

### Technical Support

For applications assistance contact the Teledyne Cormon Products Group. Field installation, commissioning and support services are available from our Service group.

### References:

PTEC™ users include:  
BHP - Neptune  
BP Angola - Block 18  
Conoco Phillips - Brodgar & Callanish  
Marathon - Droszky  
OMV - Patricia Baleen  
Petrobras - Cascade & Chinook, Sul Capixaba  
Statoil - Kristin, Snowhit  
Shell - Penguins & Howe

### Action

One easy way to receive further information or a proposal is to complete and return the subsea checklist on our website [www.cormon.com](http://www.cormon.com). This form is also available by fax or mail



# CEION®

### Europe

Teledyne Cormon Ltd  
Unit 3, Robell Building  
Chartwell Road  
Lancing Business Park  
Lancing, West Sussex BN15 8TU  
United Kingdom

Tel: +44 (0) 1903 854800  
Fax: +44 (0) 1903 854854  
Email: [sales@cormon.com](mailto:sales@cormon.com)

[www.cormon.com](http://www.cormon.com)

### USA

Teledyne Cormon Inc  
North America Regional Office  
835 Greens Parkway  
Houston, Texas  
77067  
USA

Tel: 001 281 875 0675  
Fax: 001 281 875 0161  
E-mail: [sales@cormon.com](mailto:sales@cormon.com)

### Service Base

Teledyne Cormon Ltd  
Unit 4, Kirkhill Place  
Kirkhill Industrial Estate  
Dyce, Aberdeen  
AB21 0GU  
United Kingdom

Tel: +44 (0) 1224 723315  
Fax: +44 (0) 1224 723316  
E-mail: [sales@cormon.com](mailto:sales@cormon.com)

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## TELEDYNE CORMON LIMITED

A Teledyne Technologies Company



## PRESSURE TEMPERATURE CORROSION & SAND EROSION MEASUREMENT FOR SUB SEA INSTALLATIONS

# CEION®

A tested and qualified mechanical package that is capable of the most demanding HP/HT Deepwater service. The PTEC™ range of probes covers all requirements for measurement of Pressure, Temperature, Erosion or Corrosion in sub sea applications based on the highly capable CEION® measurement platform and a flexible communications interface including SIIS level II compliance. Sensors are either flush or intrusive mounted.

### Product:

- ☪ Dual redundant pressure & temperature sensors
- ☪ Sand Erosion sensors
- ☪ CEION® Corrosion sensors
- ☪ Combined sensors

### User benefits include:

- ☪ Optimised Production
- ☪ Lower operating costs
- ☪ Extended facility life
- ☪ Pressure Integrity assurance
- ☪ Cost savings with combined sensors

### Applications include:

- ☪ Corrosion inhibitor optimisation
- ☪ Sand control
- ☪ Water detection
- ☪ Reservoir management
- ☪ Pressure barrier testing

### Suggested locations: \*

- ☪ Subsea wellheads
- ☪ Pipeline Manifolds
- ☪ Risers

### Product Features:

- ☪ Long life sensor – service life exceeding field design life
- ☪ High integrity - no epoxy resin or glass used in mounting sensors
- ☪ Qualified for HP/HT service
- ☪ Highest resolution instantaneous measurement suitable for real-time control
- ☪ One piece flange mounted unit
- ☪ Interface to Subsea Control Modules using flexible communications module
- ☪ Low power consumption
- ☪ No software required - cheaper and easier to integrate
- ☪ No on-site calibration necessary
- ☪ Single or combined measurements

\* For pipeline monitoring please refer to our RPCM product information





**Description**

Corrosion and Erosion rate measurements are made in line using CEION® high sensitivity metal loss technology. The sensors are at least an order of magnitude improvement against competing models for instantaneous resolution and speed of response. Due to the very high resolution obtained, even on thicker elements, the results may be used in real time for proactive solids/corrosion management. The sensor configuration may be flush or inserted to ensure that solids entrained in the flow will strike the face of the sensor creating maximum erosion effect. Measurements are sent, with temperature data, to a data acquisition system in real time. The instrument outputs are in engineering units, which reduces and simplifies system integration as no additional software is required at the receiving location.

