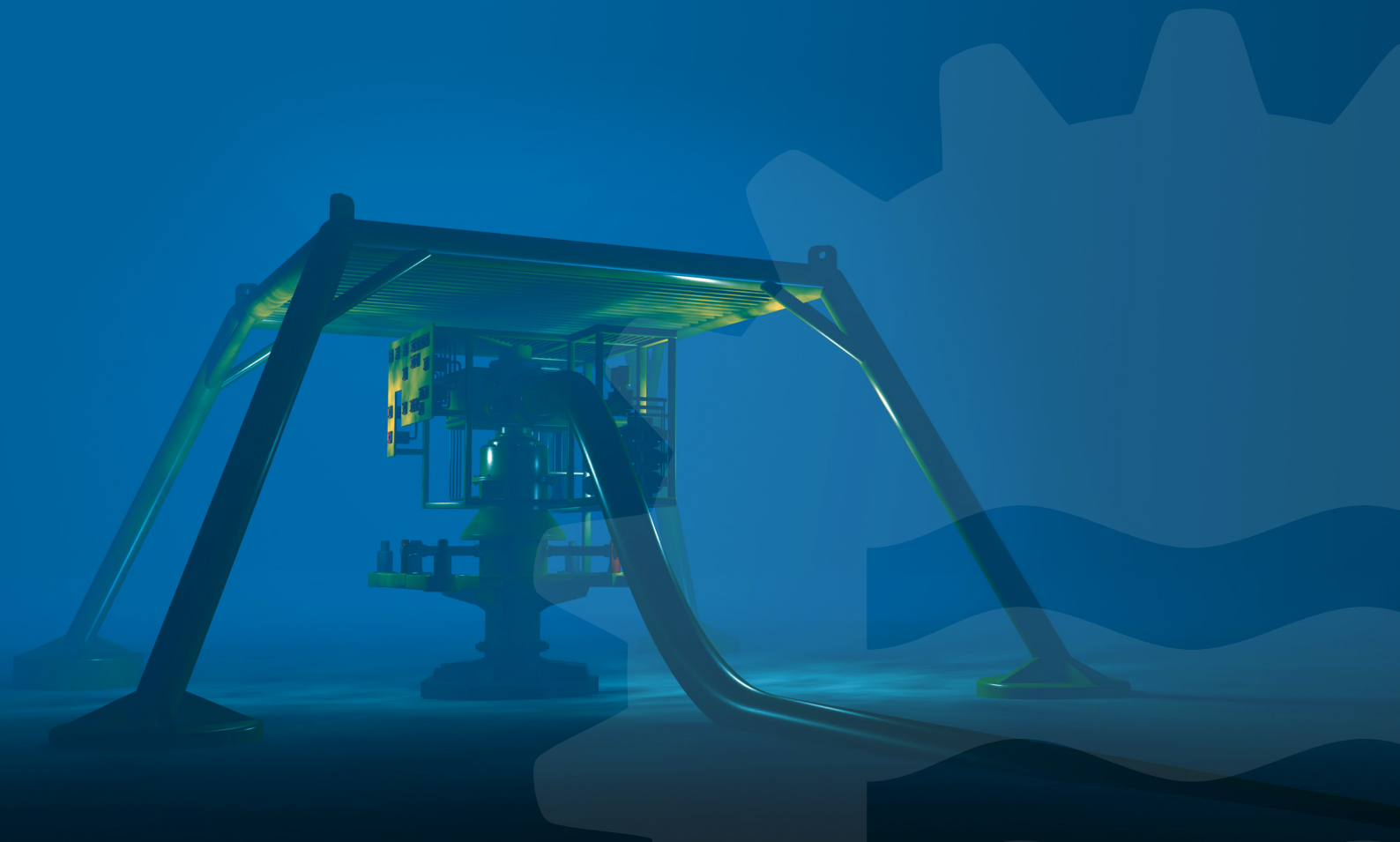
ETLFlow

Subsea Applications

Flow Meters and Instrumentation



ETLFlow

- Manufactured and designed to the highest quality in the UK
- 316 stainless steel or other materials to suit application
- 0.006 l/min up to 10,000 l/min
- Depths of up to 5000 Meters
- Working pressure up to 1060 bar
- Bespoke custom build design options available
- Various connections including Subcon, Burton and Seacon
- Various outputs including Pulse, 4-20ma, RS232
- Subsea display and instrumentation options

Subsea Flow Meters

Environmental Technologies can supply and design a wide portfolio of standard and custom produced Subsea Flow Meters. We have ranges suitable for use a low, medium and high viscosity fluids with a wide range of threaded or flanged connections.

