Instrument Datasheet
DSP Particle Monitor Ex d

CLAMPON®
ULTRASONIC INTELLIGENT SENSORS

1	General		Note
1.1	Model description	DSP Particle Monitor	
1.2	Explosion protection principle	Flameproof enclosure, Ex d	
1.3	Part number	Various depending on model type and mechanical configuration	
1.4	Serial number	YY-MM-XXXXX, unique for each unit	1

2	Physical		
2.1	Dimensions (ø x h)	112 mm x 132 mm [4.4 in x 5.2 in]	
2.2	Enclosure material	Stainless steel 316L	
2.3	Enclosure protective coating	None, not certified with any type of coatings	
2.4	Weight (sensor only)	4 kg [8.8 lb]	
2.5	Weight (with mounting bracket)	4.5 kg [9.9 lb]	
2.6	Ambient temperature	See "Approvals & certification"	
2.7	Ingress protection	IP66/IP68 (1 meter for 24 hours), in accordance with IEC 60529	
2.8	NEMA enclosure type	Type 4X	
2.9	Equipment marking	Stainless steel 316 marking plate on top of enclosure showing product name, part number, serial number, certification, and, if applicable tag number and client information	
2.10	Cable entry configuration	2 off M25x1.5 ISO metric: one entry fitted with Ex certified blanking element, one entry fitted with M25 x M20 Ex thread adaptor and Ex cable gland	2, 3
2.11	Cable gland	Hawke 501/453/UNIV A M20	2, 3
2.12	Cable length and type	10 m, RFOU(c) S2/S6, 4x2x0.75 mm^2, grey	2, 14

3	Electrical		Note
3.1	Power input	12 VDC to 28 VDC (electronics equipped with inverse polarity and transient protection)	
3.2	Power consumption (typical/maximum)	1.2 W @24 VDC/1.2 W @28 VDC	
3.3	Electronics platform/generation	ClampOn DSP II	
3.4	Microprocessor	600 MIPS	
3.5	Non-volatile memory	8 MB	
3.6	Diagnostic features (with software)	Internal self-testing of analogue filters, amplifiers, and flash memory	

4	Operation		
4.1	Manner of operation	Real-time measurement	
4.2	Unit of measurement	Raw value (and g/s if SandQ+ is specified)	9
4.3	Technology	Passive ultrasonic	
4.4	Processing	DSP in sensor unit	
4.5	Calibration	All sensors are calibrated to a master signal at factory	
4.6	Repeatability	Better than 1 %	4
4.7	Flow conditions	Oil, water, gas, multiphase	
4.8	Minimum flow velocity	0.5 m/s [1.6 ft/s]	5
4.9	Minimum particle size	Oil: 25 µm, gas: 15 µm	4
4.10	Minimum sand rate	0.01 g/s	4
4.11	Pipe material	All steel alloys	6

5	Signal		
5.1	RS-485 (half duplex) protocol	Modbus RTU or proprietary DSP	7, 8, 9
5.2	RS-485 baud rate	2.4 kbps to 115.2 kbps	7
5.3	4-20 mA (passive, sink), 4-wire	Configurable raw value range up to 5 000 000. Default 0 to 500 000	7, 8, 9

6	Installation		
6.1	Mounting	Mounting bracket clamped to pipe by non-invasive, non-intrusive stainless steel clamping bands, or welded to pipe surface. Collar nut secures sensor in mounting bracket	10
6.2	Conductor (stranded) wire cross section	0.25 mm^2 to 0.75 mm^2 [AWG 24 to AWG 18] with ferrule with plastic sleeve	

7	Approvals & certification		15
7.1	Hazardous area location approval	Zone 1, 2 for ATEX/IECEx/EAC Ex, and Zone 1, 2 and Division 2 for $_{c}UL_{US}$ (NEC/CEC)	
7.2	ATEX marking	Ex II 2 G Ex db IIB T5 Gb -50 °C ≤T_{amb} ≤ +85 °C	11
7.3	ATEX certificate	DEMKO 13 ATEX 1336551X	13
7.4	ATEX ambient temperature range	-50 °C ≤T_{amb} ≤ +85 °C	
7.5	IECEx marking	Ex db IIB T5 Gb -50 °C ≤T_{amb} ≤ +85 °C	11
7.6	IECEx certificate	IECEx ULD 13.0010X	13
7.7	IECEx ambient temperature range	-50 °C ≤T_{amb} ≤ +85 °C	
7.8	$_{c}UL_{US}$ marking	Class I, Zone 1, AEx d IIB T5 | Ex d IIB T5 Gb	12
7.9	$_{c}UL_{US}$ file number	E363818	
7.10	$_{c}UL_{US}$ ambient temperature range	-50 °C ≤T_{amb} ≤ +85 °C	
7.11	EAC Ex marking	1Ex d IIB T4 Gb -50 °C ≤T_{amb} ≤ +60 °C	11
7.12	EAC Ex certificate	RU C-NO.ГБ05.B.01181	
7.13	EAC Ex ambient temperature range	-50 °C ≤T_{amb} ≤ +60 °C	
7.14	CE marking in conformance with	2014/34/EU (ATEX Directive) and 2014/30/EU (EMC Directive)	

Notes

1. Serial number breakdown: yy (year of manufacture), mm (month of manufacture), xxxxx (unique electronics ID).
2. Various solutions available.
3. For $_{c}UL_{us}$ installations the sensor can be fitted with any type of plug/adaptor/cable gland provided they are suitably rated to maintain the type of protection. In addition all components utilized (cable included) on the sensor must be "UL Listed and Recognized" and listed in the "virtual" catalogue, the Online Certifications Directory.
4. Depends on flow conditions.
5. Minimum velocity for particle detection depends on flow medium, particle size and pipe configuration.
6. Sensor must have metal-to-metal contact with the pipe surface.
7. Factory configurable software parameters. May also be configured in-field by ClampOn authorised personnel.
8. 4-20 mA only recommended for raw value trending. ClampOn recommends digital (Modbus RTU or DSP) output to enable sand calculation.
9. For sensors with SandQ+, when this is used to calculate sand rate in the sensor, the sensor must receive live flow data, so Modbus RTU or DSP protocol must be used. Otherwise, to calculate sand rate (g/s), send sensor raw value and (live) flow data to a PC or PAC.
10. Mounting bracket in stainless steel (standard), carbon steel or duplex. Clamping bands available in stainless steel or Inconel.
11. Temperature class is given at maximum ambient temperature (including any external source of heating, typically process temperature, where applicable).
12. Suitable for use in (and additionally marked) Class I, Division 2, Group C T5 as per UL 60079-0 (6th Edition) Clause 29.12.2DV.
13. See certificate and/or installation instructions for specific conditions of use.
14. 10 m cable as standard. Sensor supplied with cable pre-terminated in sensor by ClampOn, with flying lead at the other end.
15. The sensor may not be marked with all certificates at the same time.