Submersible linear motor oil production device

Professional oil equipment manufacturer



Company Profile

Shenzhen Tiger Motion Control Technology Co., Ltd. was established in 2011 ， The company is at the top level in the field of motors in China, mastering the core motor research and development technology and system solutions, with innovative research and development team and cutting-edge intelligent manufacturing technology production line. Since its inception, the development of motor technology has been the core competitiveness of Tigercontrol, and has made the company one of the most innovative companies in the industry; Products are widely used in robotics, intelligent logistics, medical health, industrial automation, high-end security, laser processing equipment, new energy and other intelligent equipment industries, is the industry's leading core component manufacturers and solution providers, to provide customers in various industries in the field of high-end technology supporting services. The company has carried out a lot of research and development work in the aspects of speed regulation motor and control motor**,** so it has great advantages in technology ， The motor produced has the **competitive advantages** of **high control precision**, **fewer manufacturing processes**, **low cost, reliable work**, and **small maintenance amount**, and has leadership in the industry.

In order to meet the growing customer demand, the company made a major strategic deployment, in September 2021, located in Danyang City, Jiangsu Province, the establishment of **Tager Motion Control (Jiangsu) Technology Co., LTD**., the company covers an area of 20,000 square meters.

The core technology of Tiger Motion Control company is direct drive motor and drive technology, to provide customers with high-end automation system solutions quickly, to help customers improve their competitiveness.



Team Introduction

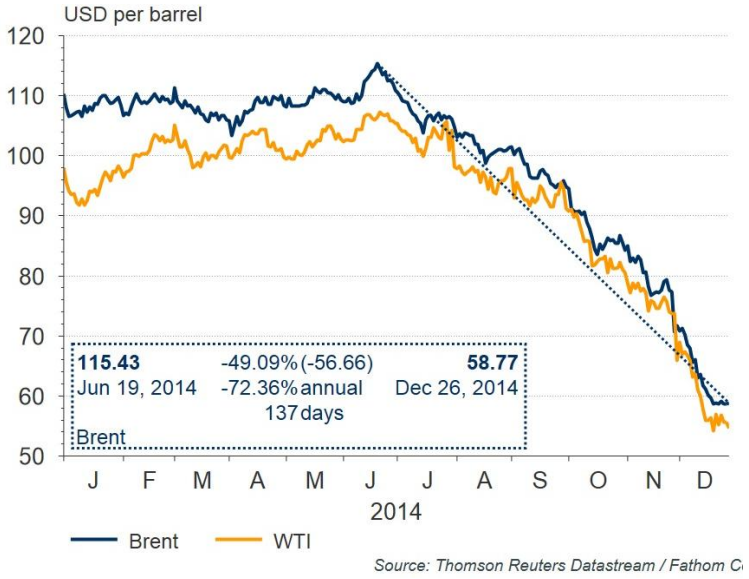
Market Analysis

Industry background analysis

With the oil field entering the middle and late stage of development, the number of low-production oil Wells is gradually increasing, and the difficulty of exploitation is gradually increasing. The traditional oil production equipment has low efficiency, high energy consumption, extremely inconvenient parameter adjustment, and frequent workover caused by partial wear, and the exploitation cost is extremely high. Therefore, improving the efficiency and reliability of the device and system is the key to the research of oil production system.

International crude oil prices plunged from around $110 per barrel in June 2014 to a trough below $30 per barrel in February 2016. Although OPEC(Organization of Petroleum Exporting Countries) reached a production limit agreement at the end of 2016, the international market is still hovering around $50 to $55 per barrel. For the global oil producers, reducing cost and increasing efficiency in the whole process of crude oil development has become the main tone.

With the gradual recovery of international crude oil prices, the application of new mining equipment will be more and more extensive.



Market Analysis

As a new oil production technology, submersible linear motor oil production system has the characteristics of simple structure, good energy saving effect, high system efficiency, can meet the requirements of automatic control of oil production process and adapt to harsh working environment, can better adapt to low-production oil and gas well mining, and has outstanding advantages in intelligent control and energy saving. Especially suitable for deep Wells, heavy oil, cluster Wells and other oil Wells, it is a new pumping unit system worthy of attention.

The Tiger linear submerged-oil motor production system meets the demands of global oil developers from the following price aspects, solving the problems of traditional equipment pipe and rod wear, low system efficiency, high maintenance costs, while the wellhead is free of plugs, solving the problem of oil leakage and reducing the cost of environmental maintenance.





