

# Catalog

Submersible  
oil pumps



# Submersible oil pumps

## 1. Submersible oil pumps

Submersible pumps are multistage centrifugal pumps which are designed to lift a full range of volume of oil and water at a low operating cost with a low initial investment. The pump is composed of impellers, diffusers, shaft, housing, pump head and base. When required with higher head, tandem pumps can be used to satisfy the demands.

The submersible pumps are categorized into 86 series, 101 series, 130 series and 172 series. The 86 series pumps are in configurations of floating type, and can be installed in 4 1/2' casings or large. The flow rates vary from 30m<sup>3</sup>/d to 350m<sup>3</sup>/d at 50HZ with pump setting depth to 3000 meters. The flow rates vary from 226bpd to 2640bpd at 60HZ with pump setting depth to 9840 feet.

The 101 series pumps are in configurations of floating type or compression type, and can be installed in 5 1/2' casings or large. The flow rates vary from 30m<sup>3</sup>/d to 700m<sup>3</sup>/d at 50HZ with pump setting depth to 3000 meters. The flow rates vary from 226bpd to 5283bpd at 60HZ with pump setting depth to 9840 feet.

The 130 series pumps are in configurations of floating type or compression type. And can be installed in 7" casings or large. The flow rates vary from 145m<sup>3</sup>/d to 1715m<sup>3</sup>/d at 50HZ with pump setting depth to 3000 meters. The flow rates vary from 1094bpd to 12900 bpd at 60HZ with pump setting depth to 9840 feet.

The 172 series pumps are in configuration of compression type, and can be installed in 8 5/8' casings or large. The flow rates vary from 2000m<sup>3</sup>/d to 4700m<sup>3</sup>/d at 50HZ with pump setting depth to 3000 meters. The flow rates vary from 15000bpd to 35500bpd at 60HZ with pump setting depth to 9840 feet.

For lifting viscous crude, the broad flow passage pumps can meet the demands.

Abrasive resistant configuration has been designed with compression pump stages to enhance the abrasive handling capability. Corrosion resistant pump, scale





resistant pump and high temperature pump also available.

### Submersible pumps parameters table

Applicable sleeve	Series	Outer diameter/mm	Capacity range @50Hz(m <sup>3</sup> /d)	Capacity range @60Hz(BPD)
4 1/2"	86	86	30~350	226~2640
5 1/2"	101	101.6	30~700	226~5283
7"	130	130	145~1715	1094~12900
8 5/8"	172	172	2000~4700	15000~35500



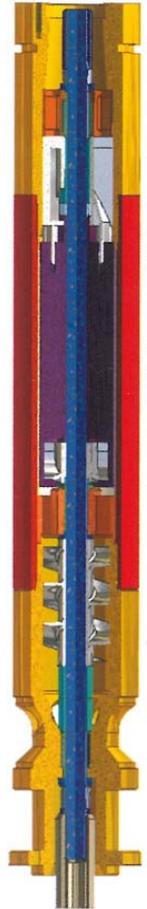
## 2. Gas Separator

The Gas Separator is a section installed between pump and protector to separate the free gas from the crude oil. In high GOR and low-bottom-hole pressure wells, the significant amount of free gas will have a detrimental effect on pump performance. In such cases. The intake section is replaced by a gas separator which removes the free gas from the produced fluid.

We manufactures rotary gas separators to significantly improve operation when free gas is present at the pump intake. By venting the free gas to the annulus, the separator prevents cycling, gas lock and cavitations resulting in a stable motor

load and increased run life.

Three types of gas separators are offered; 86 series, 101 series and 130 series, to satisfy the necessity of separators will be offered. Ni-Resist chamber and rotating parts eliminate potential corrosion and sand wear problems. In high GOR wells, we provide tandem separators with 5% - 10% gas separation efficiency increase.



**Gas Separator parameters table**

Series	Applicable sleeve	Model	Length(m)	Outer diameter/mm	Applicable conditions
86	4 1/2"	QYF86X	0.65	86	Gassy well
101	5 1/2"	QYF101X	0.76	101.6	Gassy well
101	5 1/2"	QYF101XG	0.71	101.6	Gassy well
101	5 1/2"	QYF101XS	1.35	101.6	Gassy well
130	7"	QYF130X	0.94	130	Gassy well

**Note: Separator include anti-sand, anticorrosive and anti-scale type.**

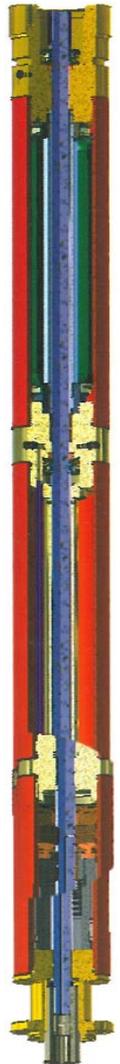


### 3. Protector

The protector is installed between the gas separator and the motor. It , in general, performs the following basic functions: Housing the thrust bearing that carries the axial thrust developed by pump; isolate and protect the motor from well fluid; Equalize the pressure inside the motor with the wellbore pressure and, thus eliminate the pressure differential across shaft seals; Compensate for the expansion and contraction of motor oil due to heating and cooling of the motor when the unit is running or shut down; transmit the shaft torque from motor to pump.

