

Subsea Control Systems





Proserv has been manufacturing control systems in the UK since 1976. In that time, Proserv has gained considerable experience in subsea engineering and control system design. Proserv acquired Brisco Engineering in August 2003 combining over 35 years established experience in topside and subsea wellhead controls.

Early involvement in the subsea arena begun for Proserv in the 1980s with the design and prototype manufacture of our own subsea control module, using our in house spool-type control valves. These, whilst initially adapted and evaluated for subsea use, did not show the degree of durability of the metal to metal shear seal type valves that are mandatory for subsea controls today. A number of subsea hydraulic systems for short step-outs and SSIV controls were made, but it was the development of our Wellcon multiplexed electronic programmable control modules employing proprietary shear seal valves that established Proserv's presence in the subsea market.

In 1992 our first complete multiplexed Electrohydraulic subsea control system was developed, and the first full system deployed the following year. In 1999 the first Artemis subsea control system was developed, adding deep water ROV deployment to the product line. As industry technology has advanced into locating much of the production equipment on the seabed, so Proserv has developed control and safety shutdown systems that are able to operate in this equipment, either from the surface or the subsea environment.





SUBSEA CONTROL SYSTEMS

Proserv has an established track record with subsea control systems. Below is a summary of recent projects completed to demonstrate our capabilities and expertise in this field.

Year	Client	Work Scope	Location
2018	Talos	TORNADO - Tornado II and Tornado III subsea distribution and control system. 2 x SCMs, XT instrumentation, UTAs and flying leads	Gulf of Mexico
2017	Walter Oil & Gas	MCS and UTA with SCM	Gulf of Mexico
2017	Zennor	FINLAGGAN - Full subsea control system, including topside SCU, HPU and EPU on each platform, 3 production SCMs and tree instrumentation	Central North Sea
2017	Talos	PHOENIX - topside expansion MCS within the existing MCS PLC rack with EPU and TPCUs for the system. 6 retrofit SCMs A2G SEMs complete with new running tools and test stand	Gulf of Mexico
2017	Premier Oil	BIGP - full subsea control system, including topside SCU, HPU and EPU on each platform, 3 Production SCMs and tree instrumentation	Natuna Sea, Indonesia
2016	Talos	Compact Open Communication Hub (c-OCH) for subsea power and communications for Multiphase Metering	Gulf of Mexico
2016	Hess	TUBULAR BELLS	Gulf of Mexico
2016	CNR	NINIAN CENTRAL PLATFORM - replacement MCS, EPU, umbilical and SCM with flying leads for SSIV control	Central North Sea
2016	DONG	STINE	Denmark
2016	Hess	CONGER	Gulf of Mexico
2016	Statoil	NJORD - future subsea upgrade - FEED study	North Sea - Norwegian Sector

