

# Safety Integrated Systems with SIL-certified Ultrasonic Flowmeters

Reliable – Safe – Accurate

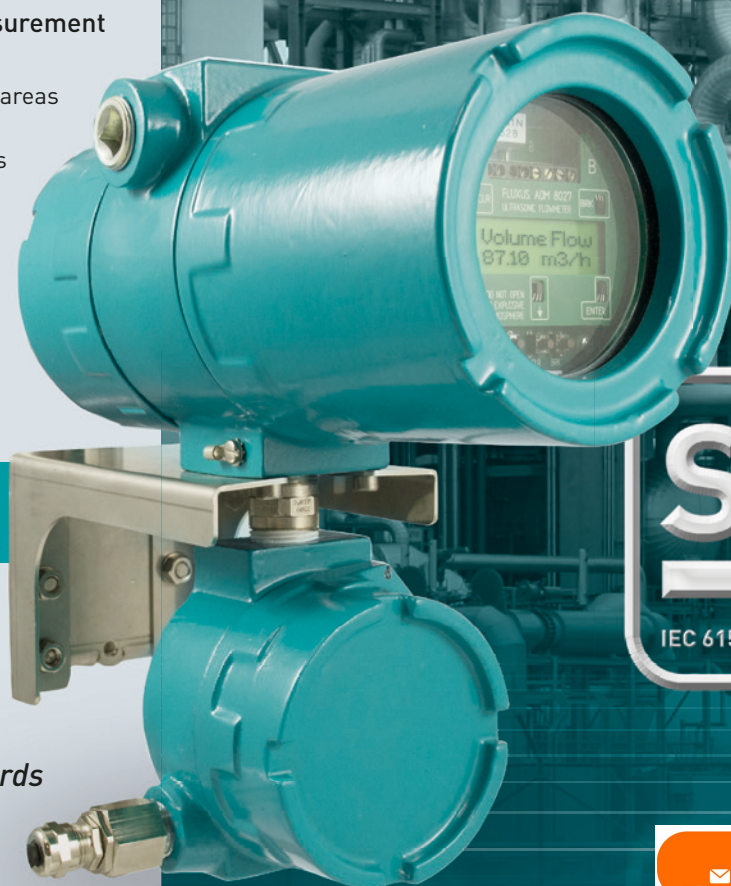
Functional safety in accordance  
with IEC/DIN EN 61508

Reliable flowmeters for safety  
instrumented systems (SIS)

- Chemical industry
- Petrochemical industry
- Oil & gas industry
- Production industry
- Power plants
- Nuclear industry

Non-invasive flow measurement

- of liquids and gases
- in potentially hazardous areas  
(ATEX, IECEx, FM)
- at extreme temperatures  
of -190 °C to +650 °C



Safety Integrity Level

**SIL**  
IEC 61508 / IEC 61511  
**2**

**FLEXIM Sets Standards**  
when measuring matters

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# Always on the safe side

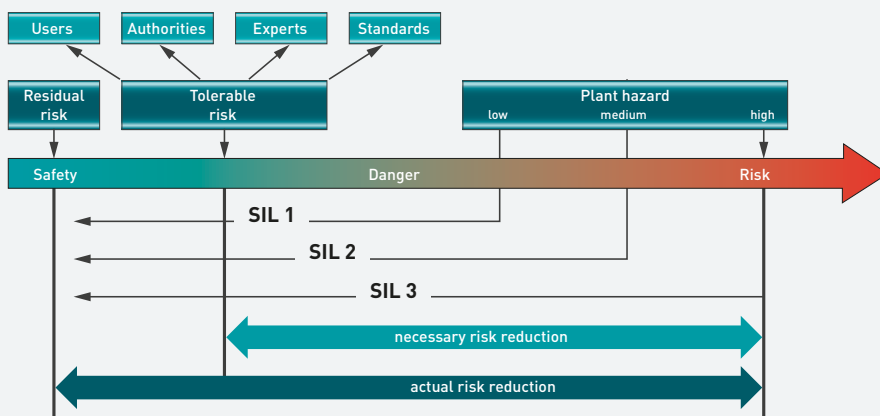
## Increased safety

The international standard IEC / DIN EN 61508 regulates the requirements for safety functions in safety-related applications. The starting point is always a risk analysis:

**What is the damage involved if the safety function fails?**

Accordingly, the standard defines four levels of security, SIL 1 to SIL 4. The sensor and actuator technology and logic of the safety circuits must be configured in such a way that the plant switches to safe mode in the event of a fault.

