PROXXON

Operating Instructions

FF 500/BL/ CNC-ready

Ver. 3

FF 500/BL CNC Operating Instructions

Translation of the Original Operating Instructions

Ver. 3
08.01.2020

1. Some generalities in advance…

Dear Customer!

The information given in this manual and the knowledge it conveys is indispensable for the safe commissioning and the safe operation of the machine and the controls!

Before you set up and commission your machine, please read through the manual and make sure you have understood everything. This is a very complicated device which poses the danger of injury or can cause damage to property if handled improperly.

Help to prevent this and familiarise yourself thoroughly with the machine and its associated electronics without rushing matters.

The use of these instructions

- makes it easier to become acquainted with the device,
- prevents malfunctions due to improper handling, and
- increases the service life of your device.

Always keep these instructions close to hand.
Only operate this device with exact knowledge of it and comply with these instructions.

PROXXON will not be liable for the safe function of the device for:

- handling that does not comply with the usual intended use,
- other application uses that are not stated in these instructions,
- disregard of the safety regulations.

You will not have any warranty claims for:
- operating errors,
- lack of maintenance.

For your safety, please comply with the safety regulations without fail.
Only use original PROXXON spare parts.
 We wish you much success with the device.

2. The technology of your FF 500/BL CNC at a glance

Dear User,

With this FF 500/BL CNC vertical miller, you have acquired a powerful, precise processing machine that fulfils the highest demands on ease of use, precision and reliability. In the following, you will find explanations on some of the technical details:

2.1. A short overview of the mechanics:

The FF 500/BL CNC is a solidly constructed and carefully manufactured upright vertical milling machine. The equipment compiled in a user-friendly manner and the extraordinary quality of the design make the milling cutter a reliable partner for an entire series of activities from the machining sector.

A heavy, rugged machine base ensures excellent stability and accommodates the CNC-controlled cross table, traversable in two axes (diagonal (X-axis) approx. 300 mm, deep (Y-axis) 100 mm) as well as the sturdy and generously dimensioned column made of high-strength aluminium continuous casting profile. Just like the cross table, it is equipped with a dovetail guide which supports the carriage to accommodate the milling head.

This carriage is also traversed by electronic control, and the traverse path (Z-axis) is approx. 220 mm. The milling head itself consists of the motor, the gearbox and the spindle unit.

If required, it can also be turned by 90° on each side and conveniently clamped in any position with the toggle screw. Together with the drilling feed, this makes slanted drilling possible, for example. The tool is held in one of the four supplied collet chucks.

In addition, the milling head is equipped with a drill feed, which means that your milling cutter can also be used for drilling work or for countersinking, for example.

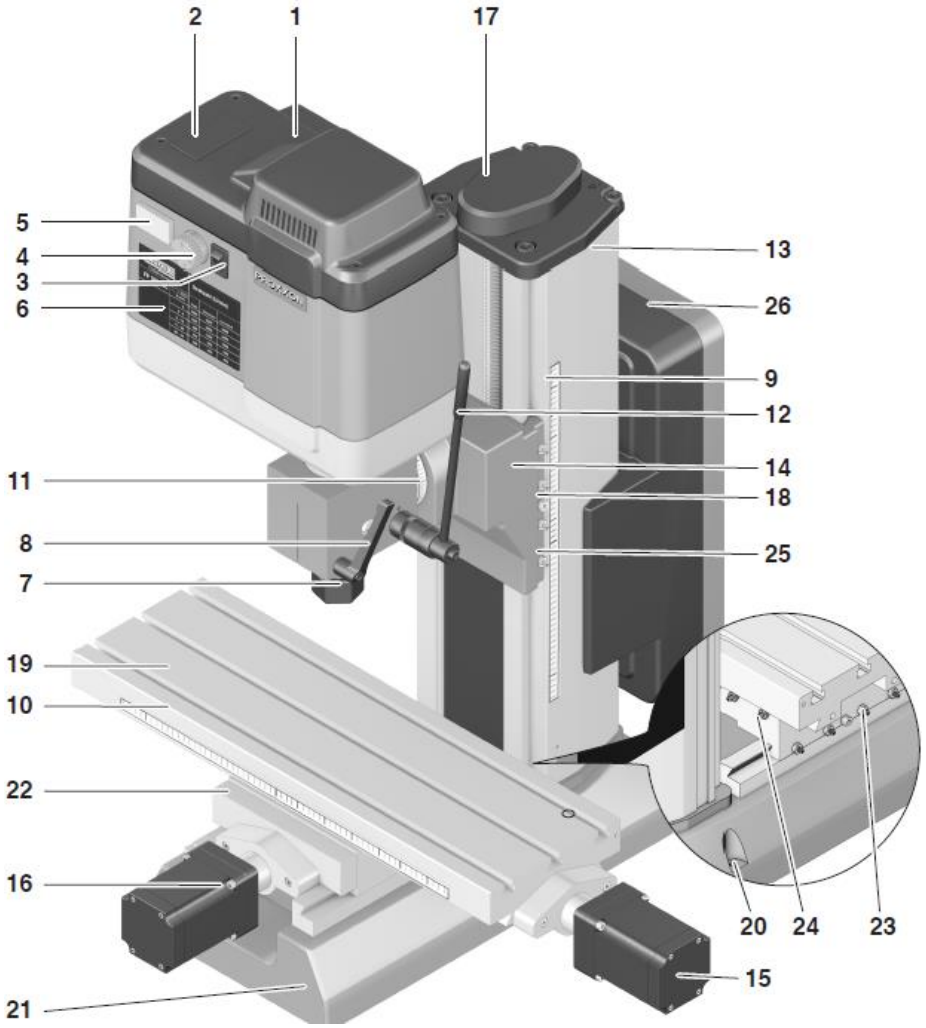
The spindle is driven directly by an ultra-modern brushless direct current motor. This technology with integrated rotor position recognition and speed sensor enables an extremely high and very consistent torque across the entire operating speed range. As a result, large-diameter milling cutters can be used even at slower speeds. In comparison, speeds up to 4000 rev/min allow the use of milling cutters with relatively small diameters. The wide range of different milling cutter types and the ability to adjust the speed to the type of material means there are practically no limits to its use.

Thanks to the direct drive and the motor construction without brushes, the drive is virtually wear-free and extraordinarily smooth-running.

The high-precision dovetail guides are adjustable for all axes in order to eliminate possible play due to wear. A comprehensive range of accessories is available in our assortment.

3. View of the machine with its elements

Fig. 1: Overall view of the milling cutter



1. Motor
2. Covering cap
3. On/Off switch
4. Speed regulation knob
5. Display
6. Speed table
7. Swivel nut for collet chuck
8. Clamping screw for quill
9. Adjustable scale for depth adjustment
10. Adjustable scale for lateral traverse path
11. Scale for angle adjustment
12. Drilling lever
13. Column
14. Z carriage/milling head fixture
15. Step Motor for X direction
16. Step Motor for Y direction
17. Step Motor for Z direction
18. Clamping screw for height adjustment
19. Work table (400 mm x 125 mm)
20. Screw holes for fastening
21. Base
22. Support
23. Adjusting screws for Y guide
24. Adjusting screws for X guide
25. Adjusting screws for Z guide
26. Power supply

4. Technical data

4.1. Milling machine:

Voltage:	230 Volt, 50/60 Hz
Capacity:	400 Watt
Spindle speed:	200-4000 rpm, electronic control
Basic dimensions	See Fig. 2
Quill feed:	30 mm using drilling lever with scale ring (1 graduation line = 1 mm).
Cross table	solid, surface-milled cross table with 3 continuous T-slots for size 8 standard bricks
Slot clearance:	45 mm
Slot cross-section	See sketch in chapter “Clamping the workpiece”
Table size	400 x 125 mm
Tool holder	6, 8, 10 and 12 mm collet chucks (included in delivery).
Milling head	can be pivoted to the left and right by 90° (with degree graduation).
Extension (column outside to centre of tool)	approx. 125 mm
Column	of high-strength aluminium continuous casting, extensively ribbed to achieve optimal strength
Noise generation	≤ 70 dB(A)
Vibrations	≤ 2.5 m/s²
Weight	approx. 47 kg

