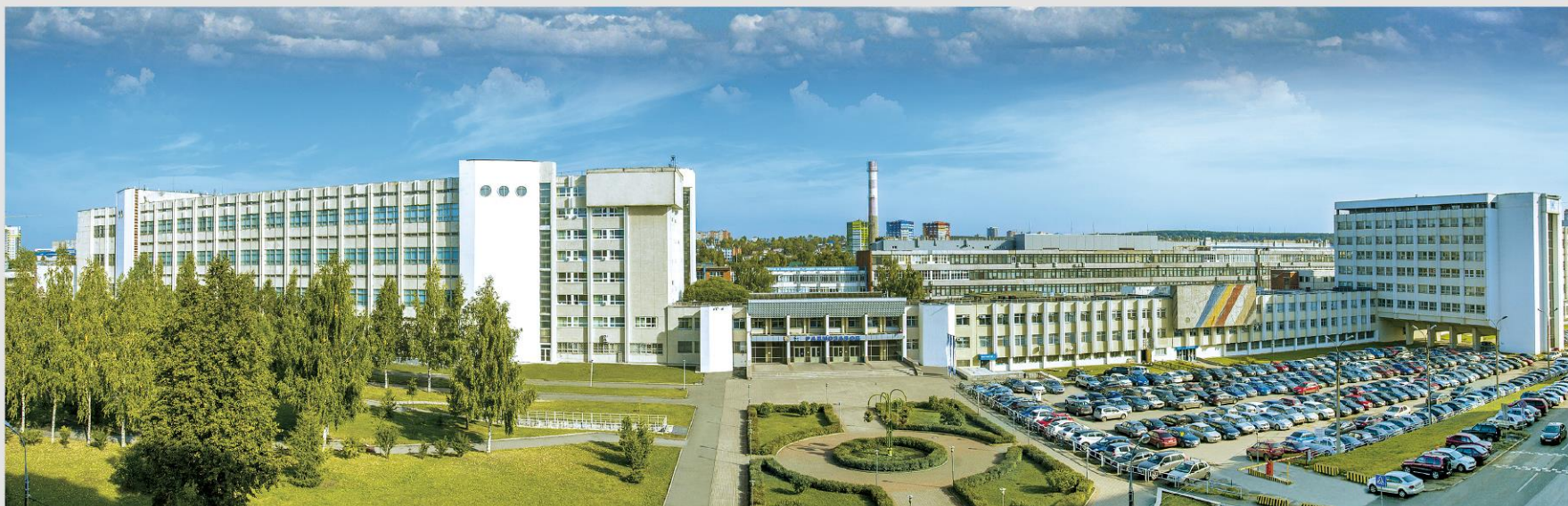


ARTIFICIAL LIFT SOLUTIONS



oil.irz.ru

Company Overview



IZHEVSKIY RADIOZAVOD (IRZ)

RUSSIAN GROUP OF COMPANIES PRODUCING ELECTRONICS

Date
of foundation

March 6
1958

Total number
of employees

5 800

Engineering
department

810

Company
is certified to

ISO 9001,
ISO 14001, BS OHSAS 18001, IRIS,
AS/EN 9001

Product Lines



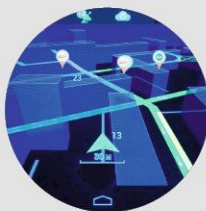
**Space-related
electronics for on-board
and ground segments**



**Railway automatics
and safety systems**



**User navigation
equipment**



**Telecommunication
systems**



**Oilfield and power
equipment**



**Video
systems**



IZHEVSKIY RADIOZAVOD (IRZ)



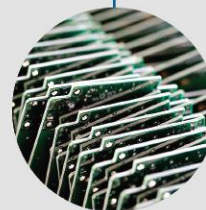
Instrumentation



**Mobile robotic
systems**



**Testing
laboratory**

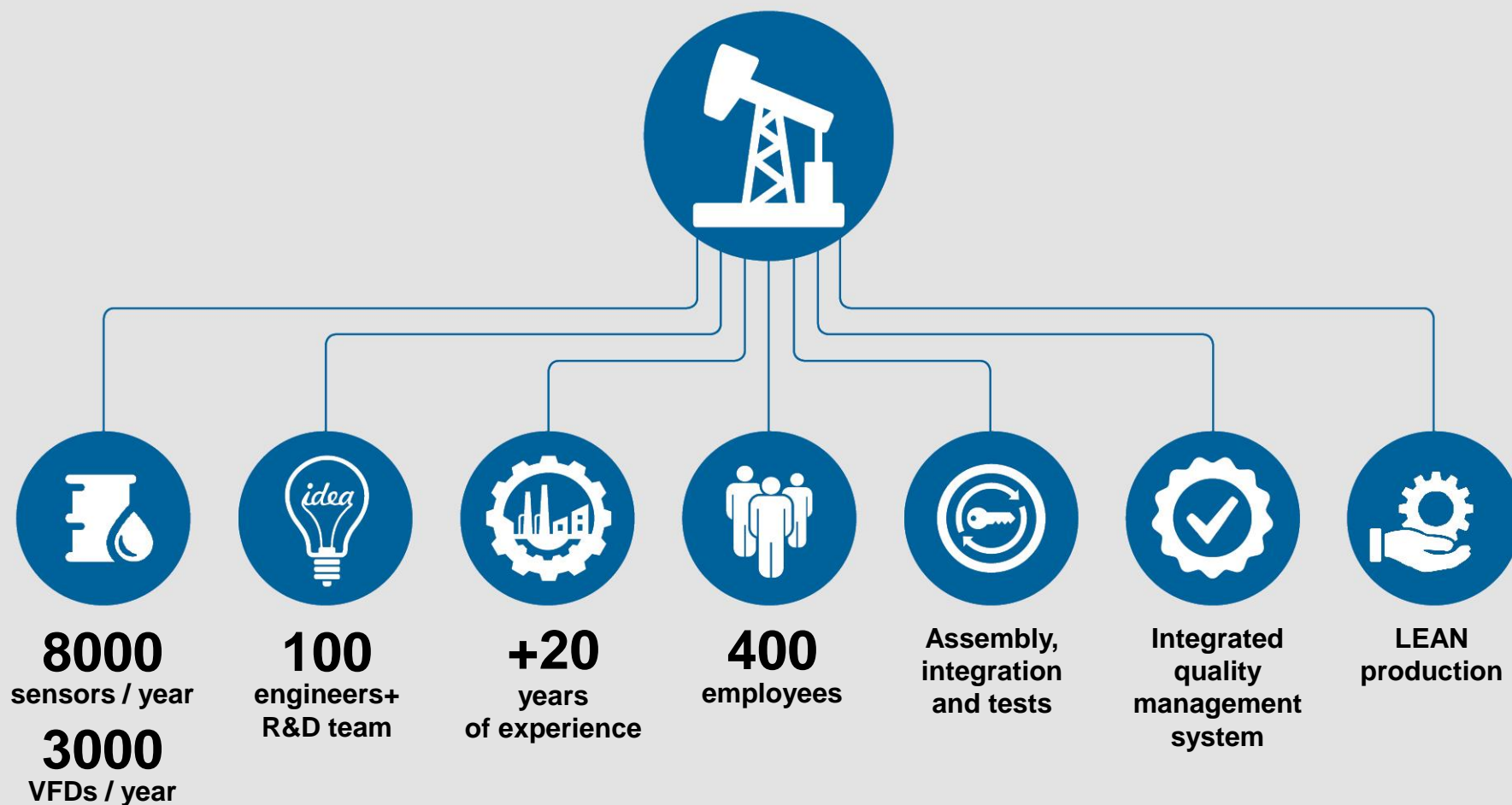


**Printed circuit
boards, surface
mounting**



**Mechanical parts
production**

Oilfield and Power Equipment



Product line is represented by IRZ TEK, subsidiary of IRZ

Quality Management





CERTIFICATE





This is to certify that

OOO "IRZ TEK"
 19 Bazanaya str.
 426034 Izhevsk
 Udmurt Republic
 Russian Federation

has implemented and maintains an **Environmental Management System**.

