



EN

Manual

**Pneumatic Drilling/Milling Unit
Series BE 22 SKM / BE 33 SKM**



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

MAN073 - Manual BE 22&33 SKM, ORIGINAL, EN, 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,

declares that the partly completed machinery:

Model: BE22x & BE33x SK(M)

- * 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 of the essential health and safety 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
2004/108/EC Electromagnetic Compatibility (EMC)
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/milling unit is in use.
- For security reasons, any modification of the drilling/milling unit and it's accessories, which may affect product safety, must be approved by the manufacturers technical manager.
- The unit is intended for drilling/milling 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/milling 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/milling 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.

According to Machinery Directive 2006/42/EC the unit is a "partly completed machinery". Thereby the manufacturer of the machine is responsible for the overall safety. This device may 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. In this manual, there is, in addition to information Machinery Directive requires of the E2 Systems, manufacturer of the unit, including 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 system for guarding tool, do we recommend the user/operator that frequently control tool that no damages occur.

Thorough review of the unit

Visual control of any outer damages. Ensure there is opportunity to fast turn of motor and air-supply and run a normal cycle without tool and material (to avoid further damages at the material and unit). Listen after noise from bearings, etc. Also control run-out on spindle nose, to ensure an satisfying result. If the unit not is ok, it has to be repaired and the control check will be necessary again. If the unit seems ok, should a normal cycle with tool and material be done and evaluated.

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. E2 Systems will give the machine constructor best possible opportunity for this work in this manual.

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.e2systemems.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 BE22 or BE33 SKM-series weight is between 0,9-2,0kg. Thereby can the unit be carried of one person, BE33 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/milling unit

The **BE 22 SKM** and **BE 33 SKM** consist of an air motor, a gear box and a robust body. When you need a unit without a feed the E2 SKM-units are a very good alternative. The design is compact as well as robust. BE 22 SKM and BE 33 SKM comes in a wide range of speeds. BE 22 SKM and BE 33 SKM is also available for lubrication-free operation.

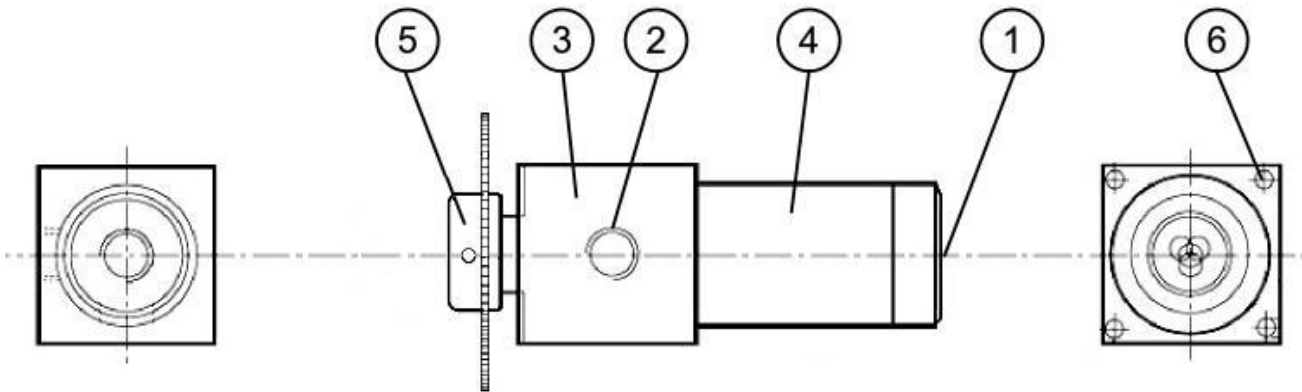
Type and speed: See data label on drilling/milling unit
Serial number: See data label on drilling/milling unit

E2 SYSTEMS		Made in Sweden	
Type		Ser. No	
BE 335 SK		090301	
	500		rpm

Normal direction of rotation for the drilling/milling units spindle is right-hand direction (clockwise).
The drilling/milling unit can be ordered as left-hand direction (anti-clockwise).
The data label is then marked with "L".

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. Saw Blade Holder or Collet Chuck.
6. BE 22 SKM: Mounting holes (4x) M4x8.
6. BE 33 SKM: Mounting holes (4x) M5x10.