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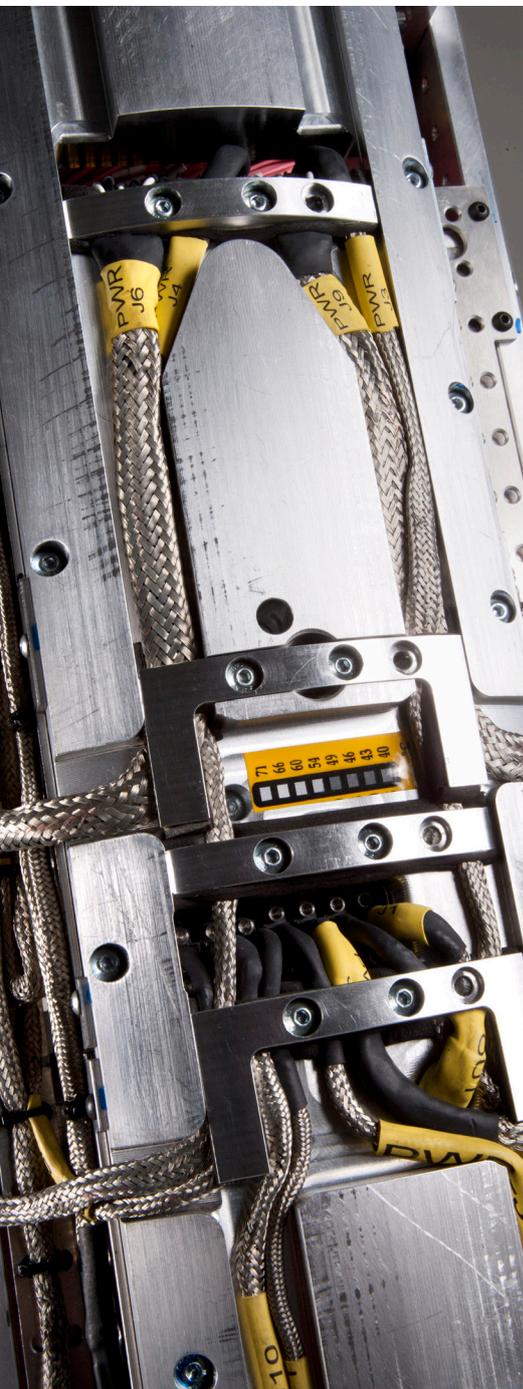


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2016	Statoil	VISUND - refurbish the used Aker 4G SCM module by installing a Proserv A2G SEM with redundant power and communication reuse all hydraulic parts and sensors, replace only where necessary. Interface to topside Siemens DCS by legacy MODBUS map	North Sea - Norwegian Sector
2016	Statoil	NJORD - future subsea upgrade - concept study	North Sea - Norwegian Sector
2015	Statoil	TROLL C - SeaHawk subsea camera for leakage monitoring on export riser including subsea video camera for monitoring on export riser solution, monitoring base for the camera on export riser structure and topside integration including software suite	North Sea - Norwegian Sector
2015	APACHE	CALLATER - surface MCS, HPU, TUTU, subsea SDU/EDU, SCMs, SCMMBs, SAMs	Central North Sea
2015	BP	SHAH DENIZ - hydrate remediation skid	Caspian Sea
2015	Hess	STAMPEDE - subsea control system for the development of 12 subsea wells	Gulf of Mexico
2015	Erin Energy	OYO	West Africa
2015	Statoil	GULLFAKS A - 1 ea wellhead HPU with options for 5 more	North Sea - Norwegian Sector
2014	APACHE	AVIAT - surface MCS, HPU, TUTU, subsea SDU/EDU, SCMs, SCMMBs, SAMs	Central North Sea
2014	APACHE	FNT - surface MCS, HPU, TUTU, subsea SDU/EDU, SCMs, SCMMBs, SAMs	Central North Sea
2014	Statoil	GULLFAKS A - subsea video surveillance, co-exist power and communication with FMC KOS 150 SCM. Needed video surveillance for permanent monitoring of subsea installation. ROV inspection was earlier necessary every month. Template is 20 km from platform without any spare cable available	North Sea - Norwegian Sector

