



## TECHNICAL DATA

### FOAM RATIO CONTROLLER MODEL VRC

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com  
 Visit the Viking website for the latest edition of this technical data page.

### 1. GENERAL DESCRIPTION

The Viking ratio controller accurately proportions foam concentrate into a water stream over a wide range of water flow rates. The controller proportions foam at concentrations of 1% or 3%.

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 discharge devices most commonly used are Sprinklers, Nozzles, Monitors, Grate Nozzles, Foam Makers and Foam Chambers. 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 Viking sales office in Section 5 Availability or refer to the technical documentation. The contents of this publication are subject to modifications without notice.

### 2. LISTINGS AND APPROVALS

The Viking ratio controller is FM Approved and UL Listed as part of a fire extinguishing system combining designated foam concentrates, bladder tanks and discharge devices. Approved and Listed system components can be found at [www.approvalguide.com](http://www.approvalguide.com) and [www.database.UL.com](http://www.database.UL.com)



FM Approved – Low Expansion Foam Systems (FM5130)



UL Listed – GHXV.EX2005 (UL162)

Other International approval certificates may be available upon request.



### 3. TECHNICAL DATA

#### 3.1 Construction Features

- Available in 2" (DN50), 2.5" (DN65), 3" (DN80), 4" (DN100), 6" (DN150), 8" (DN200)
- Brass construction 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	
Body & Nozzle	Nickel Aluminum Bronze UNS C95800 – ASTM B148
Orifice	UNS-C36000 or C46400 or C95800
Fittings	Stainless Steel
Brass Version	
Body & Nozzle	Cast Brass UNS C84400 – ASTM B584
Orifice	Brass UNS C36000
Fittings	Stainless Steel
See notes in <b>Table 3.4.1</b> for ordering information	



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### 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 <b>Table 3.4.1</b>

### 3.4 Ordering Information

- Select the Foam Concentrate Type in table 3.4.1
- 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 for the Foam Type selected in Step 1). The required higher flow rate should be lower than the maximum flow rate shown in table 3.4.1. 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 according to the FM Approval or UL Listing.
- 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:** Nickel Aluminium Bronze Ratio Controllers are standard for EMEA and Asia sales regions and Brass is standard for the Americas.

**Ordering example:** A Ratio Controller is required with a minimum flow rate of 65 GPM and maximum flow rate of 570 GPM using AFFF 3%S Foam Concentrate in a 3" Wet System. The ordering part number is VRC089JAB in EMEA/Asia and F20152B in the Americas.

**Table 3.4.1 - Ordering information**

Connection		Foam Type <sup>5</sup>	Part Number		Foam Inlet Orifice Size		FM Approved				UL Listed			
Body Grooved	Foam Inlet Grooved		Nickel Aluminium Bronze <sup>2,4</sup>	Brass <sup>3</sup>	Inch	mm	Minimum Flow Rate <sup>1</sup>		Maximum Flow Rate <sup>1</sup>		Minimum Flow Rate		Maximum Flow Rate	
							GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min
2" (60.3mm)	1.5" (48.3mm)	AFFF 1%S C6	VRC060JAA	F20282A	0.110	2.79	50	189	311	1177	50	189	225	851
		AFFF 3%S C6	VRC060JAB	F20282B	0.190	4.83	50	189	311	1177	50	189	225	851
		AFFF 3%M C6	VRC060JAM	F20282M	0.190	4.83	50	189	311	1177	50	189	225	851
		ARC 3X3S C6	VRC060JAJ	F20282J	0.218	5.54	100	378	310	1173	102	386	228	862
2.5" (76.1mm)	1.5" (48.3mm)	AFFF 1%S C6	VRC076JAA	N/A	0.141	3.56	50	189	475	1798	50	189	377	1426
		AFFF 3%S C6	VRC076JAB	N/A	0.252	6.40	50	189	475	1798	50	189	375	1419
		AFFF 3%M C6	VRC076JAM	N/A	0.252	6.40	50	189	475	1798	50	189	375	1419
		ARC 3X3S C6	VRC076JAJ	N/A	0.273	6.93	160	606	475	1798	165	625	376	1423
2.5" (73.0mm)	1.5" (48.3mm)	AFFF 1%S C6	VRC073JAA	F20162A	0.141	3.56	50	189	475	1798	50	189	377	1426
		AFFF 3%S C6	VRC073JAB	F20162B	0.252	6.40	50	189	475	1798	50	189	375	1419
		AFFF 3%M C6	VRC073JAM	F20162M	0.252	6.40	50	189	475	1798	50	189	375	1419
		ARC 3X3S C6	VRC073JAJ	F20162J	0.273	6.93	160	606	475	1798	165	625	376	1423