Installation of the drilling/drilling/milling 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 enhancing resonance noise and vibrations wherever it is possible, which can occur from nearby constructions as works as resonance box.

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/drilling/milling unit without being securely fastened and that appropriate arrangements have been organised.
	Be careful with rotating and moving parts, to avoid personal injuries.
	Ensure that the drilling/drilling/milling unit is disconnected from the main air-supply, before any maintenance.

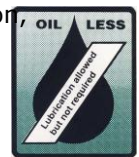
Air supply:

A complete air preparation unit (FRL unit) with a flow capacity exceeding 0,3 Nm³/min (12 Cfm) for BE 22 SKM and 0,5 Nm³/min (19 Cfm) for BE 33 SKM, 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/drilling/milling unit to provide clean and lubricated air to the drilling/drilling/milling 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 mm³ (.000528 fl.oz. (UK), .000507 fl.oz. (US)) The oil/air mix ratio should be 50 mm³ (.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/drilling/milling units are used, each unit must have a separate air supply.

The drilling/drilling/milling 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:

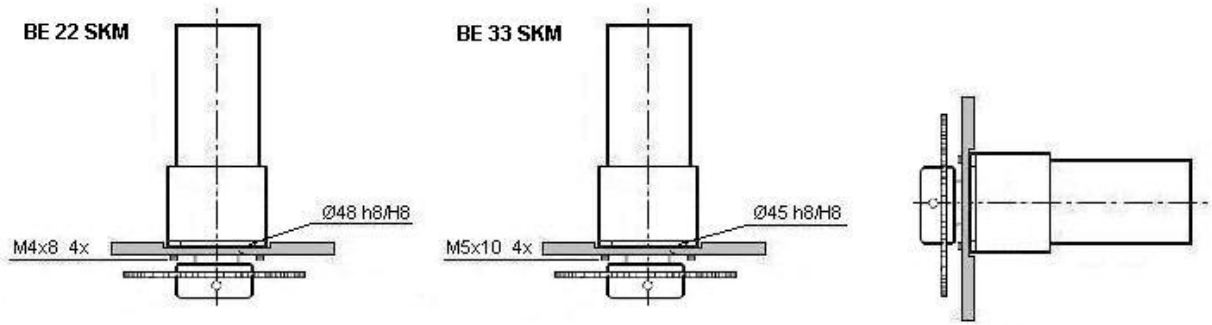
Connection (1) is for the air motors air supply and is connected via a 3/2 valve, 1/8", connected directly to the FRL unit. Hoses and couplings must maintain a flow area equivalent to at least an inside diameter of ø6 mm (1/4"). No additional pneumatic devices, controllers, etc. may be fed from this 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/drilling/milling unit according to the below. The drilling/drilling/milling unit can be mounted vertically or horizontally. Optional attachment should be discussed with E2's technician.



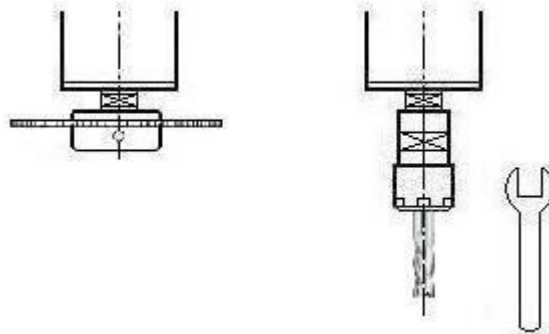
Mounting of cutting tools

The following cutting tools can be used with drilling/drilling/milling unit:

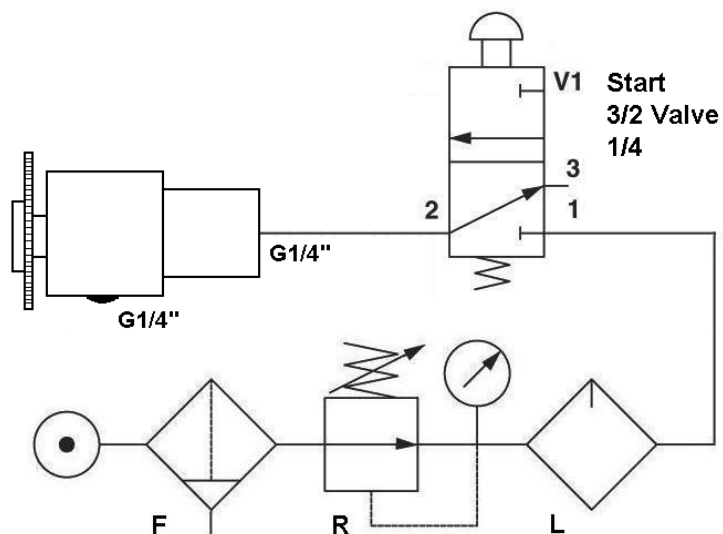
Saw blade and shank end mill.