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2014	Statoil	TROLL C - subsea video surveillance and electrical actuator, co-exist power and communication with Aker SCM. The Proserv control and monitoring system dramatically improved the system capability using existing infrastructure. Proserv has provided a highly flexible system using a configurable electrical actuator, subsea video monitoring or future SIIS L3 instrumentation. Provided permanent subsea monitoring and actuation without the regular high cost of ROV intervention	North Sea - Norwegian Sector
2014	Noble	GUNFLINT - Surface MCS with remote station, HPU and TUTA, subsea UTA and distribution including mudmat, dual SEM SCM with fibre optic communications to OCH	Gulf of Mexico
2013	Statoil	TROLL B - subsea control system upgrade FEED study	North Sea - Norwegian Sector
2013	Perenco	LEMAR	Southern North Sea
2013	TALOS	PHOENIX - MCS, HPU, TUTU, subsea umbilical distribution assembly, SCMs, SCMMBs	Gulf of Mexico
2013	Weatherford (Petrobras)	DPR - 9 off systems each comprising LER, HPU, subsea SAM and SCM module	Brazil
2013	CNR	TONI - surface MCS, subsea SCMs and SCMMBs	Northern North Sea
2012	TAQA	CLADHAN - surface MCS, HPU, TUTU, subsea SDU/EDU, SCMs, SCMMBs, SAMs	Central North Sea
2012	REPSOL	PLP - surface MCS, HPU, TUTU, subsea SDU/EDU, SCMs, SCMMBs, SAMs, OCH	Central North Sea
2012	Maersk Oil and Gas	FLYDE CAWDOR - Surface MCS, HPU and TUTA, subsea manifold mounted SCMs and SCMMB	Central North Sea
2012	Iona Energy	ORLANDO - Surface MCS, HPU, TUTA, subsea manifold mounted SCMs and SCMMB	Central North Sea
2012	Premier Oil Vietnam Offshore (POVO)	DUA - Surface MCS, HPU and TUTA, subsea manifold mounted SCMs and SCMMB with CMV on each SCMMB	Vietnam (Nam Con Son Basin)
2012	Perenco	WELL 53/02A-14A TIE BACK - 1 x well subsea control system	Southern North Sea

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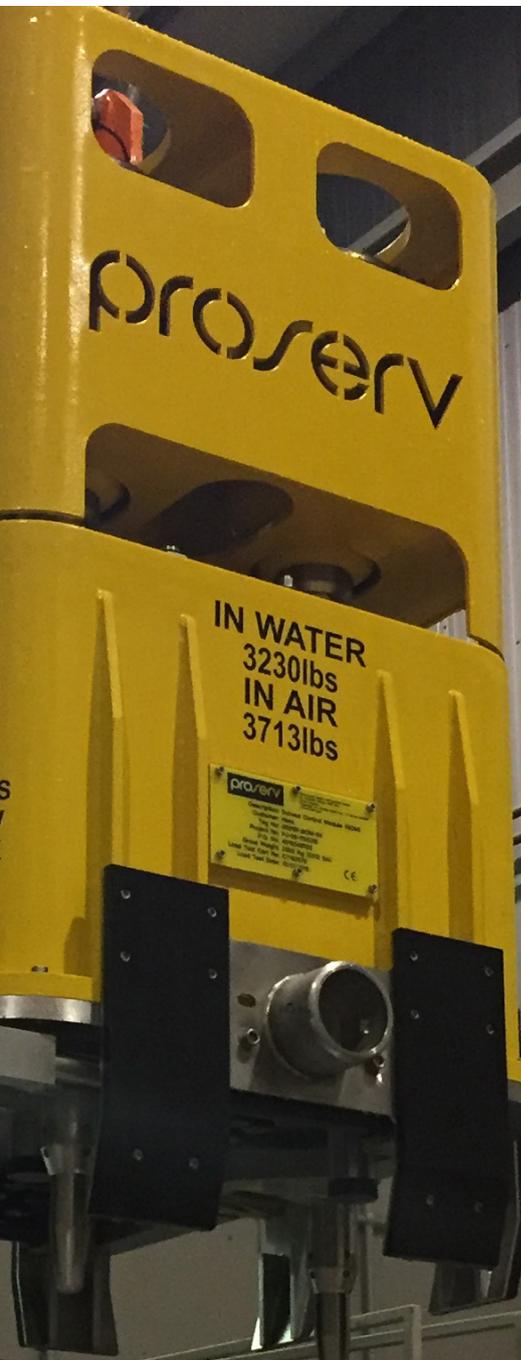
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2012	Hess Corporation	TUBULAR BELLS - surface MCS, HPU and TUTU, subsea tree mounted SCMs and SCMMB with ROV recoverable SAM and tree transmitters in scope	Gulf of Mexico
2012	Shell	PRINCESS - provide communication from topside system to subsea via power line communication co-exist with FMC KOS 150 modems. Provide topside AC power control for the system. Transform AC high-voltage to DC and provide power management subsea to all instruments. Integrate ATS and DTS on one downhole fibre.	Gulf of Mexico
2012	Statoil	spare parts	North Sea - British Sector
2012	Framo Engineering / CNR	LYELL - OCH for one subsea multiplexer system with power line modem communication for interfacing of process transmitters and control of direct control valves on the Lyell subsea multiphase booster pump. Non-redundant system, topside TPCU rack	North Sea - British Sector
2012	EnQuest	USI GORM - 9 x well control systems over two umbilicals from the Usi Gorm FPSO	Central North Sea
2012	Talisman	CAYLEY & SHAW - MCS, HPU, 3 SSIV panels, 3 TUTUs. each drill centre includes SDU, OCH, manifold mounted SCMs, pressure, temperature transmitters, GLFM, WIFM	Central North Sea
2012	Iona Energy	KELLS - surface MCS, HPU and TUTA, subsea manifold mounted SCMs and SCMMB	Central North Sea
2012	EnQuest	DON	Central North Sea
2012	Valient Petroleum	CAUSEWAY - 3 x well control systems over two umbilicals from the Cormorant platform	Central North Sea
2012	Petrofac	6 slot subsea distribution within over-trawl protective structure. Surface control system on Northern Producer FPF. SCMs located on FMC trees	Central North Sea
2012	Bluewater Industries	Extension to Perenco Davy system with subsea SUT, jumpers and SCM	Southern North Sea

