

ClampOn BIRD Leak Monitor

DIGITAL SIGNAL PROCESSING

*ClampOn BIRD Leak Monitor*

ADVANTAGES

- **Non-intrusive**
- **Wireless**
- **Internal PowerModule**
- **Versatile**
- **Real-time measurement**

BACKGROUND

The ClampOn BIRD is a unique wireless acoustic sensor for the downstream and unconventional market. The BIRD Monitor is non-intrusive and can be used for condition monitoring of pipes, flowlines, valves and other critical structures. A leak creates a very high-frequency noise that can be monitored by an ultrasonic sensor. In a "non-leak" situation, the ultrasonic signal will be stable, but when a leak occurs the signature will change drastically.

LEAK MONITORING

Smart, Sensitive, and Wireless

Leak Detection

The BIRD Leak Monitor is a highly sensitive acoustic sensor designed to detect and quantify leaks through closed valves. Operating across multiple frequency bands, it isolates leak-specific signals like the subtle "hiss" from background noise, ensuring reliable detection even in challenging environments.

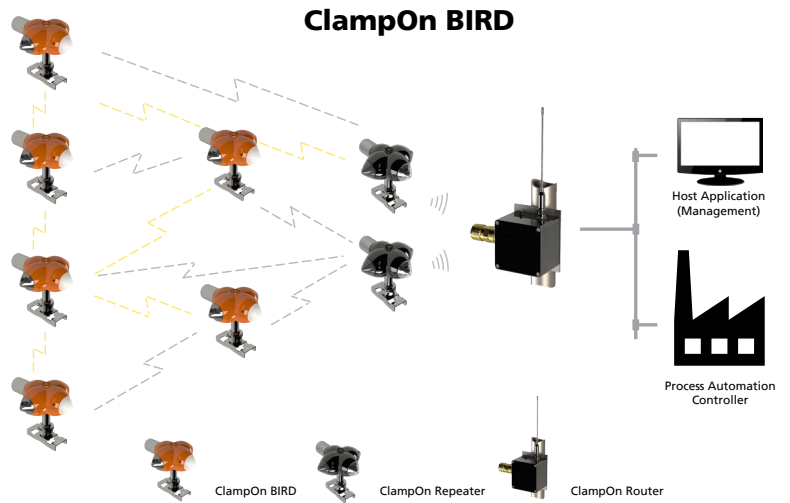
It identifies small to medium leaks or flow-throughs, even under low differential pressure, giving operators early warnings to prevent escalation.

Powered by an integrated long-life PowerModule, the system eliminates the need for cabling. With energy-efficient DSP, ultra-low power RF communication, and sub-1 GHz operation, the sensor runs for

a year on a single module. It also monitors its own power status and alerts users when replacement is needed.

INSTALLATION

The sensors are supplied fully calibrated without the need for on-site calibration and can easily be clamped to a pipe. With its wireless connection interface, the ClampOn BIRD sensor utilizes a self-forming mesh network that will add any additional ClampOn BIRD sensor to the network automatically. Installing and setting up an entire network of ClampOn BIRD sensors is done in only a few hours. Even installation in remote and rural locations is no longer a challenge.



MESH NETWORK

- Mesh network
- Wireless connectivity
- Security
- Firmware update
- Battery operated

Multi-hop mesh technology, self-forming and self healing network.
 Line of sight: up to 1 000 m (urban: 200 m)
 Encrypted data communication
 OTA - Over the Air
 1 year of operation