PPW
PULSE
OUTPUT

Constructed from 316 stainless or other materials as designated by the customer such as Duplex or Incoloy, these flowmeters have been fitted extensively into the market place for many years.

Depths of up to 5000 metres are possible with or without displays. 4-20 ma, pulse output and RS232/485 are all possible output options.

Our bespoke design capability allows us to accommodate specific requirements such as size and mass to suit your application.

Subsea Display With Various Options

Subsea displays to 4000 - 6000 metres, battery powered, up to 7 days continuous use, light sensitive and programmable.

Typical Applications

In the oil and gas industry, these include Hydraulic system monitoring, fluid control diagnostic work, subsea network, risers, blow out preventors, water /chemical injection, ROV'S and pipe laying systems.

Subsea Titanium Displays
For Total/Rate/Logging

For more information or to speak to a friendly flowmeter expert call:
01423 522911
or email:
sales@etlfe.com

ETLFlow

Subsea Flow Meters

Bespoke systems available with various connections, options and materials of manufacture.

PPW
PULSE
OUTPUT

Stainless steel turbine, female threads, 5000 metre depth rated fitted with PPW pulse pick up.

FC7
4-20ma
OUTPUT

Female thread, fitted with 4-20ma pick up, up to 5000m.

Subsea Displays

Subsea displays are available in various configurations. They can be single or dual displays, powered by internal battery or directly by host system DC power. These displays can be configured to give a rate and volume measurement. Completely programmable through a windows interface.

Integrated data logging option available, all can be supplied with a specific low powered pick up which gives greater life to the display battery.

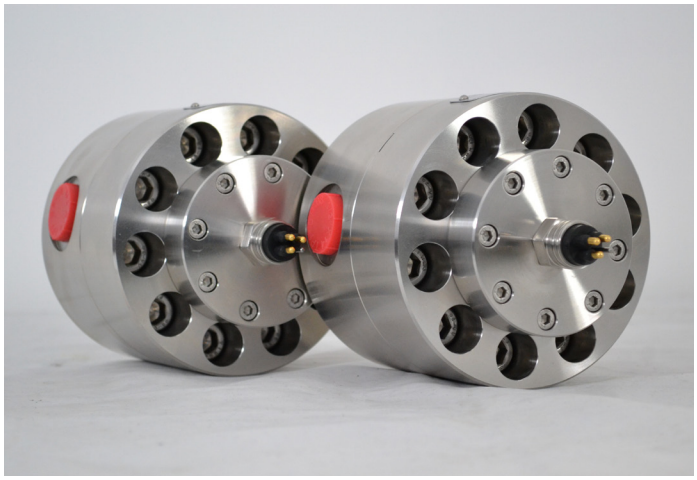
ETLFlow

Positive Displacement and Turbine Flow Meters For Subsea

Our Subsea Positive Displacement Flowmeters, can be made to suit the specific requirement of the application, 6000m depth and 400 bar as standard, versions up to 1035 bar, electronics are sealed and potted for increased durability. Connections and subsea connectors are decided by the customer.

Our Subsea Flow Turbines, pressures and materials are dependent on the application, can be flanged or threaded, with amplified pulse, 4-20ma and RS232, pressures up to 1035 psi are possible flow rates from 0.6 l/min to 10,000 l/min.

Both the Subsea options can be part of a bespoke system or linked to a Subsea single or dual display.



ETLN3/CSS Subsea Turbine Flow Meter

This range of flowmeters will provide you with a highly accurate way of measuring liquids over the range of 0.7 to 2,250 litres/min.

Application

The subsea turbine range of flowmeters are built with 316 stainless steel bodies as standard, but can be made from various alloys to suit application and pressures. Depths of up to 5,000m and pressures of 20,000psi are possible.

As these are machined from one piece, most connections are possible. ie: autoclave, NPT and BSP.

Each unit comes with a interchangeable 5,000m depth rated pick up, with a choice of subsea connections, typically Seacon, Subcon, Burton, and outputs of amplified pulse, 4-20ma, RS232.

Instrumentation

We offer special pick ups which can link to our subsea display range of single / dual displays with or without stand alone battery power.

Calibration

All flowmeters come with an individual calibration. Pressure test certificates and material test certificates are available on request.

