

## Foam Applications

### Foam Supply

Foam concentrate is supplied either from a centralized foam system, tank, or local foam tank integrated into the deluge or sprinkler skid design. The type of foam concentrate varies between the hazard (hydrocarbon or polar solvent), temperature limitations, and foam concentrate properties. The most common foam concentrate is Aqueous Film Forming Foam (AFFF) and subsequent variations in its design but FPE has history with a wide range of foam concentrate types and can meet any project requirement.

Foam concentrate must be proportioned into the firewater stream at a rate (1%, 3%, or 6%) specified by the project. FPE offers designs that accommodate pressurized, non-pressurized (gravity fed), and local tank storage.

### Foam Proportioning Devices

The available methods of foam proportioning are:

- Balanced Pressure Proportioner (BPP)
- Inductor
- Constant Flow device (CFD)
- Turbine Driven Foam Proportioning Pump
- Water Driven Pelton Wheel Foam Pump (Utilized w/ BPP or CFD)

## Foam Applications

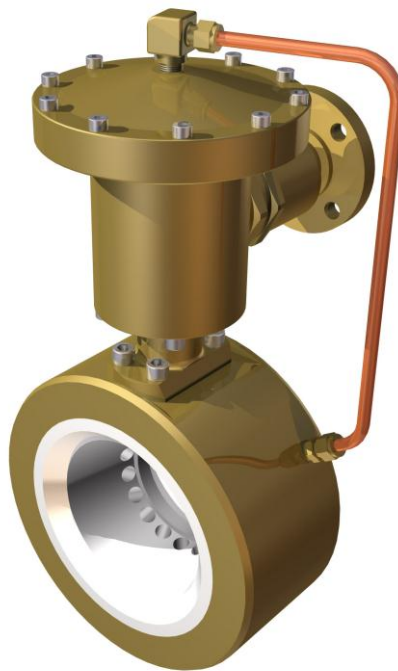
### Balanced Pressure Proportioner

A Balanced Pressure Proportioner is a wafer design installed between ANSI or DIN flanges in the water line. The foam concentrate supply to the proportioner must be pressurized either by the platform's centralized foam skid or a pelton pump design (see section) within the deluge or sprinkler skid. The foam concentrate supply pressure must be at least 1.2 barg above the water pressure and the maximum differential pressure between water and foam concentrate is 5 barg.

The balanced pressure foam proportioner senses the system water flow as a result of a pressure loss over a built in orifice. This delta pressure is used to control a foam flow valve to accurately induce foam concentrate at the desired mixing ratio.

A standard balanced pressure proportioner has a working flow range of approximately 1:3 while the wide range proportioner can handle a flow range of 1:10.

Balanced pressure proportioners require a straight pipe length of at least 3X the pipe diameter upstream while downstream is not an issue.



**Figure 1: Matre Balanced Pressure Proportioner**

## Foam Applications

### Standard Material

Proportioner: Titanium gr. 2

### Installation

Mount: Wafer  
Foam Supply: Pressurized to 1.2 barg > water supply  
Straight Pipe: Min. 3X pipe diameter upstream only

### Operation

Manual and/or automated with F&G system.

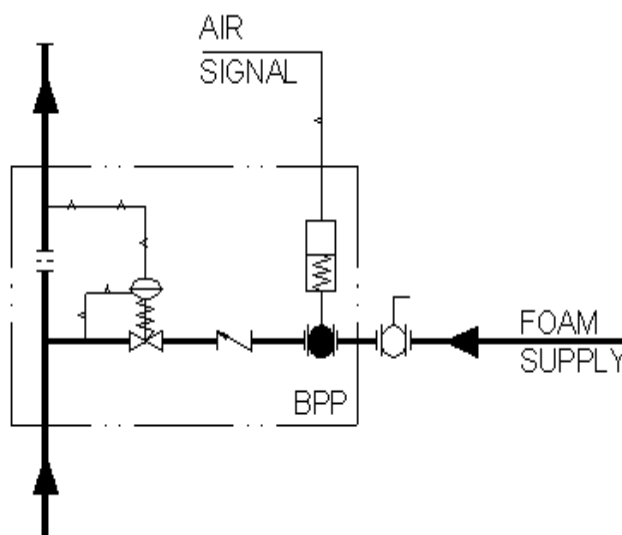
### Options

Proportioner:

- Bronze
- 316SS
- Alubronze
- Super Duplex Stainless Steel
- 6mo

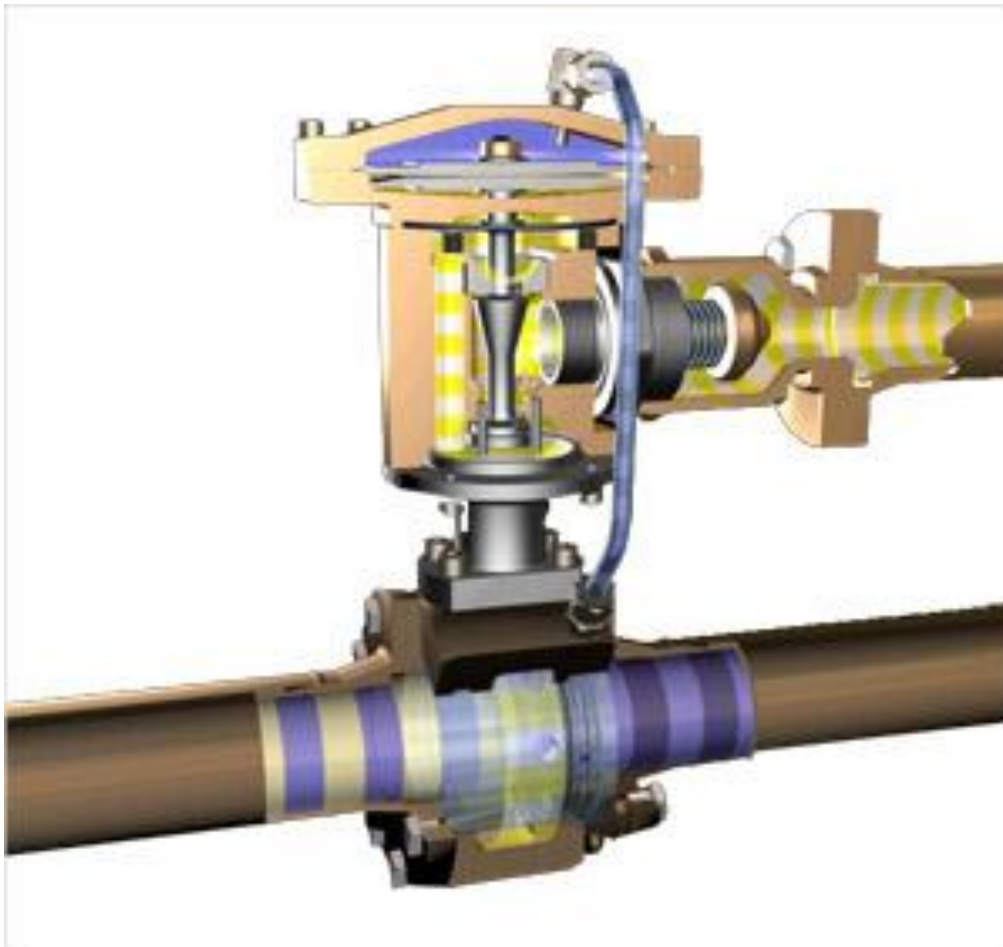
**Working pressure:** 20 barg (290 psig)

