

***Cavern Electrical
Submersible Pumps***



***Trusted Supplier of Choice
for Water Resources***

For more than a century and a half, Flowserve has been in the forefront of virtually every significant advancement in pumping technology to meet cavern fluid handling challenges. For those applications, Flowserve offers the world's most complete line of submersible motor pumps and motors – Pleuger water-filled and Byron Jackson oil-filled. Flowserve also offers a full menu of technical service and support for those products.

Product Brands of Distinction

Byron Jackson® Pumps

Flowserve® Pumps

IDP® Pumps

Pleuger® Pumps

Worthington® Pumps



Headquarters and Design Center for Submersible Motors – Hamburg, Germany



Submersible Motor Center of Excellence (MCO) – Maryland, USA



Assembling and Service Center – Newark, UK



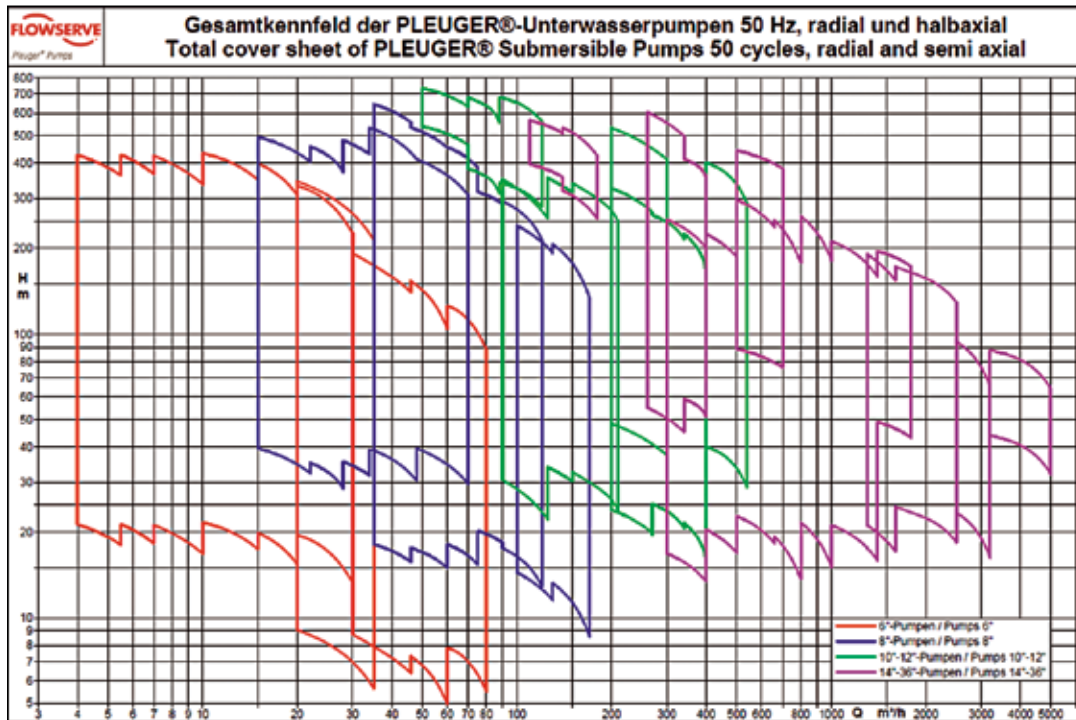
Manufacturing, Assembling and Service Center – Arganda, Spain



