



**EN**

# **Manual**

Pneumatic Drilling Unit

Series BEP 22 SK



Read this manual before installation and  
commissioning of the product.  
Keep for future reference.

MAN027 - Manual BEP 22 SK, EN, ORIGINAL, Rev. 02.doc

**E2 Systems**  
A DIVISION OF TUBEX AB

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**DECLARATION OF INCORPORATION OF  
PARTLY COMPLETED MACHINERY  
ORIGINAL**

**According to the EC's Machinery Directive 2006/42/EC, Annex 2B**

We,

E2 Systems a division of Tubex AB  
Strömslundsgatan 3  
507 62 Borås  
Sweden,

declare that the partly completed machinery:

**Model: BEP22x SK**

\* Is designed to be embedded in a larger machinery or assembled with another machine, which together will constitute machinery covered by Directive 2006/42/EC "Machinery Directive" and which shall be constructed in compliance with this directive, and

\* Must not be put into service until the machinery, which the partly completed machinery must be part of, has been found and thus as a whole is declared in accordance with the "Machinery Directive" and national legislation. We also confirm:

\* That the item 1 and 2.3 from the "Machinery Directive" Annex 1 concerning essential health and safety issues in the design of machines, which are reported in the manual for the above partly completed machinery, have been performed, and

\* That the relevant technical documentation is compiled in accordance with Annex 7, Section B of the Directive 2006/42/EC

At the substantiated request of national authorities will relevant documents on the partly completed machinery be handed over.

Following other directive and harmonized standards, including appendix, has been applied:

EN ISO 12100:2010 Safety of machinery -- General principles for design -- Risk assessment and risk reduction.

SIS ISO TR 14121-2:2007 Safety of machinery -- Risk assessment -- Part 2: Practical guidance and examples of methods.

SS EN ISO 4414:2010 Pneumatic fluid power -- General rules and safety requirements for systems and their components.

Borås: 2009-12-18



Krister Johansson  
CEO Tubex AB



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responsible for the technical file

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### WARNING!

- Ensure that the operator has read and understood this manual before the drilling unit is in use.
- For security reasons, any modification of the drilling unit and its accessories, which may affect product safety, must be approved by the manufacturers technical manager.
- The unit is intended for drilling, countersinking and reaming and should not be used for any other application, unless approved by the manufacturers technical manager
- Always follow local security regulations regarding installation, operation and maintenance.
- The drilling unit must be securely fixed and the installation instructions must be strictly observed.
- When installing the unit on a stand or in a complete machine tool, necessary protective devices must be fitted to prevent injury caused by crushing (squeezing) or any other type of personal injury that might be caused by the unit or its rotating tool.
- All protective devices that are designed to prevent personal injury must be mounted in their intended position during the operation.
- When servicing or repairing the unit, the electrical system must be switched off and the pneumatic system depressurized.
- Beware of hands, hair and loose fit clothing – Watch out for rotating parts.
- Never operate the drilling unit without any eventual safety arrangements – Beware of risk for crushing.
- Make sure that all hoses and electrical wires are safely fastened – Beware of risk for crushing.
- Ignoring the instruction may invalidate the warranty.

More detailed information regarding risks related to the unit described below.

According to Machinery Directive 2006/42/EC the unit is a “partly completed machine”. Thereby the manufacturer of the machine is responsible for the overall safety. This device should not be operational within EU before the machine, in which the device must be integrated in, assured to meet the Machinery Directive 2006/42/EC. This manual is developed according to Machinery Directive and also includes additional information to make it easy for the manufacturer of the machine to meet the Machinery Directive and the end user to maintain a high level of security

The machine is intended for use by a person with knowledge and experience of using a machine of this type, and without limited physical ability in arms and hands as well as fully sighted. The machine is designed to be serviced by a trained / qualified operator following the instructions provided in the manual. The accidents that are likely still might occur, is when the machine is running without protection or with inadequate protection, without a fence, clamps or jigs. Ill health may arise from issues or material used, for example:

- Noise generated during the drilling / threading;
- Drilling dust / chips;
- Fumes and substances released during drilling of impregnated or treated material.

