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# Artificial Lifting Expert in Oil & Gas

Shandong Weima Pumps Manufacturing  
Co., Ltd.



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**Linear Motor Pump**  
**Intelligent oil production outfit**



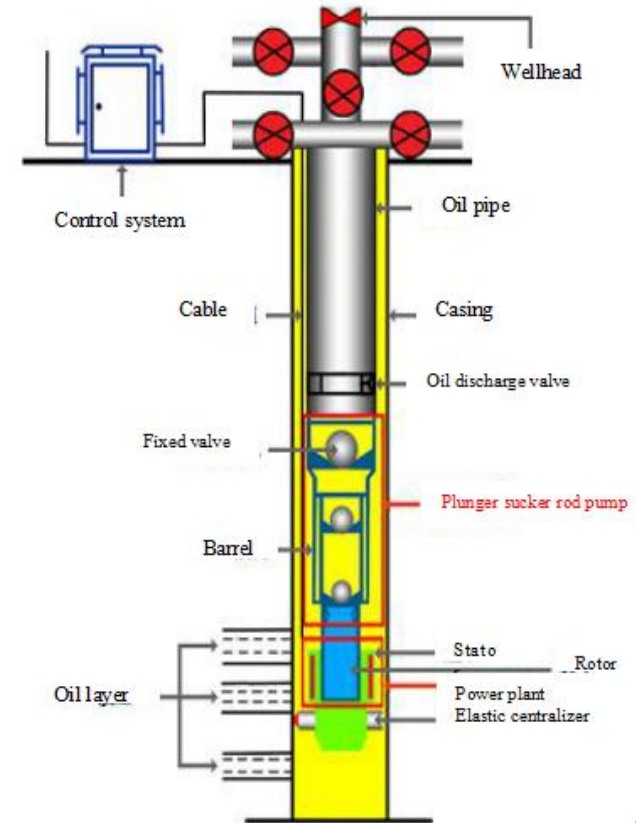
# Linear motor pump intelligent oil production outfit



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Linear motor pump intelligent oil production outfit is composed of three parts: **control cabinet, submersible linear motor, plunger pump.**

The power is transmitted to the stator of the downhole linear motor through the cable. The stator produces strong magnetic force, drives the rotor, and moves up and down according to the required speed under the instructions of the ground control cabinet. The upper end of the rotor is connected with the special tubing pump plunger to move up and down to realize the downhole liquid lifting.





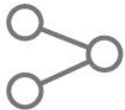
**Environmental protection**



**Energy conservation**



**Safe and efficient**



**Remote management system**





## Environmental protection

The wellhead is sealed and there is no oil leakage, bleeding, dripping, spilling phenomenon and noise pollution. In the environmental protection law and high environmental protection requirements of oil field production, it can play a unique advantage!

There is no pulling up and down of the sucker rod, packing in the wellhead, dynamic seal, and landing oil. The use of casting rod type oil drain device matched with well washing can meet the requirements of environmental protection in pump inspection. It is suitable for offshore platform, river, coastline and other environmentally sensitive areas;

There is no movable equipment on the ground, but only control cabinets and Christmas trees, without noise. It is suitable for oil well exploitation in residential area.





## Energy conservation

Intermittent power supply, short power supply time, significantly **reduced** energy consumption;

The working energy consumption of the oil beam and sucker rod of the pumping unit is removed, and the drive of surface pumping unit with the sucker -rod pump is changed into a downhole linear motor to drive the oil directly, and the energy consumption is **further reduced!**

Items	Original beam pumping unit	Linear motor pump	rate of change
Motor power factor	0.387	0.777	100.78%
System efficiency	23%	44%	91.3%
Unit consumption of production fluid	11.19KW.H/T	3.94KW.H/T	-64.79%
Unit consumption of ton liquid per hundred meters	1.18.KW.H/(100M.T)	0.62KW.H/(100M.T)	<b>-47.46%</b>

According to the test data, compared with the eight type pumping units, when the daily production of liquid is less than 2 t, **the daily electricity is saved more than 80%**; when the daily production of liquid is 2-5 t, **the daily electricity is saved more than 60%**; when the daily production of liquid is 6-8 t, **and the daily electricity is saved more than 40%!**



## Safe and efficient

The transmission mechanism of the ground equipment of the pumping unit is complex and the daily maintenance workload is heavy. A considerable number of oil wells are located near village. The production and operation of the pumping well is easy to cause mechanical damage and there is a **hidden danger of safety**.

There is no **movable equipment and maintenance point** on the ground. Neither the open field nor crowded residential areas will cause mechanical damage to people and animals.