Market Analysis

Global oil Wells are mainly distributed			
	North America	Russia	China
Number of producing Wells	750,000	150,000	100,000

According to the 《International Petroleum Economics》statistics, the number of oil Wells in the world is currently about 1.2 million. More than 40% of inclined Wells produce less than 20m³ per day.

Latent linear motor oil production market capacity forecast:

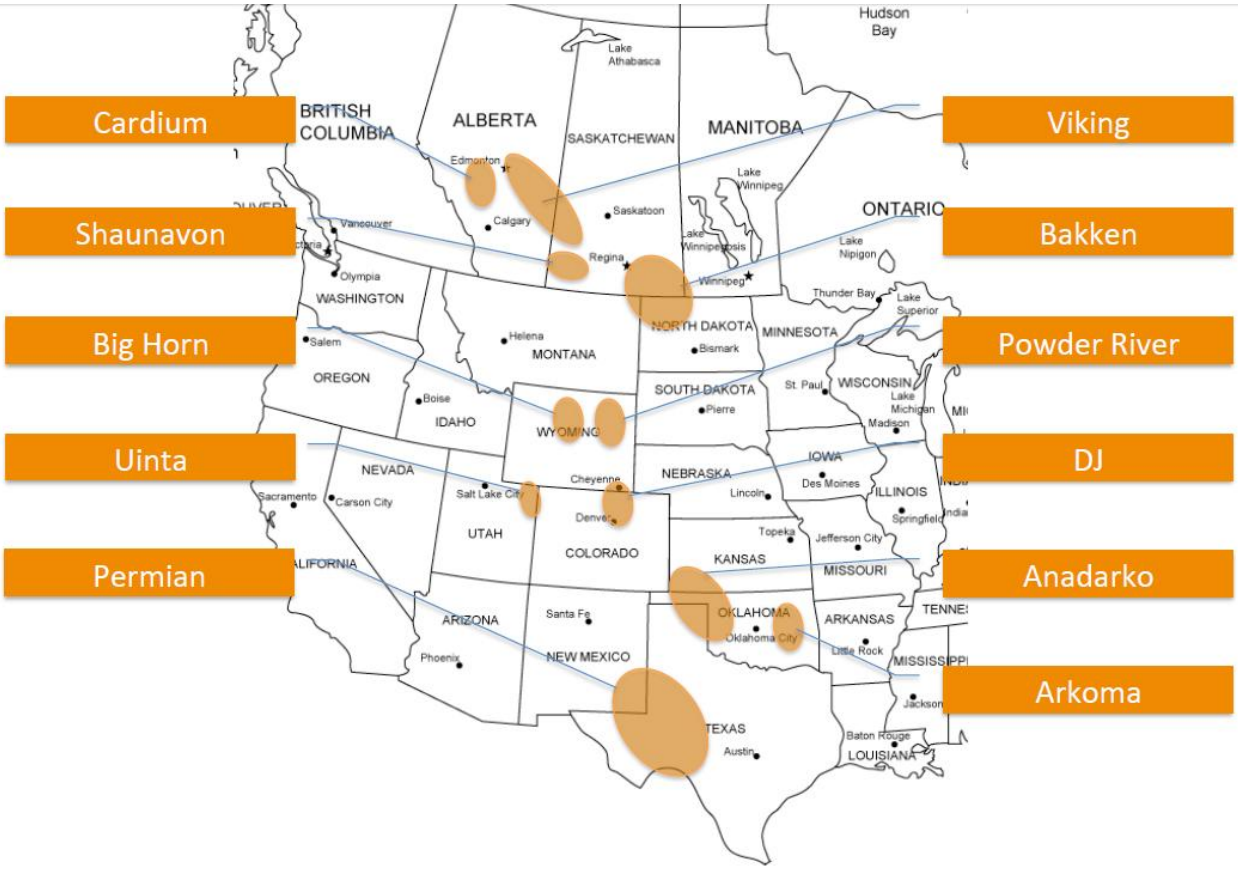
Domestic: 20,000 sets, foreign: 200,000 sets

The oilfield market has at least 200,000 sets of equipment demand, coupled with the replacement of follow-up equipment, the development of new Wells and the exploitation of new energy sources such as coal seam gas, the related equipment market capacity is about 10 billion/year, and the market prospect is broad.

There are also extensive markets for coal seam gas and offshore oil extraction.

