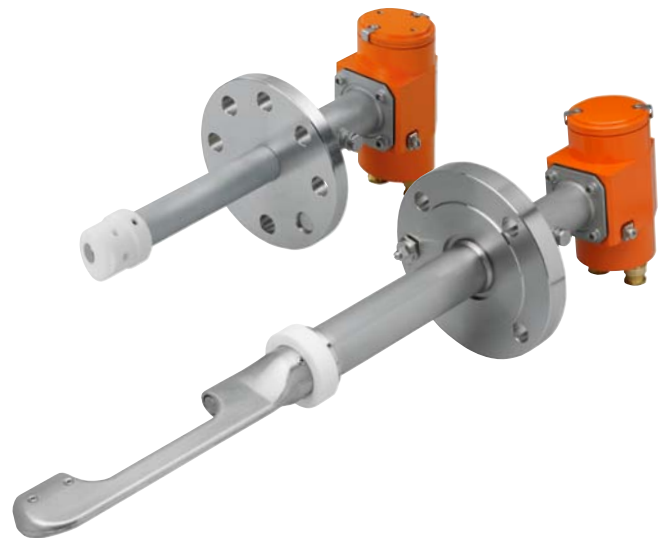


FLOWSIC100 Flare Ultrasonic Mass Flow Meter

Gas Mass Flow Measurement for
Flare Gas Applications



FLWSIC100 Flare – The reliable mass flow measurement for flare and vent gas applications

AREAS OF APPLICATION

- CO₂ emission monitoring for compliance with government regulations
- Valve leakage detection and gas identification
- Optimization of steam usage in flare gas systems
- Gas wastage reduction
- Accurate mass balance calculations and process optimization

FLWSIC100 EX-S

- Cross-duct high speed version (patent pending)
- 90° nozzle installation
- Optional: retractable under process conditions
- Hermetically sealed stainless steel and titanium probes
- ATEX and CSA approved for use in hazardous areas

FLWSIC100 EX/EX-RE

- Cross-duct high power version for large ducts and signal damping gases
- Optional: retractable under process conditions
- Hermetically sealed stainless steel and titanium probes
- ATEX and CSA approved for use in hazardous areas

FLWSIC100 EX-PR

- High speed probe version (patent pending)
- Single flange installation
- Optional: retractable under process conditions
- Hermetically sealed stainless steel and titanium probes
- ATEX and CSA approved for use in hazardous areas

KEY FEATURES

- Operation under very high gas velocities – using an innovative high speed sensor design
- Accurate operation at low flow (near zero)
- Easy installation steps – welding of nozzles perpendicular to pipeline
- Remote installation of control unit up to 1,000 m (serial interconnection)
- Single flange installation using probe version FLOWIC100 EX-PR
- Improved accuracy – spool piece solution
- Assured and reliable device function – automatic self diagnosis





SYSTEM COMPONENTS

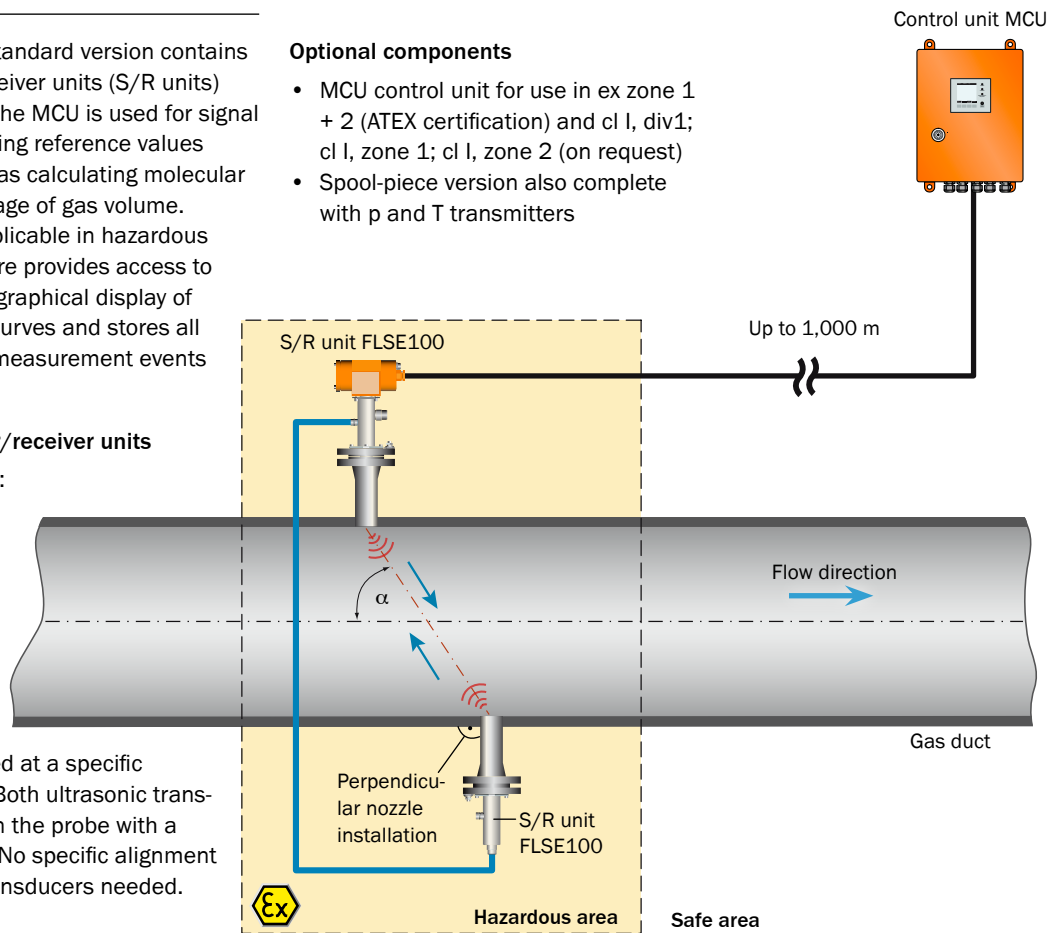
The FLOWSIC100 Flare standard version contains two FLSE100 sender/receiver units (S/R units) and a MCU control unit. The MCU is used for signal inputs/outputs, determining reference values (standardization) as well as calculating molecular weight, mass flow or storage of gas volume. Optionally the MCU is applicable in hazardous areas. The SOPAS software provides access to all parameters, contains graphical display of measured values, trend curves and stores all parameter changes and measurement events in an integrated log book.

