Product datasheet
DSP Particle Monitor TSE.DS2I.SA00.A10

CLAMPON
ULTRASONIC INTELLIGENT SENSORS

1	General		Note
1.1	Model name	ClampOn DSP Particle Monitor	
1.2	Service description	Non-invasive non-intrusive topside particle monitor	
1.3	Model number	TSE.DS2I.SA00.A10	
1.4	Explosion protection principles employed	Intrinsic safety, Ex i	
1.5	Serial number	YY-MM-XXXXX	1

2	Physical		
2.1	Dimensions (⌀ × h)	80 mm × 144 mm [3.1 in × 5.7 in]	
2.2	Enclosure material	Stainless steel 316L	
2.3	Enclosure protective coating	None, not certified with any type of coatings	
2.4	Weight (instrument only)	2.2 kg [4.9 lb]	
2.5	Equipment marking	Polyester certification label Stainless steel tag plate where applicable	
2.6	Cable entry configuration	1 off M20 × 1.5 ISO metric fitted with brass Ex blanking element	
2.7	Cable gland	By client	2
2.8	Cable	By client	2

3	Environmental	
3.1	Maximum installation altitude	2 000 meters [6 562 feet]
3.2	Ingress protection	IP66/IP68 (1 meter [3.3 feet] for 24 hours) 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	<95 % (non-condensing)
3.6	Shock (tested to IEC 60068-2-27)	40 *g*, 6 ms, 1 000 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 (from a safety barrier), U_{dc}	24 V	3
4.2	Power consumption (typical/maximum), instrument + safety barrier (PSD 1001C)	1.9 W/2.2 W	
4.3	Electronics platform/generation	ClampOn DSP II	
4.4	Manner of operation	Real-time measurement	
4.5	Unit of measurement	Raw value (and g/s if SandQ+ algorithm is configured)	10
4.6	Technology (for particle measurement)	Passive ultrasonic using piezoelectric transducer	
4.7	Technology (for vibration measurement)	3-axis MEMS accelerometer	4
4.8	Processing	Digital signal processing (DSP) in instrument	
4.9	Calibration	Instrument is factory calibrated	
4.10	Design life	25 years	
4.11	Repeatability	Better than 1 %	
4.12	Flow conditions	Oil, water, gas, multiphase	
4.13	Minimum flow velocity	0.5 m/s [1.6 ft/s]	6
4.14	Minimum detectable particle size	25 µm (in oil) 15 µm (in gas)	5
4.15	Minimum sand rate	0.01 g/s	5
4.16	Pipe material	All steel alloys	7

5	Signal		8
5.1	Signal types (galvanically isolated)	RS-485 and 4-20 mA	3
5.2	RS-485 (half duplex) protocol	Modbus RTU (default) or proprietary DSP	9, 10
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)	9, 10

6	Installation		
6.1	Mounting	Mounting bracket clamped to pipe using stainless steel clamping bands or welded to pipe surface. Instrument screws into the mounting bracket	7, 11
6.2	Terminal block connection data	0.5 mm² to 1.5 mm² [AWG 20 to AWG 16] stranded conductor (with ferrule with plastic sleeve) cross section	

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 for $_{c}UL_{us}$ (NEC/CEC) installations	
7.2	ATEX certificate	Presafe 17 ATEX 9492X	13
7.3	ATEX marking	Ex II 1 G Ex ia IIB T4 Ga −40 °C ≤ T_{amb} ≤ +60 °C	
7.4	ATEX ambient temperature range	−40 °C ≤ T_{amb} ≤ +60 °C	12
7.5	IECEx certificate	IECEx PRE 17.0009X	13
7.6	IECEx marking	Ex ia IIB T4 Ga −40 °C ≤ T_{amb} ≤ +60 °C	
7.7	IECEx ambient temperature range	−40 °C ≤ T_{amb} ≤ +60 °C	12
7.8	$_{c}UL_{us}$ file number	E354507	13
7.9	$_{c}UL_{us}$ marking	Class I Division 1 Groups C, D T4 Class I Zone 0 AEx ia IIB T4 Ga Class I Zone 0 Ex ia IIB T4 Ga	
7.10	$_{c}UL_{us}$ ambient temperature range	−40 °C ≤ T_{amb} ≤ +60 °C	12
7.11	CE marking in conformance with	2014/34/EU (ATEX) 2014/30/EU (EMC)	
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, IEC 60533, and IEC/EN 61326-1	
	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	

Notes

1. Serial number breakdown: YY (year of manufacture), MM (month of manufacture), XXXXX (unique electronics ID).
2. Various alternatives available. Cable gland and cable by client in accordance with local and/or national Ex installation regulations that apply.
3. Irrespective of whether in a hazardous area or non-hazardous area, all signal and power connections to and from the instrument must be via certified safety barriers with intrinsically safe outputs in accordance with the Ex certificates' electrical data. Only use certified safety barriers supplied or recommended by ClampOn.
4. For vibration measurement details, see instrument datasheet addendum. Vibration output is optional and not activated in instrument by default.
5. Depends on flow conditions.
6. Minimum velocity for particle detection depends on flow medium, particle size and pipe configuration.
7. Sensor waveguide must have metal-to-metal contact with the pipe surface.
8. Factory configurable software parameters via RS-485 interface. May also be configured in-field by ClampOn authorised personnel.
9. 4-20 mA only recommended for raw value trending. ClampOn recommends digital (Modbus RTU or DSP) output to enable sand calculation.
10. The instrument can be configured to calculate the sand rate, totals, and alarms internally using live flow input from a control system using an RS-485 interface, Modbus RTU or DSP protocol. The SandQ+ algorithm used by the instrument for this calculation is a simplified version of that used when running the calculation in ClampOn monitoring software on a centralized controller.
11. Mounting bracket available in stainless steel (standard), carbon steel or duplex. Clamping bands available in stainless steel.
12. The ambient temperature (T_{amb}) of −40 °C to +60 °C marked on the instrument refers to the temperature of the immediate surroundings, irrespective of any external source of heating, such as process temperature (T_{pipe}), or direct sunlight. Instrument is certified for T_{pipe} ≤ +125 °C. 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.
13. See certificate and/or user manual for electrical parameters (for IS calculations), and Specific Conditions of Use.
14. The instrument may not be marked with all certificates at the same time.