INDONESIA DISTRIBUTOR



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KEY SPECIFICATIONS

• Method of operation:	Passive acoustics (ultrasonic)	• Data transmission rate	Configurable from 1 second to 60 minutes
• Method of installation:	Non-intrusive, clamped to pipe surface	• Pipe surface temperature:	-40 °C / +140 °C
• Minimum detectable leakage		Option w/High temperature fix:	-162 °C / +350 °C
Gas:	dp>1 bar, min. leakage rate 0.1/min	• Flow regimes:	Oil, gas, water, multiphase
Liquid:	dp>3 bar, min. leakage rate 0.1 l/min	• Diagnostic features:	Intelligent "health check"
• Flow regimes:	Oil, gas, water, multiphase	• Ingress protection:	IP 65 tested to IEC 60529
• Repeatability:	Better than 1%	• Housing Material:	Polybutylene terephthalate (PBT) and stainless steel 316L
• Interface options:	RS-485 (ModBus RTU)	• Dimensions (l x w x h):	212 mm x 174 mm x 165 mm
• RF Module frequency range:	862 MHz to 930 MHz	• Weight (instrument only):	1.2 kg [2.6 lb]
Comply:	IEEE 802.15.4g, FCC and CE	• Power consumption:	0.1 Watt (average)
• RF output power:	<14 dBm	• Electronics platform:	ClampOn DSP III
• Range LOS:	≤1 km	All specifications are subject to change without notice	



ULTRASONIC INTELLIGENT SENSORS

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Product datasheet

BIRD Leak Monitor TSE.DS3I.SMBx.Hx1



1	General	Note
1.1	Model name	ClampOn BIRD Leak Monitor
1.2	Service description	Non-invasive non-intrusive wireless battery-operated leak monitor
1.3	Model number	TSE.DS3I.SMBx.Hx1 1
1.4	Explosion protection principles employed	Intrinsic safety, Ex i
1.5	Serial number	YYM-FFFFFFF ₁₆ 2

2	Physical	
2.1	Dimensions (l × w × h)	212 mm × 174 mm × 165 mm [8.3 in × 6.9 in × 6.5 in] 3
2.2	Enclosure material	Polybutylene terephthalate (PBT) and stainless steel 316L
2.3	Weight (instrument only)	1.2 kg [2.6 lb]
2.4	Equipment marking	Polyester certification label
2.5	Local indicator type	Tri color red / green / yellow 4
2.6	Antenna type	Integral omnidirectional, 868 MHz or 915 MHz
2.7	PowerModule type	Intrinsically safe non-rechargeable lithium-thionyl chloride



3	Environmental	
3.1	Maximum installation altitude	2 000 meters [6 562 feet]
3.2	Ingress protection	IP65 tested to IEC 60529
3.3	Ambient temperature	See Compliance section
3.4	Storage and transportation temperature	-20 °C to +40 °C
3.5	Storage and transportation humidity	30 % to 70 % (non-condensing)
3.6	Shock (tested to IEC 60068-2-27)	40 g, 6 ms, 100 shocks in each direction
3.7	Vibration (tested to IEC 60068-2-6)	2 Hz to 13.2 Hz (1.0 mm displacement) and 13.2 Hz to 100 Hz (0.7 g acceleration)

4	Operation	
4.1	Rated voltage, U_{dc}	$U_{nom} = 3.6$ V, from a certified single ClampOn PowerModule
4.2	PowerModule capacity	17 Ah to 19 Ah (depending on type installed), <5 years operation 5
4.3	Electronics platform/generation	ClampOn DSP III
4.4	Manner of operation	Real-time measurement
4.5	Unit of measurement	Dimensionless acoustic amplitude, raw value 10
4.6	Technology (for leak measurement)	Passive ultrasonic using piezoelectric transducer
4.7	Technology (for vibration measurement)	3-axis MEMS accelerometer 6
4.8	Processing	Digital signal processing (DSP) in instrument
4.9	Design life	20 years 9
4.10	Repeatability	Better than 1 %
4.11	Flow conditions	Oil, water, gas, multiphase
4.12	Minimum detectable leakage	dP >3 bar [44 psi] in liquid 7 dP >1 bar [15 psi] in gas
4.13	Pipe material	All steel alloys 8

5	Signal	
5.1	Signal types	RF per IEEE 802.15.4 g/e
5.2	RF module frequency range	862 MHz to 930 MHz
5.3	RF output power	<14 dBm
5.4	Range LOS	≤1 km
5.5	Network	Multi-hop mesh technology, self-forming and self-healing network. Maximum 250 nodes, depending on data rate
5.6	Data transmission rate	Configurable from 1 second to 60 minutes