**NOTES:**

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

Continued on next page.



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Continued from previous page.

**Table 3.4.1 - Ordering information**

Connection		Foam Type <sup>5</sup>	Part Number		Foam Inlet Orifice Size		FM Approved				UL Listed			
Body Grooved	Foam Inlet Grooved		Nickel Aluminium Bronze <sup>2,4</sup>	Brass <sup>3</sup>	Inch	mm	Minimum Flow Rate <sup>1</sup>		Maximum Flow Rate <sup>1</sup>		Minimum Flow Rate		Maximum Flow Rate	
							GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min
3" (88.9mm)	1.5" (48.3mm)	AFFF 1%S C6	VRC089JAA	F20152A	0.205	5.21	50	189	750	2839	50	189	750	2839
		AFFF 3%S C6	VRC089JAB	F20152B	0.362	9.19	50	189	750	2839	50	189	750	2839
		AFFF 3%M C6	VRC089JAM	F20152M	0.362	9.19	50	189	750	2839	50	189	750	2839
		ARC 3X3S C6	VRC089JAJ	F20152J	0.392	9.96	300	1136	750	2839	300	1136	750	2839
4" (114.3mm)	2" (60.3mm)	AFFF 1%S C6	VRC114JAA	F20217A	0.279	7.09	50	189	1250	4731	48	182	1250	4731
		AFFF 3%S C6	VRC114JAB	F20217B	0.485	12.32	50	189	1250	4731	50	189	1250	4731
		AFFF 3%M C6	VRC114JAM	F20217M	0.485	12.32	50	189	1250	4731	50	189	1250	4731
		ARC 3X3S C6	VRC114JAJ	F20217J	0.513	13.03	400	1514	1250	4731	400	1514	1250	4731
		FP 3% C6	VRC114JAK	F20217K	0.513	13.03	N/A	N/A	N/A	N/A	75	284	1250	4731
6" (165.1mm)	2" (60.3mm)	AFFF 1%S C6	VRC165JAA	N/A	0.358	9.09	140	530	2300	8706	100	378	2300	8706
		AFFF 3%S C6	VRC165JAB	N/A	0.700	17.78	70	265	2300	8706	50	189	2300	8706
		AFFF 3%M C6	VRC165JAM	N/A	0.700	17.78	70	265	2300	8706	50	189	2300	8706
		ARC 3X3S C6	VRC165JAJ	N/A	0.738	18.75	750	2839	2300	8706	750	2839	2300	8706
		FP 3% C6	VRC165JAK	N/A	0.738	18.75	N/A	N/A	N/A	N/A	152	575	2300	8706
6" (168.3mm)	2" (60.3mm)	AFFF 1%S C6	VRC168JAA	F20214A	0.358	9.09	140	530	2300	8706	100	378	2300	8706
		AFFF 3%S C6	VRC168JAB	F20214B	0.700	17.78	70	265	2300	8706	50	189	2300	8706
		AFFF 3%M C6	VRC168JAM	F20214M	0.700	17.78	70	265	2300	8706	50	189	2300	8706
		ARC 3X3S C6	VRC168JAJ	F20214J	0.738	18.75	750	2839	2300	8706	750	2839	2300	8706
		FP 3% C6	VRC168JAK	F20214K	0.738	18.75	N/A	N/A	N/A	N/A	152	575	2300	8706
8" (219.1mm)	2.5" (76.1mm)	AFFF 1%S C6	VRC2196JAA	N/A	0.525	13.34	200	756	4500	17033	200	756	4500	17033
		AFFF 3%S C6	VRC2196JAB	N/A	0.975	24.77	70	265	4500	17033	70	265	4500	17033
		AFFF 3%M C6	VRC2196JAM	N/A	0.975	24.77	70	265	4500	17033	70	265	4500	17033
		ARC 3X3S C6	VRC2196JAJ	N/A	1.009	25.63	1400	5299	4500	17033	1400	5299	4500	17033
		FP 3% C6	VRC2196JAK	N/A	1.009	25.63	N/A	N/A	N/A	N/A	256	969	4500	17033
8" (219.1mm)	2.5" (73.0mm)	AFFF 1%S C6	VRC2193JAA	F20137A	0.525	13.34	200	756	4500	17033	200	756	4500	17033
		AFFF 3%S C6	VRC2193JAB	F20137B	0.975	24.77	70	265	4500	17033	70	265	4500	17033
		AFFF 3%M C6	VRC2193JAM	F20137M	0.975	24.77	70	265	4500	17033	70	265	4500	17033
		ARC 3X3S C6	VRC2193JAJ	F20137J	1.009	25.63	1400	5299	4500	17033	1400	5299	4500	17033
		FP 3% C6	VRC2193JAK	F20137K	1.009	25.63	N/A	N/A	N/A	N/A	256	969	4500	17033

