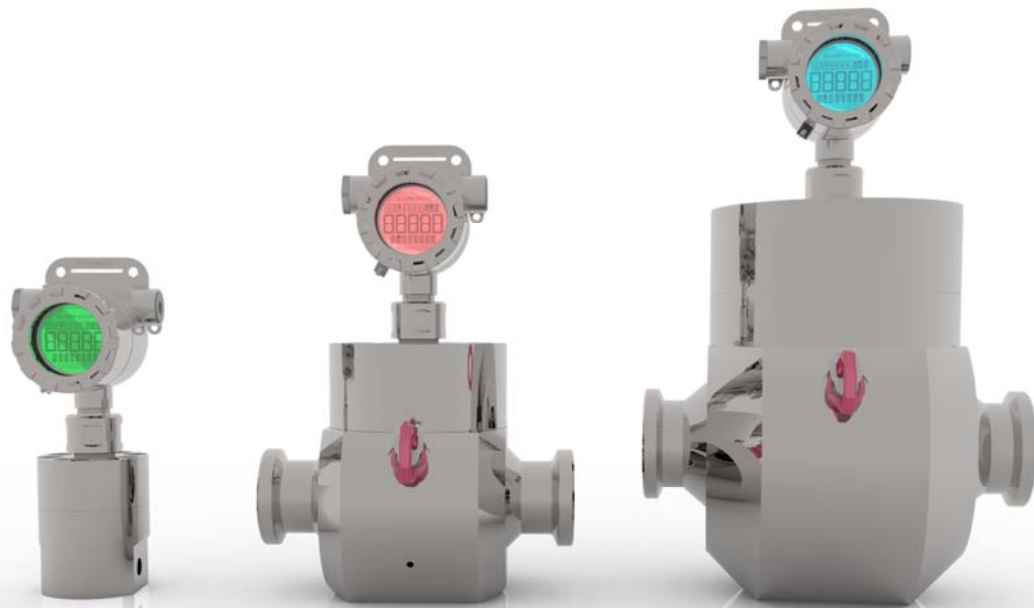


Flowmeters for Sodium Hypochlorite





LITRE METER
Specialist flow measurement engineering

Sodium Hypochlorite

Sodium hypochlorite is a green/yellow liquid with the characteristic smell of chlorine. It was first used as a bleaching agent and was then discovered to be effective in controlling wound infections. Subsequently, it is most commonly known as household bleach. The solution exhibits broad spectrum anti-microbial activity and is widely used in healthcare facilities in a variety of settings. It is usually diluted in water depending on its intended use.

In the chemical injection arena, it is common to inject sodium hypochlorite into sea water. Sea water can contain dissolved oxygen, bacteria and solids. These can affect an oil reservoirs life. Hypo is used as a bactericide whilst filters take care of the solids. Hypo is aggressive before it is diluted in the sea water and therefore requires some specialized devices in terms of wetted materials.

Litre Meter have been manufacturing flowmeters since 1975. We've always concentrated on the harder margins of metering typically at low flows and/or at high pressure. For this application note Litre Meter illustrate two solutions to this application based on <20 % solution.

Key Features

- Rotary Piston/ Oscillating Piston type or Pelton Wheel turbine flow meter have a single moving part which provides robust and low maintenance technology.
- NaOCl - Sodium Hypochlorite (<20%)
 - 2% solution - refers to shock chlorination of wells
 - 3-6% solution - refers to household disinfectant, laundering clothes, dentistry root canal treatment, antiseptics of mammary glands in dairy industry, disinfectant in hospitals, food processing, mushroom production, hog, beef, and poultry productions, maple syrup production, fish processing, etc.
 - 12-16% solution - refers to disinfectant in swimming pools, water treatment, waste water treatment
 - Note: *The higher the sodium hypochlorite strength, the faster the decomposition rate becomes*
- Available materials of construction: Hastelloy (UNSN10276), Titanium (UNS R50400) and uPVC.
- Connections: Flange or thread preferred but more on request.

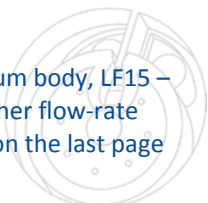
Sodium Hypochlorite Flowmeters - Applications and Rates - VFF



The VFF has successfully metered fluids such as oils, hydraulic fluids, corrosion / wax / demulsifier / pour point dispenser / scale / hydrate inhibitors, biocides, oxygen scavengers, etc. for over 30 years. Meter bodies are produced in a variety of high grade materials which offer good chemical and environmental resistance. For sodium hypochlorite, Litre Meter recommend Titanium for the body and chamber with carbon graphite for the actual rotary piston. This ensures maximum compatibility, life and accurate response. The magnet is either encapsulated in titanium or PTFE.

