

COBRA6Xe

WET/DRY DIGITAL MILLING UNIT



User Manual

Ver.: EN-1.04

Updated: 28-05-2021

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1. Safety considerations

Attention: Please read this Instruction Manual carefully before you turn on the machine!

1.1. Intended Use


This Milling Unit is a CNC milling unit used for the wet and dry machining of pre-sintered dental zirconia, glass ceramics as well as dental plastics, wax and gypsum.




The equipment may be used exclusively for its intended purpose. The manufacturer refuses to take any responsibility for damages occurring for any other use of the equipment than the intended one. The intended use includes observing the instructions of use as well as carrying out maintenance works at regular intervals.

Pidental Kft. assumes no responsibility for any damages or accidents occurring due to the use of the equipment with tools or raw materials not previously approved by the manufacturer!

1.2. Symbols

In this Instruction Manual the following symbols draw the attention to a possible danger or damage.

Symbol	Text	Explanation
	Danger!	<p>WARNING: Not observing the instructions results in the occurrence of a potential danger.</p> <p>Ignoring the symbol may lead to smaller personal injury and damage or break to the equipment.</p>

	<p>Attention!</p>	<p>Additional note related to the operation and use of the machine. Ignoring the symbol may result in damage or break to the equipment.</p>
	<p>Clean it!</p>	<p>Remove the dust from the surfaces with clean, dry brush and / or vacuum cleaner carefully!</p>
	<p>Wipe it!</p>	<p>Wipe to dry the surfaces with clean and dry cloth carefully!</p>

1.3. Guarantee and Liability

We provide 2 years guarantee for the equipment with the indicated serial number in accordance with our general terms of sales and supply. Any guarantee or liability claims occurring due to personal injuries or damage to any equipment must be considered null and void in case the injury or damage has taken place due to one or more of the following reasons:

- improper installation, operation, assembly or maintenance of the machine
- any unintended use
- operating the machine with faulty safety equipment or with improperly installed or dysfunctional safety and protective equipment

- ignoring the instructions of the User Manual regarding the transport, storing, assembly, operation and maintenance of the machine
- any modification in the machine without permission
- improperly performed repairs

1.4. Obligations of the User

The user must make sure that the operators of the equipment

- are aware of the safety and accident prevention rules and are trained for operating the equipment,
- confirm by signing a declaration that they have read and understood the safety and operating rules,
- are trained about the accident prevention rules.

1.4.1. Obligations of the Operators

Before starting to work on the equipment every operator undertakes

- to keep the safety rules
- to sign a declaration that he/she has read and understood the safety and operating rules.

1.4.2. General information for the Safe Operation of the Equipment

- Do not modify the equipment in any way.
- The equipment must not be used when it is faulty in any way.
- Always disconnect the power before starting any maintenance work.

1.4.3. Packing

The packing protects the equipment during transport but it offers only minimal protection against moisture, heat and any kind of mechanical impacts. After unpacking dispose the package in an appropriate way.

1.4.3.1. Package Content

Standard package:

- 1 pc. Milling machine
- 1 pc. Zirconia tool magazine (T11-T16)
- 1 pc. PMMA tool magazine (T21-T26)
- 1 pc. User Manual with CE conformity declaration
- 1 pc. Ethernet cable (3m)
- 1 pc. Pneumatic pipe (Ø8mm x 2000 mm)
- 1 pc. Power network cable (16 A)
- 1 pc. Zirconium disc clamping plate
- 1 pc. External vacuum hose
- 1 pc. Allen key driver
- 1 pc. Silicone grease
- 6 pcs. Tool magazine spare o-ring
- 1 pc. Spindle's cleaning set
- 1 pc. Transport pin (in spindle's collet chuck)
- 1 pc. Spare fuse 5AT
- 1 pc. Vacuum connector elbow with fixing fork
- 1 pc. Drain plate

Wet package (optional)

- 1 pc. Coolant unit (Pump + Coolant tank)

Calibration package (optional):

- 1 pc. Calibration plate
- 1 pc. ProbeTool

Glass ceramic package (optional):

- 1 pc Ceramics tool magazine (T31-T36)
- 1 pc Ceramics fixture
- 1 L Cobra MGA grinding additive
- 1 pc Measuring cup
- 1 pc Coolant unit (Pump + Coolant tank)

Metal package (optional):

- 1 pc Metal tool magazine (T41-T46)
- 1 pc Metal fixture
- 1 L Cutting fluid additive
- 1 pc Allen key driver
- 1 pc Coolant unit (Pump + Coolant tank)
- 1 pc 4 mm Spindle collet chuck

Software package:

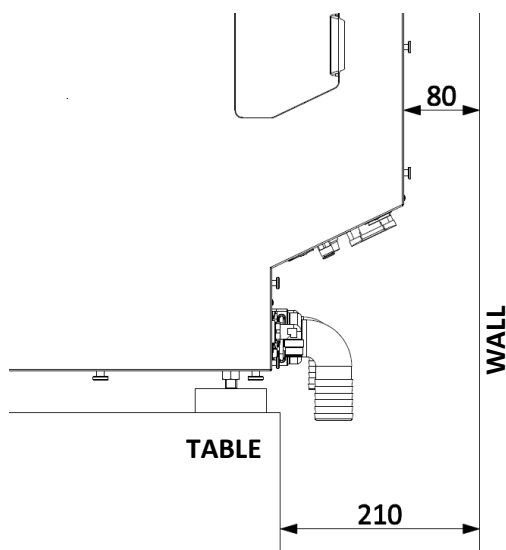
- 1 pc PiCAM dongle
- and/or
- 1 pc Millbox dongle (optional)

After unpacking please check the package content and make sure that it is free from any damage. If you detect any damage or deficiency, please inform the supplier immediately!

1.5. Placing



- The machine must be placed on a solid place, i.e. a strong table. (The mass of the machine is about 104 kg)
- Place the machine on **flat surface**; make sure that every foot of the machine is standing fully on the table.
- **Install the machine in a clean place protected from the dust as much as possible.**
- Do not place a furnace or any other heat radiating machine in the 0.5 m vicinity of the milling unit.
- It is PROHIBITED to cover the venting openings located on the casing!
- Keep the distance **around 80 mm** between backside of machine and the wall.
- Leave enough space (**around 210 mm**) between the table and the wall for the pipes and cables!

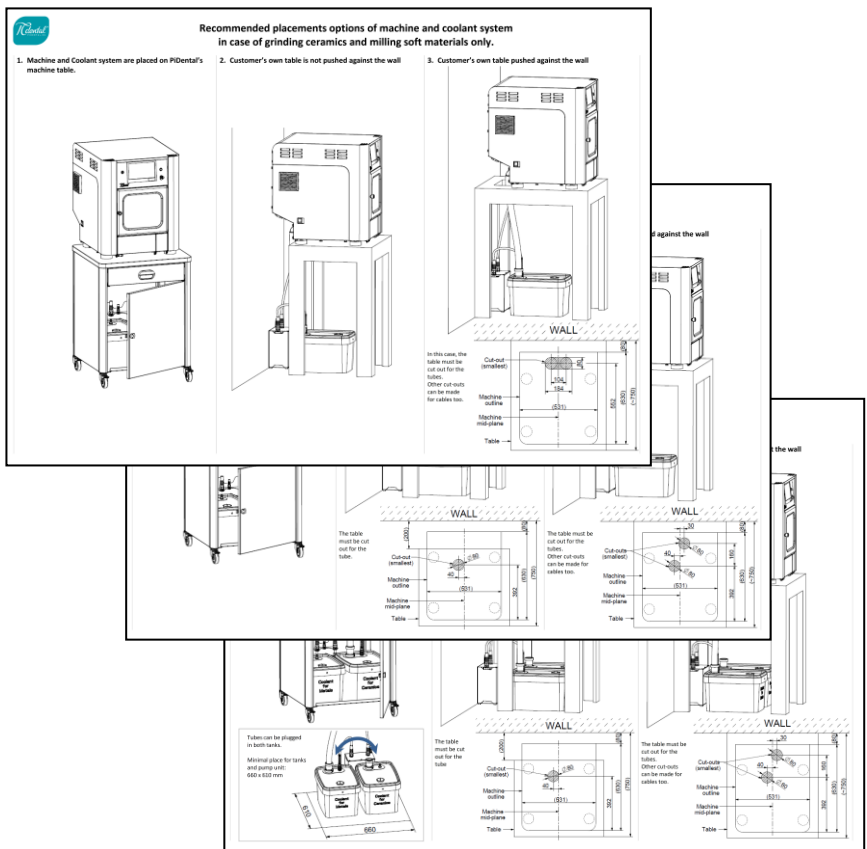


1.5.1. Table cut-out

For correct and safe leading of coolant and vacuum pipes the table-top should be cut-out at the specified areas.

The recommended table cut-out can be different depending on purchased wet package (**see section 1.4.3.1**) and desired table arrangement.

Our brochures provide information on the possibilities:



1.6. Transport pin



When the machine is being stored or shipped, milling spindle **ALWAYS** needs to have a transport pin [Figure 2] or any milling tool to secure its collet chuck.

Forgetting to put a transport pin in will cause damage to the collet and spindle, affecting the accuracy of the run out as well as lifetime of spindle.

Store the transport pin together with the other components of the spindle cleaning set [Figure 28].

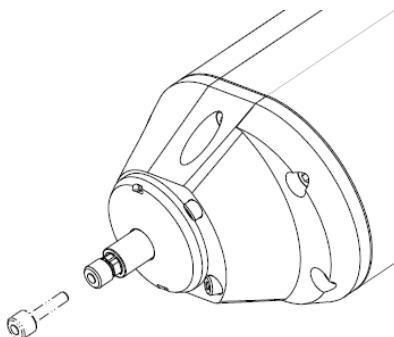
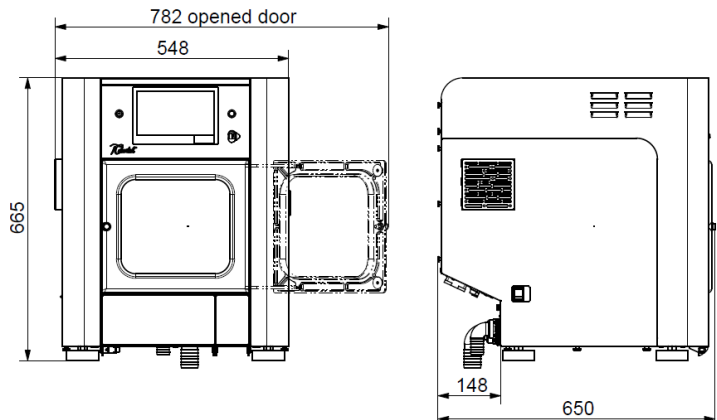


Figure 1 *Transport pin*

2. Technical specifications

Network voltage	230V, 50/60 Hz
Power consumption	max. 600 W
Fuse	6.3x32mm / 250V / 5 AT
Real precision	±0.01 mm (average)
Main spindle rpm	max. 60.000 /min
Main spindle max. power / torque	500W / 0.07 Nm
Shaft diameter of the milling tools	Ø 3mm – Ø 4 mm
Compressed air pipe connection	Ø 8 mm
Compressed air consumption	clean, dry, 7.0 bar, 80L/min
Dust extraction motor power	max. 2000 W
Ambient temperature during operation	+21 – +35 °C
Storage temperature	-10 – +50 °C
Ambient relative humidity	max. 70%
Weight	104 kg

Dimensions:
[mm]



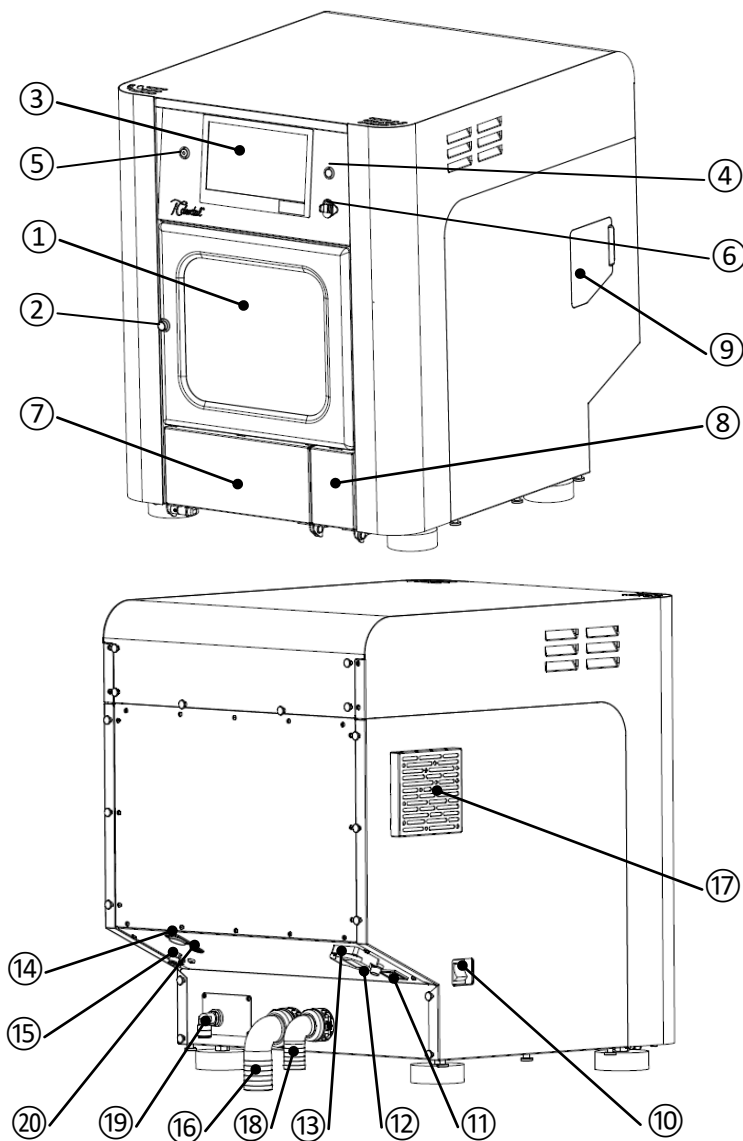


Figure 2 Front view and rear view of the machine

- ① Work-area door
- ② Door opening push button
- ③ Operating panel (LCD touch screen)
- ④ Emergency stop switch
- ⑤ Power button with LED light
- ⑥ USB 2.0 port
- ⑦ Tool magazine cabinet
- ⑧ External vacuum connection cabinet
- ⑨ Air treatment unit cover
- ⑩ Mains power switch
- ⑪ Mains cable socket (250VAC / 16 A; C20 (I))
- ⑫ Fuse (5AT)
- ⑬ Electric socket for the extractor (max. 2000 W)
- ⑭ Ethernet (LAN) connector (RJ45)
- ⑮ Air hose connection (Ø8 mm)
- ⑯ Extraction pipe connection (elbow fitting Ø39 mm)
- ⑰ Cooling fan air-filter with cover
- ⑱ Coolant drainage pipe connection
The drian pipe design can be different depending on purchased wet package. **(See section 1.4.3.1 and 1.5.1.)**
- ⑲ Coolant inlet pipe connection (Ø12 mm)
- ⑳ Coolant Pump cable socket

3. Connections of milling unit

3.1. Electric Network

The milling unit must be connected to a 230 VAC 50/60 Hz earthed socket, equipped with a 16 A circuit breaker or a 16 AT slow-blow fuse.