Features

- Highly accurate measurement of flow
  Well proven
  Improve product quality
  Reduce costs and waste
- Robust stainless steel construction
  Corrosion resistant
  Very low maintenance and down time
  Withstands high temperature and pressure
- High quality manufacture
  ISO 9001 certified company
  Individual calibration certificates
- Low pressure drop
- Bi-directional flow capability

Installation

The flowmeter is installed directly into the pipeline. To reduce turbulence and get the best results from your flowmeter we recommend that you install it in a straight section of pipe with at least 10 pipe diameters upstream and 5 pipe diameters downstream.

ETLN3/CSS Subsea Turbine Flow Meter

Specification

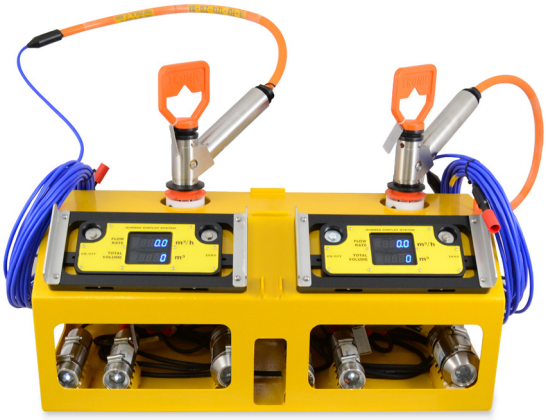
Linearity:	Better than +/- 0.5% of reading
Repeatability:	+/-0.1% of reading
Pressure drop:	0.5 bar at maximum flow
Maximum over range:	Up to 120% of the maximum flow rate for short durations
Maximum working pressure:	20,000 psi (Depending on connection).
Temperature range:	Standard pickoff -30°C to 110°C
Body connections:	BSP (F) BSP (M) AUTOCLAVE, NPT

Materials Of Construction

Body:	316 Stainless steel
Sleeve bearings:	Standard - carbon graphite filled PTFE (max temp. 180°C) Optional tungsten carbide (max temp. 300°C)
Thrust balls:	Tungsten carbide
Rotor:	431 s/s or ferralium
Rotor shaft:	Tungsten carbide
Hangers:	316 Stainless steel
Circlips:	316 Stainless steel

Model No	Flow Range Ltr/min	K factor # pulses / litre
ETLN3/10/CSS	1 - 10	5000
ETLN3/15/CSS	2 - 20	3800
ETLN3/20/5/CSS	5 - 50	1080
ETLN3/20/8/CSS	8 - 80	1080
ETLN3/25/15/CSS	15 - 150	620
ETLN3/25/CSS	25 - 250	362
ETLN3/32/CSS	45 - 450	111
ETLN3/40/CSS	67 - 670	82
ETLN3/50/CSS	110 - 1100	59
ETLN3/65/CSS	225 - 2250	19

Custom Builds



Subsea flowmeters used to produce custom builds for various applications including subsea de-watering systems.

ETLN4/CSS Subsea Turbine Flow Meter

This flanged range of flowmeters will provide you with a highly accurate way of measuring liquids over the range of 2 to 9000 litres/min.

Application

The subsea turbine range of flowmeters are built with 316 stainless steel bodies as standard, but can be made from various alloys to suit application and pressures. Depths of up to 5,000m and pressures of 20,000psi are possible.

As these are machined from one piece, most connections are possible. ie: autoclave, NPT and BSP.

Each unit comes with a interchangeable 5,000m depth rated pick up, with a choice of subsea connections, typically Seacon, Subcon, Burton, and outputs of amplified pulse, 4-20ma, RS232.

As these are machined from one piece all standard flanges can be custom made to suit applications.

Instrumentation

The signal can be used for a local display, remote display or converted for transmission to a separate control system. We have a range of instruments to suit all your requirements.

Principle Of Operation

When liquid flows and the rotor turns, the sensor detects the movement of the blade tips and generates pulses. The pulse frequency is proportional to the flowrate.

Calibration

All ETLN4/CSS Subsea Turbine Flowmeters are individually calibrated with water or oil and are traceable to national standards.

We provide you with a test certificate for each meter showing the number of pulses per litre, which is used to set the instrumentation.

Features

- Highly accurate measurement of flow
  Well proven
  Improve product quality
  Reduce costs and waste
- Robust stainless steel construction
  Corrosion resistant
  Very low maintenance and down time
  Withstands high temperature and pressure
- High quality manufacture
  ISO 9001 certified company
- Individual calibration certificates
- Low pressure drop
- Bi-directional flow capability

Installation

The flowmeter is installed directly into the pipeline. To reduce turbulence and get the best results from your flowmeter we recommend that you install it in a straight section of pipe with at least 10 pipe diameters upstream and 5 pipe diameters downstream.