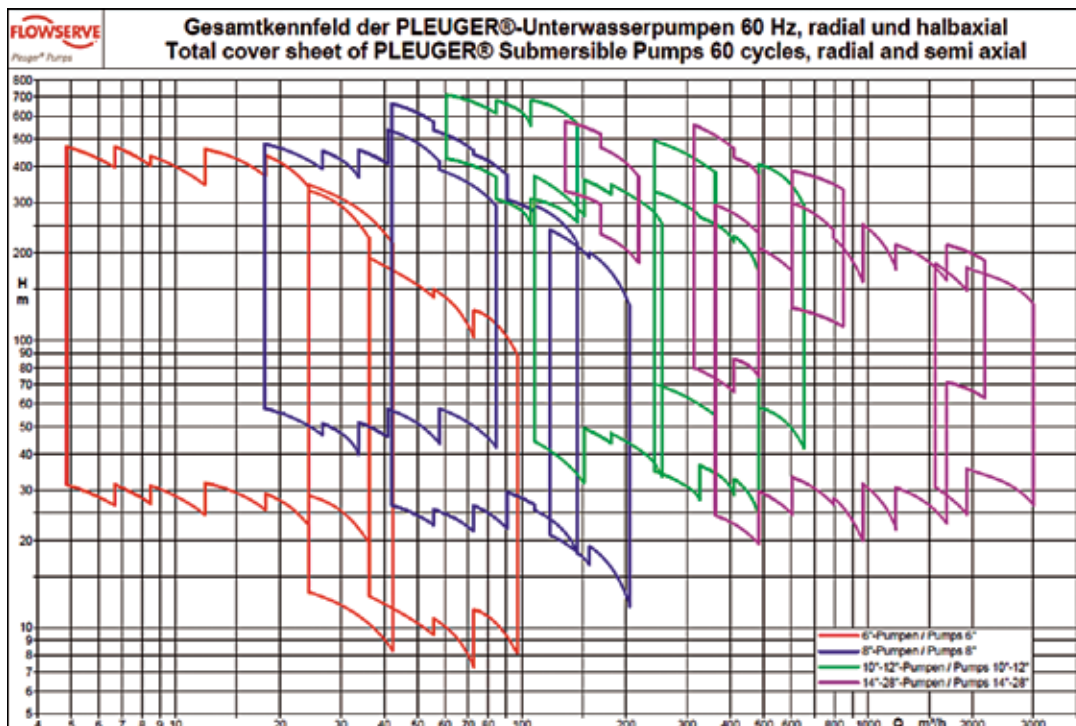
Assembling and Service Center – Orleans, France

Submersible Pumps

50 Hz Flow / Head Chart



60 Hz Flow / Head Chart



Submersible Oil-Filled Motor Feature (Byron Jackson Design)

4-Pole (hp)

Power Output Range Four-Pole Submersible Oil-Filled Motors						
Motor Type	8M	10M	12M	14M	17M	21M
50 Hz Power Output (HP) (S.F. 1,0)	4-27	34-85	107-180	107-270	215-540	540-1800
60 Hz Power Output (HP) (S.F. 1,1)	5-30	40-100	125-200	125-300	250-600	600-2000

4-Pole (kW)

Power Output Range Four-Pole Submersible Oil-Filled Motors						
Motor Type	8M	10M	12M	14M	17M	21M
50 Hz Power Output (kW) (S.F. 1,0)	3-20	25-63	80-132	80-200	160-400	400-1350
60 Hz Power Output (kW) (S.F. 1,1)	3,7-22	30-75	93-150	93-225	185-450	450-1500

2-pole oil filled motors (pumps) available on request per application.

Submersible Water-Filled Motor Feature (Pleuger Design)