Specifications of the power cable: 250V / 16A; IEC C19; with grounding.

Fuse of the control unit [Figure 2 / 12]: 250V / 5 AT, 6.3x32 mm – 1 piece.

3.2. Computer Connection

The Milling Unit can be connected to the computer having the **PiCAM** software installed through an Ethernet (RJ45) connector [Figure 2 / 14] with Ethernet cable.

Configuring the network connection: Section 5.3.4

3.2.1. Internet connection



For remote support the optimal internet connection is required! User make sure a reliable internet connection with at least 10 Mbit/s down- and 2 Mbit/s upload reaches your computer. The faster the better, of course.

Remote support connection: Section 5.3.5

3.2.2. USB Connection

Any external drive supporting USB 2.0 can be connected to the USB port of the machine [Figure 2 / 6].

More information: section 5.2.4



Only NC programs generated by licensed CAM software can be run on the Milling Unit!

No responsibility is assumed by PiDental Kft. for damages occurring due to running programs from another source on the Unit!

3.3. Air Connection

The machine uses compressed air for the automatic tool change and for the protection of the milling motor. No milling is possible in the absence of compressed air!

Connect the **Ø8x6 mm** pneumatic hose to the quick connection [Figure 2 / 15]. **Method of assembly: section 6.9**

Maximal hose length: **10 m**
(in case of air-compressor minimum requirements)

Data relating the minimum air requirement for Milling Spindle:

- Compressed air (outlet) pressure: min. 7.0 bar / 0.7 MPa (for changing tools)
- Compressed air (outlet) flow volume: 80 L/min (for sealing air)
- Solid contamination: Class 3 (particle size max. 5 µm, particle density 5 mg/m³)
- Moisture content: Class 4 (max. dew point +3 °C, moisture content max. 6000 mg/m³)
- Total oil content: Class 2 (max. oil content 0.1 mg/m³)

If the pressure drops under 6 bar during milling the “FEED HOLD” status activated. Restart automatically in 10 second after pressure restored and stabilized.

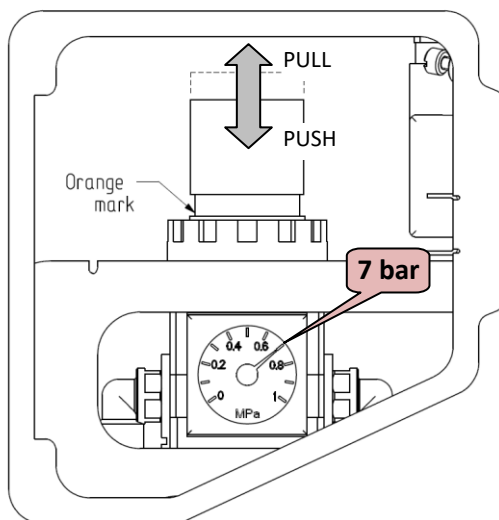


Air-compressor minimum requirements:

- Oil-free air-compressor
- Motor power: min. 750 W (recommended 1 kW)
- Airflow: 100 L/min (at 7 bar)
- Cut-in pressure of pressure switch (start pressure): 6.5 – 7.0 bar
- Quick coupler ¼" (nominal inside diam. 6 mm or greater)
- Tank: min. 6 L

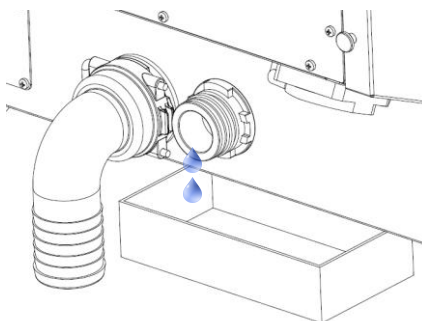
3.3.1.Setting air pressure

1. Turn-on the machine with the Main switch [Figure 2 / 10] and the Power button [Figure 2 / 5] to activate the main air valve.
2. First check the pressure gauge of the air compressor. The pressure in compressor must be over 7 bar/ 102 psi!
3. Open the cover lid on right side [Figure 2 / 9].
4. Pull the pressure regulator knob to unlock. (You can visually verify this with the “orange mark” that appears in the gap.)
5. Set the gauge to **7.0 bar / 0.7 Mpa**. by turning the knob clockwise to increase the pressure, counter-clockwise to decrease the pressure.
6. Push the knob to lock. When the knob is not easily locked, turn it left and right a little and then push it.



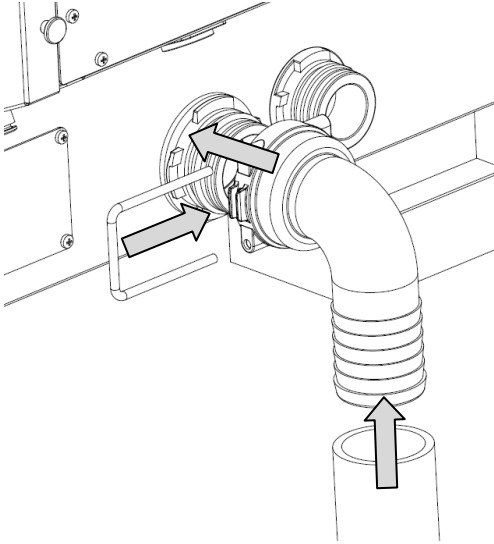
3.3.2.Condensate Management

The air condensate accumulating in the air filters tank. The condensate drained automatically from the filter and the condensate drips out.



Attention! If no coolant pipe connected to machine, a bowl need to put under the coolant outlet!

3.4. Connection of the Dust Extractor



1. Connect the electric plug of the dust extracting equipment into the relevant socket on the Milling Unit *[Figure 2 / 13]* and **turn on the main switch on the dust extracting equipment.**
2. Push the hose end of the dust extractor onto the elbow fitting correctly.

To correct fit the suction hose inner diameter must be Ø38-39 mm.

3. Connect the elbow fitting to extraction outlet *[Figure 2 / 16]*.
4. Secure the fitting with its fork.

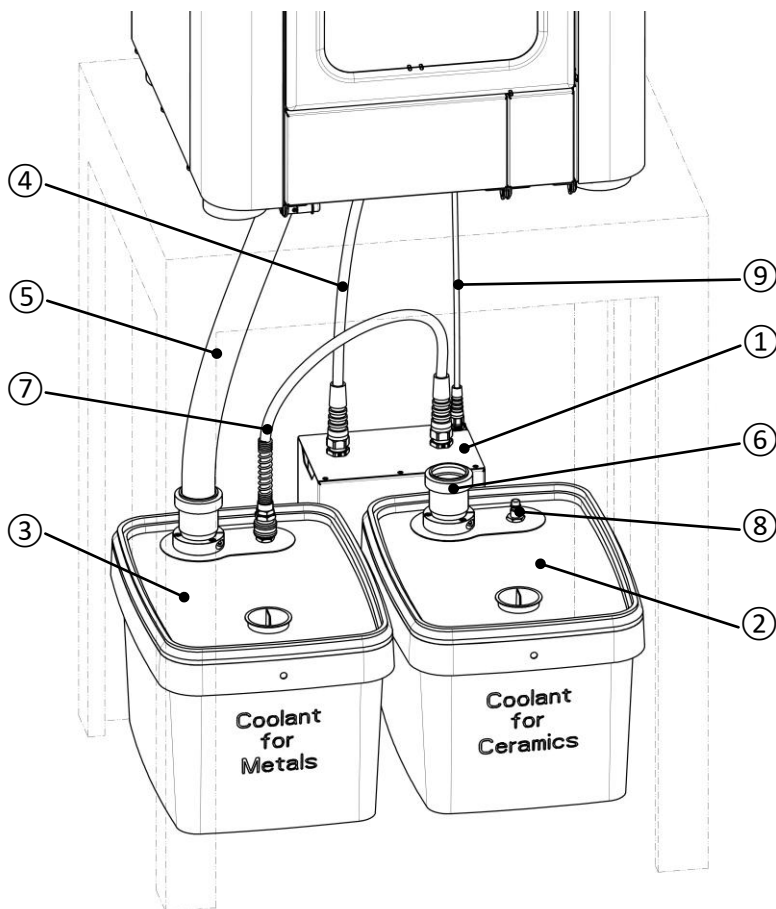
In case you want to use a dust extractor other than the one supplied and tested by PiDental Kft. observe the following criteria during the selection:

- The extractor must be suitable for the extraction of zirconium oxide dust
- Motor power: max. 2000 W
- Suction flow volume: ~ 60 l/s
- Vacuum: ~ -200 mbar
- HEPA micro filter min. 97%, filter class H12, grading class M



Attention! PiDental Kft. assumes no responsibility for the health and machine damages occurring due to ignoring the above criteria relating the dust extractor!

3.5. Connection of the coolant unit

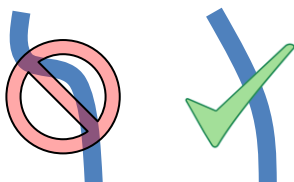


- | | |
|----------------------------------|--|
| ① Coolant Pump Unit (Standalone) | ⑤ Coolant drain pipe |
| ② Coolant tank for Ceramics | ⑥ Drain pipe case |
| ③ Coolant tank for Metals | ⑦ Coolant inlet pipe with quick coupling |
| ④ Coolant outlet pipe | ⑧ Quick coupling plug |
| | ⑨ Pump Unit connection Cable |

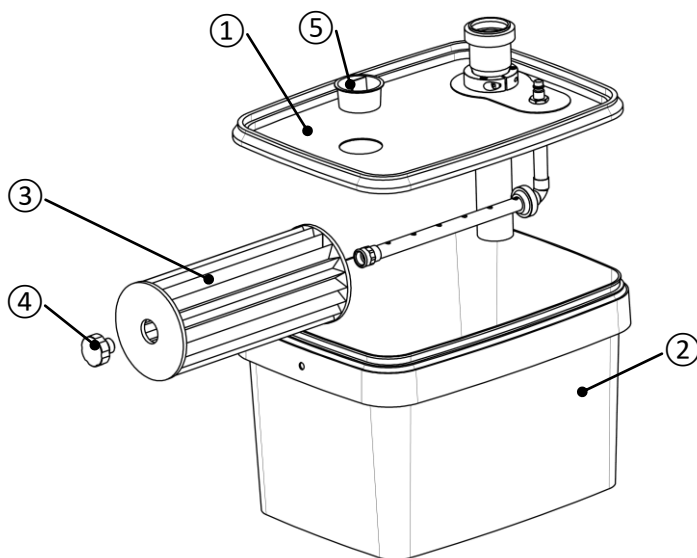
1. Place the standalone Coolant Pump Unit ① under the machine back side, on the floor.
2. Connect the interface cable of Pump Unit ⑨ to machine's socket [Figure 2 / 20].
3. Connect the outlet pipe ④ of Pump Unit to machine's inlet fitting [Figure 2 / 19].
4. Fill the Coolant tank up with the suitable coolant mixture. **See section 4.**
5. Connect the quick coupling of inlet pipe ⑦ to plug ⑧ of Coolant tank ②.
6. Push the end of drain pipe ⑤ to tank's pipe case ⑥.
The drain pipe design can be different depending on purchased wet package. **(See section 1.4.3.1 and 1.5.1.)**



The Pump Unit and Coolant tanks must be under the machine!
The pipes must be free of crack, kink and crush!
The outlet pipe ④ and drain pipe ⑤ must be cut to the right length at the time of installation of machine.
The drain pipe ⑤ must be free of multidirectional arcs!



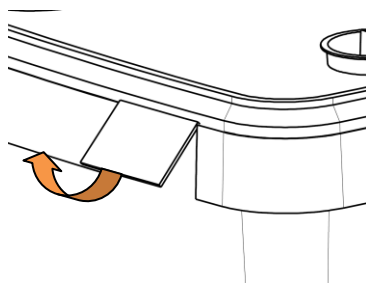
3.5.1. Coolant tank



- ① Tank lid (mounted)
- ② Tank tub (cca. 20 liter)
- ③ Tank filter

- ④ Tank filter fixing screw
- ⑤ Tank refill cap

1. Fold-up the opening tab to snap-up the tank lid ①, then remove the lid.
2. Fill-up the tank tub ② with **cca. 19 liter clear, cold water**.
3. Add the coolant additive corresponding to the material **/see section 4./** to water as follows:



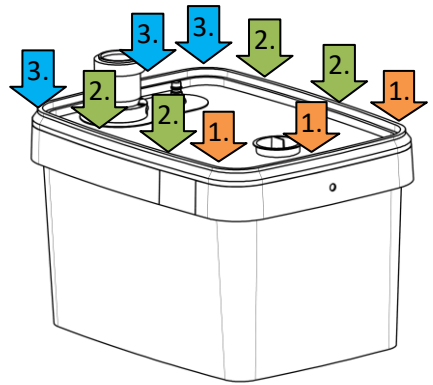
	amount of additive for 19 liters of water	amount of additive for 1 liters of water
COBRA-MGA for Ceramics	500 ml	25 ml
CUTTING FLUID for Titanium	1000 ml	50 ml



Attention! Only Additives supplied and approved by PiDental Kft. can be added to the water! The company assumes no responsibility for damages (e.g. tool or material breakage) occurring due to differences in the composition or quality of the additive from a third party manufacturer!

4. Mix the mixture thoroughly.

5. Close the tank lid ① in the following order:



6. In case of insufficient amount of coolant (below 0.8 liter/min), *Coolant Error* message is displayed on touch-screen (see section 5.2.5 and 5.3.1), tank needs to refill through the refill opening ⑤.

If the the error message persists, the Tank filter must be washed thoroughly!

Unscrew the filter fixing screw ④ to remove tank filter ③.




















Tank filter should be replaced after 2 washes!

At the same time as replacing the filter, the tank must also be cleaned and a new coolant prepared!



















Attention! Only filter supplied and approved by PiDental Ltd. can be use! The company assumes no responsibility for damages occurring due to uncontrolled filter from a third party manufacturer!

