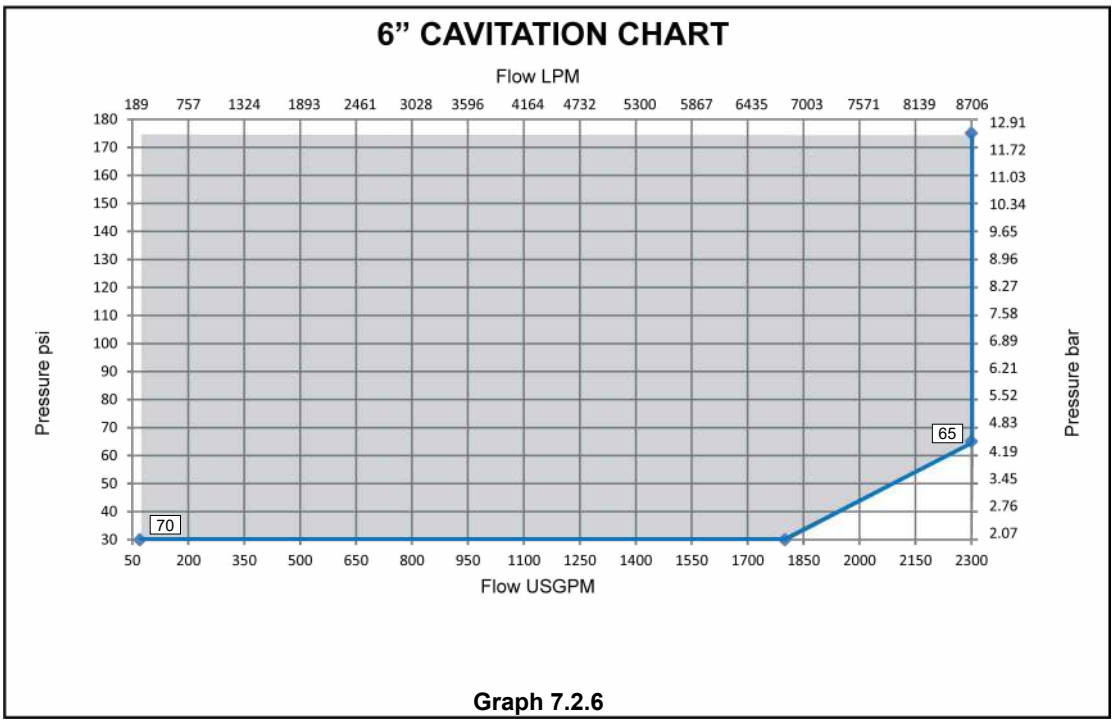
Graph 7.2.3



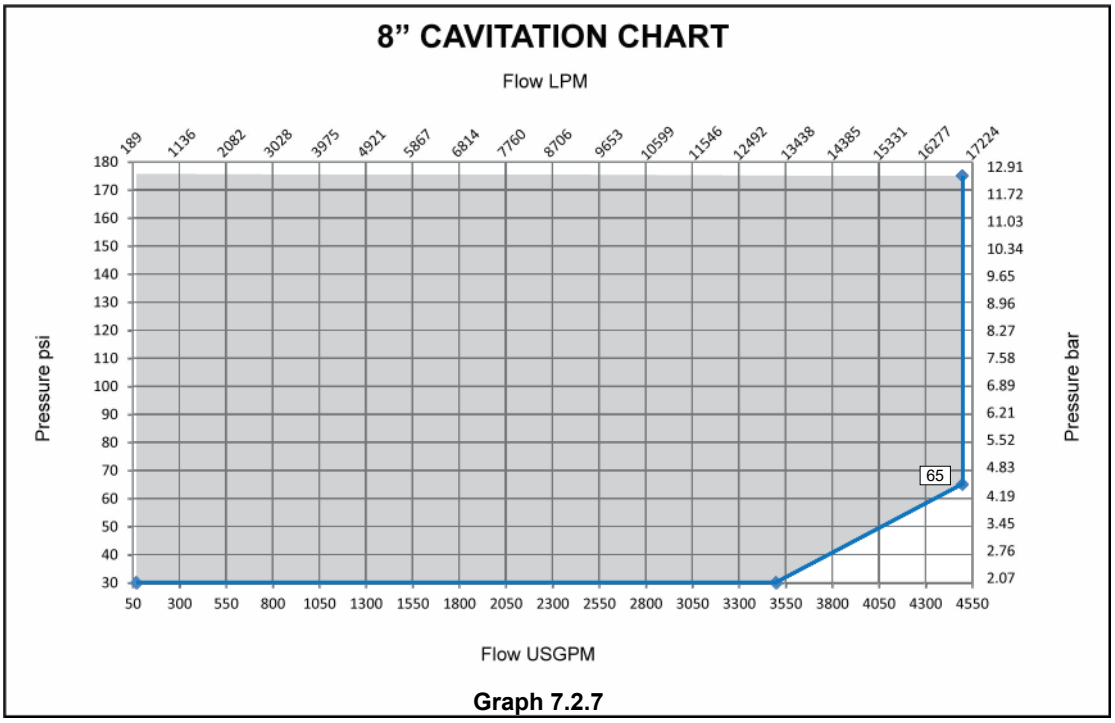
Graph 7.2.4



Graph 7.2.5



Graph 7.2.6


8” CAVITATION CHART
Flow LPM
189 1136 2082 3028 3975 4921 5867 6814 7760 8706 9653 10599 11546 12492 13438 14385 15331 16277 17224
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30
12.91 11.72 11.03 10.34 9.65 8.96 8.27 7.58 6.89 6.21 5.52 4.83 4.19 3.45 2.76 2.07
Pressure psi
Pressure bar
65
50 300 550 800 1050 1300 1550 1800 2050 2300 2550 2800 3050 3300 3550 3800 4050 4300 4550
Flow USGPM

Graph 7.2.7

8. INSTALLATION

Refer to appropriate Installation Standards (i.e. NFPA, VdS, LPCB, etc.) and / or applicable FM Global Property Loss Prevention Data Sheets such as 4-12, Foam-Water Sprinkler Systems. In addition, the “Authority Having Jurisdiction” (AHJ) may have additional installation requirements that must be followed.

Do not alter the piping without consulting a system design representative.

Before installing a ratio controller, check the system design drawing to ensure the controller location does not create excessive head pressure or frictional losses.

a) The ratio controller must be installed with the arrow pointing in the direction of the water flow.
b) The ratio controller can be installed in the vertical or horizontal position.
c) Straight piping equal to a minimum of five (5) pipe diameters should be installed before and after the ratio controller to help ensure proportioning accuracy. This includes the proportioning test connection which is best installed further downstream after changes in pipe direction which helps to ensure a better mixing of foam solution.
d) In Dry, Deluge and Preaction systems a removable section of pipe should be installed between the Concentrate Control Valve and Ratio Controller foam inlet to allow the flushing of foam concentrate after system activation.
e) The ideal location for the controller is level or below the top discharge and within 3 feet (1m) of the tank.
f) The pressure drop within the piping to the bladder tank water or foam concentrate piping can be minimized by:
    1) Limiting the number of tees and elbows used
    2) Using full port valves
    3) Increasing the pipe diameter
g) The combined total equivalent length of pipe (pipe length, plus equivalent lengths for fittings and valves), including both the water supply inlet piping and the foam concentrate discharge piping, should not exceed 165 equivalent feet (50.3 meters); specifically, 100’ (30.5 m) water supply and 65’ (19.8 m) foam concentrate piping.
h) The foam concentrate line should run as directly as possible from the bladder tank outlet to the ratio controller and avoid excessive changes in elevation.
