

## Technical Profile

### VapourView®

Non-Intrusive 'Gas-in-Liquid'  
Detection Instrument

The VapourView® instrument provides vital information to the end-user on the presence of gases in a pump's internal flow regime and forewarns of adverse conditions likely to affect bearing lubrication or magnetic coupling cooling. Early intervention by system engineers, who can undertake remedial action, will maximise the operating life of plant equipment.

This innovative, non-intrusive instrument uses an ultrasonic signal to detect the presence of gas in a liquid stream from outside the confines of the pump pressure boundary.

VapourView® consists of two major components:

- the ultrasonic sensor probe
- the pulser/receiver unit and junction box

The ultrasonic sensor probe is fed through the magnet drive coupling housing so that it locates against the outside of the containment shell (non-invasive to the process liquid). This eliminates the need for additional sealing in a harsh process liquid system.

The pulser/receiver unit and its junction box, connected together, are mounted externally to the pump and are suitable for hazardous areas. This allows straightforward access for installation into a control system.

#### Key Design Features

- Real time condition monitoring
- Detects liquid phase change
- Intrinsically safe sensor
- Flameproof electronics
- Local visual indicators
- On board data recording
- Non-invasive detection
- 4-20mA output signal
- Wide temperature operating range (-40°C to 180°C)
- Higher MTBF / Higher MTBR
- Retrofittable to GSP Frames 1, 2 & 3 pumps (check with HMD)

#### Benefits of VapourView®

- Complete sealless pump security
- Eliminates potential for dry running
- Ensures correct priming and venting
- Improved and consistent reliability
- Prevents catastrophic failure
- No unexpected repair costs
- Reduced cost of ownership
- Increased process and profitability
- Adaptable for many applications
- Suitable for hazardous environments
- Compatible with existing systems
- Complies with relevant standards

### HMD Kontro



#### Applicable to Pump Range

Frame Size	Pump Range
1	GSP
1	GSPV
1	HPGS
1	HPGSP

Frame Size	Pump Range
2	GSA/GSI
2	GSP
2	GSPV
2	GSPLF
2	LMV-801S
2	HPGS
2	HPGSP
2	GSPX

Frame Size	Pump Range
3	GSP
3	HPGSP
3	GSPX

VapourView® is not suitable for the GT, GSA Frame 0 and GSI Frame 0 pump ranges. GSA Frame 1 and GSI Frame 1 availability depends on magnetic coupling size. Consult with HMD engineering.

## Principle of Operation

VapourView® works by detecting a change of state in the internal flow regime, and does so instantaneously. This is a primary effect and is in contrast to the traditional Temperature and Power Control Monitoring methods, which only sense the delayed secondary effects on the flow conditions, with the inevitable time lag inherent in the process.

Specifically developed ultrasonic technology senses the presence of gas in the product being pumped, enabling plant operators to intervene quickly to deal with what could be incorrectly primed or vented pump conditions, entrained process gas or incipient vapourisation. This mitigates damage and minimises unscheduled maintenance action so maximising the life of plant equipment in the long term.

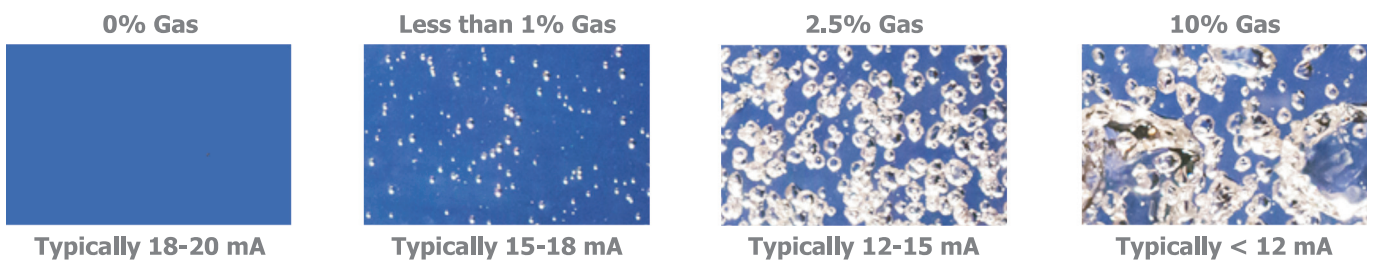
The device constantly looks for:

- Large bubbles – which have dissimilar acoustic impedance between gas and liquid
- Small bubbles – which attenuate the sound energy by scattering and absorption

The ultrasonic signal crosses the containment wall and passes through the liquid inside until it is 'bounced' back from a location within the pump. This occurs at 10 kHz or 10,000 times per second. By measuring the time and magnitude of the return signal, the condition of the fluid can be ascertained. Varying levels of gas bubbles in the liquid stream are detected by the change to the ultrasonic signal the gas causes, by scattering, absorption and the different acoustic impedance (the speed at which sound travels through a medium) of gas and liquid.

