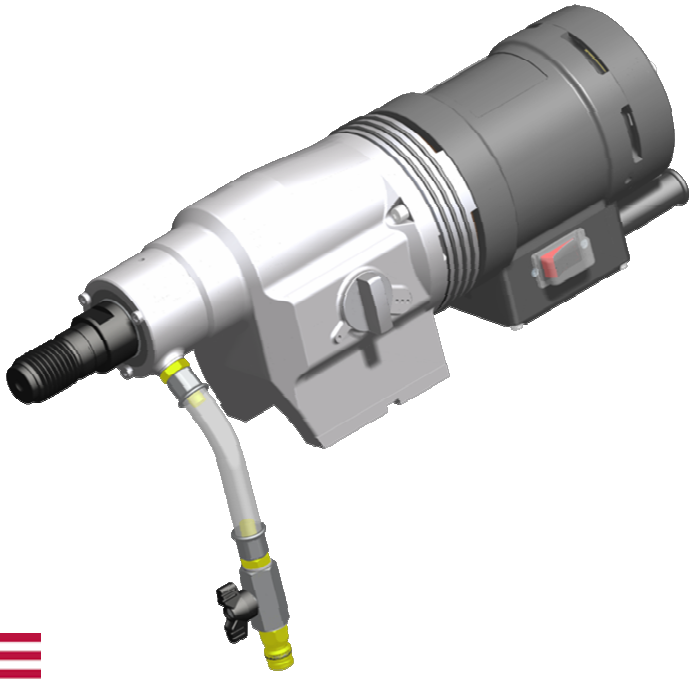
**DR. BENDER** *GmbH*
Innovative Elektrowerkzeuge

# Manual for drilling motor ***BBM 33 LL extra***

## 125 V

*Valid from 03.2018* *Art.-Nr. 201218* *Subject to alteration*



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**Conformity Declaration**

# DR.BENDER *GmbH*

Innovative Elektrowerkzeuge

## EC declaration of conformity (EG-RL 2006/42/EG)

Hereby the manufacturer

Dr. Bender GmbH
Industriestrasse 22
75382 Althengstett

declares for the product

**BBM 33 LL extra**

The named product is conform to the following Council Directives on approximation of laws of the EEC Member States:

- Council Directive for machinery (2006/42/EC)
- Council Directive for Electromagnetic compatibility (EMC) (2004/108/EG)
- Low Voltage Guide Lines (2006/95/EG)

Conformity with the requirements of this Directives is testified by complete adherence to the following standards:

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

The instructions contained in the operating manual for installation and start up the machine have to be followed.

Authorised Person for Documentation:

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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.

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## Warning

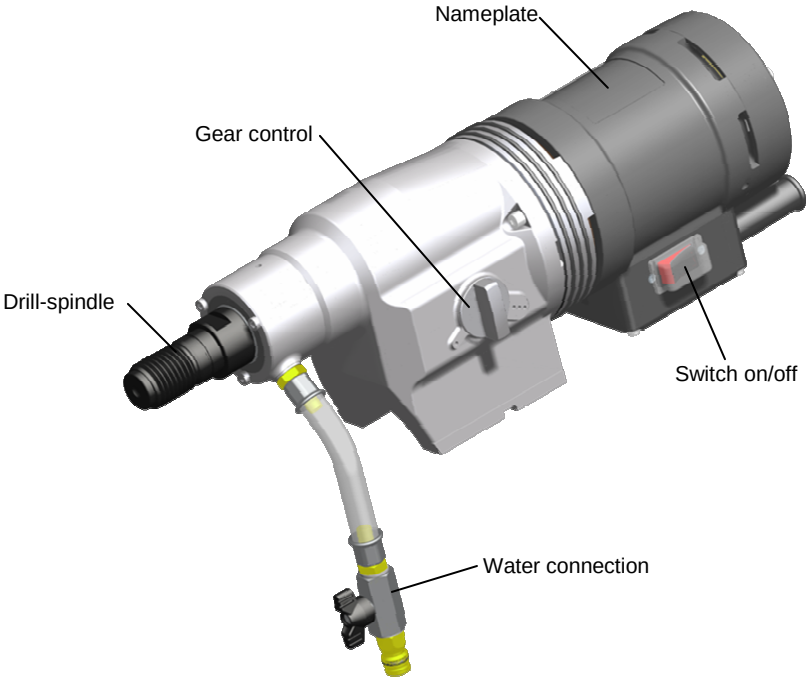
**The safety instructions set out in this operating manual must be followed at all costs.**

Special designs and versions may differ from the standard models in terms of their technical details. If any points are unclear, we urgently recommend that you contact DR.BENDER GmbH, indicating the machine type and machine number.

## 1.0 Symbol- and Pictograph description

This sign tells you rules, if you not pay attention for this your health and the function of the machine is in danger. You have no warranty if the machine breaks down because you not looking about this.

## 1.1 Function description



## 2.0 General instructions

## 2.1 Application

The core drills can be used for the purposes outlined by the data on the model plate. If you are using special machines, the details in the quotation and order confirmation also apply.

The core drills are supplied as standard in protection class I, only this can guarantee the full high quality production of the residual current-operated circuit-breaker or PRCD switch.

If you use suitable core bits, you will be able to drill holes in the most diverse material types:

- Concrete (even if it contains thick reinforcement steel)
- Sandstone and limestone
- All building materials for solid walls
- Asphalt floors

The core drills comply with the regulations issued by the ”Stone and Earth” Professional Association issued in July 1989. They are machines of category II, which means that they must be placed on stands and be stable (pursuant to DIN 57100 or VDE 0100), the stand must be equipped with

- a reversing block, and
- a water suction device.

