



## Proportioning devices

Proportioning is a key part of any fixed foam system as it needs to accurately introduce foam concentrate into the water supply to produce foam solution. Equipment should be carefully selected based upon application, flow rate, foam and system type.

Kenbri has a wide range of foam proportioning options available. Choice of product is depending on your project requirements.

### Kenbri ratio controller

The Kenbri 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.

## Technical data

### Features

- 2", 2.5", 3", 4", 6" and 8"
- Horizontal, vertical and pre-assembled to bladder tank installation
- Nickel aluminium bronze or brass construction
- For use with fresh or salt water
- FM approval and UL listing

### 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

### Listings and approvals

- FM Approved – Low Expansion Foam Systems (FM5130)
- UL Listed – GHXV.EX26572 (UL162)

## Standard design specifications

Design pressure:	250 PSI / 17.2 bar (1.7MPa)
Design temperature range:	14°F to 120°F (-10°C to 49°C)
Operating temperature range:	35°F to 120°F (1.7°C to 49°C)
Minimum operating inlet pressure:	30 PSI / 2.1 bar (0.2MPa)
Maximum operating inlet pressure:	175 PSI / 12.1bar (1.2MPa)
Proportioning range:	Refer to table ordering information (below)

Connection		Foam Type <sup>3</sup>	Part Number (Nickel Aluminium Bronze)	Orifice		FM Approved				UL Listed			
						Minimum Solution Flow <sup>1</sup>		Maximum Solution Flow <sup>1</sup>		Minimum Solution Flow <sup>1</sup>		Maximum Solution Flow <sup>1</sup>	
Body Grooved	Foam Inlet Grooved			Inch	mm	GPM	l/min	GPM	l/min	GPM	l/min	GPM	l/min
2" (60.3mm)	1.5" (48.3mm)	AFFF 1%Ultra LT C6	KFP060NA	0.11	2.79	50	189	311	1,177	50	189	225	851
		AFFF 3%S C6	KFP060NB	0.19	4.83	50	189	311	1,177	50	189	225	851
		AFFF 3% M C6	KFP060NM	0.19	4.83	50	189	311	1,177	50	189	225	851
		ARC 3X3S C6	KFP060NJ	0.22	5.54	100	378	310	1,173	102	386	228	862
2.5" (76.1mm)	1.5" (48.3mm)	AFFF 1%Ultra LT C6	KFP076NA	0.14	3.56	50	189	475	1,798	50	189	377	1,426
		AFFF 3%S C6	KFP076NB	0.25	6.4	50	189	475	1,798	50	189	375	1,419
		AFFF 3% M C6	KFP076NM	0.25	6.4	50	189	475	1,798	50	189	375	1,419
		ARC 3X3S C6	KFP076NJ	0.27	6.93	160	606	475	1,798	165	625	376	1,423
2.5" (73.0mm) <sup>2</sup>	1.5" (48.3mm)	AFFF 1%Ultra LT C6	KFP073NA	0.14	3.56	50	189	475	1,798	50	189	377	1,426
		AFFF 3%S C6	KFP073NB	0.25	6.4	50	189	475	1,798	50	189	375	1,419
		AFFF 3% M C6	KFP073NM	0.25	6.4	50	189	475	1,798	50	189	375	1,419
		ARC 3X3S C6	KFP073NJ	0.27	6.93	160	606	475	1,798	165	625	376	1,423
3" (88.9mm)	1.5" (48.3mm)	AFFF 1%Ultra LT C6	KFP089NA	0.21	5.21	50	189	750	2,839	50	189	750	2,839
