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**Power drilling
swivel based on
hydraulic drive**

VBS-100R1

VBS-100R1 POWER DRILLING SWIVEL BASED ON HYDRAULIC DRIVE



Fig. 1

Power drilling swivel is designed to transfer the rotation of the upper part of the drill string during drilling operations, as well as the overhaul of oil and gas wells, including sidetracking. The swivel is supplied with a power unit that ensures the rotation of the swivel shaft with a set torque and a smooth change in the frequency and direction of rotation, braking of the pipe string.

Speed control is carried out by changing the working volume of the main hydraulic pump and hydraulic motor, without changing the engine speed. Increasing the speed of rotation of the output shaft of the swivel to 60 rpm is carried out by increasing the working volume of the hydraulic pump at the maximum volume of the hydraulic motor. A further increase in the speed is achieved by reducing the working volume of the hydraulic motor. Braking and holding the position of the column is carried out by hydraulic motors, the maximum braking force is equal to the maximum torque.

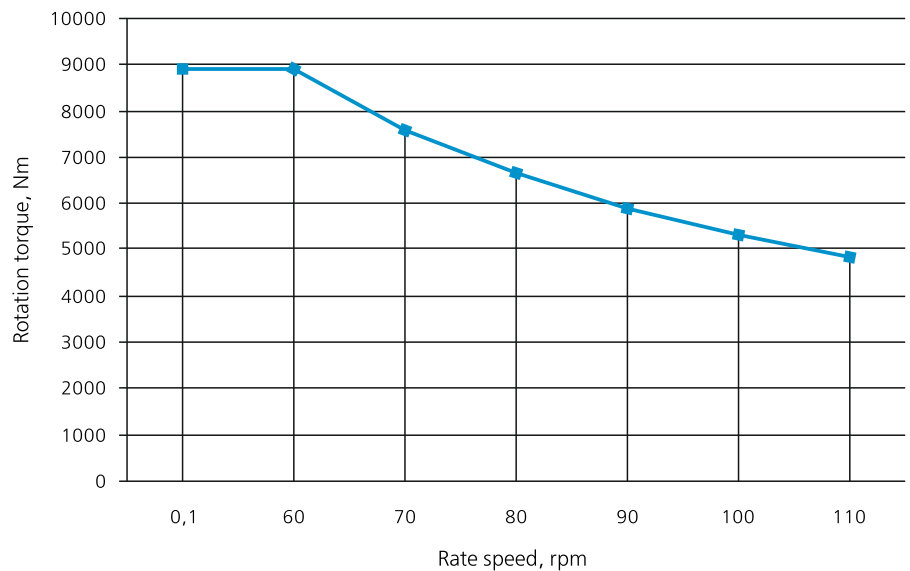


Fig. 2. Graph of the rated-load torques of the swivel depending on the rate speed.

Technical specifications of VBS-100R1 power drilling swivel

Parameter name	VBS-100R1
Nominal Load Rating, kN (tf)	1000 (100)
Dynamic Load Rating, kN (tf)	625 (62.5)
Working pressure, Psi (atm)	5144 (350)
Rated speed, rpm	60
Max speed, rpm	110
Extreme short-duration speed, speed	150
Nominal torque @ 0-60 rpm, Nwm (kg*m)	8900 (900)
Maximum short-duration torque of the swivel, Nwm (kg*m)	10 800 (1100)
Rotation direction	Reversible, for right-hand drilling
Maximum pressure in the hydraulic line, Psi (atm)	4703 (320)
Nominal pressure in the hydraulic line, Psi (atm)	3821 (260)
Full hydraulic motor displacement, cm ³ /rev	112
Stem I.D.	2 $\frac{7}{16}$ " / 62 mm
Gooseneck I.D.	2 $\frac{3}{4}$ " / 75 mm
Kelly valve I.D.	2" / 50 mm
Kelly valve model	KSHZ-102R1
Stem connection (API 7)	NC-38 (3 $\frac{1}{2}$ IF)
Kelly valve connection (API 7)	NC-38 (3 $\frac{1}{2}$ IF)
Gooseneck connection (API Spec 5B)	NUE 3 $\frac{1}{2}$ "
Telemetric system connection (API Spec 5B)	NUE 2 $\frac{3}{8}$ "
Engine brand	D-260.1
Gross power @ 1500 rpm, kW (hp)	114 (153)
Maximum torque, Nwm	622
Fuel rate, g/kWh	220
Hydraulic tank capacity, liters, not less	270
Fuel tank capacity, liters, not less	300
Overall dimensions of the swivel for transport, mm, no more	
Height	2360
Width	603
Length	1020
Overall dimensions of the hydraulic station, mm, no more	
Height	5000
Width	2300
Length	2400
Weight of product components, kg, no more	
Swivel (fig.1)	1040
Hydraulic station	4000
Terms of Use	
Ambient temperature, °C	-40 ... +40
Wind speed, mps, no more	25
Storage temperature, °C	-55 ... +50
Medium temperature, °K (°C), no more	343 (+70)