Scope:
 Development, production, commissioning and servicing of telemetry equipment, control systems for fuel and energy equipment, bench equipment

Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

ISO 14001 : 2015

Certificate registration no.	31101082 UM15
Excerpt from certificate registration no.	31101077 UM15
Valid from	2018-04-09
Valid until	2021-04-08
Date of certification	2018-04-09




DQS GmbH
Stefan Heiloth
 Managing Director



Accredited Body: DQS GmbH, August-Schanz-Straße 21, 60433 Frankfurt am Main, Germany
 Administrative Office: OOO SSU DEKUES, Respublikanskaya str. 3, 150003 Yaroslavl, Russian Federation

ISO 14001:2015



CERTIFICATE





This is to certify that

OOO "IRZ TEK"
 19 Bazanaya str.
 426034 Izhevsk
 Russian Federation

has implemented and maintains a **Quality Management System**.

Scope:
 Development, production, commissioning and servicing of telemetry equipment, fuel and energy equipment control systems, bench equipment

Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

ISO 9001 : 2015

Certificate registration no.	31101082 OM15
Excerpt from certificate registration no.	31101077 OM15
Valid from	2018-12-10
Valid until	2021-12-09
Date of certification	2018-12-10




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ISO 9001:2015



CERTIFICATE





This is to certify that

OOO "IRZ TEK"
 19 Bazanaya str.
 426034 Izhevsk
 Udmurt Republic
 Russian Federation

has implemented and maintains an **Occupational Health and Safety Management System**.

Scope:
 Development, production, commissioning and servicing of telemetry equipment, control systems for fuel and energy equipment, bench equipment

Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

BS OHSAS 18001 : 2007

Certificate registration no.	31101082 BSOH
Excerpt from certificate registration no.	31101077 BSOH
Valid from	2018-04-09
Valid until	2021-03-11
Date of certification	2018-04-09



DQS GmbH
Stefan Heiloth
 Managing Director



Accredited Body: DQS GmbH, August-Schanz-Straße 21, 60433 Frankfurt am Main, Germany
 Administrative Office: OOO SSU DEKUES, Respublikanskaya str. 3, 150003 Yaroslavl, Russian Federation

BS OHSAS 18001:2007

Artificial Lift Solutions



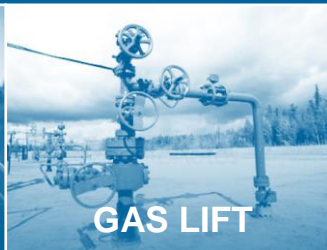
IRZ TEK designs and manufactures electronic equipment for oil & gas industry since 1998

WE PROVIDE SOLUTIONS FOR:



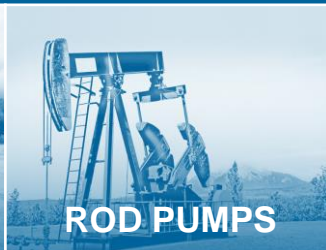
ESP

- **Drives**
VFD, soft starters, switchboards
- **Downhole Monitoring Systems**
 - Standard temp.
 - High temp.
- **Water Injection System with Flow Meter**
- **Dual Completion Systems**
- **Anti-Scaling System**



GAS LIFT

- **Downhole Monitoring System**
Field Tests



ROD PUMPS

- **Drives**
VFD, switchboards
- **Downhole Monitoring Systems**
 - Standard temp.
 - High temp.



PCP

- **Drives**
VFD
- **Downhole Monitoring Systems**
 - Standard temp.
 - High temp.



SPLM

including:

- **Drive**
- **Downhole Monitoring System**
- **Pump**
- **Downhole Linear Motor**

- **Fiber-optic DTS**

Production facilities - downhole sensors



Assembly, integration & tuning



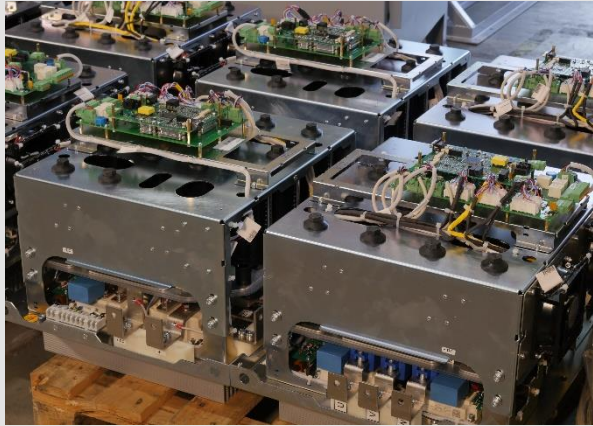
**MANUFACTURING
CAPACITY
up to 1,000 downhole
sensors/month**



Production facilities – motor drives



Production of inverters, assembly, integration, tuning & tests



**MANUFACTURING
CAPACITY
up to 400
drives/month**



DH sensor tests



Acceptance tests

100% dh sensors pass:

- Vibration tests
- Pressure (leak) test
- Running at 150°C at normal pressure for 24 h
- Pressure and temp sensors calibration
- Functional tests

Periodic tests (sampling):

- Functional tests with 6 km cable line
- 20 g tests

Motor drives tests



Acceptance tests

100% motor drives pass:

- Acceptance tests, including functional and electric insulation testing
- Electrical burn-in test for 32 h, including 7-hour test at +50 °C

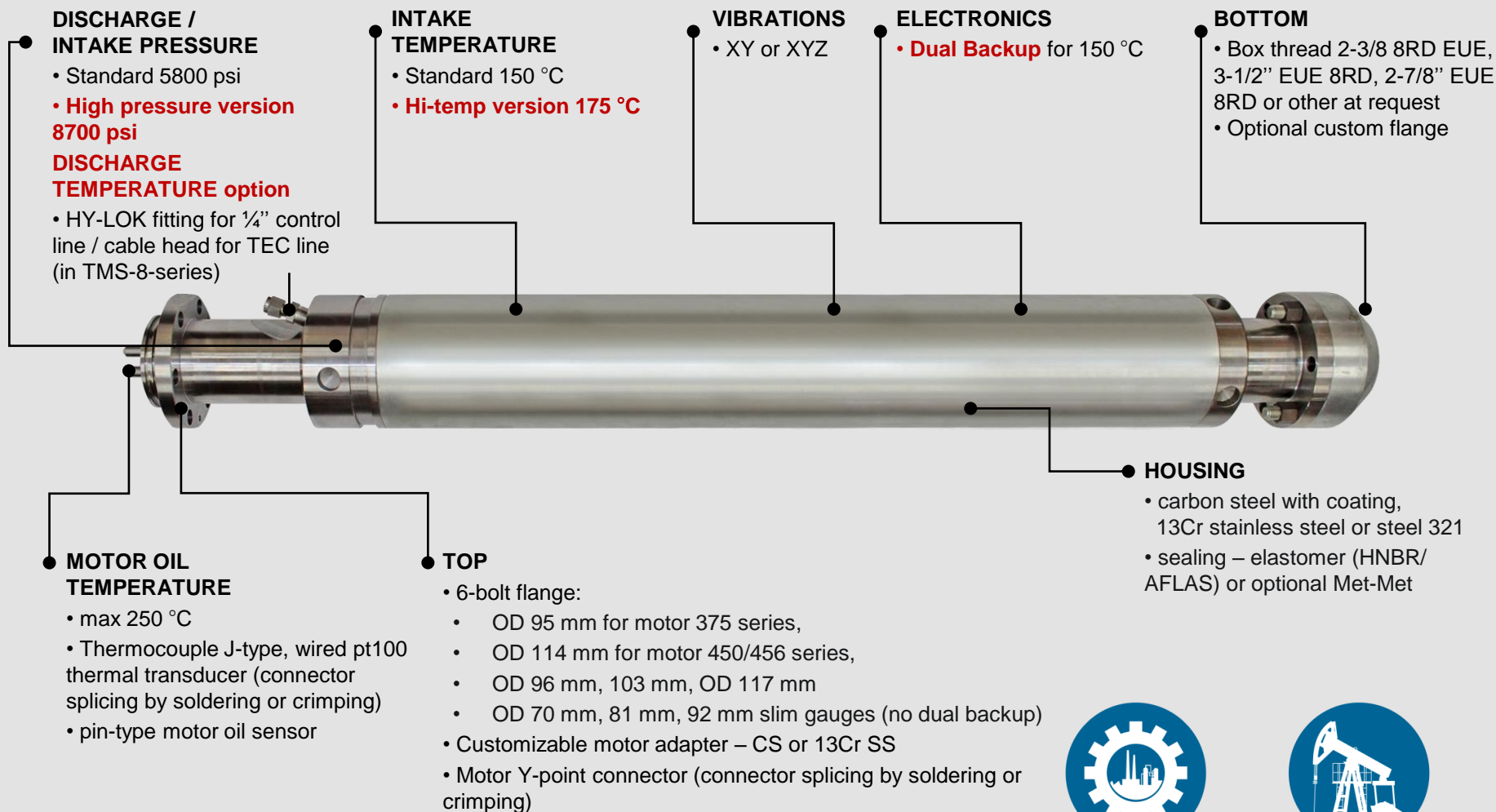
Periodic tests

(on sampling basis):

