DR. BENDER *GmbH*
Innovative Power Tools

Operating Manual
Drive unit *RX S / SL*
HF III

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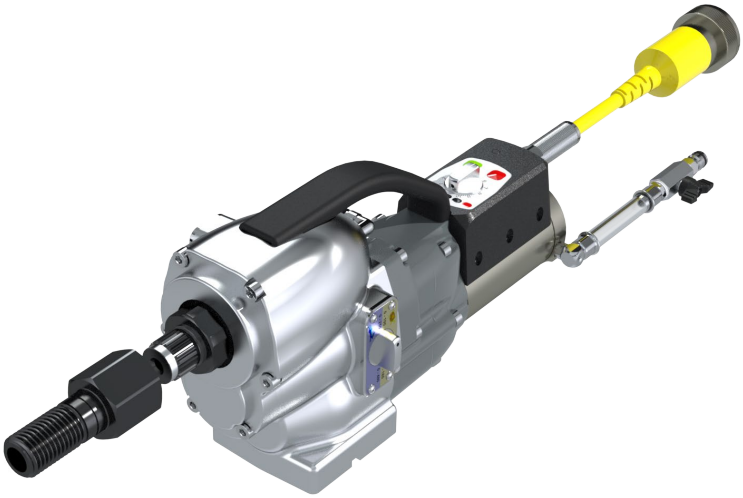

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Declaration of conformity

DR.BENDER *GmbH*

Innovative Power Tools

EC – Declaration of conformity for machines

Herewith, the manufacturer,

Dr. BENDER GmbH
Industriestrasse 22
75382 Althengstett

declares that the machine

RX S, RX SL

conforms with the aforementioned Directive and the following Directives

- Machinery Directive of the European Parliament and Council (EC-RL 2006/42/EC)
- Electromagnetic compatibility (EMC) (2004/108/EC)
- Low Voltage Directive (2006/95/EC)

The following harmonised standards have been used for assessment of the appliance:

EN 50144-1
EN 50144-2-1
EN 55014-1
EN 61000-3-2
EN 61000-3-3
EN 55014-2
EN 61029-1

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Althengstett, 30.07.2018

Min Wei, Managing Director

This Declaration does not include Assurance of Product Properties.
The Safety Instructions of the enclosed Product Documentation have to be respected.

Contents

		Page
	Declaration of conformity	*2*
	Contents	*3*
1.0	Symbol and pictogram description	*4*
1.1	Function description	*6*
2.0	General instructions	*6*
2.1	Technical description	6
2.2	Applications	7
2.3	Safety	7
3.0	Transport and storage	7
3.1	Transport	7
3.2	Storage	7
4.0	Main dimensions and technical data	8
4.1	Dimensions	8
4.2	Technical data	8
4.3	Noise emission and vibration *[EN 50144]*	9
4.4	Operating temperatures	9
5.0	Commissioning	9
5.1	Mains connection	9
5.2	Water connection	9
5.3	Stone drilling machine RX S / SL	10
5.4	Drill bits	11
6.0	Safety instructions	11
7.0	Repair and maintenance	12
7.1	Daily maintenance	12
7.2	Service after approx. 120 operating hours	12
7.3	Quarterly	12
8.0	Speed setting depending on cutting speed	12
9.0	Warranty	13
10.0	General Safety Instructions	13
11.0	Spare parts lists	14
11.1	Stone drilling machine RX SL	14
11.2	Stone drilling machine RX S	15
11.3	Gear RX SL complete	16
11.4	Gear RX S complete	18
11.5	Motor complete RX S / SL	20

Attention

The safety instructions included in this operating manual must be followed!

Custom models and design variants may deviate from the basic type in technical details. In the event of any discrepancies, we recommend that you contact DR.BENDER GmbH urgently. Always give the machine type and machine number in any correspondence.

1.0 Symbol and pictograph description

Warning

Indicates instructions which may endanger your health or the functionality of the unit if they are not followed. The warranty shall become null and void if you cause defects to the unit by non-compliance with these instructions.

Warning

Warning of dangerous electrical voltage.
Before work is performed in this specially marked section, the installation of the device must be separated completely from current (voltage) and must be secured against unintentional power ON.
Disregard can lead to severe or deadly injuries.

Recycling

Please direct waste to recycling.

Disposal

The customary and regional laws shall be observed for disposal.