The drilling/milling unit can be fitted with either saw blade holder or collet chuck.

Saw Blade Holder: 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 mm³ (.000528 fl.oz. (UK), .000507 fl.oz. (US))
- Check that the drilling/drilling/milling unit is clean.

Monthly check:

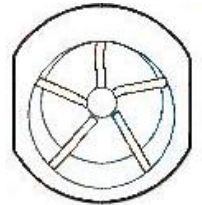
- Check that no abnormal play is present in the mill spindle.
- Check that external silencer is not clogged.
- Check that the air filter in the FRL unit is working or replace the air filter.

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 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.

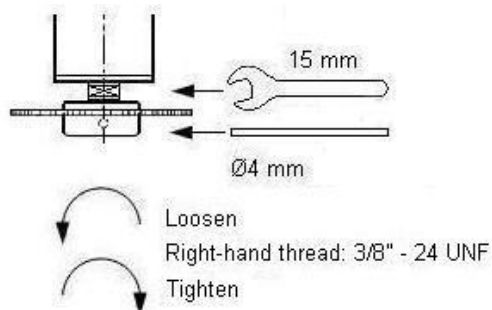


If hard operation, overhauling and cleaning should be performed with tighter intervals.

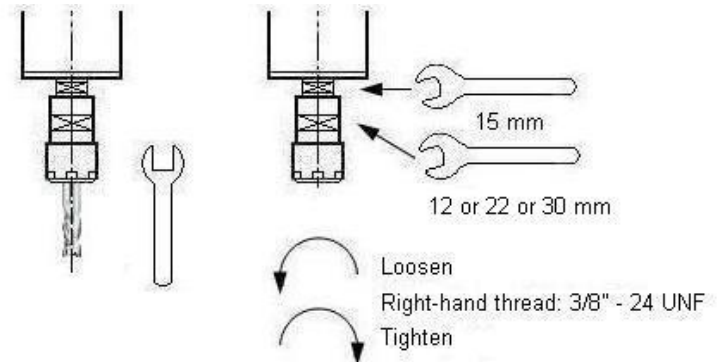
Replacement of tool holder

1. Turn off the air supply to the drilling/milling unit completely.
2. Remove eventual cutting tool from the saw blade holder or collet chuck.
3. Remove and replace the saw blade holder or collet chuck as shown below.
4. Remount the cutting tool.
5. Turn on the air supply to the drilling/drilling/milling unit again.

Saw Blade Holder:



Collet Chuck:



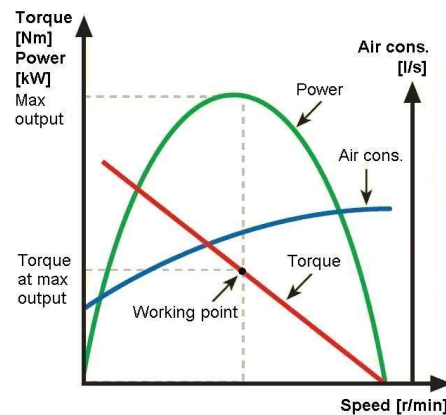
Technical information

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

Power, air motor	: See Power table below.
CC spindle spacing	: BE 22 SKM, min. 45 mm (1 3/4"). BE 33 SKM, min. 50 mm (1 15/16").
Run-out at spindle nose	: BE 22 SKM, max. 0,03 mm (.001 In). BE 33 SKM, max. 0,05 mm (.002 In).
Working pressure range	: 6 – 7 bar. Max 7 bar (85 – 100 Psi. Max. 101.5 Psi)
Air consumption	: BE 22 SKM, < 0,3 Nm ³ /min (< 12 Cfm). BE 33 SKM, < 0,5 Nm ³ /min (< 19 Cfm)
Ambient temperature	: +10° - +40° C. (+50° - +104° F.)
Sound level	: 70 dB(A)
Spindle thread	: 3/8" – 24 UNF