## Visual Representation of Typical Gas Concentrations

Images are for guidance only



## Electrical Specifications

The signal output from the VapourView® 'gas in liquid' detector is via a pair of 4 to 20 mA current loop wires, making it easy to interface with most digital control systems (DCS). The DCS wiring uses shielded or twisted pairs of 24 AWG or larger wire, and should not exceed 1500m (5000 feet) in length, to yield best results and ensure optimum communication.

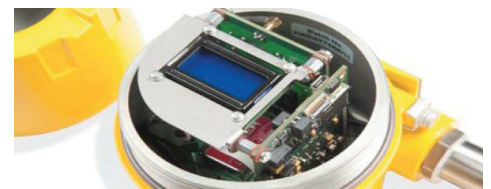
The unit is powered from a dedicated 24 Vdc supply with less than 2% ripple. An external earthing points is provided on the instrument enclosure.

The two power leads are separate from the two signal leads. A fifth lead provides a reset switch for the alarm.

Terminal	Colour	Function
1	Brown	4-20mA Loop Return
2	Red	4-20mA Loop Out
3	Orange	24Vdc

Terminal	Colour	Function
4	Yellow	Ground
5	Green	Alarm Reset
6	Unused	N/A

The signal can either be configured to be proportional to gas content, or can be used as a trip switch to prevent dry-running of the pump. Long term data logging is programmable via an on-board microSD card.



**Note: VapourView® is not suitable for 2 wire signal loop powered installations.**

## Output Signals

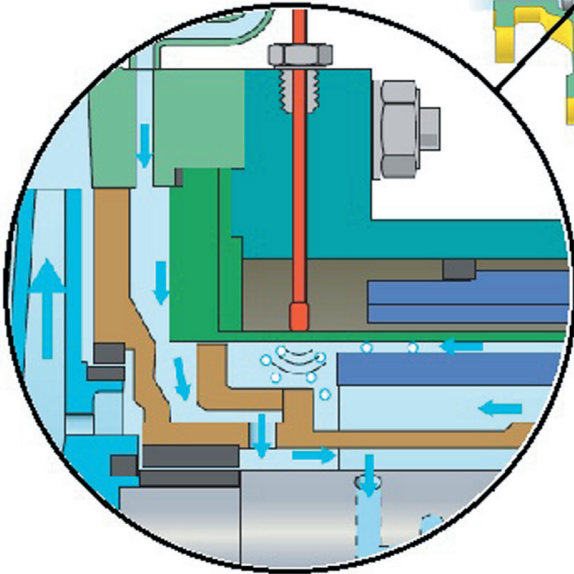
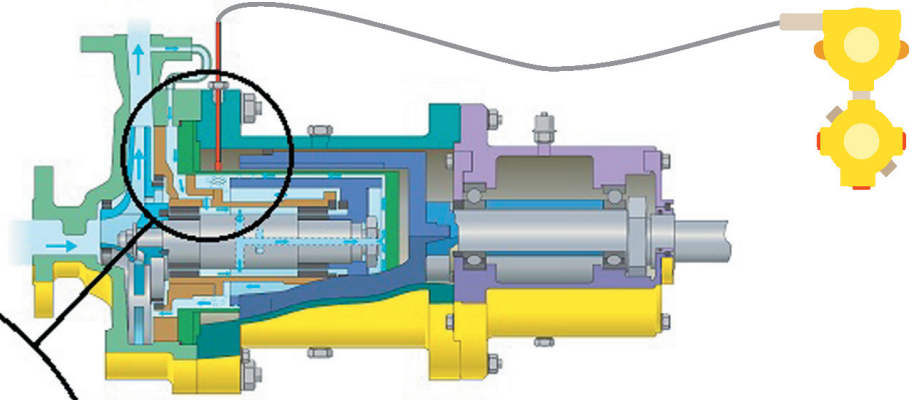
System Condition	LCD Display	*Proportional DCS Signal (mA)	*Trip Switch DCS Signal (mA)
All liquid	OK	20	20
Gas present	Gas	20 > DCS > 12	12**
High gas levels	STOP	12 > DCS > 4	4
System loading	LOADING	-	-
System error	ERROR	-	-

\* Note that either a proportional output signal or a trip switch output signal may be configured at any one time.