Market Analysis

Taking the North American market as an example, the customer application target market is shown as follows:



Market Analysis

- Based on a production casing size of 177.8mm, the number of Wells confirmed for the existing well is: 90,000. The number of Wells to be added is due to the customer drilling more areas or increasing the density of the well pattern in the existing area.
- Other casing sizes (139.7mm) may also be suitable and further studies are needed to confirm.
- More deep Wells and Wells requiring higher production require serial equipment to achieve.The number of Wells of category 2 and 3 above reaches tens of thousands.

Product Formation

Submersible linear motor oil production system is mainly composed

Submersible linear motor oil production device

Submersible linear motor

linear motor

It is composed of primary and secondary, which is the power part of the whole system. The secondary is placed inside the primary to do linear reciprocating motion and push the plunger pump to pump oil

respirator

Placed at the lower part of the linear motor, its main function is to balance the pressure change of the internal lubricating oil formed by the reciprocating motion of the motor, and play the effect of dynamic sealing

Sealer

Placed on the upper part of the linear motor, its main function is to isolate the well fluid and the motor internal lubricating oil

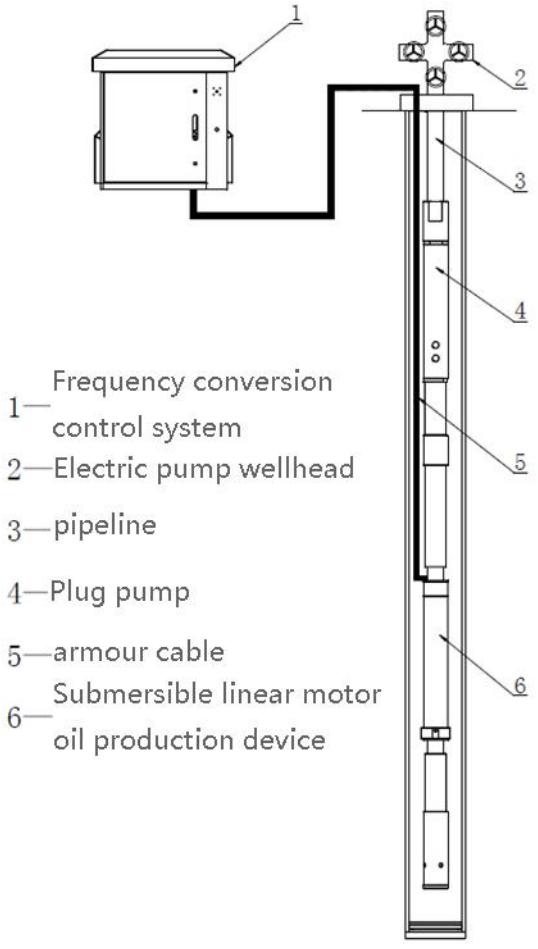
Frequency conversion control system

It is used to control the start and stop of the system, as well as the parameter adjustment of the motor in operation, with RS232 and GPRS two communication interfaces

Plunger pump, submersible cable, special wellhead, centralizer, etc

Product Formation

- Latent line Motor oil production system
  - Submersible linear oil production device
    - Frequency conversion control system
    - Submersible linear motor
      - respirator
      - Linear motor
      - Sealer
  - Supporting device
    - Plunger pump
    - Submersible cable
    - Special wellhead