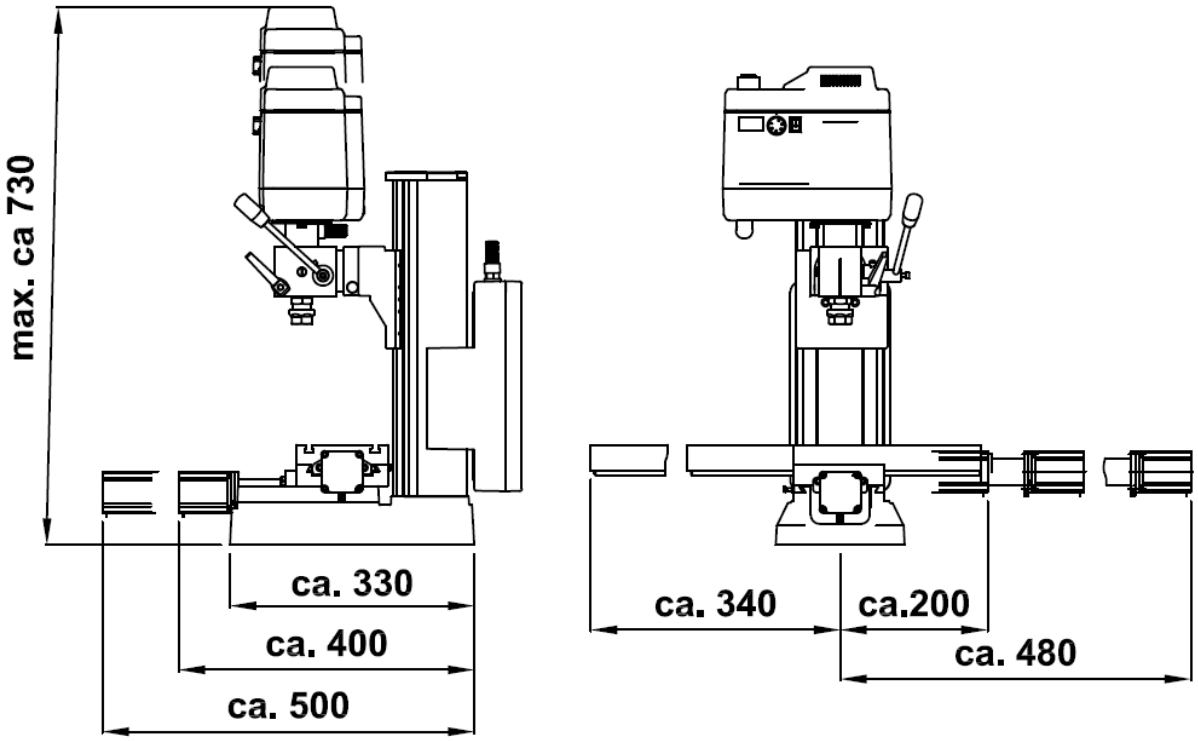
4.2. Drives of the tool axes

Spindle drive X axis (Longitudinal drive, cross table):	Recirculating ball screw with 4 mm pitch, effective diameter 12 mm. Stepping motor 2.2 A, holding torque 1.27 Nm, traverse path: approx. 290 mm
Spindle drive Y axis (Transverse drive, lower carriage):	Recirculating ball screw with 4 mm pitch, effective diameter 12 mm. Stepping motor 2.2 A, holding torque 1.27 Nm, traverse path: approx. 100 mm
Spindle drive Z axis (Leading spindle, longitudinal drive, support):	Recirculating ball screw with 4 mm pitch, effective diameter 12 mm. Stepping motor 2.2 A, holding torque 1.27 Nm, traverse path: approx. 220 mm

4.3. Further data

Ambient conditions:	5 - 40°C (Class 3K3), max.60% relative humidity
User group	Persons as of 14 years of age

4.4. Milling cutter dimensions (Fig. 2)



5. Scope of delivery

1	Qty.	Milling cutter with attached stepping motors
1	Set	of operating tools
1	Set	of commissioning manual and safety regulations
1	Set	of collet chucks Ø 6, 8, 10 and 12 mm incl. swivel nut

6. Basic tips on setting up and installing the machine

6.1. Unpacking and setting up the machine

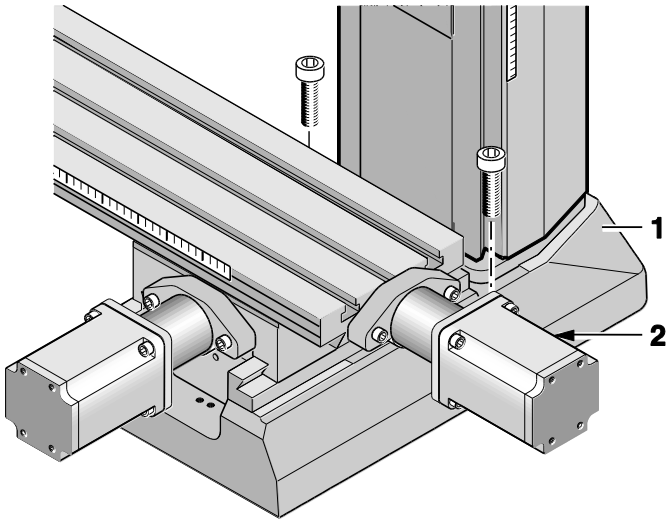
Caution!
Do not insert the mains plug before completing the assembly work as the machine could be switched on unintentionally. Risk of injuries!

Carefully unpack the individual components from the Styrofoam packaging. Please check for completeness of the delivery by using the list in the chapter "Scope of Delivery".

Please assemble the drilling lever (item 12 in the "Overall view of the milling cutter) to the drilling lever shaft!

Caution!
Your milling machine weighs approximately 47 kg. Please do not attempt to lift the machine out of the box by yourself or even set it up alone! Ask someone to help you, otherwise you risk hurting yourself or damaging the machine.

The machine may only be set up and operated in dry and well-ventilated rooms. The configuration of the components and its cabling is illustrated in the schematic figure in Chapter 2.



The setup site must be level and sufficiently stable to absorb the vibrations that occur during work. The machine must be fastened to a fixed, level underlay using the drill holes intended for this purpose.
Please make sure the mains cable is outside the hazard area and cannot be crimped or otherwise damaged.

For safe and precise work, it is mandatory to fasten the machine onto a sturdy workbench or similar working support, see figure at right. There are two drill holes 2 for two M8 Allen screws on the right and left in the machine base 1 for this purpose.

Please note:
At delivery, some of the blank metal parts of the machine are conserved with corrosion protection. This protection is not intended as lubrication but only as conservation and must be removed before first use, such as with a lint-free cloth saturated with petroleum.
All guides must be checked, and in rare cases adjusted as necessary. (See chapter "Adjusting the play of the cross table or Z carriage guides".

The blank guides and spindles must then be oiled with suitable machine oil (see chapter “Lubricating the machine”.

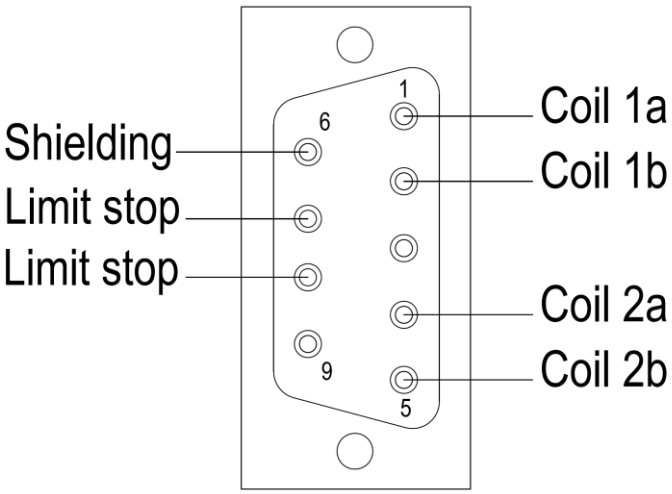
6.2. Connecting the cabling

The connection cable of the three stepping motors has to be inserted in the provided sockets of the CNC control. They are identified accordingly as "X", "Y" and "Z" of the respective CNC axes.