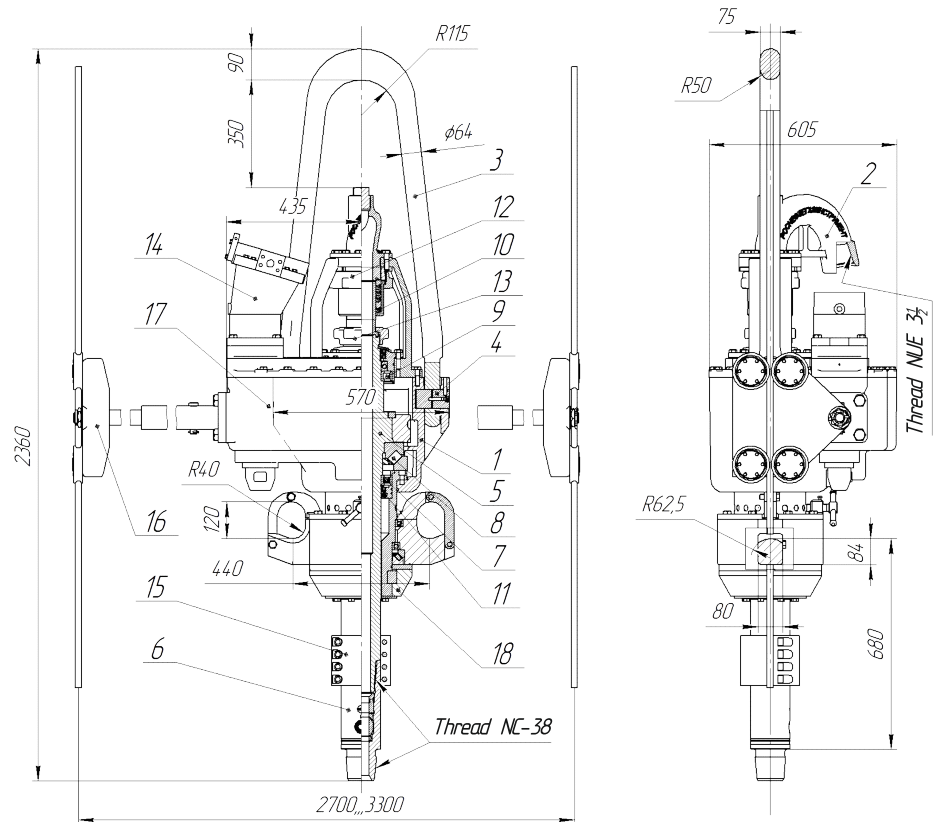
VBS-100R1 power drilling swivel. Structure.


fig. 3

Power swivel (fig.3) consist of body (pos.1) with gooseneck (pos.2), bail (pos.3), mounted in the lugs of the body (pos.1) with the possibility of swinging on the fingers (pos.4), stem (pos.5) with kelly valve (pos.6), mounted on bearings (pos.7,8 & 9) with slewing capacity in the body (pos.1), top seal (pos.10) and bottom seal (pos.11). The top seal (pos.10) is quick-detachable and is connected to the gooseneck (pos.2) and the stem (pos.5) with nuts (pos.12 & 13). The hydraulic motor (pos.14) is mounted on a gearbox (pos.17) through which is transmit rotation to the stem (pos.5) through gears. The hydraulic motor (pos.14) is powered from a hydraulic station installed on the frame (not shown in Fig. 3). The station pump, which pumps fluid to the hydraulic motor, is driven by a diesel engine. To prevent unscrewing during reverse movement, kelly valve (pos.6) is brace against the stem (pos.5) with a clamp (pos.15).

Under the swivel there is a rotary adapter for mounting elevator links (pos.18). Its angular location relative to the drilling rig is adjusted before starting work and is fixed with a clamping screw.

The reaction bars 16 are connected to the guys rope and prevent the rotation of the swivel from the reaction torque. The reaction bars are easily detached from the guys and from the swivel during transportation. The use of two backstay cable, the common plane of which passes through the hole axis, eliminates the possibility of generating a force targeted at deflecting the swivel output shaft from the hole axis. The tension force of the backstay cable is 2250 kgf. The ends of the bars are equipped with rollers on rolling bearings, which make safer work and reduce cable wear.

VBS-100R1 power drilling swivel. Pair swivel mast equipment kit.