4. Machining materials

DRY - cutting materials and its components:

	SOFT MATERIALS					HARD MATERIALS	HYBRID MATERIALS
	Zirconia	PMMA	PEEK	Wax	Sintering metal	Chrome Cobalt	Composite Resin
Workpiece						 Medentika Pre-Face	 Vita CAD-Temp Vita Enamic
Fixture (holder)							
Tool magazine	 T11-T16	 T21-T26	 T21-T26	 T21-T26	 T11-T16	 T41-T46	 T11-T16

WET - cutting materials and its components:

	SOFT MATERIALS				CERAMICS	HARD MATERIALS	HYBRID MATERIALS
	PMMA	PEEK	Wax	Sintering metal	Ceramics	Titanium	Composite Resin
Workpiece						 Medentika Pre-Face	 Vita CAD-Temp Vita Enamic
Fixture (holder)							
Tool magazine	 T11-T16	 T21-T26	 T21-T26	 T21-T26	 T31-T36	 T41-T46	 T11-T16
Coolant	Clear Water without any Additive				Clear Water with COBRA-MGA	Clear Water with CUTTING FLUID	Clear Water without any Additive

4.1. Working Area

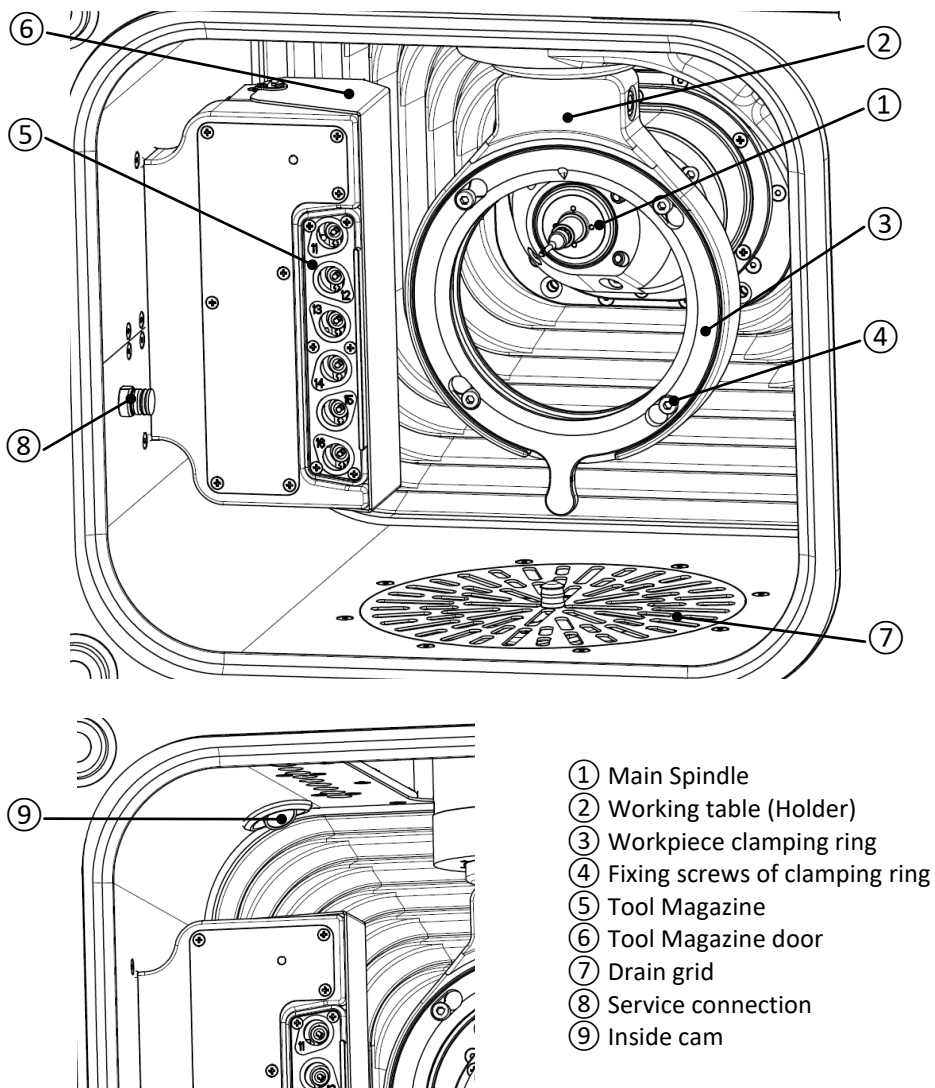


Figure 3 Working area

4.1.1. Clamping the disk shaped workpieces

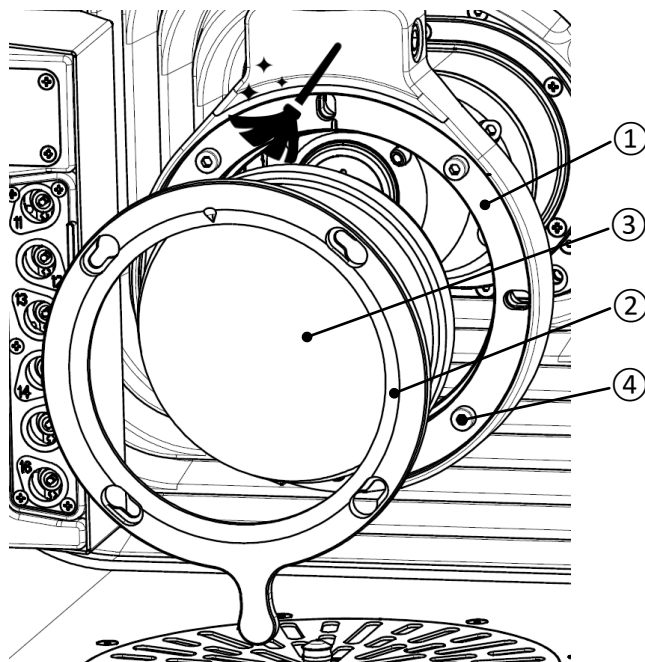


Figure 4 *Clamping the workpiece (Open system)*

1. Clean the work table ① with a clean brush.
2. Insert the workpiece ③ into the work table.
- Place the clamping plate ② on the fixing screws ④.

Take care of its position!!

3. Turn the clamping plate to the adequate direction until stop.
4. Fix the clamping plate by tightening the fixing screws.



Attention! If you over-tighten the fixing screws the zirconia disc may break!

4.1.2. Clamping the cuboid shaped workpieces

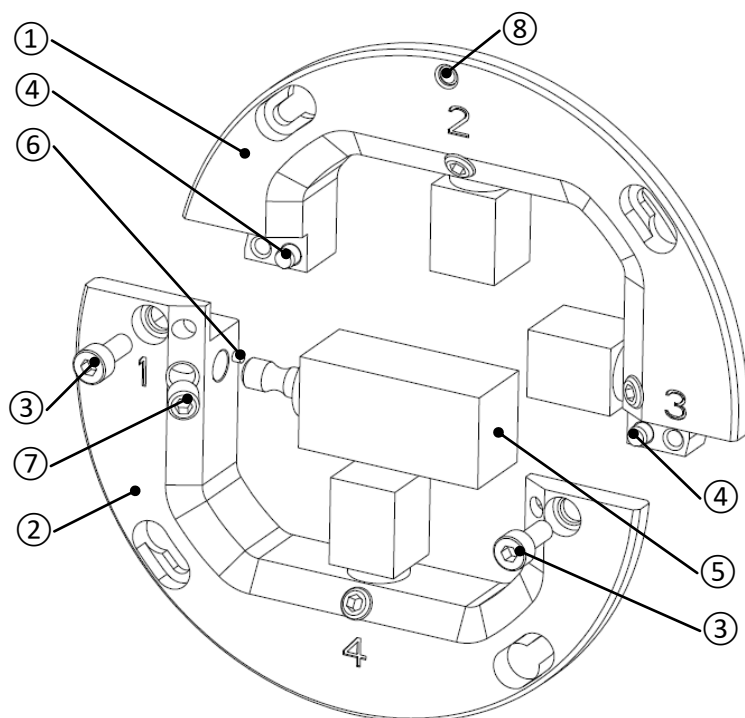


Figure 5 *Cuboid block's holder*

- ① Upper half of holder
- ② Lower half of holder
- ③ Fixing screws of two halves
- ④ Positioning pins of two halves
- ⑤ Ceramic blocks
- ⑥ Positioning pins of ceramic blocks
- ⑦ Fixing set screws of ceramic blocks
- ⑧ Positioning pin of holder

The holder can be disassembled into two halves to allow inserting multiple ceramic blocks in different sizes.



Take care of correct reassembly! Incorrect reassembly of halves causes tool as well as ceramic block damage!

1. Insert the cuboid blocks [Figure 5 / 5] in places (i.e. holes) selected in CAM software. **Take care that the position grooves of blocks fit on position pins [Figure 5 / 6]!**
2. Fix the cuboid blocks with set screws [Figure 5 / 7].



Clean all surfaces e.g. holes before placing blocks!

4.1.2.1. Positioning the cuboid block's fixture

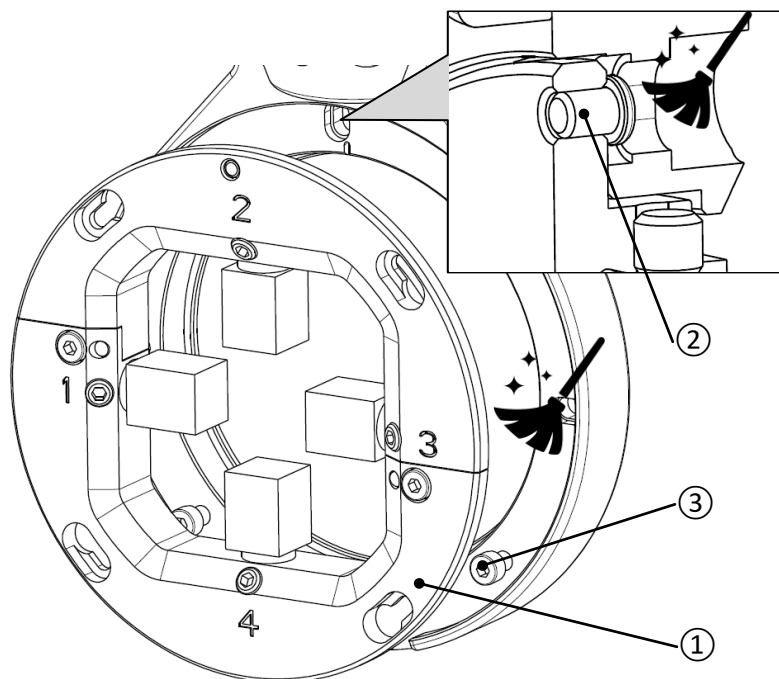


Figure 7 Positioning the ceramic block's holder

1. Clean the work table with a clean brush.
2. Insert the fixture ① into the work table so, that the positioning pin ② lies in the upper oval hole of work table.

3. Fix the fixture by tightening the fixing screws ③.

4.1.2.2. Cuboid (ceramic) blocks

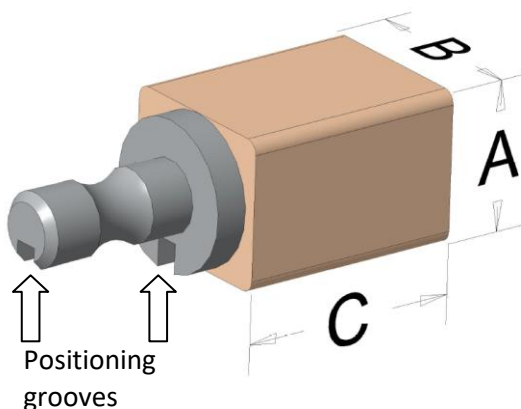
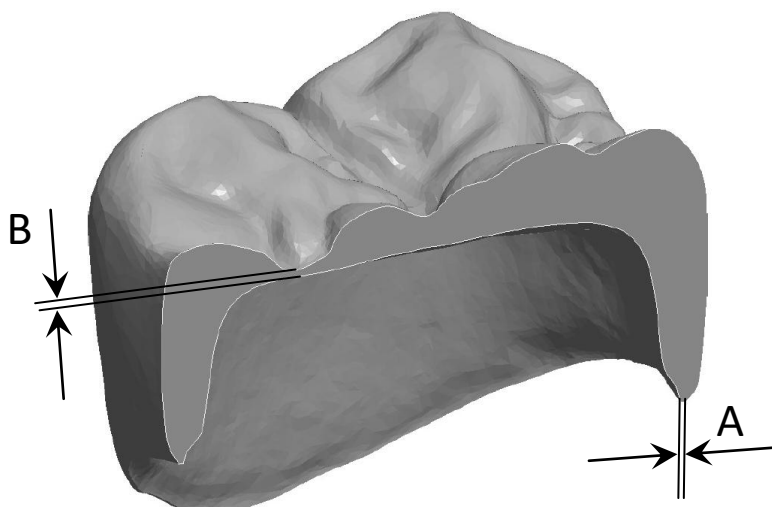


Figure 6 Cuboid (ceramic) block

Matching table of block sizes of PiCAM and the most used types:

PiCAM (AxBxC)			HASS Amber Mill	Vita Vitablocks	Ivoclar IPS e.max CAD
A	B	C			
8	8	15	-	I8 (8x8x15)	-
8	10	15	-	I10 (8x10x15)	-
10	12	15	C12 (10x12x15)	I12; TF-12 (10x12x15)	I12 (10x12x15)
12	14	18		I14; TF-14 (12x14x18)	
13	15	18	C14 (12x14x18)	PC-14; EM-14; EMC-14	C14 (12x14x18)
14	14	18	-	TF-14/14; RL-14/14 (14x14x18)	-
15	15	33	C32 (14x14x32)	-	B32 (14x14x32)
15	15	38	C40 (15x15x38)	-	B40 (15x15x38)
15	19	39	-	I-40/19; TF-40/19 (15.5x19x39)	-
18	16	39	-	-	B40L (18x16x39)
dimensions in mm					

4.1.2.3. Design requirements of Ceramic crowns

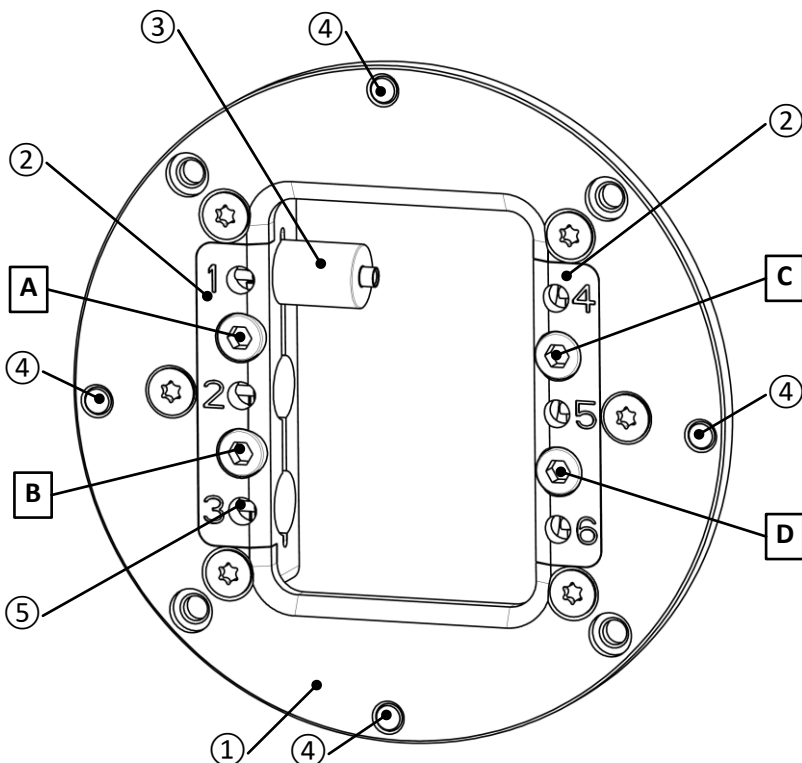


Dimension	Description	Minimum size	Recommended size
A	Thickness of margin	0.1 mm in PiCAM 0.3 mm in MillBox	above 0.25 mm
B	Wall thickness	0.2 mm	no recommendation



To avoid the breakage of margin line and/or wall of ceramic crown do not design below the minimum values of thicknesses.