For your information: The "implied" X axis is horizontal in the longitudinal direction of the cross table, the Y axis is also horizontal but at right angles to that, and the Z axis describes the vertical traversing of the milling head at the column.

The mains cable of the milling machine is inserted in the provided socket of the CNC control. Please leave the insertion of the mains plug of the computer and the CNC control in the mains socket outlet for the very last.

6.3. Connector pin assignment



7. Working with the milling cutter

7.1. General information for working with milling cutter

Caution!
Disconnect the mains plug before you do any adjustments or when exchanging tools!

Caution!
Please note that despite all the advantages for use in machine tools, the condenser motor used here can become quite warm due to the construction type. This is not an indication of a defect and can occur when the motor idles for a longer period of time or runs under a very minor load. Please be sure to avoid these operating conditions and do not allow your milling cutter to run on idle excessively.

Caution!
Please note: There is always a potential risk of injuries emanating from all motor-driven or manually driven parts from machine tools. Therefore, please ensure you always keep sufficient distance and never reach into moving tools!

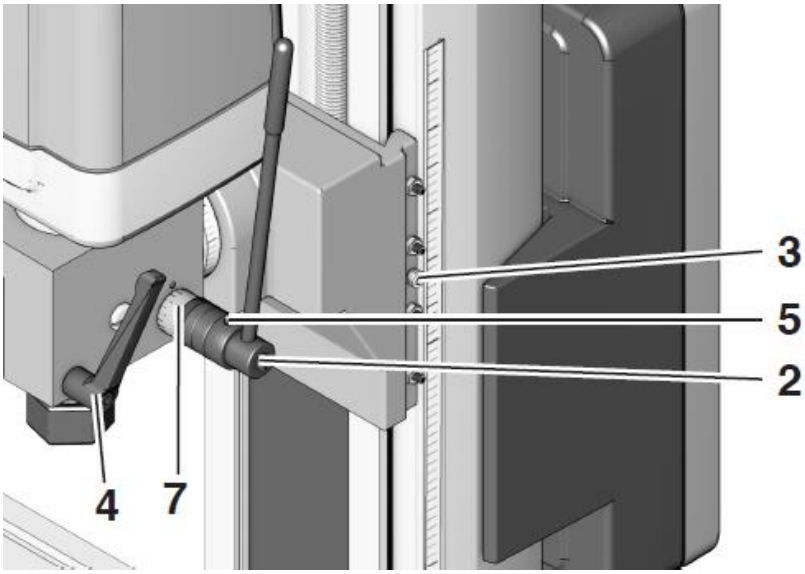
Never hold the tools with your hand - always tighten them properly!

7.2. Working with the drilling lever

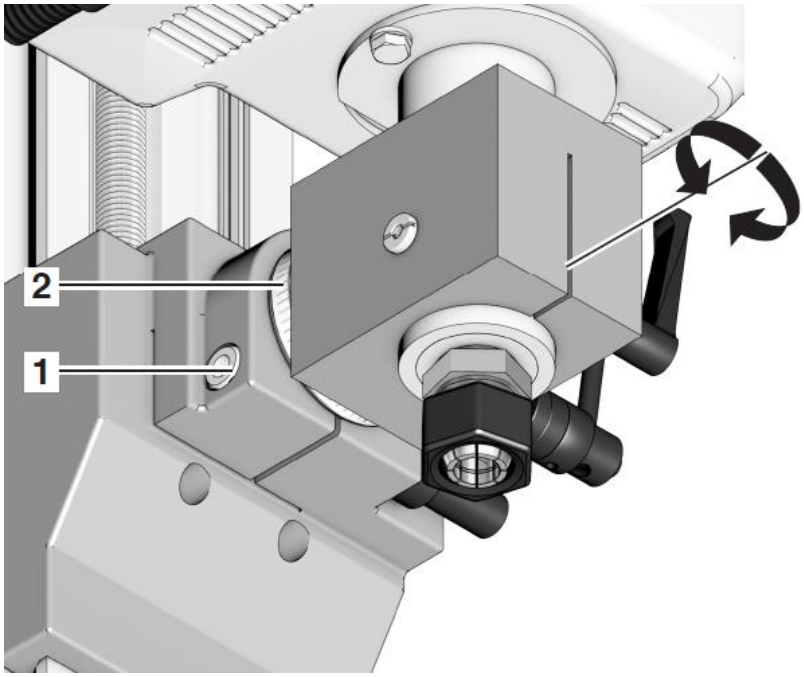
Please note: Never actuate the drilling lever during CNC operation or even adjust it to a new position! This could cause damage to the machine and/or the work piece!

While the milling cutter is operating, the milling head is traversed automatically with the milling spindle, making the use of the drilling lever superfluous: The drilling movements are performed with the Z axis.
However, for drilling work in semi-automatic mode, i.e. when working quasi manually by pressing the cursor keys to adjust the axes, it is also possible to manually actuate just the quill with the spindle using the drilling lever (e.g. if you wish to drill a hole pattern in a plate, etc.). A milling head adjusted at a slant will be able to make slanted drill holes.

1. Release toggle screw 4.
2. Release Allen screw 5 at scale ring 7 and set scale to the desired value.
3. Re-tighten screw 5. Now the feed until reaching the stop is the adjusted value.
4. After drilling re-tighten toggle screw 4.



7.3. Swivelling the milling head by its own transverse axis



To swivel the milling head by the transverse axis, simply release Allen screw 1 and swivel the milling head to the desired position. Set the desired graduated number on scale 2 and re-tighten screw 1. The milling head can be swivelled to every side by 90°: Important if drill holes must be manufactured using the quill feed.

7.4. Mounting the collet chucks

Caution!

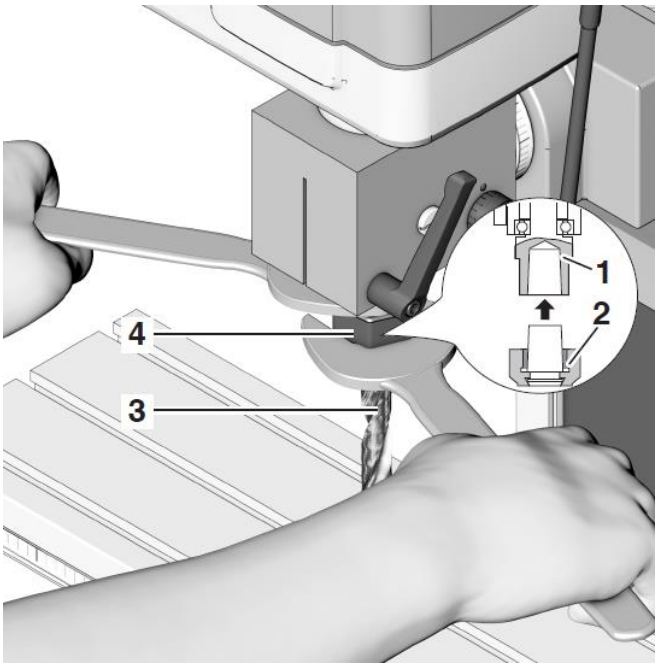
You must disconnect the plug from the power socket to prevent unintentional start-up! Risk of injuries!

