

Subsea production

The single most prohibitive production factor for offshore oil and gas development is the topside facility. Its cost spectrum reaches far and wide – including everything involved in construction, deployment, daily operation, trans-shipment, ongoing maintenance, human safety and environmental impact. But what if we didn't need these massive floating factories? Subsea alternatives can supply separation and compression capabilities to deliver natural gas to onshore processing facilities via underwater pipelines or to re-inject co-produced gas to enhance the production of oil from subsea wells.

GE's compression solution

The key to successfully pushing subsea production boundaries, particularly for marginal and deepwater fields, is reliable subsea compression. The unit must be capable of continuous, maintenance-free operation for years. To meet this challenge, we have leveraged our rich heritage in compression technology for the toughest challenges - creating Blue-C™, the first subsea product in our proven Integrated Compressor Line (ICL).

The Blue-C subsea compression module has an extremely robust design including a single sealed housing to withstand extreme pressures and temperatures, and a simplified mechanical configuration for reliable unattended operation. As the first technology to take gas compression below the surface, Blue-C is quite literally changing the industry's horizon.

GE Oil & Gas

Global Headquarters

Via Felice Matteucci, 2
50127 Florence, Italy
T +39 055 423 211
F +39 055 423 2800
customerservice.center@ge.com
Nuovo Pignone S.p.A.

Americas Regional Headquarters

4424 West Sam Houston Parkway North
Houston, Texas 77041
P.O. Box 2291
Houston, Texas 77252-2291
T +1 713 683 2400
F +1 713 683 2421

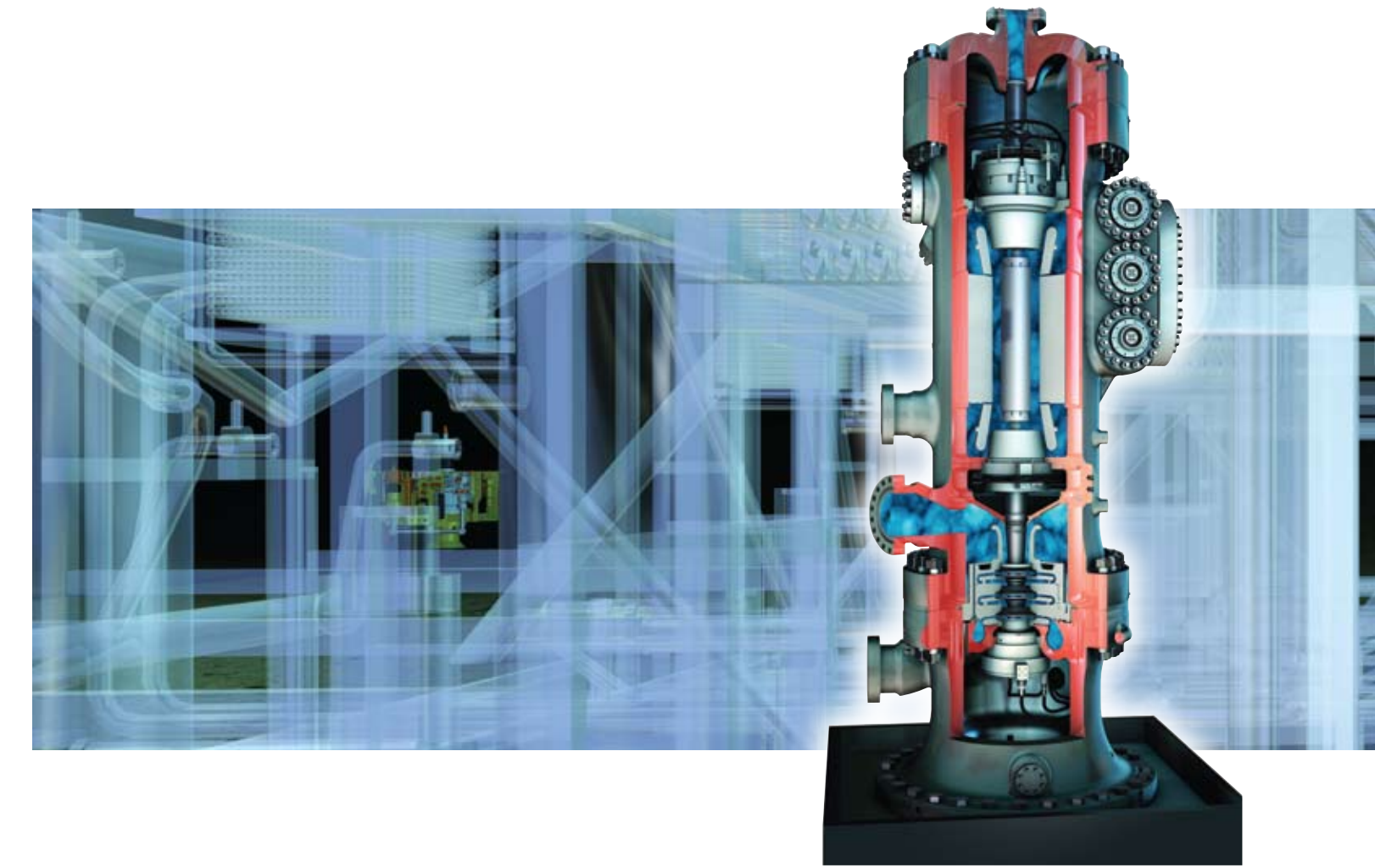
For complete contact information,
please refer to our website.