i) The diameter of this piping must be the same size or larger than the foam concentrate inlet into the ratio controller.
j) Installation of a concentrate control valve (CCV) is highly recommended to prevent unintentional migration of foam from the bladder tank.
k) Install a suitable check valve between the bladder tank and ratio controller to prevent system water flowing back to the bladder tank. This should be installed close to the ratio controller foam inlet connection.
l) Care should be taken to ensure that the bladder tank and foam concentrate line are vented of trapped air to assist proportioning performance.

9. OPERATION

The ratio controller is a modified Venturi device. As water flows through the calibrated water nozzle, it creates an area of lower pressure, referred to as the metering pressure drop. As the water flow increases through the Venturi, the metering pressure drop increases, allowing more foam concentrate to enter through the sized foam orifice. A decrease in the water flow reduces the metering pressure drop, thereby reducing the foam concentrate flow.

Because the foam concentrate flow changes in direct proportion to the water flow, the ratio controller can accurately proportion foam concentrate over a wide range of water flow rates.

The flow rate at which the metering pressure drop is just high enough to overcome the pressure losses through the bladder tank and its piping, is called the low flow rating. The water flow rate through the ratio controller must be at or above its low flow rating in order to properly proportion foam concentrate.

10. GUARANTEE

For details of warranty, refer to Viking’s current list price schedule or contact Viking directly.

11. INSPECTION, TESTS AND MAINTENANCE

Refer to respective requirements, according to the relevant standards for Inspection, Testing and Maintenance.
If applicable, refer to FM Global Property Loss Prevention Datasheet 4-12 for specific test and commissioning criteria.
In addition, the “Authority Having Jurisdiction” (AHJ) may have additional maintenance, testing and inspection requirements that must be followed.

⚠ WARNING

Any system maintenance or testing that involves placing a control valve or detection system out of service may eliminate the fire protection capabilities of that system. Prior to proceeding, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the affected area.

12. DISPOSAL



At end of use the product described here should be disposed of via the national recycling system.

13. ACCESSORIES AND SPARE PARTS

None.

14. DECLARATION OF CONFORMITY

If required, Contact the appropriate Viking sales office in ***Section 5 Availability*** for further assistance.