**Test pressure:** 30 barg (435 psig)



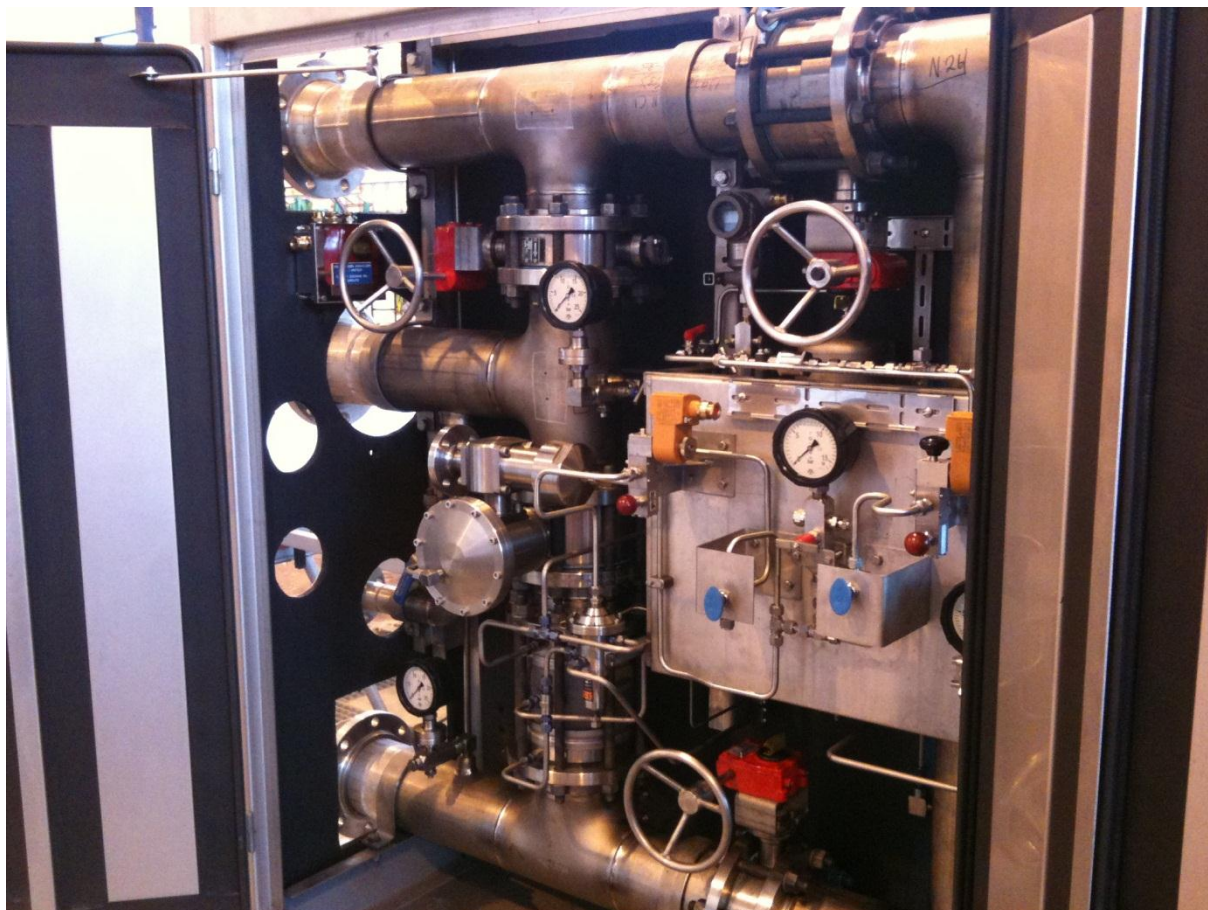
**Figure 2: P&ID**

## Foam Applications



**Figure 3: Operation Principal**

## Foam Applications



**Figure 4: Deluge Skid w/ Balanced Pressure Proportioner Design**

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## Foam Applications

### Foam Inductor

The foam inductor has no moving parts and is therefore the most reliable foam induction device. However, inductors are limited to a known fixed flow and pressure. Modifying the inlet flow or pressure will most likely result in the modification of nozzle dimensions and recalibration of insertion element.

This inductor can pickup foam liquid from a tank below it as a result of a vacuum created by water passing through the venturi. A minimum of 30% drop of pressure is necessary for the inductor to work properly. This pressure drop must be taken into consideration during calculation of system parameters both upstream and downstream of the inductor.

Foam Inductors are delivered with a check valve as an integrated part of the unit. It can also be delivered with a special shut off valve that prevents leakage from the foam tank if the foam level is higher than the inductor. This valve operates through the water pressure upstream of the inductor. The valve will open and operate as a check valve once inlet pressure is present at the inductor.



**Figure 5: Matre Inductor**



## Standard Material

Proportioner: Titanium gr. 2

## Installation

Mount: 

- Flanged
- Wafer
- Threaded

Foam Supply: Non-Pressurized

## Operation

Manual and/or automated with F&G system.