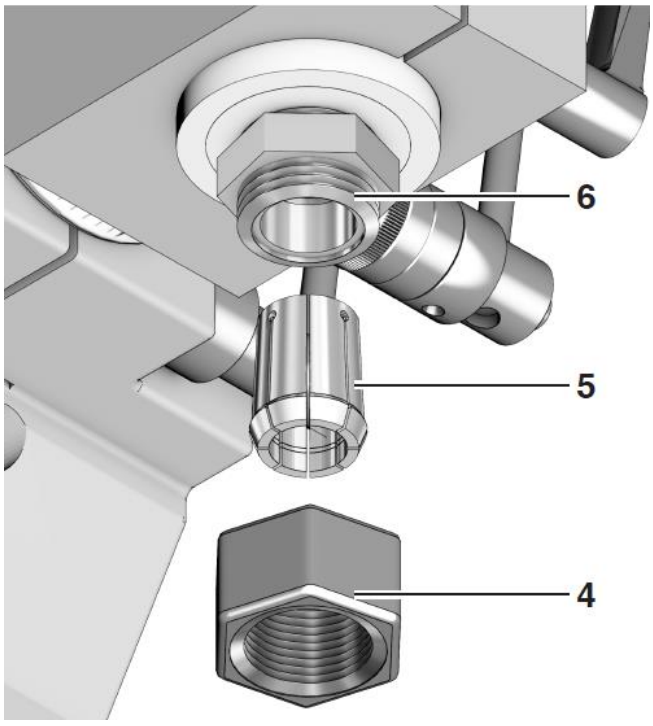
Caution!

- Never insert the collet chuck singly into the spindle receiver!
- Always engage the collet chuck in the swivel nut first!
- Always make sure that the collet chuck and the milling shaft have the matching diameter!

Please note: In addition to the supplied collet chucks, we have further sizes available in our accessories range. Please contact our Customer Service should you have any further questions. You will find the postal address at the back of these instructions, or simply write us an e-mail to technik@proxxon.com.

1. Release sleeve nut 4 at the milling spindle.
2. Place required collet 5 by hand in the sleeve nut 4 and let snap into place by exerting slight axial pressure at the continuous groove. Caution: The thinner end of the collet must point up, as shown in the figure.
3. Insert sleeve nut 2 with the collet in spindle 1 (see small illustration) and tighten lightly by hand.
4. Insert shaft of tool 3 in the collet.
5. Use the supplied wrench to tighten the sleeve nut, as shown in Fig. 7.
6. To remove the collet, release sleeve nut 4 and pull out tool 3.
7. Now remove the complete sleeve nut with collet out of the milling spindle.
8. Apply slight side pressure to disengage and remove the collet.



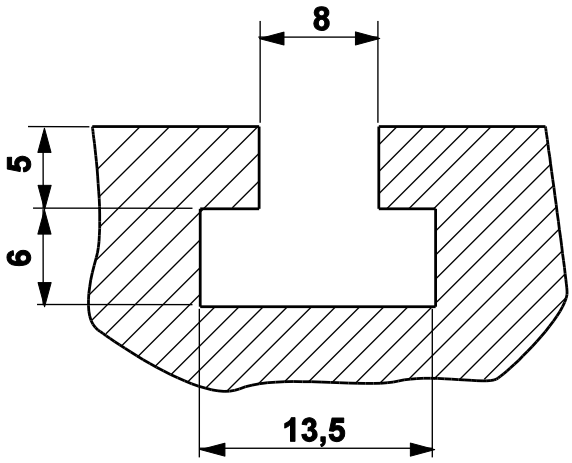


7.5. Changing the spindle speed

Setting the spindle speed is necessary to adapt the cutting speed of the tool to the characteristics of the material to be machined and to the tool geometry.
Large tool diameters at equal rotational speed also mean a large circumferential speed and thus potentially a large cutting speed. Conversely, the same is also true for small tool diameters. The speed can be adjusted with the rotational speed adjusting knob and the current value is shown on the digital display.

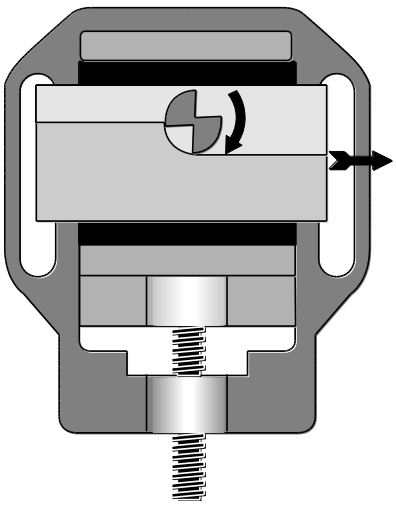
7.6. Clamping the workpiece

Caution!
Always wear protective goggles during milling. Comply with the safety regulations without fail!



The work piece to be processed must always be securely fastened to the cross table! There are various possibilities available to you: Clamping jaws (e.g. 24 257 from PROXXON) and vices (e.g. 24 255 from PROXXON) are very well suited.
The cross section of the groove is shown in the image on the right.
You will find examples for clamping devices and accessories in our equipment brochure, on the internet at www.proxxon.com, and together with other valuable notes, in our "Manual for the Creative Modeller" (Art. No. 28 996; only in German).

7.7. Feed:



During milling, make sure the feed always occurs against the cutting direction of the milling cutter, see image at right.

8. Accessories

Commercially available milling cutters with a maximum shaft diameter of 12 mm and a tool diameter of approx. 40 mm can be used.

For an optimal working result, it is necessary to adapt the milling cutter as well as the milling parameters (feed, milling depth, rotational speed) to the working conditions and to make a choice from these. Naturally, this includes observing the speed table on the front of the casing of the milling cutter.

We recommend the milling inserts from our accessories program, such as the end mill cutter set (2-5 mm) 24610 or - for larger work - the end mill cutter set (6-10 mm), article no. 24620.

You will find further suitable milling and drilling tools in PROXXON quality from our comprehensive program in specialist shops.

They will be able to recommend a suitable PROXXON product for your special application case. Please have as well a look at www.proxxon.com.

9. Repair, Cleaning and Maintenance

Caution!
Disconnect the mains plug before all repair and maintenance work!

9.1. In general

Please keep the machine clean and handle with care. Keep in mind that "healthy" mechanics are decisive for the quality of the working result.
The guides play a very important role here: They are important machine elements and must be handled with special care.
Cleaning the machine after every use and the regular application of oils and lubricants is always a part of caring for the machine.

The CNC machine should always be in a clean condition, i.e. carefully cleaned after every working stage.
Some elements affect the precision and work safety and must therefore be checked regularly. Here the following checklist for this purpose:

- Are the guides clean and dry?
- Is the machine, and are especially its moving parts, free from processing residues?
- Are the fastening screws tight?
- Alignment: Are the guides adjusted neatly?

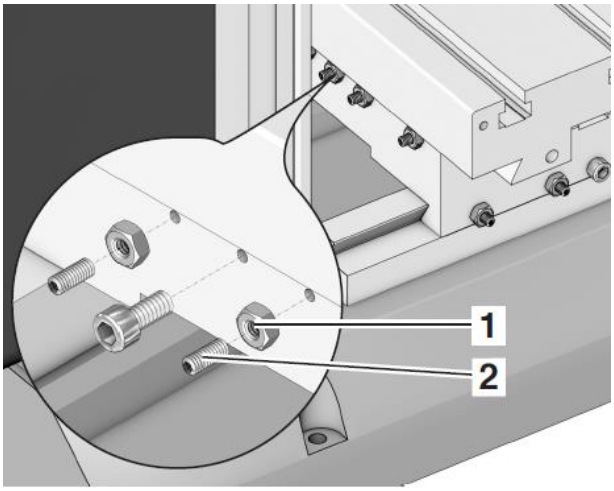
If required, the following maintenance activities are necessary:

- Clean the machine (vacuum cleaner!) and rub dry
- Readjust the guides in case the carriages have play
- Rub guides and moving parts with acid-free oil.

If the CNC machine will be decommissioned for a longer period of time, it should be stored in a dry room at a minimum temperature of 5°C.
A cover to protect from dust and environmental effects is sensible.

