# DSP Compact Leak Monitor

## Instrument Datasheet

CLAMPON®
ULTRASONIC INTELLIGENT SENSORS

## INSTRUMENT DATA

| | | | NOTE |
|---|---|---|---|
| | **GENERAL** | | |
| 1.0 | Manufacturer | ClampOn AS | |
| 1.1 | Model description | DSP Compact Leak Monitor | |
| 1.2 | Part number | 930-xxxx0-xxx | 1 |
| | **CLIENT DATA** | | |
| 2.0 | Customer | | |
| 2.1 | Project title | | |
| 2.2 | Field / installation | | |
| 2.3 | P.O. number | | |
| 2.4 | Part number | | |
| 2.5 | Tag number | | |
| 2.6 | Document number / rev. | | |
| 2.7 | Pipe OD | | |
| 2.8 | Jumper length | | |
| 2.9 | Connector | | |
| | **PHYSICAL** | | |
| 3.0 | Dimensions (ø x h) | 89 mm x 489 mm [3.5 in x 19.3 in] | |
| 3.1 | Material | Titanium grade 2 | 2 |
| 3.2 | Weight (approximate, jumper excluded) | In air: 5 kg [11 lb]<br>In water: 4 kg [8.8 lb] | |
| 3.3 | Protective coating | None | 3 |
| 3.4 | Cathodic protection | None | |
| 3.5 | Operating temperature | -40 °C to 150 °C [-40 °F to 302 °F] | 4, 5 |
| 3.6 | Ambient temperature | -40 °C to 60 °C [-40 °F to 140 °F] | |
| 3.7 | Max design pressure | 330 bar [4 786 psi] | |
| 3.8 | Max water depth | 3 000 m [9 842 ft] | |
| 3.9 | Mounting | Clamp on to pipe surface | 6 |
| 3.10 | Sealing | Welded 1 atmospheric chamber | 7 |
| 3.11 | Jumper interface | See note | 8 |
| 3.12 | Filling / ventilation port | See note | 8 |
| | **HARDWARE** | | |
| 4.0 | Supply voltage | 12 VDC to 28 VDC | 9 |
| 4.1 | Power consumption | 60 mA @ 24 VDC (typical) | 9 |
| 4.2 | Electronic | Single or redundant | |
| 4.3 | Signal output | RS-485 | 16,17 |
| 4.4 | Protocol | ClampOn proprietary DSP protocol | |
| 4.5 | Baud rate | 19 200 bps (9 600 bps on request) | |
| 4.6 | Microprocessor | 66 MIPS | |
| 4.7 | Memory | 4 Mb onboard flash | |
| 4.8 | Diagnostic features | Self-testing | 10 |
| 4.9 | Insulation resistance | >10 GΩ @ 50 VDC | |
| 4.10 | Penetrator | Glass to titanium seal, 8 pin | 11 |
| 4.11 | Max wire cross-section | 1.5 $mm^2$ [AWG 16] | |
| | **OPERATION** | | |
| 5.0 | Manner of operation | Real-time measurement | |
| 5.1 | Technology | Passive ultrasonic | |
| 5.2 | Processing | DSP in sensor unit | |
| 5.3 | Calibration | Factory calibrated | 12 |
| 5.4 | Flow conditions | Oil / water / gas / multiphase | |
| 5.5 | Minimum detectable leakage: | Liquid: dP >3 bar [44 psi]<br>Gas: dP >1 bar [15 psi] | 13 |
| 5.6 | MTBF | >30 years | |
| | **INSTALLATION** | | |
| 6.0 | Installation method | By ROV or diver | |
| 6.1 | ROV handle | See note | 14 |
| 6.2 | Locking | Spring-loaded in J-slot | 15 |
| 6.3 | Installation torque | 30 N·m [22 ft $lb_f$] | |
| 6.4 | Retrieval torque | 50 N·m [37 ft $lb_f$] | |
| 6.5 | Damage torque | >200 N·m [147 ft $lb_f$] | |

## INSTRUMENT LAYOUT

## NOTES

1 X notation subject to change according to type of jumper interface, signal output, protocol, and baud rate.

2 All major metal parts exposed to seawater are made of titanium grade 2. Material certificates according to EN 10204 3.1.

3 ROV handle coating according to NORSOK M-501, system 7, RAL 2004 (orange) unless otherwise specified.

4 Maximum pipe surface temperature 200 °C [392 °F].

5 Operating temperature stated for 15 °C [59 °F] ambient temperature.

6 Funnel has to be made to fit actual installation. Funnel models for topside installation and/or retrofit subsea installation can be supplied. Ask supplier for details.

7 Electronics encapsulated in nitrogen gas-filled ($N_2$)
1 atmospheric chamber, sealed by electronic beam welding and helium leak tested.

8 Bennex Omnitec Mk II Anguila M25 system or Ocean Design Inc. ¾" SAE Boss interface

9 Inrush current worst case @ 24 VDC:
≈1 300 mA for <1 ms, thereafter ≈70 mA for <2 seconds.

10 Internal self-testing of analogue filters, amplifiers and flash memory.

11 See sensor GA drawing for details.

12 Calibration of ClampOn DSP Compact Leak Monitors is performed on a calibration block by use of a signal generator element.

13 Minimum leakage rate is 0.1 l/min [0.026 gal/min], depending on delta pressure (dP) over the leakage point.

14 ROV handles according to ISO 13628-8:
- T-bar, extended T-bar, fishtail or paddle (shown for illustrational purposes)

Hex nut for diver installation also available.
Ask supplier for details.

15 See funnel GA drawing for details.

16 Proprietary DSP protocol (1 200 bps to 57 600 bps)
Modbus RTU (9 600 bps to 38 400 bps)
FMC KOS 150 protocol, 21 byte string (2 400 bps)
Proprietary 13 byte m/s binary mode (2 400 bps)
4-20 mA, passive (4-wire) or active (3-wire)

17 Can be supplied if requested;
- CANopen protocol to SIIS level 2 standard
- Profibus DP:
  9 600 bps / 19 200 bps / 93 750 bps / 187 500 bps
- Vibration:
  0 G to 5 G, 0,25 Hz to 1 024 Hz
  Vibration output on RS-485 Modbus RTU at speeds 9 600 bps to 38 400 bps or proprietary DSP protocol at speeds 1 200 bps to 57 600 bps.

Ask supplier for details.

## SYSTEM DESIGN

*ClampOn DSP Compact Leak Monitor is designed to detect leakage or flow-through on pipes and valves. The sensor is non-intrusive and installed in a funnel clamped to the pipe surface; hence no parts are in contact with the flow. All ClampOn sensors have two-way communication via RS-485 and can be upgraded / customized by software download. A computer running ClampOn software must be used to handle data storage and communication to client control system.*