



EN

Manual

**Electro Pneumatic Drilling
And Tapping Unit**

Series BE 48 and BEG 48



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

MAN052 - Manual BE 48 and BEG 48, EN, ORIGINAL Rev.
03.doc

E2 Systems

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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: BE48X or BEG48X

* 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

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 4413:2010 Hydraulic fluid power -- General rules and safety requirements for systems and their components.

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

SS EN ISO 60204-1 Safety of machinery - Electrical equipment of machines - Part 1: General requirements

Borås: 2009-12-18



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Table of content:	Page:
Table of content	4
General warnings	5
Safety	6
Information about Manufacturer	6
Device management	7
Description of the Drilling and Tapping unit	7, 8
General and Installation	9,10,11,12,13,14
Settings	15, 16
Start-up	17
Tool holders and Cutting tools	17
Drilling, Countersinking and Reaming	17
Tapping	18
Maintenance instructions	19
Oil refilling of the Hydrocheck	20
Drive belt tension and Transmission change out	21
Technical information	22
Dimensional drawing	23
Spare parts drawings	24 and 29
Spare parts lists	25, 26, 27, 28 and 30, 31, 32, 33
Warranty conditions, Environmental declaration	34



WARNING!

- **Ensure that the operator has read and understood this manual before the unit is in use.**
- For security reasons, any modification of the drilling/tapping unit and its accessories, which may affect product safety, must be approved by the manufacturers technical manager.
- The unit is intended for drilling, countersinking, reaming and tapping 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 unit must be securely fixed and the installation instructions must be strictly observed.
- The drilling/tapping unit must be protected against splash of emulsions, etc. This is to ensure the units function as the lid for the micro-switches is not sealed against dust or liquid.
- 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.
- In order to avoid personal injury, the unit's quill must not be run with compressed air in any direction without first mounting safety plates over the limit switches and linear transducer. When changing settings with these plates removed, measures must be taken prevent unintentional movement of the quill, e.g. disconnecting control current or depressurizing the unit's feed cylinder.
- 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.
- Prior to disassembling the unit to change seals etc., the hydrocheck must be fully depressurized. This is most easily accomplished using the bleed screw, See Fig. 15. Pos. 3, on page 14.
- When disassembling the end cover from the hydrocheck, be careful of the spring loaded piston inside the hydrocheck.
- Beware of hands, gloves, hair and loose fit clothing – Watch out for rotating parts.
- Never operate the 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

Safety

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 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.
- Secure that electric motor is supplied with overload protection.

Thorough review of the unit

Visual control of any external damages. Ensure there is possibility to quickly turn off the motor and 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. If you would like to come in contact with E2 Systems regarding questions or comments on our products or documentation, our contact information follows:

E2 Systems

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Device management

The BE(G)48-series weight in most cases between 24-28kg and always lesser than 35kg (BE485 with largest possible multi-spindle head VH104P). The easiest units (BE481 without multi-spindle head) can be carried with only one person. The heavier models should be carried with two persons standing towards each other and walking sideways. All models should be carried in minimum 2 attachment points, both considering the safety for the persons lifting the unit and also considering the safety for the unit. Hands as well as other lifting devices which are used as carrying device should be attached at feeding house/-control (to the left on drawing in the end of the manual) in front of the unit as well as transmission housing at the units rear position (to the left at drawing) to ensure best possible grip and balance of weight. The unit can be lifted around the electric motor as one lifting point if it is done carefully and for a shorter time. The same applies for the spindle/chuck for units with integrated ER32- chuck or mounted multi-spindle head.

BE(G)48- series weight is laterally symmetric, but not in any other direction. Because of unit compact laterally it may, with the engine in the standard mode up, easily obtained from tipping sideways from a stable standing position. There is a risk for squeezing damages and other not direct damages occurring from the heaviness from the falling unit. Therefore should the unit be mounted or put in sideways position before installing adjustments of electric motor and pneumatic air. When motor are mounted in 90° degree are unit stabile standing. When the unit are mounted in 180° degree should the unit be placed on a surface which the motor can be hanging outside table edge. Therefore should the unit always be placed as long from the edge possible.

Description of the Drilling and Tapping unit

The **BE 48**-series is a flexible electro-pneumatic unit in a modular design. The electric motor runs the spindle while the feed is pneumatic. An hydraulic feed control (hydrocheck) makes it possible to include functions such as multi wall drilling, rapid advance and automatic chip removal.

The **BEG 48**-series is a flexible electro-pneumatic unit in a modular design. The electric motor runs the spindle while the feed is pneumatic. An hydraulic feed control (hydrocheck) makes it possible to include functions such as rapid advance. A tapping spindle gives the unit the necessary length compensation.

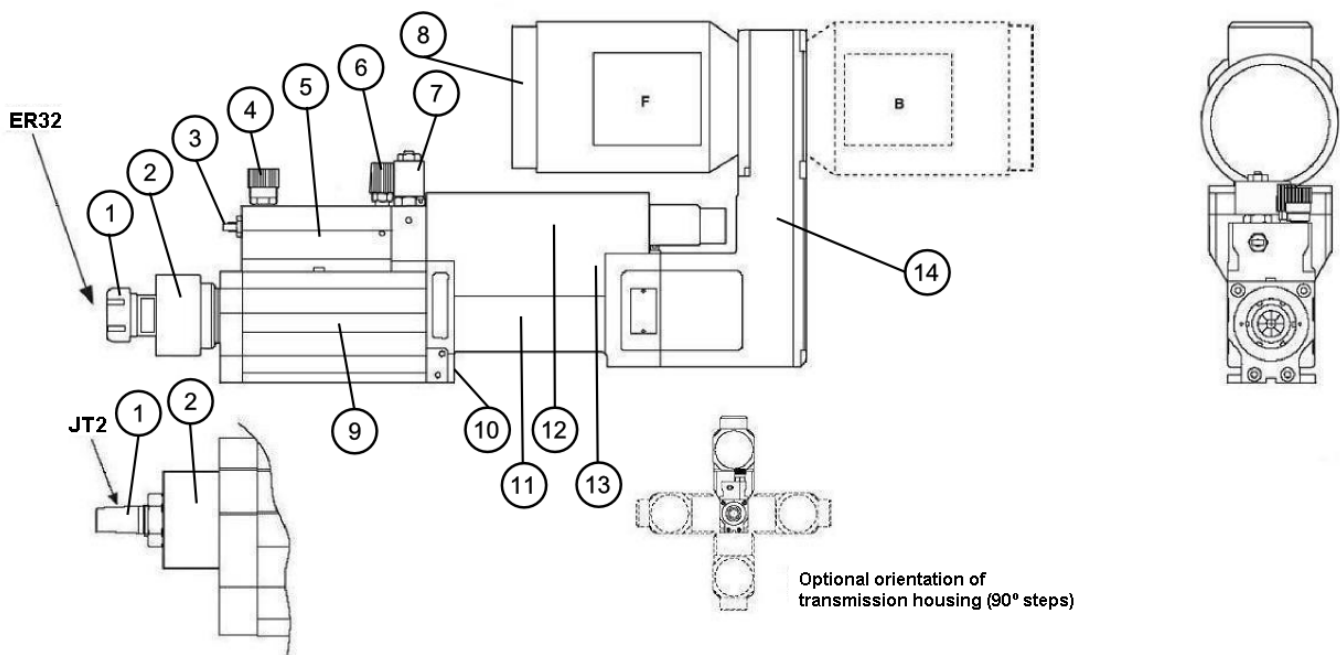
Series have three different motor options which define model BE(G)481, BE(G)482, BE(G)485. Within each model series there also are, different revolutions per minute, together with a big number of transmission alternative is there possible to achieve a huge number of different spindle revolutions. Which are typed in to the unit's data label below. BE(G)48-series can be supplied with Jacob-Kona 2 (male) alternative an integrated ER32-chuck. Which are labelled JT2 or ER32 at data label. To the BE(G)48-series can be delivered whit a large range of different multi-spindle head, which have own data labels.

4 different types of limit switches/position sensors ensure that this unit fits your system design.

Type and speed: See data label on unit
Serial number: See data label on unit



1. Spindle with ER32 collet chuck or JT2 taper.
2. Pinole.
3. Oil-level indicator.
4. Regulating valve for controlled feed rate. 0 – 100%.
5. Hydrocheckl.
6. Oil refilling nipple for hydrocheck.
7. 2-way magnetic valve. For linear transducer only.
8. Electric motor. Forward or backward mounted.
9. Feed house.
10. Ports, G1/8".
11. Mid-section.
12. Limit switches; electric, pneumatic, inductiv or linear transducer.
13. Setting screws for stroke limit.
14. Transmission housing with transmission between electric motor and drive shaft.



Installation

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 to 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 and hydraulic 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 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 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

If test will be done anyway beware of following risk

Attached the unit to something very stable

Keep hair, clothes and other loose things away from the rotating spindle.

Keep everything away from spindle when feeds forward and back – for risk for clamping

Give space so that the feeding can feed all stroke (100mm) add safety distance for clamping risk

1. We recommend that this unit is installed in a place with clean air and an ambient temperature of $+10 - +40^{\circ}\text{C}$ ($+50 - +104\text{ F.}$).
2. The unit must always be mounted on a level surface (machined) and attached with six M8 screws. On the bottom side of the unit = mounting surface, there is a 10 mm wide groove for align the unit. See Fig. 1.

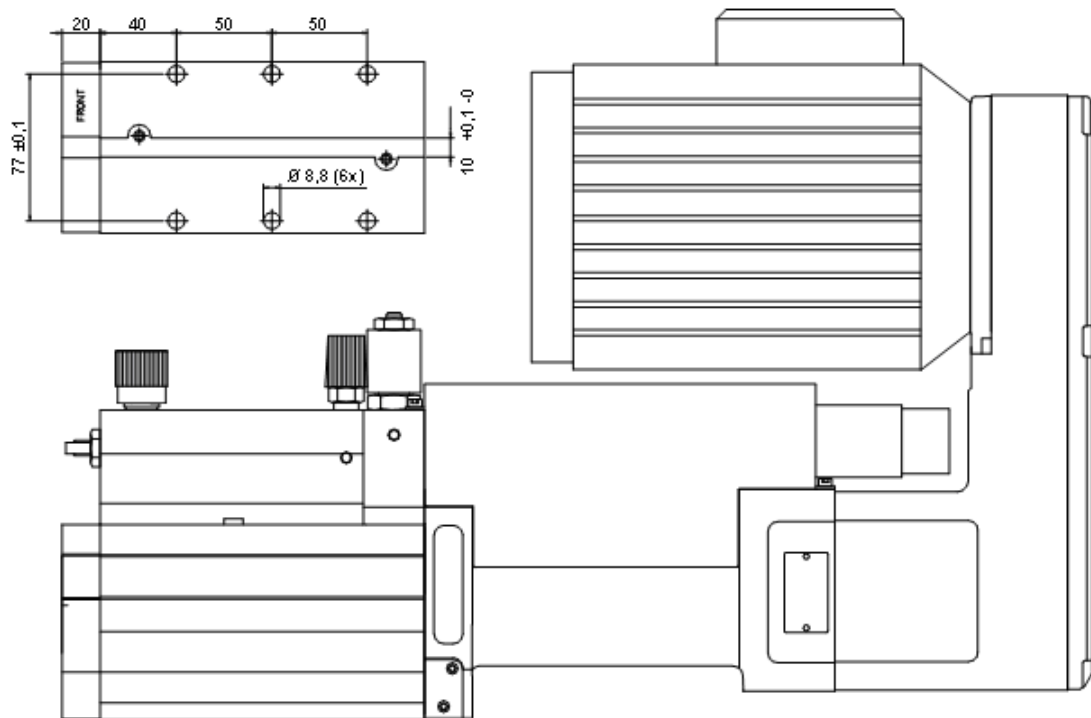


Fig. 1.