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

Type	Power, kW	Power, Hp
BE 225 SK	0,25	0,33
BE 228 SK	0,25	0,33
BE 2211 SK	0,25	0,33
BE 2222 SK	0,25	0,33
BE 2236 SK	0,25	0,33
BE 2249 SK	0,25	0,33
BE 22150 SK	0,25	0,33
BE 22220 SK	0,25	0,33
<hr/>		
BE 335 SKM	0,36	0,48
BE 337 SKM	0,36	0,48
BE 3313 SKM	0,36	0,48
BE 3326 SKM	0,36	0,48
BE 3333 SKM	0,36	0,48
BE 3360 SKM	0,36	0,48
BE 33210 SKM	0,36	0,48



Typical air motor characteristics.

Speed and torque, at 6.3 Bar (91.35 Psi):

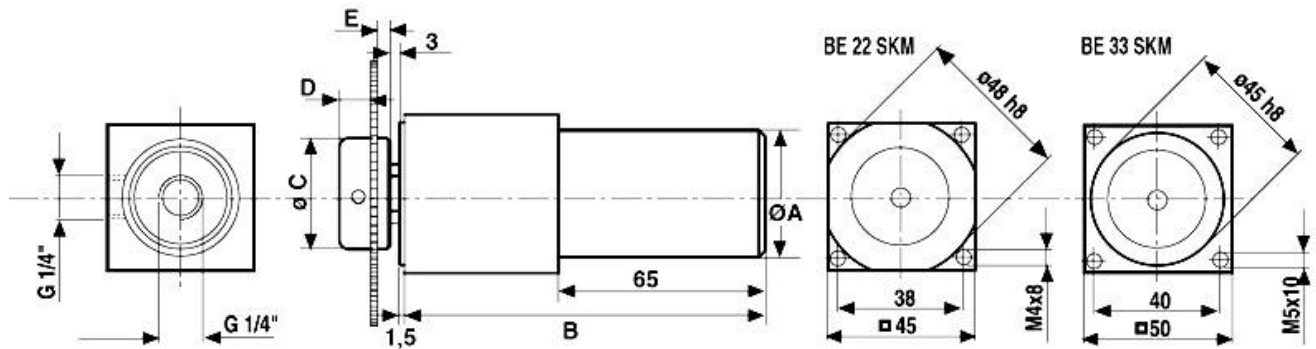
Type	Speed * (idle) Rpm	Speed (at max power) Rpm	Torque (at max power) Nm	Torque (at max power) Lbf
BE 225 SK	500	250	9,9	88
BE 228 SK	800	400	6,0	53
BE 2211 SK	1100	550	4,3	38
BE 2222 SK	2200	1100	2,4	21
BE 2236 SK	3600	1800	1,5	13
BE 2249 SK	4900	2450	1,1	10
BE 22150 SK	15000	7500	0,25	2,25
BE 22220 SK	22000	11000	0,25	2,25
<hr/>				
BE 335 SKM	500	250	12,6	112
BE 337 SKM	700	350	10,4	92
BE 3313 SKM	1300	650	5,7	50
BE 3326 SKM	2600	1300	2,9	26
BE 3333 SKM	3300	1650	2,3	20
BE 3360 SKM	6000	3000	1,3	12
BE 33210 SKM	21000	10500	0,37	3,25

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

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

For other data such as drilling/milling capacity we refer to our website www.e2systems.com.