- Functional tests
- Safety check
- Exposure tests
 - high, low voltage
 - electromagnetic interference
 - high, low temperature
 - high humidity and other



ESP Downhole Sensor – Main features



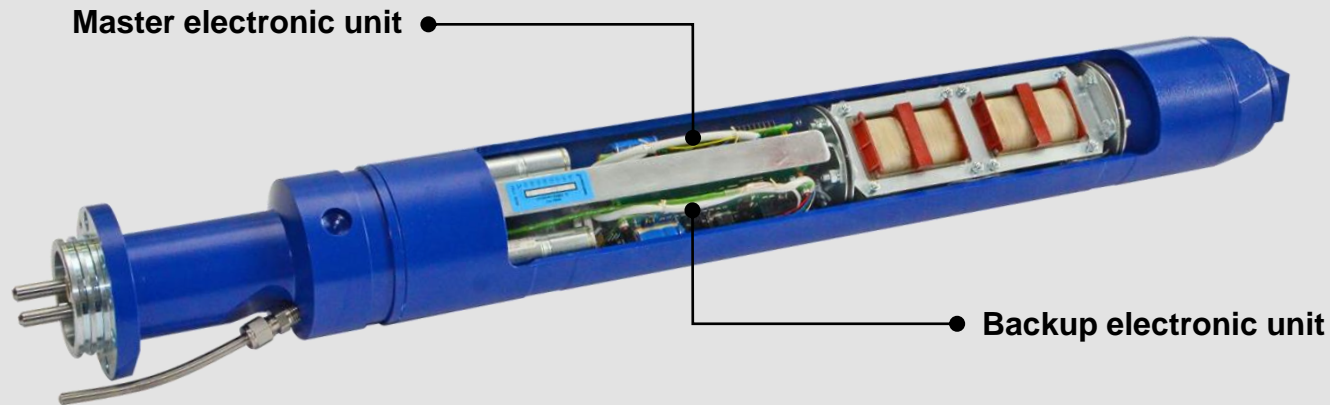
Production since

1998



+ 60 000
sensors put in operation

Double redundant ESP downhole sensor



Double redundant design allows increasing sensor's lifetime

High reliability of the system is ensured by two standalone electronic modules inside the sensor: the main one being operating, whereas the standby one is off.

Should the main module fail, the system switches to the standby module, either by the operator's command or automatically, assuring trouble-free operation of the system.

In addition, the second module can be used to verify readings of the main module.

ESP Downhole Sensor - Specification



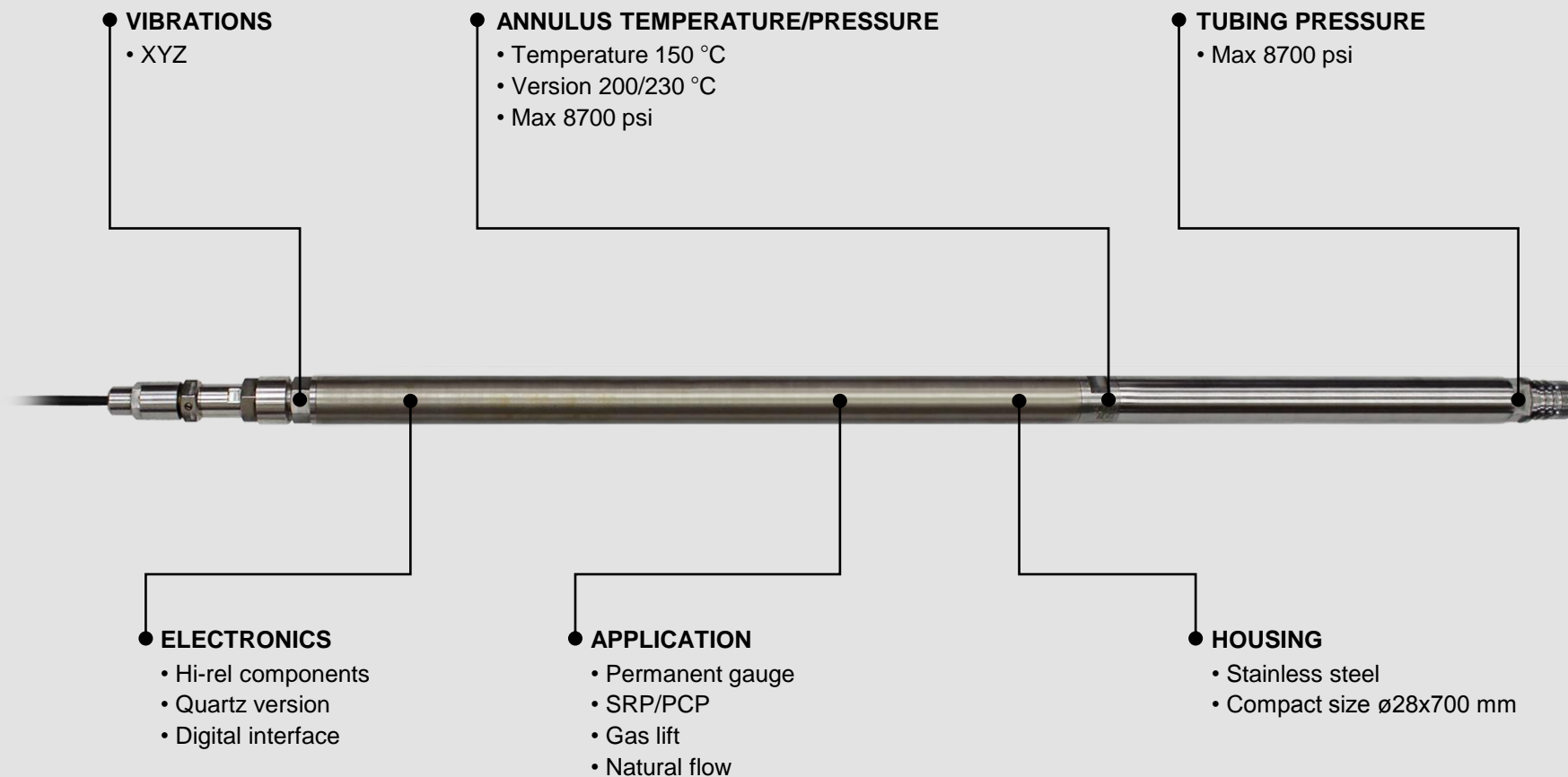
MONITORED PARAMETERS		IRZ TMS
Intake pressure	Range**	0-5800 psi
	Resolution	0.1 psi
	Accuracy*	± 0.5 % FS
Intake temperature	Range	0-150 °C / 0-175 °C
	Resolution	0.01 °C
	Accuracy*	± 1 % FS
Motor oil or winding temperature	Range	0-250 °C
	Resolution	0.01 °C
	Accuracy*	± 1 % FS - at request
Motor vibrations (X, Y, Z)	Range	0-5 g
	Resolution	0.01 g
	Accuracy*	± 5 % FS
Insulation resistance (current leakage)	Range	0-10 MOhm (0-20 mA)
	Resolution	1 kOhm (0.001 mA)
	Accuracy*	± 2-5 % FS (± 0.05 % FS)
Discharge pressure	Range**	0-5800 psi
	Resolution	0.1 psi
	Accuracy*	± 0.5 % FS
Discharge temperature***	Range	0-250 °C
	Resolution	0.01 °C
	Accuracy*	± 1 % FS
Parameters update time	TMS-7***	≤30 sec
	TMS-8***	≤1 min

* Higher accuracy is available upon request.