3. The protective guards covering the limit switches or linear transducer are not sealed. Make therefore certain not spray coolant or similar over them.

4. Connection of the electric motor is done as shown in Fig. 2. and depending on which 3-phase voltage is available. Check all the data on the electric motors data label to ensure that motor protection and connection are properly carried out. The electric motor must be equipped with a suitable control circuit and motor protection. Different brands of motors may be present. See the enclosed manual from the engine manufacturer, and follow its installation instructions. Specifically for this unit: The connection cable must have an area of at least 1.5 mm². Ensure that the motor rotation direction is correct.

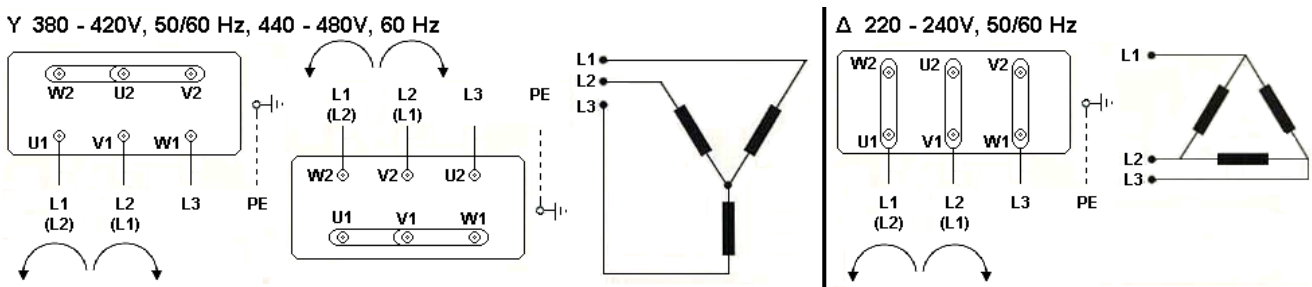


Fig. 2.

If the phases L1, L2 and L3 are connected to the terminals as shown in Fig. 2 the motor shaft rotates clockwise, seen against the shaft end on the drive side. Let two of the phase cables change place if the direction of rotation needs to be changed.

Example of control circuit: One way rotation for drilling and two way rotation for tapping.

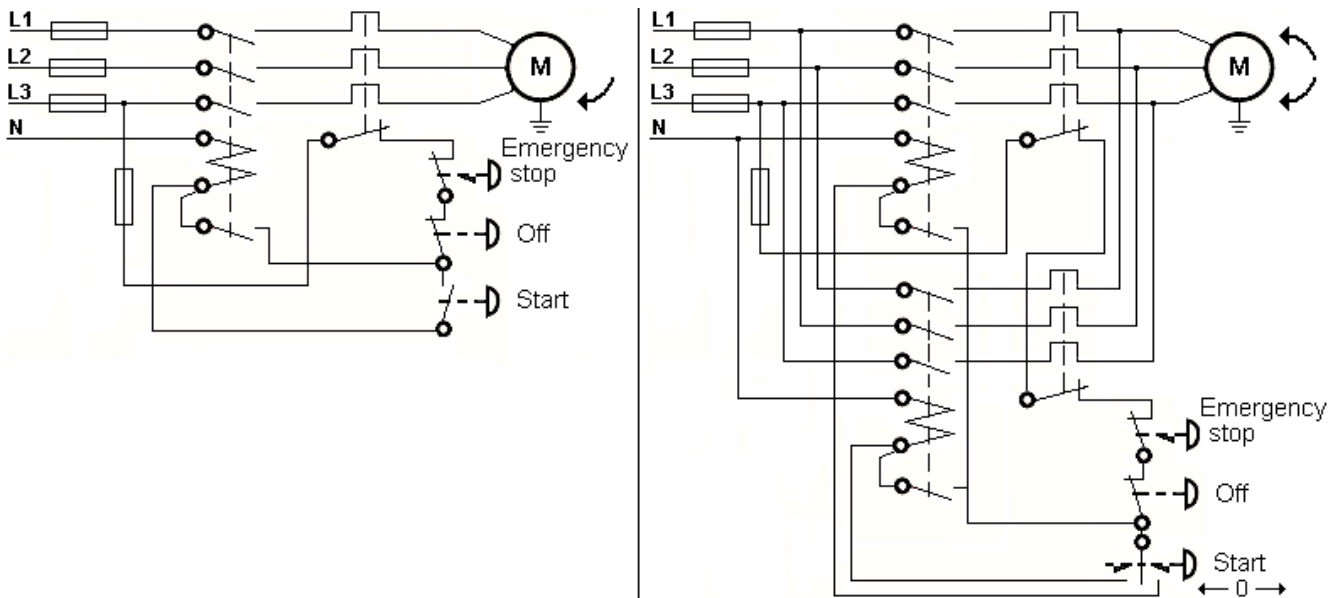


Fig. 2a

5. Connection of the feeding cylinder. The connected compressed air must be of good quality. 6 – 7 Bars (87 – 101.5 Psi). Max pressure 8 Bars (116 Psi). Anslutningen sker då lämpligast via en luftberedningsenhet med ett luftfilter och tryckregulator. Oil-mist lubrication is an advantage, but not necessary. The unit is provided with plug-in couplings for plastic hoses of Ø8 mm (5/16") outside diameter for compressed air connection. The inside diameter shall be ø6 mm (1/4"). See Fig. 3.

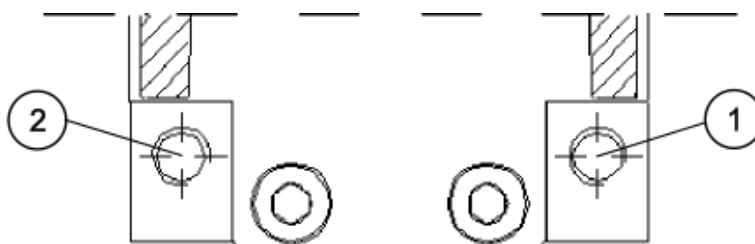


Fig. 3.

- Pos. 1. Port 1, connection thread G 1/8. Pressurized for forward feed.
 Pos. 2. Port 2, connection thread G 1/8. Pressurized for retraction feed.

6. Drilling, countersinking or reaming: The units rapid advance and retraction movements should not exceed a speed of 100 mm/sec. (0,33 fps) to ensure smooth operation and proper signal processing. This is particularly important when the unit is equipped with a linear transducer. Regulation of the speed is possible by fitting the hoses to the units feed cylinder, Port 1 and 2, with throttle-check valves. Place the throttle-check valves as close as possible to the unit. See Fig. 4a.

Tapping: The rapid advance retraction should not be too high. Regulation of the speed is possible by fitting the hose to the units feed cylinder advance, Port 1, with a throttle-check valve. Place the throttle-check valve as close as possible to the unit. See Fig. 4b.

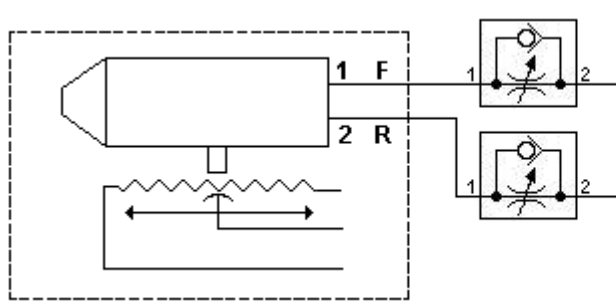


Fig. 4a.

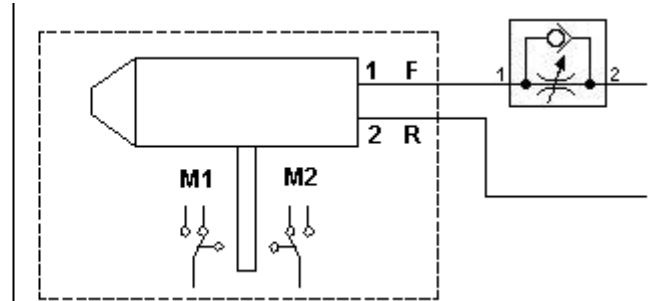


Fig. 4b.

7. Units delivered with pneumatic limit switches (chosen when ordering) allow automatic drilling operation, pneumatically controlled in accordance with Fig. 5 where the valve (marked Start) is actuated manually. Should repeated automatic drilling be desired, this valve must be replaced by a pneumatically controlled valve which receives its activation signal from the control system of the processing machine in which the unit is installed. Valves V4 and V5 are pneumatic limit switches, which are delivered mounted on the unit. Valve V1 shall be of 4-way, 2 position type and the the dimension of valve V1 shall be 1/8" when the valve is used for a single unit.

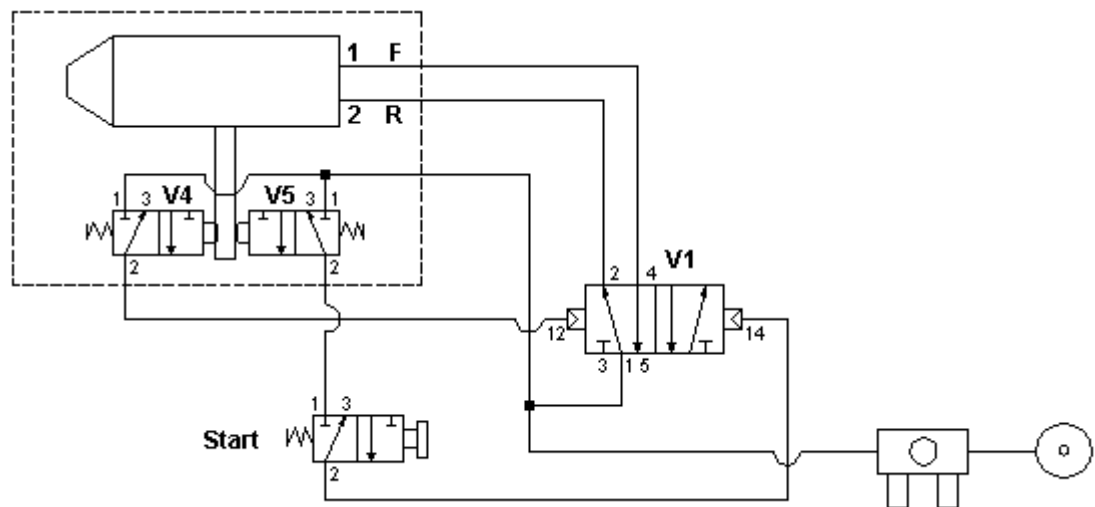


Fig. 5.