Submersible linear motor oil production device system structure diagram

Oil production system of submersible linear motor

Product drawing



control cabinet

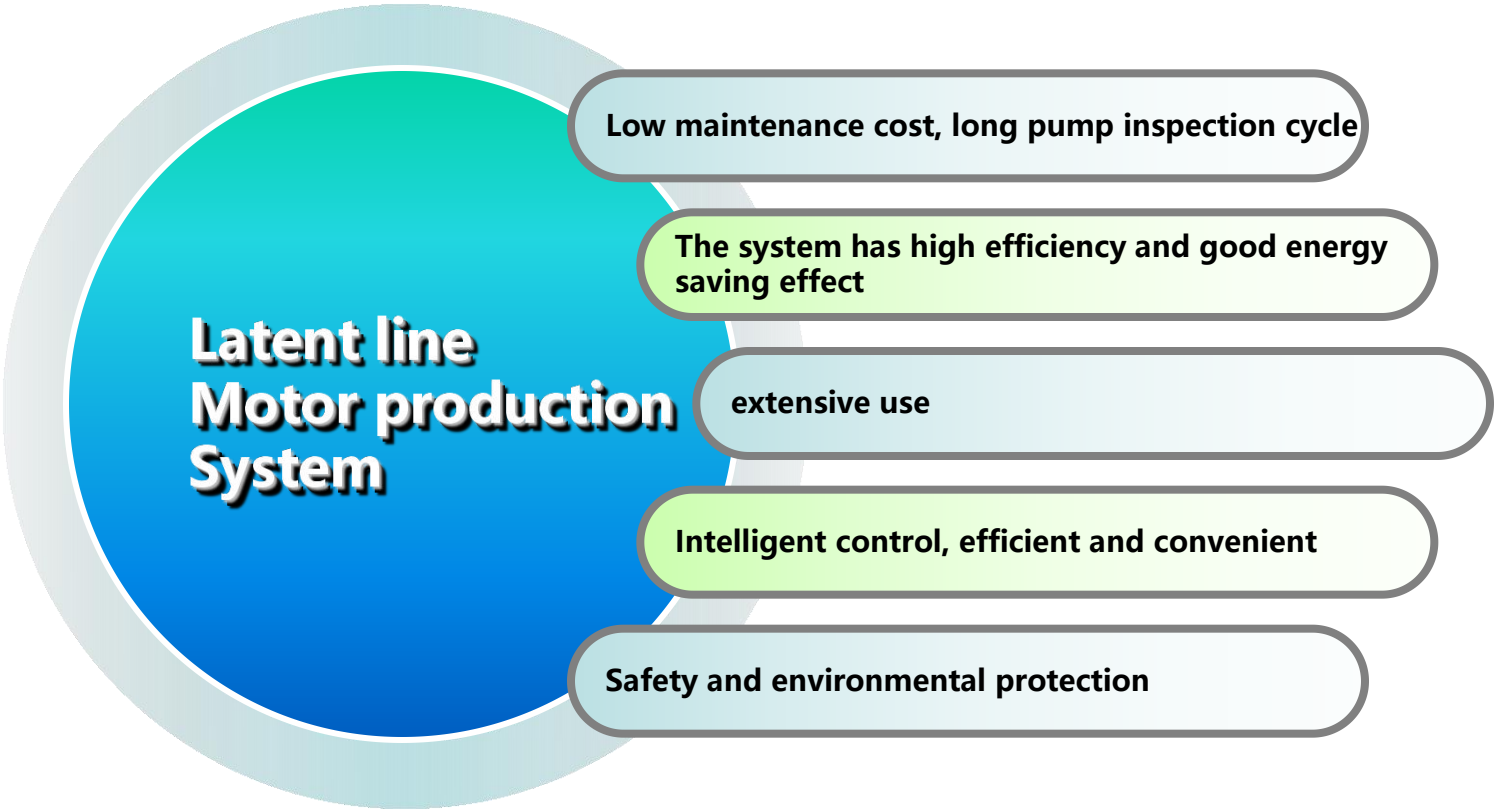


driver



linear motor

product feature



product feature

1. Low maintenance cost, long pump inspection cycle

- The rodless oil production method avoids rod and tube wear in the pumping process and prolongs the service life of the tubing
- Less surface equipment reduces the daily maintenance workload and maintenance cost of the well;
- For small displacement Wells, the number of strokes is reduced, the wear of the pump barrel and plunger is effectively reduced, and the pump inspection period is prolonged.

2. The system has high efficiency and good energy saving effect

- The intermediate transmission mechanism is cancelled, which greatly improves the system efficiency;
- The intermittent power supply mode reduces energy consumption, and the energy-saving effect is more obvious for small displacement Wells

3. extensive use

- Wide application rangeSuitable for Wells producing oil within 2500 meters;
- Solve rod and tube bias wear, can be applied to inclined Wells, cluster Wells, horizontal Wells.

4. Intelligent control, efficient and convenient

- It can realize remote monitoring, parameter adjustment and real-time fault diagnosis.
- The user control interface is simple and easy to adjust parameters.

5. Safety and environmental protection

- There is no running machinery and equipment on the ground, and the wellhead covers a small area to avoid safety accidents and is conducive to safe production;
- The operation is noiseless, the dynamic seal is cancelled, the liquid overflow is avoided, the ground is pollution-free, and the well site environment is guaranteed.

Technical parameters of linear motor oil production system

The equipment is mainly used in inclined Wells with pump hanging depth within 2500m, which can solve the problems of low efficiency and high energy consumption of the existing oil production equipment under small displacement, and has a good application prospect in low production Wells and small displacement CBM Wells.