### General recommendations

- Apply a system for monitoring the tool in the machine. If no such system is at hand, we recommend user/operator to frequently control the tool. To ensure that no damages occurred.

### **Thorough review of the unit**

Visual control of any outer damages. Ensure there is opportunity to fast turn of air-supply and run a normal cycle without tool and material (to avoid further damages at the material and unit). Listen for noise from bearings and also control the run-out at the spindle nose. If not ok, unit has to be repaired and a new control for damages will be necessary. If a unit seems ok, perform a normal cycle and evaluate the processed result.

### **If accident or breakdown occurs:**

When accident or breakdown occurs as results in damages, or risk for accident, should the unit be transferred to workshop or similar to ensure that unit can be repaired in a safe place. An accident or breakdown will assume that the entire machine is affected. Therefor is it up to the machine supplier to describe the work method when accident or breakdown occurs. E2Systems will with this manual make it easy to achieve a safe design of the machine.

## **Information about the manufacturer**

Drill and thread unit is manufactured and supplied by E2 Systems a division of Tubex AB. E2 Systems are specialized in constructing and manufacturing drill and thread units. The units are compact and have a robust design constructed to be easy to use and have a long life-span with high precision. More of E2 Systems collection you will find at [www.e2systems.com](http://www.e2systems.com). If you would like to come in contact with E2 Systems regarding questions or comments on our products or documentation, our contact information follows:

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## **Device management**

The BEP22 SK-series weight is 1,7kg. Thereby can the unit be carried of one person, BEP22 SK-series weight laterally is symmetrical. Since the unit is compact designed, there is a risk of crushing injury and other consequential damages due to the weight of the falling unit. Therefore, the unit has to be mounted at fixed position or be laid down on the page, prior to settings of pneumatic connection is made.

## Description of the drilling unit

The **BEP 22 SK** is a precision version equipped with a precision chuck. It consists of an air motor, a gear box and a robust body. When you need a unit without a feed the E2 SK-units are a very good alternative. The design is compact as well as robust. Thanks to precision, separate and double ball bearings run-out amounts at the most to 0,01 mm (.0004 In). BEP 22 SK comes in a wide range of speeds. BEP 22 SK is also available for lubrication-free operation.

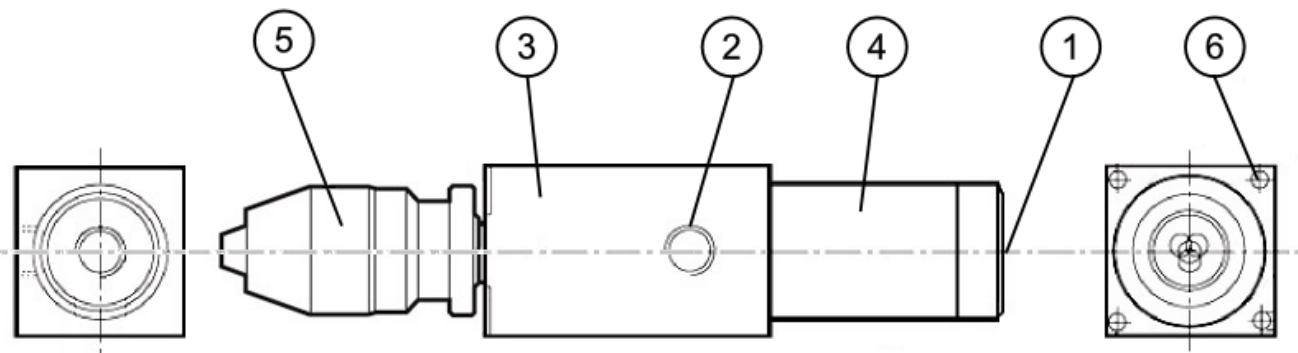
Type and speed: See data label on drilling unit

Serial number: See data label on drilling unit

E2 SYSTEMS		Made in Sweden	
Type		Ser. No	
BEP 2222 SK		090301	
	500		rpm

### Description:

1. Air motor inlet port, G1/4" (NPT). Direct air from 3/2 valve.
2. Air motor directed exhaust port, G1/4" (NPT).
3. Housing.
4. Air motor housing.
5. Precision Key Chuck or Precision Collet Chuck.
6. Mounting holes (4x) M4x8.