8. If the unit is delivered with electrical switches, proximity switches or a linear transducer (chosen when ordering), valve V1 shall be electrically controlled type of 4-way, 2-position type. The dimension of the valve shall be 1/8" when the valve is used for a single unit. See Fig. 6.

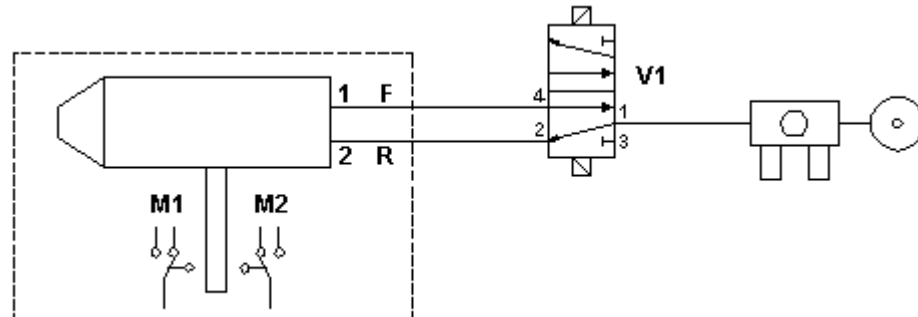


Fig. 6.

9. Connection of pneumatic limit switches for sensing the position of the feed spindle. The unit is delivered with plastic hose (length 2 meters (6.56 Ft)) with an outside diameter of $\varnothing 4$ mm (3/16") for connecting the pneumatic limit switches. Connection, see Fig. 5 and 7.

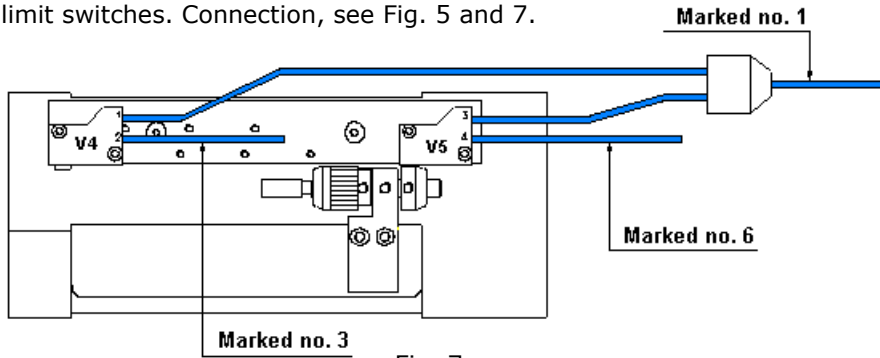


Fig. 7.

Hose marked, 1: Pressure supply for both limit switches. To be connected directly to the compressed air system.

Hose marked, 3: Signal for attainment of the set drilling depth. To be connected to maneuvering valve V1, port no.12.

Hose marked, 6: Signal indicating that the unit is in the retracted position. To be connected to the start valve, port no.1

10. Connection of electrical limit switches for sensing the position of the feed spindle. Max. capacity 6A at 125 or 250V AC. The unit is delivered with both microswitches connected to a single cable with a length of 2 meter (6.56 Ft). Connection, see Fig. 6. and 8.

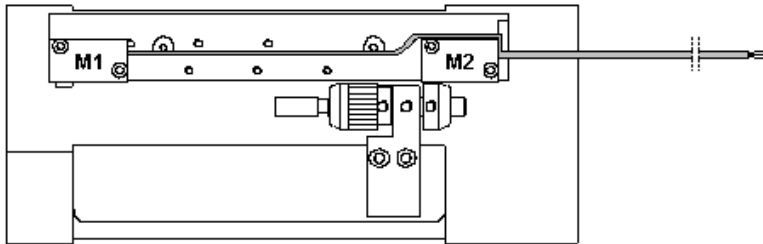


Fig. 8.

Microswitch M1 for setting forward direction-reverse position when mechanically non-activated:

Cable colour coding: - Between beige and green = no contact
- Between beige and yellow = contact

When the microswitch is activated at the set direction-reverse position:

Cable colour coding: - Between beige and green = contact
- Between beige and yellow = no contact

Microswitch M2 is mechanically activated when the feed spindle is in "home position" = fully retracted:

Cable colour coding: - Between black and blue = no contact
- Between black and brown = contact
- The green/yellow cable is used for earthing.

11. Connection of proximity switches for sensing the position of the feed spindle. The unit is delivered with both switches and with cable lengths of 2 meter (6.56 Ft). Connection, see Fig. 6 and 9.

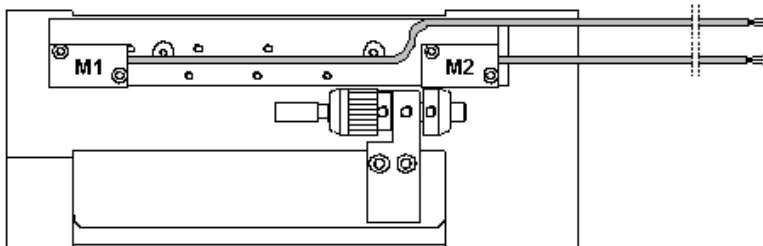


Fig. 9.

Proximity switch M1 for setting forward direction-reverse position and M2 when the feed spindle is in "home position" = fully retracted. Cable colour coding:

- Brown = +24V DC
- Black = Signal
- Blue = 0V DC

12. Connection of the linear transducer for sensing the position of the feed spindle.
 The linear transducer is a potentiometer, which is delivered with a 2 meter (6.56 Ft) long cable connected to the potentiometer with a PG9 connector, DIN 43650. To facilitate connecting the cable, the leads are marked with their respective numbers as illustrated in Fig. 10. below.
 Max. voltage for the linear transducer is 40V DC. Connection, see Fig. 6 and 10.

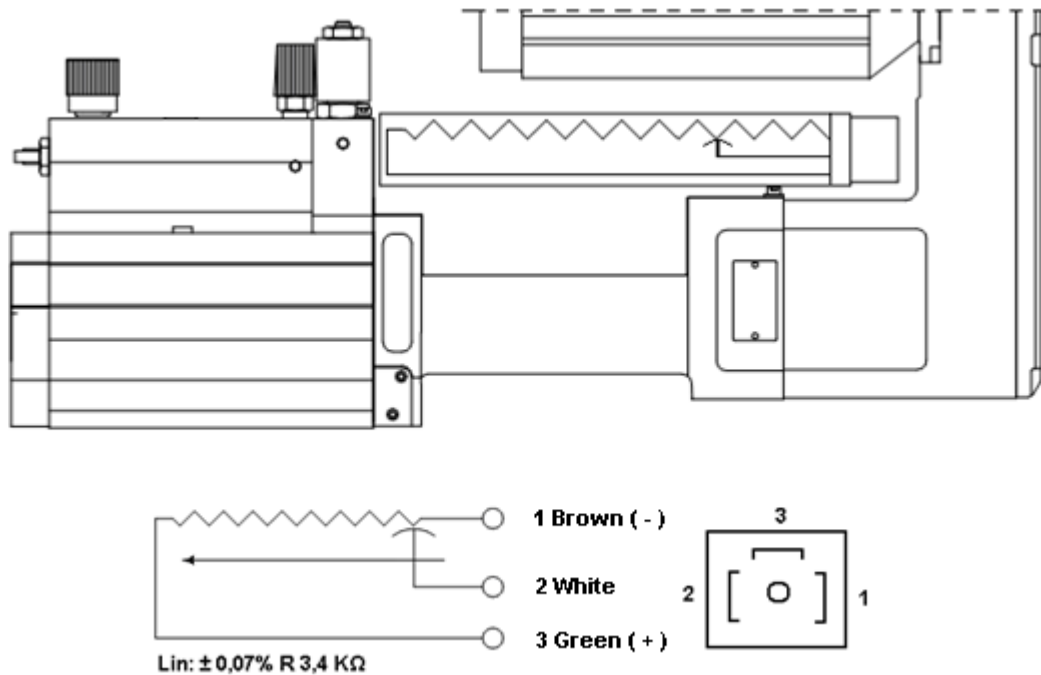


Fig. 10.

Important

Connect the transducer as a voltage divider. The amperage across the potentiometer must not exceed 1 μ A. This is no problem if the inner resistance of the analogue IN-port of the measuring device is more than 0,34 M Ω . Should the external control system require greater amperage, an amplifier must be used in accordance with Fig. 11 below.

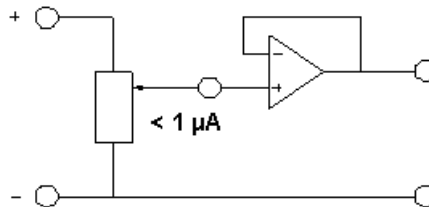


Fig. 11.

When the unit is delivered with a linear transducer, the hydrocheck is fitted with a 2-way valve (24V DC) for the transition from rapid advance to working feed. This valve is normally closed, and for rapid advance it shall be supplied with current at the same time as maneuvering valve V1 in Fig. 6. When the output signal from the position sensor matches the set value for the transition to working feed, the current to the 2-way valve is broken. If the unit is fitted with a linear transducer, the external control system must have an analogue input connection to receive the analogue signal from the position sensor.

With the external control system (PLC), the transition from rapid advance to working feed or drilling depth can then be chosen freely by setting the desired value using the control equipment, for example for chip removal or multi-wall drilling.

A normal cycle for a unit with linear transducer means that

1. The control system releases the compressed air to the unit's power supply (port 1), which means that the spindle feeds with rapid feed speed up to where the setting that unit shall resume normal feeding. This feeding is regulated by feed control settings.
2. The electric motor should start simultaneously when the feeding begins (compressed air is released on).
3. After the mode of transition to work feed reached is feeding slowly, but will also become much stronger.

4. When the spindle reaches the set stop-position the gives limit switches a signal to the machine control system, which then will redirect the air supply to port 2 to start the return feed of the spindle to the home position. For extra precision at drilling depth can the unit's positive stop be used (see below).
5. When the spindle reaches its home position at home position sensor provides a signal to the machine control system.
6. See the electric motor manual to determine if power to the motor should be stopped at the home position. The time until the next cycle starts could be shorter than what motor manufacturer recommends regarding life span and energy consumption of the motor. E2 Systems proposes the machine designer to think about energy consumption!

When the unit is ordered / supplied with linear transducers, provides linear transducers a continuous signal to which the machine control system to interpret

When linear transducer corresponds to the set value for the transition for work feed on or off, the control system have to give signal to the solenoid valve at feed control and switch air supply to feed the spider forward or back (return).