### NOTES:

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

### INFORMATION

Some of the available options may be not covered by the UL Listing. Please always make reference to the appropriate approval directory or guides or contact Viking for further assistance.

## 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.



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### 5. AVAILABILITY

Please contact Viking for further information.

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

**EMEA: Viking SA**, ZI Haneboesch, L-4562 Differdange / Niederkorn, Tel.: +352 58 37 37 - 1, Fax: +352 38 37 36, vikinglux@viking-emea.com

**Americas: The Viking Corporation**, 210 N. Industrial Park Drive, Hastings, Michigan 49058, Toll free phone: (800) 968-9501

**APAC: The Viking Corporation (Far East) Pte. Ltd.**, 69 Tuas View Square, Westlink Techpark, Singapore 637621

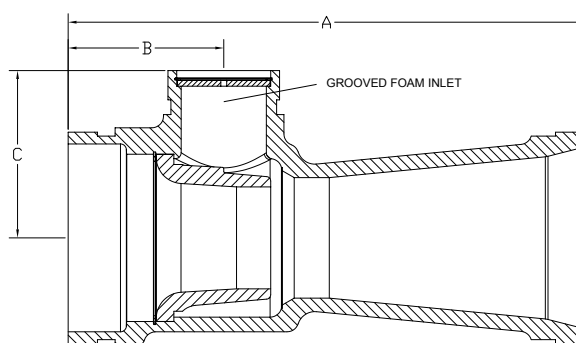
Tel: (+65) 6 278 4061, Fax: (+65) 6 278 4609, Email: vikingsingapore@vikingcorp.com

### 6. PRODUCT VARIANTS

#### 6.1 Options

- Suitable for Viking Foam Concentrate: AFFF 1%S C6 | AFFF 3%S C6 | ARC 3X3S C6 | FP 3% C6 | AFFF 3%M C6
- 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

**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
2.5" (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
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