Safety signs on the machine

Wear safety shoes

Wear gloves

Wear a safety helmet

Wear protective goggles

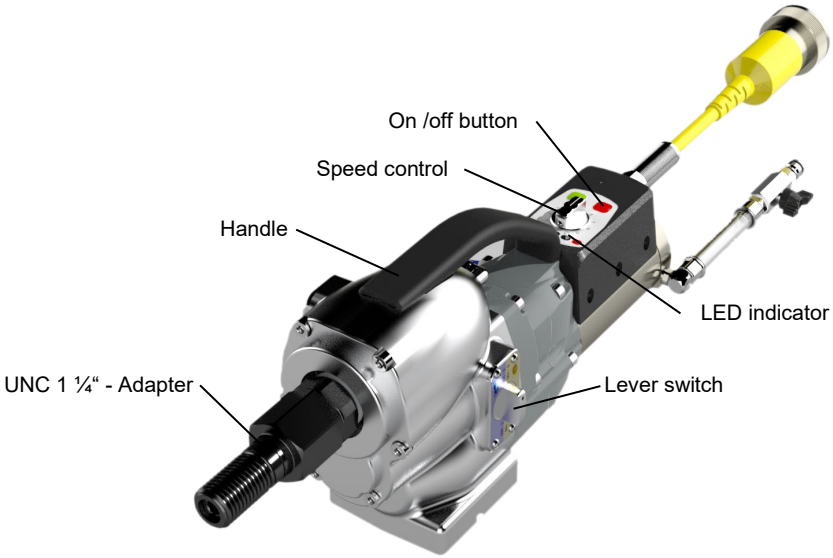
Wear ear protection

Wear a breathing mask

Pull the power plug before work on the device

Read the instructions

1.1 Function description



2.0 General instructions

2.1 Technical description

The BELUGA represents a whole new generation of drive units for stone cutting. The exceptionally comprehensive modular system offers the flexibility needed today when performing cutting work in concrete and stone. To achieve this, newly developed high-frequency motor parts are used in the motor. The frequency range is controlled by the frequency converter from 0 - 1000 Hz integrated into the Powerbox. At 1000 Hz, the rotor reaches a speed of 30.000 min^{-1}. A major benefit lies in the exceptional weight / power ratio (motor power output = 8 kW / weight = 6.5 kg -> 1.2). Using conventional technology e.g. type BBM33extra (motor power output = 2.4 kW / weight = 13.5 kg -> 0.17) It means that the weight of the machine has been reduced sevenfold using the high frequency technology. We have succeeded in running the Powerbox as well as the drive units on a 230V single phase network or on a 400 V three-phase network. This means that only one piece of equipment is needed for use on both voltage sources. Further benefits lie in the stepless speed control. This enables the best speed to be assigned to each tool diameter, in order to attain the best possible cutting speed on the tool. During work, the speed can be steplessly reduced if you come up against steel reinforcements and thus can be optimised according to the progress of the work. Here, you can run the unit at much higher cutting speeds (Attention! depends on the tool) and in doing so, the progress of the job can be speeded up by up to 150%. With conventional machines, the torque drops very sharply at the higher speeds. Therefore, this advantage does not apply to conventional machines.

2.2 Applications

The drive units BELUGA and the related Powerboxes can be used according to the data attached to the information plate. When you are using custom-built machines, the details on the quotation and the order confirmation also apply.

The drive units and the Powerboxes are essentially Class I appliances, only this guarantees the full high-quality protection of the residual current circuit breaker.

When suitable saw blades and drill bits are used, a wide range of materials can be cut:

- Concrete (even with strong reinforcement)
- Sandstone and limestone
- All building materials for solid walls
- Asphalt road surfacing

The machines must be connected to the Powerbox RX/SX 12.

2.3 Safety

Warning

Before commissioning, check that the mains voltage and frequency match the data given on the information plate. ± 5 % voltage and/or ± 2 % frequency deviation are permitted. Repairs may only be performed by suitably qualified staff based on their training and experience.

Pay particular attention to:

- the technical data and information on the permitted use (commissioning, standard operating conditions), which are included e.g. in the catalogue, the operating manual, the information plate details, and other product information.
- the relevant accident prevention regulations
- the correct use of tools
- the use of personal protective equipment

3.0 Transport and storage

3.1 Transport

Warning

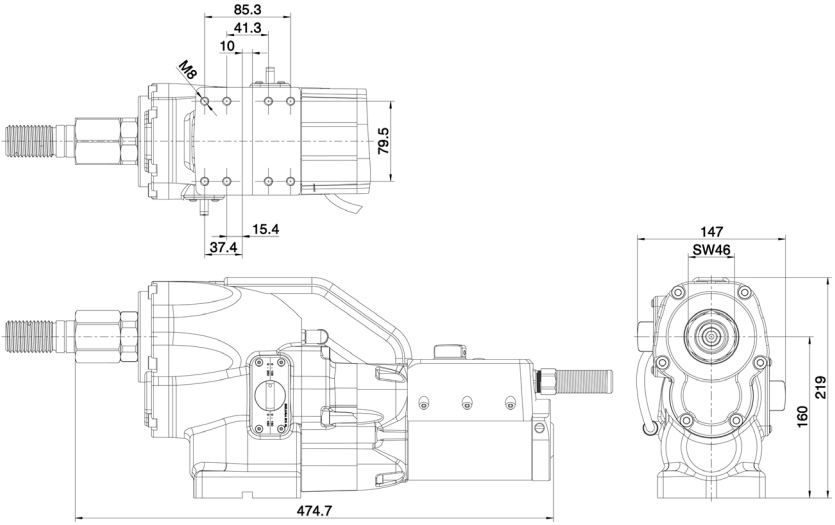
The drive units must be inspected for transport damage after receipt.
Any damage present must be recorded in writing.

3.2 Storage

The storage location should be dry, clean, and at a constant temperature wherever possible. In order that the lubrication film in the bearings and the seal systems does not separate, the drive shaft should be turned several times manually after a lengthy storage period, e.g. at monthly intervals. The roller bearings of the devices should be replaced (or re-lubricated) if the period between delivery and commissioning is more than 4 years. This period will be significantly reduced if the storage conditions are unsuitable.

4.0 Main dimensions and technical data

4.1 Dimensions



4.2 Technical data

Gearbox variants	RX S	RX SL	
Rated voltage	400V ~3 / 230V ~1		*V*
Current rating	15 / 16		*A*
Power consumption	10.000 / 3.200		*W*
Frequency	1000		*Hz*
Idle - full load speed Gear 1	0 - 200	0 - 100	min^{-1}
Idle - full load speed Gear 2	0 - 400	0 - 180	min^{-1}
Idle - full load speed Gear 3	0 - 600	0 - 250	min^{-1}
Idle - full load speed Gear 4	0 - 1250	0 - 480	min^{-1}
Power output	8.900 / 2.800		*W*
Torque 400 V 3~ Gear 1	750	1.500	*Nm*
Torque 400 V 3~ Gear 2	375	830	*Nm*
Torque 400 V 3~ Gear 3	250	600	*Nm*
Torque 400 V 3~ Gear 4	120	310	*Nm*
Torque 230 V 1~ Gear 1	375	750	*Nm*
Torque 230 V 1~ Gear 2	190	415	*Nm*
Torque 230 V 1~ Gear 3	125	300	*Nm*
Torque 230 V 1~ Gear 4	60	155	*Nm*
Degree of protection	IP 67		-
Cooling medium	Water		-
Weight RX S / SL	17,0		*kg*

4.3 Noise emission and vibration *[EN 50144]*

Sound pressure level	Sound power level	Vibration
db(A)	dB	m/s^2
72	84	< 2.5

4.4 Operating temperatures

If the system is sufficiently cooled, the RX S / SL attains to the cooling water temperature.