1. Transition from rapid advance to working feed.

Setting the transition on units equipped with pneumatic, electrical or proximity limit switches is performed with a screw, see Fig. 12, Pos. 1, which on return of the feed spindle, retracts the hydrocheck piston rod into position for the next braking. To make it possible to set the transition along the entire stroke length, the unit is delivered with two separate screws of different lengths.

When setting or changing the screw, the feed spindle must be advanced. If this is done using the unit's compressed air system, the system must be depressurized before setting or changing the screw.

For units fitted with a linear transducer, the hydrocheck piston rod is fixed by screw to the adapter and this follows the movement of the feed spindle completely. Setting is performed using the external control system.

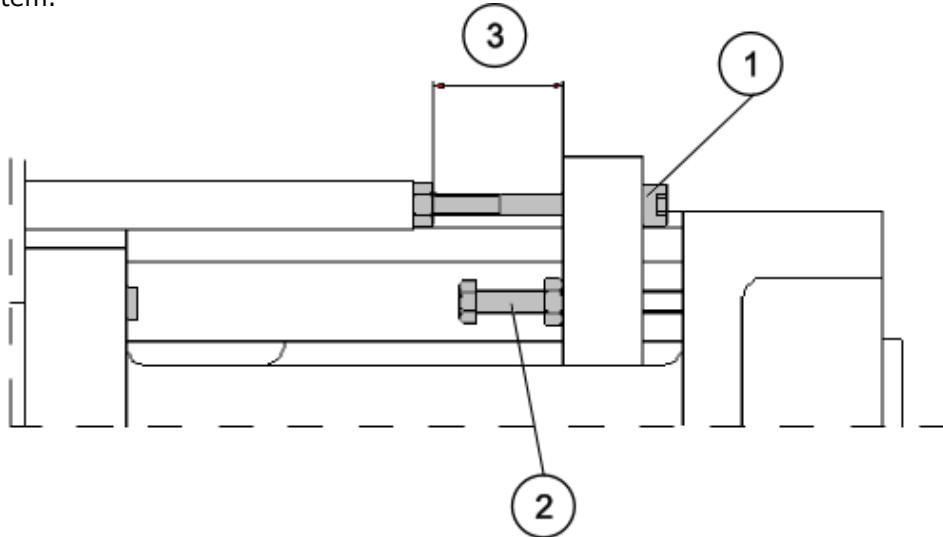


Fig. 12.

2. Drilling depth and front end position.

For units with pneumatic, electrical or proximity limit switches, the reverse position is set by first making a coarse setting by placing the position sensor, see Fig. 13, Pos. 1, in the right position (4 positions). Then place the cam, see Fig. 13. Pos. 2, in the right groove on the rod. The cam is locked into the groove with a screw. In certain positions the threaded portion of the cam must be screwed out to expose the screw. Setting is then accomplished with the threaded cam. One rotation corresponds to 1 mm (.039 In). See Fig. 13.

For units with a linear transducer, drilling depth and the forward-reverse position are set using the external control system and the analog signal from the position sensor.

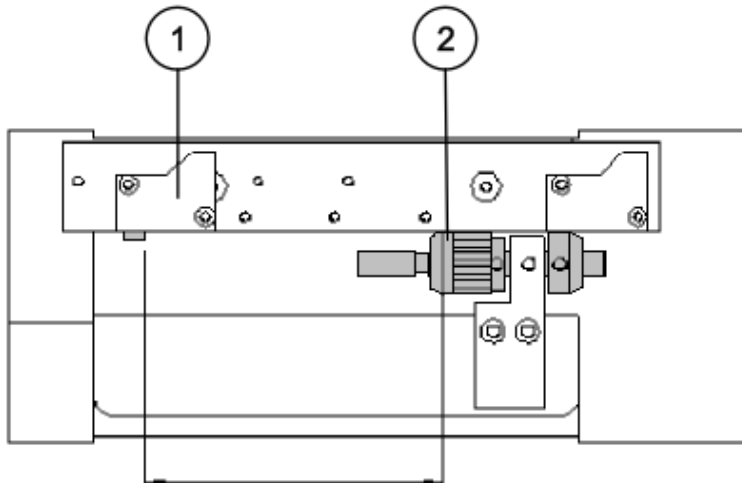


Fig. 13.

3. Positive stop.

When more exact drilling depth or reverse position is desired, the positive stop is used. The units control system must then be fitted with a time valve so that the feed spindle continues forward a short time (0,5-2 Sec.) after the pneumatic or electric impulse from the position sensor.

First a somewhat shallower (e.g. 0,5 mm (.019 In)) drilling depth or reverse position is set than that desired in point 2. The drilling depth or reverse position is then set using the adjustment screw, see Fig. 12. Pos. 2, and locked into position with a lock nut. Please note that the impulse from the position sensor must be received before the feed spindle reaches the positive stop.

4. Working feed rate.

Setting the limit for the working feed rate is performed using the valve on the hydrocheck. The adjustment is from 100% (full open) down to 0%. See Fig. 14, Pos. 1.



ONLY, adjust the working feed rate when the spindle is in "home position".

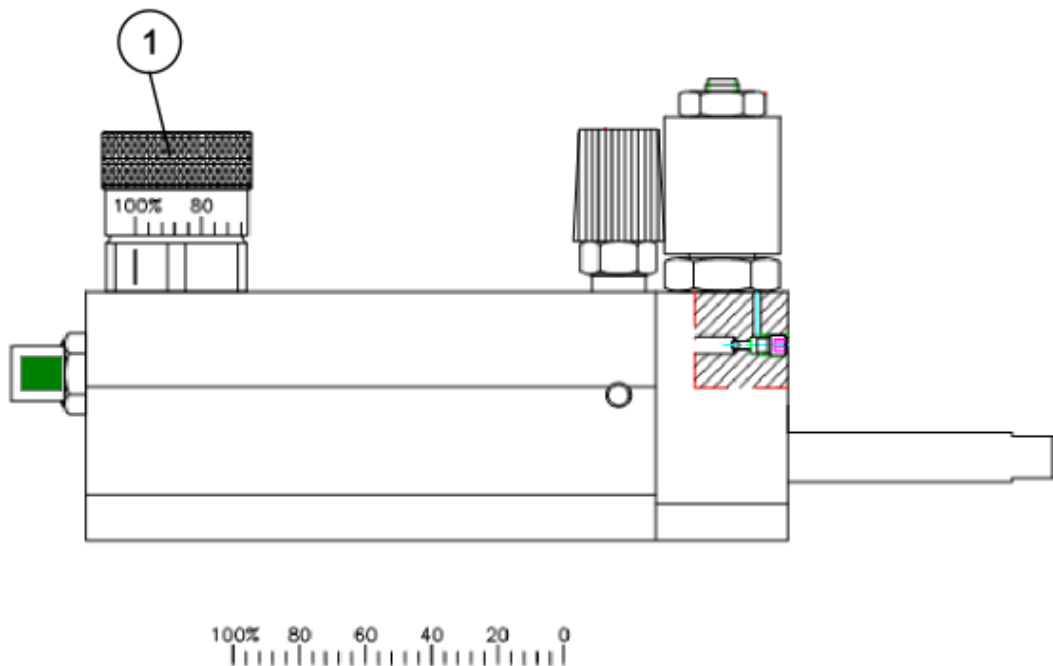


Fig. 14.

Start-up

1. Ensure that the responsible operator has read and understood the manual before start-up of the unit.
2. Ensure that the safety measures in chapter "Security" are met before the start-up of the unit.
3. Follow possible local safety regulations.
4. Ensure that the installation is performed as described in chapter "Installation".
5. Check that the spindle rotates in the right direction.
6. Before starting check the setting of the transition to the working feed so that the tool doesn't enter the workpiece at rapid speed.

Tool holders and Cutting tools

The unit can be equipped with the following tool holder types: (Chosen when ordering.)

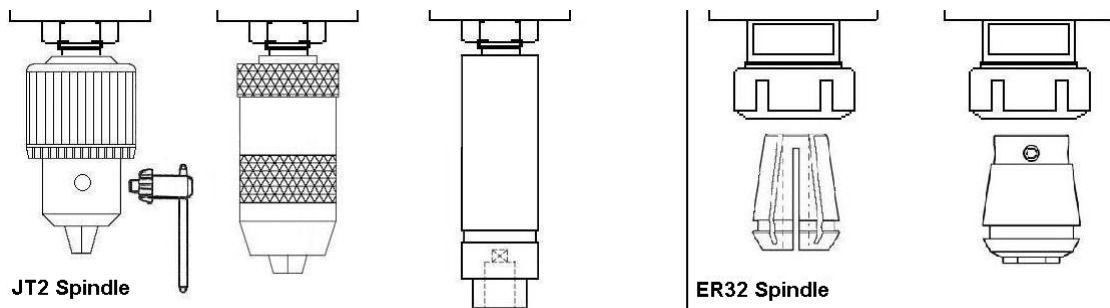
Key Chuck:
compensation

Drill Chuck:

Tapping spindle:

Collet Chuck:

Collet with
compensation



The following cutting tools can be used with drilling or tapping unit:

Drilling unit BE 48: Drills, Core Drills, Shank Mills, Countersinkers, Reamers or Brotsch.
Tapping unit BEG 48: Cutting Taps or forming Taps.

Drilling, Countersinking and Reaming

1. The transition from rapid advance to working feed must be set, see chapter "Settings" paragraph 1, so that a margin of safety is provided allowing the speed to change to working feed before the tool reaches the workpiece. Measure the distance from the leading edge of the tool to the workpiece and set the distance in accordance with, Fig. 12, Pos.3 for a somewhat shorter distance. **Note!** When the unit is equipped with a linear transducer, consideration must be taken to the reaction time of the valve so that the value set using the external control system is sufficiently shorter than the measured distance to allow braking.
2. Drilling depth and forward-reverse position should be set in accordance with chapter "Settings" par. 2.
3. Should the air pressure used on the feed cylinder result in a working feed rate that is too high, limit the rate as described in chapter "Settings" paragraph 6.

Tapping

Tapping may be performed using a reversing die head or by reversing the tapping units electric motor. Please note, that when reversing the electric motor, a tapping spindle with an axially floating tap holder must be used.

1. When tapping, set the working feed rate at a somewhat lower value than that of the speed of the tap. Tap speed can be calculated in accordance with the following: $\text{Rpm} = 60 \times \text{pitch in mm} = \text{mm/sec}$. Measure a distance and divide it by the measured time to determine the speed.
2. Tapping depth is then set using the forward-reverse position. See chapter "Settings" paragraph 2.
Note! When setting, the working feed rate must not be altered, as this will affect the tapping depth. When tapping with a tapping spindle, the signal for reversing the electric motor must be given when the feed spindle reaches the forward-reverse position.
3. The retraction rate of the feed spindle must be adapted to the speed of the tap at withdrawal to prevent the axial movement of the die head or the tapping spindle from hitting bottom during retraction. The speed is regulated using a throttle-check valve in accordance with chapter "Settings" paragraph 6.
4. When tapping short lengths where the axial movement of the die head or tapping spindle take up the entire tapping length, the feed spindle can be run to the positive stop after the tap strikes the piece and then commence retraction after a predetermined time.
5. When using low retraction rates it may be necessary to delay initiation of the electric motors rotation for withdrawal of the tap. This is due to the fact that air pressure in the plus chamber of the feed cylinder must have time to drop for the feed spindle to retract.