		AFFF 3%S C6	KFP089NB	0.36	9.19	50	189	750	2,839	50	189	750	2,839
		AFFF 3% M C6	KFP089NM	0.36	9.19	50	189	750	2,839	50	189	750	2,839
		ARC 3X3S C6	KFP089NJ	0.39	9.96	300	1136	750	2,839	300	1,136	750	2,839
4" (114.3mm)	2" (60.3mm)	AFFF 1%Ultra LT C6	KFP114NA	0.28	7.09	50	189	1,250	4,731	48	182	1,250	4,731
		AFFF 3%S C6	KFP114NB	0.49	12.3	50	189	1,250	4,731	50	189	1,250	4,731
		AFFF 3% M C6	KFP114NM	0.49	12.3	50	189	1,250	4,731	50	189	1,250	4,731
		ARC 3X3S C6	KFP114NJ	0.51	13	400	1,514	1,250	4,731	400	1,514	1,250	4,731
		FP 3% C6	KFP114NK	0.51	13	n/a	n/a	n/a	n/a	75	284	1,250	4,731
		ENVIRO USP 3%	KFP114NL	0.51	13	n/a	n/a	n/a	n/a	420	1,590	1,515	5,734
6" (165.1mm)	2" (60.3mm)	AFFF 1%Ultra LT C6	KFP165NA	0.36	9.09	140	530	2,300	8,706	100	378	2,300	8,706
		AFFF 3%S C6	KFP165NB	0.70	17.8	70	265	2,300	8,706	50	189	2,300	8,706
		AFFF 3% M C6	KFP165NM	0.70	17.8	70	265	2,300	8,706	50	189	2,300	8,706
		ARC 3X3S C6	KFP165NJ	0.74	18.8	750	2839	2,300	8,706	750	2,839	2,300	8,706
		FP 3% C6	KFP165NK	0.74	18.8	n/a	n/a	n/a	n/a	152	575	2,300	8,706
		ENVIRO USP 3%	KFP165NL	0.74	18.8	n/a	n/a	n/a	n/a	990	3,748	2,300	8,706
6" (168.3mm) <sup>2</sup>	2" (60.3mm)	AFFF 1%Ultra LT C6	KFP168NA	0.36	9.09	140	530	2,300	8,706	100	378	2,300	8,706
		AFFF 3%S C6	KFP168NB	0.70	17.8	70	265	2,300	8,706	50	189	2,300	8,706
		AFFF 3% M C6	KFP168NM	0.70	17.8	70	265	2,300	8,706	50	189	2,300	8,706
		ARC 3X3S C6	KFP168NJ	0.74	18.8	750	2,839	2,300	8,706	750	2,839	2,300	8,706
		FP 3% C6	KFP168NK	0.74	18.8	n/a	n/a	n/a	n/a	152	575	2,300	8,706
		ENVIRO USP 3%	KFP168NL	0.74	18.8	n/a	n/a	n/a	n/a	990	3,748	2,300	8,706
8" (219.1mm)	2.5" (76.1mm)	AFFF 1%Ultra LT C6	KFP2196NA	0.53	13.3	200	756	4,500	17,033	200	756	4,500	17,033
		AFFF 3%S C6	KFP2196NB	0.98	24.8	70	265	4,500	17,033	70	265	4,500	17,033
		AFFF 3% M C6	KFP2196NM	0.98	24.8	70	265	4,500	17,033	70	265	4,500	17,033
		ARC 3X3S C6	KFP2196NJ	1.01	25.6	1,400	5,299	4,500	17,033	1,400	5,299	4,500	17,033
		FP 3% C6	KFP2196NK	1.01	25.6	n/a	n/a	n/a	n/a	256	969	4,500	17,033
		ENVIRO USP 3%	KFP2196NL	1.01	25.6	n/a	n/a	n/a	n/a	2,000	7,570	4,500	17,033
8" (219.1mm) <sup>2</sup>	2.5" (73.0mm)	AFFF 1%Ultra LT C6	KFP2193NA	0.53	13.3	200	756	4,500	17,033	200	756	4,500	17,033
		AFFF 3%S C6	KFP2193NB	0.98	24.8	70	265	4,500	17,033	70	265	4,500	17,033
		AFFF 3% M C6	KFP2193NM	0.98	24.8	70	265	4,500	17,033	70	265	4,500	17,033
		ARC 3X3S C6	KFP2193NJ	1.01	25.6	1,400	5,299	4,500	17,033	1,400	5,299	4,500	17,033
		FP 3% C6	KFP2193NK	1.01	25.6	n/a	n/a	n/a	n/a	256	969	4,500	17,033
		ENVIRO USP 3%	KFP2193NL	1.01	25.6	n/a	n/a	n/a	n/a	2,000	7,570	4,500	17,033

NOTES:

<sup>1</sup> Please refer to graphs in **section 7** for specific flow rate parameters.

