ISAFE 3
Intrinsically Safe AE-Sensor System

The Vallen Intrinsically Safe Acoustic Emission (AE) Sensor system, ISAFE3, is designed to meet highest standards of permanent monitoring applications or periodic inspection tasks. Its ATEX zone 0 certification allows installation in hazardous areas where explosive atmosphere is continuously present. It can be used with Vallen`s best known AMSY series of Acoustic Emission measurement equipment.

The ISAFE3 is focused on applications of petrochemical - as well as oil and gas transportation industry. By the use of Acoustic Emission measurement technique active corrosion in pipelines or storage containers can be detected and located. Furthermore fatigue cracks in supporting structure of e.g. tanker ships can be identified.

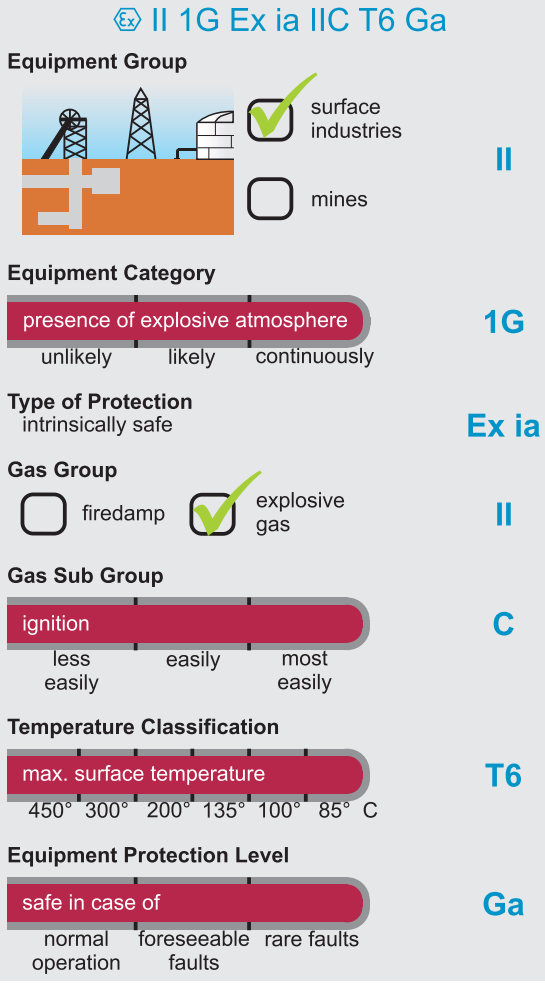
Acoustic Emission testing is the only NDT technique that allows cost efficient 24/7 monitoring of objects. Protecting assets and environment becomes possible by the use of ISAFE3 even in highly sensitive field of oil and gas industry without any compromise.

Vallen's ISAFE3 sensor system consists of a range of five intrinsically safe AE-sensors and a signal isolator. The intrinsically safe AE-sensors are certified according to ATEX for installation in zone 0 and gas group IIC. The signal isolator is an associated apparatus and certified for installation in non hazardous area. It limits the power, Voltage, current and pulse energy supplied to the AE-sensor in hazardous area.

The mechanical design of ISAFE3 AE-sensor allows also submerged installation in oil and water up to a peak pressure of 12bar.

Intrinsically Safe Sensor (ISAS3)

ATEX abbreviations



ISAS3 is an Acoustic Emission (AE) sensor with integral preamplifier based on intrinsically safe electronic design making it suitable for installation in ATEX zone 0 environment.

An AE-sensor is employed to detect and locate cracks, corrosion and leakage. The ISAS3 product range consits of five variants of high sensitive AE-sensors covering a frequency range from 25kHz to 900kHz. Low frequency variants are suitable for corrosion screening and leakage detection of large objects such as above ground storage tanks and pipelines. Higher frequency variants are suitable for integrity testing.

ISAS3 is equipped with an integral preamplifier that has 20dB gain. It is suitable for driving long distances (up to 2km) of BNC cable. The integral preamplifier supports Automatic Sensor Test (AST) for judging sensor coupling.

ISAS3 can be submerged into oil or water, withstanding pressures up to 12bar. ISAS3 sensors are designed to be mounted inside crude oil storage tanks of ships and can be operated even in case of rough sea.

ISAS3 product range features

- intrinsically safe design
- ATEX/CENELEC certification
- robust sensor design
- case material of stainless steel SS1.4571
- Ingress Protection class IP68
- water and oil resistant up to 12bar

ISAS3 carries the following label based on ATEX/CENELEC standards:

Ⓔx II 1G Ex ia IIC T6 Ga Tamb: -20°C ... +60°C IP68

Mechanical Specifications

Protection class (EN60529)	IP68 (cable connected)
Ambient temperature	-20 … +60 °C
Case material	Stainless steel 1.4571
Max. surface temp. (worst case fault)	< 85°C at 60 °C ambient temperature
Dimension	53,5 W x 56 L x 47,5 H mm, Cover diameter: 46,5mm For ISAS3-030 add 7,5mm height
Weight	0,25 kg (sensor) 0,17 kg (magnet holder)
Mounting aid	Magnet holder MAG4IS, see ISAS3-SpecMount

Acoustic Properties

Model	Frequency Range	Typical Peak Sensitivity @ Frequency	Recommended Bandwith for Acquisition
ISAS3-030	25kHz - 80kHz	-63dB re 1V/µbar @ 55kHz	25kHz - 100kHz
ISAS3-075	50kHz - 300kHz	-61dB re 1V/µbar @ 78kHz	25kHz - 120kHz
ISAS3-150	100kHz - 450kHz	-63dB re 1V/µbar @ 150kHz	95kHz - 300kHz
ISAS3-375	300kHz - 500kHz	-63dB re 1V/µbar @ 370kHz	300kHz - 500kHz
ISAS3-900	100kHz - 900kHz	-64dB re 1V/µbar @ 340kHz	95kHz - 960kHz

Signal Isolator SISO3

SISO3 is a signal isolator that electrically isolates the intrinsically safe circuit from non-intrinsically safe circuit such as a data acquisition system, e.g. AMSY-5 or AMSY-6. A SISO3 is required if an ISAS3 is installed in an hazardous area according to ATEX. The SISO3 itself can be installed in ATEX zone 2 environments. SISO3 requires an enclosure guaranteeing ingress protection class IP54.