The machine must be connected to the 230 V mains

- direct using a personal safety switch (residual current-operated circuit-breaker or PRCD), or
- using a coded (1h) plug to a safety box (IP 44) with a residual current-operated circuit-breaker.

## 2.2 Safety

### Warning

**Before using the machine for the first time, check that the conformity of the data on the model plate with the mains voltage and frequency. Voltage deviations of ± 5 % and/or voltage deviations of ± 2 % are permissible. Repairs must only be completed by quality persons who have suitable training and qualifications.**

The following points are to be given special attention:

- the technical data and details of the permitted use of the machine (commissioning, ambient and operating conditions) which are set out in the catalogue, the operating manual, the model plate data and other product information,
- the relevant accident prevention regulations
- the correct use of tools
- the use of personal safety equipment

## 3.0 Transport and storage

### 3.1 Transport

**Warning**

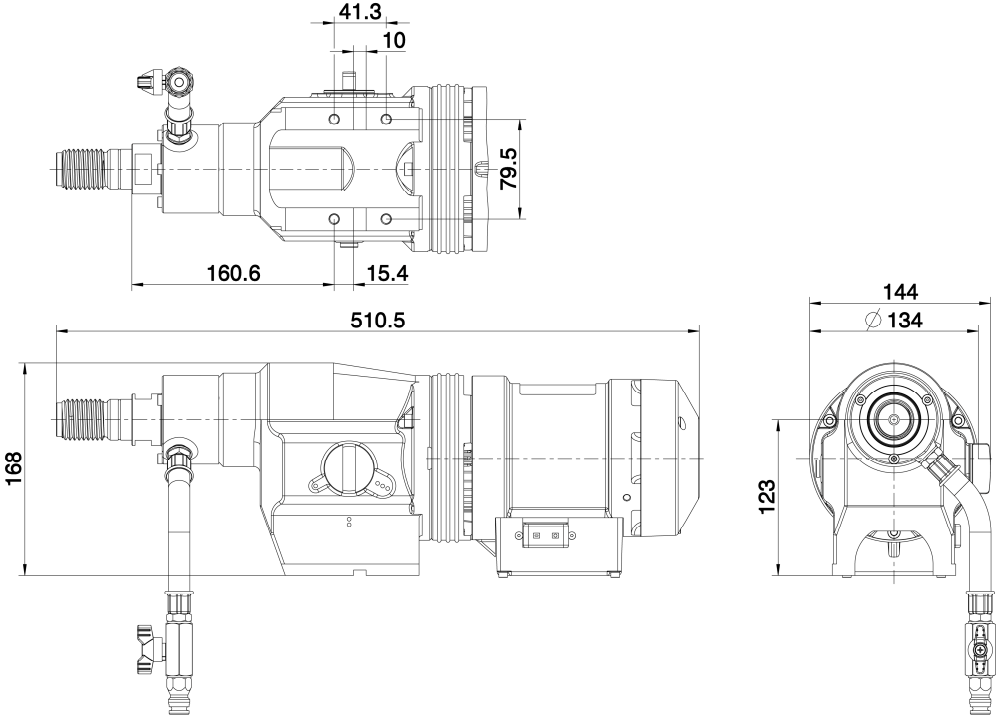
**The core drills are to be checked for signs for transport damage on receipt. Any damage must be documented in writing.**

### 3.2 Storage

If possible, the storage site should be dry, clean and have a constant temperature. To ensure that the film of lubricant in the bearings and sealing system is not lost, the motor shaft should be turned through several revolutions by hand after a lengthy period of storage, for example at monthly intervals. The roller bearings in the motors should be replaced (or regreased) if the period between delivery and commissioning is over four years. If the machines are stored in adverse conditions, this period may differ considerably.

## 4.0 Main dimensions and technical data

## 4.1 Dimensions




## 4.2 Technical data

| | | |
|---|---|---|
| Rated Voltage | 125 | *V* |
| Current consumption | 30 | *A* |
| Power requirement | 3300 | *W* |
| Frequency | 50 – 60 | *Hz* |
| Idling speed | 315 / 720 / 1090 | $min^{-1}$ |
| Full speed | 155 / 375 / 650 | $min^{-1}$ |
| Output rating | 2400 | *W* |
| Torque | 142 / 68 / 38 | *Nm* |
| Drilling diameter | 50 - 470 | *mm* |
| Weight | 13,2 | *kg* |
| Core bit connection | UNC 1 ¼ | *“* |
| Overload coupling torque | 260 | *Nm* |

## 4.3 Noise emissions and vibrations *[EN 50144]*

| Noise level | Noise level | Vibration |
|---|---|---|
| dB(A) | dB | $m/s^2$ |
| 83 | 96 | < 2,5 |

## 5.0 Commisioning

Check that the mains voltage is identical to the voltage specified on the model plate.
Secure the core drill and the water collector to the drilling stand with its reverse block. The drilling stand should be as rigid as possible and have precise, low-play guides. Ensure that the core drill axis is parallel to the axis of the drilling stand.
Insert the core bit and set the speed. The setting instructions are on page 12.
Connect the water supply. Important: Do not exceed the maximum water pressure of 3 bar.
Connect the core drill to the mains using a residual current-operated circuit-breaker box and 6 h coded CEE plug. Only use three-core extension cables with a protective conductor and an adequate cross-section. If the cross-section is too low, you may lose excessive power and result in the motor and cable overheating. An extension cable must have an overload cut-out switch. Recommended cable cross-sections:

| Rated current = 30 A | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cable length | m | 7,5 | 15 | 25 | 30 | 45 | 60 |
| Cable cross-section | $mm^2$ | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 4 |

Ensure that you have sufficient cooling water for drilling. Use only pure tap water, no dirt or sewage, otherwise the drilling motor will damaged. Adjust the feed speed to the core bit diameter and the drive rating of the core drill so that the rated current is not exceeded.