5.0 Commissioning

5.1 Mains connection

Attention

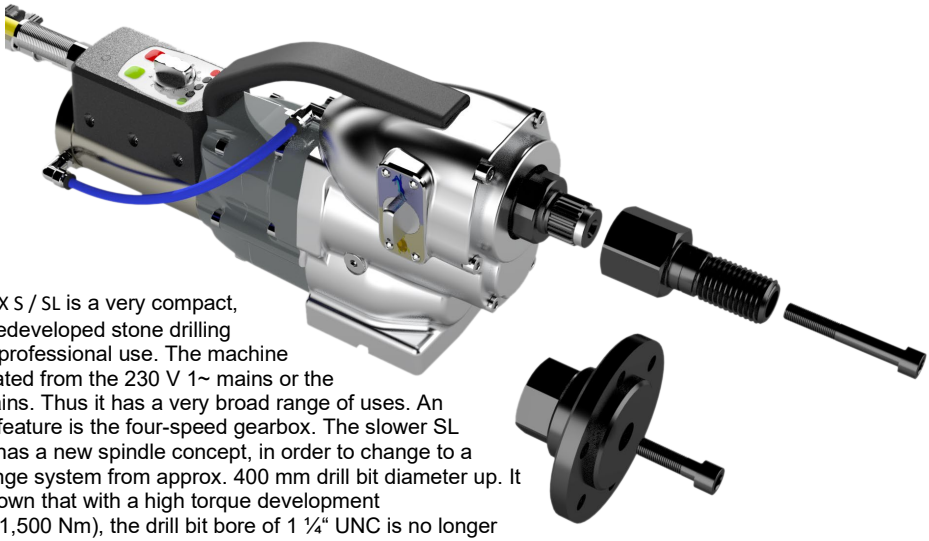
Check whether the mains voltage matches the voltage given on the information plate. Check whether the mains voltage matches the voltage given on the information plate.

Remove the protective covers on the plug sockets. These protective covers are designed to protect the socket against the ingress of water when the plug is not connected. This significantly increases the service life of the high-quality cable sockets.
Connect the electrical power lead of the Beluga RX S / SL drive unit to the round socket located on the front of the Powerbox. Lock the bayonet sleeve of the plug socket until you hear it click, in order to maintain the required IP 67 protection.

5.2 Water connection

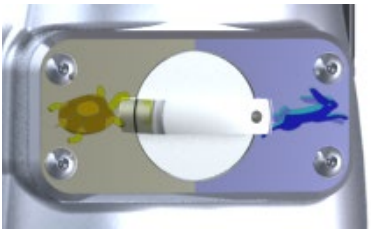
The water must first flow through the Powerbox, then through the drive unit, and only then to the saw blade or the drill bit. Therefore, connect the water supply to the water line (with tap) provided on the Powerbox.
Attention: If possible, do not exceed a maximum water pressure of 3 bar.
The Beluga RX S / SL drive units are water-cooled. During operation, always supply sufficient cold cooling water (cooling water should not exceed 30 °C). The machine must be operated during full load operation with at least 1/2 litre of water per minute. Only use clean tap water, no contaminated or waste water, since otherwise the heat transfer to the cooling surfaces is no longer guaranteed and the motor may suffer irreparable damage.
The Powerbox PB RX/SX 12 is normally air-cooled and therefore does not require the water connection. Water supply fittings (part no. 102122) are available as custom accessories. Please take the necessary information from the Powerbox PB RX/SX 12 operating manual.

5.3 Stone drilling machine RX S / SL

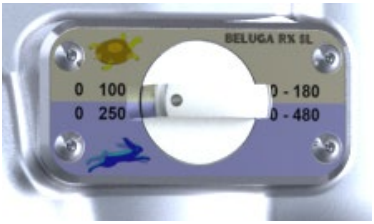


The Beluga RX S / SL is a very compact, completely redeveloped stone drilling machine for professional use. The machine can be operated from the 230 V 1~ mains or the 400 V 3~ mains. Thus it has a very broad range of uses. An outstanding feature is the four-speed gearbox. The slower SL variant also has a new spindle concept, in order to change to a four-hole flange system from approx. 400 mm drill bit diameter up. It has been shown that with a high torque development in first gear (1,500 Nm), the drill bit bore of 1 ¼“ UNC is no longer sufficient. The axial forces that result from the thread pitch increase in such a way that the drill bit threaded bore is expanded by approx. 2-3 mm and the drill bit cannot be separated from the stone drill machine.

The gear shift is a classic transmission shift. The first switch lever (transmission lever) switches from tortoise (slow speed, high torque) to hare (quick speed, low torque). With the second switch lever, you can change to an intermediate gear.



Transmission shift



Gear change

In the above example, the transmission switch is on the hare symbol (blue) and the gear change lever in the blue field is on 0 – 250 min^{-1}, i.e. the machine is in third gear and can be regulated from 0 – 250 min^{-1}.