Routine maintenance items	Pumping unit lifting	Electric submersible plunger pump
Anticorrosion and insulation	✓	✓
Inspection of oil leakage, bleeding, dripping, spilling	✓	✓
Routine maintenance	✓	✗
First -class maintenance	✓	✗
Second- class maintenance	✓	✗
Belt replacement	✓	✗
Addition of packing	✓	✗
Adjusting balance, stroke and rate of pump	✓	✗



## Remote intelligent management

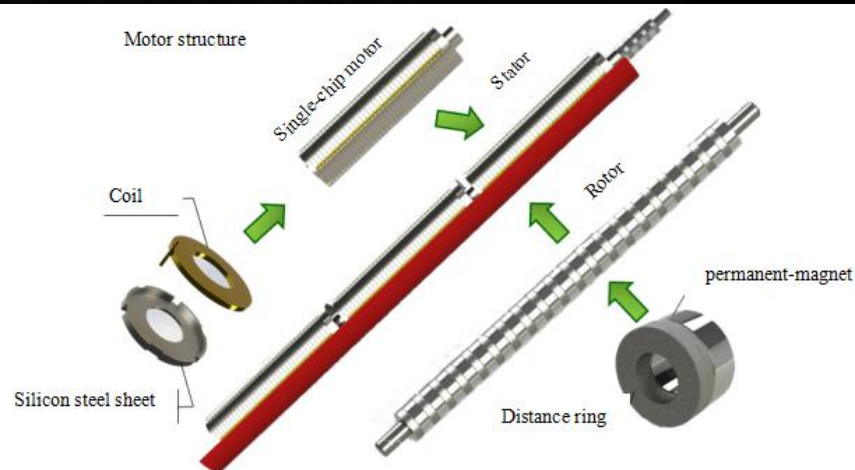
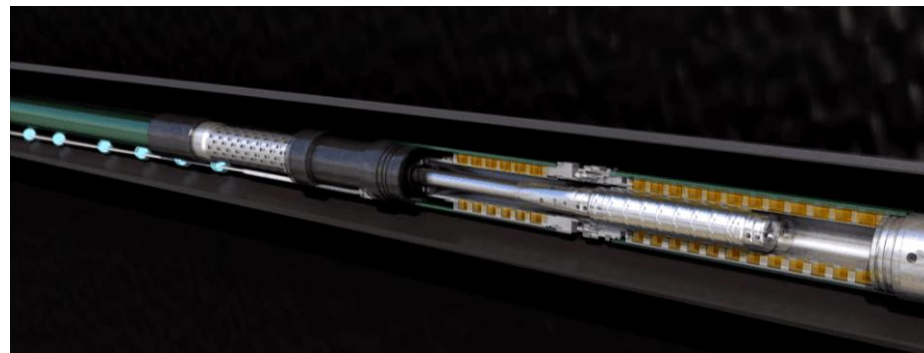
- ◆ The control system adjusts parameters online without shutdown;
- ◆ The human-computer interaction interface is clear and easy to understand, which reduces the operation difficulty of oil production workers;
- ◆ Downhole operation data are collected through selecting and mounting **Wireless IOT remote production equipment management system**, which can realize remote start and shutdown in the office computer, mobile phone and other devices, remote parameter adjustment (up and down frequency, frequency of stroke), remote parameter online browsing (current, voltage, frequency of stroke, up and down frequency) and remote fault code view, etc., without need to visit the well site in person, and the maintenance is simple and saves human resources.





## Linear motor

- Type: permanent-magnet linear motor
- Outer diameter :  $\phi 96\text{mm}$ ,  $\phi 114\text{mm}$ ,  $\phi 143\text{mm}$ ,
- Length : 4.46~10.9m
- Working medium: mixture of oil, water and gas
- Bearable downhole medium temperature :  $\leq 150^{\circ}\text{C}$
- Bearable downhole environmental pressure:  $\leq 30\text{Mpa}$
- Rated input voltage: 380V, 660V, 1140V three-phase four-wire system
- Input Frequency: 50Hz
- Max output power : 50KW(114 series);80KW(143 series);
- Work schedule: intermittent
- Insulation grade : H
- Maximum thrust :3.5T(114 series) 6.0T(143 series)
- Stroke of stator : 1.23 m, 1.47m
- Cooling mode: well fluid flow cooling





## Plunger pump



- ◆ **High pump efficiency:** intermittent operation of the motor, long time for liquid inlet of the pump and good filling degree; no extension state of sucker rod, the program precision control, no stroke loss for the pump.
- ◆ **Adjustable liquid production capacity:** stroke per minute can be adjusted from 0.1 to 8 strokes per minute as needed.