** Optionally 0-60 MPa (8700 psi)

*** TMS-7 is version with d-sub pressure measurement; TMS-8 is version with d-sub pressure/temperature measurement

Permanent Downhole Gauge



Surface Equipment



CONTROLLER

- 6" graphic screen
- Keyboard
- USB-port
- Active size 10 Mb/3 months

INTERFACES

- SCADA support (GPRS modem), RS232/RS485 Modbus RTU
- Ethernet
- Analog inputs/outputs



HOUSING

- IP47/IP65
- -40...+70 °C

PROTECTION

- Tripping relay (high temp/vibration, low intake pressure, ground fault)
- Overvoltage protection



TMS-E5M SURFACE BOARD

- 2-line display
- Keyboard
- USB-port
- Active size 1 Mb/1 week
- RS232/RS485
- Overvoltage protection
- For integration inside VFD00



CHOKE

- 5 kV phase-to-phase
- 1 kV insul. resistance



SURFACE BOARD

- Overvoltage protection
- RS232/RS485
- Integration with any VFD

Downhole Sensor References



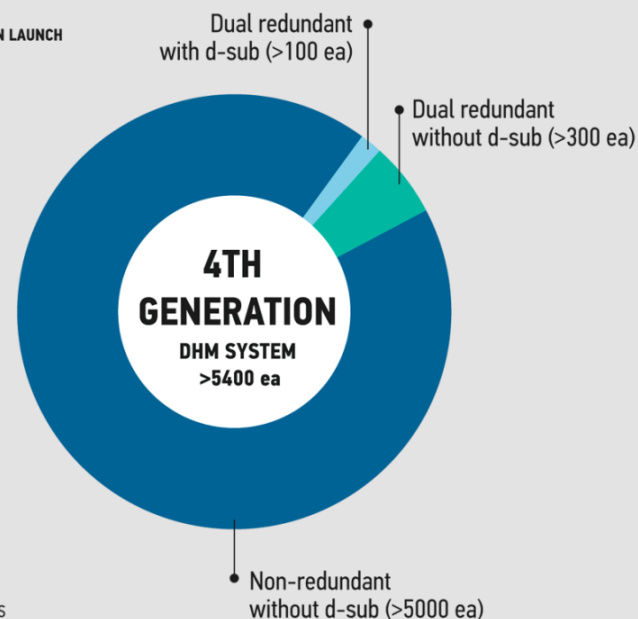
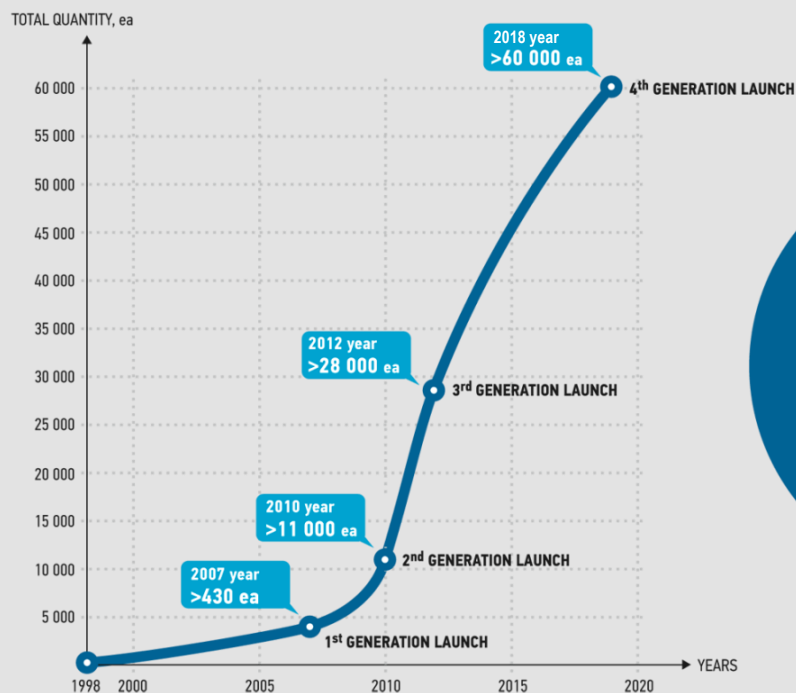
ANNUAL SALES

~8000 sensors/year

TOTAL SALES

>60000 sensors

Number of DHM systems supplied



CANADIAN EMIRATES WESTERN
ENGINEERING Co Ltd

ESP/PCP Variable Frequency Drives



CONTROLLER

- 6" graphic screen
- Pump protection functions and automatic restart
- Service modes for variety of production scenarios
- Smart control algorithms for well production optimization
- USB-port

CABINET

- Resistant to severe environment IP43, IP54 OR HIGHER



POWER SUPPLY

- Supply voltage 480 V^{+15%}_{-40%}

FREQUENCY INVERTER

- In-house inverter
- Inverter bypass option

IEEE 519 COMPLIANT

- Output sinus filter
- 6-pulse with optional external harmonics filter
- 12-,18-pulse
- Active front end

INTERFACES

- RS232/RS485
- Ethernet
- Optional GPRS-modem, WiFi-modem
- NC, NO dry contacts (relay in/out)
- Extendable analog and discrete inputs / outputs

Communication with downhole sensors of any vendor by MODBUS protocol



Features



Compatible with induction & PM motors



Suitable for ESP and PCP



Range: (@480 VAC):
to **1400 kVA** for 6 p.
to **750 kVA** for 12&18 p.
to **620 kVA** for AFE



Operating temperature
– 60... +60 °C
(wider range upon request)

ESP Switchboards & Soft Starters



CONTROLLER

- Text screen
- Pump protection functions and automatic restart
- For soft starters: 4 start modes (current increase, current limitation, push start, direct start) and 2 stopping modes (soft stop, natural run-down)
- USB-port

CABINET

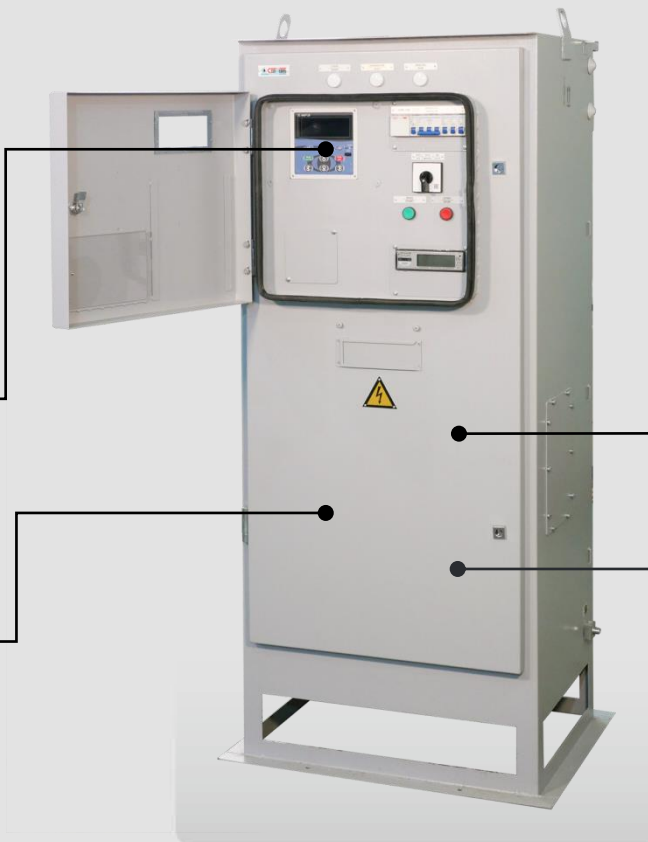
- Resistant to severe environment IP43, IP54 OR HIGHER

INTERFACES

- communication with downhole sensors of any vendor by MODBUS protocol RS232/RS485 interface
- SCADA support
- Optional GPRS-modem
- RS232/RS485 interfaces
- Ethernet