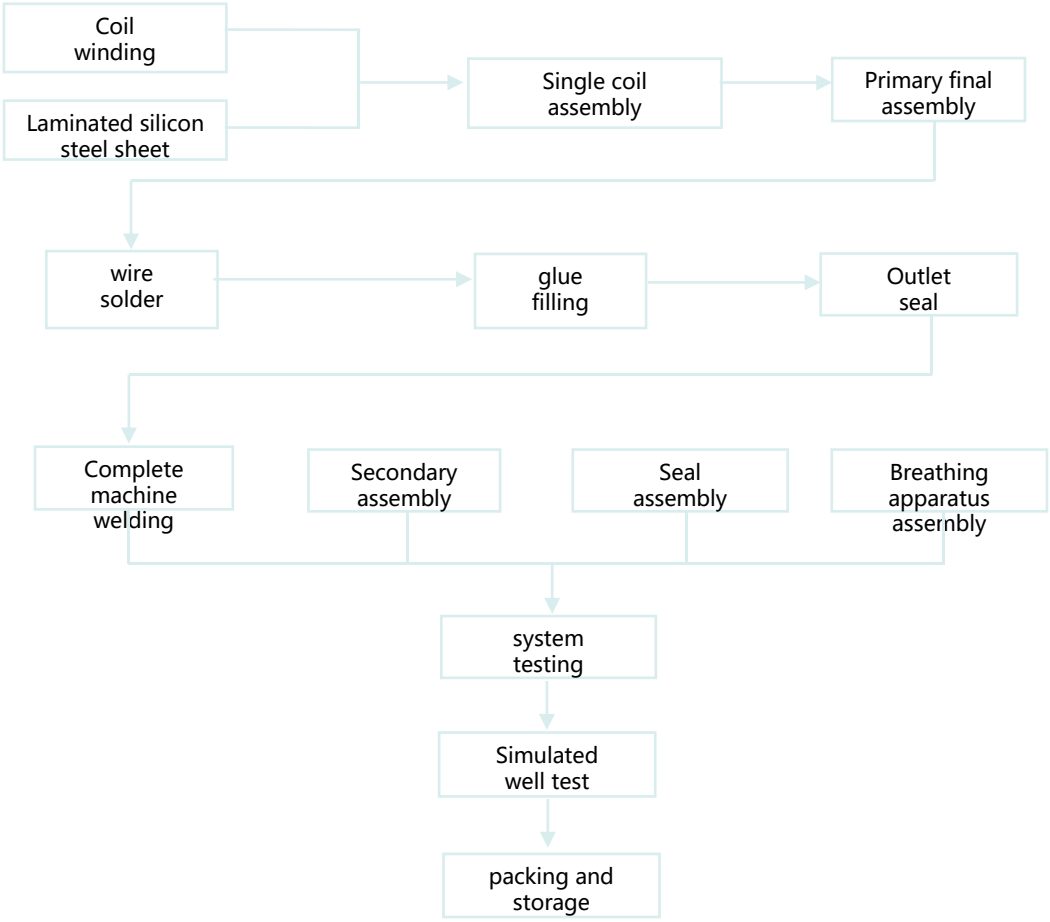
Suitable well condition			
projct	parameter	project	parameter
input voltage	AC 660V	sand content	< 0.5%
Casing specification	5-1/2in	containing water	20% ~ 98%
Tubing specification	2-7/8in	containing water	< 20mg/L
setting depth of pump	< 2500m	environment temperature	< 80℃
liquid production capacity	< 30m³/d	bottom hole pressure	< 25MPa
total salinity	< 30000mg/L	viscosity of crude	< 50mpa.s

Product development history

	Time	Applied well depth	Application client
First-generation model	08.5-10.2	> 1000m	Shengli oilfield
Second generation model	10.2-12.5	> 1500m	Jilin oilfield
Third generation model	12.5-14.3	> 2000m	Shengli oilfield
Fourth generation model	14.3-16.5	> 2500m	North American oil fields

Submersible linear motor oil production system started in May 2008, has gone through nearly 9 years of time, during which the product performance has been improved three times, is currently in use is the fourth generation model, the performance indicators of the system have reached the advanced level at home and abroad.

