

Product datasheet

DSP PIG Detector TSE.DS2D.SA0x.E11

1 General Note

1.1	Model name	ClampOn DSP PIG Detector	
1.2	Service description	Non-invasive non-intrusive topside pig detector	
1.3	Model number	TSE.DS2D.SA00.E11 (acoustic detection) TSE.DS2D.SA01.E11 (magnetic detection)	1
1.4	Explosion protection principles employed	Flameproof enclosure, Ex d Increased safety, Ex e Intrinsic safety, Ex i	
1.5	Serial number	YY-MM-XXXXX	2

2 Physical

2.1	Dimensions (ø × h)	114 mm × 188 mm [4.5 in × 7.4 in]	
2.2	Enclosure material	Stainless steel 316L	
2.3	Enclosure protective coating	None by default	
2.4	Weight (instrument only)	3.4 kg [7.5 lb]	
2.5	Equipment marking	Polyester certification label Stainless steel tag plate where applicable	
2.6	Cable entry configuration	2 off M25 × 1.5 ISO metric fitted with Ex blanking element	
2.7	Cable gland	By client	3
2.8	Cable	By client	3
2.9	Local indicator type	Red LED array visible 360°	
2.10	Local reset type	Rotary proximity switch	



3 Environmental

3.1	Maximum installation altitude	2 000 meters [6 562 feet]	
3.2	Ingress protection	IP66/IP68 (10 meters [32.8 feet] for 7 days) tested to IEC 60529 and UL Type 4X tested to UL 50E	
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 range, U_{dc}	12 V to 28 V, $U_{nom} = 24$ V (instrument equipped with reverse polarity and transient protection)	4
4.2	Power consumption, at U_{nom}	1.2 W (no alarm/light not illuminated) 1.5 W (alarm, light illuminated)	
4.3	Electronics platform/generation	ClampOn DSP II	
4.4	Manner of operation	Real-time measurement	
4.5	Unit of measurement	Raw value	
4.6	Technology (for pig detection)	Passive ultrasonic using piezoelectric transducer and flux sensor for magnetic pig detection	
4.7	Technology (for vibration measurement)	3-axis MEMS accelerometer	5
4.8	Processing	Digital signal processing (DSP) in instrument	
4.9	Calibration	Instrument is factory calibrated	
4.10	Design life	30 years	
4.11	Detection mode	Acoustic, magnetic, combined acoustic and/or magnetic	1, 7, 13
4.12	Detection direction	Bidirectional	
4.13	Detection algorithm (acoustic)	Fixed over Background (FoB) with trigger level, fallback level, trigger time minimum and trigger time maximum. All parameters are configurable	7, 8
4.14	Detection algorithm (magnetic)	Trigger level in magnetic raw value	1, 7, 8
4.15	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	
4.16	Detectable magnetic flux density	Minimum 0.15 mT (1.5 G) at detection point	1
4.17	Repeatability	Better than 1 %	
4.18	Flow conditions	Oil, water, gas, multiphase	
4.19	Pipe material	All steel alloys	6

5 Signal 7

5.1	Signal types (galvanically isolated)	RS-485, 4-20 mA, relays and reset. Relay 1 and local reset switch are intrinsically safe circuits	15
5.2	RS-485 (half duplex) protocol	Modbus RTU (default) or proprietary DSP	
5.3	RS-485 bit rate	2.4 kbps to 115.2 kbps (19.2 kbps default)	
5.4	4-20 mA	Type 4 fully isolated 4-wire transmitter in accordance with ISA 50.00.01. Configurable raw value range 0 to 5 000 000 (default 0 to 500 000). 15 mA alarm level when a pig is detected	8
5.5	Relay 1 (for local alarm)	Solid state SPST type programmed as NO in listening mode (closed in alarm mode)	
5.6	Relay 2 (for remote alarm)	Electromechanical DPDT latching type with 2 A at 28 V contact rating	
5.7	Reset	Either by the integral local switch, by a reset command on RS-485 Modbus RTU or with a timed automatic reset (duration configurable). When reset, alarms on 4-20 mA and relays are reset to listening mode	8