POWER SUPPLY

- Supply voltage 190-520 V



Features

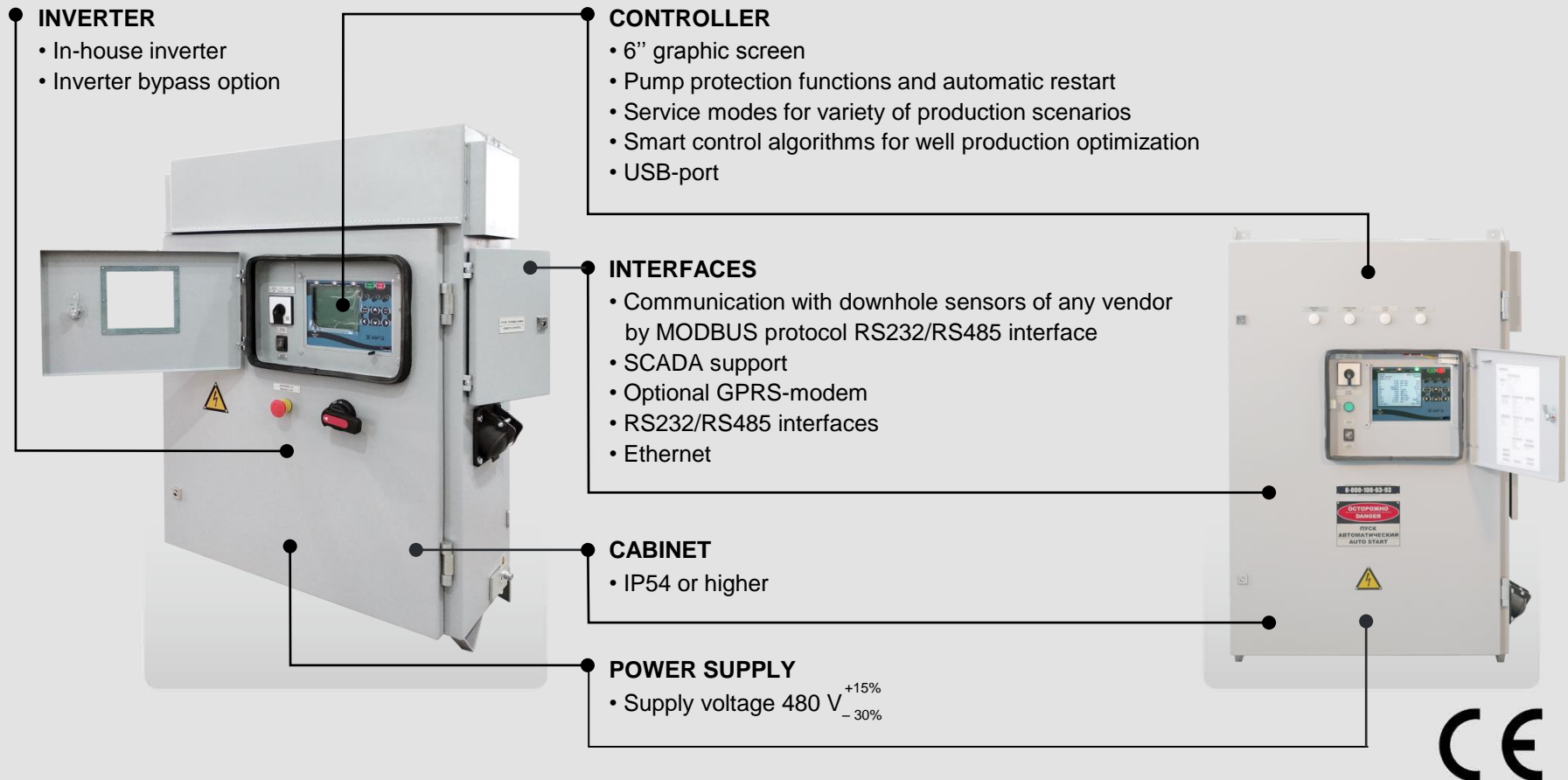


Power of connected motor:
up to 500 h.p.



Operating temperature
– 60... +50 °C
(wider range upon request)

Rod Pump / PCP Variable Frequency Drives & Switchboards



Features



Power of connected motor:
up to 200 hp



Operating temperature
– 60... +50 °C
(wider range upon request)

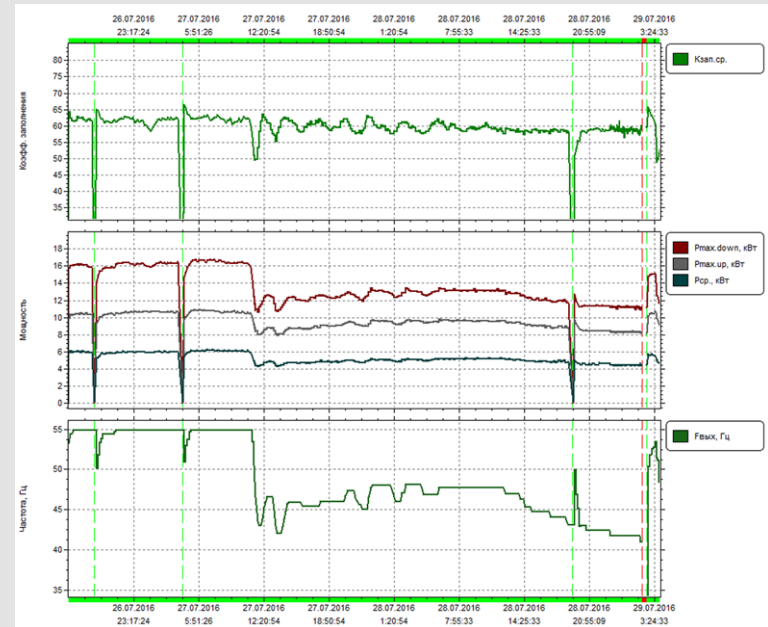


Compact sizes

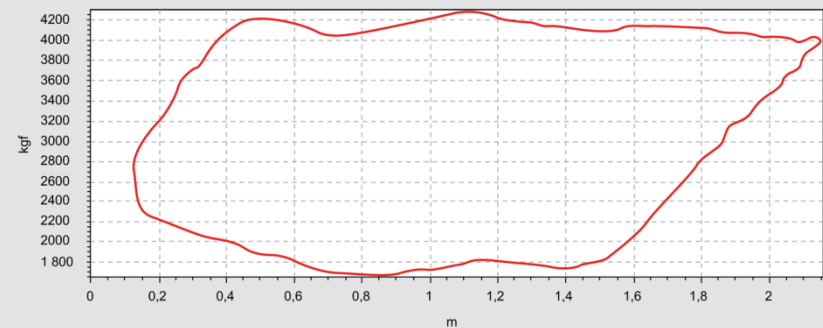
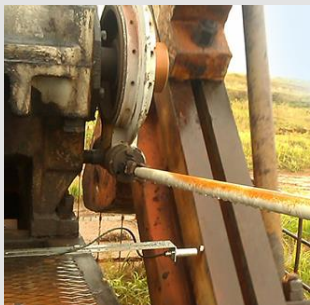
VFD Data Analytic Tool