4.1.3. Clamping the MEDENTIKA® PreFace® premilled abutments

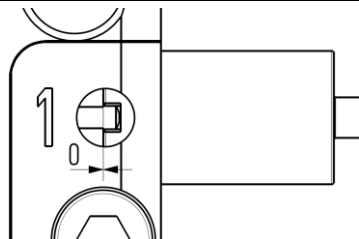


- ① Frame of holder
- ② Workpiece clamps
- ③ Workpiece
- ④ Positioning pins of holder
- ⑤ Positioning pins of workpiece
- A B C D Fixing screws



Clean all surfaces and holes thoroughly from the very small metal chips before placing workpieces!

1. Insert the workpiece ③ in place(s) selected in CAM software.
Take care that the position groove of blocks fit on position pins ⑤, furthermore the mating surfaces close correctly!



2. Fix the workpiece with fixing screws tightly as follows:

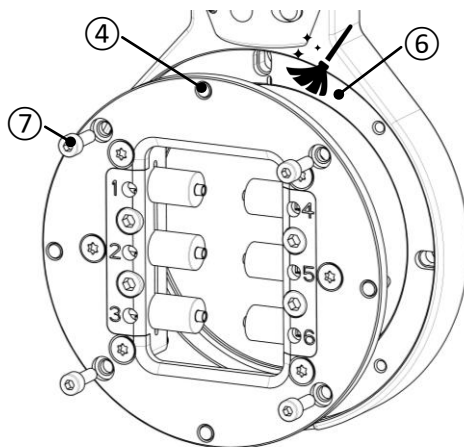
- if the workpiece is in place #1, fix it with screw **A**
- if the workpiece is in place #2, fix it with screws **A** and **B**
- if the workpiece is in place #3, fix it with screw **B**
- if the workpiece is in place #4, fix it with screw **C**
- if the workpiece is in place #5, fix it with screws **C** and **D**
- if the workpiece is in place #6, fix it with screw **D**



Take care of correct and tight clamping of workpieces!

Incorrect assembly causes tool, holder as well as workpiece damage!

3. Unscrews 4 fixing screws ⑦ of work table ⑥.
4. **Clean all surfaces and the 4 oval holes of work table ⑥ carefully and thoroughly!**
5. Place the abutment holder (fixture) into work table inserting the pins into the oval holes.
6. Screw back the fixing screws ⑦ to secure the abutment holder in work table.



4.1.4. Tool Management



Only tools supplied and approved by PiDental Kft. can be loaded into the magazines! The company assumes no responsibility for damages occurring due to differences in the geometry or material of the tools!

The machine performs the tool changes in accordance with the milling program automatically using the pneumatic tool chucking system of the milling spindle.

The machine measures (calibrates) and checks the tool length before and after each automatic or manual tool change ensuring the continuous milling precision.

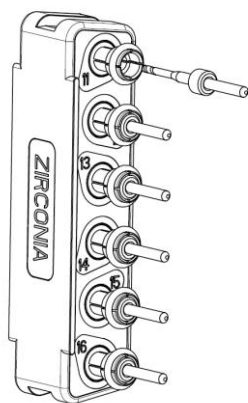


Figure 8 Changing tool

There are six tool positions in a magazine. Five tool magazines could be loaded into machine for several materials. The magazines and the tools managed by the CAM software.

Tool measurement process need to perform at new tool change only! For example: after changing broken or worn tool.

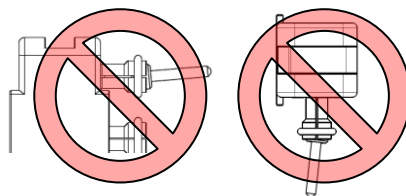
The tool measurement process can be initiated from the operating panel. **See: section 5.4.2**



Take care of correct position of tools!

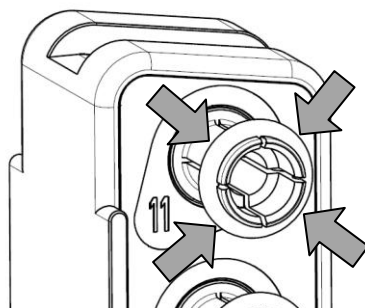
Incorrect position of tool causes tool and magazine damage and/or axis moving errors.

Tools have to be clean without dirt and grease!



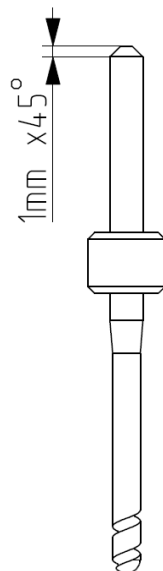
If the tool stays in the spindle during tool change process means probably the collet of magazine loose.

Press the segments of magazine's collet with o-ring together by hand so that the tool is clamped **securely but not strongly** in collet!



Caution!








Only tools with a 1x45 ° edge chamfer on the shank may be used! Please check your tools before use!










4.1.5. Approved layouts of magazines

ZIRCONIA, SINTERMETAL and hybrid COMPOSITES

/ Shank diameter: Ø 3 mm





	T11		Ø2.5 mm / Order No.: diamond coated ball-end mill
	T12		Ø2 mm / Order No.: diamond coated ball-end mill
	T13		Ø1 mm / Order No.: diamond coated ball-end mill
	T14		Ø0.6 mm / Order No.: diamond coated ball-end mill
	T15		Ø1.5 mm / Order No.: uncoated square-end mill
	T16		Ø1 mm / Order No.: uncoated square-end mill

PMMA, WAX and light COMPOSITES / Shank diameter: Ø 3 mm

	T21		Ø2.5 mm / Order No.: uncoated ball-end mill
	T22		Ø2 mm / Order No.: uncoated ball-end mill
	T23		Ø1 mm / Order No.: uncoated ball-end mill
	T24		Ø0.6 mm / Order No.: uncoated ball-end mill
	T25		Ø1.5 mm / Order No.: uncoated square-end mill
	T26		Ø1 mm / Order No.: uncoated square-end mill





GLASS CERAMICS / Shank diameter: Ø 3 mm



T31		Ø3 mm / Order No.: ball-end grinding tool
T32		Ø2 mm / Order No.: ball-end grinding tool
T33		Ø1 mm / Order No.: ball-end grinding tool
T34		Ø0.6 mm / Order No.: conical ball-end grinding tool
T35	unused	
T36	unused	

Titanium and Cobalt-Chrome / Shank diameter: Ø 4 mm




T41		Ø3 mm / Order No.: hard coated ball-end mill
T42		Ø2 mm / Order No.: hard coated ball-end mill
T43		Ø1 mm / Order No.: hard coated ball-end mill
T44		Ø0.8 mm / Order No.: hard coated ball-end mill
T45	unused	
T46	unused	



Attention! Tool positions in CAM software and in machine's tool magazine must match!

4.1.6. Changing tool magazine

1. Close the machine door [Fig. 1 / 1]
2. Push the change magazine button  [Fig. 22 / 1] (see: **section 5.4.**).
(The magazine door [Fig. 2 / 6] opens and closes automatically.)
3. Open the machine door and pull the magazine out [Figure 5].
4. Clean the place of magazine carefully and thoroughly!
5. Place the new magazine correctly, and close the machine's door.
6. Wait for finish of automatic changing process.



Machine's controller store the tool and magazine information in memory, so tool measurement process is no need to perform after changing the magazine in case the tools in the magazine have not been modified!

The unused magazines can be placed in magazine cabinet [Figure 2 / 7]. Lightly push to open the door. When closing, magnet will catch the door by lightly pushing.

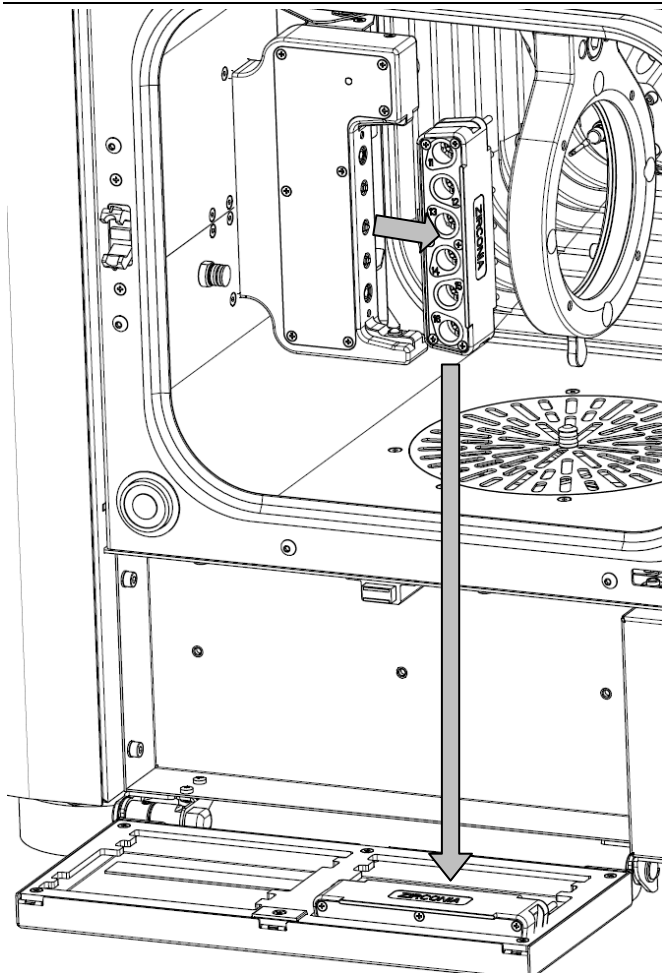


Figure 9 **Tool magazine change**



Attention! Tool magazine fixed magnetically! The place of magazine must be clean! Even the smallest contamination under the magazine can cause damage of tools and magazine!

In case of tool change or tool break, the new tool must be loaded into the relevant tool position in the magazine and **NOT INTO THE MILLING SPINDLE!**

Mixing the tool positions or improperly returning the tools may cause breaks!

The magazine door [Fig. 2 / 6] opens and closes by electric motor. **DO NOT TRY TO MOVE IT BY HAND AND OTHER TOOLS!**

4.1.7. Switching wet or dry mode

Depending of the material wet and dry mode is selected in CAM software.

Accordingly also machine need to set for wet or dry process by adjusting the plug-lever.

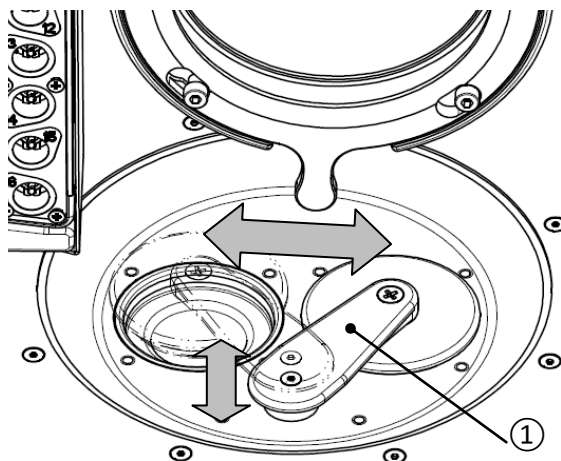
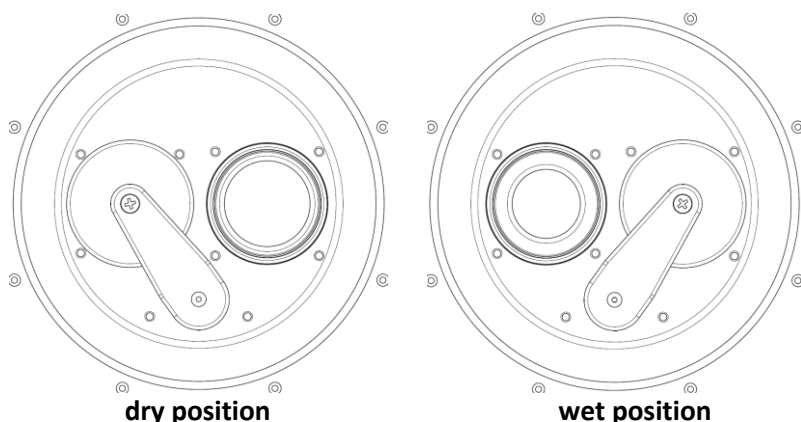


Figure 10 Switching wet / dry mode

1. Remove drain grid [Figure 2 / 7].
2. Pull the plug-lever [Figure 10 / 1] up.
3. Hold it pulled-up and turn to the appropriate position of desired outlet.
4. Let the plug-lever down and push it down a little.



Processing modes for materials (see section 4.):

Material	Dry mode	Wet mode
Zirconia	YES ✓	NO ✗
PMMA, WAX and light composites	YES ✓	YES ✓
Sintermetal	YES ✓	YES ✓
Glass ceramics	NO ✗	YES ✓
Titanium	NO ✗	YES ✓
Cobalt-Chrome	YES ✓	NO ✗



Attention! DO NOT start dry process after wet process immediately! Mixing-up coolant and dust causes extreme dirt i.e. mud in working area!

Before switching from dry to wet processing and reverse, cleaning instructions must be carried out!

About the important cleaning instructions see the following sections:

Switching from dry- to wet processing: see section 6.1

Switching from wet- to dry processing: see section 6.2

4.2. Axis Movements

Machine movements in the **X**, **Y** and **Z** axes directions are performed by the milling spindle, while the rotation around the **A** and **B** axes are carried out by the work table.

To move the axes: see section 5.2.7.

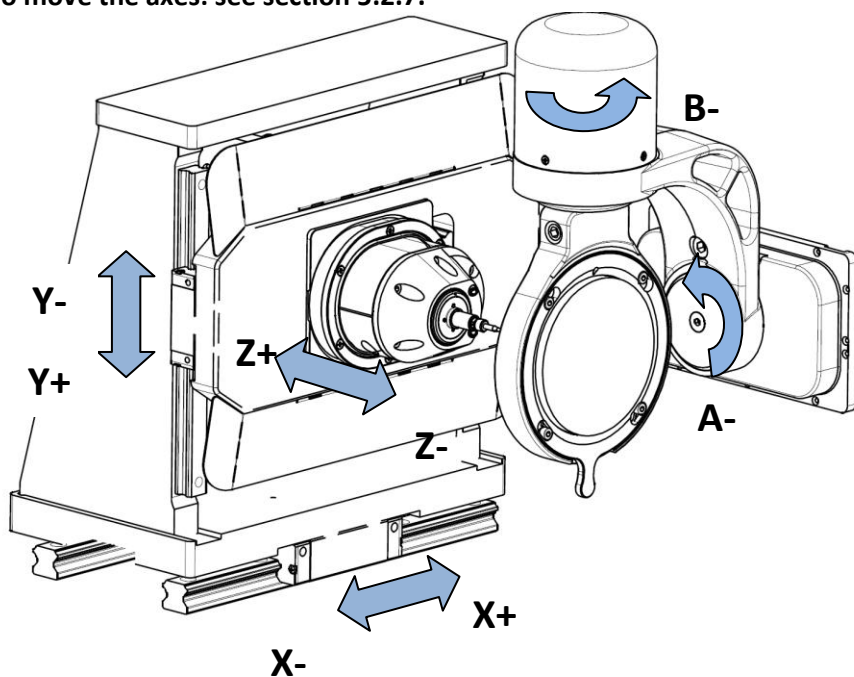


Figure 11 Axis movements

4.3. Operating Panel

The operating panel is a high definition LCD touch screen [Figure 2 / 3]. You can control the Milling Unit touching the graphic pushbuttons appearing in the windows on the screen by your fingertips. The touch is followed by a pointing arrow too.

