

# DESIGNING *for* SFFF: *The* PROPORTIONING *challenge*

Industrial Firefighting

Per Aredal of Firemiks AB explores proportioning challenges in transitioning to fluorine-free firefighting foams

**T**he phase-out of fluorinated foams and the move towards synthetic fluorine-free firefighting concentrates (SFFF) is one of the most significant material shifts the fire protection industry has navigated in decades.

For those specifying or operating fixed suppression systems, the change raises an important and often underestimated question - not just which concentrate to use, but whether the proportioning system in place can handle what comes next. Per Aredal, International Sales Director at Firemiks AB, makes the case that getting the proportioning system right is where future-proofing the installation begins.

## Water-driven volumetric proportioning

At its core, a water-driven volumetric pump proportioner is ingeniously self-

regulating. The system relies on positive displacement for both its water motor and concentrate pump. The water motor - driven entirely by the flow of extinguishing water - powers the concentrate pump, which injects the correct amount of firefighting concentrate into the water stream.

The dosing ratio is determined by the volumetric relationship between the two components, requiring no electricity, engines or power take-off (PTO) units.

This autonomy has direct operational consequences. Start-up and commissioning are straightforward, and the system is less susceptible to the failure modes that come with dependence on external power or fuel.

Installation can be decentralised (placed close to the hazard) which can meaningfully reduce response times in demanding environments.

**“Installation can be decentralised (placed close to the hazard) which can meaningfully reduce response times in demanding environments.”**

### Four decades of refinement

The FIREMIKS system is rooted in the volumetric water motor design first developed in the late 1970s by the grandfather of the company's current management. What began as an innovative mechanical concept has been continuously refined over more than four decades, yielding a wide operating range across both flow and pressure.

The self-regulating nature of the system is one of its defining characteristics. It accurately tracks flow changes and oscillations in real time, remaining largely unaffected by pressure variations across its operating range. A single unit can cover varying fire area sizes or service multiple simultaneous fires and does so without requiring recalibration when conditions or concentrates change.

The concentrate storage arrangement adds further flexibility. An atmospheric tank configuration makes it easy to inspect concentrate levels, take samples and replenish or swap tanks even during active firefighting operations.

Fixed and mobile tanks - including IBC containers or tank trailers - can be combined for uninterrupted operation. For installations

requiring periodic performance verification, the optional Dosing/Return Valve (DRV) with dual flow meters allows accurate testing without releasing any concentrate to the environment, reducing both cost and disposal concerns.

### Certified for variable viscosity

Perhaps the most significant aspect of the FIREMIKS range is its FM approval classification as a "Variable Viscosity Pump Proportioner." Under FM Standard 5130 (May 2021), eighteen 3% models across seven flow sizes - 450, 800, 1800, 2400, 4000, 6000 and 8000 lpm - have been certified to maintain accurate dosing across a very wide viscosity range: from 1 cP up to 7,288 cP at a shear rate of 5 l/s.

This is particularly relevant as the industry transitions to SFFF concentrates, many of which are non-Newtonian and exhibit higher viscosity than their AFFF predecessors. Unlike bladder tank systems, which are typically designed around a narrow viscosity window and require recalibration if the concentrate or its properties change, a FIREMIKS unit does not need recalibration when a different concentrate is introduced, provided its viscosity falls within the certified envelope. ▶

Shear rate 1/s	Viscosity (cP)		
	450 & 800 lpm	1800, 2400 & 4000 lpm	6000 & 8000 lpm
5	3934	6422	7288
10	2141	3545	3942
20	1157	1945	2110
50	529	882	959
100	302	497	533
600	80	128	132

See above for the shear rate curves approved for our different FM-approved models.

If a concentrate's shear rate curve falls at or below the figures for a given unit size, it will perform within approved dosing tolerances, including the latest generation of fluorine-free concentrates. For installations requiring flows above 8,000 lpm, two units can be configured in parallel, either on a base skid or in a "double-decker" arrangement, to reach 12,000 or 16,000 lpm.

### Why proportioning system choice matters

The shift to SFFF is not a simple one-for-one swap. It involves regulatory compliance, environmental assessment, logistics and equipment compatibility - each link in a long chain. Firemiks focuses specifically on one critical link: ensuring that the proportioner can deliver the correct dosing rate regardless of viscosity, within approved limits.

The practical implications are straightforward. A variable viscosity system means no need to replace or recalibrate the proportioner when switching concentrate suppliers or brands. It means minimal downtime if a change becomes necessary for operational, commercial or regulatory reasons.