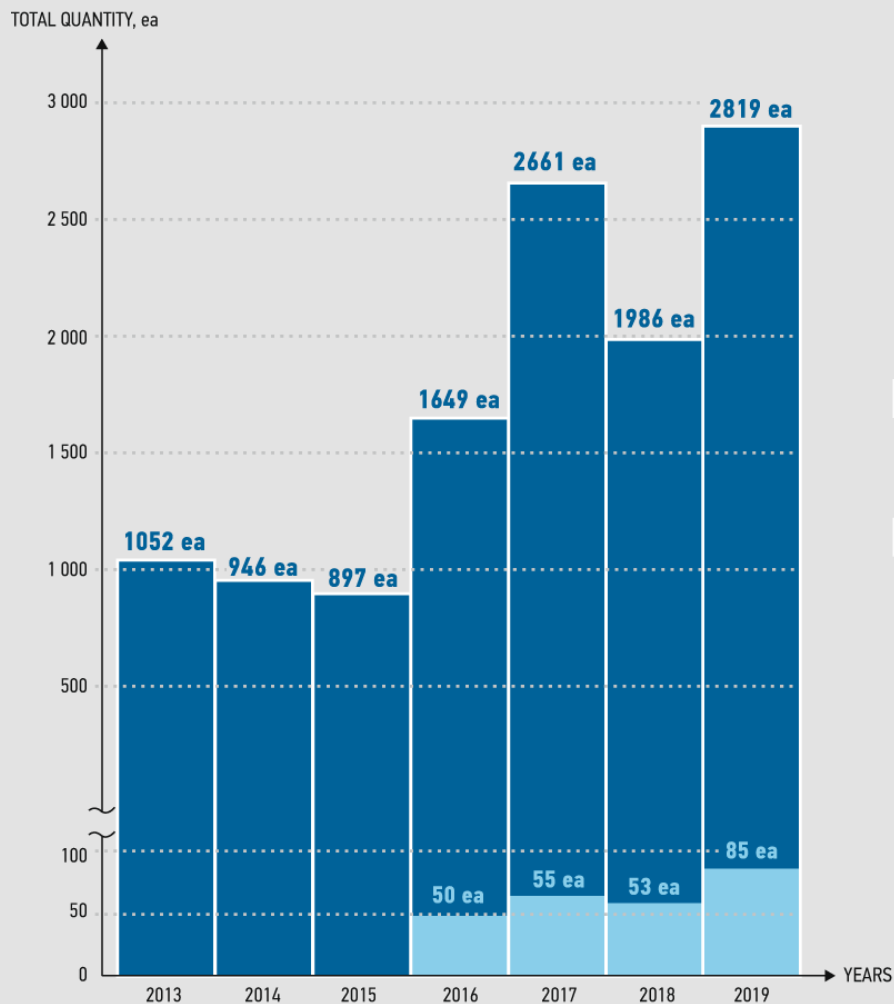
Adjustable graphical representation of any parameter on drive's display or a PC



Load curve drawing without a dynamograph:



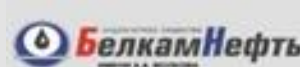
VFDs References



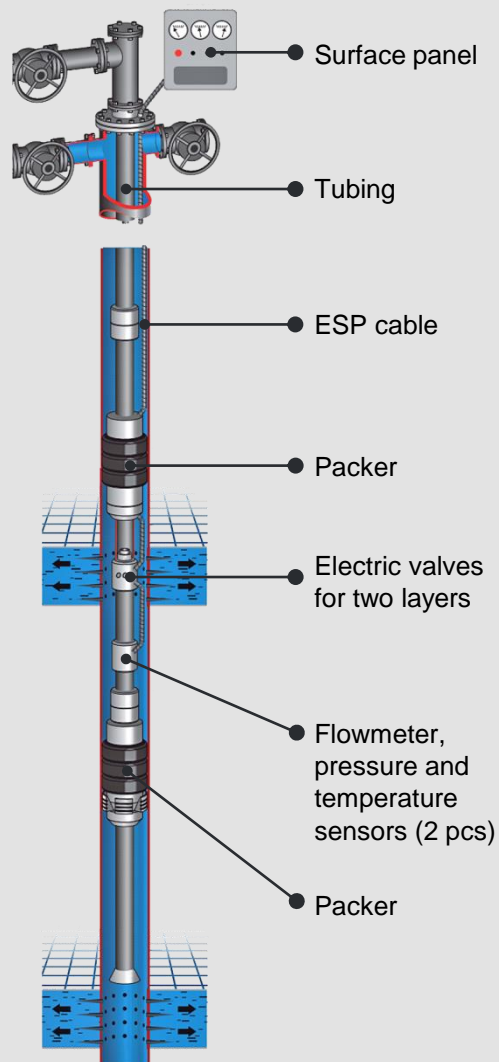
TOTAL SALES
>12 000 VFDs, including
>240 outside Russia

**Number of VFD
supplied in Russia**

**Number of VFD
supplied in the World**



Water Injection System with Flowmeter



Functions:

- Obtain real-time data on bottomhole pressure, flow rate, temperature
- Distribute injection volume in real-time mode
- Protect the production string from injection pressure

Specification

Parameter	Value
Measured environment	water, bottom water
Operation mode	Continuous
Operating temperature	+100 °C
Temperature absolute error	±0.5%
Temperature resolution	0.1 °C
Operating pressure	0..50 MPa
Pressure relative reduced error	±0.16%
Pressure resolution	0.01 MPa
Valve cap diameters, mm	2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 20
Flow rate range	20-180 m ³ /day
Relative flow rate error	1.5%
Production string diameter	146 mm and more

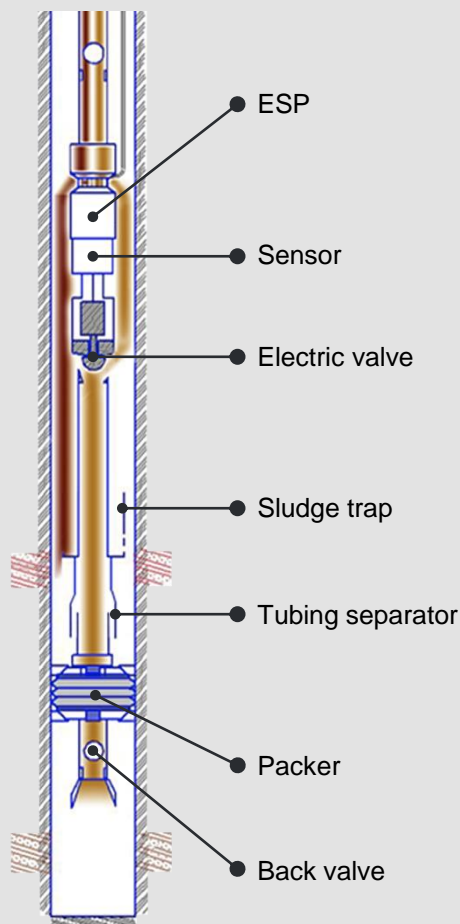


- Flowmeter is certified as a measurement tool
- No rotating parts
- Wide measurement range
- Wide range of valve cap diameters

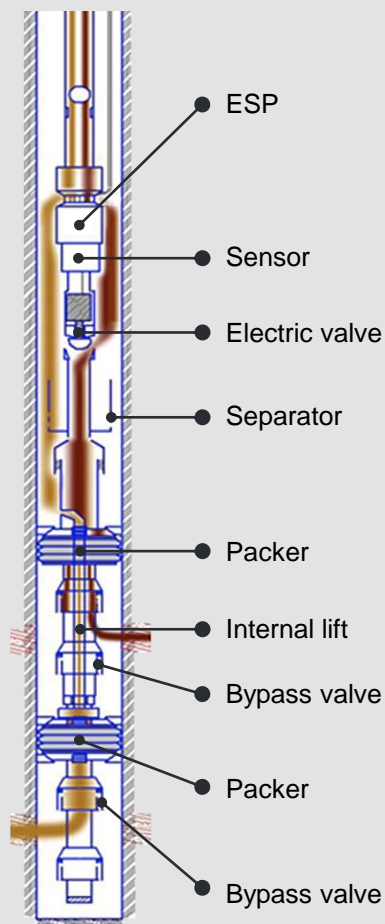
Dual Completion Systems



Single packer configuration



Double packer configuration



Benefits

- Separated control for each reservoir
- Parameters measured for each segregated zone
- One ESP for two reservoirs
- Valve is controlled by VFD
- Pressure of separated reservoir is measured by valve
- One motor with two ESPs configuration available

Specification

Parameter	Value
Intake pressure range	0-60 MPa / 0-8702 psi
Intake temperature range	0-150 °C / 32-302 °F
Motor oil temperature	15-200 °C / 59-392 °F
Radial vibration	0-5g
Valve position	0-100%
Pressure of separated reservoirs	0-60 MPa / 0-8702 psi