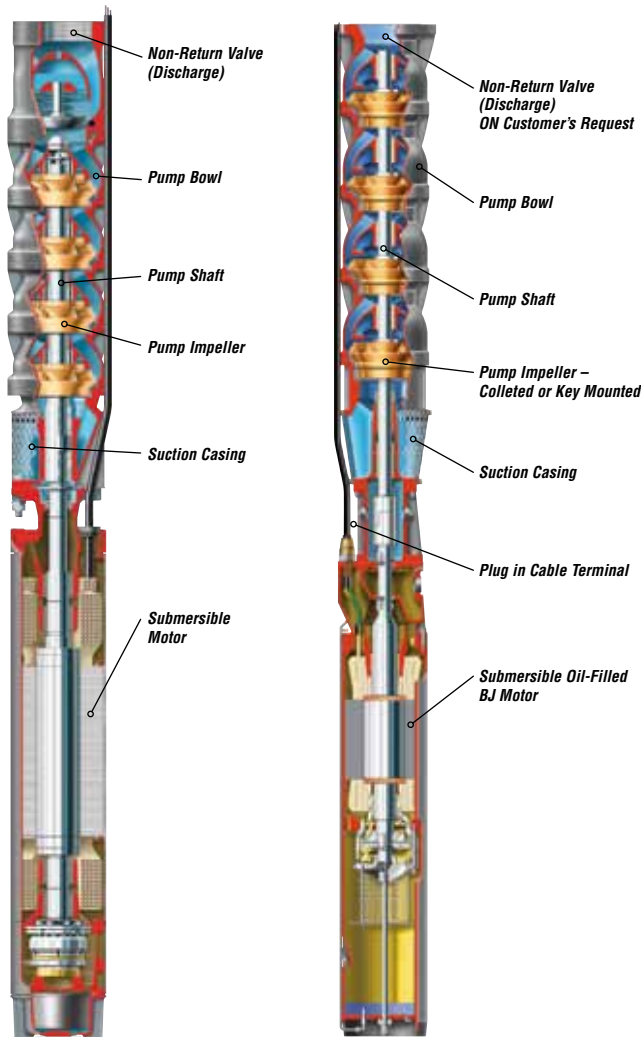
2-Pole (hp)

Power Output Range Two-Pole Submersible Water-Filled Motors						
Motor Type	M6	M8	MI10	VNI12	VNI14	MI16
50 Hz Power Output (HP)	7,5-50	45-120	100-310	220-360	250-540	400-900
60 Hz Power Output (HP)	8,5-60	55-140	120-355	250-425	290-585	460-1050

2-Pole (kW)

Power Output Range Two-Pole Submersible Water-Filled Motors						
Motor Type	M6	M8	MI10	VNI12	VNI14	MI16
50 Hz Power Output (kW)	5,5-37	33-90	75-230	165-270	185-400	300-670
60 Hz Power Output (kW)	6,4-45	40-106	90-265	185-315	215-435	345-770

4-pole water-filled motors (pumps) available on request per application.



Water-filled Motor (Pleuger design)

Oil-filled Motor (Byron Jackson design)

Submersible Pump End Feature

Flowserve submersible pump units are multistage centrifugal units which operate below liquid level and are driven by oil-filled or water-filled AC three-phase induction submersible motors.

Pumps and motors form a single enclosed unit which, when installed vertically in cavern, is held in position by the connected discharge pipe at the non-return valve or discharge casing.

Flowserve submersible pump units are offered in a wide range of applications. Pumps are available from 4" to 48" bowl diameter with capacities up to 6000 m³/h (25 000 gpm) and heads up to 800 m (2600 ft).

Pump units are designed and manufactured to the highest quality with high pump efficiency and long working life under the most adverse conditions. They are extensively tested and inspected to ensure operational safety.

Flowserve pump units are designed on the principle of a modular structure. Thus, with a limited number of parts, different tailor-made requests can be achieved. Pumps are equipped with non-return valves to guarantee optimal functional safety (water hammer).

Flowserve submersible pump units provide economic solutions for almost every user's requirements.

To produce high-quality submersible pumps and motors requires both specialized know-how and continually evolving manufacturing processes. All submersible pump products are produced using the most advanced manufacturing techniques – from initial development base CAD to quality-controlled CNC production equipment. It is not by chance that among experts Flowserve has been a byword for top product quality for decades.

General Description of Electrical Submersible Cavern Pumps

BJ Oil-filled Motors and Pleuger Water-filled Motors

Flowserve submersible pumps with oil-filled or water-filled motors are designed to handle explosive fluids / LP gas. The installation conditions must ensure that both the pump and motor are always totally submerged and monitored by explosion-proof level sensors.

Motor and signal cables are protected via cable protection hoses / pipes or special armored cables will be used. The cable protection pipes or hoses are filled with motor oil (oil-filled motors) and with water (water-filled motors).