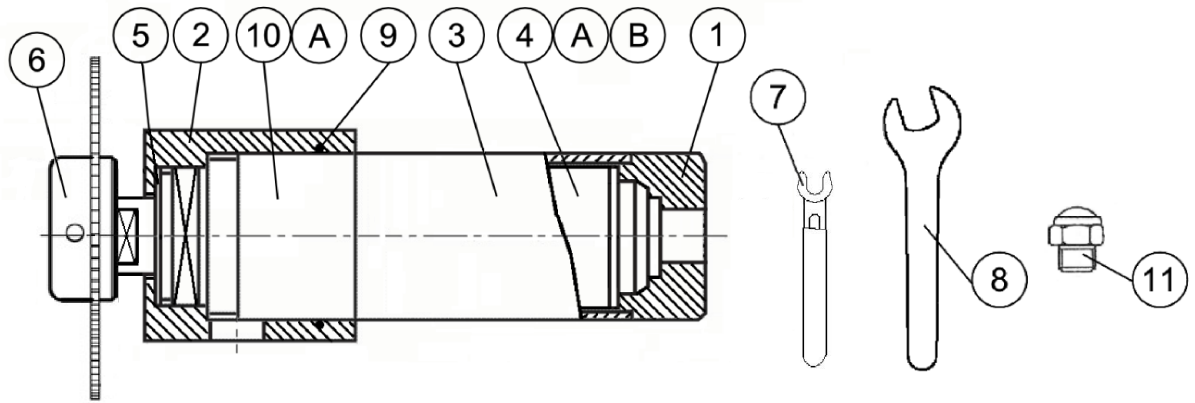
Dimensional drawing



Type	$\varnothing A$ mm	B mm	Weight, Kgs	Weight, Lbs
BE 225 SKM	36	141	1,5	3,25
BE 228 SKM	36	141	1,5	3,25
BE 2211 SKM	36	141	1,5	3,25
BE 2222 SKM	36	109	0,9	2
BE 2236 SKM	36	109	0,9	2
BE 2249 SKM	36	109	0,9	2
BE 22150 SKM	36	109	0,9	2
BE 22220 SKM	36	109	0,9	2
BE 335 SKM	40	149	2,0	4,43
BE 337 SKM	40	149	2,0	4,43
BE 3313 SKM	40	149	2,0	4,43
BE 3326 SKM	40	115	1,4	3,06
BE 3333 SKM	40	115	1,4	3,06
BE 3360 SKM	40	115	1,4	3,06
BE 33210 SKM	40	115	1,4	3,06

Bore	$\varnothing C$ mm	D mm	E mm
$\varnothing 16$	35	10	4
$\varnothing 22$	40	8	5
$\varnothing 32$	50	12	5