9.2. Adjusting the play of the cross table or Z carriage guides

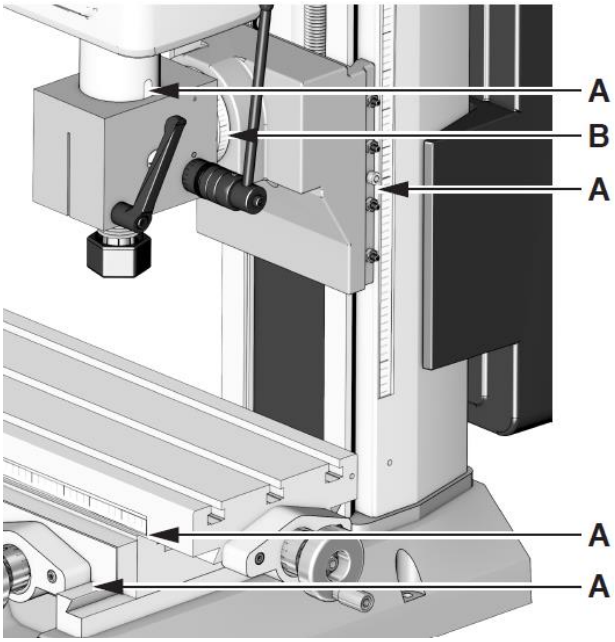
If the guide of a cross table or Z carriage axis develops too much play after some time, you can readjust the play using the adjusting screw 2. To do so, release the counter nuts 1 and evenly turn in all adjusting screws until the play is eliminated. Then retighten the counter nuts.



9.3. Lubricating the machine

After use, clean the cross table and milling cutter with a soft cloth or brush. Then lightly oil the guides and distribute the oil by traversing the table.
Never clean the cross table with compressed air as the guides would be destroyed by the entering swarf!

To guarantee the long service life of the milling cutter, please comply with the lubrication schedule below (A: Oil before beginning any work / B: Oil monthly, please note: The figure corresponds to the conventional version of the milling cutter, but the lubricating points are appropriate). Only use acid-free machine oil from specialist shops!



Grease or oil all parts according to the lubrication schedule. When oiling the sliding surfaces, move the carriages back and forth by hand several times so that oil can run into the guides.

A = Oil/lubricate before every use
B = Oil/lubricate monthly

The regular and careful lubrication will decisively reduce friction between two moving parts and will thus contribute to a long service life of the guide and a good mechanical condition of the machine.

To properly apply the lubricant, use an oil can or a lint-free cloth saturated with oil or grease. Please, treat the guides and all moving and blank parts in the same manner.
Please, also comply with the instructions of the lubricant manufacturers!

9.4. Cleaning and Care

Caution!
Always disconnect the mains plug before any cleaning, adjusting, maintenance or repair! Risk of injuries!

Note:
The machine is primarily maintenance free. For a long service life, clean the device after every use from swarf and other processing residues.

Make expedient use of a hand broom, a brush or a (lint-free) cloth. A vacuum cleaner can also be recommended.
Please ensure that swarf does not get into the guides or other moving parts!
Therefore, never blow off the machine using compressed air: Dust and above all swarf can be blown into guides or other moving parts and damage them!

When using cleaning agents, make sure the saturated wiping cloths are disposed of in an environmentally-compliant manner.

10. Disposal

The device contains valuable substances which could be recycled. If you have questions concerning this topic, please address your municipal disposal company or other appropriate municipal institutions.

11. Compilation of safety notes:

As with any other machine, there are some things that need to be observed when operating the CNC milling machine so that dangers to humans and the environment cannot occur.
In this context, please also observe the separately enclosed pamphlet with the safety notes.

Special noise protection	This can be achieved through ear protection, a protective cell, or a closed room. Also, clamp the tools short so that they do not vibrate so strongly
User group	Persons above the age of 14 may use the system; instructions on safety and compliance with the safety notes is always required.

Caution!

Risk of injuries!	Always keep your fingers away from the rotating work piece during milling! Never measure the work piece during operation with a sliding calliper or similar device! Do not process the work piece during operation with a rasp or sandpaper!
Setting up the workplace:	No spatial narrowness EMERGENCY Off pushbutton in the room Vacuum cleaner, permanently installed PC and machine next to each other
User group	Technically capable persons who are at least 14 years of age. Familiarize yourself using the documents or by being instructed.
Machining unit	Due to the safety regulations, a machining unit for clamping processing is delivered.
Changing work pieces	Please observe at all costs that the machine is protected against unintentional actuation while changing the tools or clamping work pieces in the respective clamping device!

When changing the tools, the mains power input for the machining unit must be removed from the mains socket!
Clamp the milling cutter as short as possible!

Eye and contact protection	Wear protective goggles in the immediate vicinity and make sure that the chuck guard is in the correct position when operating the machine.

12. EC Declaration of Conformity

We herewith declare in sole responsibility that the following designated product in the design which we have marketed complies with the principle safety and health requirements of the applicable EU Directive.
This declaration shall lose its validity if unauthorised changes were made to the system.

Manufacturer:	PROXXON S. A. Härebierg 6-10 6868 Wecker LUXEMBOURG
Product designation	CNC vertical milling machine
Type designation	FF 500/BL CNC-ready Article number 24364

EU-EMC Directive	**2014/30/EU**
Applied standards:	DIN EN 55014-1/05.2012 DIN EN 55014-2/02.2016 DIN EN 61000-3-2/03.2015 DIN EN 61000-3-3/03.2014

EU Machinery Directive	**2006/42/EC**
Applied standards:	DIN EN 62841-1 / 07.2016

Date: 8th of January of 2020

Signature:

Dipl.-Ing. Jörg Wagner
PROXXON S.A.
Device Safety Division

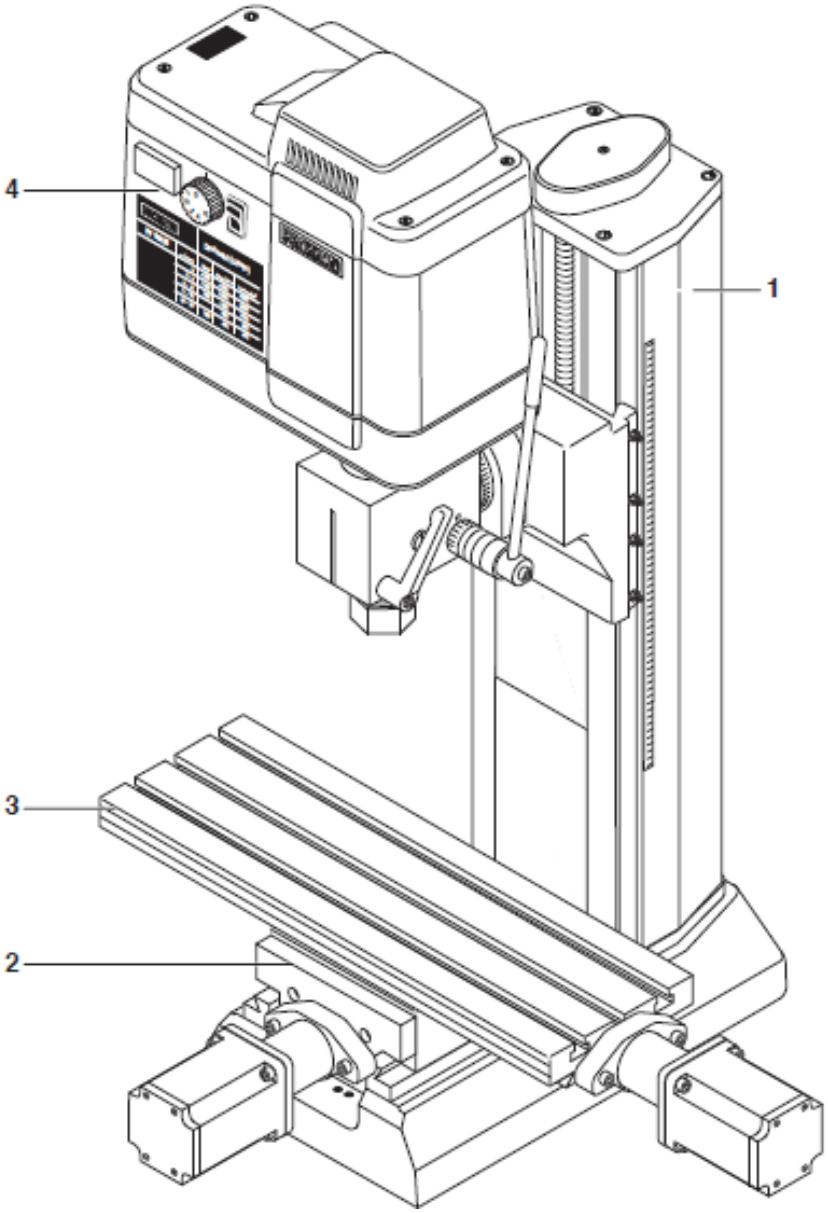
13. List of components and exploded views