## Installation of the drilling unit

This Drilling and Tapping Unit is only intended for use in machinery which applies to the Machine Directive 2006/42/EC. This Drilling and Tapping Unit is designed for normal drilling, countersinking, reaming and tapping. In applications requiring high-precision hole placement or when drilling into rounded or slanted surfaces, drill bushings must be used.

To be able to use the unit, it must first be installed and fitted with control equipment. Regardless of how simple the installation is performed, the unit must be fitted with necessary protective devices to avoid personal injury. Special precaution must be taken to eliminate the risk of clothing, gloves, hair, etc. being caught in the rotating tool. The unit should always be mounted to a flat surface and be attached in a stable construction. Avoid adjacent parts enhancing resonance noise and vibrations wherever it is possible, which can create a resonance box effect.

The unit consists of many components and preassembled parts, the reliability of which is dependent upon proper maintenance. The pneumatic systems include a number of seals. It is essential to keep moving seal surfaces clean and free of marks and scratches.



### WARNING!

Never use the drilling unit without being securely fastened and that appropriate security arrangements have been organised.

Be careful with rotating and moving parts, to avoid personal injuries.

Ensure that the drilling unit is disconnected from the main air-supply, before any maintenance.

If the user feels the need to control the operation of this unit before it is installed in the machine, this is done AT YOUR OWN RISK

### Air supply:

A complete air preparation unit (FRL unit) with a flow capacity exceeding 0,3 Nm<sup>3</sup>/min (12 Cfm), air-filter with 5 µm (2500 mesh) filtration, pressure regulator and oil-mist lubricator shall be placed within 5 meters (16.4 Ft) of the drilling unit to provide clean and lubricated air to the drilling unit. The main pipe which the FRL unit is connect to should have a pipe dimension of 1 1 / 2 - 2". The oil-mist lubricator should be set to provide approx. 1 drop/10-20 cycles. 1 drop = 15 mm<sup>3</sup> (.000528 fl.oz. (UK), .000507 fl.oz. (US)) The oil/air mix ratio should be 50 mm<sup>3</sup> (.00176 fl.oz. (UK), .00169 fl.oz. (US)) per 1000 liter (219.97 Gallons (UK), 264.17 Gallons (US)) consumed air. The lubricating oil viscosity should be between 50 and 300 cSt at the air motor operating temperature. Recommended lubricant: Mineral based lubrication oil.

If multiple drilling units are used, each unit must have a separate air supply.

The drilling unit can be ordered with an air motor for lubrication free operation, without oil-mist lubrication, and is marked with a label. In this case an air preparation unit with (FR), in this case an air filter and a pressure regulator is only required.

We recommend that this unit is installed in a place with clean air and an ambient temperature between +10° - +40° C. (+50° - +104° F).



### Connection:

Connection (1) is for the air motors air supply and is connected via a 3/2 valve, 1/8", connected directly to the FRL unit. Hoses and couplings must maintain a flow area equivalent to at least an inside diameter of ø6 mm (1/4"). No additional pneumatic devices, controllers, etc. may be fed from this line.