The sensor element material may be selected according to the monitoring objective. If corrosion/erosion is being measured the material selected is usually the same as the process pipework. For erosion a corrosion resistant alloy is often used.

CEION® subsea probes are constructed for extended maintenance free service in aggressive environments. In the demanding

pressure and temperature conditions encountered by subsea systems, especially during start-up, epoxy or glass seals may readily fail. Pressure balanced sensor designs have been developed that are not reliant on epoxy or glass seal materials. Dual redundant penetrator sets are installed to ensure absolutely reliable pressure containment. Critical modules and components for the product have been qualified to permit flexibility in design to meet client requirements.

Sensors may be placed in any suitable location, usually close to the wellhead or manifold. Ideal locations are identified using modelling techniques to determine a predicted flow regime at any given point. For sand erosion applications an understanding of the flow regime is usually an essential requirement.

Sensors located close to platforms or fixed installations may be hard-wired for power and data or integrated with the subsea control module. Flexible interfacing tools are provided within the instrumentation package. Compatibility with long range modem technology has been qualified for remote, deepwater applications. On-site calibration is not required.

**PTEC™ has the edge for Sand Erosion & Corrosion**

PTEC™ gives users significant advantages over non-intrusive acoustic techniques and competing intrusive sensors:

Relative to Acoustic	Relative to Competing Sensors
PTEC™ requires no calibration	PTEC™ uses no epoxy or glass in sensor mounting
PTEC™ not subject to noise interference	PTEC™ requires no software
PTEC™ Measures erosion directly	PTEC™ gives temperature compensation
PTEC™ offers combined parameters	PTEC™ Sensors can be flush mounted
PTEC™ can detect Fines even at low sand rates and in high viscosity fluids	PTEC™ has CEION®'s superior resolution



**Operation**

Each unit is installed on a flanged (or hubbed) branch after full factory testing and calibration. Once on location the unit is connected via a short jumper cable to the stabbing plate/SCM using underwater mateable connectors. Data is delivered to the acquisition/transmission system in an agreed format allowing any combination of commercial data transmission methods to provide an intermediate surface link. The data is output in engineering units requiring no further processing. System integration services are available from Teledyne Cormon Products Group.

**Maintenance**

No routine maintenance is required for directly powered and data linked units. No on-site calibration is required.

**Specifications**

- Power: 24v dc / 60 - 100mA
- Ambient temperature: -40°C to 70°C (-40°F to 158°F)
- Process temperature: -70°C up to 200°C (-94°F to 392°F)
- Service Pressure: all configurations rated to 1035 bar (15,000 psi) at max. temperature
- Service depth: 3050m (10,000 ft)
- Time base: selectable multiple of 4 seconds
- Sensor material: client selected
- Sensor life: client selected up to field design life
- Flange/Hub mounting: client selected – usually API 2 1/16"
- Metal loss resolution: From 5nm (0.0002 mils) or 0.00025% dependent on element thickness
- Temperature resolution: 0.5% full scale or better
- Pressure resolution: 0.1% full scale or better (high sensitivity piezoresistive silicon chip technology)
- Typical communications: RS 232, RS 485 (Modbus, Profibus, Canbus etc) and Analogue 4-20mA. Interface experience with all major SCM suppliers.

**CEION® performance**

At the heart of PTEC™ sand erosion and corrosion sensors lies Teledyne Cormon's advanced metal loss measurement technology CEION®. The table below shows two examples of resolution for different probe specifications.

Sand Erosion Sensor example	
Element material	Inconel 625
Element thickness	Extended life 8mm (320 mil)
Instantaneous resolution	45 nm (0.0018 mil)
% of wall thickness	0.0006%
Limit of sand detection (including fines to 30 microns)	<0.01 lb/MMscf
Corrosion Sensor example	
Element material	Carbon Steel
Element thickness	Minimum life 2 mm (80 mil)
Instantaneous resolution	5 nm (0.0002 mil)
% of wall thickness	0.00025%
Limit of detection	<0.025 mppy (0.1 mpy)