<sup>2</sup> 73 mm body and 219 mm body with 73 mm foam connection are non-standard and available on special order only.

<sup>3</sup> All foam types comply with the requirements of the EPA 2010/2015 PFOA Stewardship Program.

### Scope of supply

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.

### Availability

Please contact Kenbri for further information.

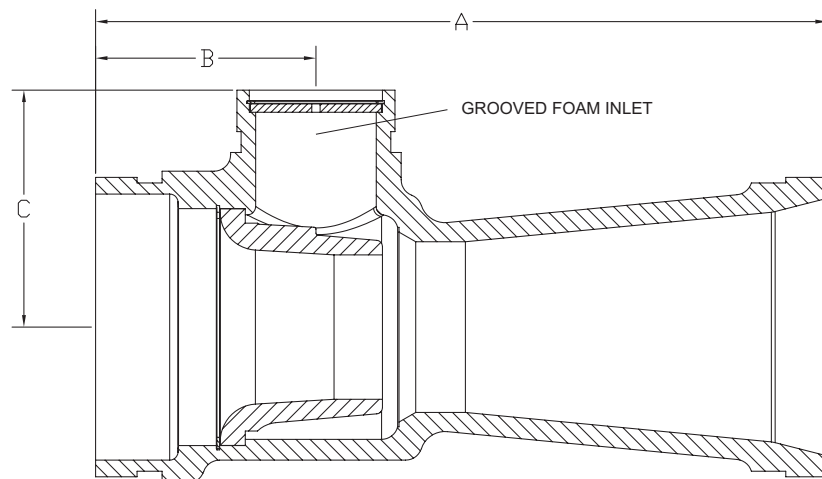
The product is available directly from Kenbri and official distributors only.

### Product variants

#### Options

- Suitable for Fomtec foam concentrate: AFFF 1% ULTRA LT C6 | AFFF 3% S C6 | AFFF 3% M C6 | ARC 3X35 C6 | FP 3% C6 | ENVIRO USP 3%
- Brass UNS C84400 construction available on special request
- Pre-assembled with bladder tank and water/foam pipe work