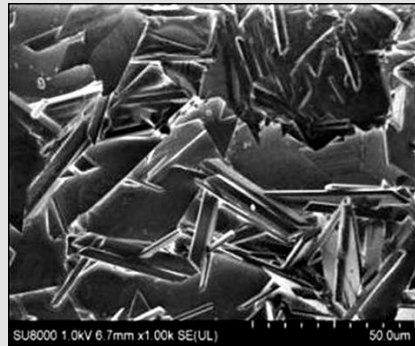
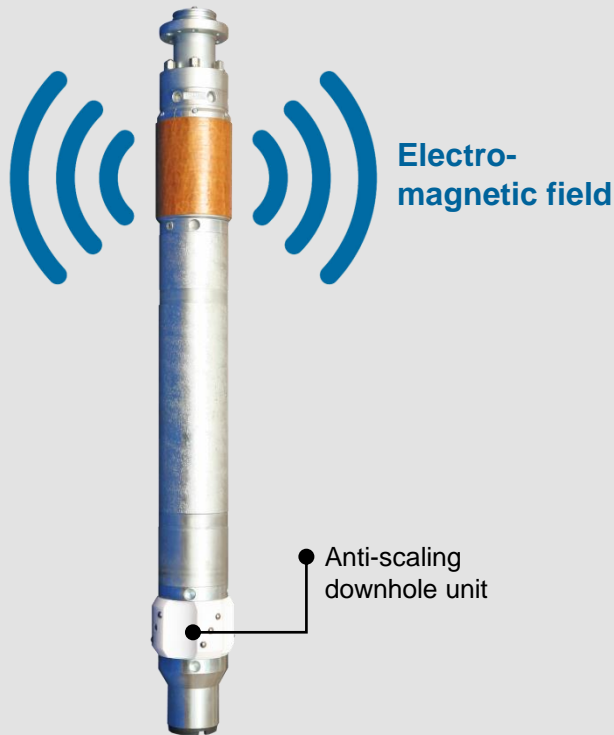
In collaboration with



Pilot-1 Anti-Scaling System



Electromagnetic field changes structure of salt crystals in fluid:



The emitter generates alternating electro-magnetic field which affects structure of salt crystals in fluid. As a result, salt is not deposited on metal surfaces of downhole equipment. The effect is observed along the whole length of the well.

The system prevents deposits of salts:

CaCO₃
Calcium carbonate

CaSO₄
Calcium sulphate

The effect is proved
by laboratory
and field tests

Pilot-1 Anti-Scaling System



Without Pilot-1



With Pilot-1



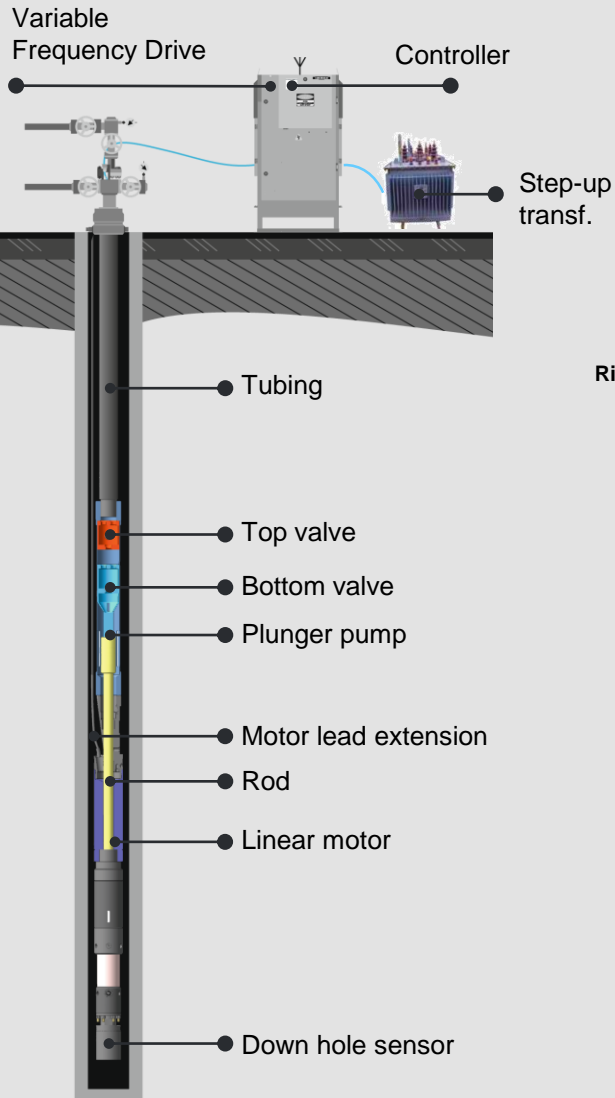
Benefits

- No chemicals required
- bifold MTBF increase
- +20% production rate
- ESP runtime protection

Tested and approved by



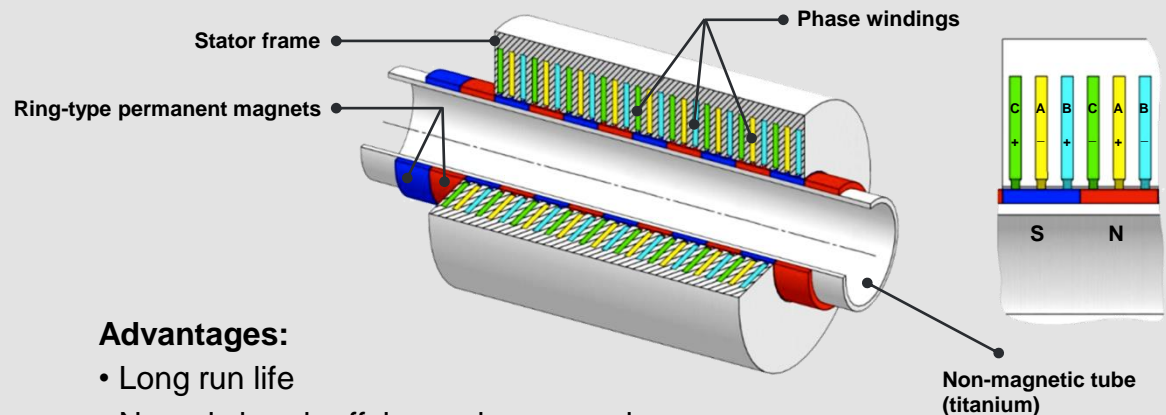
Submersible reciprocating pump unit with linear permanent magnet motor (SPLM)



Application

Horizontal, vertical, and inclined wells with 3-470 bpd (0-75 m³/day) production rate and up to 20000 ft (6000 m) depth

Linear motor operation principle



Advantages:

- Long run life
- No rods break-off, loosening, corrosion, or wear
- Suitable for wells with any curvature
- Suitable for operation in severe environment with low permeability, and in marginal wells
- Easy well site construction
- Low maintenance costs
- Smooth adjustment of length and nr. of strokes per minute
- Efficiency is 60-90% higher comparing to other pumping systems
- Energy consumption is 30-80% lower comparing to other pumping systems

Submersible reciprocating pump unit with linear permanent magnet motor (SPLM)



SPLM system is an economically viable, power efficient, and environment friendly version of a **sucker-rod pumping system**. Moreover, SPLM systems can effectively substitute **ESP systems** in marginal wells without replacement of the infrastructure.

Comparison of SPLM, ESP, PCP and SRP systems

Parameter	PCP	Rod Pumps	ESP	SPLM
Construction	Rod (Abrasion)	Rod (Abrasion)	Motor Rotary	Rodless (no Abrasion)
Suitable for deviated or horizontal wells	no	no	yes	yes
Wellhead infrastructure installations	required	required	Not required	Not required
Production	<400 bpd (<60 m ³ /day)	<1200 bpd (<200 m ³ /day)	>190 bpd (>30 m ³ /day)	<470 bpd (<75 m ³ /day)
Operating mode	continuous	continuous	periodic	continuous
Running depth	<4900 ft (<1500 m)	<6400 ft (<2000 m)	<10000 ft (<3000 m)	<20000 ft (<6000 m)
Specific energy consumption (kW/ton)	2.56 kWh/barrel (16 kWh/ton)	3.2 kWh/barrel (20 kWh/ton)	1.6 kWh/barrel (10 kWh/ton)	1.28 kWh/barrel (8 kWh/ton)

KVANT+

Fiber Optic Downhole Distributed Temperature Sensing System



Functions:

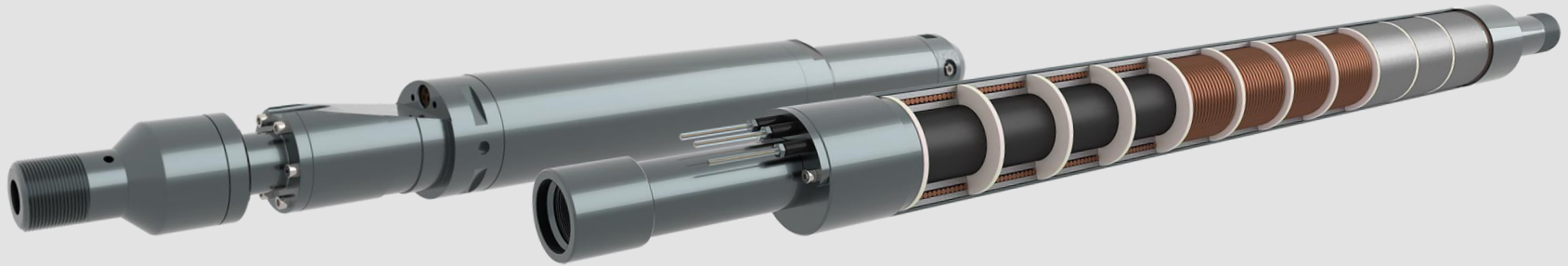
- Measuring and recording temperature distribution along fiber optic cable run in a wellbore
- Monitoring ESP temperature to prevent overheating
- Locating wellbore leakage
- Defining dynamic fluid level

Specification

Parameter	Value
Temperature measurement range	-55... +300 °C
Temperature measurement accuracy*	±2.0 / ±0.5 °C
Temperature resolution	0.01 °C
Temperature increment*	1.63 / 0.25 m
Fiber optic type	Single mode
Measuring optic channel length	Up to 6 km
Number of optic channels*	1; 4
Single measurement time	1; 3; 5; 10; 15 minutes
Switchboard supply voltage	220 ± 40 V (50 ± 1 Hz)
Switchboard auxiliary circuits voltage	24 V
Switchboard independent operation at ambient temperature -30... +50°C	4 hours minimum
Enclosure class	IP54
Switchboard operating temperatures*	-60... +50 °C +5... +50 °C
Data communication interfaces	USB-port; Ethernet-port (RJ-45); RS-485; GPRS-modem
Dimensions	674 x 365 x 1850 mm
Number of fibers in cable sensor*	1 to 4
Cable sensor operating temperatures	-55... +300 °C
Cable sensor OD	7.4 mm
Tensile strength	30 kN

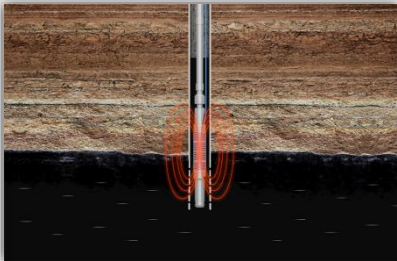
* Optional. Depending on version

Upcoming products – Downhole Induction Heaters



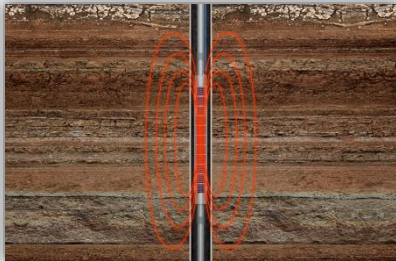
Functions:

- designed for fluid heating to decrease oil viscosity and prevent from paraffins deposits



TERMIT-3M

Bottomhole zone induction heater



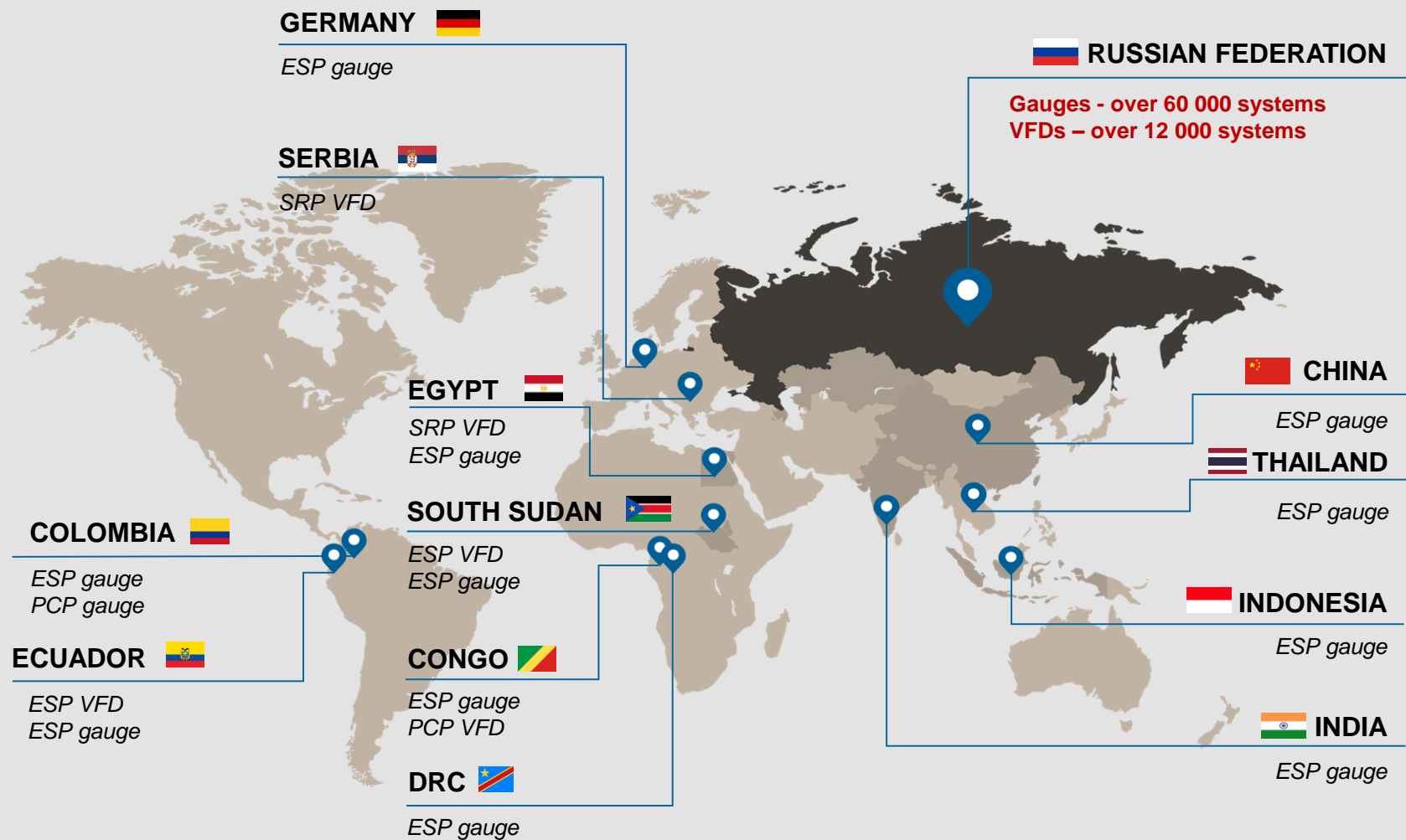
TERMIT-5

Downhole flow induction heater

Specification

Parameter	Termit-3M	Termit-5
Overall Tool Length	3.8 m	10 m
Heating Part Length	3.0 m	9.0 m
Maximum OD	117 mm	102 mm
Supply Voltage	220, 380 V	380 V
Heating Power	4-14 kW	13 kW
Temperature Gradient at Q = 15 m ³ /day	+ 12 °C	25°C
Power Cable	3-phase	KPpPBP 3x10
Cable Connector	B46-3B	S-LOCK

Sales Record



Contact Information



We are looking for partners to establish long-term cooperation for ALS services

Julia Detkova

Business Development Manager

Tel: +7 3412 662 660

Email: detkova@irz.ru

IRZ TEK

19 Bazisnaya street

Izhevsk, Russia

426034

Tel / fax: + 7 3412 501 501 / 686 555

Email: sales@irz.ru

Web: oil.irz.ru



Note: performance and physical configuration of the presented products may be changed without notice. This is not a public offer of the company.