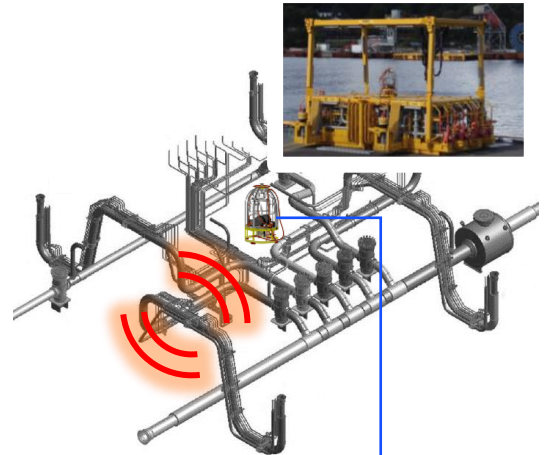


SUBSEA VIBRATION MONITORING

Naxys Subsea Vibration Monitoring

Both the ALD and AECM sensors are designed to detect and trend vibrations occurring on subsea structures. Sensors are used for monitoring of VIV (Vortex Induced Vibrations), FIV (Flow Induced Pulsations) and FIV (Flow Induced Vibrations). The system is used for continuous monitoring and trending of vibrations. This provides the Operator with an early warning in case the subsea asset is operating outside the defined limits.

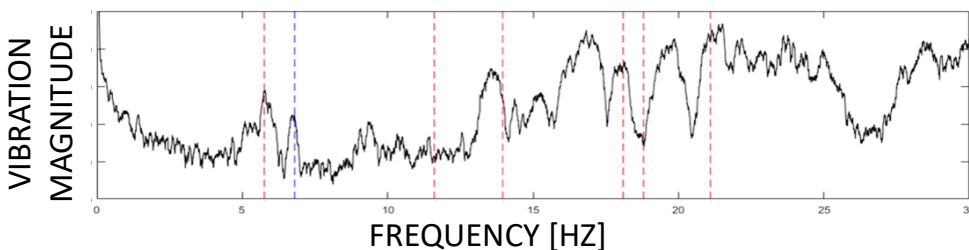


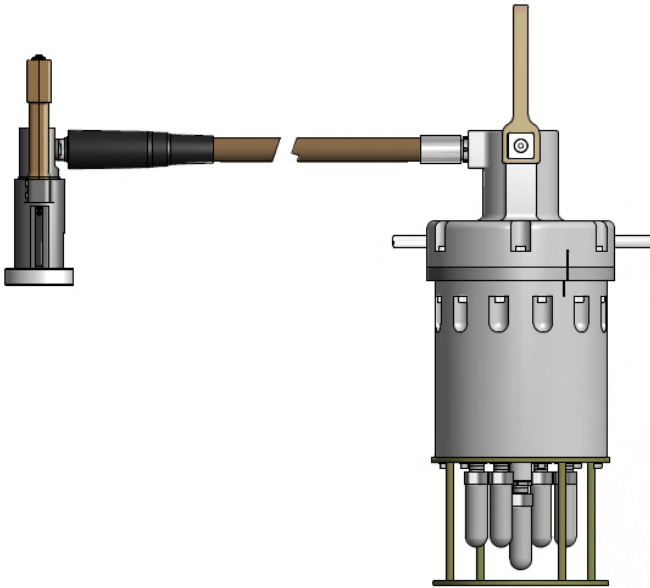
Performance trending

- Flow velocity tuning to avoid vibrations
- Maximum acceptable flow velocity

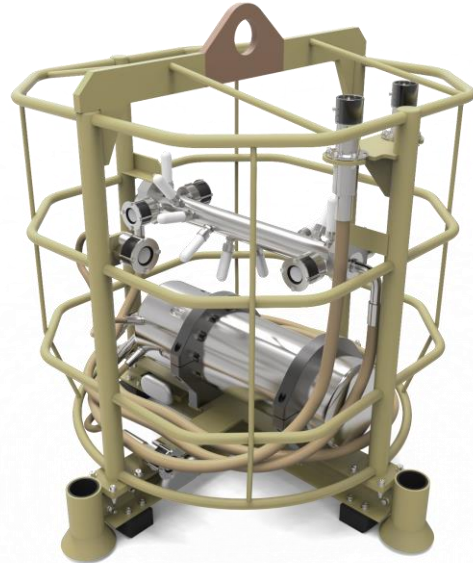
Maintenance planning & Forecasting

- Detection of damaged pipe support
- Detection of loose components
- Abnormality detection