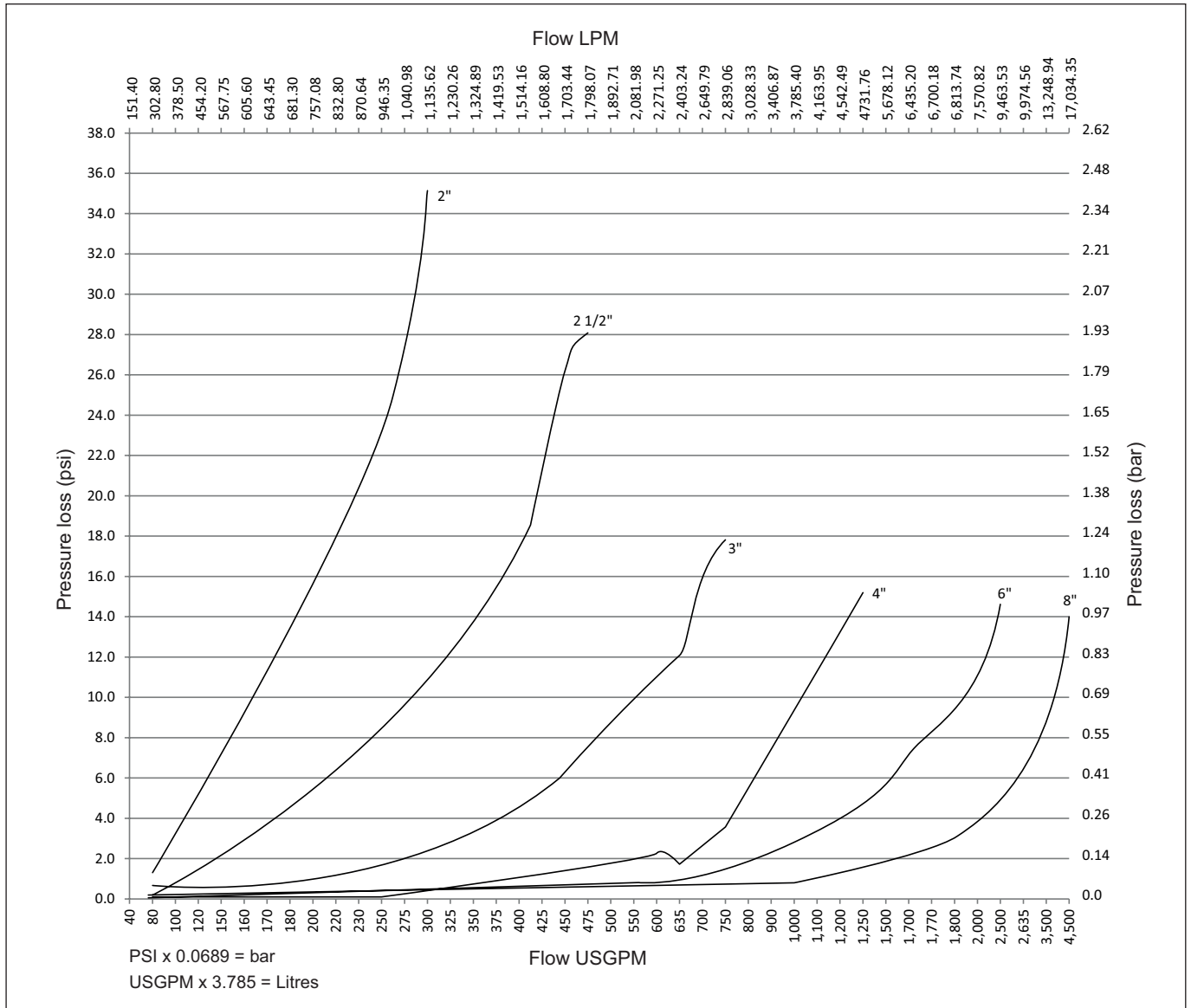
### Dimensions and equivalent length



Nominal Size	Equivalent Length		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
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

## Performance data

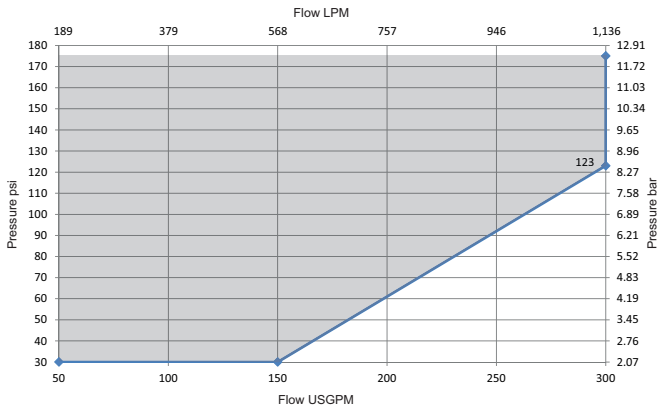
### Friction loss vs. foam solution flow



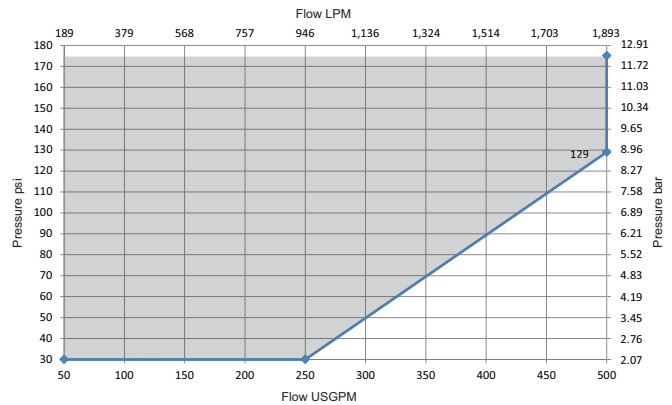
## Inlet pressure vs. foam solution flow

Ratio controller must be used within the shaded flow and pressure conditions.