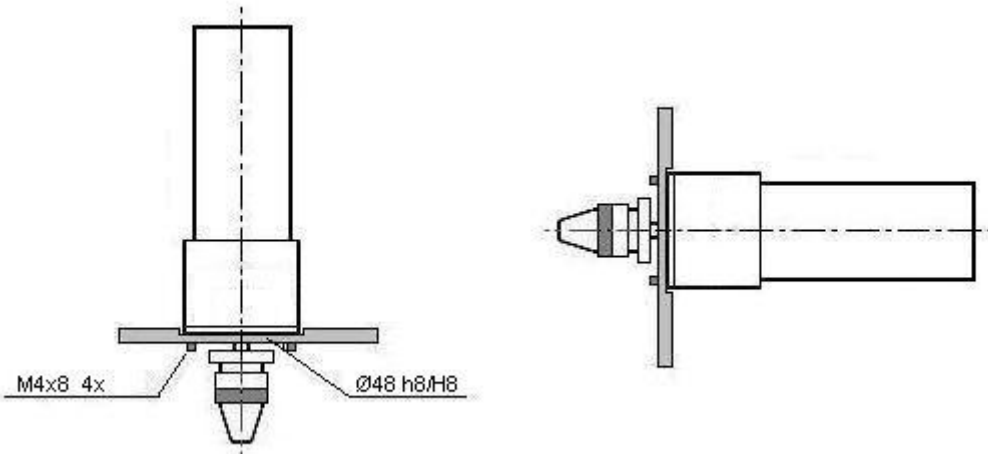
Connection (2) is for air motor exhaust, is normally equipped with a silencer, but can also be used to blow away chippings or led off with a longer hose. For lowest noise level, use an external silencer.

Before start up, check that the FRL unit (set at 6 – 7 Bar (87 – 100.5 Psi)) is connected correctly, a filter cartridge is mounted in the air-filter and the oil-mist lubricator is set correctly.



## Attachment

Attach the drilling unit according to the below. The drilling unit can be mounted vertically or horizontally. Optional attachment should be discussed with E2's technician.



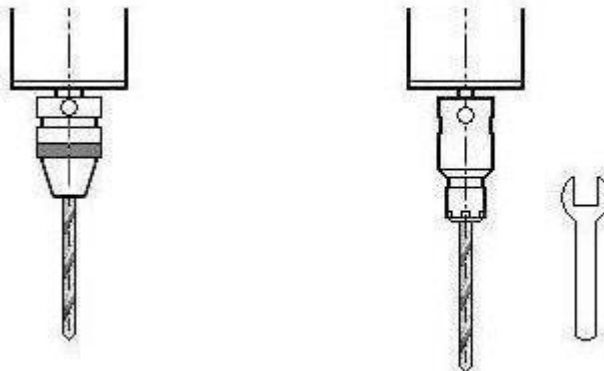
## Mounting of cutting tools

The following cutting tools can be used with drilling unit:

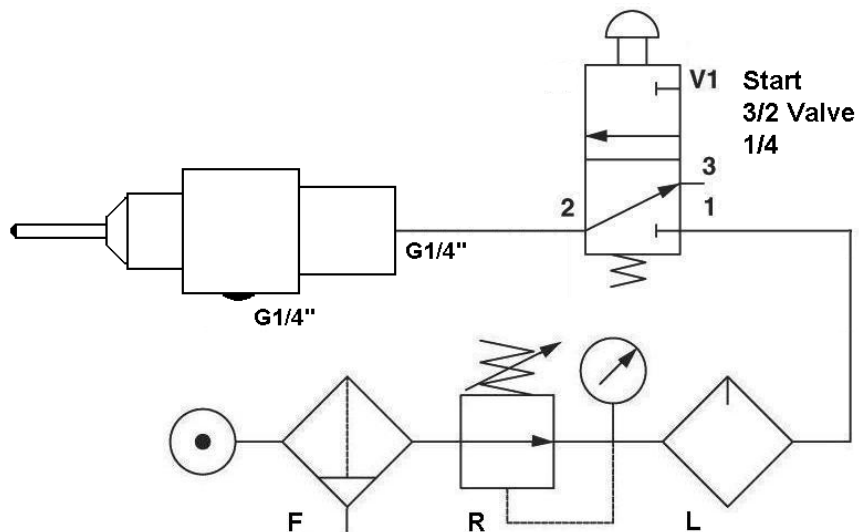
Drills, shank end mills, countersinkers, reamers or broaches.

The drilling unit can be fitted with either precision key chuck or precision collet chuck.