Product process flow



economic benefit analysis

	project	pumpjack	Submersible linear motor	Annual cost savings/yuan
electric charge	system efficiency	15%	25%	21600
	Daily power consumption/KWH	185	110	
	Annual electricity consumption/KWH	66600	39600	
	Unit price/yuan/degree	0.8	0.8	
	Annual electricity consumption cost/Yuan	53280	31680	
operating costs	Annual operation	2	0.5	30000
	Cost per operation/yuan	20000	20000	
	operating costs	40000	10000	
material cost	Number of tube/rod sets per change	10	0	20000
	Annual operation	2	0.5	
	Single casing rod cost/yuan	1000	1000	
	material cost	20000	0	
Ground maintenance cost	Ground maintenance cost	10000	2000	8000
total				79600

Remark:

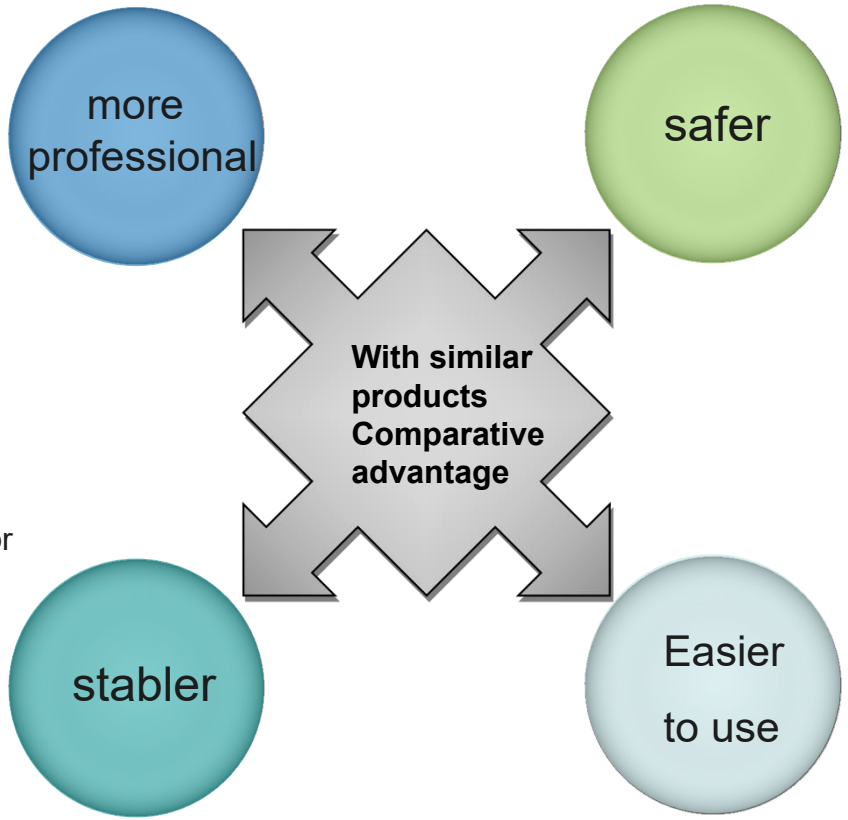
1. The above cost statistics are calculated according to the pump hanging depth of 1000m, and the fluid discharge is calculated according to the well condition of 10m³/ day

2. The average power saving is calculated by 40%, the single casing rod is 1 oil pipe plus 1 sucker rod, and the cost of the single casing rod is calculated by 1000 yuan;

3. Together with the annual safety and environmental protection input conversion costs and maintenance personnel costs, the annual savings per well is expected to be about 10W yuan.Foreign labor costs are very high, especially in North America, the operation cost of a single well is about $20,000, and the cost of two operations is equivalent to the selling price of our equipment.So in foreign submersible linear motor oil production system economic benefits are more obvious.

System advantage

- Professional electromagnetic design team
- Advanced control theory
- Professional technical support team



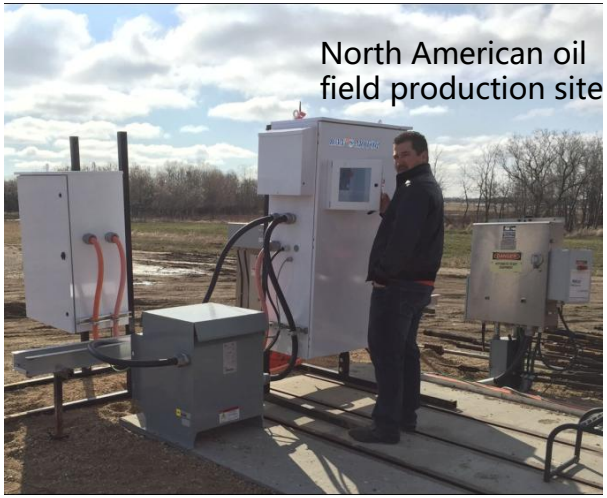
- Multiple protection to reduce motor risk
- The control cabinet is UL certified with IP65 protection level

- Low vibration, prolong motor life
- Fully sealed structure to reduce wear
- Low running current, high motor efficiency