ETLN4/CSS Subsea Turbine Flow Meter

Specification

Linearity:	Better than +/- 0.5% of reading
Repeatability:	+/-0.1% of reading
Pressure drop:	0.5 bar at maximum flow
Maximum over range:	Up to 120% of the maximum flow rate for short durations
Maximum working pressure:	Subject to flange rating
Temperature range:	Standard pickoff -30°C to 110°C IS pick-off -30°C to 110°C High temp. -30°C to 232°C
Flanged connections:	ANSI 150, ANSI 300 DIN PN16, PN40 or custom flanges

Materials Of Construction

Body:	316 Stainless steel
Sleeve bearings:	Up to 500mm - carbon graphite filled PTFE (max temp. 1800°C) Optional tungsten carbide 80mm and above tungsten carbide (max temp. 3000°C)
Thrust balls:	Tungsten carbide or ceramic
Rotor:	431 s/s or ferralium
Rotor shaft:	Tungsten carbide
Hangers:	316 Stainless steel
Circlips:	316 Stainless steel

Model No	Flow Range Ltr/min	K factor # pulses / litre
ETLN4/20/5/CSS	5 - 50	1080
ETLN4/20/8/CSS	8 - 80	1080
ETLN4/25/15/CSS	15 - 150	620
ETLN4/25/CSS	25 - 250	362
ETLN4/32/CSS	45 - 450	250
ETLN4/40/CSS	67 - 670	70
ETLN4/50/CSS	110 - 1100	59
ETLN4/80/CSS	225 - 2250	14
ETLN4/100/CSS	450 - 4500	6.6
ETLN4/150/CSS	900 - 9000	2.3

Dimensions

Model Number	Thread Size BSP	L mm	Weight kg
ETLN4/20/5/CSS	20	139.7	2.0
ETLN4/20/8/CSS	20	139.7	2.0
ETLN4/25/15/CSS	25	139.7	2.2
ETLN4/25/CSS	25	139.7	2.7
ETLN4/32/CSS	32	145.0	3.9
ETLN4/40/CSS	40	152.4	6.5
ETLN4/50/CSS	50	165.1	8.4
ETLN4/80/CSS	80	250.0	14.5
ETLN4/100/CSS	100	300.0	16.5
ETLN4/150/CSS	150	360.0	16.5

The nominal K factor is based on water at 20°C

Each flowmeter is individually calibrated on water and will have a unique K factor.

Complete range of Total and Rate displays available.

ETL Flow Subsea PD Meters

Our Subsea PD Flow Meters are available in a wide variety of flow ranges and electrical outputs, as well as a variety of exotic materials for highest corrosion resistance and material compatibility.

0.006 - 2 l/min 1035 bar version with Burton Connector.

Electronics are housed in a separate vessel allowing interchangeability and spares to be held separate to the meter.

Only high grade steels are used in the production of the meters, short response times ,high resolution ,high turn down ratios , make these meters ideal for very low flow applications.

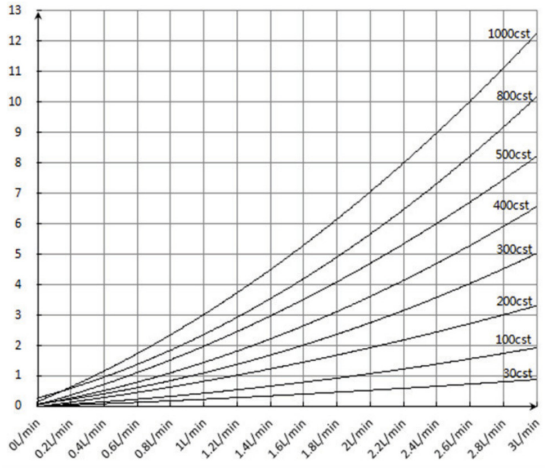
Two precise gears rotate freely inside the measuring chamber. The fluid passes through and causes rotation of the gears, their rotational frequency is proportional to the flow rate and we use a non intrusive subsea sensor to measure through the housing wall.

Working Pressure: Internal up to 15,000 psi (1,035 bar), external up to 6,000m depth.