And it means reliable performance even as concentrate viscosity shifts due to ageing, temperature fluctuations or batch variation - provided the concentrate remains within the approved viscosity envelope.

For specifiers and end users planning installations that may span several decades, this is not a trivial consideration. The concentrate landscape is still evolving, and future-proofing an installation against that uncertainty is a sound engineering decision.

### Matching the pump to the application

One further differentiator in the FIREMIKS range is the availability of two concentrate pump types - piston and gear - each suited to distinct application profiles and viscosity characteristics.

Piston pump models use a reciprocating mechanism in which the plunger draws in and then expels concentrate in each revolution, taking the fluid from zero to maximum shear rate twice per cycle. For lower viscosity and non-Newtonian concentrates up to FM-approved viscosity, this works well and the piston configuration performs particularly effectively in applications with low start-up flows relative to



Per Aredal  
Firemiks AB

maximum flow, such as sprinkler systems. The wide operating range makes it a versatile choice across many installation types.

Gear pump models take a different approach. Counter-rotating gears generate a smooth, consistent flow without agitation, which makes them well-suited to handling very high-viscosity fluids - particularly those that exceed the shear rate envelope verified by FM approval for the piston pump models.

**“The wide operating range makes it a versatile choice across many installation types.”**

This characteristic makes gear pumps the preferred option for deluge systems, large fire monitor installations and any application operating at the higher end of the maximum flow range.

When advising clients, Firemiks prioritises understanding the concentrate type and viscosity alongside flow and pressure requirements before recommending a pump type - ensuring that the specified system performs reliably across its full operating life.

Per Aredal is International Sales Director at Firemiks AB, with more than 35 years of experience in the design, production and global delivery of water driven volumetric pump proportioners. He can be reached at [per.aredal@firemiks.com](mailto:per.aredal@firemiks.com), +46 76 139 70 34, or via [www.firemiks.com](http://www.firemiks.com).



# WATER DRIVEN VOLUMETRIC PUMP PROPORTIONERS

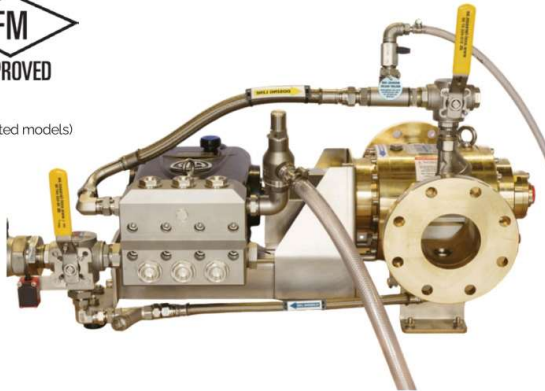
FOR FOAM FIRE FIGHTING



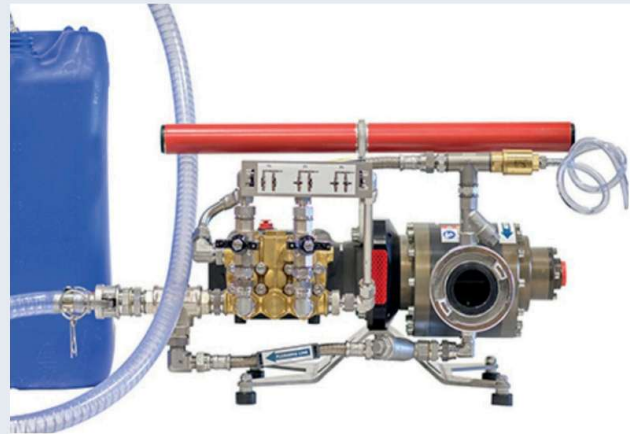
## PROVEN PERFORMANCE WITH FLUORINE-FREE FOAM



(Selected models)



FIREMIKS For Industrial and Sprinkler Firefighting Piston pumps (-PP) are well suited for systems with wide flow range, for example sprinkler systems and Gear pumps (-GP) are particularly suited for working in deluge installations and with large flow monitors.



FIREMIKS Mobile unit for Fire Brigades  
With a FIREMIKS the firefighters get a flexible resource, easy to adapt to different firefighting situations. FIREMIKS works within a wide pressure and flow range giving a precise and steady dosing rate.

### EASY TO INSTALL

COMPACT DOSING SYSTEM  
WITH NO NEED FOR PRESSURE  
TANK OR ADDITIONAL ENERGY  
SUPPLY

### EASY TO OPERATE

RELIABLE MECHANICAL  
PROPORTIONER

### EASY TO TEST

COST EFFECTIVE AND LOWER  
ENVIRONMENTAL IMPACT