Maintenance instructions

Daily inspection:

1. Ensure that the unit is free of chips and dirt that can cause disruption.
2. Ensure that the unit is running smoothly and that it is not making any unusual sounds. In the event of any abnormal noise, immediately stop the machine and call for service staff to rectify the fault.
3. Check that there is no external leakage on the hydrocheck. In the event of leakage, immediately call for service staff to rectify the fault and then refill oil. See chapter "Oil refilling of the Hydrocheck".

Monthly inspection:

1. Check the oil level in the hydrocheck using the green oil-level indicator, see Fig. 15. Pos 1. At max. oil level, the indicator is completely visible, and when only 2 - 3 mm (.078 - .118 In) are showing it is advisable to add oil. If the green indicator is inadvertently depressed, it can be reset by manually pulling it out again. To grip the indicator pin, loosen the hexagonal protective sleeve. For refilling of oil see chapter "Oil refilling of the Hydrocheck".
2. Check the belt drive for wear and proper tension, see chapter "Belt tension and Transmission replacement".
3. Check the locking of the settings:
 - Adjustment screw for transition to working feed. (Applicable for pneumatic, electric and proximity limit switches.)
 - If linear transducer, sled on attachment to the device's carrier.
 - Drilling depth and forward-reverse position.
 - Positive stop.
 - Working feed rate.

Annual inspection:

In addition to the daily and monthly inspections, the following points should be observed.

1. Check the units pneumatic feed system for:
 - External leakage.
 - Leakage at the piston seal by performing the following. Advance the feed spindle to the positive stop without activating the signal for the forward-reverse position and check that there is no leakage of air on the minus side. **Note!** Disconnect the hose to port 2, see Fig. 3 on page 6. Check correspondingly for leakage at the piston seal when the feed spindle is in "home position".
 - Check that the feed spindle advances and retracts at an air pressure of 2 Bars (29 Psi). Without feed control the feed spindle should advance and retract at 1 Bar (14.5 Psi).

In the event of leakage or if the feed spindle is sluggish, the feed system should be dismantled and cleaned and all seals should be replaced. **Note!** When reassembling, lubricate bushings, seals, and the cylinder barrel with suitable grease.

2. Check the hydrocheck for:
 - Scratches or marks on the hydrocheck piston rod.
 - Leakage at the piston by lowering the working feed rate to 0 and checking that the feed spindle practically stands still.
 - Advance and retraction of the hydrocheck at 2 Bars (29 Psi) pressure. See paragraph 1 above.

In the event of leakage or problems with any of the above mentioned points, the hydrocheck should be dismantled and cleaned and all seals and damaged parts should be replaced. For refilling of oil see chapter "Oil refilling of the Hydrocheck".

3. Check the lubrication of the drive shafts splines by separating the belt housing from the mid-section. Note that in certain cases the pulley on the drive shaft must be removed, see chapter "Belt tension and Transmission replacement". If necessary, lubricate the splines with a suitable grease.

Oil refilling of the Hydrocheck

Suitable oil quality: Hydraulic oil with a viscosity of e.g. 32 cSt at +40° C (+104 F) and a high viscosity index e.g. 345. Recommended oil: Castrol, Hyspin AWH-M 32 acc. to ISO VG32.

Oil quantity (filled): Ca 6,3 cl (2.22 fl.oz. (UK), 2.13 fl.oz. (US))

Oil refill equipment: Part. no. 043J400426

WARNING!

1. When filling oil the feed spindle should be fully extended so that the hydrocheck piston rod is fully retracted.



2. If, for some reason, the green level indicator, see Fig. 15. Pos. 1, is fully visible when filling oil, it should be depressed manually.
3. Connect an oil injector to the oil filling nipple, see Fig. 15. Pos. 2, and fill oil until the green indicator pin is nearly completely extended again. **Note!** Discontinue filling just before the pin is completely extended to avoid excessive pressure in the system.
4. Whenever the hydrocheck has been disassembled or if air has entered the oil system, The system must be bled when filling oil. The hydrocheck must then be turned so that its piston rod is facing upwards as oil is being filled and the system is bled using the screw shown in, see Fig. 15. Pos. 3. **Note!** The piston rod must be completely depressed while filling oil. Begin filling with the bleeding screw open and when the oil stream is air-free, tighten the screw. Then fill with oil until the indicator pin Pos. 1 is extended.

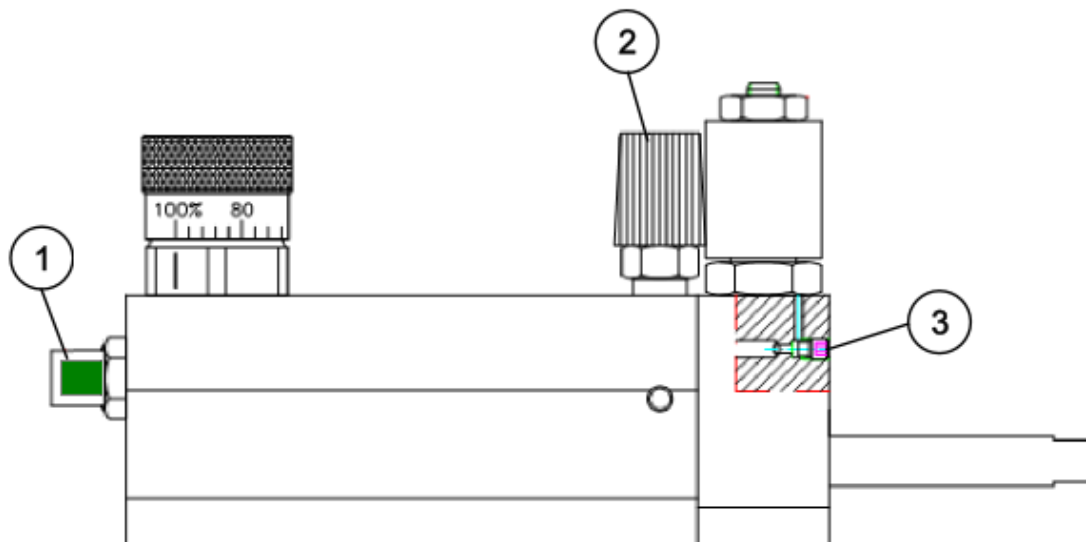


Fig. 15.

Belt tension and Transmission replacement

1. Belt tension must not be too great. Slide the tensioning pulley carefully against the belt and lock with the screw in its center. Proper belt tension has been attained when the belt can be depressed approx. 20 mm (13/16") with light pressure. See Fig. 16.
2. When changing the transmission, first loosen the centre screw for the respective drive pulley. The pulley can be kept from rotating by mounting two screws (M6) in the threaded holes in the pulley and using a metal bar. Then loosen the tensioning pulley and remove the belt. Use a puller to remove the drive pulley if it cannot be loosened by hand. When removing the larger pulleys it might not be possible to use a puller. In such cases the threaded holes can be used to mount a strip of steel plate with a screw in the middle to press loose the pulley.

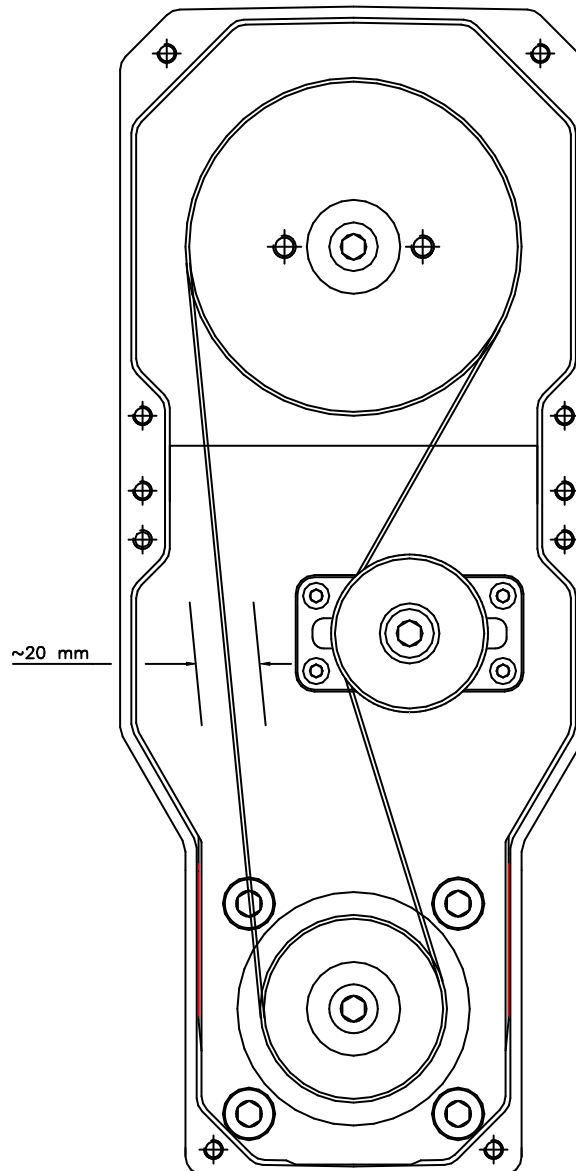
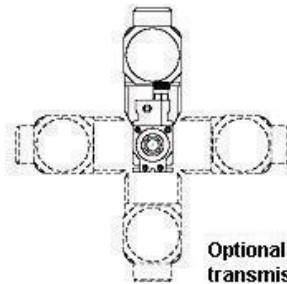
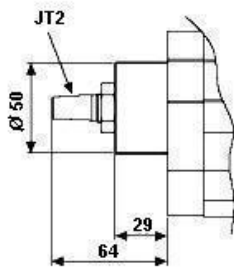
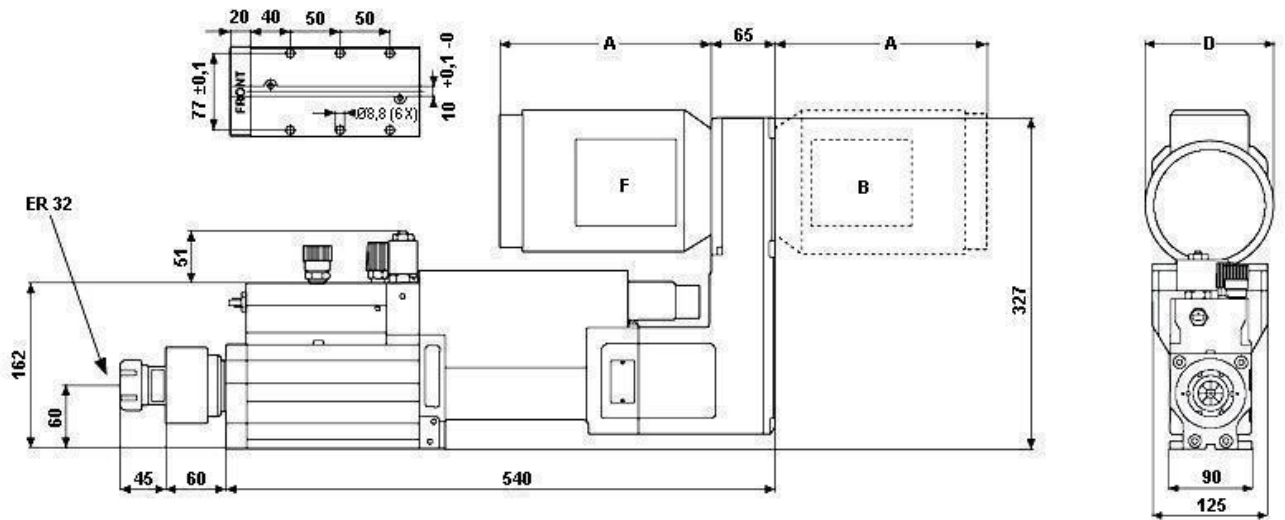


Fig. 16.