The screen is not of „multi-touch” system so it senses only one fingertip touch at one time.

4.3.1. Touch Screen Structure



Figure 12 Touch screen structure

- | | |
|------------------------------|-------------------|
| ① Main page (initial screen) | ⑤ Work area |
| ② Status page | ⑥ Status bar |
| ③ Tools page | ⑦ Information bar |
| ④ Service page | |

4.4. Emergency Stop switch

The emergency stop switch [Figure 2 / 4] may be pushed down during the operation (milling) only, if any part of the machine (the main spindle for example) is well visibly or audibly faulty and the machine must be stopped immediately in order to avoid further damages. The push-down of the emergency stop switch results in the full stop of the milling program. This means that the milling operation cannot be resumed even if the emergency stop switch was pushed down accidentally.

5. Operation of the Milling Unit

5.1. Turning the Machine ON

Before turning the machine ON, it must be connected:

- to the electric power network: **see section 3.1.**
- to the computer: **see section 3.2.**
- to the air compressor: **see section 3.3.**
- to the dust extractor: **see section 3.4.**
- to the coolant unit: **see section 3.5.**


- Turn on the air compressor.
- Turn on the dust extractor.
- After establishing the connections you can apply the power to machine by the main switch *[Figure 2. / 10]* located on the left side of the machine. You have to wait for the control software to boot up.
- The Milling Unit is ready to turn on when the Main window *[Figure 13]* appears on the screen.
- Now you can turn on the machine with pushing the power switch *[Figure 2. / 5]*. The blue LED of power switch lights steady.

Turning the machine OFF process: **see section 5.2.1**



The correct operating temperature is required for excellent milling quality!
Before START working, machine must warm up!
See section 5.2.2

5.2. Main page (Initial screen)

The main functions needed for the control of the machine are located in the Main menu window [Figure 12 / 1]. 

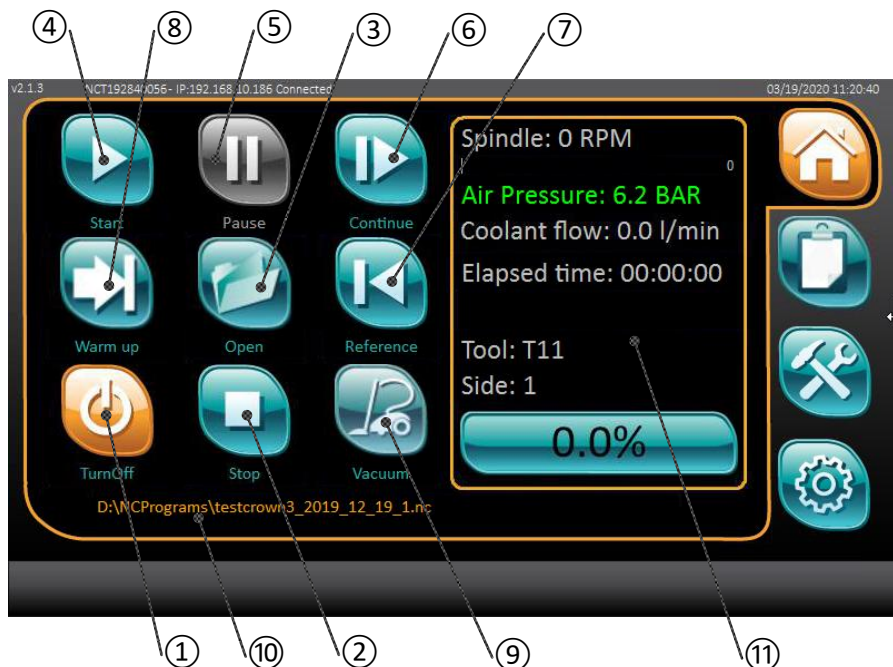



Figure 13 **Main page**

- | | |
|------------------------------------|-------------------------|
| ① Controlling computer Turning OFF | ⑦ Reference position |
| ② Stop button | ⑧ Warm up process Start |
| ③ Program (file manager) opening | ⑨ Vacuum switch |
| ④ Milling program start | ⑩ Filename bar |
| ⑤ Milling program pause | ⑪ Status window |
| ⑥ Milling program continue | |

5.2.1. Turning OFF the Milling Unit

1. Push the Emergency stop switch *[Figure 2 / 4]*.
2. Touch the TURN OFF button  *[Figure 13 / 1]*.
3. The controller turns off the controller.
4. Switch-off the main switch *[Figure 2. / 10]*




Attention!

Improper shutdown e.g. simple switching-off the machine only with the main switch causes failure of the SSD device and datas!

5.2.2. Warm up

1. Put a tool magazine with tools in machine. Warm up process uses tool # T11 or T21 or T31 or T41 or T51.
2. Close the door.

3. Touch the Warm up button  *[Figure 13 / 8]*.

The warm up process starts, and it will continue until the machine reaches the desired operating temperature.

Machine ready to work (means machine has correct temperature):

- If the process does not start by pushing Warm up button.
- If machine stopped automatically during warm up process.

5.2.3. Status bar (Error messages)

All management messages as well as improper operating modes and operations [Figure 14 / 1] detected by the machine are displayed in the status bar of the touch screen [Figure 12 / 6].

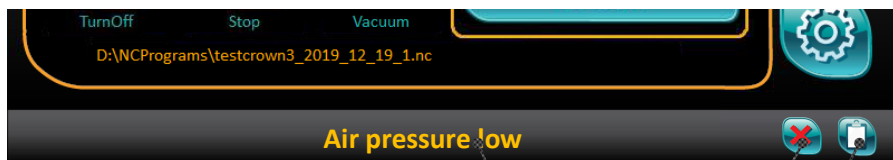





Figure 14 **Status bar**

The error messages must be confirmed each time by touching reset button  [Figure 14 / 2].

Until the deletion all actual error message, the machine does not accept any command.

Several, simultaneous error are displayable by touching error list button  [Figure 14 / 3].

5.2.4. File manager

Touch open button  [Figure 13 / 3] to enter in file manager and open a milling process.

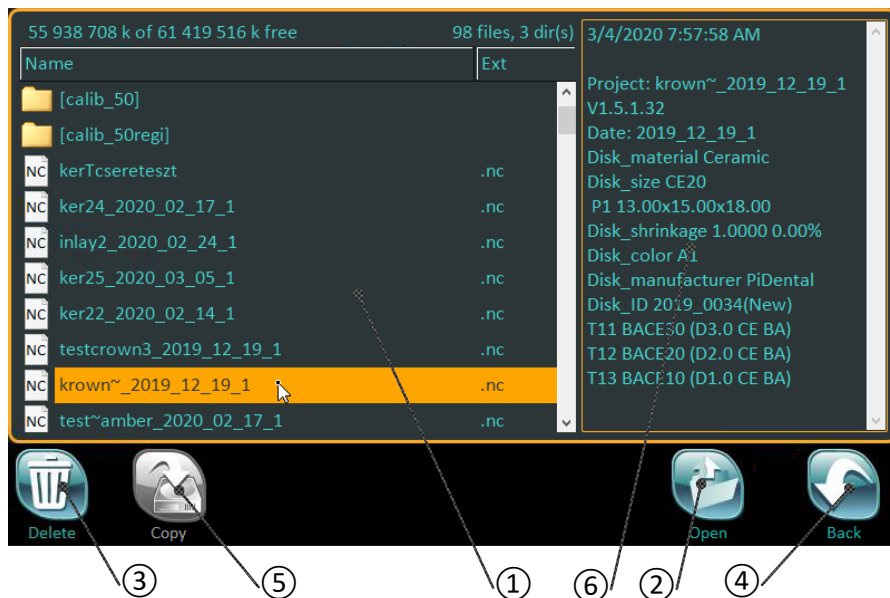


Figure 15 File-manager

- ① NC program list
- ② Program opening
- ③ Program delete
- ④ Back to Main page
- ⑤ Copy from USB Flash drive
- ⑥ File-information window

Opening milling program:

1. Select the program (.nc file extension only) to be run by touching it [Figure 15 / 1]. The [D:\] is the built in storage, the [E:\] is the USB drive.
2. Check the tooling and disk parameters in file-information window [Figure 15 / 7]. **Take care of tool positions as well as disk specification!**
3. Open the program [Figure 15 / 2].

After the opening of the program [Figure 15 / 2] the window switches back to the Main menu [Figure 13].

The actual program name shows on Filename bar [Figure 13 / 10]

In case you do not want to open a program you can exit the file manager by touching the BACK [Figure 15 / 4] button.

Opening milling program from USB Flash drive in the file manager page:

1. Plug in the external Flash drive to machine USB port [Figure 2 / 11]
2. Select the [E:\] drive on the program list,
3. Select the program (.nc file extension only) to be run by touching it [Figure 15 / 1],
4. Check the tooling and disk parameters in file-information window [Figure 15 / 7]. **Take care of tool positions as well as disk specification!**
5. Open the program [Figure 15 / 2] or copy the program [Figure 15 / 5] to [D:\NCPrograms]. With the open button, you copy the program to the machine and open it, with copy you just copy the program, you have to open it manually.
6. Remove Flash drive from machine.



Only NC programs generated by the PiCAM software can be run on the Milling Unit!


No responsibility is assumed by PiDental Kft. for damages occurring due to running programs from another source on the Unit!



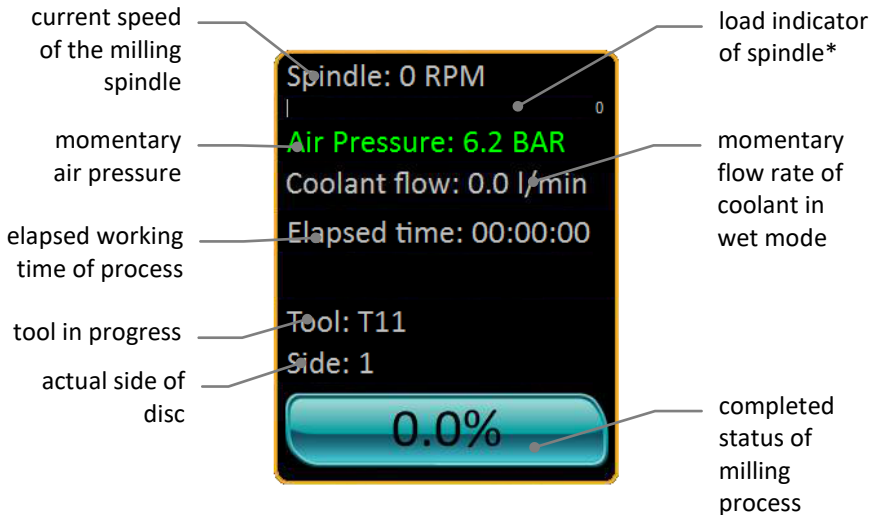
Attention!

When you manually delete a program [Figure 15 / 3] the program will be removed from the list irrevocably and permanently.

5.2.5. Starting a Milling Program

- Close the door of the Milling Unit [Figure 2 / 1].
- Touch the START button  [Figure 13 / 4].
- The door of the Milling Unit is closed and the milling program starts.
- **RUN** indication appears in the status bar [Figure 14 / 1]

- You can follow the below processes on the status indication [Figure 13 / 11]:



*** load indicator bar of milling spindle:**

- **green** → normal load
- **orange** → medium load
- **red** → heavy load;



Attention!

Milling spindle must work in green or orange load state.
In red state of load the machine will go to error status!

Possible reasons of red state:


- incorrect milling technology
- worn tool

5.2.6. Stopping and Resuming a Milling Program

- During the milling operation the program can be suspend by the

PAUSE button  [Figure 13 / 5].

The Milling Unit stops and returns to the home position.

The paused (suspended) program can be continued from the actual position using the START button  [Figure 13 / 4].


- During the milling operation the program can be stopped (cancelled) by the STOP button  [Figure 13 / 2].

The Milling Unit stops and returns to the home position.

In that case, if the program stopped after a tool change process, the stopped program can be continued from the beginning of the

last tool change using the CONTINUE button  [Figure 13 / 6].




When the machine is not in milling mode the STOP button  [Figure 13 / 2] functions as **HOME** button. (see: **section 5.2.7.1.**)



Attention!

If you want to resume a paused or stopped program you MUST NOT unscrew the fixing screws of the workpiece clamping plate [Figure 3 / 3]! If the workpiece was moved the program cannot be resumed.

5.2.7. Reference page

Touch reference button  [Figure 13 / 7] to enter into reference page.
In reference page

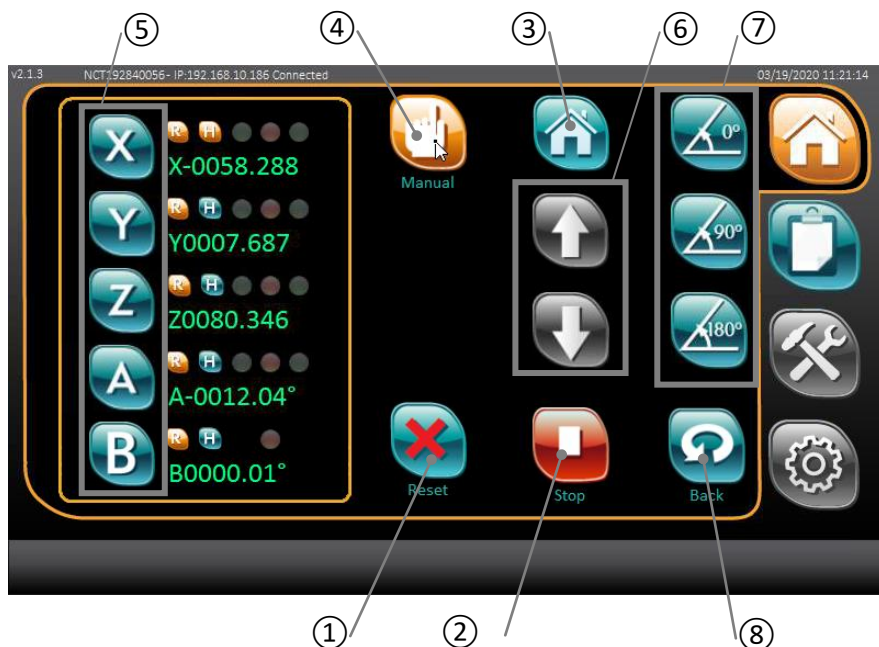


Figure 16 **Reference page**

- | | |
|---------------|------------------------------|
| ① Error reset | ⑤ Axis selection |
| ② Stop / HOME | ⑥ Manual axis movement |
| ③ HOME | ⑦ Work table angle positions |
| ④ Manual mode | ⑧ Exit |

5.2.7.1. Go to HOME position

In this function the axes return to their home position.

Homing should be carried out in the following cases:



- after error confirmation, when the Milling Unit stopped during milling process;
- after manual movement of axes.



Attention!

In case of error, before homing you have to make sure that the spindle (and the milling tool) will not collide with the work table when the axes start to move.

In case the machine stops with the work table being in an inclined position, manual homing has to be carried out.

