

ClampOn BIRD PIG Detector

DIGITAL SIGNAL PROCESSING

*ClampOn BIRD PIG Detector*

ADVANTAGES

- **Non-intrusive**
- **Wireless**
- **Internal PowerModule**
- **Versatile**
- **Real-time detection**
- **Acoustic & magnetic detection**
- **Local and remote indication**

BACKGROUND

The ClampOn BIRD PIG Detector is a unique wireless acoustic sensor for the onshore, downstream and unconventional market. The PIG Detector is non-intrusive and provides reliable detection of any type of pig.

PIG DETECTION

The BIRD PIG detector senses a passing pig using passive acoustic (ultrasonic) technology. The instrument has internal Digital Signal Processing (DSP).

As a pig passes the detectors location, the instrument senses and analyses changes in the signal level at multiple frequencies. A pig can be indicated either via light on the instrument or via wireless signal transmission to a control system indicator panel. This signal can be a "pig passed" signal or a RAW-signal output for further processing. By using either a dedicated computer running ClampOn software or sending the output to the MCS, the user can see a graphical representation of the signal received from the PIG Detector.

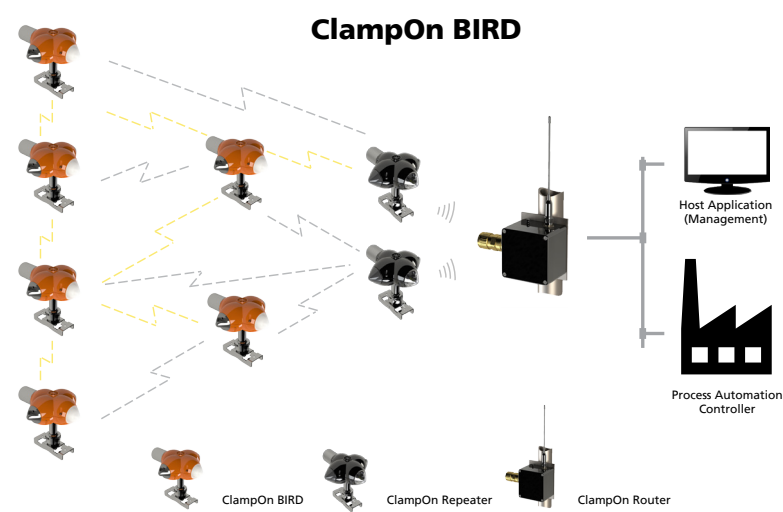
With wireless communication and power from an integral long lasting PowerModule, the need for expensive cabling, complex wiring diagrams, and termination boxes is now a thing of the past. The

ClampOn BIRD PIG Detector offers the latest technology, including energy efficient Digital Signal Processing (DSP), a very low-power RF node, and a sub 1 GHz programmable ultra-low power mode. These technologies combined allow the sensor to operate for more than a year on a single PowerModule. The ClampOn BIRD sensor continuously monitors the condition of the PowerModule and will inform the client when replacement is due.

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. Installation in remote and rural locations is no longer a challenge. The PIG signaller is clamped to the outside of the pipe, so no parts are in contact with the flow. It can easily be installed on pipes of various dimensions.



MESH NETWORK

- | | |
|-------------------------|---|
| • Mesh network | Multi-hop mesh technology, self-forming and self healing network. |
| • Wireless connectivity | Line of sight: up to 1 000 m (urban: 200 m) |
| • Security | Encrypted data communication |
| • Firmware update | OTA - Over the Air |
| • Battery operated | 1 year of operation |

INDONESIA DISTRIBUTOR

SAKA NUSA PERSADA

PT Saka Nusa Persada

Ruko Tabespot Blok G.5 No. 20, BSD City

Jl. BSD Raya Pusat, Lengkong Kulon, Pagedangan

Tangerang, Banten 15339, Indonesia

+62 21 2953 8924

info@sakanusapersada.id

www.sakanusapersada.id

KEY SPECIFICATIONS

- Method of operation: Ultrasonic (acoustic) - Optional dual detection with magnetic flux gate - Method of installation: Non-intrusive, clamped to pipe surface - Detection mode: Default: Acoustic Optional: Magnetic - Pipe surface temperature: -40 °C / +140 °C - Option w/High temperature fix: -162 °C / +350 °C - Interface options: RS-485 (ModBus RTU) - RF Module frequency range: 862 MHz to 930 MHz - Comply: IEEE 802.15.4g, FCC and CE - RF output power: <14 dBm - Range LOS: ≤1 km - Data transmission rate: Configurable from 1 second to 60 minutes - Flow regimes: Oil, gas, water, multiphase	- Diagnostic features: Intelligent "health check" - Ingress protection: IP 65 tested to IEC 60529 - Housing Material: Polybutylene terephthalate (PBT) and stainless steel 316L - Dimensions (l x w x h): 212 mm x 174 mm x 165 mm - Weight (instrument only): 1.2 kg [2.6 lb] - Power consumption: 0.1 Watt (average) - Electronics platform: ClampOn DSP III
All specifications are subject to change without notice	