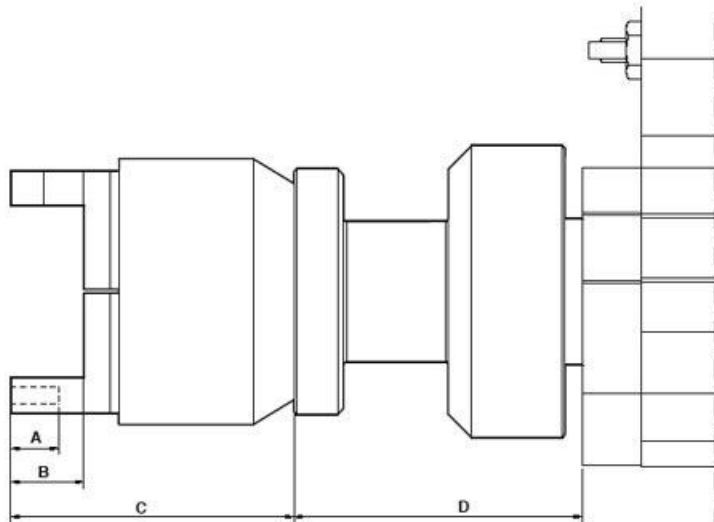
Dimensional drawing



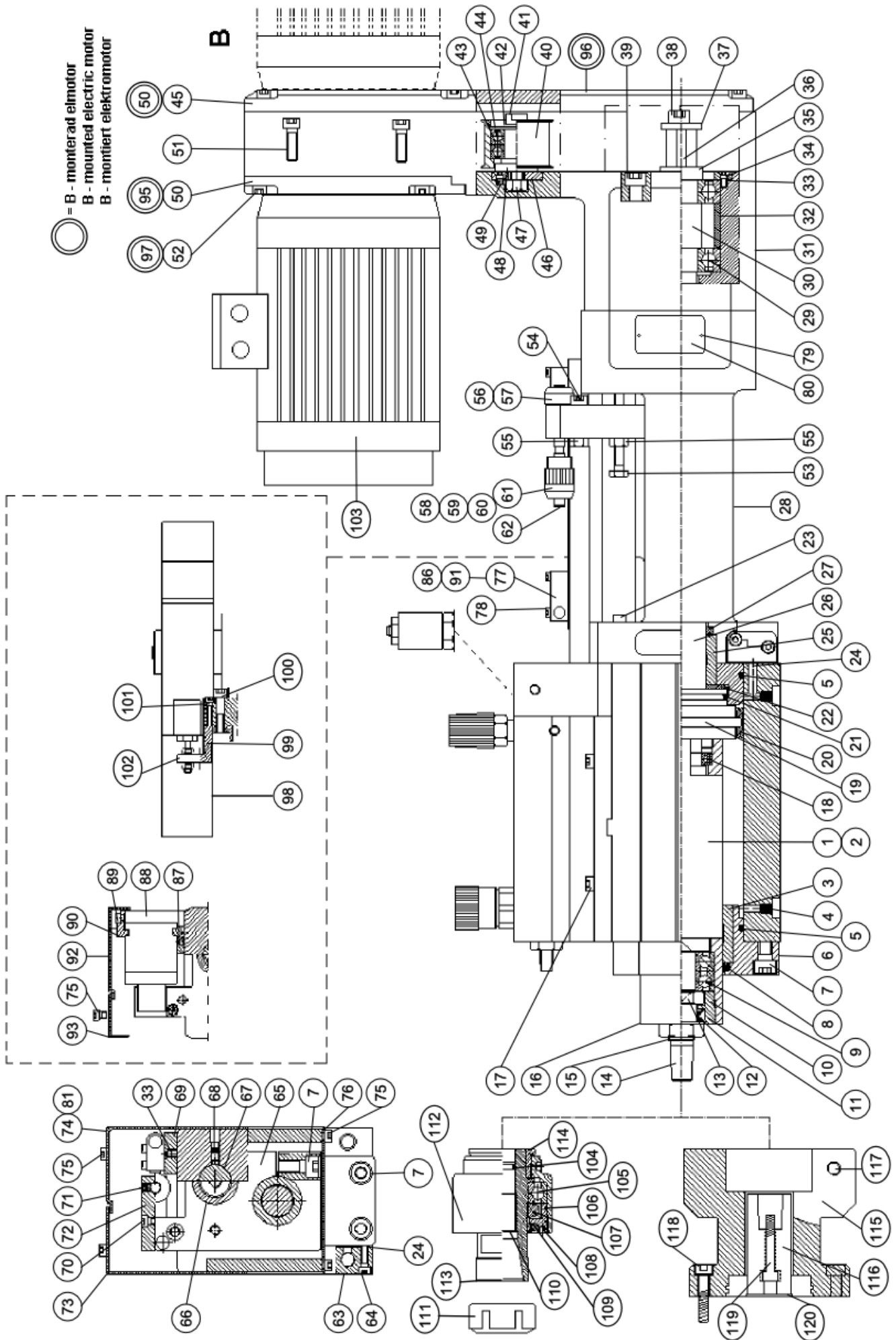
	BE 481/482	BE 485
A	210	230
D	130	150

Optional orientation of transmission housing (90° steps)

Weight: 24 - 28 Kgs
53 - 62 Lbs



Multi-spindle head, type	A mm	B mm	C mm	D mm	Adaptor, weight Kgs	Adaptor, weight Lbs
MBKV-402	20	35	117	95	1,2	2,65
VH 042P / 043P / 043LP / 044P	22	25	97	98	1,2	2,65
MBK-6V2	21	56	117	91	1,2	2,65
MBK-6V3 / 6V4	21	56	121	98	1,2	2,65
MBKV-6VR3	21	56	137	98	1,2	2,65
MBKV-602 / 603 / R603 / 604	21	35	127	98	1,2	2,65
VH 062P / 063P / 063LP / 064P	25	34	136	98	1,2	2,65
MBKV-802 / 803 / R 803 / 804	34	40	144	107	1,2	2,65
VH 082P / 083P / 083LP / 084P	28	40	148	98	1,2	2,65
VH 102P / 103P / 103LP / 104P	28	40	162	104	1,2	2,65
MBKV-1002	27	35	163	107	1,2	2,65



Spare parts list

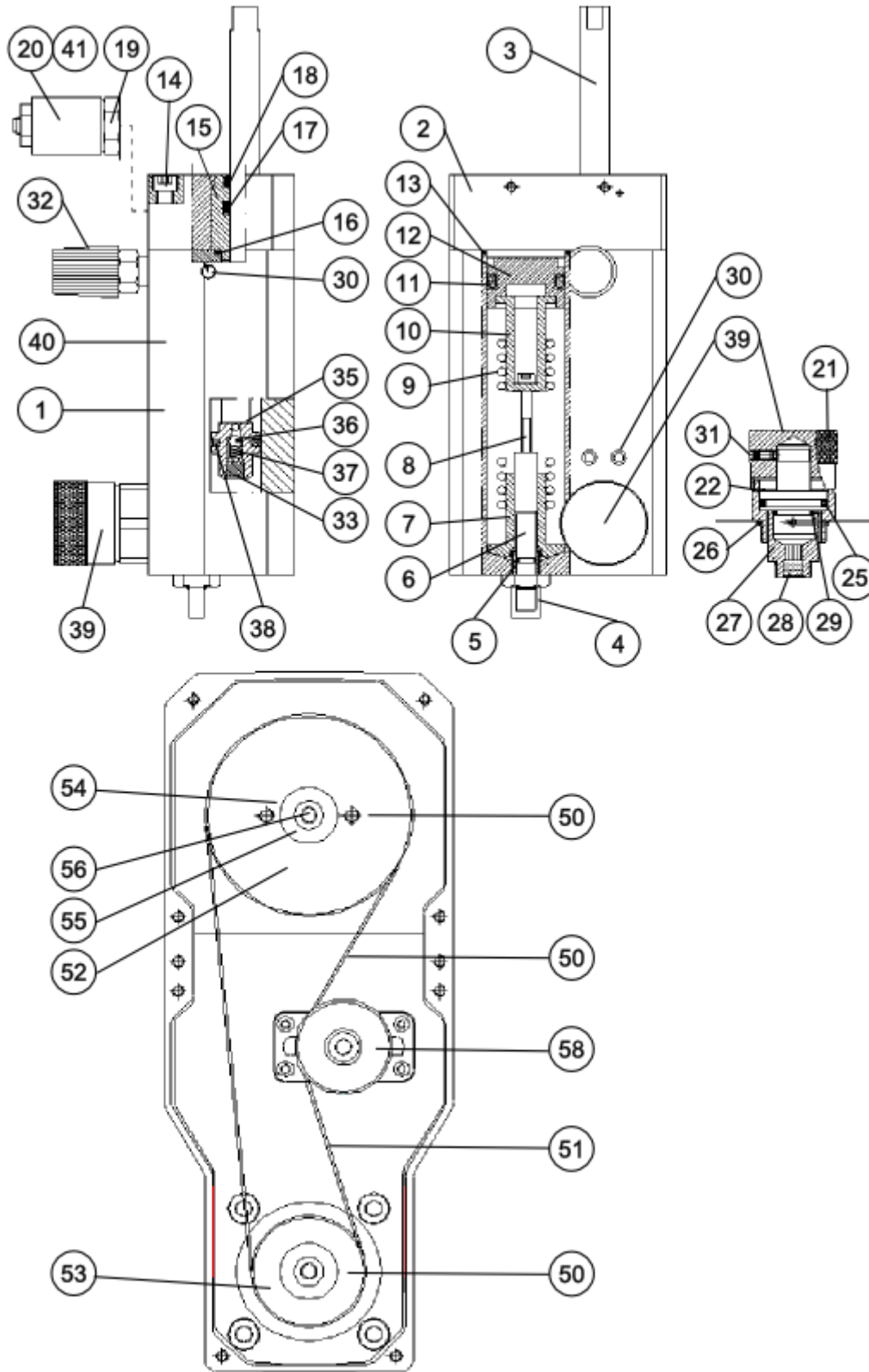
BE(G) 481, BE(G) 482 and BE(G) 485			
Pos.	Qty	Description	Part no.
1	1	Feed housing, complete.	See pos. 125
2	1	Seal kit for quill with JK2 spindle, complete.	See pos. 120
2	1	Seal kit for quill with ER32 spindle, complete.	See pos. 129
3	1	Slide bearing	See pos. 124
4	2	Expander plug MB 800-060	See pos. 125
5	2	O-ring, 69,5x3 Nitril	See pos. 120/124/129
6	1	Front plate	See pos. 124
7	9	Screw, MC6S 8x30 FZB	See pos. 121
8	1	Piston rod seal	See pos. 120/124/129
9	2	Ball bearing	See pos. 126
10	1	O-ring, Ø35,1x1,6 Nitril	See pos. 120/126
11	1	Spindle nut	043V400349
12	1	V-ring, V18 A	See pos. 120/126
13	1	Nut	043V400348
14	1	Spindle with B12 taper, complete.	043R000016
14	1	Spindle with JT2 taper, complete.	043R000017
14	1	Spindle ER32 collet chuck, complete.	043R000024
15	1	Spindle nut	413A112025
16	1	Quill	043V300163
17	4	Screw, MC6S 5x20 8.8 FZB	411A121115
18	1	Ball bearing	See pos. 125
19	1	Piston	043V400350
20	1	Piston rod gasket	See pos. 120
21	1	O-ring, Ø50x3 Nitril	See pos. 120/129
22	1	Cushioning washer	043V400372
23	1	Button	See pos. 122
24	4	O-ring, Ø5,1x1,6 Nitril	See pos. 120/129
25	1	Slide bearing	See pos. 122
26	1	Guide tube	043V300164
27	1	Piston rod seal	See pos. 120/129
28	1	Mid-section	See pos. 122
29	2	Ball bearing	419A100014
30	1	Drive shaft	043V300158
31	1	Belt housing	043V100009
32	1	Spacer	043V400347
33	5	Screw, MF6S 4x12 FZB	411A121038
34	1	Locking washer	043V400346
35	1	Spacer	043V400354