6	Installation	
6.1	Mounting	Mounting bracket clamped to pipe using stainless steel clamping bands or welded to pipe surface. Collar nut secures instrument in mounting bracket 8, 11
6.2	PowerModule replacement	Can be replaced in a hazardous area by client

Product datasheet

BIRD Leak Monitor TSE.DS3I.SMBx.Hx1



7 Compliance			15
7.1	Hazardous area location approval	Zone 0, 1, 2 for ATEX/IECEx installations and Zone 0, 1, 2 or Division 1, 2 for North America (NEC/CEC) installations	
7.2	ATEX certificate	UL 22 ATEX 2652X	13
7.3	ATEX marking	Ex II 1 G Ex ia IIB T4...T3 Ga $-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +80^{\circ}\text{C}$	
7.4	ATEX ambient temperature range	$-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +80^{\circ}\text{C}$	12
7.5	IECEx certificate	IECEx ULD 22.0007X	13
7.6	IECEx marking	Ex ia IIB T4...T3 Ga $-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +80^{\circ}\text{C}$	
7.7	IECEx ambient temperature range	$-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +80^{\circ}\text{C}$	12
7.8	UL file number	E354507	13
7.9	UL marking	Class I Zone 0 AEx ia IIB T4...T3 Ga Ex ia IIB T4...T3 Ga $-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +80^{\circ}\text{C}$	14
7.10	UL ambient temperature range	$-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +80^{\circ}\text{C}$	12
7.11	CE marking in conformance with	2014/34/EU (ATEX) 2014/53/EU (RED) 2011/65/EU and 2015/863/EU (RoHS)	
7.12	EMC standards applied	EN/IEC 61326-1, IEC 61892-3, IEC 60533, EN 55032, FCC CFR 47 Subpart 15B, and ISCED ICES-003	
	Radiated emissions	CISPR 16-2-3, CISPR 32, and FCC CFR 47 Subpart 15B	
	ESD immunity	IEC/EN 61000-4-2	
	Radiated RF disturbance immunity	IEC/EN 61000-4-3	
	Power frequency magnetic field immunity	IEC/EN 61000-4-8	

Notes

- Various add-on configurations such as transducer waveguide length and with/without temperature measurement functionality will generate different model numbers.
- Serial number breakdown: Year (YY) and month (M) of manufacture (where M is A for January, B for February etc.) and unique electronics ID (FFFFFFFF, 8 digits) in hexadecimal format.
- Height depends on transducer waveguide length utilized:
H1x model (waveguide height 70 mm) = 165 mm total height
H2x model (waveguide height 150 mm) = 245 mm total height
- See user manual for LED blink codes.
- PowerModule life depends on operating mode and conditions of use. Leak monitor mode with real time data, 13 months can typically be expected. All products in the BIRD-series are equipped with BatteryMonitor software to report health status.
- For vibration measurement details, see instrument datasheet addendum. Vibration output is optional and not activated in instrument by default.
- Minimum leak rate is 0.1 l/min [0.026 gal/min], depending on delta pressure (dP) across the leak point.
- Instrument waveguide must have metal-to-metal contact with the pipe surface.
- Depending on environmental factors.
- The instruments' UOM is raw value. To calculate leak rate (l/min), send instrument raw value, (live) inlet pressure and valve status to a PC or PAC programmed with fluid type, valve type and inlet ID.
- Mounting bracket available in stainless steel (standard) or carbon steel. Clamping bands available in stainless steel.
- The ambient temperature (T_{amb}) marked on the equipment refers to the temperature of the surroundings, irrespective of any external source of heating, such as process temperature (T_{pipe}), or direct sunlight. The instrument is certified for process temperature $\leq +150^{\circ}\text{C}$. If there is a risk the ambient temperature of the surroundings will exceed T_{amb} , steps must be taken to mitigate this risk, such as installing a sunshade, insulating the pipe, or moving the instrument to another location.
- See certificate and/or installation instructions for Specific Conditions of Use.
- Suitable for use in (and additionally marked) Class I Division 1 Groups C, D T4...T3.
- The instrument may not be marked with all certificates at the same time.