Spare parts drawing BE 22 SKM

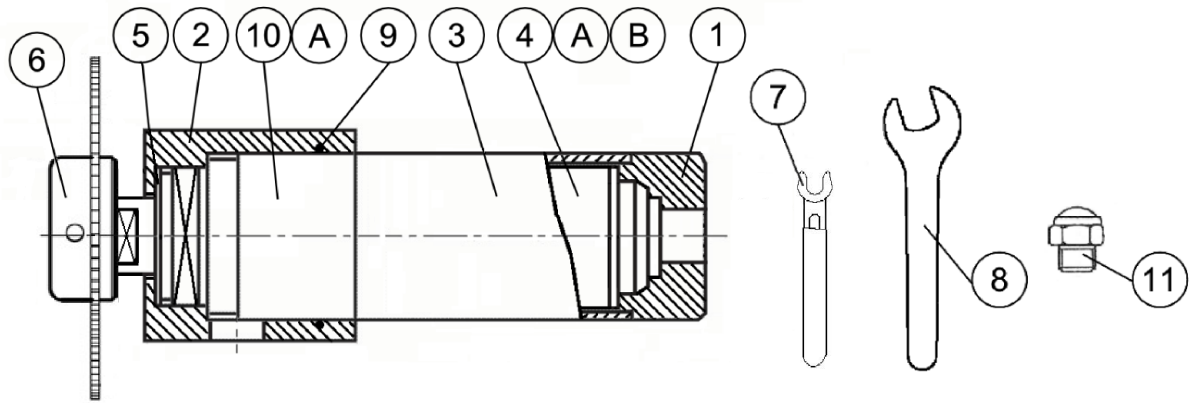


Spare parts list BE 22 SKM

BE 22 SKM

Pos.	Qty	Description	Part no.
1	1	End Cap	041U000049
2	1	Housing	041V400091
3	1	Air motor cover	042K000017
4	1	Air motor BE 228, 2236 SK	042K000010
4	1	Air motor BE 225, 2211, 2222, 2249, 22150, 22220 SK	042K000011
4	1	Air motor for left-hand rotation, on request.	
4A	1	Set of vanes for oil lubricated air motor, pos. 4, complete.	041R000030
4A	1	Set of vanes for non-lubricated 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	Holder for Saw, Ø16 mm (5/8")	041J000010
6	1	Holder for Saw, Ø22 mm (7/8")	041J000003
6	1	Holder for Saw, Ø32 mm (1 1/4")	041J000005
6	1	Collet Chuck ER11, Ø 1,0 - 8,0 mm (.04 - 5/16")	040J000122
6	1	Collet Chuck ER20, Ø 1,0 - 15,0 mm (.04 - 9/16")	040J000121
6	1	Collet Chuck ER32, Ø 2,0 - 20,0 mm (.08 - 13/16")	040J000124
7	1	Wrench for Collet Chuck Nut pos. 6. ER11.	041J004083
7	1	Wrench for Collet Chuck Nut pos. 6. ER20.	041J004084
7	1	Wrench for Collet Chuck Nut pos. 6. ER32.	043J000002
8	1	Tool for removal of Holder or Collet Chuck.	041J004047
9	1	O-ring, 34,2x3,0 Nitril	418A210140
10	1	Planetary gear BE 225 SK, complete.	041R000047
10	1	Planetary gear BE 228 SK, complete.	041R000048
10	1	Planetary gear BE 2211 SK, complete.	041R000024
10	1	Planetary gear BE 2222 SK, complete.	041U000056
10	1	Planetary gear BE 2236 SK, complete.	041U000059
10	1	Planetary gear BE 2249 SK, complete.	041U000054
10	1	Planetary gear BE 22150, 22220 SK, complete.	041U000053
10A	1	Bearing kit for Planetary gear BE 225, 228, 2211 SK, complete.	041R000035
10A	1	Bearing kit for Planetary gear BE 2222, 2236, 2249 SK, complete.	041R000034
10A	1	Bearing kit for Planetary gear BE 22150, BE 22220 SK, complete.	041R000036
11	1	Silencer, G1/4"	057U000001

Spare parts drawing BE 33 SKM



Spare parts list BE 33 SKM

BE 33 SKM			
Pos.	Qty	Description	Part no.
1	1	End Cap	041V400094
2	1	Housing	041V400093
3	1	Air motor cover	041U000125
4	1	Air motor BE 337, 3313, 3333, 3360, 33210 SK	041U000137
4	1	Air motor BE 335, 3326 SK	041U000138
4	1	Air motor for left-hand rotation, on request.	
4A	1	Set of vanes for oil lubricated air motor, pos. 4, complete.	041R000031
4A	1	Set of vanes for non-lubricated air motor, pos. 4, complete.	041R000029
4B	1	Set of ball bearings for air motor, pos. 4, complete.	041R000041
5	1	Wave spring	414A132002
6	1	Holder for Saw, Ø16 mm (5/8")	041J000010
6	1	Holder for Saw, Ø22 mm (7/8")	041J000003
6	1	Holder for Saw, Ø32 mm (1 1/4")	041J000005
6	1	Collet Chuck ER11, Ø 1,0 - 8,0 mm (.04 - 5/16")	040J000122
6	1	Collet Chuck ER20, Ø 1,0 - 15,0 mm (.04 - 9/16")	040J000121
6	1	Collet Chuck ER32, Ø 2,0 - 20,0 mm (.08 - 13/16")	040J000124
7	1	Wrench for Collet Chuck Nut pos. 6. ER11.	041J004083
7	1	Wrench for Collet Chuck Nut pos. 6. ER20.	041J004084
7	1	Wrench for Collet Chuck Nut pos. 6. ER32.	043J000002
8	1	Tool for removal of Holder or Collet Chuck.	041J004047
9	1	O-ring, 39,2x3,0 Nitril	418A210142
10	1	Planetary gear BE 335 SK, complete.	041R000046
10	1	Planetary gear BE 337 SK, complete.	041R000037
10	1	Planetary gear BE 3313 SK, complete.	041R000038
10	1	Planetary gear BE 3326 SK, complete.	041U000142
10	1	Planetary gear BE 3333 SK, complete.	041U000141
10	1	Planetary gear BE 3360 SK, complete.	041U000140
10	1	Planetary gear BE 33120 SK, complete.	041U000139
10A	1	Bearing kit for Planetary gear BE 335, 337, 3313 SK, complete.	041R000042
10A	1	Bearing kit for Planetary gear BE 3326, 3333, 3360, 33210 SK, complete.	041R000043
11	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 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/milling unit, Type BE 22 SKM or BE 33 SKM

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.

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.