Pos.	Qty	Description	Part no.
36	1	Key, TK 6x6x22	415A141010
37	1	Washer	043V400396
38	1	Screw, MC6S 8x20 FZB	411A122028
39	4	Screw, MC6S 8x90 8.8 FZB	411A122045
40	1	Tension roll	See pos. 123
41	1	Screw, MC6S 8x40 8.8 FZB	411A121155
42	2	Washer, BRB 8,4X17X1,6	414A112011
43	2	Ball bearing	See pos. 123
44	1	Circlip, SGH 32	See pos. 123
45	1	Lid	043V200022
46	1	Foil	043V400343
47	1	Nut, M6M M8 FZB	413A112016
48	1	Tension shaft	043V400345
49	4	Screw, MF6S 4x10 FZB	411A121001
50	1	Motor lid for -71 electric motor. BE(G) 481 and BE(G) 482	043V300160
50	1	Motor lid for -80 electric motor. BE(G) 485.	043V300159
51	4	Screw, MC6S 6x16 FZB	411A122039
52	10	Screw, MC6S 5x16 FZB	411A121114
53	1	Screw, M6S 6x60H 8.8 FZB	See pos. 127
54	1	Screw, MC6S 6X25 8.8 FZB	411A121142
55	2	Nut, M6M M6 FZB	See pos. 127/128
56	1	Transducer ring	See pos. 130
57	1	Grub screw, P6SS 4x5, svart	See pos. 130
58	1	Setting nut	See pos. 131
59	1	Setting body	See pos. 131
60	1	Pressure spring, 1x8x25	See pos. 131
61	1	Grub screw, P6SS4x4	See pos. 131
62	1	Transducer rod	043V400360
63	2	Air connection	043V400351
64	4	Screw, MC6S, 4x20 FZB	411A122017
65	1	Cross head	See pos. 121
66	1	Slide bearing	See pos. 121
67	1	Support shaft	043V400342
68	1	Screw, T6SS 5x8 FZB	See pos. 122
69	1	List	043V400359
70	2	Screw, MC6S 4x10 FZB	411A121101
71	1	Screw, P6SS 5x5 FZB	411A151024
72	1	Clamp	043V400356
73	1	Cover plate	043V300172
74	1	Cover plate	043V300173
75	7	Screw, MC6S 4x6 FZB	411A122015
76	1	Bottom plate	043V400364

Pos.	Qty	Description	Part no.
77	2	Proximity switch, inductive, 24 V DC.	604A000006
77	2	Micro switch, pneumatic.	604A000011
77	2	Micro switch, electric, 10A 125V AC / 10A 250V AC.	604A000012
78	4	Screw, MC6S 3x16 FZB	411A121095
79	2	Rivet	415A122001
80	1	Data label	417S900050
81	1	Cable gland, for pneumatic switches	418A264001
81	1	Cable gland, for electric and proximity switches	418A260001
82	1	Y-connector	057Y000001
83	1	Plastic hose PA 11, length 2 meter (6.56 Ft)	057G000002
84	2	Coupling, G1/8-8	057E010818
86	1	Cable, 7x0,25, length 2,15 meter (7.05 Ft)	514A000001
87	4	Screw, MF6S 4x10 FZB	411A121001
88	2	Linear stay	043V400365
89	2	Screw, MC6S 4x8 FZB	411A121007
90	2	Dog	043V400352
91	2	Insulation plate	604A000013
92	1	Cover plate	043V300175
93	1	Cover plate	043V300174
95	1	Blind lid	043V200028
96	1	Lid	043V200029
97	2	Screw, MC6S 5x16 FZB	411A121114
98	1	Linear transducer with plug PG 9, DIN 43650 and cable 2 m (6.56 Ft).	604A000005
99	1	Spacer	043V400370
100	1	Screw, MC6S 6x35 FZB	411A121139
101	1	Screw, MC6S 4x22 FZB	411A121006
102	1	Linear clamp	043V400361
103	1	Motor, BE(G) 481, 0,55 kW, 2820 rpm at 50Hz, M2VA 71 B	508A000103
103	1	Motor, BE(G) 482, 0,75 kW, 2820 rpm at 50Hz, M2VA 71 BC	508A000110
103	1	Motor, BE(G) 485, 1,65 kW, 2820 rpm at 50Hz, M2VA 80 C	508A000123
103	1	Motor BE(G) 481, 0,37 kW, 1390 rpm at 50Hz, M2VA 71 B	508A000112
103	1	Motor, BE(G) 482, 0,55 kW, 1390 rpm at 50Hz, M2VA 71 C	508A000126
103	1	Motor, BE(G) 485, 1,1 kW, 1390 rpm at 50Hz, M2VA 80 C	508A000127
103	1	Motor, BE(G) 481, 0,25 kW, 910 rpm at 50Hz, M2VA 71 B	508A000131
103	1	Motor, BE(G) 482, 0,32 kW, 910 rpm at 50Hz, M2VA 71 C	508A000138
103	1	Motor, BE(G) 485, 0,75 kW, 910 rpm at 50Hz, M2VA 80 C	508A000137
103	1	Motor, BE(G) 485, 0,40 kW, 680 rpm at 50Hz, MT 80 C	508A000146
104	1	O-ring, Ø13,95x2,62 Nitril	See pos. 129
105	1	Ball bearing	419A100038
106	1	O-ring, Ø64,2x1,6 Nitril	See pos. 129
107	1	Nut	413A119015
108	1	Front nut	043V400459

Pos.	Qty	Description	Part no.
109	1	Radial seal, R38x55x7	See pos. 129
110	1	Setting screw	043V400461
111	1	Tension nut ER32	043K000004
112	1	Bearing housing	043V300226
113	1	Spindle	043V200038
114	1	Quill ER32	043V300225
115	1	Adaptor for multi spindle head VH042.	043V300190
115	1	Adaptor for multi spindle head VH062, VH063, VH082 and VH083.	043V300194
115	1	Adaptor for multi spindle head VH0102.	043V300195
115	1	Adaptor for multi spindle head VH043.	043V300199
115	1	Adaptor for multi spindle head VH0103.	043V300203
115	1	Adaptor for multi spindle head VH13X and VH18X.	043V300461
115	1	Adaptor for multi spindle head VH181.	043V200050
116	1	Drive adaptor for VH042/043, 062/063, 082/083 and VH181.	040V400077
116	1	Drive adaptor for VH102/103 and VH13X/18X.	040V300091
117	1	Screw, MC6S 8x30 FZB.	411A121153
118	4	Screw, MC6S 6x25 FZB, for VH042, VH062 and VH082.	411A122004
118	3	Screw, MC6S 6x25 FZB, for VH043, VH063 and VH083.	411A112004
118	4	Screw, MC6S 8X30 FZB, for VH102.	411A121153
118	3	Screw, MC6S 8X30 FZB, for VH103.	411A121153
118	4	Screw, MC6S 8x40 8.8 FZB, for VH13X and VH18X.	411A121155
118	4	Screw, MC6S 8x35 8.8 FZB, for VH181.	411A121139
119	1	Screw, MC6S 4x20, for VH042/043, 062/063, 082/083 and VH181.	411A122017
119	1	Screw, MC6S 4x25, for VH102/103 and VH13X/18X.	411A121104
120	1	Sacer washer PS	414A131020
		Complete kits.	
120	1	Seal kit for quill with JT2 spindle, complete.	043R000002
121	1	Dog for hydrocheck, complete.	043R000006
122	1	Mid-section, complete.	043R000007
123	1	Tension roll, complete.	043R000008
124	1	Front plate, complete.	043R000009
125	1	Feed housing, complete.	043R000012
126	1	Bearing kit for spindle, complete.	043R000013
126	1	Stop screw kit, complete.	043R000014
127	1	Rapid advance screw kit, complete.	043R000015
129	1	Seal kit fpr quill with ER32 spindle, complete.	043R000018
130	1	Transducer ring, complete.	042R005008
131	1	Adjusting nut, complete.	042R005010
135	1	Conversion kit, from JT2 spindle to ER32 spindle, complete.	043R000023
136	1	Convesrion kit, from ER32 spindle to JT2 spindle, complete.	043R000025