Precision Key Chuck: Precision Collet Chuck:



## Example of connection



## Maintenance instruction

### **Daily check:**

- Check the air-pressure on the FRL-unit, 6 – 7 bar (87 – 101.5 Psi). Max 7 bar (101.5 Psi).
- Check for any leakages of air. If a leakage is detected, contact service staff.

### **Weekly check:**

- Check that the oil-mist lubrication is working, approx. 1 drop/10-20 cycles. 1 drop = 15 mm<sup>3</sup> (.000528 fl.oz. (UK), .000507 fl.oz. (US))
- Check that the drilling unit is clean.

### **Monthly check:**

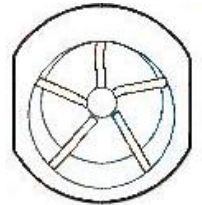
- Check that no abnormal play is present in the drilling spindle.
- Check that external silencer is not clogged.
- Check that the air filter in the FRL unit is working or replace the air filter.

### **Every 12 months:**

Perform overhauling and clean the air motor every 12 months alternatively after 1500 – 2000 working hours operation depending on which occurs first. Planetary gear, ball bearings and needle bearings are greased with ball bearing grease.

The air motor is of so called vane type. The air motors service life depends to a high degree on the air motors operating conditions. The vanes in an air motor intended for oil-mist lubrication have a life expectancy between 1500 to 2000 working hours at normal operation conditions. Other mechanical parts such as bearing have a service life between 3000 – 5000 hours.

The service life for an air motor intended for lubrication free operation is 1/3 of the service life compared with a lubricated air motor at normal operation.

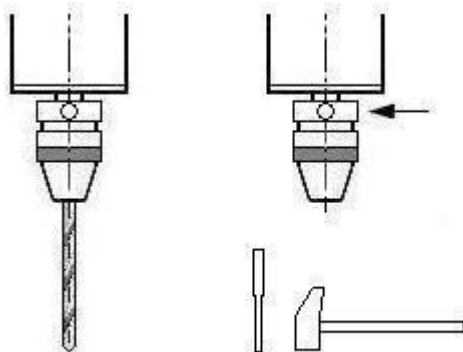


If hard operation, overhauling and cleaning should be performed with tighter intervals.

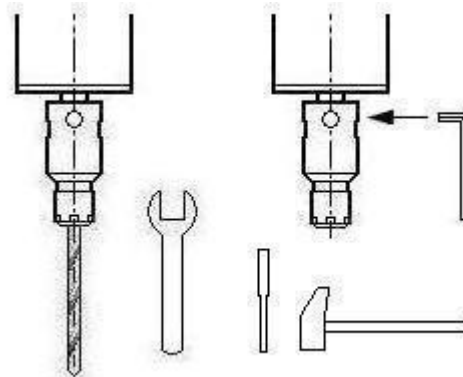
## Replacement of chuck

1. Turn off the air supply to the drilling unit completely.
2. Remove eventual cutting tool from the precision chuck or precision collet chuck.
3. Remove and replace the precision chuck or precision collet chuck as shown below.  
Loosen the chuck locking screw with a small screwdriver or allen key, kw 2.5 mm. Tap off the chuck by using a small mandrel and a hammer placing the mandrel on top of the chuck. A light tap is enough to loosen the chuck. Put on the new chuck on the taper by hand. Tighten the chucks locking screw.
4. Remount the cutting tool.
5. Turn on the air supply to the drilling unit again.

Precision Chuck:



Precision Collet Chuck:



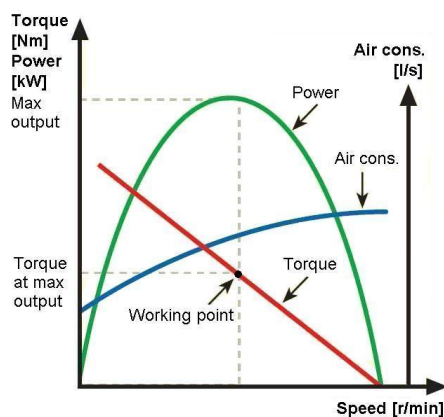
## Technical information

### Technical features, at 6,3 Bar (91.35 Psi):

Power, air motor	: See Power table below.
CC spindle spacing	: Min. 45 mm (1 3/4")
Run-out at spindle nose	: Max. 0,03 mm (.001 In)
Working pressure range	: 6 – 7 bar. Max 7 bar (85 – 100 Psi. Max. 101.5 Psi)
Air consumption	: < 0,3 Nm <sup>3</sup> /min (< 12 Cfm)
Ambient temperature	: +10° - +40° C. (+50° - +104° F)
Sound level	: 70 dB(A)
Spindle taper for chuck	: B10
Chuck	: As standard the drilling unit is fitted with a precision chuck Ø 0 – 5,0 mm (0 – 3/16"). A smaller and larger precision chuck and precision collet chuck with collets are available as an option. A larger key chuck and collet chuck with collets are available as an option.

### Power, at 6,3 Bar (91.35 Psi):

Type	Power, kW	Power, Hp
BEP 2222 SK	0,25	0,33
BEP 2236 SK	0,25	0,33
BEP 2249 SK	0,25	0,33
BEP 22220 SK	0,25	0,33



Typical air motor characteristics.

### Speed and torque, at 6,3 Bar (91.35 Psi):

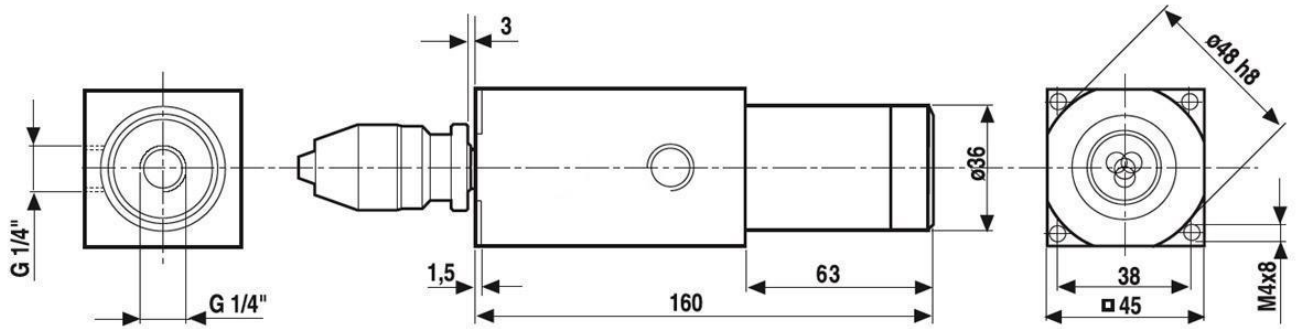
Type	Speed * (idle) Rpm	Speed (at max power) Rpm	Torque (at max power) Nm	Torque (at max power) Lbf
BEP 2222 SK	2200	1100	2,4	21
BEP 2236 SK	3600	1800	1,5	13
BEP 2249 SK	4900	2450	1,1	10
BEP 22220 SK	22000	11000	0,25	2,25

\* Lubrication free air motors have 95% of shown idle speed.

Maximum power is produced when the drilling spindle during operation rotates at half speed max speed.

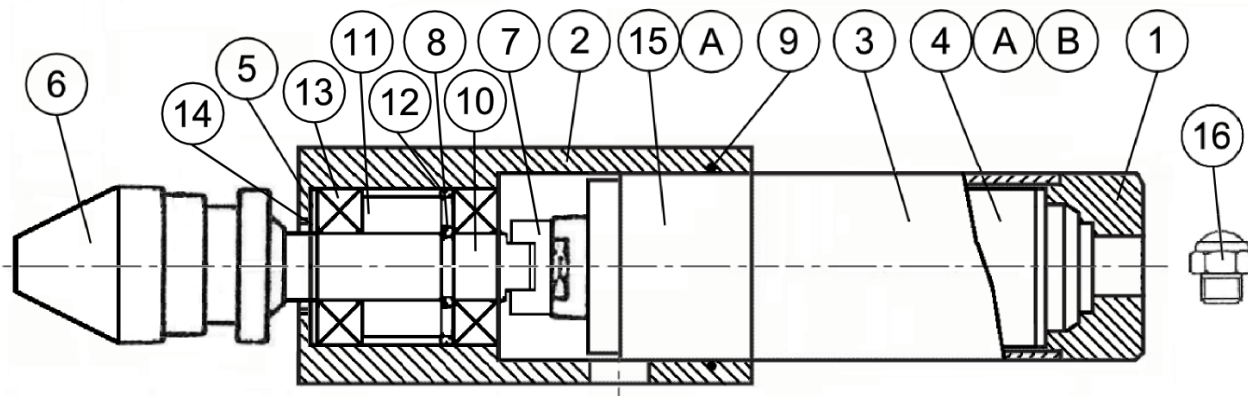
For other data such as drilling capacity we refer to our website [www.e2systems.com](http://www.e2systems.com).