1. Close door.

2. Touch Stop button  [Figure 16 / 2] or Home button  [Figure 16 / 3].

3. To exit, please touch BACK button  [Figure 16 / 8].

Status LEDs of axes:








Figure 17 Reference status LEDs



- ① Ready
- ② HOME
- ③ Negative limit
- ④ Positive limit
- ⑤ Reference position lost
- ⑥ Coordinate [mm]




- ① Ready lights **orange** = axis ready / **red** = axis not ready to work.
- ② Home lights orange if the axis is in HOME position.
- ③, ④ Limit switches (1.&2.) light green, if axis moved to end-position.
- ⑤ Lights red if reference position lost of the axis.

5.2.7.2. Manual Axis Movement

The free movement of the axes can be checked by the manual axis movement.

1. Touch MANUAL button  [Figure 16 / 4].
2. Select the axis to be moved      [Figure 16 / 5].
3. Touch the necessary direction button [Figure 16 / 6] or angular button [Figure 16 / 9].

Axis movement  = **+** direction and  = **-** direction (*see: section 4.2*).

Predetermined angular positions of working table:  **0° (front position)**,  **90° (side position)**,  **180° (back position)**

4. After the end of the movement return the axes to the home position.
5. To exit, please touch BACK button  [Figure 16 / 8].


Limit switches of control software stops the movements at both end positions of the axes sending also an error message to the display. To reset this error, axis need to move away from the end position with arrows.



You have to be careful to avoid the collisions also during the manual axis movements!

Collisions between the machine elements may cause damage to the machine and personal injury!

5.3. Service page

To check machine conditions furthermore to set machine parameters enter in service page  [Figure 12 / 4].

5.3.1. Status page (machine condition list)

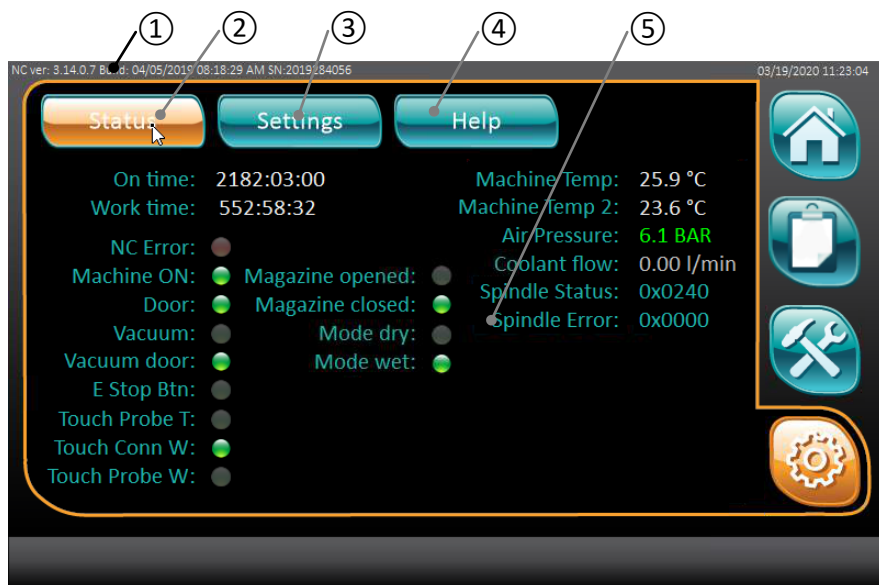


Figure 18 Status page

- | | |
|-----------------|------------------------------|
| ① NC version | ④ Help page |
| ② Status page | ⑤ Machine status information |
| ③ Settings page | |

- **On time:** present operation time
- **Work time:** total milling time during the present operation time
- **Machine Temp:** the current temperature of machine frame

- **Machine Temp2:** the current temperature of milling spindle
- **Air pressure:** momentary air pressure
- **Coolant flow:** momentary flow rate of coolant only in wet mode.
- **Spindle Status** and **Spindle Error:** information and error message from spindle's frequency converter.

Status LEDs:

- **NC Error:** lights red if there is a control program error
- **Machine ON:** lights green if controller card is on
- **Door:** lights green if door closed correctly
- **Vacuum:** lights green during milling if dust extraction is correct
- **E Stop Btn:** lights green if Emergency stop switch activated
- **Touch Probe T:** Tool length sensor inspection LED
- **Touch Conn W:** Calibration socket inspection LED
- **Touch Probe W:** Calibration circuit inspection LED


Status LEDs help to identify – first of all at remote service – the reason and position of a possible malfunction.

In case of any error see section 6.10 Errors!


5.3.2.Settings page

Entering settings page:



1. Touch  button [Figure 18 / 3].
2. Type the **password: 1221** (for end users) with numerical keyboard.



3. Touch  button.
4. Touch  button on popup window.

Status

To exit from Settings page touch
button [Figure 18 / 2]!

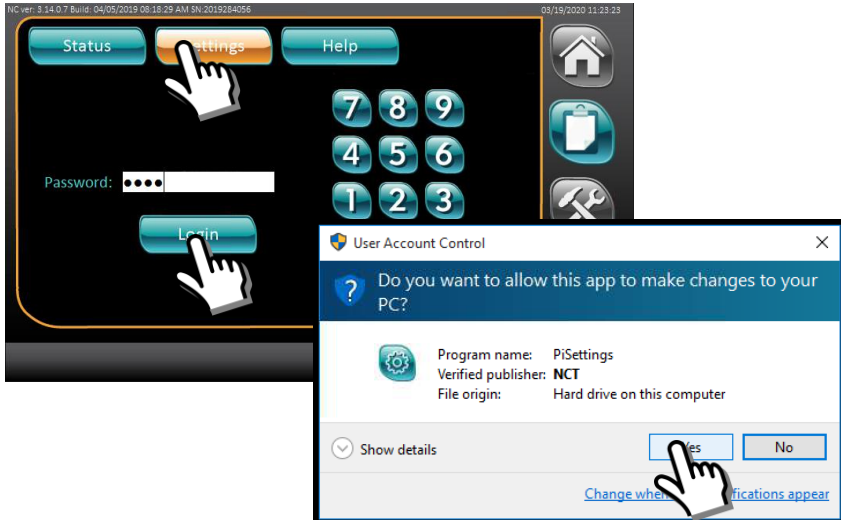


Figure 19 Entering settings page

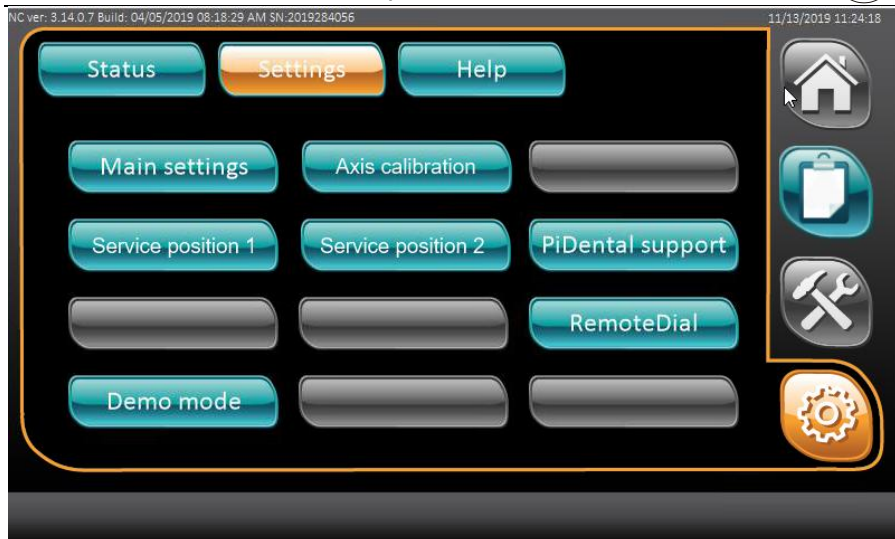


Figure 20 *Settings page*

5.3.3. Main Settings page



Figure 21 *Main settings page*

Language settings:

1. select the language you want to use by touching the bar,
2. save it by touching the Apply settings button.

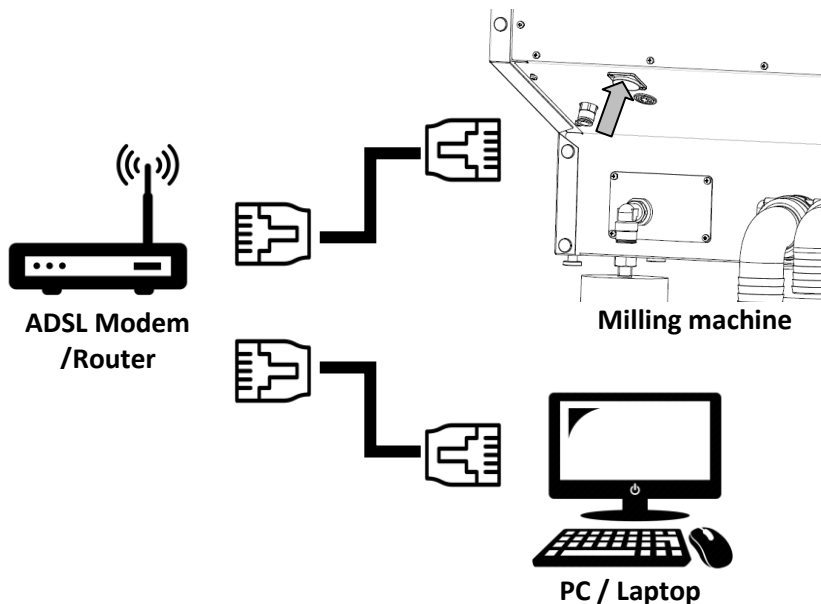
Date and Time settings:


1. touch the Time and / or Date bar,
2. enter the current time and date using the numeric keypad,
3. exit the keypad by touching the ENTER button on the numeric keypad,
4. save it by touching the Apply settings button.

5.3.4. Network settings

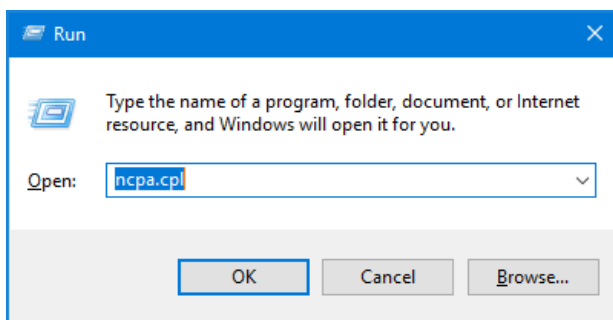
There are two way to connect computer to milling unit.

5.3.4.1. PC and Milling machine connected to same Router with ethernet cables

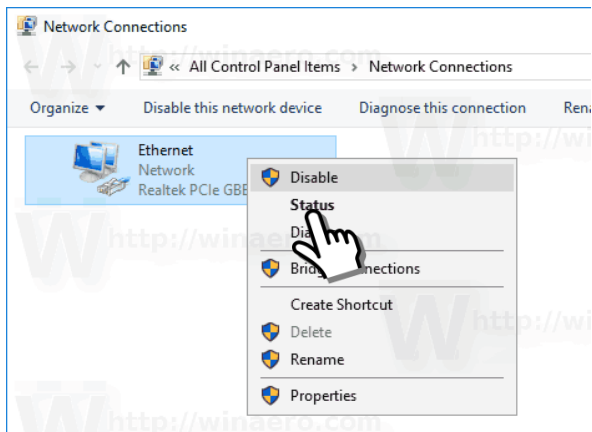


1. Press the  Windows key and the **R** key at the same time to open the Run box.

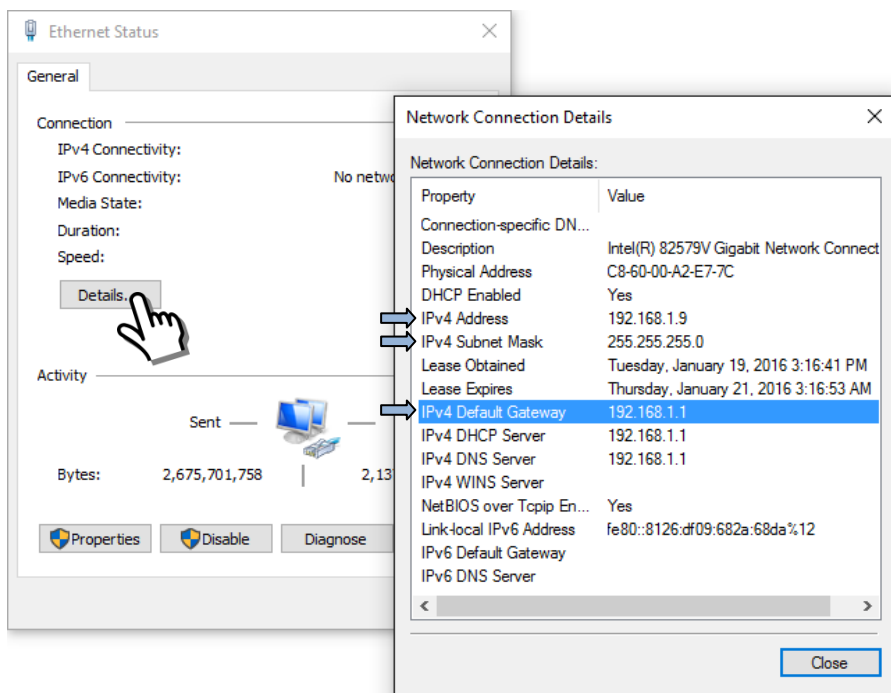
Type **ncpa.cpl** and OK and you can access Network Connections immediately to check the network configuration of computer on which PiCAM installed.