## Options

Proportioner: 

- Bronze
- 316SS
- Alubronze
- Super Duplex Stainless Steel
- 6mo

**Working pressure:** 20 barg (290 psig)

**Test pressure:** 30 barg (435 psig)

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## Foam Applications

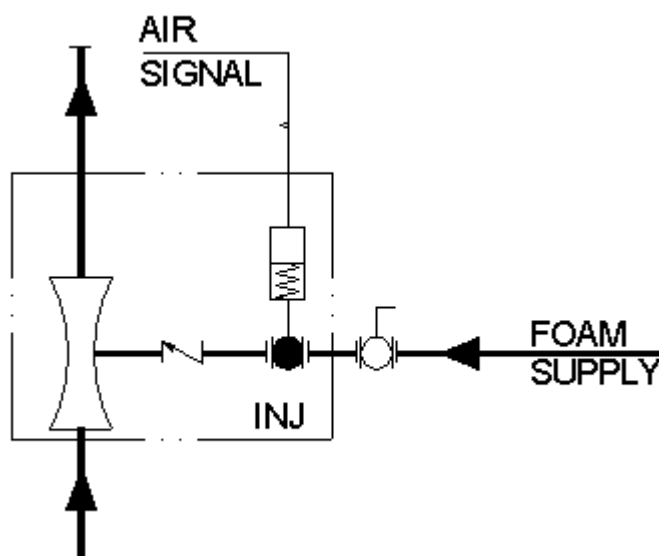


Figure 6: P&ID

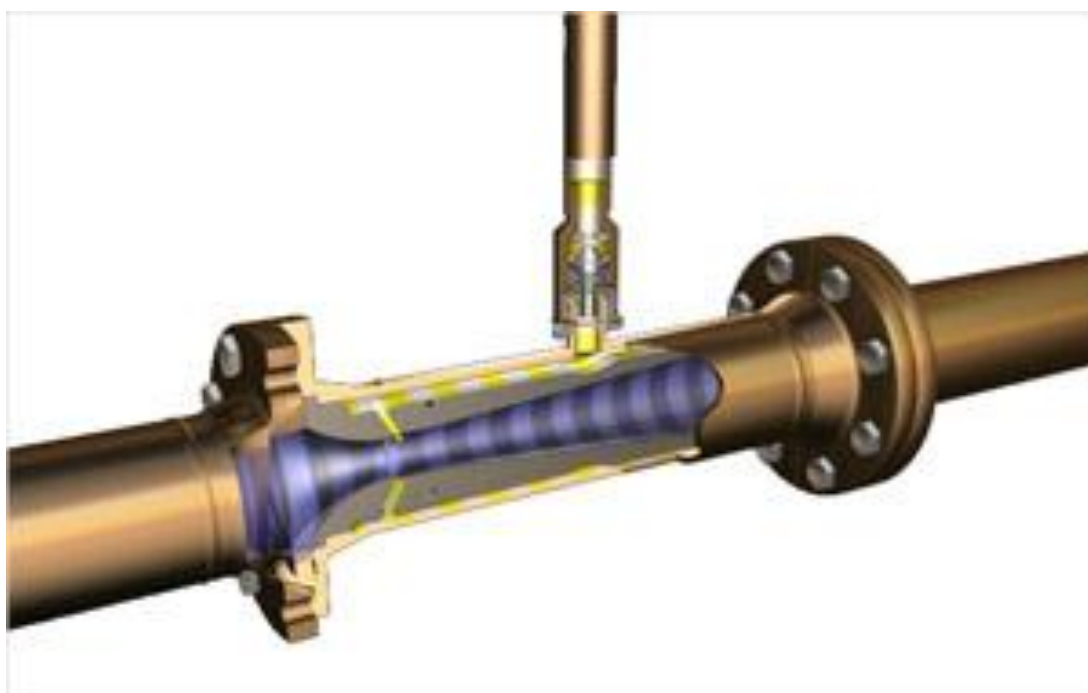
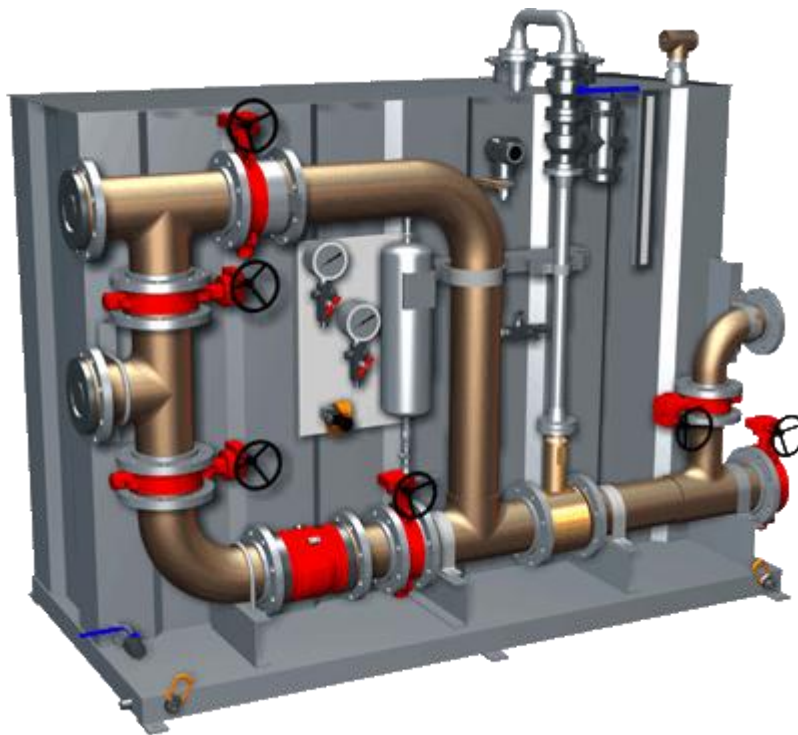