BELUGA RX SL
Transmission switch on tortoise means 1st or 2nd gear 0 - 100 or 0 - 180 min^{-1}.
Transmission switch on hare means 3rd or 4th gear. 0 - 250 or 0 - 480 min^{-1}.

BELUGA RX S
Transmission switch on tortoise means 1st or 2nd gear. 0 - 200 or 0 - 400 min^{-1}.
Transmission switch on hare means 3rd or 4th gear. 0 - 600 or 0 - 1,250 min^{-1}.

5.4 Drill bits

You can use any drill bit with a connection thread of 1 ¼“ UNC or with a four-hole flange. Only use drill bits that are suitable for the stone type. Using only concentric drill bits that are not deformed prolongs the service life of the drive unit. Ensure that the diamond segments have an adequate undercut in relation to the drill bits.

6.0 Safety instructions

Attention

The units must be attended when in use. Disconnect the mains plug and check that the switch is disabled,

- when the units remain unattended
- during assembly and disassembly
- during voltage drop (rated voltage 400 V 3~ under 340 V), (rated voltage 230 V 1~ under 200 V),
- if the mains voltage fluctuates (phase imbalance) or during interruption of a phase (phase failure),
- when adjusting or fitting an accessory.

Switch the machine off when you stop operation for any reason. This prevents the unit from suddenly starting while unattended.

Do not use the unit if,

- a part of the housing is missing or defective,
- There is damage to switches, lines, or plug connections (daily inspection!)
- when operating the units, cooling water must not penetrate the electrical components in whichever location the units are used.
- If water is dripping from the unit, stop work and take the unit to an authorised service centre.
- After a break in operation, only switch on again if the saw blade or drill bit can rotate freely.
- Check the work area with a pipe detector in order to avoid cutting into electrical cables, water pipes or gas pipes etc.

7.0 Repair and maintenance

Warning

Always disconnect from the mains before starting repair or maintenance work. After any repair, the unit must be checked by a qualified electrician (legal requirement pursuant to VBG4 since 1.1.1990).

7.1 Daily maintenance

Check that no water is leaking out of the unit. This may impair the electrical safety of the unit and lead to damage to the gearbox. In this case, please contact an authorised service centre.

Visual inspection for damage to the switches, the lines, or the plug sockets.
Clean the units after completion of the work.
Check that no water gets into the units during cleaning.
Drain the cooling water after using the machine. (Open the tap and blow out the water using compressed air). This is particularly important in case of frost formation in winter.

7.2 Service after 120 operating hours

A service is due after 120 operating hours. The machine counts the operating hours itself and tells you when 120 operating hours are reached by a blue LED on the handle. All worn parts are replaced during this service. The next service is carried out at further intervals of 120 operating hours. The service interval may be extended by max. 10 %, so you can complete your work with the machine at your own convenience.
If the maximun service interval of 120 + 12 operating hours is exceeded, the warranty becomes null and void.

7.3 Quarterly

Have the cables, switches, plugs checked by a qualified specialist (provision pursuant to VBG4) and record this. Replacing the gearbox oil significantly increases the service life of the gearbox.

8.0 Speed setting depending on cutting speed

The drive units of the Beluga series allow stepless speed adjustment. You can thus set the best cutting speed for your saw blade or drill bit. This also provides a perfect, quick cut and the service life of the tool is also significantly extended.

9.0 Warranty

Pursuant to our Terms & Conditions of Sale, we offer a warranty of 12 months from the date of purchase. This covers the free repair of material and production defects which are shown to have been caused prior to sale.

An original sales receipt must always be produced when asserting a warranty claim. It must include the full address of the dealer, purchase date, and type code of the product. The user manual for the relevant product as well as the safety instructions must have been followed.
Damage caused by operating errors is not covered by the warranty.

The manufacturer's products are developed and built for specific applications. If the product is used for purposes other than the intended purpose based on the user manual, or in the event of misuse, or if unapproved accessories are used, the warranty shall become null and void.

The products must be regularly maintained and cleaned according to the instructions in the user manual. The warranty shall become null and void in the event of an intervention by third parties (opening the machine).
The warranty does not cover maintenance and cleaning work.

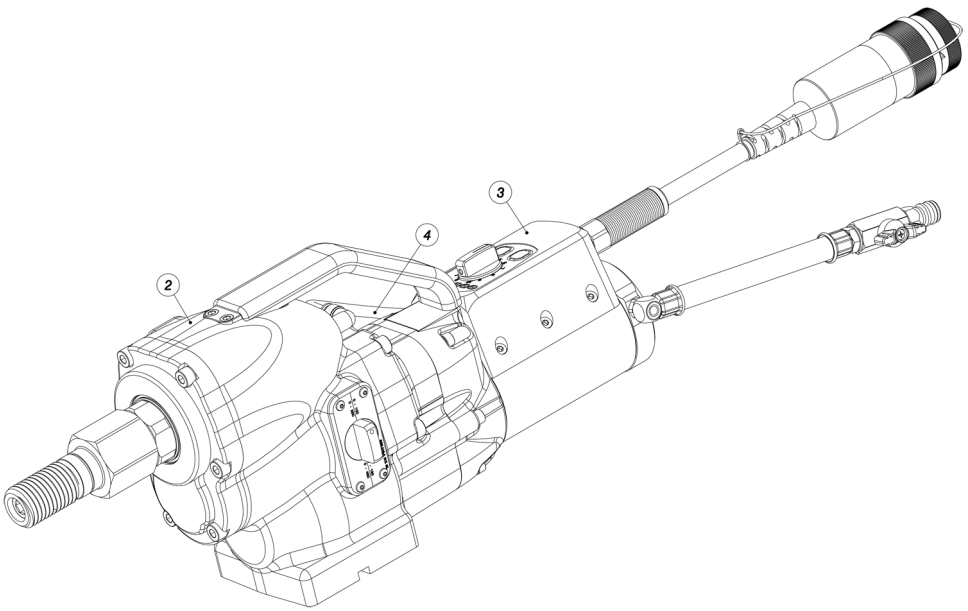
You must ensure that only original spare parts and accessories are used. The products must be purchased from an authorised dealer. If non-original parts are used, this may result in consequential damage and increased risk of accidents. The manufacturer is not liable for such damage. Disassembled, partially disassembled units, and units repaired with third party parts are not covered by the warranty.