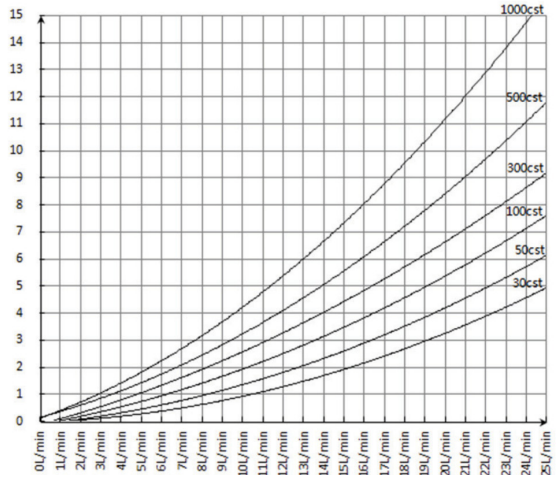
Communications:	Analog (4-20mA), Amplified Pulse, Pulse, RS232
Connections:	BSP NPT, Autoclave,
Accuracy:	±0.5% of measured value. A calibration certificate is provided based on a representative viscosity fluid for the application.

Pressure Loss / Viscosity / Flow Rate

Typical ETLFLOW-200-SSEA-3L



Typical ETLFLOW-200-SSEA-25L



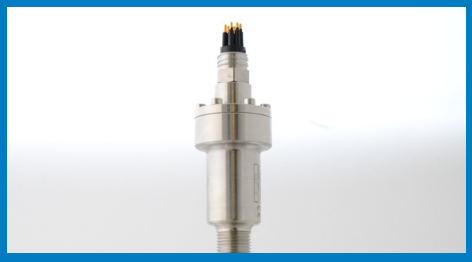
Parameter of Meter	Measuring Range (L/Min)	K Coefficient (IMPULSE/L)	Max. Pressure Rating (bar)		Connection BSPP/NPT Autoclave	Journal Bearing	Accuracy
			316 S Steel	Output			
ETLFLOW-200-SSEA 1L	0.006 - 1	40,000	420/1035	Pulse/4-20ma	G1/8	TC/BB	0.5%
ETLFLOW-200-SSEA 3L	0.02 - 3	13,500	420/1035	Pulse/4-20ma	G1/4	TC/BB	0.5%
ETLFLOW-200-SSEA 7.5L	0.05 - 7.5	4,200	420/1035	Pulse/4-20ma	G1/4	TC/BB	0.5%
ETLFLOW-200-SSEA 25L	0.2 - 25	1,400	420/1035	Pulse/4-20ma	G1/2	TC/BB	0.5%
ETLFLOW-200-SSEA 75L	0.5 - 75	450	420/1035	Pulse/4-20ma	G3/4	TC/BB	0.5%
ETLFLOW-200-SSEA 150L	1.5 - 150	190	420/1035	Pulse/4-20ma	G1	TC/BB	0.5%

Example of a Subsea pick up CSS166 Subsea Pulser

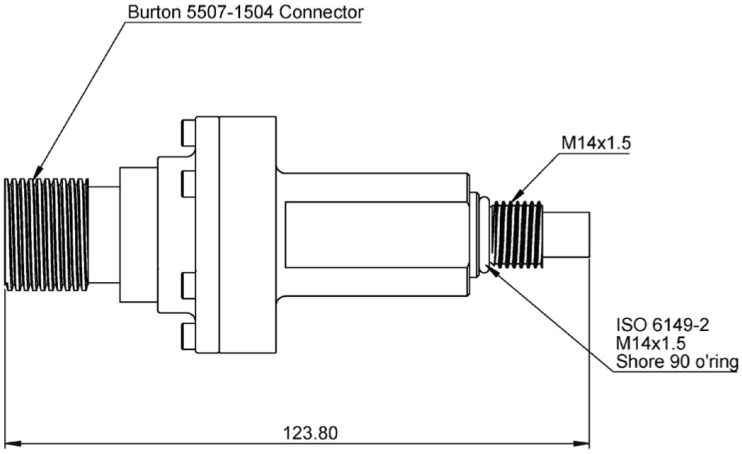
Housing Material:	316ss
Mechanical Connection:	ISO 6149-2 M14 x 1.5 stud
O'ring:	ISO 6149-2 M14 x 1.5 Nitrile Shore 90
Connector:	Burton 5507-1504
Max Pressure:	Submersible to an external pressure of 600 bar
Power supply:	10-25vdc
Current Consumption:	8Ma
Reverse Polarity proof:	Yes
Short-circuit proof:	Yes
Output:	NPN OC output : NPN OC output + pull up resistor(5.1k)

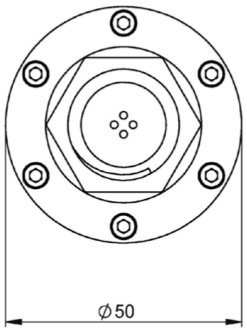
Connections:

Pin 1:	10 - 25 vdc supply
Pin 2:	Pulse output
Pin 3:	0V
Pin 4:	Not used



Other Subsea pick-ups can be supplied such as Subcon and Seacon.