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Year	Client	Work Scope	Location
2011	Statoil	SNORRE B - provide communication from topside system to subsea via DSL communication direct to a SeaHawk subsea camera unit for observation of possible leakage on template. Achieved bandwidth approx up to 10 mb/sec	North Sea - Norwegian Sector
2011	Ithica Energy UK Ltd	ATHENA - Up to eight well subsea control systems with 5 wells developed in the first phase	Central North Sea
2011	Statoil	HEIDRUN - provide communication from topside system to the subsea via broadband DSL communication to an OCH. The OCH has 4 open power and communication outputs with DSL and Ethernet communication, 240 VAC and 24 VDC power. Deliver of 2 subsea cameras for observation of possible leakage on template. Special monitoring leak during gas lift operation	North Sea Norwegian Sector
2011	MPM, Cameron, Chevron	JACK & ST. MALO - 4 off subsea meter interface module (SMIM) for connection to 4 MPFM flowmeters. Four topside cabinets for power and communication to up to 40 MPM flowmeters. TCS - redundant topside controller station for storage and data handoff to PAS	Gulf of Mexico
2011	BG Group	GAUPE - 2 wells in Norwegian waters tied back to a UK platform with subsea distribution and manifolding at its base	Central North Sea
2011	GDF Suez	JULIET - 2 well subsea control system plus manifold SCM	Southern North Sea
2011	Apache North Sea Ltd	BACCHUS - 4 well subsea control system plus manifold SCM in a pipeline bundle step out	Central North Sea
2011	Petrobras	EPR - EPR control system for WOCS in 2,500 m water, 40 EH functions using three pressure levels, topside control cabin with HPU and LER	South America
2011	Addax	OKWORI	West Africa
2011	Talisman	AUK NORTH	Central North Sea
2010	EnQuest	DON - 2 manifolds retrofitted with Skoflo chemical metering valves controlled from existing subsea control system	Central North Sea