Installation of the sender/receiver units

- Cross-duct installation: two sender/receiver units are mounted on both sides of a duct – rectangular to the gas flow direction.
- One-side installation: Only one single sender/receiver unit (probe type) is mounted at a specific angle to the gas flow. Both ultrasonic transducers are installed on the probe with a fixed measuring path. No specific alignment between ultrasonic transducers needed.

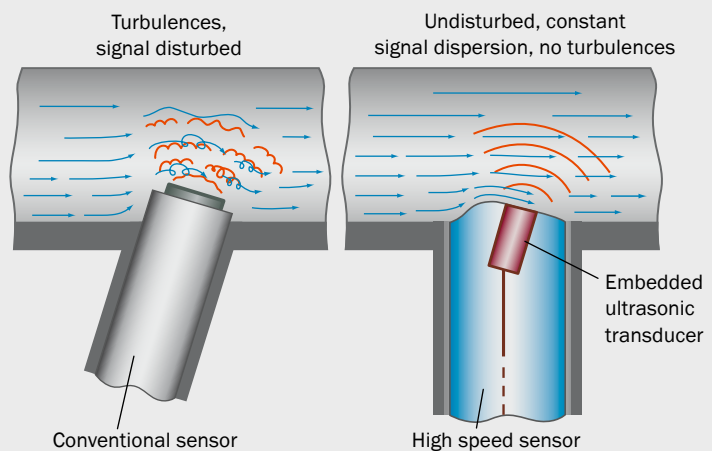
Optional components

- MCU control unit for use in ex zone 1 + 2 (ATEX certification) and cl I, div1; cl I, zone 1; cl I, zone 2 (on request)
- Spool-piece version also complete with p and T transmitters



UNIQUE HIGH SPEED SENSOR DESIGN (PATENT PENDING)

For the FLOWSIC100 Flare an innovative sensor design was developed. The ultrasonic transducer is embedded in a flow optimized sensor shape – qualified for high speed gas flow conditions. The unique design reduces flow noise and signal drift to a minimum and enables stable and reliable measurement results at very high gas velocities. A new developed 2-stage signal algorithm ensures best signal processing under low flow as well as under high flow conditions.