Subsea Graphical Datalogger

The ETL Flow Subsea Graphical Datalogger builds on the capability of existing ETL Flow Subsea Displays.

The SGD is designed to display the total number of sensor actuations on Subsea tools, modules & installations without the need for a complex control system or datalink.

Critical operations can be monitored and now data logged using an internal 32Gb Mass Storage Device (MSD). Diagnostic capability allows the operator to test / operation with customisable sensitivity level set-up.

Any displayed image automatically flips upright via an in built accelerometer and also logs this occurrence.

Facilities to log 'Shock and vibration' and upload data logs via IrDA 'infra-red' with for the SGD via external RS232 / USB host connections, will present the operator with a user-friendly GUI to configure parameters and execute functions.

The SGD has 2 inbulit light sensors that actuate the module only when illuminated by ROV lights or Rig Lights. This allows the SGD to remain dormant for years before operation.

The SGD display shows key data such as battery status, system temperature, date / time. The display is also highly custom text to be inserted as well as a bitmap such as a client logo and different text colour options to choose from.

A New Standard In Subsea Sensing

The ETL Flow range of Jupiter Subsea Control Systems has led to the development of a range of stand-alone battery powered subsea sensor systems.

Features & Benefits

- Provides analogue count feedback from "dumb" tools or Subsea Modules scaled as per user needs
- 32GB Data logging and Diagnostics functionality
- Infra-red (IR) capability
- Accelerometer
- Rugged Titanium housing, 4000m rated
- User configurable via both USB and RS232
- Optional output available for connection to control system or datalink
- 3 cell Lithium ion batteries
- 5 hour full battery charge via USB port
- Display is a 3.5" WQVGA display (320 x 480 pixels)
- Battery status displayed
- System Temperature displayed and logged
- User Input – text and bitmap option
- Display colours are user configurable
- 2 x Proximity sensors.
- External scale change & zero
- 2 x Light sensors. Wakened by ROV lighting
- Suitable for any volt free sensor or 3v-5v Proximity Sensor
- User scalable measurement value
- Can typically be set to display Torque, Turns or Volume and Flow rate

Subsea Graphical Datalogger

System Specification

Operational Modes & Battery Life:	1) Full power mode - 5 days (display on continuously with full operation) 2) Idle Mode - as above with no active display (30 days) 3) Background Running Mode with no data log & reduced operation - greater than 12 months 4) Deep Sleep Mode - greater than 24 months
Data Storage:	32 GB

Mechanical / Environmental

Size:	148mm Diameter x 139mm Long. Display 74mm x 50mm	
Weight:	5.2kg (air) 2.3kg	
Temperature:	Operating - 10 to + 55°C	Storage - 20 to + 60 °C
Depth:	4000msw	
Material:	Titanium Ti-6Al-4V	

Connectors:	
E1:	Subconn MCBH6M (External USB)
E2:	Subconn MCBH6M (RS232 to allow configuration of internal settings)
E3:	Subconn MCBH8F (Sensors)

Other products on this range include

2, 4 & 8 Digit Subsea Display Systems,

Sensor Light System (open closed / on off),

Data-logger and ICM – live / stand-alone inline hydraulic oil contamination monitor.

Subsea Display Systems

The ETLFlow range of Subsea Control Systems have lead to the development of a stand-alone battery powered Subsea Display System (SDS). The SDS is a user configurable unit that can be set to act either as a counter or as an analogue display on Subsea tools, modules & installations without the need for a complex control system or datalink.

The SDS allows critical measurements of process values such as flow, torque, pressure or extension to be monitored at a low cost. The SDS can be set to accurately display correctly scaled values of any variable to 0.3%.

Single Subsea Display

The SDS is supplied with various input interfaces. The user can quickly select what functionality they require with a PC. The SDS has an inbuilt light sensor that actuates the display only when illuminated by ROV lights or Rig camera. This allows the SDS to remain dormant for years before operation and display. A dual display option is also available.