Naxys ALD



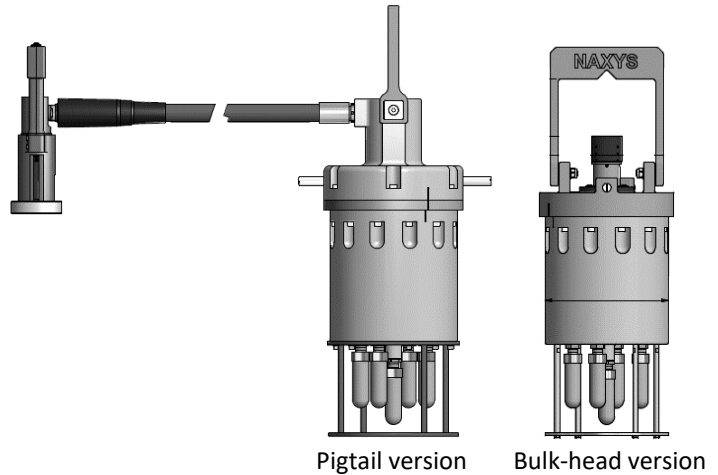
Naxys AECM

Both Naxys ALD and Naxys AECM are designed for Vibration Monitoring

ALD – Acoustic Leak Detector
AECM – Acoustic Electric Condition Monitoring

ALD-FEATURES

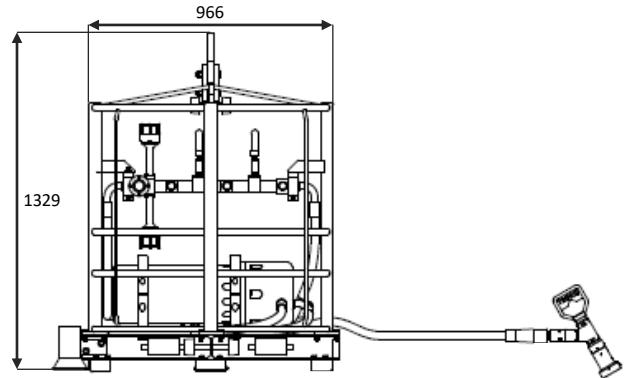
- Wide area coverage:
 - Manifold & XTs,
 - Surrounding infrastructure
- Directional detection:
 - 15 sectors (operator's view)
 - 1–2 degree 3D-resolution
- Early warning
 - Default response time: 2 min. (configurable)



Version	Pigtail	Bulk-head
Design life	30 years	
Operating temperature range	-5°C to +40°C	
Maximum operating pressure / depth	340 bara / 3048m	
Weight (in air):	49 kg (ex. jumper assy)	41 kg
Dimensions (L x Ø)	787 x 250 mm	727 x 250 mm
Qualification	API 17F 4 th edition	
Testing	API 17F 4 th edition	
Communication interface	<ul style="list-style-type: none"> • Standard: Ethernet (SIIS Level 3) Optional: Canbus (SIIS Level 2)/ RS-485 	
Redundancy	Single electronics. Dual power and dual comms. interface available	
Voltage supply	Nominal 20-34 VDC	
Power consumption	< 16W (Nominal)	
Material	Titanium Gr.2	
Sensors	5 acoustic sensors	
Directivity	1-2 degrees resolution. Default 15 sectors (configurable).	
Method of installation	Mounted in funnel. Installed topside or subsea by ROV. ROV retrievable	
SCM connection	Pigtail jumper w/wet-mate connector (7 or 12 way) 3m min. jumper length	Jumper assy. w/wet-mate connectors for connection to SCM and sensor. Customer provided or included on request.
Additional functionality	Vibration monitoring Choke Valve monitoring	

AECM-FEATURES

- Non-intrusive
- Can be placed up to 20 meters from pump
- Provides KPI's and trend analysis:
 - Actual Shaft Speed
 - Power factor (slip ratio)
 - Harmonic vibration levels (1x, 2x, 3x..)
 - Sub-synchronous vibration level
 - Electric drive unit sideband level
- Rotation start/stop confirmation
- Leak Detection (inward and outward)



Name	Naxys AECM
Design life	30 years
Operating temperature range	-5°C to +40°C
Operating pressure	Max. 300 bar
Weight	Approx. 250kg in air
Dimensions	1750x1000mm
Qualification	API 17F 4 th edition
Testing	API 17F 4 th edition
Communication interface	Ethernet (SIIS Level 3)
Power supply	24V DC nominal (18 to 34V DC) 25 W
Material canister and sensors	Titanium
Material protection frame	Steel
Method of installation	ROV installable/retrievable
Additional functionality	Valve and choke monitoring, transient detection, vibration monitoring