## 5.1 Changing gear

### Warning

**Never change gear using force and only do so when the machine is slowing down or at a standstill.**

To change into the next higher or lower gear, move the gear-change lever through an angle of approx. 50°. If necessary (if the gear is difficult to engage), turn the drive spindle briefly by hand until the gear engages easily. Do not use any tools (pliers, hammer, etc.) to change gear since otherwise gear damage is a natural con-sequence.

## 5.2 Safety coupling

The values set out in the table are theoretical values and may be used to provide a rough guide for gear changing. Since a whole range of other parameters also plays a major role in adjusting the speed, we cannot offer any guarantee if the tool is damaged when using the values in the table. Drilling work for which the speeds are outside the range of the core drill (values printed in italics), should only be completed with extreme care and by trained personnel.

## 5.3 Core bits

All core bits with a connection thread of UNC 1 ¼ " can be used.
Adapters can be supplied to allow core bits with other connection systems to be used.
Only use core bits that are suitable for the type of stone.
You will keep the core drill in good condition if you only use core bits that are concentric and not deformed ones.
Ensure that the diamond segments have an adequate undercut against the core bit body.

### Warning

**To use wrong tools or accessories is danger for your life.**

## 5.4 To change a core bit

The drill spindle has a right-handed thread.
Always use a 32 mm open-ended spanner to hold against the drill spindle.
Never release the core bit with (hammer) blows since this will damage the core drill.
The core bit can be removed more easily if you apply a little waterproof grease to the drill spindle thread.

## 6.0 Safety instructions

# Important

**Only use the core drill under supervision. Disconnect the mains plug and check that the switch has been turned off,**

- If you intend to leave the core drill unsupervised,
- For attachment and disconnection work,
- If the voltage drops (below 340 V),
- At uneven mains voltage (phase asymetrical) or interruption of a phase (phase failure),
- For adjustments or for fitting an accessory,

Switch off the machine if it stops for any reason. This will prevent its starting suddenly when it is not under supervision.

Do not use the tool if

- Part of the casing is missing or defective,
- If water drips out of the overflow hole, stop work and have the core drill inspected by an authorised service contractor.
- After a fault do not switch on the machine again until the core bit can be turned easily.
- Check the area you wish to drill with a line detector to prevent drilling through electric cables, water or gas lines, etc.
- The switch, lead or plug connector has suffered damage (conduct a visual inspection every day).
- Cooling water must not be allowed to ingress into the motor or the electrical components when operating the core drill in any position.

Do not expose the tool to rain and use not in humidity or wet environment. Use a good lightning. Do not use the tool near flammable fluids or gase air mixes.

## 7.0 Servicing and care

# Warning

**Before starting any servicing or repair work always disconnect the mains plug. After all repairs you must have the core drilling machine inspected by an electrician (statutory regulation pursuant to VBG4 since 1.1.1990).**

## 7.1 Daily care

Ensure that no water is emitted from the overflow hole. This will cause gear damage and may adversely affect the electrical safety of the core drill. If water is emitted, see assistance from an authorised service outlet.
Visual inspection for damage to the switch, connection lead or plug connector.
After completing the drilling work clean the core drill. Grease the core bit mounting thread. The ventilation slits must always be clean and open. Ensure that during the cleaning process, no water gets into the core drill.
Empty the cooling water in the drilling motor after the use. Open to this the ball cock completely and let the cooling water go off. This is particulary very important because of freezing education in the winter months.
To maintain the seal, oil the drilling spindle as follows

- Disconnect the core drill from the water supply. Open the water connector shut-off cock, add several drops of oil, close the shut-off cock, add several drops of oil to the overflow hole and turn the machine briefly by hand.

## 7.2 After approx. 150 hours of use

After the first 150 hours of use, the gearbox oil must be changed.

## 7.3 After approx. 250 hours of use

Have the carbon brushes checked, and replaced if necessary, by an electrician.
Avoid adjusting the carbon retaining springs.
Only use original spare parts.

## 7.4 Quarterly

Have the cable, switch and plug connectors inspected by a specialist (regulation pursuant to VBG4) and document this inspection. Changing the gearbox oil will produce a considerably increase in the service life of the gear.