Applications for flow-rates as low as 0.5 litres per hour have been supplied. Normal minimum flow rates depend on operating viscosity. In this case, viscosity is assumed to be between 1 and 2.5cP. Using the smallest VFF with carbon graphite rotor (LF15) and calibrating on water, which has a lower viscosity than NaOCl, a range of 0.5 to 40 L/hr is achieved.

The meters range in size from the smallest titanium body, LF15 – 40 L/hr, to the largest V270 - 270 L/min max. Higher flow-rate meters are available to special order. The table on the last page assists in the selection of the best technology.



Sodium Hypochlorite Flowmeters - Applications and Rates - Pelton



Litre Meter started manufacturing the Pelton Wheel turbine in 1975. These usually had some stainless steel components together with a plastic rotor, elastomer seals and sapphire bearings. All plastic versions soon followed, including all Polypropylene, all PFA, all PVC and all PVDF. The other wetted parts are still sapphire with a suitable elastomer such as FKM or FFKM for the single O ring seal.

The normal specification for Sodium Hypochlorite compatible Pelton Wheel flow meters is now PVC for the main body and cap with PVC or titanium internals, sapphire bearings, an FKM O-ring and PFA rotor.

The Pelton Wheel is an economical device with low pressure ratings and needs to have relatively steady state non-pulsing flows.

The table on the last page assists in the selection of the best technology.

Compatible Materials

Due to the nature of Sodium Hypochlorite only a select group of tested materials is recommended by Litre Meter. We tailor our meters using three key materials, developed over 30 years of measuring Sodium Hypochlorite:

Typical Material and Pressure Ratings	
Material	Maximum Pressure (bar)
PVC	15
Hastelloy (UNS N10276)	1035
Titanium (UNS R50400)	1380

These material make up the body and the cap of the meter. The seals between the meter body and cap are normally FKM. Other seal materials include FFKM and PTFE. All Seals within the meter are fully compatible with Sodium Hypochlorite.

Physical and Chemical Properties of 12% Sodium Hypochlorite

Physical State	Liquid
Odour and Appearance	Strong chlorine odour. Clear, greenish-yellow solution.
Specific Gravity	1.17 at 20°C
Boiling Point	Slowly decomposes above 40°C.
Freeze/Melting Point	-15°C
pH	< 12
Molecular Weight	74.44

For Further information about Sodium Hypochlorite please contact us.

Flow ranges and references

All Litre Meter manufactured flowmeters are custom calibrated across the customer specified minimum to maximum flow conditions and working viscosity. The minimum flow rates achievable are dependent on fluid viscosity. With sodium hypochlorite, in most normal concentrations, water is used as the calibration medium as this proves to be the best for accurate calibration representation. The table below assists in selecting which technology is preferred.

Normal engineering materials like 304 and 316 stainless steel, aluminium, brass and steel are unsuitable due to the aggressive nature of the free chlorine in the Sodium Hypochlorite. Plastics such as PVC and PTFE are suitable together with Hastelloy C and purer grades of Titanium.

Comparison table:

	VFF Rotary Piston	LM or MM Pelton Wheel
0.5 to 16,800 l/hr	One of a range from LF15 to VFF270	
0.6 to 30,000 l/hr		One of a range from LM01 to MM50
0.5 to 1000 l/hr normal range	Usually LF15, MF30, VFF4 or VFF8	
0.6 to 30,000 l/hr normal range		One of a range from LM01 to MM50
Pulsing pump	Yes	Avoid pulsing flows, relatively stable flow are required
Up to 15 bar	Yes	Yes
Over 15 bar	Yes,	No, limited by plastic
Materials of Construction for body and cap	Hastelloy (UNSN10276), Titanium (UNS R50400)	Hastelloy (UNSN10276), Titanium (UNS R50400) and uPVC
Materials of Construction for rotor	Carbon graphite	PFA
Materials of Construction for seal	FKM or FFKM	FKM or FFKM

Areas of key significance:

- Extended experience in measuring sodium hypochlorite in Process and Oil & Gas applications.
- World leaders in low flow and high pressure measurement.
- High or low viscosity fluids flow measurement.
- The Flow Measurement Specialists.

Project	Portion	Primary	Region	Scope	Year	Installed	Application
Western Isles	CI and Methanol skids	Dana Petroleum	North Sea	LF05 x 47, HF40 x 12, LF15 x 24 etc	2014	North Sea	Methanol, Corrosion, Scale, Wax Inhibitor, Sodium Hypochlorite
Valemon	CI	Statoil	North Sea	VI25 and LF05 in titanium, VI25 with Galperti hubs.	2013	North Sea	MEG, Sodium Hypochlorite

Litre Meter can provide optimum solutions for a wide range of flow rates of Sodium Hypochlorite. Using a variety of materials, a flowmeter can be constructed that handles any specific concentration of NaOCl and provide a display and/or output for measurement and control.



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