Certain parts are subject to normal wear and tear depending on use. These parts include e.g. carbon brushes, ball bearings, switches, mains cables, seals, etc. These consumable parts are not covered by the warranty. Consumable parts are highlighted in the spare parts lists.

10.0 General Safety instructions

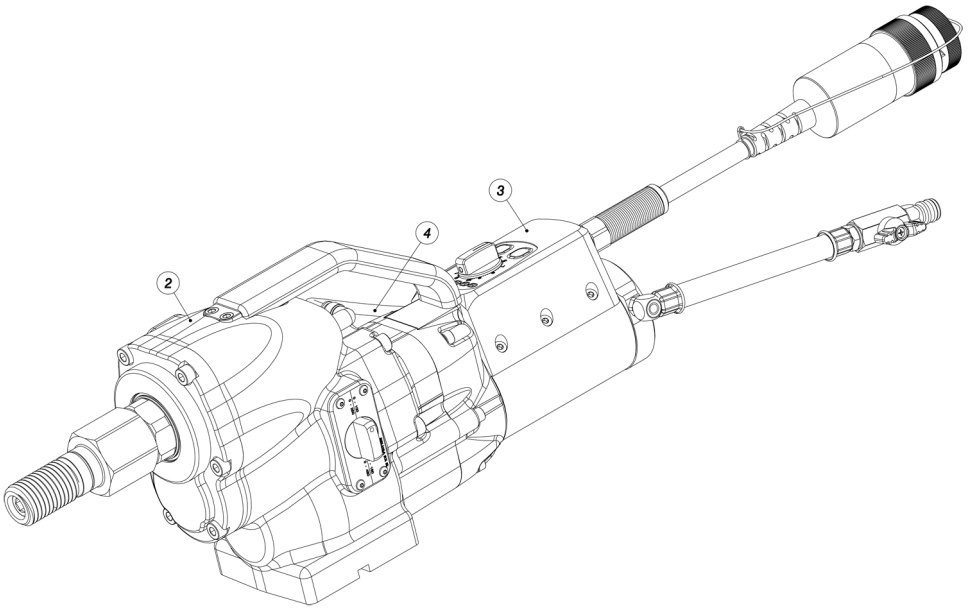
The general safety instructions can be found in the supplied safety instruction booklet.

11.0 Spare parts lists
11.1 Stone drilling machine RX SL



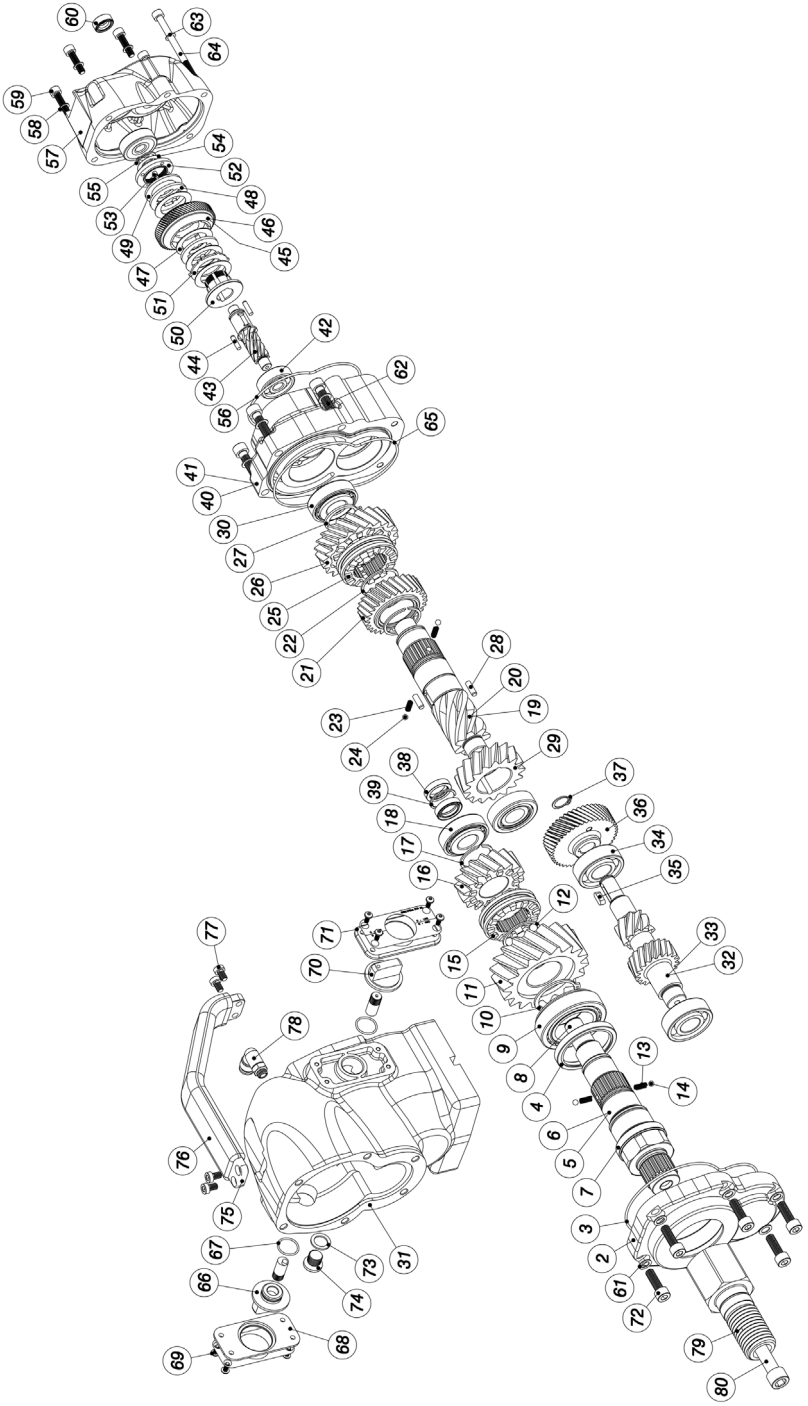
Item	Part no.	Description	No.
1	102429	Stone drilling machine RX SL	1
2	102428	Gear complete RX SL	1
3	201190	Motor complete	1
4	802403	Water hose	1 **
			Wearing parts **