An oil-filled header tank, including 35-50 psi nitrogen (used by oil-filled motors) on top of the wellhead, is provided to always guarantee positive pressure in the motor. Filling additional nitrogen in the header tank guarantees that no moisture can enter the header tank.

Explosion-proof instrumentation monitors oil fill level in the motor and triggers volume compensation from the header tank upon low level detection.

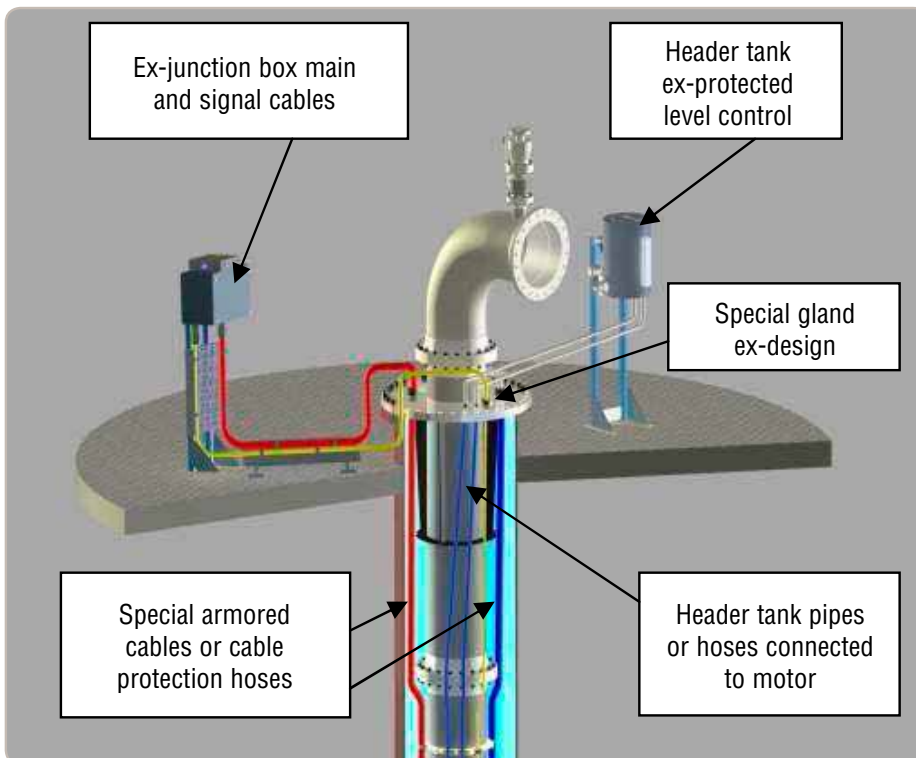
Water-filled header tanks (without nitrogen) are required when using water-filled motor design (Pleuger) pumps. Static positive pressure is sufficient for explosion-proof save duty (level monitored).

The special glands at the wellhead (main cables, signal cables and header tank pipes / hoses) are explosion-proof and completely sealed for hazardous areas.



For liquified petroleum gas (LPG), a medium special gas-tight gland design is available.

For cable junction boxes (main and signal cable), an explosion-proof design is provided.



Pumps

Material Options

Special materials are available for cavern electrical submersible pump bowls, impellers, shafts, wear rings and connections

Bronze



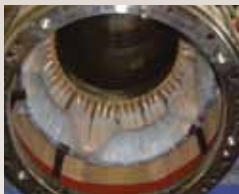
Super Duplex SST



Motors

Varied motor options are available

Water-Filled Design



Water-filled motor design

Oil-Filled Design



Oil-filled motor design

Motors With Cooler



Oil-filled motor design

Cable and Plug Options

Armored cable with plug motor connection



Cable in protection hose



Cable protection hose ready connected together



Cable with protection hose (water or oil filled)



Cable plug connection (oil-filled motor)