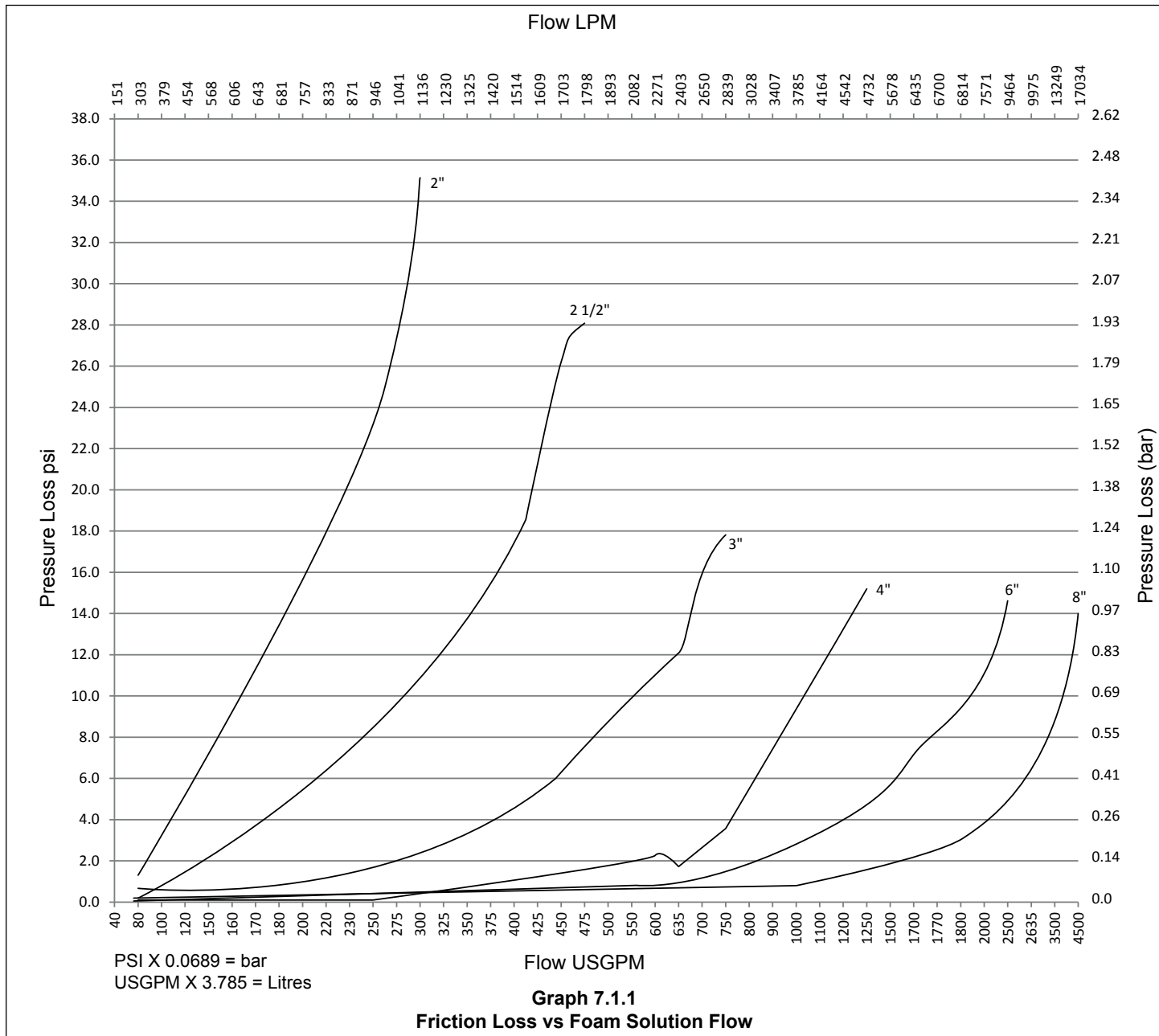
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### 7. PERFORMANCE DATA