11.2 Stone drilling machine RX S



Item	Part no.	Description	No.
1	102431	Stone drilling machine RX S	1
2	102430	Gear complete RX S	1
3	201190	Motor complete	1
4	802403	Water hose	1 **
			Wearing parts **

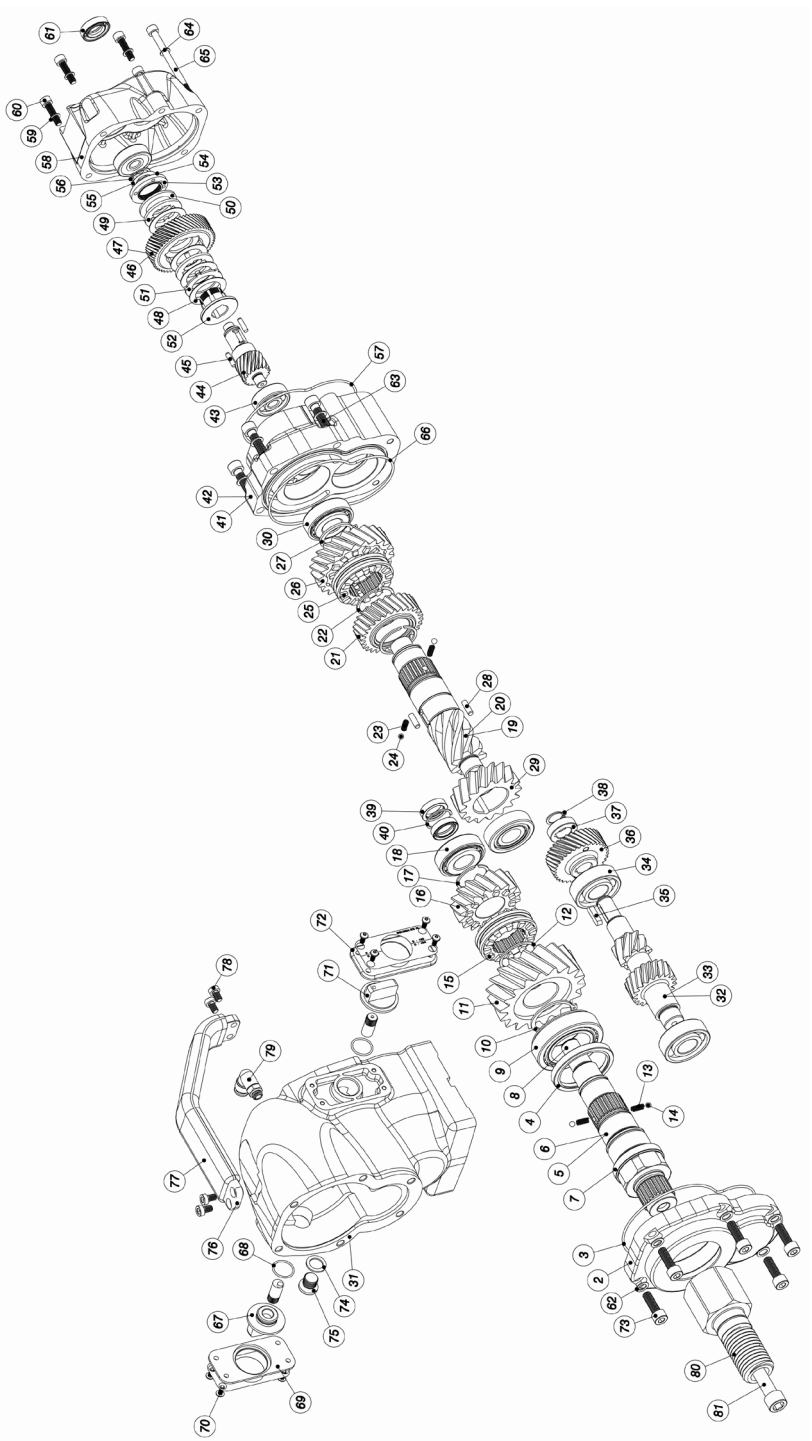
11.3 Gear complete RX SL



Item	Part no.	Description	No.		Item	Part no.		No.
1	102428	Gear complete	1		56	401684	O-ring	1 **
2	102160	Lower flange	1		57	201189	Housing	1
3	101162	O-ring	1 **		58	800077	Lock washer	4
4	901210	Rotary shaft seal	1 **		59	900321	Allen head screw	4
5	102170	Drill spindle complete	1		60	900708	Rotary shaft seal	1 **
6	102171	Drill spindle	1		61	801144	Lock washer	10
7	401855	Shaft sleeve	1		62	900302	Allen head screw	4
8	401204	Shaft sleeve	1		63	800077	Lock washer	2
9	901179	Tapered roller bearing	1 **		64	900309	Allen head screw	2
10	902120	Snap ring	1		65	101178	O-ring	1 **
11	102172	Idler 4	1		66	101179	Switching handle complete	1
12	802015	Retainer ring	1		67	802577	O-ring	2 **
13	900013	Compression spring	2		68	401808	Plate complete	1
14	900014	Ball	2		69	802055	Raised head screw	8
15	102202	Control sleeve	1		70	102195	Switching handle complete	1
16	102174	Idler 3	1		71	401813	Plate complete	1
17	802016	Retainer ring	1		72	900304	Allen head screw	6
18	901178	Tapered roller bearing	1 **		73	800028	Sealing ring	1 **
19	102179	Gear shaft 2 complete	1		74	902028	Screwed seal plug	1
20	102173	Gear shaft 2	1		75	301613	Handle	1
21	102176	Idler 1	1		76	401807	Soft grip	1
22	802015	Retainer ring	2		77	900323	Allen head screw	4
23	900013	Compression spring	2		78	802402	Quick-lock screw fitting	1
24	900014	Ball	2		79	301646	UNC adapter	1
25	102202	Control sleeve	1		80	401828	Allen head screw	1
26	102177	Idler 2	1					
27	901258	Snap ring	1				option core drill bit short	
28	901016	Dowel pin	2		80	401830	Allen head screw	1
29	102175	Wheel 2	1					
30	901178	Tapered roller bearing	2 **					
31	102156	Gear housing	1					
32	102180	Gear shaft 1 complete	1					
33	102178	Pinion shaft	1					
34	902093	Groove ball bearing	2 **					
35	901247	Shaft key	1					
36	301597	Clutch wheel	1					
37	900210	Snap ring	1					
38	900715	Rotary shaft seal	2 **					
39	900716	Retainer ring	1					
40	302268	Gear V complete	1					
41	201087	Top flange	1					
42	901139	Groove ball bearing	2					
43	301385	Gear shaft 2V	1					
44	901071	Dowel pin	2					
45	302267	Gear 2 slip coupling	1 **					
46	302249	Hub	1					
47	401563	Brake disc	4 **					
48	401562	Support washer I	2 **					
49	401339	Plate spring	1					
50	301252	Hub	1					
51	401561	Support washer A	1 **					
52	401566	Nut	1					
53	101866	Pin	1					
54	800107	Shim washer	1					
55	900209	Snap ring	1					