Dual Subsea Display

Advantages

- Provides analogue feedback accurate to 0.3% for 'dumb' tools or Subsea Modules or:
- Provides count feedback to 'dumb' tools or Subsea Modules
- Rugged 316 Stainless Steel housing, 4000m deep water rated
- Ultra-low power with selectable dormant state can be installed Subsea for years before use.
- Bright 5 digit solid state 14mm display
- User can zero display or change scale units by front panel magnetic switches
- Rechargeable NiMh D Cell Field replaceable with primary cell
- Low battery warning

Features

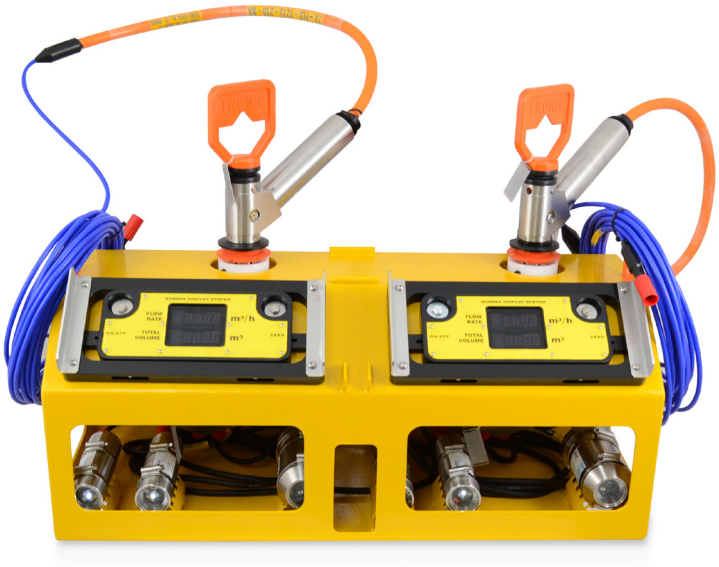
- Battery Life:
  7 days (average display on continuously)
  6 months standby (NiMH), 4 years (Primary)
- Wakened by ROV lighting
- 5 digit LED display displays up to +/- 9999
- User scaleable measurement value
- External zero (tare) capability
- Scaling & Input type displayed on power up
- Size:
  200 x 80 x 40mm (L x W x Dia.)
- Weight:
  1.6kg (in air), 1.1kg in water
- Environmental: -10 to 50oC
- Connectors:
  Subconn MCDC8M (Sensor)
  Subconn MCDC5M (Charge)

ETL Flow use the Zetechtics subsea display & data logger products which are considered to be the industry standard choice for reliability and criticality for subsea operations.

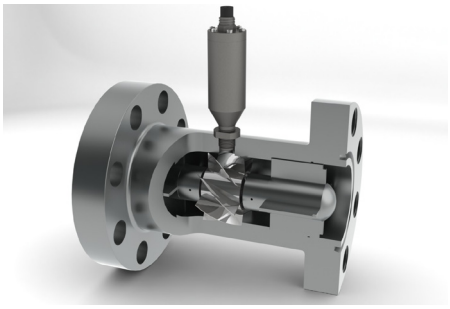
Subsea - Bespoke Subsea Systems

ETL has recently supplied a major oil company with important Subsea Flow Meter equipment. The equipment was designed for operational use up to 4000 Meters with flow range of 4000 litres/min.

The design brief was for the system to be battery driven and able to work for up to 15 days before the system needed to be recharged. ETL designed a system with a low power transmitter, and the ability to meet and exceed the specifications required.



Bespoke Subsea display system, with integral data logging. This unit was connected to two separate flow meter turbines and the display to be viewed by an ROV and the data recorded.



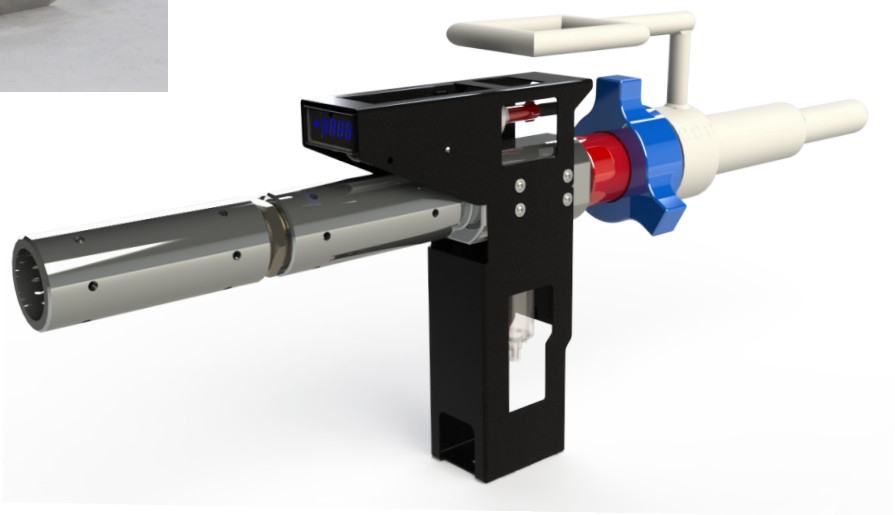
3D design and development enabling NORSOK flanges to be built and tested without the need for additional welding. Can be tested and approved to Lloyds registry requirements.