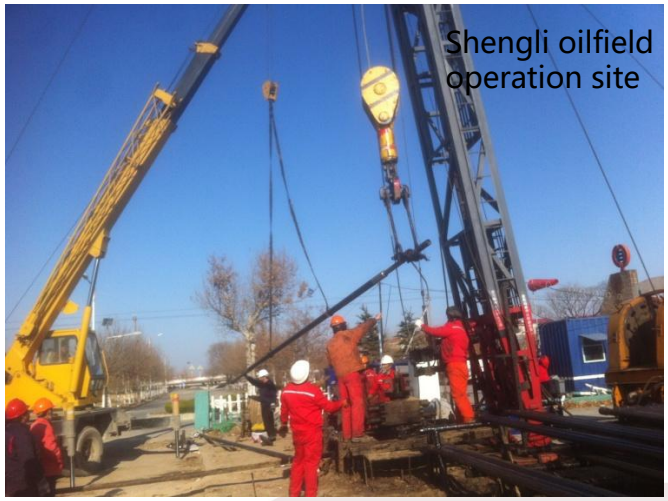
- The interface is simple and easy to learn
- Easy parameter adjustment, on-line parameter adjustment and on-site manual parameter adjustment

typical application


North American oil field operation site


North American oil field production site


Jilin oilfield production site


Shengli oilfield operation site

typical application

	well number	Yield situation (t/d)	Pump type selection	Motor selection	Pump depth (m)	Running time (days)	Date of sinking
North American oil fields (15.1～)	1#	20	44/32	A surname2200	1460	/	2015.01.18

Working oilfield	Well number	front and back	Pump diameter/ mm	Pump hanging/m	Stroke /m	Stroke /min-1	Fluid per day /t	Daily power consumption /Kw.H	system efficiency/%
Shengli Oil Field (14.8～16.5)	13-703	pumpjack	57	1180	1.9	1.5	7	190	11.8
		Linear motor	44	1180	1.2	2	5	50	32.1
Jilin oilfield (10.7～13.4)	141-49	pumpjack	44	599.86	2.5	6.1	8.1	86.64	15.27
		linear motor	44	599.86	1.2	2.8	8.2	60.25	22.22
	2-019	pumpjack	44	646.72	1.8	4.8	6	69.84	15.12
		linear motor	44	645.03	1.2	3	6.4	50.1	22.43
	128-79	pumpjack	38	705.11	1.8	6.8	7.3	118.08	11.87
		linear motor	44	711.73	1.2	3.4	7.6	52.77	27.9
	130-4-5	pumpjack	44	948.9	1.8	5.9	5.1	149.25	8.83
		linear motor	44	948	1.2	2.9	5.3	95.23	14.36
	130-5-9	pumpjack	38	1115.8	2.5	5.2	4.7	148.91	9.59
		linear motor	44	1115	1.2	3	5.2	102.59	15.38

Production data of submersible linear motor in oil field

patented

Patent list					
serial number	Patent volume number	Chinese name of patent	Patent application number	Current state of law	announcement date
1	01-043	Submersible linear motor	200810218303.5	certified	2011/6/22
2	01-149	The utility model relates to a submersible linear motor	200810217179.0	authorization	2011/12/7
3	01-150	The utility model relates to a submersible linear motor	200810217180.3	authorization	2010/12/8
4	01-193	A submersible motor system and a transmission method thereof	200910108995.2	authorization	2011/8/31
5	01-286	The utility model relates to a cylindrical submersible linear motor	201010269275.7	authorization	2012/10/3
6	01-316	The invention relates to a submersible linear motor respirator	201110063161.1	authorization	2014/4/2
7	01-642	The invention relates to a respiratory protector for a submersible linear motor	201410529932.5	examine the matter	
8	01-645	The utility model relates to a wire stand for winding a coil and an automatic winding machine	201510022066.5	examine the matter	
9	01-792	The utility model relates to a submersible linear motor and an actuator thereof	201510208190.0	examine the matter	
10	01-811	Pump and sand filter structure	201510439430.8	examine the matter	
11	02-1139	The utility model relates to an oil-submersible linear motor seal	201621042805.3	Official acceptance	
12	02-240	Submersible linear motor	200820213529.1	authorization	2009/9/16
13	02-241	Submersible linear motor	200820213528.7	authorization	2009/10/14
14	02-245	Submersible linear motor	200820234912.5	authorization	2009/10/14
15	02-289	A submersible motor system	200920134224.6	authorization	2010/9/15
16	02-355	Submersible linear motor	201020156741.6	authorization	2010/11/24
17	02-434	The utility model relates to a submersible linear motor connector	201120050396.2	authorization	2011/9/28
18	02-439	A sealing device	201120050412.8	authorization	2011/9/28
19	02-851	The utility model relates to a sealing device for a submersible linear motor	201520942873.4	certified	2016/4/13
20	PCT-009/01-148-CN	Submersible linear motor	200880000363.8	Chinese authorization	2012/2/1
21	PCT-027/01-551-CN	Submersible linear motor oil production system	201380081628.2	examine the matter	