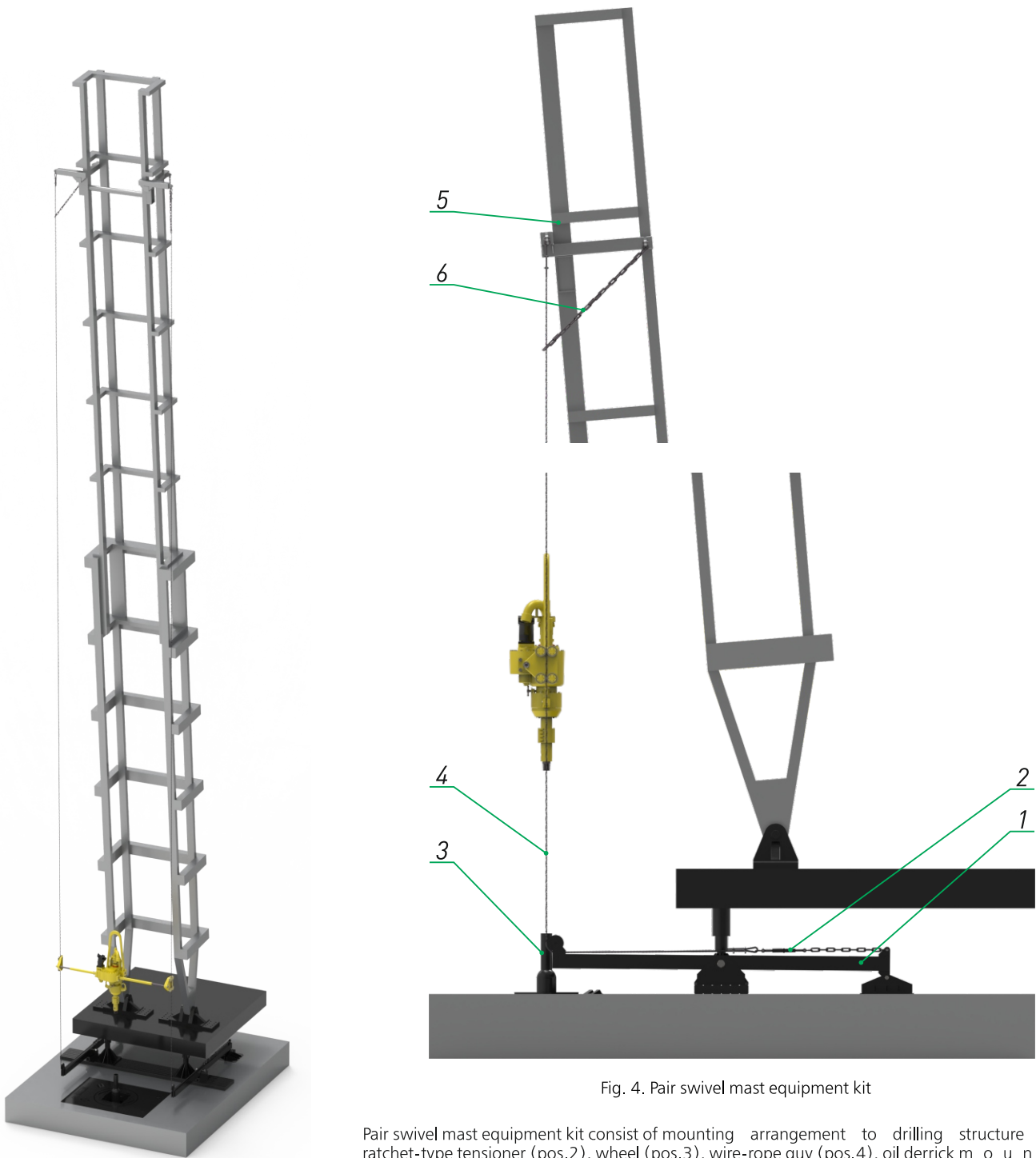


Fig. 4. Pair swivel mast equipment kit

Pair swivel mast equipment kit consist of mounting arrangement to drilling structure (pos.1), ratchet-type tensioner (pos.2), wheel (pos.3), wire-rope guy (pos.4), oil derrick mounting arrangement (pos.5), safety cable gear (pos.6). The drilling hose and hydraulic drive hoses are attached to the standard device for attaching the drilling hose of the well servicing unit. Optionally, it is possible to manufacture a clamp with fastening to the derrick for fixing the hydraulic drive hoses. The drilling hose is not included in the delivery package; there is no space for its storage in the hydraulic station. Hydraulic drive hoses are included in the delivery set (see Table 2), mounted on the hydraulic station drum. It is possible to partially unwind the drum to an incomplete length of the sleeves.

VBS-100R1 power drilling swivel. Arranged sets

- 1) VBS-100R1 power drilling swivel – 1 pc;
- 2) Hydraulic station – 1 pc;
- 3) Mast equipment - 1 kit;
- 4) Spares and tool kit;
- 5) operations manual – 1 pc.