2. Double click on Ethernet connection **OR** right click on it then on **Status**:







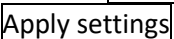
3. Click on **Details...** button:



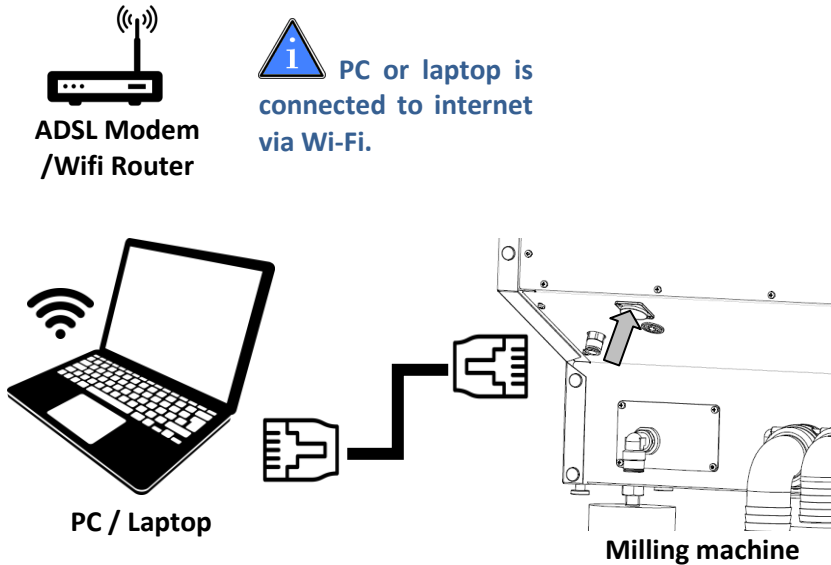
Necessary Network details of the computer:


- IPv4 Address
- IPv4 Subnet Mask
- IPv4 Default Gateway

Static

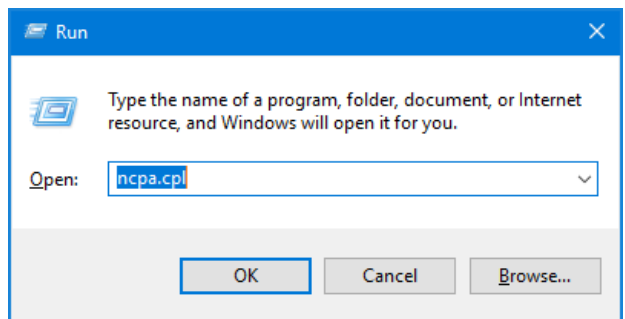
4. Touch the  button [Figure 21].
5. Touch the bar of **IP address** [Figure 21] and enter the digits using the numeric keypad.
Type such a number that is the same as your computer's first three digits but the last digit must be different!
E.g.: if PC's Ipv4 Address: 192.168.1.9 then machine's IP address: 192.168.1.10
6. Exit the keypad by touching the  button on the numeric keypad.
7. Touch the bar of **Subnet mask** [Figure 21] and enter the digits using the numeric keypad.
Type the number that is as your computer's IPv4 Subnet Mask.
E.g.: if PC's Ipv4 Subnet Mask: 255.255.255.0 then machine's Subnet mask: 255.255.255.0
8. Exit the keypad by touching the  button on the numeric keypad.
9. Touch the bar of **Gateway** [Figure 21] and enter the digits using the numeric keypad.
Type the number that is as your computer's IPv4 Default Gateway.
E.g.: if PC's IPv4 Default Gateway: 192.168.1.1 then machine's Gateway: 192.168.1.1
10. Exit the keypad by touching the  button on the numeric keypad.
11. save it by touching the  button

5.3.4.2. PC and Milling machine connected directly with ethernet cable

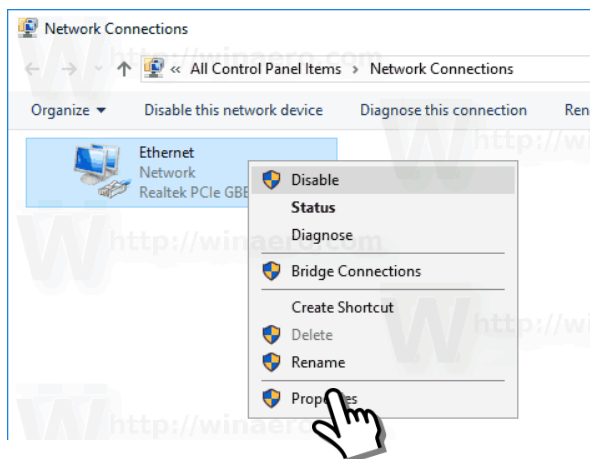


1. Press the  Windows key and the **R** key at the same time to open the Run box.

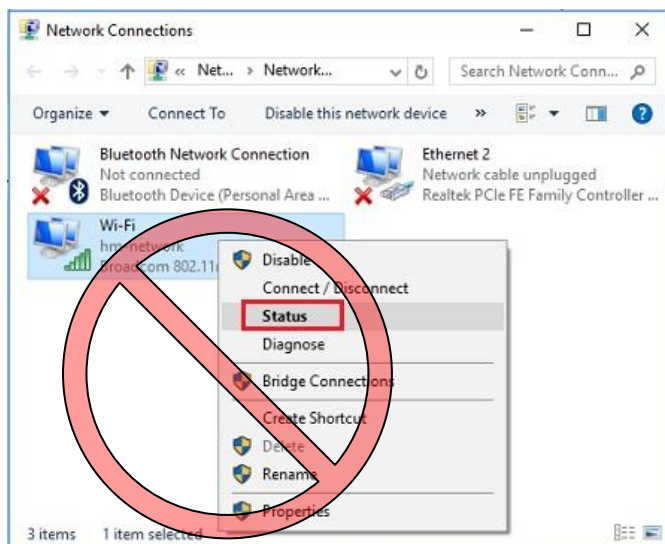
Type **ncpa.cpl** and **OK** and you can access Network Connections immediately to set the ethernet network configuration of computer on which PiCAM is installed.



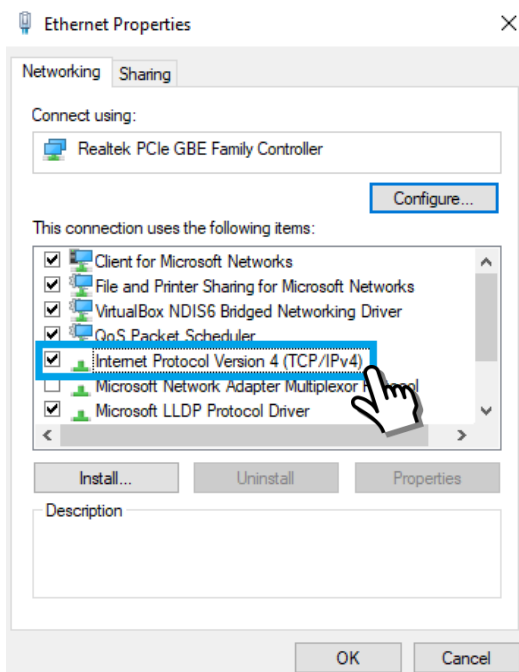
2. Right click on **Ethernet connection** then click on **Properties**:



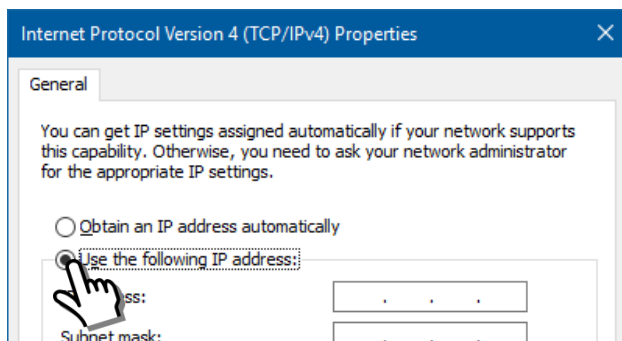
Attention! Do not click on Wi-Fi connection!



3. Double Click on **Internet Protocol Version 4 (TCP/IPv4)**:



4. Select **Use the following IP address** option:

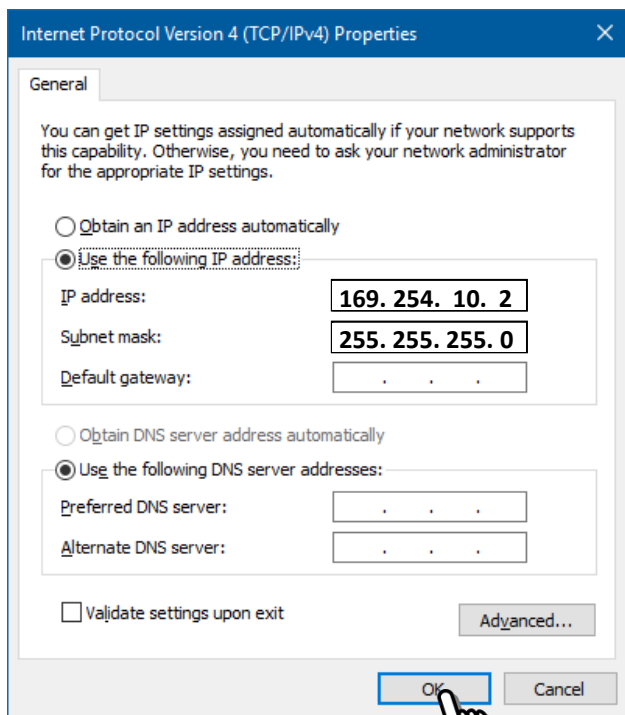


5. Type new IP address in next format: **169.254.XXX.XXX**

Type new Subnet Mask: **255.255.255.0**

then click **OK**.

e.g.:



Static

6. Touch the **Static** button [Figure 21].
7. Touch the bar of **IP address** [Figure 21] and enter the digits using the numeric keypad.

Type such a number that is the same as your computer's first three digits but the last digit must be different!

E.g.: if PC's Ipv4 Address: 169.254.10.2 then machine's IP address: 169.254.10.3

8. Exit the keypad by touching the **ENTER** button on the numeric keypad.
9. Touch the bar of **Subnet mask** [Figure 21] and enter the digits using the numeric keypad.

Type the number that is as your computer's IPv4 Subnet Mask.

E.g.: if PC's Ipv4 Subnet Mask: 255.255.255.0 then machine's Subnet mask: 255.255.255.0

10. Exit the keypad by touching the **ENTER** button on the numeric keypad.
11. Touch the bar of **Gateway** [Figure 21] and enter the digits using the numeric keypad.
Type the number that is as your computer's IPv4 Address.
E.g.: if PC's IPv4 Address: 169.254.10.2 then machine's Gateway: 169.254.10.2
12. Exit the keypad by touching the **ENTER** button on the numeric keypad.
13. save it by touching the **Apply settings** button

5.3.5.Remote support



Attention!

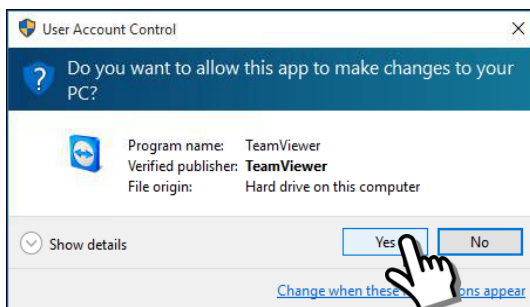
Remote support required conversation between User and Pi dental Ltd. in English, through fast internet connection, via TeamViewer furthermore Phone or Viber or other chat applications.

5.3.5.1. Connecting via PC

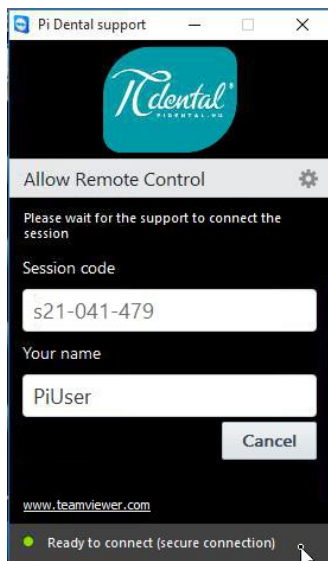
1. Download TeamViewer QuickSupport software from Pi dental website to your computer:
<https://www.pidental.hu/service-support/cad-cam-support/>



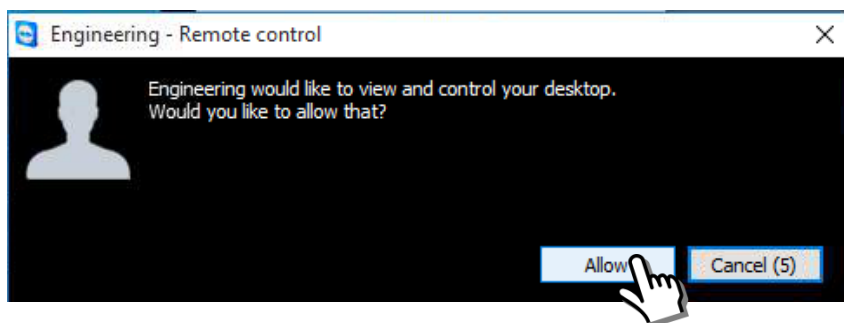
2. Start it, and touch **YES** button on popup window.



Pi Dental support window pops-up on screen.

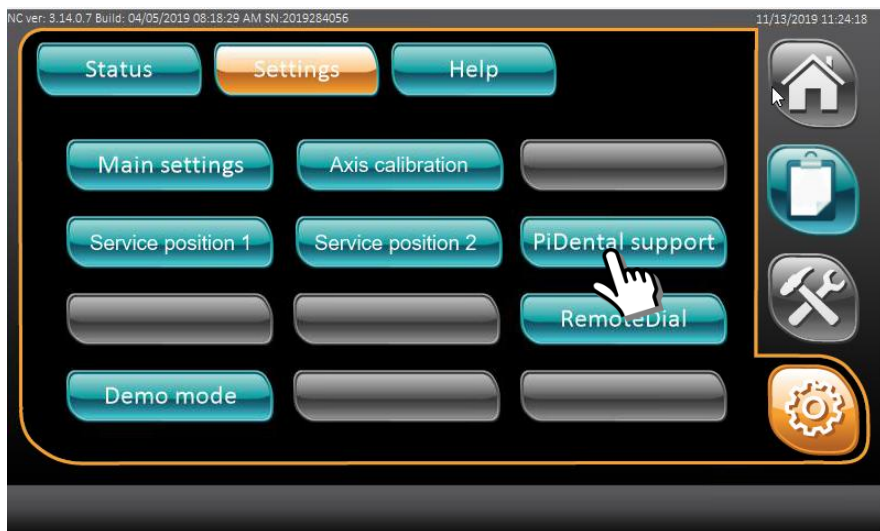


3. Touch **Allow** button within 5 seconds to let support team to connect to your computer.

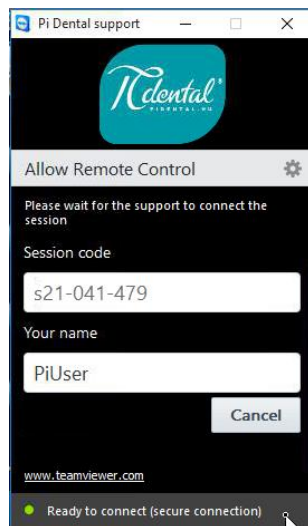
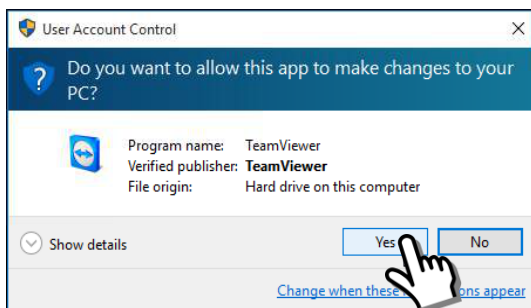


5.3.5.2. Connecting via machine's PiDental support

1. Touch the **PiDental support** button in settings page: see section 4.3.2.

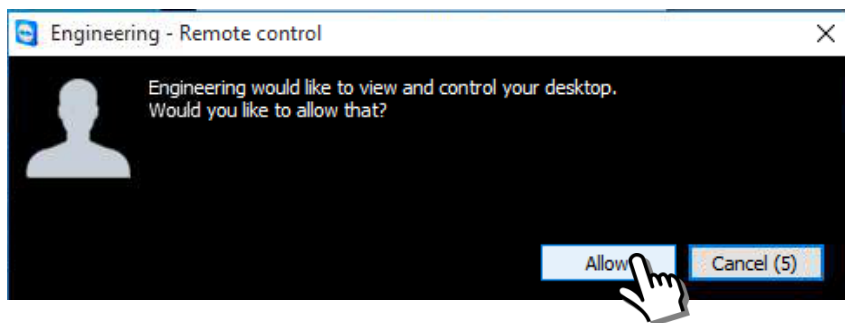


2. Touch **YES** button on popup window.




Pi Dental support window pops-up on screen.

3. Touch **Allow** button within 5 seconds to let support team to connect to your milling machine.



5.4. Tools page

To enter in tools page push its button  [Figure 12 / 3].