Chemical Injection Dosing Skid

This structure was designed and built for a prestigious subsea project. It involves 2 displays to monitor and log, rate and total for turbines of 4". It also involves a chemical dosing positive displacement meter, within the framework with ROV actuation.

Custom Subsea Manifold Builds

Subsea Dewatering Flowmeters and Digital Display



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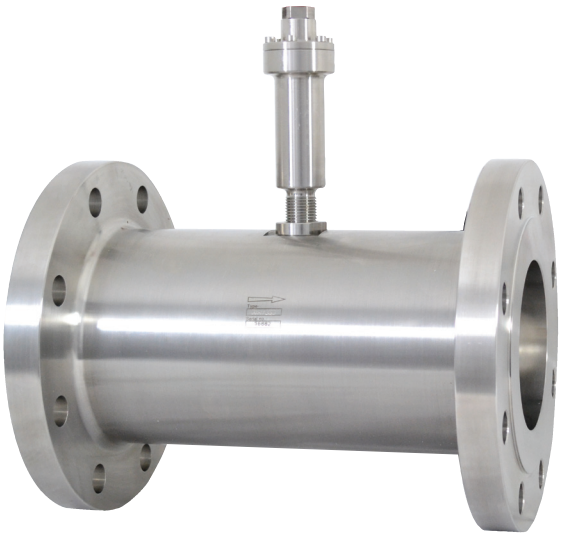
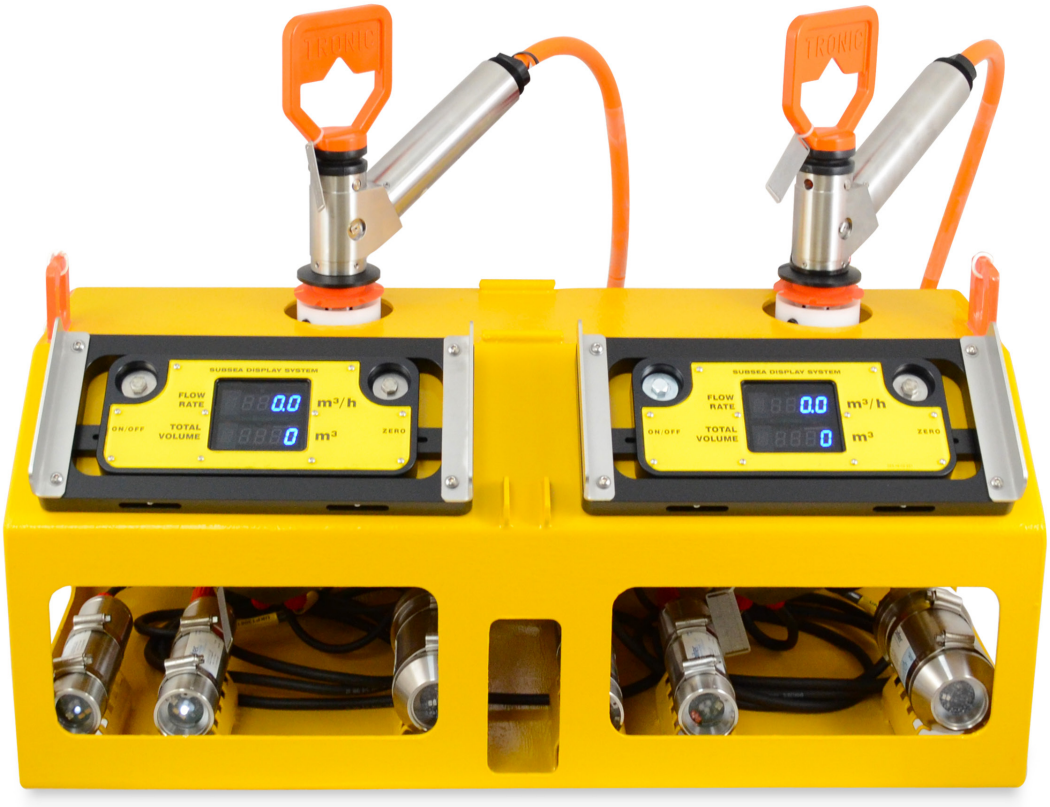


Subsea displays and datalogging with Subsea connection to flow turbines



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