We Manufactures module type of protectors with multiple configurations of labyrinth and/or labyrinth-bag chambers configurations to match individual well conditions or customer requirements.

Five series module protectors are provided by us; they are 86 series,98 series, 101 series,130 series and 172 series protectors, when required, tandem protectors can be used to increase motor protection.



**Protector parameters table**

Applicable sleeve	Series	Model	Configuration	Length (m)	O.D /mm	Applicable temperature(°C)
4 1/2"	86	QYH86J	Capsule type	1.6	86	90/120
4 1/2"	86	QYH86J2	Double capsule type	2.0	86	90/120
5 1/2"	98	QYH98RC	Precipitation type	1.6	98	90/120/150
5 1/2"	101	QYH101RC	Capsule type	1.7	101	90/120
5 1/2"	101	QYH101ZH	Combined type	1.8	101	90/120/150
7"	130	QYH130C	Precipitation type	1.9	130	90/120/150
7"	130	QYH130J	Capsule type	1.9	130	90/120
8 5/8"	172	QYH172C	Precipitation type	2.1	172	90/120/150
8 5/8"	172	QYH172J	Capsule type	2.1	172	90/120
8 5/8"	172	QYH172J2	Double capsule type	2.1	172	90/120

#### 4. Submersible Motor

We offers motor designs in a wide range of rated horsepower, operating voltages and currents to meet application requirements in casings of and larger casing size. Normally the operating voltage for motors is from 200V to 3500V and the operating current is from 10A to 120A. The output horsepower is a direct proportion with the motor length, When the motor fully loaded, it rotates at about 2900 RPM at 50 Hz.

The motor offered by us is manufactured with two type of insulation treatment; slot epoxy and varnish impregnation system. For the motor with varnish impregnation system, the motor temperatures are rated Class F(155 °C) and Class H(180 °C). For the motors with epoxy installed in 150 down hole temperature, special requirements should be proposed.

The requirement for fluid velocity passing the motor housing of our motors should not less than 0.3 meter per second for motor cooling.



Otherwise, motor shroud should be installed for better cooling. For installation in higher down hole temperature, special cooling apparatus will be provided to enhance the motor cooling.

Apart from the motor mentioned above, we can offer patent rare earth permanent magnet synchronous motors. The output horsepower is 30% higher than normal motors with same size. The running speed of this motor is 2980rpm at 50Hz. The efficiency is 88% power factor is 0.92. The input power of this motor is lower, and the idle power can be decreased, and power consumption is lowered. Also this motor has a property of self-start, and can be installed in the well less than 90 °C down hole temperature.

**Submersible Motor parameters table**

Applicable sleeve	Series	O.D /mm	Power(KW) @50(Hz)		HP @60(Hz)		Remark
			Range	Single-rotor power	Range	Single-rotor power	
4 1/2"	95	95	6-72	1.2	10-116	1.9	Applicable well temperature 120°C
5 1/2"	114P	114.3	6-148	3.1	10-240	5	Applicable well temperature 120°C
5 1/2"	114J	114.3	7-152	3.7	10-246	6	Applicable well temperature 90°C
5 1/2"	114PH	114.3	8-151	4.3	14-245	7	Applicable well temperature 50°C
5 1/2"	114Y	114.3	8-152	4	12-243	6.4	Applicable well temperature 90°C Rare earth permanent magnet synchronous motor
7"	138	137.2	8-320	8	26-516	12.9	Applicable well temperature 120°C
7"	143	143	10-420	10	32-672	16	Applicable well temperature 120°C

**5. Down hole Sensing Unit**

Down hole Sensing Unit is a device to monitor the down hole temperature and pressure with features of highest accuracy, repeatability and reliability. It consists

of a surface readout and a down hole sensor bolted to the base of the submersible motor. The surface readout features a simple to use keyboard and large, easy-to-read liquid crystal display with historical data memory. We can manufacture two down hole sensing models (YJ-1 & YJ-2), and also can provide high performance multi-sensing instruments upon request.