## 8.0 Speed adjustment dependent on the cutting speed

| | 3 | 4 | 5 | 6 | 7 | [m/s] |
|---|---|---|---|---|---|---|
| 50 | 1146 | *1528* | *1910* | *2292* | *2674* | 3rd gear |
| 60 | 955 | 1273 | *1592* | *1910* | *2228* | 3rd gear |
| 65 | 881 | 1175 | *1469* | *1763* | *2057* | 3rd gear |
| 70 | 819 | 1091 | *1364* | *1637* | *1910* | 3rd gear |
| 75 | 764 | 1019 | 1273 | *1528* | *1783* | 3rd gear |
| 80 | 716 | 955 | 1194 | *1432* | *1671* | 3rd gear |
| 85 | 674 | 899 | 1123 | *1348* | *1573* | 3rd gear |
| 90 | 650 | 849 | 1061 | 1273 | *1485* | 3rd gear |
| 95 | 603 | 804 | 1005 | 1206 | *1407* | 3rd gear |
| 100 | 573 | 764 | 955 | 1146 | 1337 | 3rd gear |
| 110 | 521 | 694 | 868 | 1042 | 1215 | 3rd gear |
| 120 | 477 | 650 | 796 | 955 | 1114 | 3rd gear |
| 130 | 441 | 588 | 735 | 881 | 1028 | 3rd gear |
| 140 | 409 | 546 | 682 | 819 | 955 | 3rd gear |
| 150 | 375 | 509 | 650 | 764 | 891 | 3rd gear |
| 160 | 358 | 477 | 597 | 716 | 836 | 3rd gear |
| 170 | 337 | 449 | 562 | 674 | 786 | 3rd gear |
| 180 | 318 | 424 | 531 | 650 | 743 | 3rd gear |
| 190 | 302 | 402 | 503 | 603 | 704 | 3rd gear |
| 200 | 286 | 375 | 477 | 573 | 650 | 3rd gear |
| 220 | 260 | 347 | 434 | 521 | 608 | 2 or 3 |
| 240 | 239 | 318 | 398 | 477 | 557 | 2 or 3 |
| 260 | 220 | 294 | 375 | 441 | 514 | 2 or 3 |
| 280 | 205 | 273 | 341 | 409 | 477 | 2 or 3 |
| 300 | 191 | 255 | 318 | 375 | 446 | 2 or 3 |
| 320 | 160 | 239 | 298 | 358 | 418 | 2 or 3 |
| 340 | 169 | 225 | 281 | 337 | 393 | 2 or 3 |
| 360 | 159 | 212 | 265 | 318 | 375 | 2nd gear |
| 380 | 120 | 201 | 251 | 302 | 352 | 1 or 2 |
| 400 | *143* | 191 | 239 | 286 | 334 | 1 or 2 |
| 420 | *136* | 182 | 227 | 273 | 318 | 1 or 2 |
| 440 | *130* | 174 | 217 | 260 | 304 | 1 or 2 |
| 460 | *125* | 166 | 208 | 249 | 291 | 1 or 2 |
| 480 | *119* | 159 | 199 | 239 | 279 | 1st gear |
| 500 | *115* | 120 | 191 | 229 | 267 | 1st gear |
| 520 | *110* | *147* | 184 | 220 | 257 | 1st gear |
| 540 | *106* | *141* | 177 | 212 | 248 | 1st gear |
| 560 | *102* | *136* | 171 | 205 | 239 | 1st gear |
| 580 | *99* | *132* | 165 | 198 | 231 | 1st gear |
| 600 | *95* | *127* | 159 | 191 | 223 | 1st gear |
| 620 | *92* | *123* | 154 | 185 | 216 | 1st gear |
| 640 | *90* | *119* | 149 | 179 | 209 | 1st gear |
| 660 | *87* | *116* | 145 | 174 | 203 | 1st gear |
| 680 | *84* | *112* | 140 | 169 | 197 | 1st gear |
| Bit capacityø | | concrete | concrete | rock | | |
| [mm] | | reinforced | | | | |

The values set out in the table are theoretical values and may be used to provide a rough guide for gear changing. Since a whole range of other parameters also plays a major role in adjusting the speed, we cannot offer any guarantee if the tool is damaged when using the values in the table. Drilling work for which the speeds are outside the range of the core drill (values printed in italics), should only be completed with extreme care and by trained personnel.

## 9.0 Warranty

In keeping with our terms of sale, we offer a warranty for twelve months from the date of sale. This refers to the free repair of material and workmanship defects, which were verifiably caused before the sale.

An original purchase document must always be submitted in case of a warranty claim. It has to contain the full address of the dealer, the date of purchase and the type designation of the product. The operating instructions of the particular product and the safety instructions must have been followed.

Damages resulting from operational faults cannot be acknowledged as warranty cases.

The products of the manufacturer have been developed and produced for specific applications. No warranty claim is accepted in case of non-compliance with the due employment according to the operating instructions, in case of the employment for other purposes than originally intended or the employment of inadequate accessories.

The periodical maintenance and cleaning of the products according to the directions of the operating instructions is absolutely necessary. The intervention of third persons (opening the machine) renders any warranty claim void.

Maintenance and cleaning operations cannot be claimed on the basis of warranty.