13.1. General view

13.1.1 General view exploded drawing and parts list

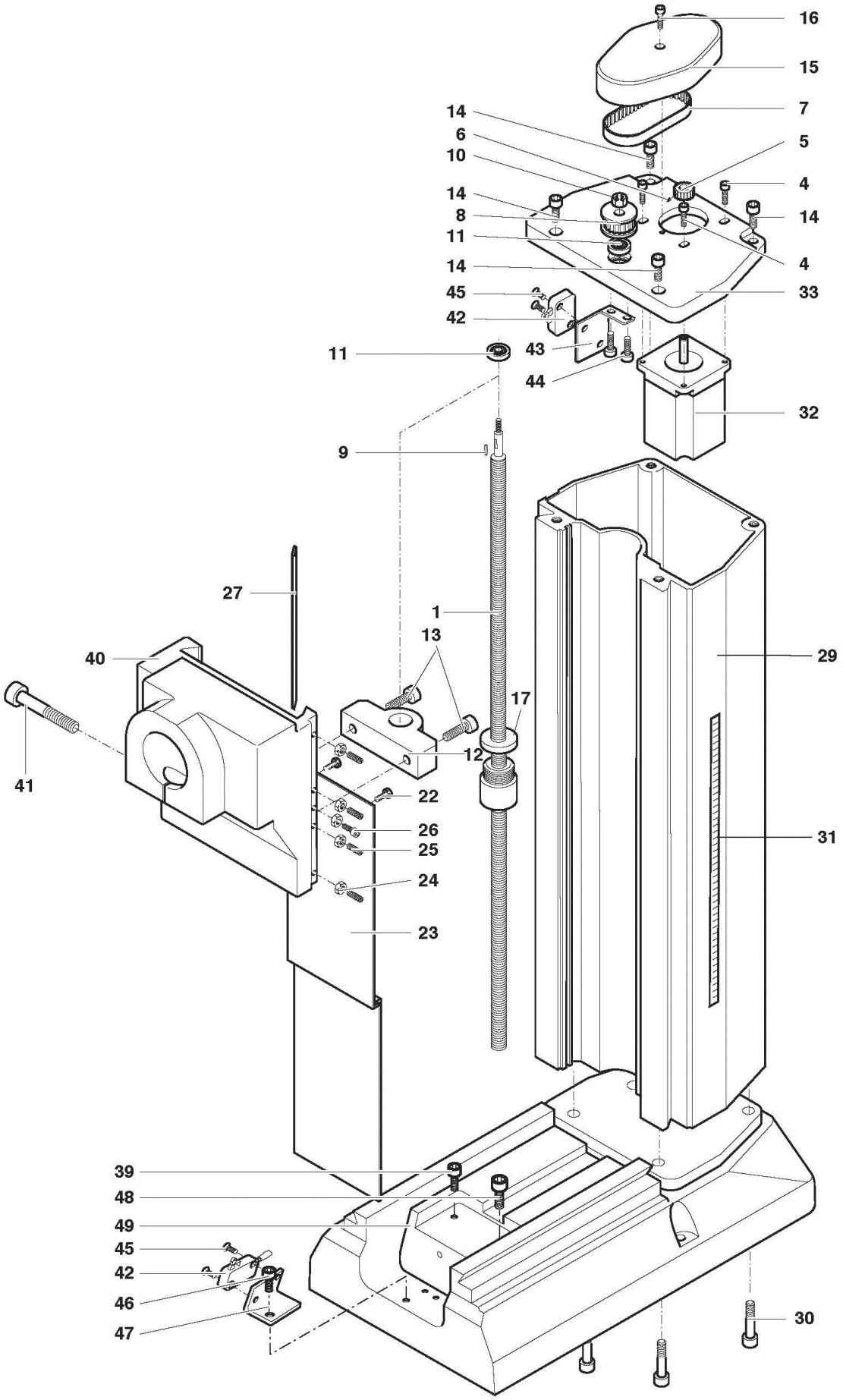
ET No.: Designation

24360 - 01 Assembly group Z axis
24360 - 02 Assembly group Y axis
24360 - 03 Assembly group X axis
24360 - 04 Milling head



13.1.2 Exploded drawing and parts list Assembly group 01:Z axis

ET No.:	Designation
24360 - 01 - 01	Z threaded spindle
24360 - 01 - 04	Screw
24360 - 01 - 05	Toothed belt wheel
24360 - 01 - 06	Headless screw
24360 - 01 - 07	Toothed belt
24360 - 01 - 08	Toothed belt wheel
24360 - 01 - 09	Fitted key
24360 - 01 - 10	Nut
24360 - 01 - 11	Ball bearing
24360 - 01 - 12	Spindle nut mount Z axis
24360 - 01 - 13	Screw
24360 - 01 - 14	Screw
24360 - 01 - 15	Hood
24360 - 01 - 16	Screw
24360 - 01 - 17	Felt ring
24360 - 01 - 22	Screw
24360 - 01 - 23	Cover plates
24360 - 01 - 24	Nut
24360 - 01 - 25	Headless screw
24360 - 01 - 26	Screw
24360 - 01 - 27	Adjusting plate
24360 - 01 - 29	Column
24360 - 01 - 30	Screw
24360 - 01 - 31	Ruler
24360 - 01 - 32	Motor
24360 - 01 - 33	Cover for column
24360 - 01 - 34	Support
24360 - 01 - 35	Limit Switch
24360 - 01 - 36	Clamping piece (through hole)
24360 - 01 - 37	Clamping piece (With thread)
24360 - 01 - 38	Base
24360 - 01 - 39	Stop screw
24360 - 01 - 40	Z carriage
24360 - 01 - 41	Screw
24360 - 01 - 42	Limit switch
24360 - 01 - 43	Holder
24360 - 01 - 44	Screw
24360 - 01 - 45	Screw
24360 - 01 - 46	Screw
24360 - 01 - 47	Holder
24360 - 01 - 48	Stop screw
24360 - 01 - 49	Base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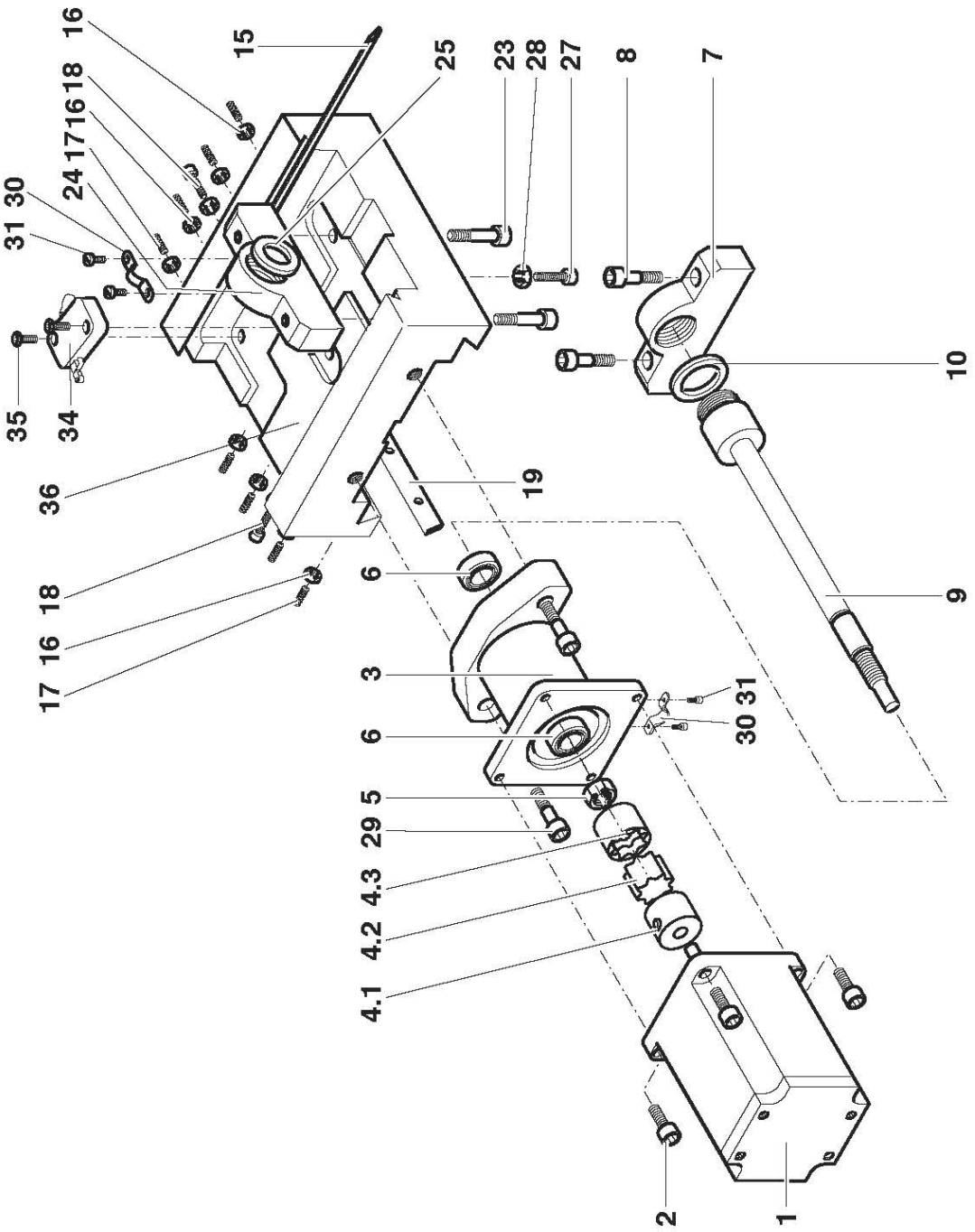
13.1.3 Exploded drawing and parts list Assembly group 02 Drive Y axis