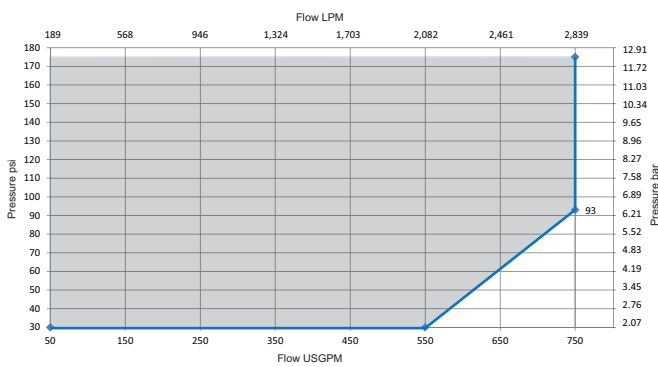
**2" CAVITATION CHART**



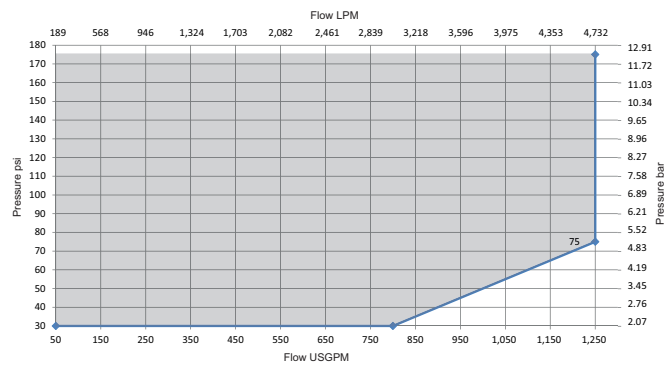
**2 1/2" CAVITATION CHART**



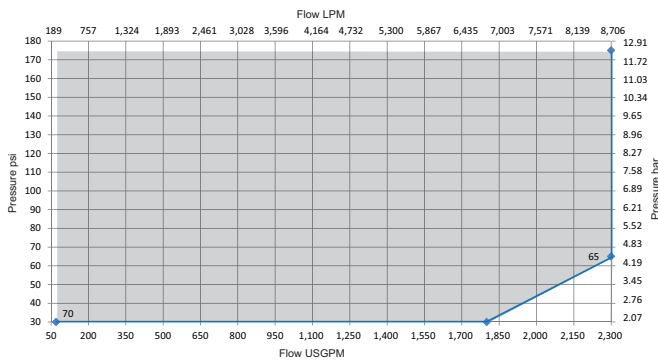
**3" CAVITATION CHART**



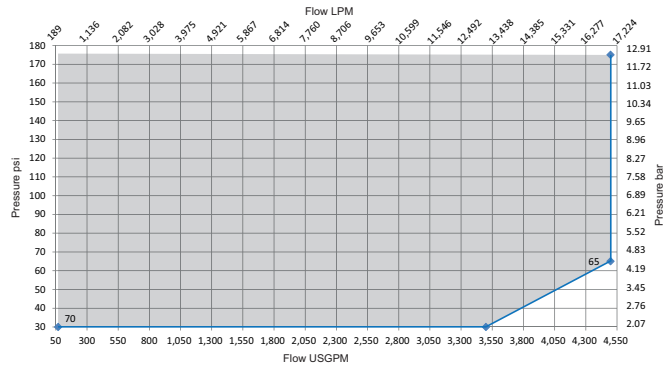
**4" CAVITATION CHART**



**6" CAVITATION CHART**



**8" CAVITATION CHART**



### 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 (1 m) 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 2 PSI (0.14 bar) 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 (15.2 m). The diameter of this piping must be the same size or larger than the foam concentrate inlet into the ratio controller.

Kenbri 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.

### 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.

### Guarantee

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

### Inspection, tests and maintenance

**WARNING** Any system maintenance or testing that involves placing a control valve or detection system out of service may eliminate the fire protection 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.

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.