Figure 7: Operation Principal



## Foam Applications



**Figure 8: Open Skid w/ Local Tank and Inductor**

## Foam Applications

### Constant Flow Device

The constant flow device is a preferred method to proportion foam concentrate with a pressurized foam concentrate supply and fixed flow rate. The constant flow control device utilizes a flexible rubber control ring with an orifice diameter that responds instantly to fluctuations in foam concentrate pressure. As pressure differential increases, the orifice diameter reduces to maintain the pre-set flow rate. Likewise, as pressure reduces, the orifice opens up to maintain the pre-set flow rate.

The constant flow device is useful in designing hydrants and hose reels with a pressurized foam supply. Unlike inductors the constant flow device is small and thus a smaller footprint for the entire assembly is achievable. The constant flow device is not limited to hose reels and hydrants etc. as FPE has utilized this design in deluge systems as well.

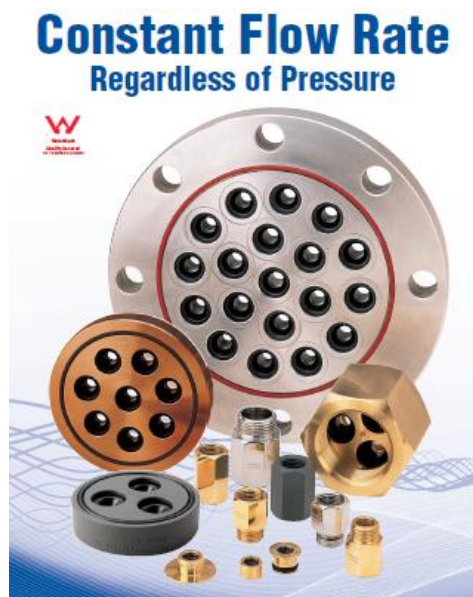


Figure 9: Maric Constant Flow Valve



## Standard Material

Proportioner: 316SS

## Installation

Mount: 

- Wafer
- Threaded

Foam Supply: Pressurized

## Operation

Manual and/or automated with F&G system.

## Options

Proportioner: 

- Bronze

**Working pressure:** 20 barg (290 psig)

**Test pressure:** 30 barg (435 psig)

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## Foam Applications



**Figure 10: Constant Flow Device w/ Pelton Pump**

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### Inline Foam Proportioning Pump

The inline foam-proportioning pump utilizes firewater flow to pressurize a non-pressurized foam supply and proportion it at the rate specified by project. The inline foam-proportioning pump is limited to a fixed flow and pressure with minimal tolerance and therefore each deluge valve / system requires the inline foam pump proportioner.