**Pressure measuring device parameters**

<b>Service condition</b>		
<b>Model</b>	<b>YJ-1</b>	<b>YJ-2</b>
<b>Ground environment:</b>		
<b>Temperature</b>	<b>-40°C-45°C</b>	<b>-40°C-45°C</b>
<b>Relative humidity</b>	<b>≤50%(40°C); ≤90%(25°C)</b>	<b>≤50%(40°C); ≤90%(25°C)</b>
<b>Altitude</b>	<b>≤2000M</b>	<b>≤2000M</b>
<b>Power</b>	<b>110V 50-60Hz</b>	<b>110V (AC), 50-60Hz</b>
<b>Underground environment:</b>		
<b>Temperature</b>	<b>90°C</b>	<b>150°C</b>
<b>Pressure</b>	<b>≤15Mpa</b>	<b>≤25Mpa</b>
<b>Technical parameters</b>		
<b>Pressure measurement range</b>	<b>0-15Mpa/0-2175 PSI</b>	<b>0-25Mpa/0-3625 PSI</b>
<b>Precision</b>	<b>2.5%</b>	<b>2.5%</b>
<b>Temperature measurement range</b>	<b>30°C-90°C</b>	<b>30°C-150°C</b>
<b>Signal output</b>	<b>4mA DC</b>	<b>15V DC</b>
<b>Pressure change memory</b>		<b>Eight periods pressure data memory</b>

## The multivariate testing instrument technology parameters

Test parameters	Measuring range	Precision	Resolution ratio
Inlet pressure	0-30Mpa	0.1%	0.0069Mpa
Outlet pressure	0-30Mpa	0.1%	0.0069Mpa
Inlet temperature	0-150°C	1%	0.1%
Motor temperature	0-150°C	1%	0.1%
Rate of discharge	0-4770M <sup>3</sup> /day	5%	0.159M <sup>3</sup> /day
Vibration	0-12 g	5%	0.001 g
Leakage current	0-25mA	0.05%	1 uA

### 6. Cables

The power cable offered by us is a kind of armored cable specially designed for ESP systems with flat and round configurations, also motor lead extension cables with pothead is provided.

We can provide a cost-effective cable solution for the most difficult well conditions. Cables are available in a range of conductor sizes that permits an efficient match to motor requirements.

Application Parameters;

Operating Voltage:3kV-6kV

Operating Temperature:90-204°C

**Cables parameters table**

Model	American wire gauge	Insulation material	Sheath material	Temperature rating	Armor material
QYPN	5, 4	Polypropylene	Nitrile rubber	200°F /93°C	Monel metal strip  Stainless steel band  Galvanized steel strip
QYPF	5, 4	Polypropylene	Butyronitrile polyvinyl fluoride complexes		
QYYEN	5, 4, 2, 1	Polyimide ethylene-propylene rubber	Nitrile rubber	248°F /120°C	
QYYEQ	5, 4, 2, 1	Polyimide ethylene-propylene rubber	Lead		
QYYEE150	5, 4, 2, 1	Polyimide ethylene-propylene rubber	Ethylene-propylene rubber	302°F /150°C	
QYYEQ150	5, 4, 2, 1	Polyimide ethylene-propylene rubber	Lead		
QYYEE180	5, 4, 2, 1	Polyimide ethylene-propylene rubber	Ethylene-propylene rubber	356°F /180°C	
QYYEQ180	5, 4, 2, 1	Polyimide ethylene-propylene rubber	Lead		
QYYEE205	5, 4, 2, 1	Polyimide ethylene-propylene rubber	Ethylene-propylene rubber	400°F /205°C	
QYYEQ205	5, 4, 2, 1	Polyimide ethylene-propylene rubber	Lead		
QYYEQ	8, 6, 4	Polyimide ethylene-propylene rubber	Lead	400°F /204°C	Monel metal strip
QYYFFF	8, 6, 4	Polyimide ethylene-propylene rubber	Fluorine sheath Fluorine coextrusion		Stainless steel band

## 7. Control panel

Control panels manufactured by us used to control the operation and give



protection to the downhole motors operating below 4200V/200A power supply at 50-60Hz and also to control and protect normal motors. The Control panels have protective functions of overload, underload, current imbalance, auto-restart, manual restart, and overload delay restart.

The Control panels are classified into outdoor type, indoor type, platform type And remote control type.

Upon request from clients, we can also provide variable speed drives with Medium voltage and low voltage, and soft starter with 1140V-2300V.

Applicable Environment:

Altitude:  $\leq 2000\text{m}$

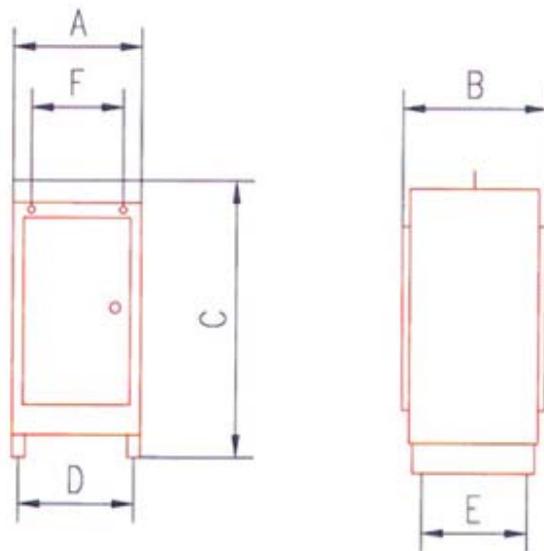
Surface temperature:  $-30^{\circ}\text{C}$  to  $50^{\circ}\text{C}$

Humidity:  $\leq 85\%$

Installed under conditions without flammable or explosive medium.