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2010	Anadarko	2 subsea modules for up to 8 flowmeters 1 topside cabinet for data handoff and storage test equipment	Gulf of Mexico
2010	Kangean Energy Indonesia	TSB PROJECT - two phase project with Terang manifold installed in the first phase of 5 wells and the extension to Batur and Sirasun included in the second phase of another 4 wells	Indonesia
2010	GDF Suez	JULIET	Southern North Sea
2007	Bluewater Industries/ Granby?	TRISTAN NW - extension to Perenco Davy system with subsea SUT, jumpers and SCM	Southern North Sea
2009	Perenco	BURE NORTH - upgrade EPU and SCM with SUTU and jumpers	Southern North Sea
2009	Centrica	WEST SOLE ALPHA - subsea multiplexed electro hydraulic control system with 3 SCMs including replacement for current BP Newsham system	Southern North Sea
2009	Talisman	AUK NORTH - subsea multiplexed electro-hydraulic control system with 4 SCMs, HPU, MCS, EDU and subsea distribution	Central North Sea
2009	Statoil	KRISTIN - 1 SeaHawk subsea camera system including integration of power and communication from topside system to the subsea via broadband DSL communication direct to the subsea camera unit	North Sea - Norwegian Sector
2009	Nexans/Statoil	1 OCH with 2 electrical and 2 fiber optic ROV connectors interfaces integrated on Nexan's CEM	North Sea - Norwegian Sector
2009	Bluewater Industries	ATP TELEMAR - single well subsea control system. Proserv stock SCM and mounting base modification to suit project requirements allowing a fast track delivery	Gulf of Mexico
2008	Technip or Bridge Resources?	DURANGO - single well SCM control system c/w topside HPU, MCS and subsea XT transmitters	Southern North Sea
2008	RWE	TOPAZ - single well SCM control system XT set c/w subsea XT transmitters	Southern North Sea

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Year	Client	Work Scope	Location
2007	CNR	LYELL/KYLE? - surface control unit and subsea data module for MPFM and analogues	North Sea
2007	Tullow	WISSEY - tie into the Horn and Wren platform for a single well control system	Southern North Sea
2007	Petrofac	DON - 6 slot subsea distribution within over-trawl protective structure. Surface control system on Northern Producer FPF. SCMs located on FMC trees	Central North Sea
2007	Framo Engineering / Bhp Billiton	Communication system for up to 36 multiphase flow meters	West Australia
2007	Framo Engineering / Woodside	Powerline modems for power and communication infrastructure to Framo's instrumentation on this delivery	West Australia
2007	Statoil	VISUND - OCH, DIACS IWIS Option 3 for Visund with Roxar 5 gauge downhold solution and interfaced to topside system. Update the communication infrastructure. New high speed communication infrastructure is needed due to increased number of downhold instrumentation	North Sea - Norwegian Sector
2007	Statoil	TORDIS - OCH with fibre optic communication for AECM IOR acoustic leak detection system / condition monitoring. Provide Ethernet communication from topside system to subsea via on site optical fibre link at Tordis	North Sea - Norwegian Sector
2006	Statoil	ASGARD - SeakHawk subsea video surveillance for Mikkell template. Developed a compact flexible subsea camera system under this pilot delivery	North Sea - Norwegian Sector
2006	GDF	MINKE - MCS, EPU hydraulic and electrical jumpers, SCM	Southern North Sea
2006	BG Tunisia	MISKAR - Hydraulic and Electrical Jumpers, SCM, SCMMB, SDU, Subsea Instrumentation	North Africa
2006	Addax	OKWORI - topside MCS, EPU, HPU modifications, TUTU and subsea hydraulic and electrical jumpers, SCM, subsea mud mat and protective frame	West Africa