The unit is flanged (ANSI B16.5) on each end and is in the shape of an elbow. The inline turbine foam pump is a direct proportioning unit.

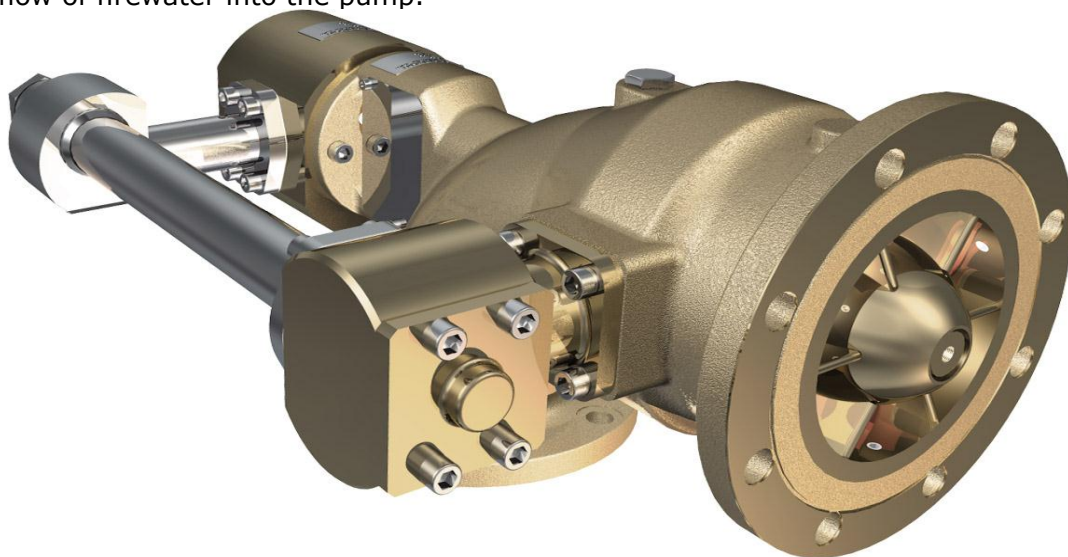
The Matre inline foam pump proportioner consists of two main components, turbine and AFFF pump.

The turbine is driven by the water flow and will rotate proportionally with the velocity of the water stream. The rotor is directly linked to the external AFFF pump by the turbine drive shaft.

The AFFF pump is a positive displacement pump, and its size is adjusted to the percentage of AFFF required. The special pump works in principle like a gear pump, but it can work at higher rpm speeds and is more accurate than a gear pump.

The turbine rotor blades and guide blades are permanently adjusted and set to give the volume pump the exact speed to pump AFFF concentrate into the firewater. The concentrate is pumped to the turbine casing and fed into the firewater-flow by the rotor blades through a circumferential slit in the turbine casing. Here AFFF is whipped evenly into the water. The accuracy is +/- 10% deviation for set point over the flow range.

A check valve is fitted at the turbine casing where the AFFF is induced to prevent backflow of firewater into the pump.



**Figure 11: Matre Inline Foam Pump Proportioner**

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## Foam Applications

### Standard Material

Proportioner: Titanium gr. 2

### Installation

Mount: • Flanged

Foam Supply: Non-Pressurized

### Operation

Manual and/or automated with F&G system.

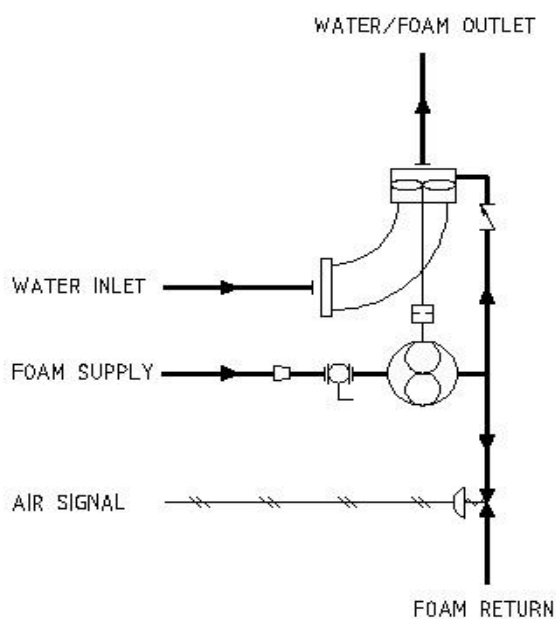
### Options

Proportioner:

- Bronze
- 316SS
- Alubronze
- Super Duplex Stainless Steel
- 6mo

**Working pressure:** 20 barg (290 psig)

**Test pressure:** 30 barg (435 psig)



**Figure 12: P&ID**

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## Foam Applications



**Figure 13: Operation Principal**

## Foam Applications



**Figure 14: Inline Foam Turbine Pump Proportioner**

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### Water Driven Pelton Wheel Foam Pump

The pelton wheel water driven foam pump is utilized to pressurize foam concentrate for insertion into the firewater stream via balanced pressure (deluge or sprinkler systems) or constant flow (deluge systems) proportioners. This design can be used in skids that have a local foam tank integrated into the skid design or gravity fed foam supply from the platform.

A Pelton wheel turbine drives the pump, i.e. the pump is water powered. A separate water supply off of the fire main within the skid feeds the pelton wheel via an actuator valve. Operating this valve will power the pelton wheel turbine and the foam pump will start to supply foam at the preset pressure.

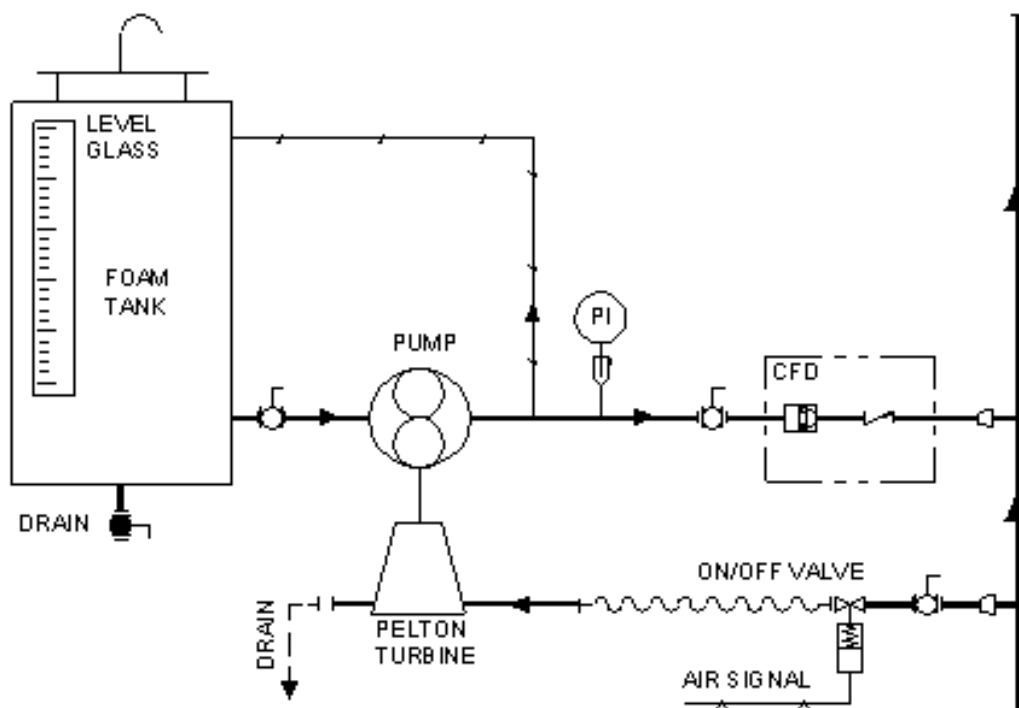
The water utilized to power the pelton wheel is discharged typically into a box that is connected to a fixed drainpipe. When designing pelton wheel foam pumps it is critical to account for the drain.

FPE utilizes Albany pelton pumps, which are supplied in gunmetal construction for seawater with 316SS for foam concentrate.



**Figure 15: Albany Pelton Pump on Discharge Box**

## Foam Applications



**Figure 16: P&ID**

Note the constant flow device is incorporated in above complete with a check valve to prevent seawater from entering the foam supply.