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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	6, 9
6.2	Terminal block connection data	0.5 mm ² to 2.5 mm ² [AWG 20 to AWG 14] stranded conductor (with ferrule with plastic sleeve) cross section	
7 Compliance			14
7.1	Hazardous area location approval	Zone 1, 2 for ATEX/IECEx installations and Zone 1, 2 or Division 2 for cUL _{us} (NEC/CEC) installations	
7.2	ATEX certificate	UL 20 ATEX 2422X	11
7.3	ATEX marking	Ex II 2 G Ex db eb ib IIB T5...T4 Gb -50 °C ≤ T _{amb} ≤ +55 °C...+80 °C	
7.4	ATEX ambient temperature range	-50 °C ≤ T _{amb} ≤ +55 °C...+80 °C	10
7.5	IECEx certificate	IECEx ULD 20.0023X	11
7.6	IECEx marking	Ex db eb ib IIB T5...T4 Gb -50 °C ≤ T _{amb} ≤ +55 °C...+80 °C	
7.7	IECEx ambient temperature range	-50 °C ≤ T _{amb} ≤ +55 °C...+80 °C	10
7.8	cUL _{us} file number	E363818	
7.9	cUL _{us} marking	Class I Zone 1 AEx db eb ib IIB T5...T4 Gb Ex db eb ib IIB T5...T4 Gb -50 °C ≤ T _{amb} ≤ +55 °C...+80 °C	12
7.10	cUL _{us} ambient temperature range	-50 °C ≤ T _{amb} ≤ +55 °C...+80 °C	10
7.11	CE marking in conformance with	2014/34/EU (ATEX) 2014/30/EU (EMC) 2011/65/EU and 2015/863/EU (RoHS)	
7.12	RCM marking in conformance with	Radiocommunications Act 1992	
7.13	EMC generic standards applied	IEC/EN 61000-6-2, IEC/EN 61000-6-4 and IEC 60533	
	Conducted emissions	CISPR 16-2-1	
	Radiated emissions	CISPR 16-2-3	
	ESD immunity	IEC/EN 61000-4-2	
	Radiated RF disturbance immunity	IEC/EN 61000-4-3	
	Electric fast transient/burst immunity	IEC/EN 61000-4-4	
	Surge immunity	IEC/EN 61000-4-5	
	Conducted RF disturbance immunity	IEC/EN 61000-4-6	
	Power frequency magnetic field immunity	IEC/EN 61000-4-8	
	Power supply failures immunity	IEC/EN 61000-4-11	
	Voltage / frequency variations immunity	IEC/EN 61000-4-11	
	Conducted LF disturbance immunity	IEC/EN 61000-4-16	

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- Magnetic PIG detection is optional and requires add-on electronics during manufacturing.
 - Serial number breakdown: YY (year of manufacture), MM (month of manufacture), XXXXX (unique electronics ID).
 - Various alternatives available. Cable gland and cable by client in accordance with local and/or national Ex installation regulations that apply.
 - The instrument must be powered from a safety extra low voltage (SELV) power supply.
 - For vibration measurement details, see instrument datasheet addendum. Vibration output is optional and not activated in instrument by default.
 - Sensor waveguide must have metal-to-metal contact with the pipe surface.
 - Factory configurable software parameters via RS-485 interface. May also be configured in-field by ClampOn authorised personnel.
 - Parameters available for configuration by client via RS-485 interface with *ClampOn PIG Configuration Tool* software.
 - Mounting bracket available in stainless steel (standard), carbon steel or duplex. Clamping bands available in stainless steel.
 - The ambient temperature (T_{amb}) of -50 °C to +55 °C...+80 °C marked on the instrument refers to the temperature of the immediate surroundings. The instrument will have different T-classes (see Ex certificate) depending on any external source of heating, such as process temperature (T_{pipe}), or direct sunlight. If there is a risk the T_{amb} and T_{pipe} temperature ratings will exceed those listed in the Ex certificate, 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 user manual for Specific Conditions of Use.
 - Suitable for use in (and additionally marked) Class I Division 2 Groups B, C, D T5...T4.
 - By default, the pig detector uses acoustic detection, but magnetic detection can also be specified as an option. With magnetic detection, the instrument uses a magnetic field sensor to measure changes in the magnetic flux density near the sensor. Magnetic detection is only available over the RS-485 output.
 - The instrument may not be marked with all certificates at the same time.
 - 4-20 mA and DPDT relay outputs are not available simultaneously. Output type must be specified at time of order so that the correct output can be factory-wired.