**FLEXIM is the world's only provider of clamp-on ultrasonic systems for non-invasive flow measurement of liquids and gases with SIL certification.**



## Typical applications with protective functions within the chemical and petrochemical industries:

- Ensuring heat dissipation
  - from exothermic reactions
  - from heated boiler plants
  - from heated plants, e.g. distillation columns, cokers, etc.
- Dry-running protection of pumps in potentially explosive areas
- Leak detection during transport of hazardous media
- Monitoring of a minimum or maximum flow rate at critical supply and return lines

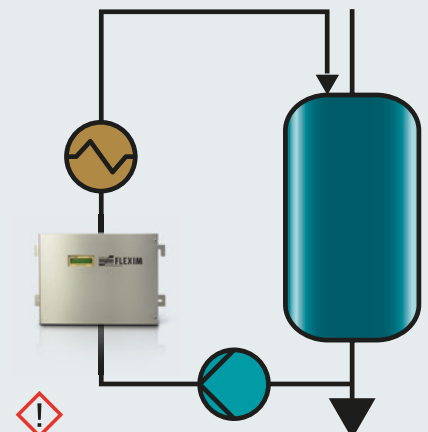
## Case study:

### Heat dissipation from an exothermic reaction

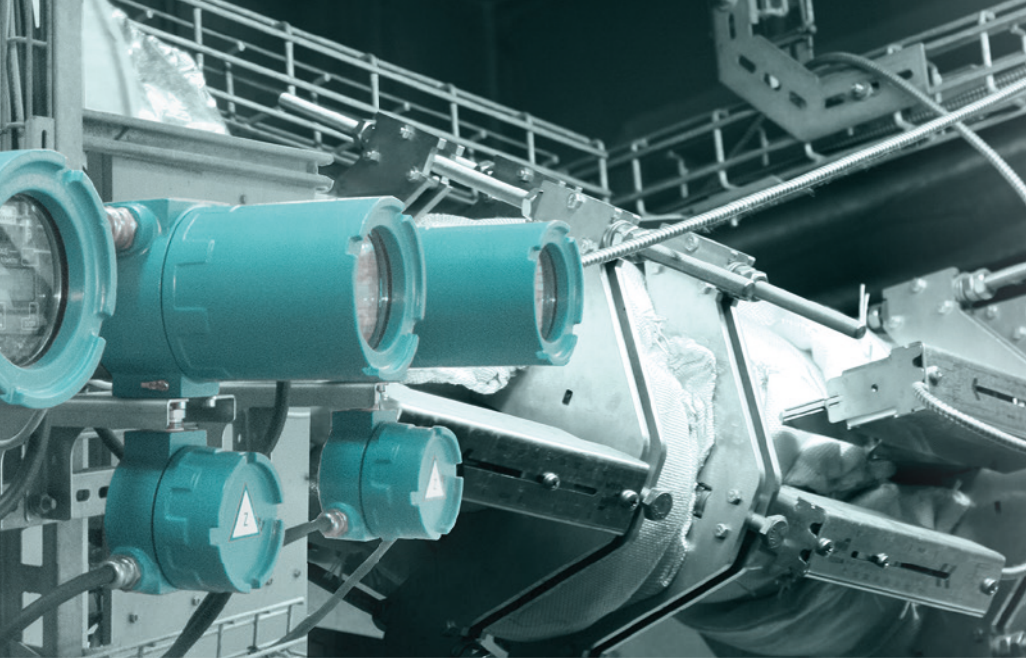
For maintaining a safe exothermic process flow, the heat dissipation out of the reactor is a necessity. The measurement of the heat transfer can be achieved with a SIL 2 certified non-invasive FLUXUS® ultrasonic flow meter, which is installed at the return line. As part of the safety instrumented system (SIS), measurements are checked regularly and their operational reliability is documented.

## Advantages

- Non-invasive measuring technology without pressure loss
- Practically wear-free, virtually no maintenance costs
- No leakage risk -> Increased plant availability and safety
- Multi-channel versions for increased safety and accuracy
- No process shut downs and no pipe works are necessary for installation
- Even radiation resistant transducers are available for operation within nuclear power plants







## Wear-free and SIL certified ultrasonic flow measurement

Be it aggressive media, big pipe sizes or high pressure - FLUXUS® measures precisely and reliable without any risk of leaks and with plant availability. In comparison to wetted devices, where the sensors, which are in direct contact with the flowing medium, are not subject to the Failure Mode Effects and Diagnostics Analysis (FMEDA) and are thus not included in the scope of certification, the SIL 2 certification of the FLUXUS® clamp-on ultrasonic systems covers the entire measuring system, i.e. the measuring transmitters and transducers. It also includes the patented Wavelnjector® device for extreme pipe temperatures, which can be used to measure liquid flow rates from as low as -190 °C up to 650 °C.