ET No.:	Designation
24360 - 02 - 01	Motor
24360 - 02 - 02	Screw
24360 - 02 - 03	Motor mount Y axis
24360 - 02 - 04	Coupling part
24360 - 02 - 04-1	Coupling motor side
24360 - 02 - 04-2	Elastomer insert
24360 - 02 - 04-1	Coupling screw side
24360 - 02 - 05	Nut
24360 - 02 - 06	Ball bearing
24360 - 02 - 07	Spindle nut mount Y axis
24360 - 02 - 08	Screw
24360 - 02 - 09	Recirculating ball screw
24360 - 02 - 10	Felt ring
24360 - 02 - 15	Adjusting plate
24360 - 02 - 16	Nut
24360 - 02 - 17	Stud bolt
24360 - 02 - 18	Screw
24360 - 02 - 19	Adjusting plate
24360 - 02 - 23	Screw
24360 - 02 - 24	Spindle nut mount X axis
24360 - 02 - 25	Felt ring
24360 - 02 - 27	Stop screw, carriage
24360 - 02 - 28	Nut
24360 - 02 - 29	Screw
24360 - 02 - 30	Cable clamp
24360 - 02 - 31	Screw
24360 - 02 - 34	Position switch
24360 - 02 - 35	Screwt
24360 - 02 - 36	Lower carriage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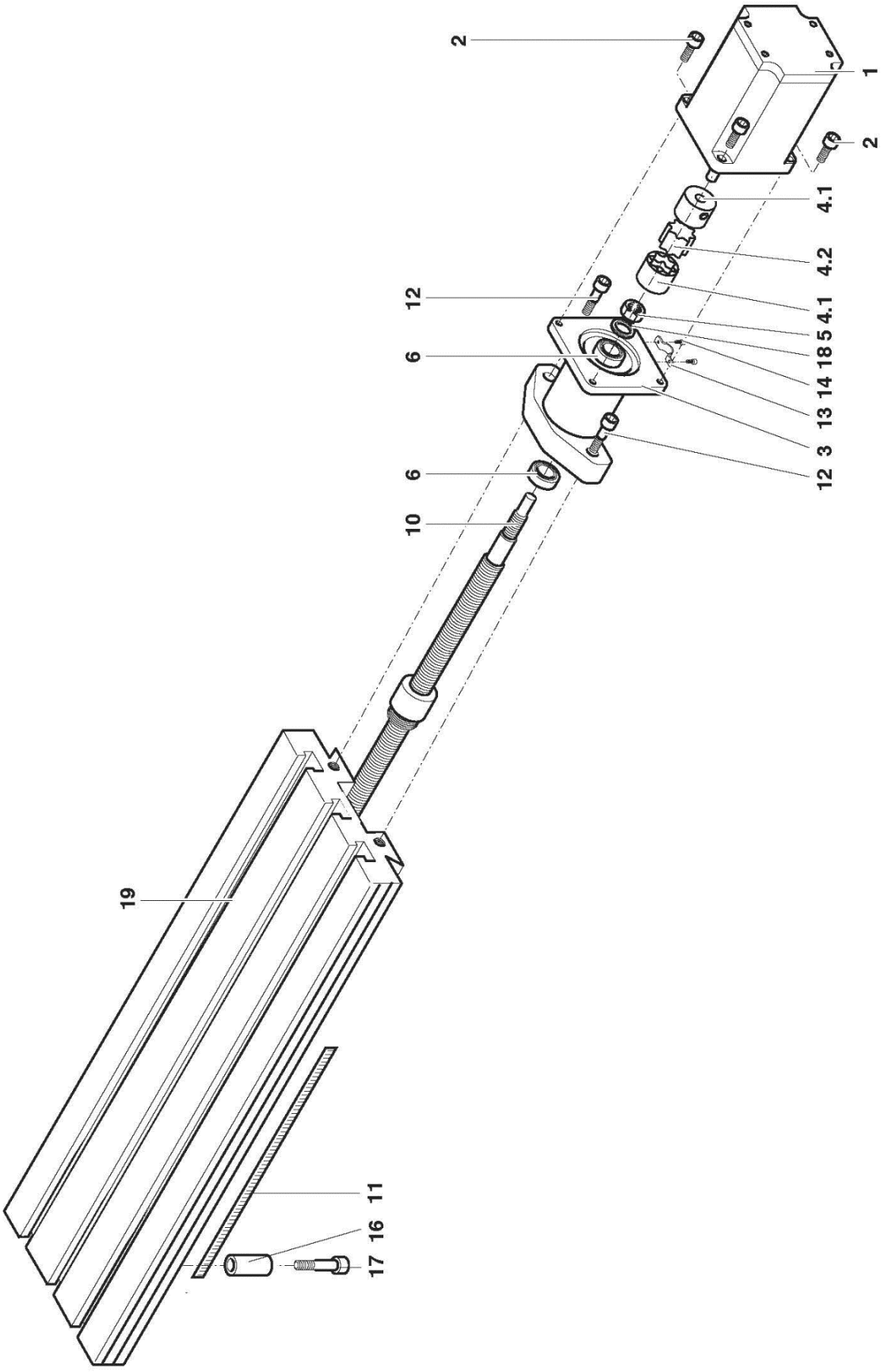
13.1.4 Exploded drawing and parts list Assembly group 03 Drive X axis