Wearing parts **

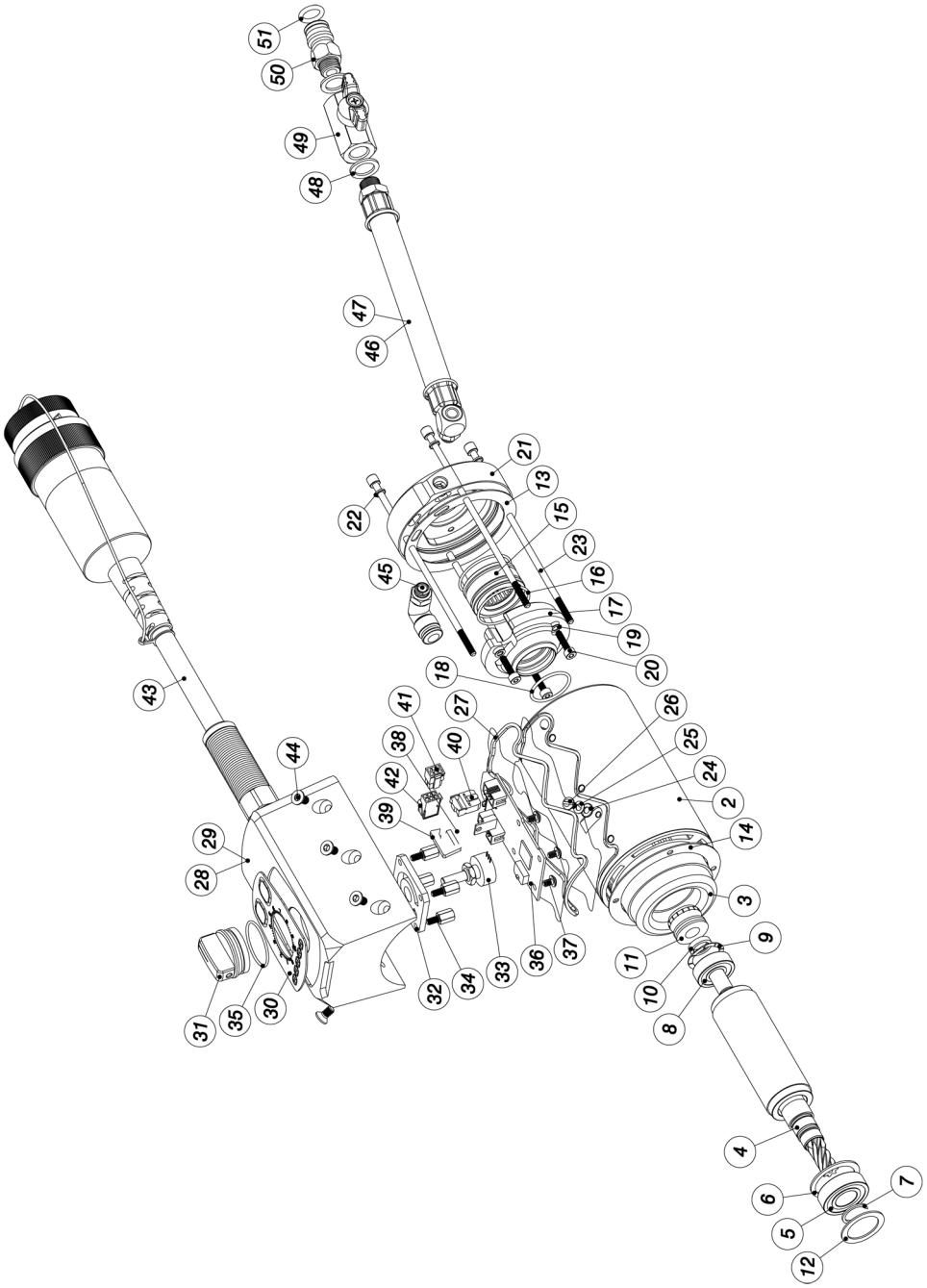
11.4 Gear complete RX S



Item	Part no.	Description	No.		Item	Part no.		No.
1	102430	Gear complete	1		57	401684	O-ring	1 **
2	102160	Lower flange	1		58	201189	Housing	1
3	101162	O-ring	1 **		59	800077	Lock washer	4
4	901210	Rotary shaft seal	1 **		60	900321	Allen head screw	4
5	102170	Drill spindle complete	1		61	900708	Rotary shaft seal	1 **
6	102171	Drill spindle	1		62	801144	Lock washer	10
7	401855	Shaft sleeve	1		63	900302	Allen head screw	4
8	401204	Shaft sleeve	1		64	800077	Lock washer	2
9	901179	Tapered roller bearing	1 **		65	900309	Allen head screw	2
10	902120	Snap ring	1		66	101178	O-ring	1 **
11	102172	Idler 4	1		67	101179	Switching handle complete	1
12	802015	Retainer ring	1		68	902094	O-ring	2 **
13	900013	Compression spring	2		69	401808	Plate complete	1
14	900014	Ball	2		70	802055	Raised head screw	8
15	102202	Control sleeve	1		71	102195	Switching handle complete	1
16	102174	Idler 3	1		72	401813	Plate complete	1
17	802016	Retainer ring	1		73	900304	Allen head screw	6
18	901178	Tapered roller bearing	1 **		74	800028	Sealing ring	1 **
19	102179	Gear shaft 2 complete	1		75	902028	Screwed seal plug	1
20	102173	Gear shaft 2	1		76	301613	Handle	1
21	102176	Idler 1	1		77	401807	Soft grip	1
22	802015	Retainer ring	2		78	900323	Allen head screw	4
23	900013	Compression spring	2		79	802402	Quick-lock screw fitting	1
24	900014	Ball	2		80	301646	UNC adapter	1
25	102202	Control sleeve	1		81	401828	Allen head screw	1
26	102177	Idler 2	1					
27	901258	Snap ring	1				option core drill bit short	
28	901016	Dowel pin	2		80	401830	Allen head screw	1
29	102175	Wheel 2	1					
30	901178	Tapered roller bearing	2 **					
31	102156	Gear housing	1					
32	102180	Gear shaft 1 complete	1					
33	102178	Pinion shaft	1					
34	902093	Groove ball bearing	2 **					
35	901247	Shaft key	1					
36	301644	Clutch wheel	1					
37	402099	Sleeve	1					
38	900210	Snap ring	1					
39	900715	Rotary shaft seal	2 **					