### Safety without interruption

The advantages of non-invasive flow measurement pay off all the more over the entire lifecycle: **The plant availability is never affected - neither when carrying out periodic inspections nor during other maintenance or service works at the meter.**

### Functional safety with FLUXUS®

#### Non-invasive measurement without media contact

- shortened prior-use method excluding the media influence

#### Simple retrofitting during ongoing operation

- ideal for a subsequent increase in safety
- ideal for maintaining the protective function should an inline measurement fail

#### Comprehensive certification

- transducers, mounting device and electronics are part of the FMEDA

#### Straightforward retesting

- easy functional tests in no time at all
- employee trainings as well as services for regular inspections
- step by step documentations for easy execution

#### Transparent evaluations

- publication of FMEDA report
- full information on certification procedures and scope

#### Extremely wide range of applications

- transducers and measuring transmitters for the flow measurement of liquids and gases
- SIL certification also covers Wavelnjector® technology for the flow measurement of liquids at extreme temperatures from -190 °C up to +650 °C

### Case study:

#### Leak detection on transport pipelines

Within tank terminals the monitoring of the pipeline integrity is of crucial importance. In these installations SIL 2 certified non-invasive FLUXUS® ultrasonic flow meters precisely detect even the smallest leaks and can never be the cause for such due to their measurement principle.

### Advantages

- Simple retrofitting permanently increases the safety of the plant
- High measuring accuracy and dynamics, no measurement drift
- No risk of leakage
- Highly cost effective
  - No pipe work for installation
  - No modification of pipeline which is subject to approval
  - No material certificates



## Technical facts



### FLUXUS® F70X and FLUXUS® G70X

Non-invasive ultrasonic flowmeter for liquids or gases (ATEX Zone 2 optional). Available in aluminium or stainless steel enclosure (IP66, suitable for offshore environments).

### FLUXUS® F80X and FLUXUS® G80X

Non-invasive ultrasonic flowmeter for liquids or gases (ATEX Zone 1 approved). Available in aluminium or stainless steel enclosure (IP66, suitable for offshore environments).

<b>Measurement of:</b>	volumetric flow rate, mass flow rate, flow velocity
<b>Operating temperature of the transmitter:</b>	-30 °C to +60 °C
<b>Transducer specifications:</b>	Protection degree up to IP68, Temperature range: -40 °C to +200 °C (-190 °C to +650 °C with high temp. mounting fixture)
<b>Flow velocity range</b>	
<b>Liquids:</b>	0.01 to 25 m/s
<b>Gases:</b>	0.01 to 35 m/s
<b>Temperature range</b>	
<b>Liquids:</b>	-40 °C to +200 °C (-190 °C to +650 °C in conjunction with the patented WaveInjector® mounting fixture)
<b>Gases:</b>	-40 °C to +100 °C
<b>Pipe diameter range</b>	
<b>Liquids:</b>	6 mm to 6500 mm
<b>Gases:</b>	7 mm to 1600 mm (up to 35 mm pipe wall thickness)
<b>Accuracy*</b>	
<b>Liquids:</b>	± 0.5% v. of reading ± 0.01 m/s, field calibration** ± 1.2% v. of reading ± 0.01 m/s, advanced calibration
<b>Gases:</b>	± 0.5% of reading ± 0.01 m/s, field calibration** ± 1% to 3% of reading ± 0.01 m/s
<b>Repeatability:</b>	0.15% of reading ± 0.01 m/s
<b>Data logger:</b>	> 100 000 measurement values
<b>Loggable values:</b>	all physical quantities, totalised values and diagnostic values
<b>Communication interface:</b>	Modbus RTU
<b>Power supply:</b>	100 to 240 V AC / 50 to 60 Hz or 20 to 32 V DC

\* under reference conditions with  $v > 0.15$  m/s

\*\* reference uncertainty < 0.2%

Further information can be found in the according Technical Specifications at [www.flexim.com](http://www.flexim.com)

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