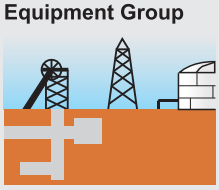
SISO3 limits the power, voltage, current and pulse energy supplied to the integral ISAS3 preamplifier to safe level even in case of two worst case failures in SISO3. Furthermore it provides an amplification stage to fully utilize the input range of ASIP-2 signal processor. It also relays the Auto Sensor Test control pulse to the ISAS3 integral preamplifier.

SISO3 is an associated apparatus for the intrinsically safe apparatus of ISAS3.

ATEX abbreviations

Ⓔx II 3 (1) G Ex nA [ia Ga] IIC T4 Gc

Equipment Group



surface industries ☑

mines ☐

II

Equipment Category

presence of explosive atmosphere

associated apparatus

intrinsically safe apparatus

unlikely | likely | continuously

3 (1) G

Type of Protection

non sparking

Ex nA

Gas Group

☐ firedamp ☑ explosive gas

II

Gas Sub Group

ignition

less easily | easily | most easily

C

Temperature Classification

max. surface temperature

450° 300° 200° 135° 100° 85° C

T4

Equipment Protection level

safe in case of

associated apparatus

intrinsically safe apparatus

normal operation | foreseeable faults | rare faults

Gc [ia Ga]

Accessories

HISO3 provides an enclosure for SISO3 with ingress protection class IP54. HISO3 can be installed in non hazardous area and is required for operating SISO3 within specification and meeting ATEX requirements.

HISO3 is available in two different sizes with easy to handle DIN snapon rail.

MAG4IS is a magnetic holder for ISAS3, providing stable acoustic coupling. A magnetic holder allows for easy mounting and removing of an AE-sensor.

HISO3

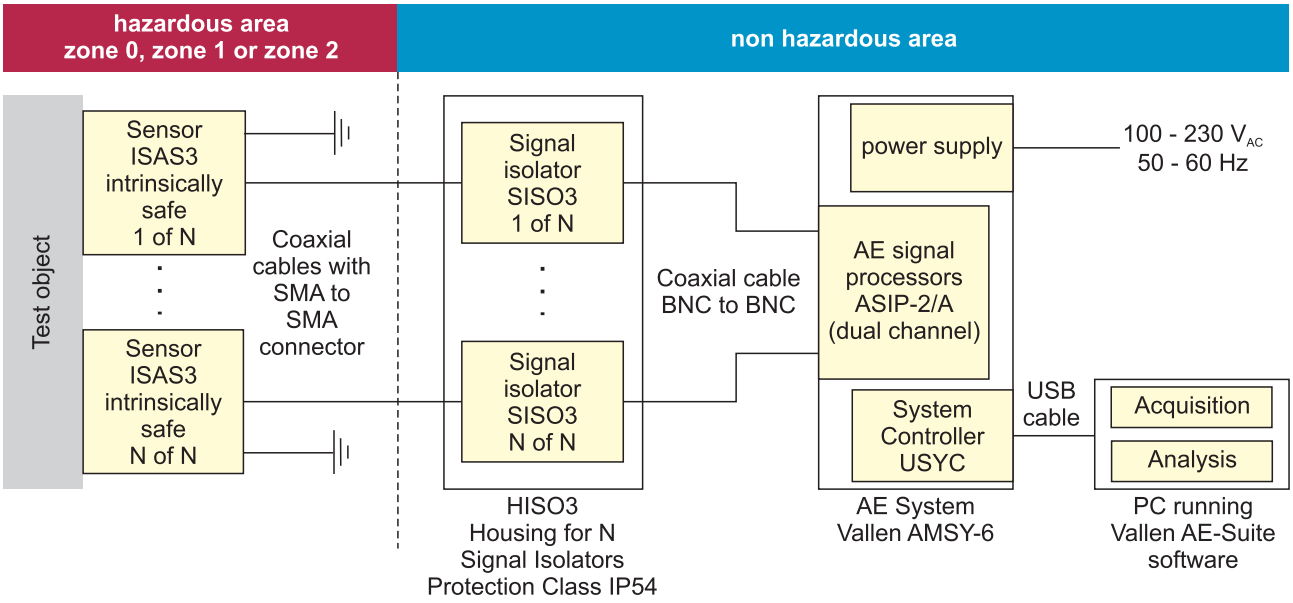
MAG4IS

Block Diagram of sample installation

The following block diagram shows an application example where PC, AE-system and signal isolator (SISO3) are located in a non-hazardous area The intrinsically safe AE-sensor of type ISAS3 is installed in an hazardous area of zone 0, 1 or 2.

The SISO3 acts as a barrier to isolate the intrinsically safe side (ISAS3 installation) from the non instrinsically safe side.

The AE-System can be standard AMSY-6 or AMSY-5 with ASIP-2 signal processor boards (recommended variant is ASIP-2/A)



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