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Year	Client	Work Scope	Location
2006	Perenco	EAST DAVY - MCS, EPU, HPU modifications to existing system, hydraulic and electrical jumpers, SCM, SDU	Southern North Sea
2006	Talisman	DUART - MCS hardware and software modifications, hydraulic and electrical jumpers, SCM	Central North Sea
2006	BG International	NORTH WEST SEYMOUR - topside EPU, HPU modifications to NW Seymour, TUTU, hydraulic end electrical jumpers, SCM, SCMMB, SDU, subsea instrumentation	Central North Sea
2005	BG International	NORTH WEST SEYMOUR - hydraulic and electrical jumpers, SUTU, SCM, SCMMB, SDU, subsea instrumentation	Central North Sea
2005	Walter Oil	EWING BANK - topside MCS and EPU and subsea SCM, SCMMB	Gulf of Mexico
2004	BP	THUNDER HORSE - rubsea riser monitoring system. Delivery in cooperation with Force Technology in Norwat	Gulf of Mexico
2004	Framo Engineering / Santos	MUTINER & EXETER - subsea open communication and power system for subsea multiphase meters	West Australia
2004	Framo Engineering / Amerada Hess	CEIBA FFD - subsea open communication and power system for subsea multiphase meters	North Sea - Norwegian Sector
2004	DONG	STINE - topside MCS, EPU, HPU, TUTU and subsea hydraulic and electrical jumpers, SUTU, SCM, SCMMB, SDU, subsea instrumentation	Denmark
2004	CNR	KYLE - HPU, MCS, EPU test stands and test HPU subsea electro-hydraulic distribution SCM electro-hydraulic jumpers	Central North Sea
2004	Talisman	TARTAN - MCS, EPU, HPU, hydraulic and electrical jumpers, SCM	Central North Sea
2003	Centrica	ROSE - topside MCS, EPU, HPU, TUTU and subsea hydraulic and electrical jumpers, SCM, SCMMB, UTDA tree instrumentation	Southern North Sea

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2002	Marathon	BRAEMAR - topside MCS, UPU, HPU, TUTU and subsea hydraulic and electrical jumpers, SCM, SCMMB, subsea instrumentation	Central North Sea
2002	Statoil	SNORRE UPA - subsea power line communication system for DIACS	North Sea - Norwegian Sector
2002	Talisman	HANNAY - topside MCS, EPU, HPU, TUTU and subsea hydraulic and electrical jumpers, SCM	Central North Sea
2001	Brovig	CHESNUT - topside MCS, EPU, HPU, TUTU and subsea hydraulic and electrical jumpers, SCM, SCMMB	Central North Sea
2001	Talisman	HANNAY - SCMs incorporating smart well technology, electro-hydraulic termination and distribution units, SAM, HPU, MCS and TUTU	Central North Sea
2001	CNR	KYLE - HPU, MCS, EPU test stands and test HPU subsea electro-hydraulic distribution SCM electro-hydraulic jumpers	Central North Sea
2001	AMERADA HESS	ANGUS - SCM upgrade and MCS hardware and software changes	Central North Sea
2000	Statoil	SNORRE B - DIACS topside integration with SAS and information management system, SCRAMS, smartwell software for Halliburton	North Sea - Norwegian Sector
2000	Statoil	SNORRE B - power line modems for production system, DIACS EDU and DIACS downhole control modules via GE O&G in Stavanger	North Sea - Norwegian Sector
2000	Shell	SHELL SRI LANKA	Asia Pacific
1998	Petrobras	ENCHOVA SAC - MCS and HPU, SCM and electro-hydraulic termination and distribution units	South America
1999	Talisman	ROSS - MCS, EEx'p' Zone 1 rated EPUs, HPU, SCM test stand, test HPU electro-hydraulic distribution units, umbilical termination units, electro-hydraulic jumpers, 10 off SCMs, SAM, subsea instrumentation	Central North Sea
1999	AMERADA HESS	FIFE & FLORA - MCS, EPU, SCMs, electro-hydraulic termination and distribution units	Central North Sea

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Global Subsea Controls Landscape



	TechnipFMC	GE Oil & Gas	OneSubsea <small>A Cameron & Schenberger Company</small>	DRIP	OTHER	TOTAL
Indonesia				7	3	10
Sri Lanka					1	1
Vietnam		4				4
Nigeria		3			1	4
Tunisia			4			4
Gulf of Mexico	14	2	6	1	13	36
Brazil			1		15	16
Norway			2			2
North Sea (North)	77	35	18		18	148
North Sea (South)		10	4	8	2	24

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