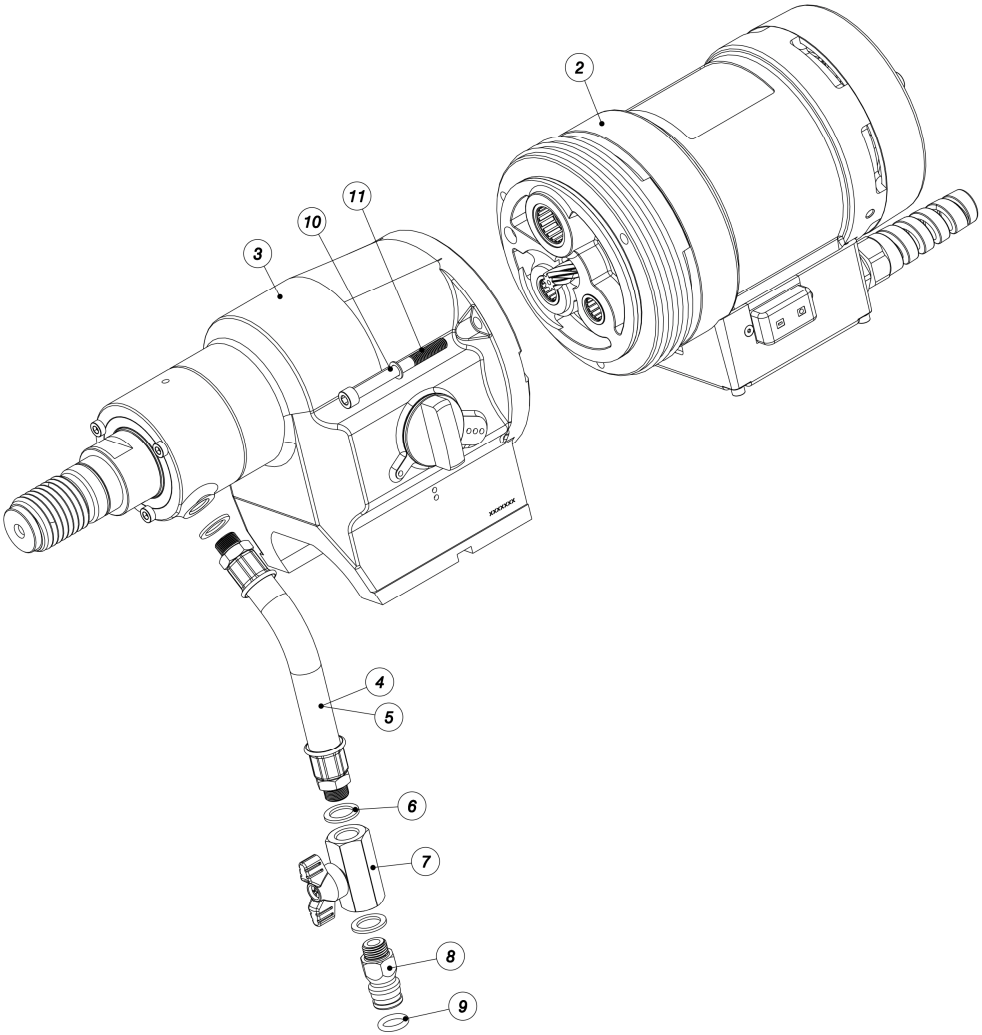
Make sure only original spare parts and original accessories are used. They are available at the authorized specialized product dealer. If non-original parts are used, consequential damages and increased hazard cannot be ruled out. The producer is not liable for such damages. Disassembled or partially disassembled hand saws and those repaired with non-original parts are excluded from the warranty.

Certain components, such as carbon brushes, ball bearings, switches, power-supply lines, gaskets, etc., are exposed to usage dependent or to normal wear. These wearing parts are not object of this warranty. Wearing parts are marked on the spare parts lists.

## 10.0 General safety instructions

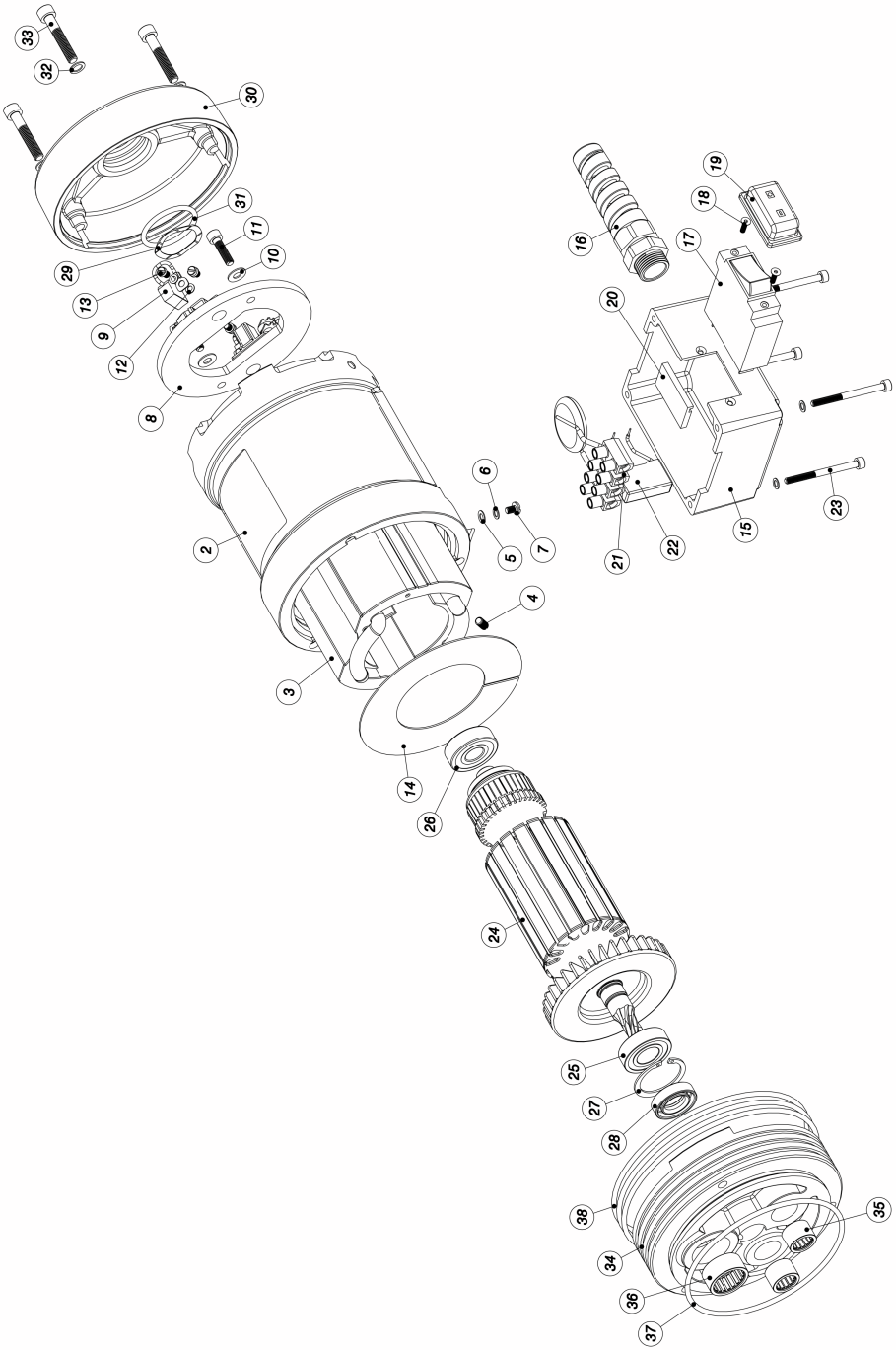
The general safety instructions can be found in the supplied safety instruction booklet.