#### 7.1 Friction Loss vs Foam Solution Flow





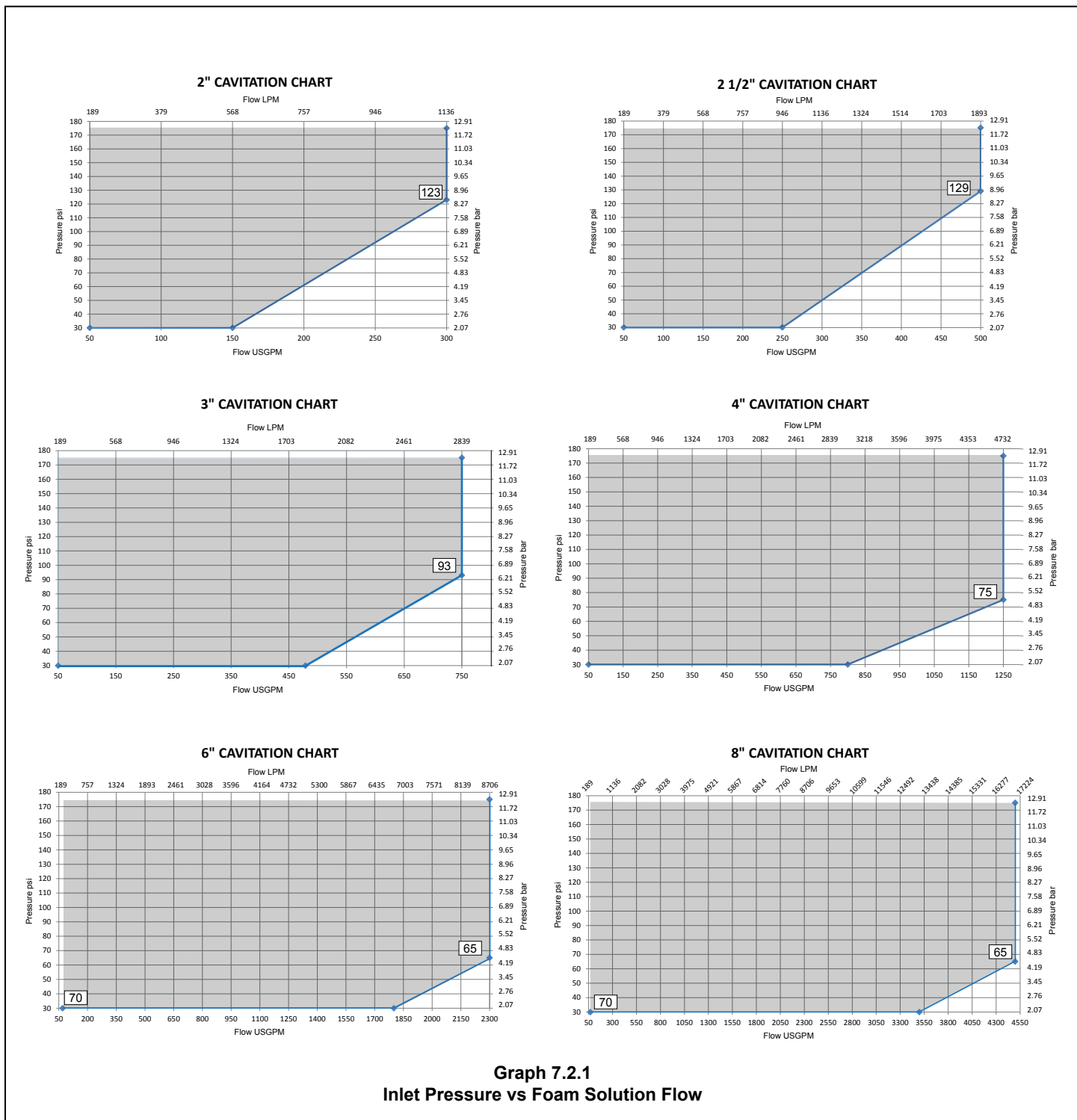
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### 7.2 Inlet Pressure vs Foam Solution Flow

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



**Graph 7.2.1  
Inlet Pressure vs Foam Solution Flow**



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## 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.

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.

- The ratio controller must be installed with the arrow pointing in the direction of the water flow
- The ratio controller can be installed in the vertical or horizontal position
- 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
- 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
- The ideal location for the controller is level or below the top discharge and within 3 feet (1m) of the tank. The controller can be placed further from the bladder tank, as long as the pressure of the foam concentrate at the foam inlet of the ratio controller is within 2PSI of the incoming water pressure
- 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

A good rule to follow to ensure the piping is designed properly is as follows:

The combined total equivalent length (pipe length plus equivalent lengths for fittings and valves) of the water supply inlet piping and the foam concentrate discharge piping should not exceed 50 equivalent feet (15.2m). The diameter of this piping must be the same size or larger than the foam concentrate inlet into the ratio controller.

Viking requires the installation of a concentrate control valve and a suitable check valve between the bladder tank and ratio controller. This will prevent migration of water into, and foam out of, the bladder tank.

## 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.



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#### 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.