Technical Data		FLWSIC100 Flare		
Version	EX-S	EX/EX-RE	EX-PR	
Measuring parameter				
Measuring principle	Ultrasonic transit time measurement method			
Measuring values	Mass flow, standard and actual volumetric flow, molecular weight, totalized standard volume and mass, gas velocity, gas temperature, speed of sound			
Measuring range ¹⁾	0.03 up to 120 m/s			
Accuracy ^{2) 3)}	1-path measur.: $\pm 1.5 \dots 5 \%$ / $\pm 0.5 \dots 2.5 \%$ ⁴⁾ ; 2-path measur.: $\pm 1.0 \dots 3.0 \%$ / $\pm 0.5 \dots 1.5 \%$ ⁴⁾			
Accuracy of molecular weight ⁵⁾	< 2% of measured value, 2 ... 120 kg/kmol			
Accuracy of mass flow ⁵⁾	1-path measurement: $\pm 2.5 \dots 5 \%$ of meas. value; 2-path measurement $\pm 2 \dots 4 \%$ of meas. value			
Resolution	0.001 m/s			
Repeatability	0.2 % at 10 m/s			
Rangeability	up to 4000 : 1			
Inner duct diameter	$\geq 0.1 \dots 1.8 \text{ m}$ ($\geq 4 \dots 72 \text{ in}$)		$\geq 0.3 \dots 1.8 \text{ m}$ ($\geq 12 \dots 72 \text{ in}$)	
Measurement conditions				
Gas temperature	<ul style="list-style-type: none"> Standard range: $-70 \dots +180 \text{ }^\circ\text{C}$ ($-95 \dots 356 \text{ }^\circ\text{F}$) High temperature range zone 1: $-70 \dots +280 \text{ }^\circ\text{C}$ ($-95 \dots 535 \text{ }^\circ\text{F}$) zone 2: $-70 \dots +260 \text{ }^\circ\text{C}$ ($-95 \dots 500 \text{ }^\circ\text{F}$) Low temperature range: $-200 \dots +100 \text{ }^\circ\text{C}$ ($-325 \dots 210 \text{ }^\circ\text{F}$) (on request) 			
Pressure range	$-0.5 \dots 16 \text{ barg}$			
Ambient conditions				
Temperature range	<ul style="list-style-type: none"> Sender/receiver units: $-40 \dots +70 \text{ }^\circ\text{C}$ ($-40 \dots 158 \text{ }^\circ\text{F}$); option: $-50 \dots +70 \text{ }^\circ\text{C}$ ($-58 \dots 158 \text{ }^\circ\text{F}$) MCU control unit: $-40 \dots +60 \text{ }^\circ\text{C}$ ($-40 \dots 140 \text{ }^\circ\text{F}$) 			
Approval				
Ex-certification	S/R unit, zone 1	<ul style="list-style-type: none"> ATEX II 1/2G Ex d [ia] IIC T4 ATEX II 1/2G Ex de [ia] IIC T4 CSA Cl I, Div1/Div2; Cl I, Zone 1/Zone 2 Option <ul style="list-style-type: none"> Temp. class T6 Zone 0 for ultrasonic transducers ATEX II 1/2G Ex d [ia] IIC T4 	<ul style="list-style-type: none"> ATEX II 2G Ex d IIC T4 ATEX II 2G Ex de IIC T4 CSA Cl I, Div1/Div2; Cl I, Zone 1/Zone 2 Option <ul style="list-style-type: none"> Temp. class T6 	<ul style="list-style-type: none"> ATEX II 1/2G Ex d [ia] IIC T4 ATEX II 1/2G Ex de [ia] IIC T4 CSA Cl I, Div1/Div2; Cl I, Zone 1/Zone 2 Option <ul style="list-style-type: none"> Temp. class T6 Zone 0 for ultrasonic transducers ATEX II 1/2G Ex d [ia] IIC T4
	S/R unit, zone 2	<ul style="list-style-type: none"> ATEX II 3G Ex nA II T4 		
	Control unit MCU, non-ex	<ul style="list-style-type: none"> for remote installation up to 1,000 m (3,280 ft) away from measuring point 		
	Control unit MCU, zone 1	<ul style="list-style-type: none"> ATEX II 2G Ex de IIC T4; CSA Cl, Div1; Cl I, Zone 1 (pending) 		
	Control unit MCU, zone 2	<ul style="list-style-type: none"> ATEX II 3G Ex nA II T4; CSA Cl I, Zone 2 		
Protection class	S/R unit	<ul style="list-style-type: none"> Aluminium, stainless steel IP 65/67 		
	Control unit MCU	<ul style="list-style-type: none"> Steel, stainless steel wall housing IP 65; Ex d housing IP 66; 19" rack housing 		
Inputs, outputs, controls via MCU control unit				
Analog output	1 output active: 0/2/4 ... 22 mA, max. load 750 Ω ⁶⁾ , according to NAMUR NE43			
Analog inputs	2 inputs: 0 ... 20 mA ⁶⁾			
Digital outputs	Pulse/frequency output (opt. module); 5 outputs: 30 V DC/2A, 48 V AC/1 A, floating, status signals: operation/malfunction, maintenance, check cycle, limit value, maint. request ⁶⁾			
Digital inputs	4 inputs for connection of floating contacts ⁶⁾			
Interfaces	<ul style="list-style-type: none"> USB RS232 (service) 	<ul style="list-style-type: none"> RS485 via optional module Ethernet via optional module 		
Bus protocol (option)	<ul style="list-style-type: none"> MODBUS via RS485 or via Ethernet PROFIBUS DP via RS485 TCP/IP via Ethernet 	<ul style="list-style-type: none"> HARTBUS (pending) Foundation Fieldbus (on request) 		
General				
System components	<ul style="list-style-type: none"> Sender/receiver unit(s) FLSE100 MCU control unit, optional 24 V DC version 	<ul style="list-style-type: none"> Mounting parts (nozzles, ball valves, mounting material) 		
Operation	Via MCU control unit or SOPAS ET software			
Check function	Internal check cycle for zero-point and span check			

¹⁾ Depending on pipe size²⁾ For fully developed flow profile³⁾ Of measuring value⁴⁾ Flow calibrated⁵⁾ Hydrocarbons⁶⁾ Option: additional inputs/outputs when using I/O modules