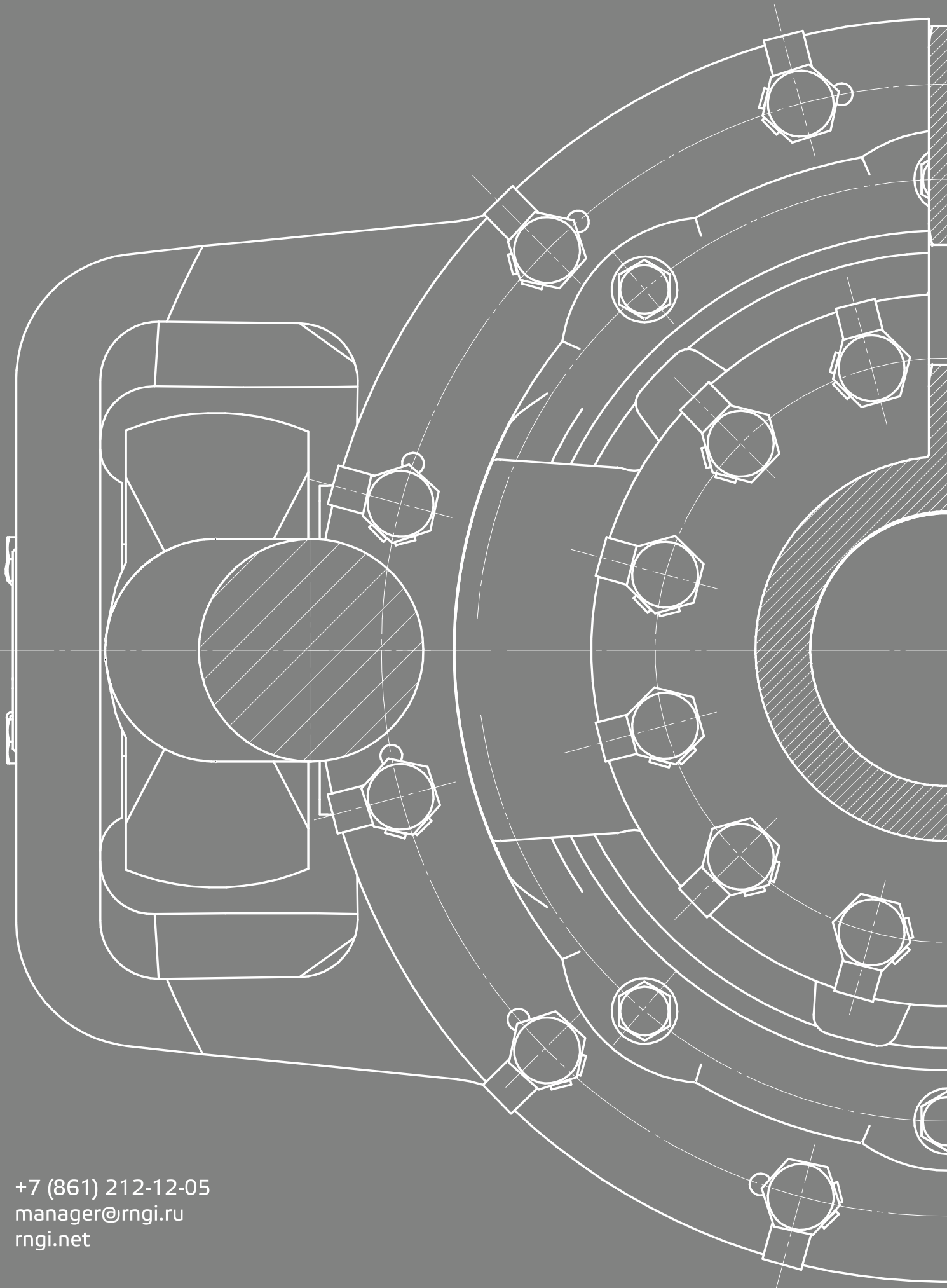


Fig. 5. Driller's console

The driller's console is supplied in an explosion-proof housing, with connected explosion-proof components, type of explosion protection d. The console is equipped with a cable 20 meters long. The supply voltage for the driller's control panel does not exceed 24V.

VBS-100R1 power drilling swivel. Additional options.

Name	Include in package
Explosion protection certificate for swivel and driller's console	<input type="checkbox"/>
Set of quick-release couplings (QRC) for hydraulic hoses with a power swivel.	<input type="checkbox"/>
Set of high pressure hydraulic hoses, 50 meters each	<input type="checkbox"/>
Remote control console with cable 20 meters	<input type="checkbox"/>
Hydraulic hose clip on the oli derrick	<input type="checkbox"/>
engine starting heater type:	
Electric	<input type="checkbox"/>
Diesel	<input type="checkbox"/>



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