

Subsea - Hoffer Meters in the Depths of the Ocean

It has long been known that some of the largest reserves of oil and gas lay below the waters of the world's oceans. For the last several decades the relatively shallow coastal waters have been the center of activity to locate and extract these reserves. With the ever increasing demand for energy and the increasing price of energy, oil companies have been forced to look in deeper and deeper water to locate new reserves. Until the last few years, the limitation on how deep underwater a reserve could be tapped was the ability to build a fixed production platform structure tall enough and big enough to reach the ocean floor. This limited production to water depths of no more than a few hundred to just over 1000 feet. That is no longer the case. The invention of advanced subsea production systems, remotely operated vehicles (ROV's) and floating oil and gas production facilities have now pushed the limitation on water depth out to the 10,000-foot mark and soon beyond. Accurate flow measurement of a variety of fluids used in these subsea production systems located on the ocean floor and on the ROV's used to service them at these extreme depths is critical to their proper and safe operation. Measurement applications include specially formulated hydraulic control fluids, drilling mud and seawater.



Illustration #2 4" Subsea flowmeter

Hoffer Flow Controls is a leading supplier of highly customized flowmeters to meet the extreme conditions associated with working at depths to 10,000 ft or more. In addition to high internal operating pressures of up to 10,000 PSIG and more, the meters must withstand high external pressures created by the sea. These pressures can reach as much as 5000 PSIG. The temperature of the seawater to which the meters are exposed is often well below 32°F (0°C). The salt content of the seawater prevents the water from freezing but still reduces the strength of metals which must be taken into account. The need to transmit the flow signal to a remote input control device, either located subsea or on the surface aboard the production facility, requires the use of specialized electrical connectors to permit wiring interfaces. These connectors are often welded to the top of special risers that enclose the meter coil (See Illustration 1). This coil riser enclosure must also be able to withstand the high external pressure exerted by the sea and remain watertight.

Above all else, however, the flowmeters must be exceptionally reliable. Day-in and day-out the flowmeters must function accurately and reliably at these depths without routine servicing or maintenance. When a subsea system has to be serviced, it is a logistically complicated and financially expensive operation. Though scheduled servicing is required on the systems; an unscheduled service call due to a flowmeter failure is simply not acceptable. The extraordinary reliability of Hoffer turbine meters under these conditions has made them the preferred choice for many subsea system manufacturers.



Pictured in Illustration #2 is one of three custom-built Hoffer 4" flowmeters recently built for use on a new subsea system being developed for operations at depths to 10,000-feet and beyond. These are perhaps the largest turbine meters ever built for operation at these depths. The meters feature a proprietary high-pressure clamp-type end fitting specified by our customer. They are rated and tested to internal and external operating pressures of 10,000 PSIG. The coil rise atop the meter is built from a smaller version of this same connector. It mates with a blind connector (not shown) to form the riser enclosure. In the upper portion of this riser enclosure, a HIT-1B transmitter is also located to provide a 4-20 mA output signal that is transmitted to a controller remotely located in another subsea enclosure. From concept to final product, these meters were designed, built and tested in 12-weeks, an astonishingly quick turnaround for such a highly customized product. Once again, when the pressure to perform was on, Hoffer delivered.



Illustration #1 5/8" Subsea flow meters with special electrical connectors

Whether your requirements for flow measurement take you to the depths of the ocean, the outer reaches of the Solar system or on plain Terra Firma, call on Hoffer. We have the experience to deliver the performance you need, when you need it.