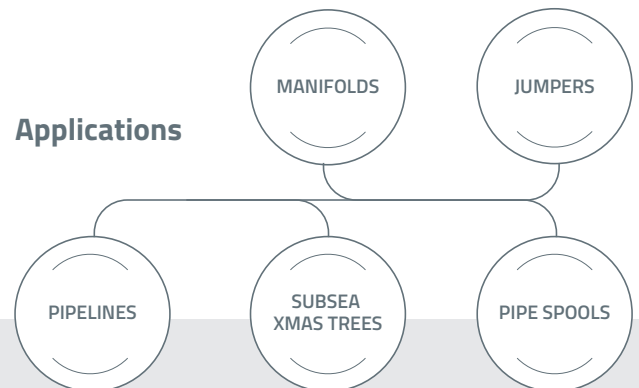


Erosion-corrosion has been rated in the top five most prevalent forms of corrosion damage in the oil and gas industry and defined as accelerated corrosion following the removal of surface films. Erosion in oil and gas production systems is mainly due to the presence of sand along with liquid and gas. It is associated with production velocities and is the most severe when production velocities are high. Since erosion is caused by mechanical forces occurring on the metal surface, erosion can be difficult to control. To address this industry problem ESP Safety has developed **Echo-ECUW** Erosion-Corrosion Detector.

The **Echo-ECUW** monitors the condition of pipes and provide information about its erosion corrosion rate in various applications. **Echo-ECUW** uses a group of acoustic sensors to detect wall thickness by pulse-echo method. The quantity of sensors in a system varies from 4 to 32 pcs. The output signals from **Echo-ECUW** acoustic sensors are transmitted directly to a control system for online data monitoring via SIIS Level 2 or SISS Level 3 communication protocols. Being the next generation of smart instruments Echo uses advanced digital signal processing algorithms to provide reliable, high-resolution data to operator. This allows users to plan preventative measures, optimize use of corrosion inhibitors, calculate the remaining lifetime of pipeline, monitor weld/HAZ on pipe, verify and calibrate inspection pigs and provide information about critical areas between inspection surveys.

The **Echo-ECUW** non-intrusive device can be easily tied into any existing system or implemented into new pipeline installation. ESP Safety's erosion corrosion detector is recommended to be installed in combination with our sand detector to minimize sand intrusion (the main cause of erosion corrosion), detect early signs of corrosion and extend life of pipelines.



## Features and Benefits

### ENHANCED ACOUSTIC SENSITIVITY

Combination of superb sensing element, digital signal processing algorithm with advanced filtering techniques allow device to measure wall thickness at high resolution.

### MAXIMUM RELIABILITY

Rigorous self diagnostics, data averaging and use of filtering techniques provide fail to safe reliable operation.

### LOW MAINTENANCE COST

Echo requires minimum maintenance on site, which makes it an easy choice for operator.

### LONG SERVICE LIFE

The life expectancy for the Echo-EC is 30 years

### NON-INTRUSIVE MOUNTING

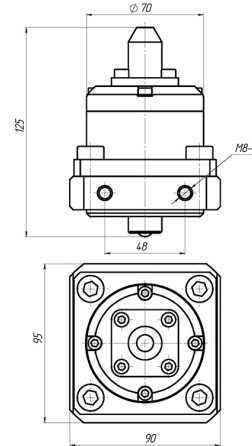
The installation is very simple and easy, no need in cutting or welding and shutting down a process. The Echo-EC system comes with mounting frame which is attached to the pipe by a crane vessel either with ROV or diver for existing installations. This design provides a secure fit while maintaining pipeline integrity.

### ROV DEPLOYABLE/RETRIEVABLE

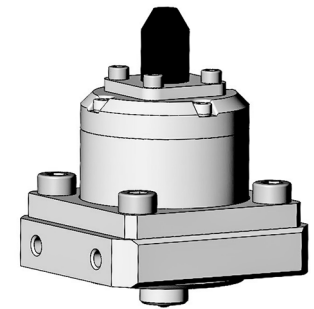


**ELECTRICAL CHARACTERISTICS**

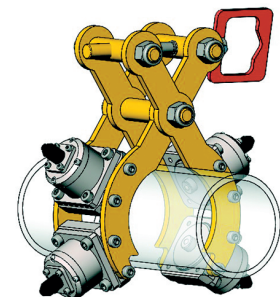
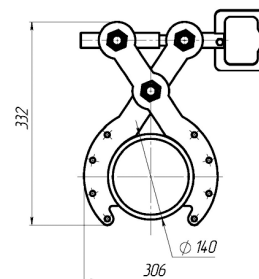
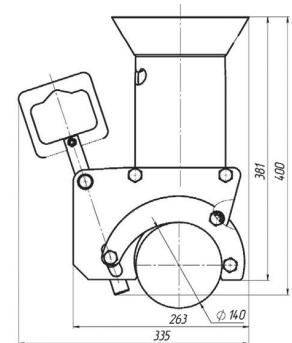
Input Voltage	+24VDC (Nominal) +18 to 32 VDC Battery Operated by Request
Power Consumption	≤6W
Output Signals	CANopen CiA 443 (SIIS level 2) Digital RS-485 Modbus RTU Ethernet TCP/IP (SIIS level 3)
Communication Bid Rate	<b>Modbus</b> 9600 bps (default) 4800,19200,115000 (by request) <b>Canbus</b> 20 kbps (default) 10, 50, 83.3,100,125, 250, 500, 800, 1000 (by request)

**DIMENSIONS IN MILLIMETERS (MM)**


ECHO-EC Detector Dimensions


**OPERATIONAL CHARACTERISTICS**

Principle of Operation	Passive acoustic
Units of measurement	Wall loss (mm), corrosion rate (%)
Calibration	Factory calibrated
Accuracy	0.1%
Repeatability	<1%
Pipe Size	> 4 inch OD (101.4 mm)
Coverage Area	32 ft <sup>2</sup> (3 m <sup>2</sup> )
Wall Thickness	3-50 mm (0.1 -2 inches)
Wall Material	Metal Alloys
Depth	4,500 m (14,760 ft)
Extrenal Pressure	30 MPa
Operating Temperature	-20C to +80C (-76F to 185F)
Pipe Surface Temperature	-100C to +290C (-148F to 554F)
Storage Temperature	-50C to +50C (-58F to 122F)
Design Life	30 years


**MECHANICAL CHARACTERISTICS**

Dimensions	Monitoring Module 14" x 4.7" (348 mm x Ø 120 mm) ECHO EC sensor 2" x 4" x 5" (50 mm x 95 mm x 125 mm)
Material	Titanium/UNS S31803/2205 Duplex SS
Weight in Air	Monitoring Module 22 kg/ ECHO EC Sensor 19 kg
Weight in Water	Monitoring Module 35 kg/ ECHO EC Sensor 30 kg
ROV Handle Type	D-Handle as standard (T-handle, Fishtail handle, O-handle available by request)
Coating	Xylan 1070, F4210 yellow (detector), Xylan 1070, F1677 orange (ROV handle)
Interface Connector Type	Omnitec MKII Tronic Connector ODI Connector

**Monitoring Module Dimensions**