ET No.:						Designation
24360	-	03	-	01		Motor
24360	-	03	-	02		Screw
24360	-	03	-	03		Motor mount X axis
24360	-	03	-	04		Coupling
24360	-	03	-	04-1		Coupling part
24360	-	03	-	04-2		Elastomer insert
24360	-	03	-	05		Nut
24360	-	03	-	06		Ball bearing
24360	-	03	-	07		Milling table
24360	-	03	-	08		Actuating plate
24360	-	03	-	09		Screw
24360	-	03	-	10		X recirculating ball screw
24360	-	03	-	11		Ruler
24360	-	03	-	12		Screw
24360	-	03	-	13		Cable clamp
24360	-	03	-	14		Screw
24360	-	03	-	14		Limit stop actuator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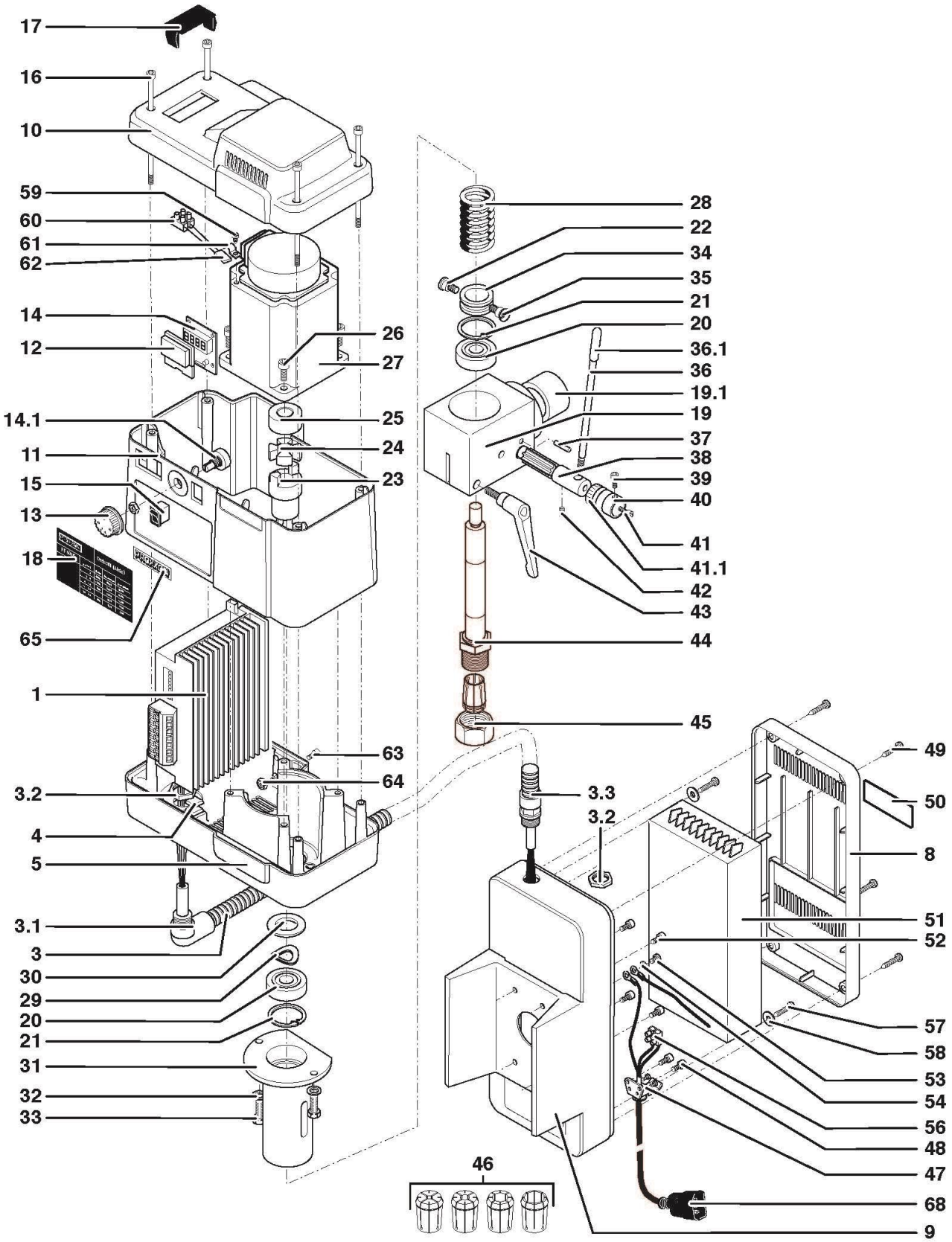
13.1.5 Exploded drawing and parts list Assembly group 04: Milling head

ET No.:	Designation
24360 - 04 - 01	Controller
24360 - 04 - 03	Cable harness, comp.
24351 - 04 - 03.1	Fitting, angular
24352 - 04 - 03.2	Nut
24353 - 04 - 03.3	Fitting, straight
24360 - 04 - 04	Rubber pad
24360 - 04 - 05	Casing, downer part
24360 - 04 - 08	Cover
24360 - 04 - 09	Casing column
24360 - 04 - 10	Cover
24360 - 04 - 11	Casing
24360 - 04 - 12	Cover fort Display
24360 - 04 - 13	Knob
24360 - 04 - 14	Speed display
24360 - 04 - 14.1	Potentiometer
24360 - 04 - 15	Motor switch
24360 - 04 - 16	Casing screw
24360 - 04 - 17	Cover
24360 - 04 - 18	Speed table sticker
24360 - 04 - 19	Quill guidance
24360 - 04 - 19.1	Angle label
24360 - 04 - 20	Roller bearing
24360 - 04 - 21	Circlip
24360 - 04 - 22	Pin with thread
24360 - 04 - 23	Downer coupling part
24360 - 04 - 24	Elastomer cross
24360 - 04 - 25	Upper coupling part
24360 - 04 - 26	Allen screw
24360 - 04 - 27	Motor
24360 - 04 - 28	Spring
24360 - 04 - 29	Spring washer
24360 - 04 - 30	Washer
24360 - 04 - 31	Quill
24360 - 04 - 32	Washer spring
24351 - 04 - 33	Screw
24360 - 04 - 34	Ring
24360 - 04 - 35	Pin with slit
24360 - 04 - 36	Lever
24360 - 04 - 36.1	Grip
24360 - 04 - 37	Pin
24360 - 04 - 38	Toothed shaft
24360 - 04 - 39	Allen screw
24360 - 04 - 40	Scale ring
24360 - 04 - 40.1	Scale label
24360 - 04 - 41	Allen screw
24360 - 04 - 42	Set screw
24360 - 04 - 43	Toggle screw
24351 - 04 - 44	Spindle
24360 - 04 - 45	Swivel nut for spindle
24360 - 04 - 46	ER-Collet chuck, set complete
24360 - 04 - 46.1	ER-Collet chuck 6 mm
24360 - 04 - 46.2	ER-Collet chuck 8 mm
24351 - 04 - 46.3	ER- Collet chuck 10 mm
24360 - 04 - 46.4	ER-Collet chuck 12 mm
24360 - 04 - 47	Strain relief
24360 - 04 47.1	Clamp
24360 - 04 47.2	Allen screw
24360 - 04 - 48	Allen screw
24360 - 04 - 49	Casing screw
24360 - 04 - 50	Label
24360 - 04 - 51	Switching power display
24360 - 04 - 52	Allen screw
24360 - 04 - 53	Ground screw
24360 - 04 - 54	Toothed washer
24360 - 04 - 55	Lever
24360 - 04 - 56	Luster terminal
24360 - 04 - 57	Screw
24360 - 04 - 58	Washer
24360 - 04 - 59	Screw
24360 - 04 - 60	Luster terminal
24360 - 04 - 61	Fastener
24360 - 04 - 62	Thermal element
24360 - 04 - 63	Screw
24360 - 04 - 64	Nut
24360 - 04 - 65	Proxxon-Logo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PROXXON

Service note

All PROXXON products are thoroughly inspected after production. Should a defect occur nevertheless, please contact the dealer from whom you purchased the product.

Only the dealer is responsible for handling all legal warranty claims which refer exclusively to material and manufacturer error.

Improper use, such as capacity overload, damage due to outside influences and normal wear are excluded from the warranty.

You will find further notes regarding "Service and Spare Parts Management" at www.proxxon.com.

We reserve the right to make changes in the sense of technical progress

24360-99 E