Certificates and Regulations

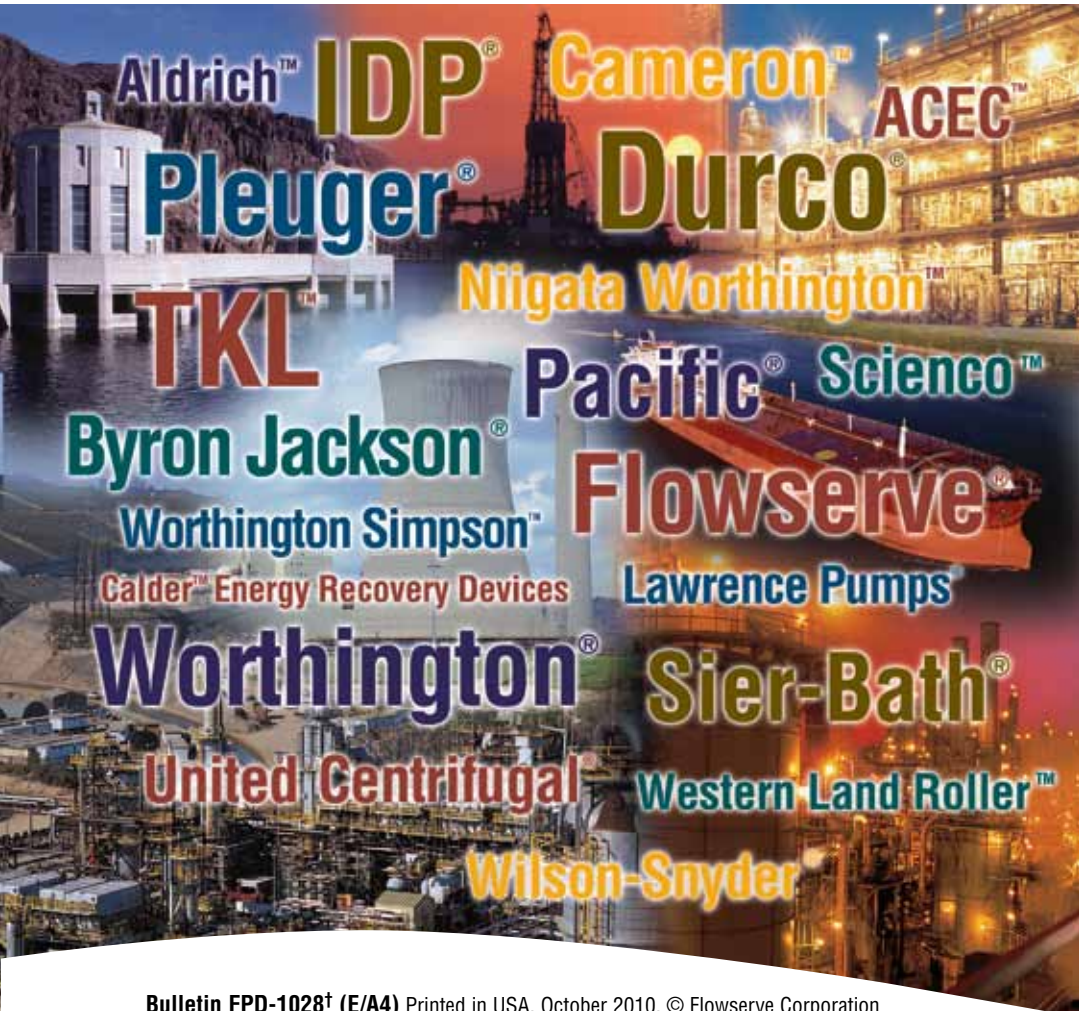
Flowserve cavern electrical submersible water-filled motors/pumps are certified to ExGuide 04 ATEX 037 X.

ATEX certification for Flowserve cavern electrical submersible oil-filled motors / pumps is expected in 2011.



Worldwide Leader

Flowserve is recognized as a global leader in supplying pump units for cavern services. It has delivered pump units throughout the world that handle crude oil, gasoline, jet fuel, diesel, butane, Proban® and other cavern fluids.



Bulletin FPD-1028† (E/A4) Printed in USA. October 2010. © Flowserve Corporation

To find your local Flowserve representative:

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