## Intelligent control system

- Working voltage : 380V, 660V, 1140V
- Parameters can be adjusted online at will : 0.1-8 times/min
- Level of protection : IP65

井号	电压 (kV)	液面深度 (m)	采集时间	运行状态	上行频率 (Hz)	下行频率 (Hz)	上行电流 (A)	下行电流 (A)	故障代码	采集时间
井#1-09	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:01
井#14-10	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:01
井#3-5	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:01
井#14-10	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:01
井#3-5	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:01
井#3-7	--	--	--	正常运行	6.00	10.00	19.92	5.81	0	2016-11-13 14:23:02
井#4-3	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:02
井#4-5	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:02
井#3-5	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:13
井#3-7	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:02
井#4-3	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:01
井#4-5	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:01
井#48 A10-2	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:03
井#3-9	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:03
井#2-5	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:03
井#14-014	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:01
井#48A10-3	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:01
井#48A12-4	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:01
井#2-03	--	--	--	正常运行	6.00	10.00	18.26	5.81	0	2016-11-13 14:23:00



Large platform unit controller centralized management area



## System parameter

Type	Supporting sucker rod pump	Rated voltage (V)	Rated power (kW)	Projection diameter (mm)	Applicable casing (in)	Stroke per minute (min <sup>-1</sup> )	Pump setting depth (m)	Displacement (m <sup>3</sup> /d)
QYDB-114-660-(15~30)	28/32/38/44	660	30	114	5.5	0.1~8	≤2000	≤20
QYDB-114-660-(20~35)	28	660	35	114	5.5	0.1~8	2400	7
QYDB-114-660-(20~35)	32	660	35	114	5.5	0.1~8	2000	10
QYDB-114-660-(20~35)	38	660	35	114	5.5	0.1~8	1500	15
QYDB-114-660-(20~35)	44	660	35	114	5.5	0.1~8	1000	20
QYDB-114-660-(20~35)	50	660	35	114	5.5	0.1~8	900	26
QYDB-114-660-(20~35)	57	660	35	114	5.5	0.1~8	650	35
QYDB-114-1140-(30~50)	32	1140	50	114	5.5	0.1~8	3000	10
QYDB-114-1140-(30~50)	38	1140	50	114	5.5	0.1~8	2500	15
QYDB-114-1140-(30~50)	44	1140	50	114	5.5	0.1~8	1600	20
QYDB-114-1140-(30~50)	50	1140	50	114	5.5	0.1~8	1400	26
QYDB-114-1140-(30~50)	57	1140	50	114	5.5	0.1~8	1050	35
QYDB-114-1140-(30~50)	70	1140	50	114	5.5	0.1~8	700	50



## System parameter

Type	Supporting sucker rod pump	Rated voltage (V)	Rated power (kW)	Projection diameter (mm)	Applicable casing (in)	Stroke per minute (min <sup>-1</sup> )	Pump setting depth (m)	Displacement (m <sup>3</sup> /d)
QYDB-114-380-(8~15)	28/32	380	15	114	5.5	0.1~8	≤1000	≤10
QYDB-143-1140-(30~50)	32/38/44/50/57/70	1140	50	143	7	0.1~8	≤3000	≤50
QYDB-143-1140-(40~80)	38	1140	80	143	7	0.1~8	3000	15
QYDB-143-1140-(40~80)	44	1140	80	143	7	0.1~8	2600	20
QYDB-143-1140-(40~80)	50	1140	80	143	7	0.1~8	2100	26
QYDB-143-1140-(40~80)	57	1140	80	143	7	0.1~8	1600	35
QYDB-143-1140-(40~80)	70	1140	80	143	7	0.1~8	1100	50
QYDB-143-1140-(40~80)	83	1140	80	143	7	0.1~8	800	75
QYDB-143-1140-(40~80)	95	1140	80	143	7	0.1~8	600	100



## Application case

### Application in Block Ji 7 of Zhundong Oil Production Plant of Xinjiang Oilfield

Pump setting depth : 1300m-1600m,  
when the temperature is up to 50°C, the  
viscosity of crude oil is 497mPas,  
displacement : 10m<sup>3</sup>/d, sand content is less  
than 3%.

Maintenance-free period : 660 days, the  
longest running period: 960 days.



Pre-construction wellhead



Platform overall control lever



Large platform unit controller  
centralized management area



## Application Case

### CNOOC offshore platform well

Because of the high environmental protection and stability requirements of offshore platform on the equipment, linear motor pump can play a unique advantage.

143 series 1140V linear motor pump is applied, with liquid production 20 square / day.

Since January 4, 2016, the pump has been applied to a number of platforms (Tianjin Branch, Zhanjiang Branch), with a maintenance-free period of 572 days and longest running 900 days.





**【Thank you】**

**Shandong Weima Pumps  
Manufacturing CO.,LTD.**

**Phone: 0086 634-5919863**

**Fax: 0086 634-8856601**

**Email: [weima@sdweima.com](mailto:weima@sdweima.com)**

**Webset: <http://www.sdweima.com>**