ge.com/oilandgas

The information contained herein is general in nature and is not intended for specific construction, installation or application purposes. GE reserves the right to make changes in specifications or add improvements at any time without notice or obligation.

©2010 General Electric Company
All Rights Reserved

GE Oil & Gas



Blue-C™ Subsea Compressor

A reliable, cost-effective alternative to traditional offshore platforms



GE_SC_042110

Blue-C is redefining subsea

Vertically stacked orientation protects electric motor from raw process gas and drains liquids from the unit. This configuration also reduces the module's overall footprint.

- 1 Packaged in a single sealed housing designed to withstand extreme pressures and temperatures
- 2 Robust rotordynamic design with three Active Magnetic Bearings (canned type)
- 3 Driven by a gas-filled, high-speed electric motor to enable autonomous operation
- 4 Diffuser separation system and dust removal device for wet gas compression
- 5 Stainless steel for maximum protection of compressor parts exposed to raw process gas

Making subsea an economic reality

To date, production from marginal subsea and deepwater fields has been hampered by high investment costs. Now a revolutionary, next-generation technology from GE Oil & Gas – the Blue-C subsea compressor – offers a viable alternative for extracting resources that were previously not economically recoverable.

Blue-C is part of our Integrated Compressor Line suite of products and has been specifically designed to reduce the industry's dependency on topside facilities while enabling greater flexibility in deepwater situations. The subsea units connect directly to shore or distant platforms through subsea flowlines. Installation of subsea gas boosters or re-injection compressors close to the wellhead manifolds will allow operators to enhance productivity and maintain plateau production for an extended number of years.

The compression modules will be available in a power range up to 15 MW, with the same pressure and flow ranges as conventional natural gas compression applications.

The high-tech answer for low-margin wells

The Blue-C subsea compression module consists of a centrifugal compressor driven by a gas-filled, high-speed electric motor, stacked in a vertical orientation and packaged in a single sealed housing designed to withstand the surrounding hydrostatic pressure. The entire unit is NACE compliant.

The significant technical challenges associated with highly reliable yet unattended operation have been resolved through a number of creative engineering solutions.

One of the most notable among them was the elimination of dry gas seals, which are susceptible to damage from sand-gas mixtures and transient conditions. They also require a reliable barrier gas source and regular maintenance such as cartridge replacement and head machining. In short, dry gas seals require too much attention to be reliable in long-term subsea duty. We successfully eliminated them through the use of a gas-filled motor, special materials selection and design procedures specifically developed for this application.

A vision of the future

Our quest for the subsea solution began in 1990 with the construction of an 850-KW compression module tested in a water-filled tank. Although results were positive, the market was not yet ready for the new product. But with an eye to the future, GE Oil & Gas continued developing its subsea compression technologies, drawing on the extensive resources of the entire GE Research & Development network and working closely with partners at Ormen Lange.

Ormen Lange is the largest natural gas field in development off the Norwegian coast. With water depths of 800-1,100 m, and reservoir depths of approximately 3,000 m, it is a challenging environment for surface installations – and is therefore the ideal location for subsea installations.

At an installed depth of 900 m with no support from conventional offshore platforms, the Ormen Lange Blue-C pilot will totally redefine the possibilities for offshore production.

Subsea compressor technical data	
Product feature	Characteristics
Operating pressure	Delivery: up to 175 bar
Flow	Up to 15,000 M ³ hourly production flow
Arrangement	Vertical: electric motor on top Single shaft line (rigid coupling)
Operating speeds	3,000 - 11,000 rpm
Centrifugal compressor	Up to 6 stages NACE compliant
Electric motor	Up to 15 MW electric motor Natural gas cooled, 6.6 kV/1.6 kA
Bearings	3 canned radial Active Magnetic Bearings 1 canned axial Active Magnetic Bearing
Dimensions (HxW)	6 m x 2 m
Weight (w/o cooler)	55 t
MTTF	~5 years



Reliable, robust & compact

- Facilitates low-cost development of marginal fields
- Up to 15 MW
- High-speed oil free
- Packaged system featuring high reliability compression technology
- Eliminates high-cost platforms
- State-of-the-art centrifugal compressor rotating equipment
- Fully marinized VSDS and AMB control system
- GE Oil & Gas Global Services support

From pilot to profitable production