Without conducive dust or corrosive air to destroy the insulation.

Installed in a place without severe vibration, vertical incline degree should less than 5.



**Control panel size**

Environment	The size of each part					
	A	B	C	D	E	F
Indoor	600	650	1600	500	400	515
Outdoors	600	650	1400	500	395	515
Offshore platform	500	550	1800	430	360	440



## 8. Transformer

The transformers offered are oil-filled transformers in different capacities(KVA) with seven taps for voltage adjustments, also the secondary winding with three-phase and output auxiliary output provided.

We can manufacture wide-band, frequency transformers with different types and specifications upon requests.

Operating Environments:

Altitude: ≤2000m

Surface temperature:-45°C to 50°C

Application Parameters:

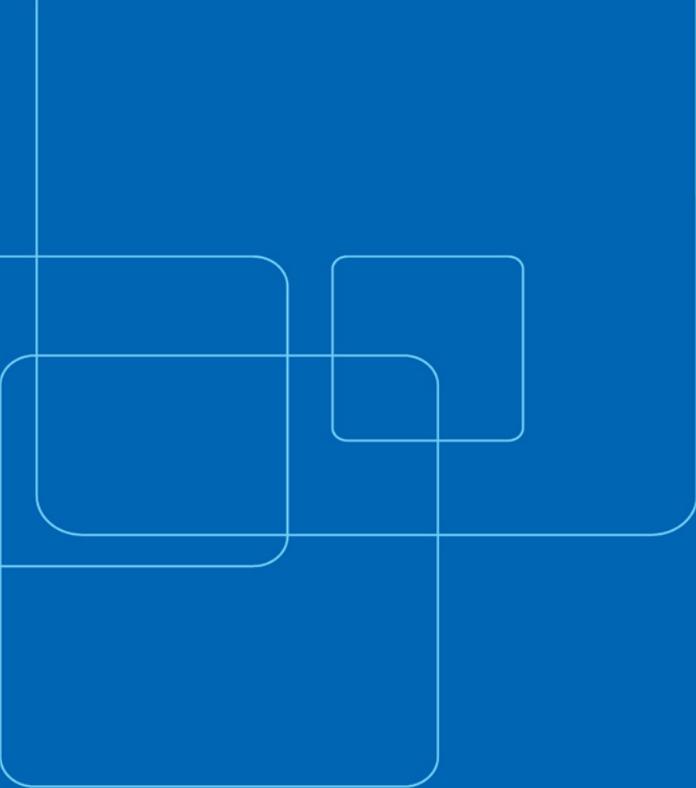
Input Volts:0.4V.6kV.10kV.35kV

Output Volts:0.4kV~3kV

Capacities:10kVA~830kVA

**Transformer Specifications Sheet**

Model	Capacity(KVA)	Primary voltage (KV)	Secondary voltage (KV)	Low voltage (V)
QYSS30	30	6.3	500~600	380
QYSS45	45		420~620	
QYSS50	50		430~730	
QYSS50	50		545~845	
QYSS63	63		740~1040	
QYSS80	80		740~1040	
QYSS100	100		1000~1330	
QYSS125	125		1005~1325	
QYSS160	160		1130~1430	
QYSS160	160		1210~1510	
QYSS200	200		2000~2300	
QYSS300	300		1800~2400	
QYSS315	315		10	
SS9-400	400	33	690	414
SS9-500	500			
SS9-600	600			
SS9-830	830			
SS9-250	250	433	1100	80Hz
SS9-400	400			
SS9-630	630			



# SATAREM

## **Hong Kong Office**

Unit 1210, Level 12, Landmark North,  
39 Lung Sum Avenue, Sheung Shui, N.T., H.K.  
Tel : +852 266 818 61  
Fax : +852 319 947 55

## **Guangzhou Office**

Room 1810-1811 Baiyun Building  
N°113 Baiyun Road, Guangzhou 510100  
Tel : +86 20 62728715  
Fax : +86 20 83292148

## **G.W.J.F-SATAREM**

Toutant 75, Boulevard Haussmann 75008  
Paris France  
Tel : +33 1 4256 0380  
Fax : +33 1 5301 3454  
Bundesstrasse,7,6300 Zug Switzerland

**E-mail** : [satarem@satarem.com](mailto:satarem@satarem.com)