40	900716	Retainer ring	1					
41	302270	Gear V complete	1					
42	201087	Top flange	1					
43	901139	Groove ball bearing	2					
44	301643	Gear shaft 2V	1					
45	901071	Dowel pin	2					
46	302267	Gear 2 slip coupling	1 **					
47	302249	Hub	1					
48	401563	Brake disc	4 **					
49	401562	Support washer I	2 **					
50	401339	Plate spring	1					
51	401561	Support washer A	1 **					
52	301252	Hub	1					
53	401566	Nut	1					
54	101866	Pin	1					
55	800107	Shim washer	1					
56	900209	Snap ring	1					

Wearing parts **

11.5 Motor complete RX SL / S



Item	Part no.	Description	No.
1	201190	Motor complete	1
2	201015	Motor housing	1
3	802407	Stator	1
4	302269	Rotor complete	1
5	901370	Groove ball bearing	1 **
6	901094	Locking ring	1
7	800380	Snap ring	1
8	901208	Groove ball bearing	2 **
9	801574	Bearing shim	1
10	401768	Distance bush	1
11	802354	Rotor resolver	1
12	901337	Shim	1
13	401892	Flat seal	1 **
14	401421	Flat seal	1 **
15	802828	Stator resolver	1
16	800092	O-ring	2 **
17	102009	Bushing	1
18	800100	O-ring	1 **
19	800076	Lock washer	3
20	902026	Allen head screw	3
21	102010	Bearing cap	1
22	800391	Sealing ring	4 **
23	802197	Allen head screw	4
24	900231	Washer	1
25	900181	Spring washer	2
26	900412	Flat head screw	1
27	802481	O-ring	1 **
28	302198	Control box complete	1
29	201129	Control box	1
30	802746	Membrane keypad	1
31	301509	Switching handle	1
32	401708	Plate	1
33	802311	Potentiometer	1
34	801376	Distance pins	4
35	800092	O-ring	1 **
36	802817	Board complete	1
37	901151	Button head socket screw	4
38	801810	Flat cable assembly	1
39	801963	Spring wire clip	1
40	802915	Female IDC connector	1
41	802453	Plug connector socket	1
42	802189	Plug connector housing	1
43	802854	Connection cable complete	1
44	150549	Hex socket countersunk head screw	6
45	802402	Threaded nipple	1
46	800359	Water connection complete	1 **
47	800415	Hose complete	1
48	800028	Sealing ring	2
48	800023	Tap complete	1
50	800020	Plug-in nipple	1
51	800040	O-ring	1
			Wearing parts **