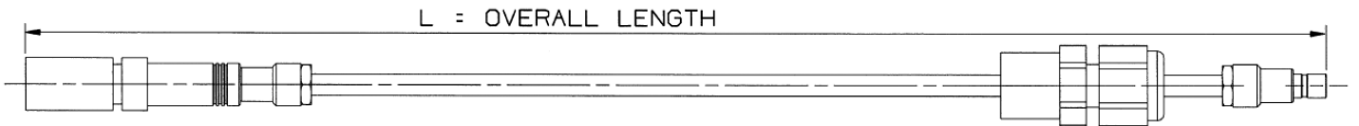
\*\* Guidance value only. Actual value to be established after taking into account specific application.

## Sensor Probe Lengths

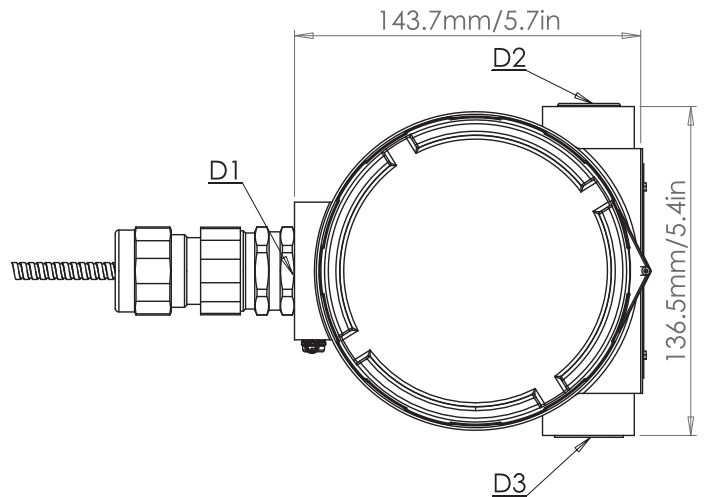
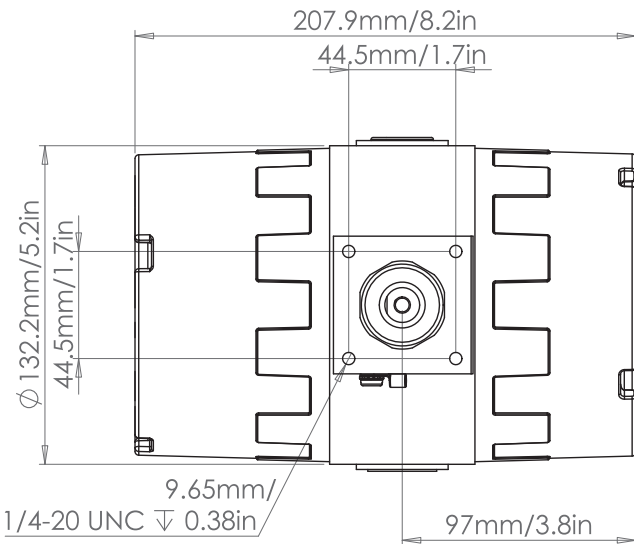
The sensor probe is available in a variety of lengths to suit the pump ranges tabulated below.