ULTRASONIC INTELLIGENT SENSORS

Norway: ClampOn AS, Vaagsgaten 10, NO-5160 Laksevaag, Bergen, Norway, Phone: +47 5594 8850, e-mail: mail@clampon.com

USA: ClampOn, Inc., 15720 Park Row, Ste. 300 (77084), Houston, TX, USA, Phone: +1 281 492 9805, email: infoinc@clampon.com

Saudi: ClampOn ME, 3554 King Fahd Bin Abdul Aziz Rd., 6716 Al Adamah District, Dammam 32242, Phone:+966 13330 1922, e-mail: KSA@clampon.com

www.clampon.com

Product datasheet

BIRD PIG Detector TSE.DS3I.SMBx.Hx1

1	General	Note
1.1	Model name	ClampOn BIRD PIG Detector
1.2	Service description	Non-invasive non-intrusive wireless battery-operated topside PIG detector
1.3	Model number	TSE.DS3I.SMB0.Hx1 (acoustic detection) 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	Local reset type	Yes
2.7	Antenna type	Integral omnidirectional, 868 MHz or 915 MHz 5
2.8	PowerModule type	Intrinsically safe non-rechargeable lithium-thionyl chloride



3	Environmental	
3.1	Maximum installation altitude	2000 meters [6562 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 6
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
4.6	Technology (for pig detection)	Passive ultrasonic using piezoelectric transducer
4.7	Technology (for vibration measurement)	3-axis MEMS accelerometer 7
4.8	Processing	Digital signal processing (DSP) in instrument
4.9	Design life	20 years 9
4.10	Detection mode	Acoustic
4.11	Detection direction	Bidirectional
4.12	Detection algorithm (acoustic)	Fixed over Background (FoB) with trigger level, fallback level, trigger time minimum and trigger time maximum. All parameters are configurable
4.13	Operating limits	The pig detector can detect all types of pig. The pig must be moving with a minimum velocity of 0.3 m/s [1 ft/s], depending on type of pig, pipe configuration and installation point
4.14	Repeatability	Better than 1 %
4.15	Flow conditions	Oil, water, gas, multiphase
4.16	Pipe material	All steel alloys 8

5	Signal	5
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

7	Compliance	14
7.1	Hazardous area location approval	Zone 0, 1, 2 for ATEX/IECEx installations and Zone 0, 1, 2 or Division 1, 2 for cUL_{us} (NEC/CEC) installations
7.2	ATEX certificate	UL 22 ATEX 2652X 12
7.3	ATEX marking	Ex II 1 G Ex ia IIB T4...T3 Ga -40 °C ≤ T_{amb} ≤ +80 °C
7.4	ATEX ambient temperature range	-40 °C ≤ T_{amb} ≤ +80 °C 11

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BIRD PIG Detector TSE.DS3I.SMBx.Hx1



7.5	IECEX certificate	IECEX ULD 22.0007X	12
7.6	IECEX marking	Ex ia IIB T4...T3 Ga $-40\text{ }^{\circ}\text{C} \leq T_{\text{amb}} \leq +80\text{ }^{\circ}\text{C}$	
7.7	IECEX ambient temperature range	$-40\text{ }^{\circ}\text{C} \leq T_{\text{amb}} \leq +80\text{ }^{\circ}\text{C}$	11
7.8	cUL-us file number	E354507	12
7.9	cUL-us marking	Class I Zone 0 AEx ia IIB T4...T3 Ga Ex ia IIB T4...T3 Ga $-40\text{ }^{\circ}\text{C} \leq T_{\text{amb}} \leq +80\text{ }^{\circ}\text{C}$	13
7.10	cUL-us ambient temperature range	$-40\text{ }^{\circ}\text{C} \leq T_{\text{amb}} \leq +80\text{ }^{\circ}\text{C}$	11
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.
- For local indication, radio can be disabled via software but will still be included on the label.
- PowerModule life depends on operating mode and conditions of use. PIG Detector 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.
- Instrument waveguide must have metal-to-metal contact with the pipe surface.
- Depending on environmental factors.
- Mounting brackets are available in stainless steel (standard) or carbon steel. Clamping bands are 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 $\leq +150\text{ }^{\circ}\text{C}$. 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.