UL证书

The high performance medium and high pressure new submersible linear motor digital mining system has the advantages of high speed response, low long-term transmission loss, etc. The unique control mode developed according to the oil production system.



CERTIFICATE OF COMPLIANCE

Certificate Number 20160106-E481314
Report Reference E481314-20160105
Issue Date 2016-JANUARY-06

Issued to: SHENZHEN HAN'S MOTOR S&T CO., LTD
No.128 Chongqing RD Fuyong Street Baoan District
Shenzhen, Guangdong 518057 CHINA

This is to certify that representative samples of: POWER CONVERSION EQUIPMENT
Model LMS-INVERTER-660-40-2, open type.

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 508C, Power Conversion Equipment;
CSA C22.2 No.14-13, Industrial Control Equipment

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Look for the UL Certification Mark on the product.

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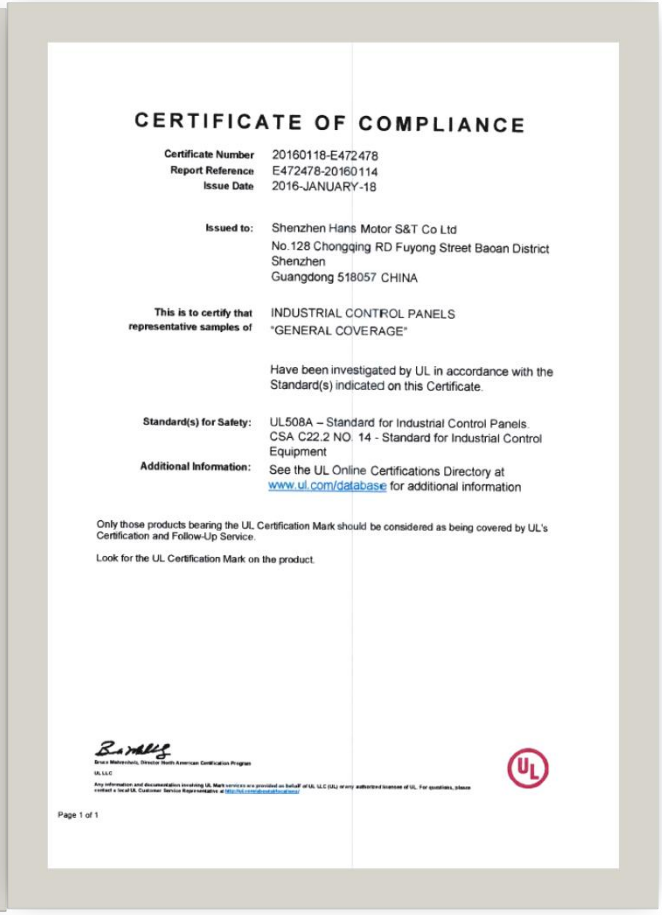
Drive UL certification



CERTIFICATE OF COMPLIANCE

Certificate Number 20160118-E472478
Report Reference E472478-20160114
Issue Date 2016-JANUARY-18

Issued to: Shenzhen Hans Motor S&T Co Ltd
No.128 Chongqing RD Fuyong Street Baoan District
Shenzhen
Guangdong 518057 CHINA

This is to certify that representative samples of: INDUSTRIAL CONTROL PANELS
"GENERAL COVERAGE"

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL508A – Standard for Industrial Control Panels.
CSA C22.2 NO. 14 - Standard for Industrial Control Equipment

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

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UL certificate for control cabinet

competitive assay

- Competitors of similar products are Shenyang New City and Shandong Weima
- Rival advantage: The price is cheap and belongs to CNPC internal or affiliated enterprises.
- Advantages: Leading product technology (high reliability, strong adaptability to the environment), cost-effective
- Opponent disadvantage: Shenyang New City:—Weak technological innovation ability, only maintain the current technology and production status quo. Shandong Weima—No motor and drive research and development ability.
- Tiger Disadvantage:Loose relationship with domestic oil companies

Thank you!

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