## 11.0 Spare parts list
## 11.1 Stone drilling machine complete



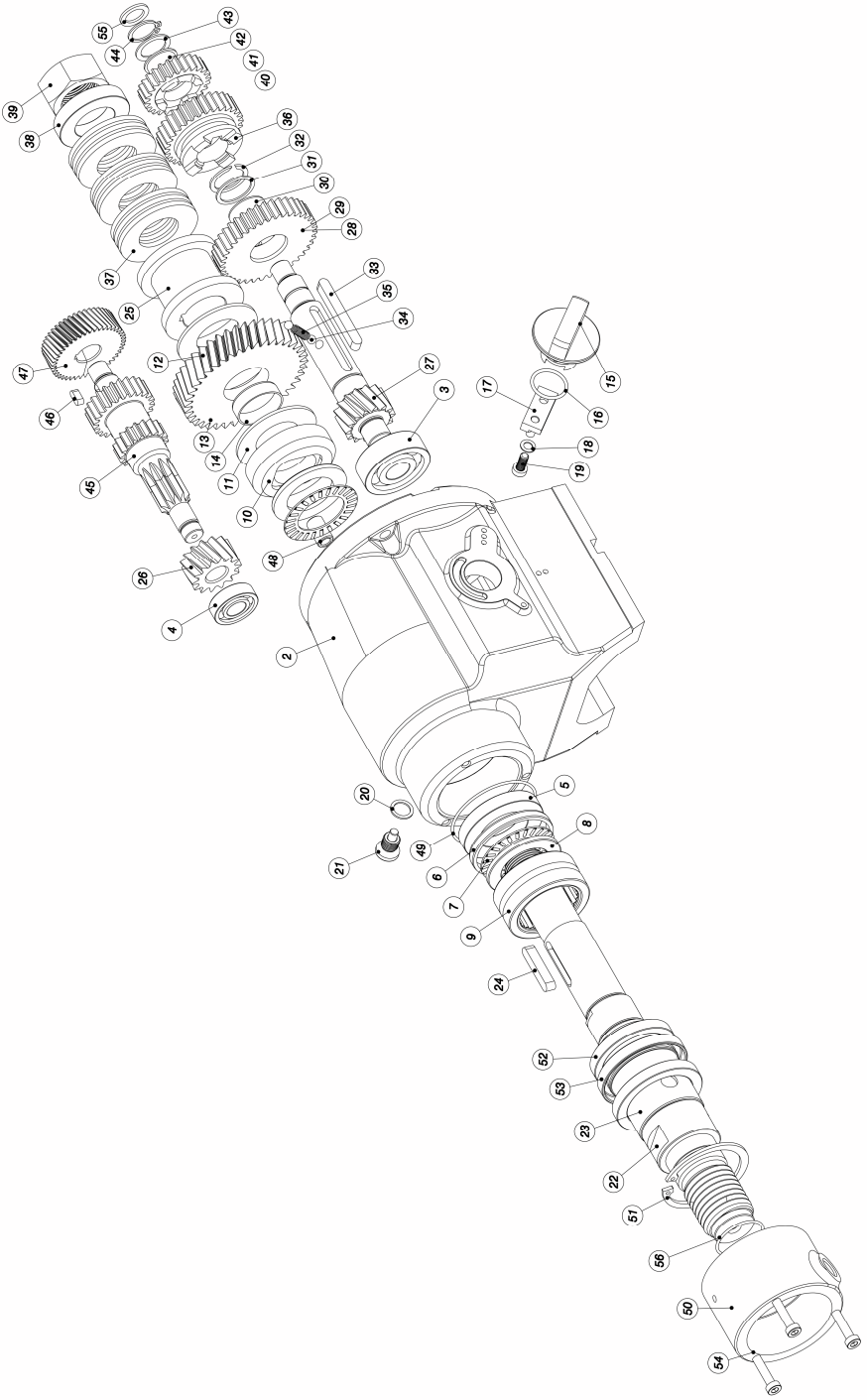
| Item | Art. No. | Description | No. |
|---|---|---|---|
| 1 | 201218 | Stone drilling machine complete | 1 |
| 2 | 301277 | Motor complete | 1 |
| 3 | 200895 | Gear complete | 1 |
| 4 | 300074 | Water connection complete | 1 ** |
| 5 | 800733 | Hose complete | 1 |
| 6 | 800028 | Sealing ring | 3 |
| 7 | 800023 | Ball cook complete | 1 |
| 8 | 800020 | Slot-in nipple | 1 |
| 9 | 800040 | O-ring | 1 |
| 10 | 800077 | Locking ring | 3 |
| 11 | 900318 | Hexagon socket head cap screw | 3 |
| | | | Wearing parts** |