Spare parts drawing



Pos.	Qty	Description	Part no.
1	1	Hydrocheck <u>without</u> magnetic 2-way valve, complete.	043A200036
1	1	Hydrocheck <u>with</u> magnetic 2-way valve, complete.	043A200037
2	1	End cover for hydrocheck <u>without</u> magnetic 2-way valve, complete.	043R000004
2	1	End cover for hydrocheck <u>with</u> magnetic 2-way valve, complete	043R000003
3	1	Piston rod, complete.	043R000005
4	1	Level protector	043V400363
5	2	O-ring, Ø5,1x1,6 Nitril	See pos. 40
6	1	Level indicator	043V400338
7	1	Guide	043V400334
8	1	Screw, MC6S 4x35 FZB	411A121106
9	1	Spring	416A111042
10	1	Spring guide	043V400333
11	1	Piston seal	See pos. 40
12	1	Piston	043V400336
13	1	O-ring, Ø31,4x1,6 Nitril	See pos. 40
14	4	Screw, MC6S 6x35 FZB	411A121139
15	1	Bushing	043V400332
16	1	O-ring, Ø19,1x1,6 Nitril	See pos. 40
17	1	Piston seal	See pos. 40
18	1	Scraper seal	See pos. 40
19	1	Directional valve, 2-way	043K000001
20	1	Magnetic coil, 24V DC	043K000002
21	1	Knob	043V400436
22	1	Circlip, SGH 28	415A151012
23	1	Regulating spindle	043V400439
25	1	O-ring, Ø22,2x3,0 Nitril	See pos. 40
26	1	O-ring, Ø27,1x1,6 Nitril	See pos. 40
27	1	Regulating body	See pos. 39
28	1	Filter	See pos. 39
29	1	O-ring, Ø14,1x1,6 Nitril	See pos. 40
30	7	Expander plug, MB 800-600	See pos. 1
31	1	Screw, T6SS 5x8	411A151151
32	1	Oil refilling nipple	043K000003
33	1	Expander plug, MB 800-070	See pos. 3
34	1	O-ring, Ø13,1x1,6 Nitril	See pos. 40
35	1	Piston	See pos. 3
36	1	Ball	See pos. 3
37	1	Spring	See pos. 3
38	1	Piston seal	See pos. 40
39	1	Adjustment valve, complete.	043R000022
40	1	Seal kit for hydrocheck, complete.	043R000020

Pos.	Qty	Description	Part no.
41	1	Plug PG9, for magnetic 2-way valve, DIN 43650	033J339000
50	1	Transmission kit, BE(G) 481, BE(G) 482; 2.5:1, complete.	043A500017
50	1	Transmission kit, BE(G) 481, BE(G) 482; 2.1:1, complete.	043A500016
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1.8:1, complete.	043A500015
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1.6:1, complete.	043A500014
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1.4:1, complete.	043A500013
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1.2:1, complete.	043A500012
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1:1, complete.	043A500011
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1:1.2, complete.	043A500010
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1:1.4, complete.	043A500009
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1:1.6, complete.	043A500008
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1:1.8, complete.	043A500007
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1:2.1, complete.	043A500006
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1:2.3, complete.	043A500005
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1:2.5, complete.	043A500004
50	1	Transmission kit, BE(G) 481, BE(G) 482; 1:2.8, complete.	043A500003
50	1	Transmission kit, BE 481, BE 482; 1:3.1, complete.	043A500002
50	1	Transmission kit, BE 481, BE 482; 1:3.4, complete.	043A500001
50	1	Transmission kit, BE(G) 485; 2.5:1, complete.	043A600017
50	1	Transmission kit, BE(G) 485; 2.1:1, complete.	043A600016
50	1	Transmission kit, BE(G) 485; 1.8:1, complete.	043A600015
50	1	Transmission kit, BE(G) 485; 1.6:1, complete.	043A600014
50	1	Transmission kit, BE(G) 485; 1.4:1, complete.	043A600013
50	1	Transmission kit, BE(G) 485; 1.2:1, complete.	043A600012
50	1	Transmission kit, BE(G) 485; 1:1, complete.	043A600011
50	1	Transmission kit, BE(G) 485; 1:1.2, complete.	043A600010
50	1	Transmission kit, BE(G) 485; 1:1.4, complete.	043A600009
50	1	Transmission kit, BE(G) 485; 1:1.6, complete.	043A600008
50	1	Transmission kit, BE(G) 485; 1:1.8, complete.	043A600007
50	1	Transmission kit, BE(G) 485; 1:2.1, complete.	043A600006
50	1	Transmission kit, BE(G) 485; 1:2.3, complete.	043A600005
50	1	Transmission kit, BE(G) 485; 1:2.5, complete.	043A600004
50	1	Transmission kit, BE(G) 485; 1:2.8, complete.	043A600003
50	1	Transmission kit, BE 485; 1:3.1, complete.	043A600002
50	1	Transmission kit, BE 485; 1:3.4, complete.	043A600001
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 2.5:1, L = 600 mm.	422A000001
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 2.1:1, L = 600 mm.	422A000001
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1.8:1, L = 620 mm.	422A000002
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1.6:1, L = 620 mm.	422A000002
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1.4:1, L = 660 mm.	422A000003

Pos.	Qty	Description	Part no.
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1.2:1, L = 545 mm.	422A000007
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1:1, L = 600 mm.	422A000001
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1:1.2, L = 545 mm.	422A000007
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1:1.4, L = 660 mm.	422A000003
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1:1.6, L = 620 mm.	422A000002
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1:1.8, L = 620 mm.	422A000002
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1:2.1, L = 600 mm.	422A000001
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1:2.3, L = 620 mm.	422A000002
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1:2.5, L = 660 mm.	422A000003
51	1	Tooth belt, BE(G) 481, BE(G) 482 and BE(G) 485; 1:2.8, L = 660 mm.	422A000002
51	1	Tooth belt, BE 481, BE 482 and BE 485; 1:3.1, L = 620 mm.	422A000002
51	1	Tooth belt, BE 481, BE 482 and BE 485; 1:3.4, L = 660 mm.	422A000003
52	1	Pulley, Z = 20, for BE(G) 481/482, 2.5:1.	043V400386
52	1	Pulley, Z = 20, for BE(G) 485, 2.5:1.	043V400374
52	1	Pulley, Z = 24, for BE(G) 481/482, 1.2:1, 2.1:1.	043V400387
52	1	Pulley, Z = 24, for BE(G) 485, 1.2:1.	043V400375
52	1	Pulley, Z = 24, for BE(G) 485, 2.1:1.	043V400375
52	1	Pulley, Z = 28, for BE(G) 481/482, 1.8:1, 1:1.2.	043V400388
52	1	Pulley, Z = 28, for BE(G) 485, 1.8:1.	043V400376
52	1	Pulley, Z = 28, for BE(G) 485, 1:1.2.	043V400376
52	1	Pulley, Z = 31, for BE(G) 481/482, 1.6:1.	043V400389
52	1	Pulley, Z = 31, for BE(G) 485, 1.6:1.	043V400377
52	1	Pulley, Z = 37, for BE(G) 481/482, 1.4:1, 1:1.	043V400390
52	1	Pulley, Z = 37, for BE(G) 485, 1.4:1, 1:1.	043V400378
52	1	Pulley, Z = 50, for BE(G) 481/482, 1:1.4, 1:1.6, 1:1.8, 1:2.1.	043V400391
52	1	Pulley, Z = 50, for BE(G) 485, 1:1.4, 1:1.6, 1:1.8, 1:2.1.	043V400379
52	1	Pulley, Z = 55, for BE(G) 481/482, 1:2.3, 1:2.8.	043V400392
52	1	Pulley, Z = 55, for BE(G) 485, 1:2.3, 1:2.8.	043V400380
52	1	Pulley, Z = 61, for BE 481/482, 1:2.5, 1:3.1.	043V400393
52	1	Pulley, Z = 67, for BE 481/482, 1:3.4.	043V400394
52	1	Pulley, Z = 61, for BE(G) 485, 1:2.5, 1:3.1.	043V400381
52	1	Pulley, Z = 67, for BE 485, 1:3.4.	043V400382
53	1	Pulley, Z = 20, for BE(G) 481/482/485, 1:2.8, 1:3.1, 1:3.4.	043V400374
53	1	Pulley, Z = 24, for BE(G) 481/482/485, 1:1.2, 1:2.1, 1:2.3, 1:2.5.	043V400375
53	1	Pulley, Z = 28, for BE(G) 481/482/485, 1.2:1, 1:1.8.	043V400376
53	1	Pulley, Z = 31, for BE(G) 481/482/485, 1:1.6.	043V400377
53	1	Pulley, Z = 37, for BE(G) 481/482/485, 1:1, 1:1.4.	043V400378
53	1	Pulley, Z = 50, for BE(G) 481/482/485, 1.4:1, 1.6:1, 1.8:1, 2.1:1, 2.5:1.	043V400379
54	1	Spacer	043V400353
55	1	Washer	043V400632
56	1	Screw, MC6S 5x25 FZB, for BE 481 and BE 482.	411A121008
56	1	Screw, MC6S 6x20 FZB, for BE 485.	411A122043

Pos.	Qty	Description	Part no.
58	1	Tension roll, complete.	043R000008
Miscellaneous:			
1		Holder for adjustable adaptor TR 20x2. Automotive shank.	040J000008
1		Key Chuck JK2 6A-2A, Ø 0 - 13,0 mm (0 - 1/2").	040J000107
1		Chuck Key for above key chuck.	041J004073
1		Drill Chuck JK2, Ø 1,0 - 10,0 mm (.04 - 3/8").	040J000115
1		Drill Chuck JK2, Ø 1,0 - 13,0 mm (.04 - 1/2").	040J000116
1		Drill Chuck JK2, Ø 3,0 - 16,0 mm (.12 - 5/8").	040J000117
1		Collet ER32, Ø2 - 20 mm (.079 - .787 In). On request.	043J032XXX
1		Wrench for Collet Chuck Nut , ER32.	043J000002
1		Spanner, 32 mm, for ER32 collet chuck.	043J000003
1		Collet Chuck ER20/JT2, Ø2 - 15 mm (.08 - 9/16")	040J000123
1		Collet ER20, Ø2 - 15 mm (.08 - 9/16"). On request.	041J008XXX
1		Wrench for Collet Chuck Nut, ER20.	041J004084
1		Collet Chuck ER40/JT2, Ø21 - 30 mm (13/16 - 1 3/16")	040J000110
1		Collet ER40, Ø21 - 30 mm (13/16 - 1 3/16"). On request.	041J010XXX
1		Wrench for Collet Chuck Nut, ER40.	040J000111
1		Tapping spindle, type GS 12E with 25 mm (1") length compensation, JT2.	042J000034
1		Tapping spindle, type GS 24E with 40 mm (1 1/2") length compensation, JT2.	042J000035
1		Taper shank Ø16 - B18 for the GS 24E on a BE 48 ER.	042J000047
1		Tapholder T12. Please, On request. State Ø and #.	042JXXXXXX
1		Torque stop for tapping device.	043J400608
1		Collet ER32-ET1, Ø4,5 - 12,5 mm.	043J032XXX
1		Throttle-check valve, 1/8"	075F000902

Warranty conditions

The warranty period for the product is 4 000 000 cycles or 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

Unit, Type BE 481 , BE 482, BE 485 or BEG 481, BEG 482, BEG 485.

Housing	: Aluminium
Pinole	: Brass
Electric motor	: Aluminium, steel and Copper.
Other parts	: Aluminium, brass and steel.
Seals, Drive belt	: Rubber, Rubber/steel
Hydraulic oil	: Oil. The unit contains a small amount of hydraulic oil.

Housing, pinole and other metallic parts	: Dispose as metal waste; Aluminium, brass and steel.
Electric motor	: Dispose as electric waste.
Seals, Drive belt	: Dispose as combustible waste.
Hydraulic oil	: Dispose as hazardous 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.