## Dimensional drawing



Type	Weight, Kgs	Weight, Lbs
BEP 2222 SK	1,7	3,75
BEP 2236 SK		
BEP 2249 SK		
BEP 22220 SK		

## Spare parts drawing



## Spare parts list

### BEP 22 SK

Pos.	Qty	Description	Part no.
1	1	End Cap	041U000049
2	1	Housing	041V300044
3	1	Air motor cover	042K000017
4	1	Air motor BEP 2222, 2236, 2249, 22220 SK	042K000011
4A	1	Set of vanes for <b>oil lubricated</b> air motor, pos. 4, complete.	041R000030
4A	1	Set of vanes for <b>non-lubricated</b> air motor, pos. 4, complete.	041R000028
4B	1	Set of ball bearings for air motor, pos. 4, complete.	041R000032
5	1	Wave spring, for old versions only.	042K000060
6	1	Precision Chuck, Ø 0 - 3,0 mm (0 - 1/8")	041J004004
6	1	Precision Chuck, Ø 0 - 5,0 mm (0 - 3/16"), (standard chuck).	041J004005
6		Precision Chuck, Ø 0 - 8,0 mm (,03 - 3/8")	041J004006
6	1	Presision Collet Chuck ER11, Ø 0,5 - 8,0 mm (,02 - 5/16")	041J004020
7	1	Coupling	041U000045
8	1	Locking ring, split	015U001006
9	1	O-ring, 34,2x3,0 Nitril	418A210140
10	1	Adaptor	041U000047
11	1	Spacer	041U000048
12	1	Circlip, SGA 15	415A151011
13	2	Ball bearing	419A100020
14	1	Circlip, SGH 28	415A151012
15	1	Planetary gear BEP 2222 SK, complete.	041U000056
15	1	Planetary gear BEP 2236 SK, complete.	041U000059
15	1	Planetary gear BEP 2249 SK, complete.	041U000054
15	1	Planetary gear BEP 22220 SK, complete.	041U000053
15A	1	Bearing kit for Planetary gear BEP 2222, 2236, 2249 SK, complete.	041R000034
15A	1	Bearing kit for Planetary gear BEP 22220 SK, complete.	041R000036
16	1	Silencer, G1/4"	057U000001

## Warranty conditions

The warranty period for the product is 12 months after installation/ commissioning or 18 months after delivery, whichever of these occurs first, and provided that the product is installed/stored in a satisfactory manner and that the product is used in normal operation, the mounting/ clamping and handling conditions. The warranty is not valid if unauthorized change/modification have been performed on the product and that this may make the product unsafe.

## Environmental declaration

Drilling unit, Type BEP 22 SK

Housing : Steel  
Other parts : Aluminium, Brass and steel  
Gasket : Rubber

Housing and other metallic parts : Dispose as metal waste; Aluminium, Brass and steel.  
Gasket : Dispose as combustible waste.

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All information contained in this manual is intended to be correct; however information and data in this manual are subject to change without notice. E2systems makes no warranty of any kind of regard to this information or data. Further, E2systems is not responsible for any omissions or errors or consequential damaged caused by the user of the product. E2systems reserves the right to make manufacturing changes which may not be included in this manual.