## 11.2 Motor complete



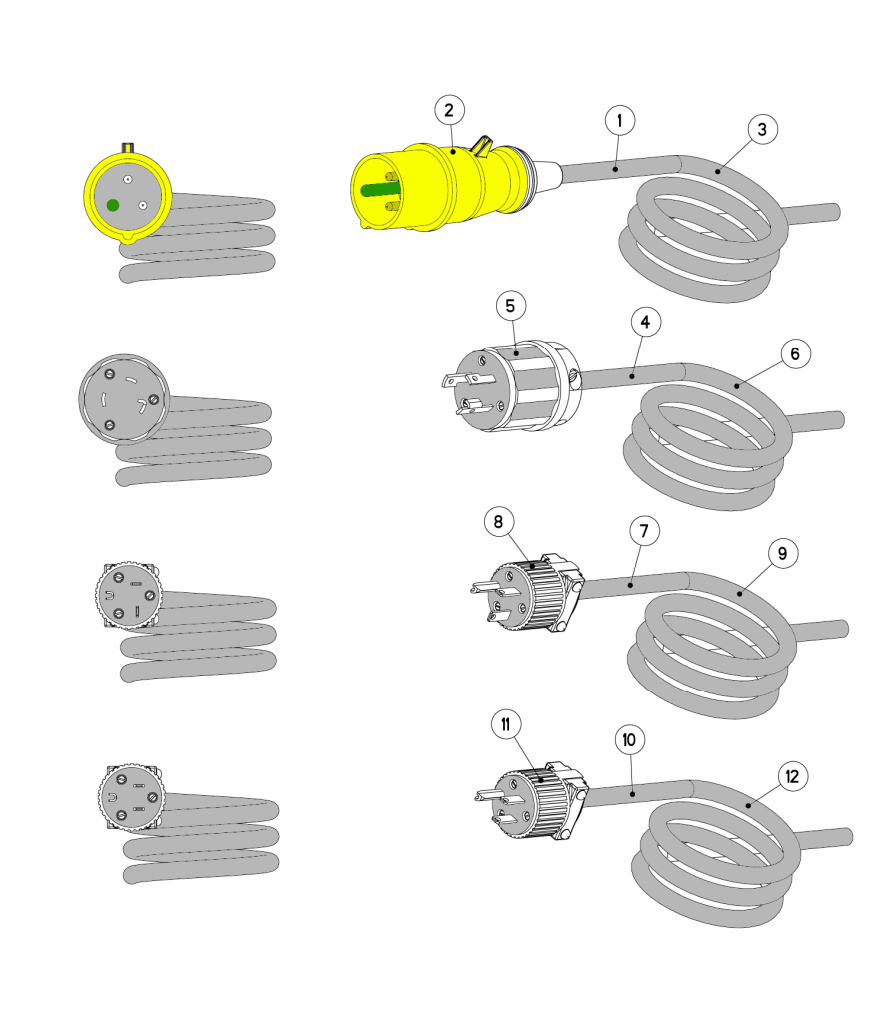
| Item | Art. No. | Description | No. |
|---|---|---|---|
| 1 | 301277 | Motor complete | 1 |
| 2 | 200839 | Motor casing | 1 |
| 3 | 401554 | Field coil | 1 |
| 4 | 900011 | Set screw | 1 |
| 5 | 900229 | Washer | 1 |
| 6 | 800076 | Locking washer | 5 |
| 7 | 900412 | Slotted pan head screw | 1 |
| 8 | 300068 | Brush bridge | 1 |
| 9 | 800064 | Carbon brush | 2 ** |
| 10 | 900180 | Locking washer | 2 |
| 11 | 900332 | Hexagon socket head cap screw | 2 |
| 12 | 900183 | Wave spring washer | 4 |
| 13 | 900399 | Slotted cheese head screws | 2 |
| 14 | 400036 | Air-flow-plate | 1 |
| 15 | 302099 | Switch box cover | 1 |
| 16 | 802733 | Pull-out protection | 1 |
| 17 | 801263 | Switch controller | 1 |
| 18 | 900458 | Hexagon socket countersunk head screw | 2 |
| 19 | 800174 | Protecting cap | 1 ** |
| 20 | 401334 | Cover plate | 1 |
| 21 | 401667 | Attempt current limiters complete | 1 |
| 22 | 801354 | Capacitor | 1 |
| 23 | 900704 | Hexagon socket head cap screw | 4 |
| 24 | 401585 | Armature | 1 |
| 25 | 900483 | Grooved ball bearings | 1 ** |
| 26 | 900329 | Grooved ball bearings | 1 ** |
| 27 | 901094 | Locking ring | 1 |
| 28 | 900708 | Shaft seal | 1 ** |
| 29 | 800122 | Cup spring | 1 |
| 30 | 300029 | Stored cap | 1 |
| 31 | 800089 | O ring | 1 ** |
| 32 | 800077 | Locking washer | 3 |
| 33 | 900312 | Hexagon socket head cap screw | 3 |
| 34 | 200379 | Intermediate cover | 1 |
| 35 | 900168 | Needle sleeve | 2 ** |
| 36 | 900156 | Needle sleeve | 1 ** |
| 37 | 800083 | O ring | 1 ** |
| 38 | 800354 | O ring | 3 ** |
| | | | Wearing parts** |