Frame Size	Pump Range	Sensor Probe Length L	Frame Size	Pump Range	Sensor Probe Length L
1	GSP	125mm/5in	2	GSPLF	200mm/8in
1	GSPV 6"	150mm/6in	2	HPGS 6" 8" 10"	150mm/6in
1	GSPV 8"	175mm/7in	2	HPGS 13"	200mm/8in
1	HPGS	175mm/7in	2	HPGSP 6" 8" 10"	150mm/6in
1	HPGSP	175mm/7in	2	HPGSA/HPGSP 13"	200mm/8in
2	GSA 6" 8" 10"	150mm/6in	3	GSP 13"	175mm/7in
2	GSA 13"	200mm/8in	3	GSP 15"	200mm/8in
2	GSP 6" 8" 10"	150mm/6in	3	GSP 21"	300mm/12in
2	GSP 13"	175mm/7in	3	HPGSP 13"	175mm/7in
2	GSPV	175mm/7in	3	HPGSP 15"	250mm/10in



## Instrument Dimensions



## Enclosures

The electronics enclosure cover and the junction box cover can both be removed for access, outside of an explosive environment. The junction box cover needs to be removed to access the electrical terminals for the power supply and signal wire terminations. The electronics enclosure cover needs to be removed to access the microSD card.

## Cable Entry

The junction box has three M20 threaded cable entry points. Suitably rated cables and cable glands (not included) should be used in order to maintain the explosive rating certified for the VapourView® instrument.

## Installation

The integral gland on the sensor probe is screwed into the 1/8" NPT port of the pump coupling housing. The probe is then pushed through the gland until the radial sensor head locates against the containment shell. Finally the integral gland is tightened into position to create a pressure seal.

## Environmental Limitations

Best practice is to mount the VapourView® instrument in a position where it is subjected to minimal ambient temperature change. The instrument electronics, temperature operating limits are -40 to 60°C (-40 to 140°F).

## Temperature Limitations

The process temperature limitations for the VapourView® sensor head are -40 to 180°C (-40 to 356°F).

## Mechanical Limitations

Mount the VapourView® instrument so that it is not susceptible to vibration and shock loads and does not have external contact with corrosive materials.

## Shipping Weights

The unpackaged weight of the VapourView® instrument and sensor probe is 2.94 kg.

## Connection

The sensor connection is via a Sub Miniature version A (SMA) co-axial connector.

## Physical Specifications

The enclosure is Aluminium Alloy (Al Al) and is rated to IP68.

## Materials of Construction

Item	Material
Enclosure	Glass and Aluminium Alloy
Armoured Cable Gland	Stainless Steel
Armoured Cable	Stainless Steel
Blanking Plugs	Stainless Steel
Co-axial Connectors	Gold plated Beryllium Copper
Radial Sensor Body	Stainless Steel
Sensor	PZT (Lead Zirconate Titanate)

## Mounting Specifications

Item	Dimensions
Connection Probe Gland	1/8" NPT
Terminal Box Entry	3/4" NPT
Sensor Connector	(SMA) Sub Miniature Version A

## Enclosure Specifications & Explosive Atmosphere Certifications

Item	Detail
Enclosure	Adalet XDHLFGCX

## Hazardous Location Certification

- cUL file number: E467941
- Pulsar/receiver unit certification:  
cUL class 1, division 1, groups B, C and D.  
Temperature code T4
- cUL sensor rating:  
Class 1, division 1, groups A, B, C, D  
Temperature code T6 - T1



Sundyne Headquarters:

### Sundyne, LLC

14845 West 64th Avenue  
Arvada, Colorado 80007  
USA  
1-866-Sundyne  
Phone: 1 303 425 0800  
Fax: 1 303 940 2911  
www.sundyne.com

Sundyne United Kingdom:

### Sundyne HMD Kontro Sealless Pumps

Marshall Road  
Hampden Park Industrial Estate  
Eastbourne East Sussex, BN22 9AN  
United Kingdom  
Phone: +44 (0)1323 452000  
Fax: +44 (0)1323 503369

Sundyne China:

### Sundyne Industrial Equipment (Tianjin) Company Limited

Building 1, No. 879 Shen Fu Road  
XinZhuang Industrial Zone  
Min Hang District  
Shanghai, China 201108  
Phone: +86 21 5055 5005  
Fax: +86 21 5442 5265

Sundyne France:

### Sundyne International S.A.

13-15, Bld. Eiffel - B.P. 30  
21604 Longvic Cedex  
France  
Phone: +33 (0)3 80 38 33 00  
Fax: +33 (0)3 80 38 33 66

Sundyne Spain:

### Sundyne Marelli Bombas, S.R.L.

Ctra. Madrid-Toledo, Km.30.8  
45200 Illescas  
Toledo, Spain  
Phone: +34 925 53 45 00  
Fax: +34 925 51 16 00

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ATEX VapourView TP 2.0 04/16 A4 Eng.