## 11.3 Gear complete



| Item | Art. No. | Description | No. |
|---|---|---|---|
| 1 | 301764 | Gear complete | 1 |
| 2 | 100080 | Gear casing | 1 |
| 3 | 900051 | Grooved ball bearings | 1 ** |
| 4 | 900495 | Grooved ball bearings | 1 ** |
| 5 | 900670 | Interim washer | 1 |
| 6 | 400795 | Sleeve | 1 |
| 7 | 900669 | Axial needle rim | 2 ** |
| 8 | 900672 | Rotor disc | 2 ** |
| 9 | 900671 | Needle bearing | 1 ** |
| 10 | 300670 | Support disc | 1 |
| 11 | 400011 | Brake disc | 2 ** |
| 12 | 401308 | Floor wheel complete | 1 |
| 13 | 301051 | Floor wheel | 1 |
| 14 | 400798 | Bearing sleeve | 1 ** |
| 15 | 400048 | Gear change shaft complete | 1 |
| 16 | 800097 | O ring | 1 ** |
| 17 | 400096 | Gear change lever complete | 1 |
| 18 | 800075 | Locking disc | 1 |
| 19 | 900354 | Hexagon socket head cap screw with centre hole | 1 |
| 20 | 900500 | Sealing ring | 1 ** |
| 21 | 900498 | Sealing screw | 1 |
| 22 | 301934 | Drill spindle | 1 |
| 23 | 401964 | Wave protection sleeve | 1 |
| *23* | *400002* | *Wave protection sleeve optional* | *3* |
| 24 | 900110 | Parallel key | 1 |
| 25 | 400796 | Pressure sleeve | 1 |
| 26 | 300427 | Pump wheel | 1 |
| 27 | 301052 | Pinion shaft | 1 |
| 28 | 401310 | Loose wheel 1 complete | 1 |
| 29 | 301053 | Loose wheel 1 | 1 |
| 30 | 400082 | Bearing sleeve | 1 ** |
| 31 | 400129 | Adjusting washer | 1 |
| 32 | 800080 | Spring ring | 1 ** |
| 33 | 900504 | Adjusting ring | 1 |
| 34 | 900014 | Ball | 2 |
| 35 | 800165 | Bridge spring | 1 |
| 36 | 301054 | Gear change wheel | 1 |
| 37 | 900663 | Disc spring | 9 |
| 38 | 401965 | Compensation slice | 1 |
| 39 | 401966 | Hexagonal nut | 1 |
| 40 | 401311 | Loose wheel 2 complete | 1 |
| 41 | 301055 | Loose wheel 2 | 1 |
| 42 | 400083 | Bearing sleeve | 1 ** |
| 43 | 900163 | Adjusting washer | 1 |
| 44 | 900209 | Locking ring | 1 ** |
| 45 | 300872 | Reduction gear shaft | 1 |
| 46 | 900127 | Adjusting spring | 1 |
| 47 | 401338 | Reduction gear wheel | 1 |
| 48 | 900674 | Bush | 1 |
| 49 | 801059 | O ring | 1 ** |
| 50 | 400797 | Connection ring | 1 |
| 51 | 800760 | Locking ring | 1 ** |
| 52 | 900673 | Shaft seal | 1 ** |
| 53 | 900027 | Shaft seal | 2 ** |
| 54 | 900675 | Hexagon socket head cap screw with centre hole | 3 |
| 55 | 900503 | Adjusting washer | 1 |
| 56 | 800092 | O-Ring | 1 ** |
| 57 | 800413 | Gear lubricant oil 0,3l | 1 ** |
| | | | Wearing parts** |

## 11.4 Connection cables and accessories



| Item | Article number | Description | No. |
|---|---|---|---|
| | | | |
| **Plugs for UK and standards for type EBM** | | | |
| | | | |
| 1 | 801462 | Connection cable compl. 4h | 1 |
| 2 | 900159 | Plug, 4h | 1 |
| 3 | 801328 | Connection cable, finished | 1 |
| | | | |
| **Plugs for UK and standards for type BBM** | | | |
| | | | |
| 1 | 801460 | Connection cable compl. 4h | 1 |
| 2 | 900159 | Plug, 4h | 1 |
| 3 | 801459 | Connection cable, finished | 1 |
| | | | |
| **Plugs for USA and Japan up to 30 amps for type BBM** | | | |
| | | | |
| 4 | 801321 | Connection cable compl. | 1 |
| 5 | 801317 | Plug, 30A | 1 |
| 6 | 801320 | Connection cable, finished | 1 |
| | | | |
| **Plugs for USA and Japan up to 20 amps for type EBM** | | | |
| | | | |
| 7 | 801461 | Connection cable compl. | 1 |
| 8 | 800200 | Plug, 15A | 1 |
| 9 | 801328 | Connection cable, finished | 1 |
| | | | |
| **Plugs for USA and Japan up to 20 amps for type EBL** | | | |
| | | | |
| 7 | 803182 | Connection cable compl. | 1 |
| 8 | 800168 | Plug, 20A | 1 |
| 9 | 801328 | Connection cable, finished | |
| | | | |
| **Plugs for Australia** | | | |
| | | | |
| 10 | 802839 | Connection cable compl. | 1 |
| 11 | 801809 | Plug, 15A | 1 |
| | | | |
| | | | |
| | | | |