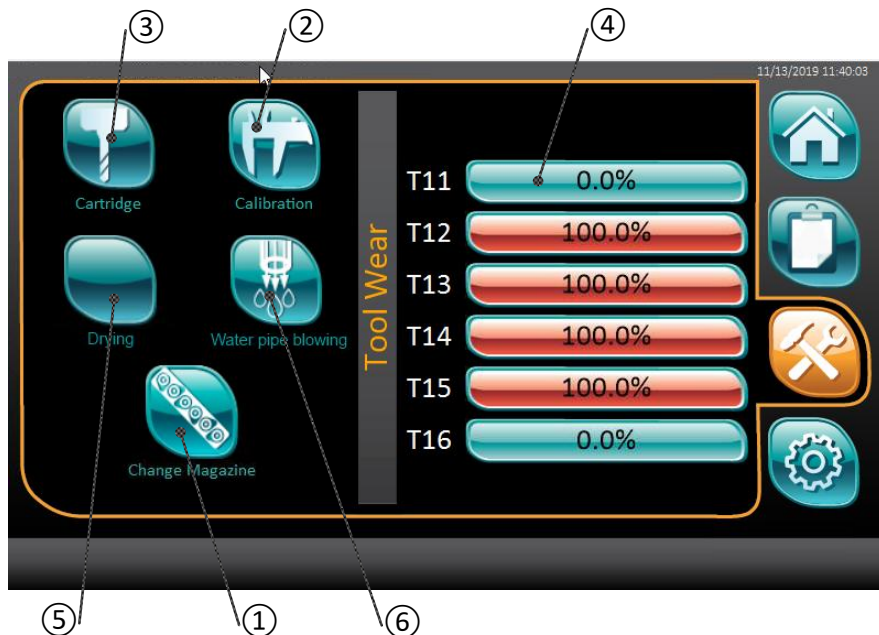


Figure 22 Tools page

- ① Change tool magazine
- ② Tool measurement (calibration)
- ③ Spindle collet chuck opening
- ④ Tool wear display
- ⑤ Drying process
- ⑥ Coolant pipe blowing

5.4.1. Changing tool magazine

See section 4.1.6

5.4.2.Tool Calibration page

Touch Calibration button  [Figure 22 / 2] to open calibration page.





Figure 23 Tool calibration

- | | |
|---------------------|----------------------|
| ① Tool number | ③ Stop Calibration |
| ② Start Calibration | ④ Back to Tools page |
| | ⑤ Magazine number |

Magazine number bar [Figure 23 / 5] helps to check whether correct magazine placed in.

1. Select the tools to be measured [Figure 23 / 1]. (The color of the button changes to yellow.)

2. Start the calibration by touching START button  [Figure 23 / 2].
3. After completing the calibration you can exit by touching BACK  button [Figure 23 / 4].

Colors of the tool ID buttons:



(green) Calibrated tool



(orange) Tool that has been selected for calibration




(red) Empty (unallowed) tool position

For more information see section 4.1.4

5.4.3. Removing tools from the spindle

To remove the tool being in the spindle (e.g. to remove the part of broken tool furthermore to cleaning spindle) you have to open the collet chuck of the spindle.

1. Touch CARTRIDGE button  [Figure 22 / 3]. (The collet chuck opens.)
2. Remove the tool from the spindle.
3. To close the collet chuck of the spindle touch CARTRIDGE button [Figure 22 / 3].



Attention!

When changing a broken or worn tool the (new) tool must be placed into the relevant tool position of the magazine and NOT INTO THE SPINDLE (see: *section 3.6.4.*)!

If you load the tool into the spindle, the machine stops with an error message.

The new tool must be calibrated! (see: *section 5.4.2*)

5.4.4. Tool wear display

The machine gives information about the current wear status of the tool [Figure 22 / 4] based on the usage time since the calibration of the tool and the total life span of the tool.

It is advisable to change the tool when it reaches a **80%-age** worn status



Attention!

Only the new (not yet used) tool should be calibrated!

If you once again calibrate a tool being already in use, from then on the machine considers that tool as a new tool and it resets its wear rate to zero.

5.4.5. Automatic drying process

See section 6.2

5.4.6. Coolant pipe blowing

See section 6.5

5.5. Inspection page


In inspection page  [Figure 12 / 2] the milling process observable by inside cam [Figure 3 / 9]



Figure 24 Status page

- ① Image of inside cam
- ② Momentary position display

Momentary positions of axes are visible by checking Position visible checkbox.

6. Cleaning and Maintenance



Perform maintenance regularly!

Regular maintenance intervals:

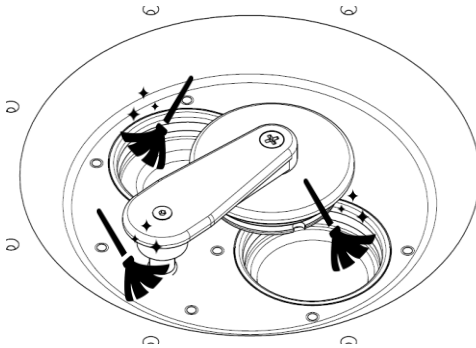
Daily (recommended)	<p>Use suction on and/or wipe out the working area at the end of the working day.</p> <p>Clean the collet chuck at the end of the working day.</p> <p>Check coolant nozzles and clean if necessary.</p> <p>Clean LCD touch screen with dry, clean cloths.</p>
Monthly	<p>Check coolant nozzles and clean if necessary.</p> <p>Change the coolant filter.</p> <p>Change the coolant.</p> <p>Check filter regulators and clean if necessary.</p> <p>Clean the outer surfaces of the machine.</p>
Annually (recommended)	<p>System maintenance by service technician.</p>

Total milling time of the machine since its first startup: **see section 4.3.1.**

6.1. Dust removal in working area

Cleaning the work area is a task to be carried out every day.

Dust removal in working area is very important in case of switching from dry to wet process.



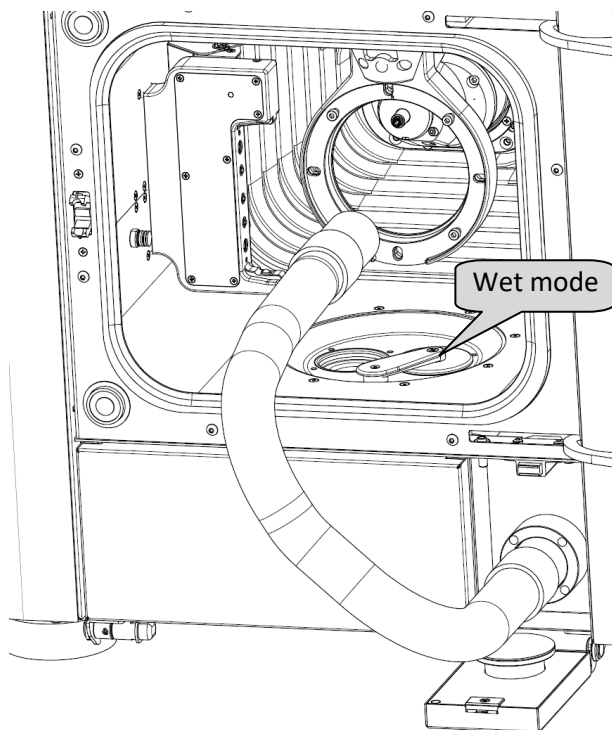
Prior to changing position of plug-lever the surfaces under the plug lever as well as the sealing surfaces of both openings must be cleaned from any contamination otherwise the seal will not close properly and may drip!



Only dry, clean brush can be used for the cleaning.

Remove the dust from all surfaces of working area, such as:

- work table and arm
- holder of tool magazine (tool magazine removed!)
- spindle
- rubber bellow
- inside cam
- ... etc.



Front side vacuum port is much powerful if during its using the plug-lever switched to wet mode.

If front side vacuum port not used, switch back the plug-lever to dry mode.

6.2. Drying the working area

Drying the working area is very important in case of switching from wet to dry process.

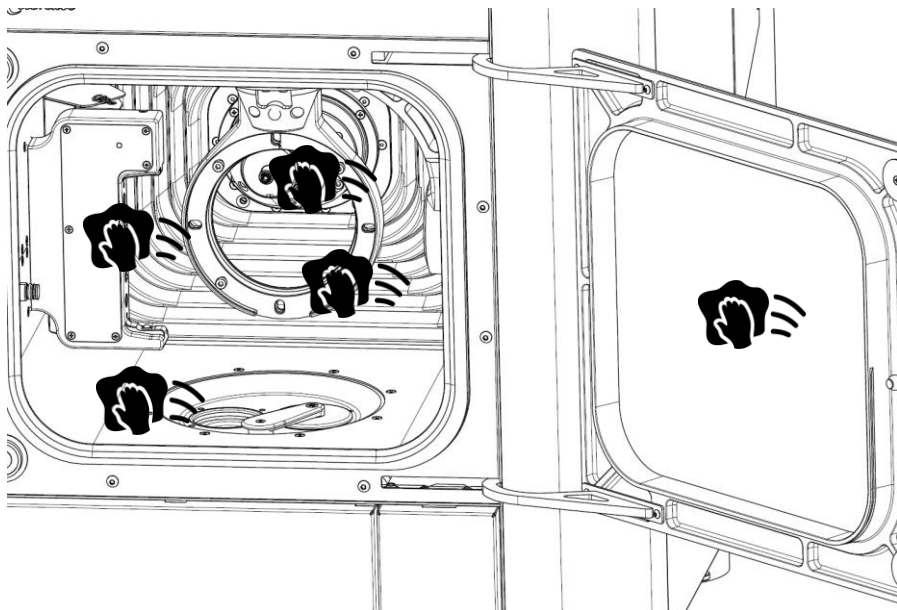


Only dry, clean cloth can be used for wiping.


Wipe off the coolant from all surfaces of working area, such as:

- work table and arm
- tool magazine (before placing in tool magazine cabinet *[Figure 5]*)
- holder of tool magazine (tool magazine removed!)
- spindle
- rubber bellow

- inside cam
- ... etc.



After wiping there are two ways to continue the drying:

- Open the work-area door and let the machine drying on in the open air cca. 8-10 hours at min. room temperature 21 °C.
- Start the automatic drying process:
 1. Close the door.
 2. Touch Drying button  [Figure 22 / 5] to start the process.
 3. Wait for automatic drying process is finished.

When the machine inside is dry, if necessary grease the spindle holder:
see section 6.3

6.3. Greasing the spindle holder



Greasing the spindle holder very important in terms of lifetime of sealing wiper ring. Dried wiper ring sticks to the holder, sounds crackling sound during moves, then within a short time moves out of its place and get stuck.

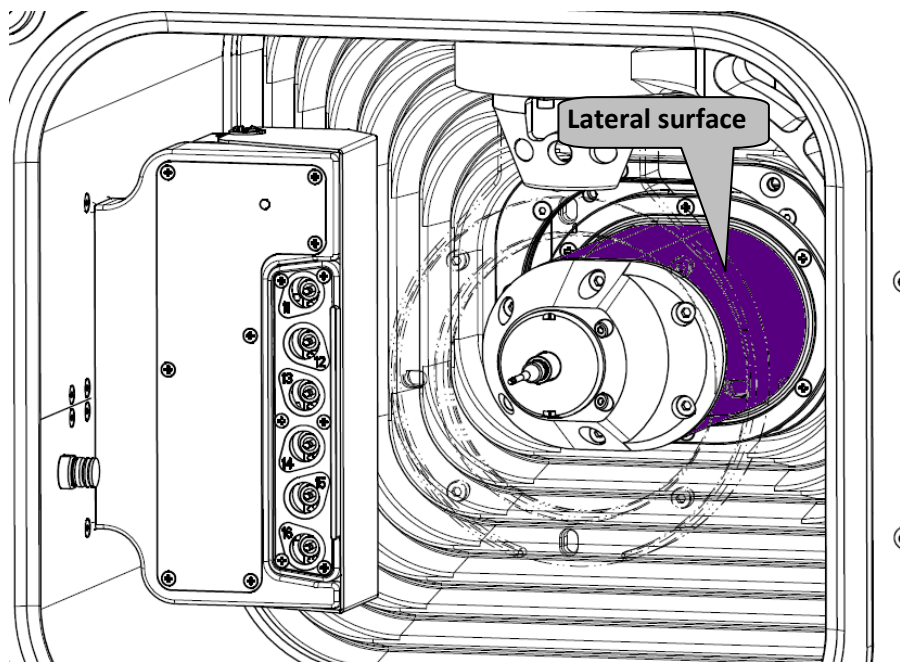






Figure 25 Greasing spindle holder

1. Close the door.
2. Push the Service position1  button on settings page (passw. 1221) (see section 5.3.2.)
3. Move the Z axis out until stop (software limit) with up arrow button  [Figure 16 / 6] (see section 5.2.7.)

4. Grease around the whole lateral surface of spindle holder with **silicone grease included in package.**
5. Move the Z axis in and out with arrow buttons   until stops a few times.

6.4. Replacement of wiper ring

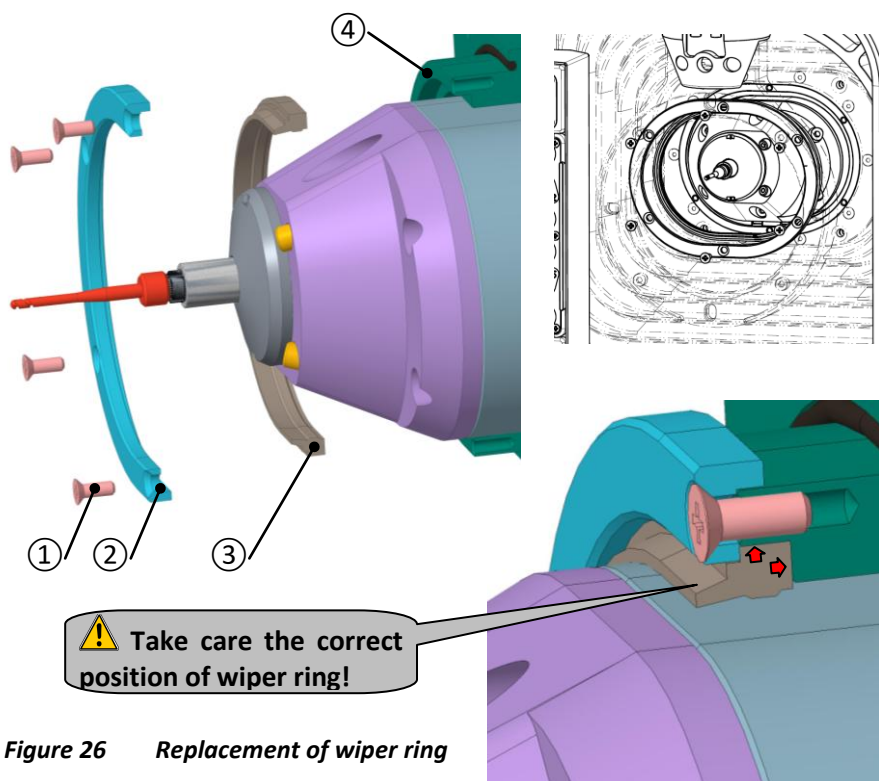




Figure 26 Replacement of wiper ring

1. Close the door.
2. Push the Service position1  button on settings page (passw. 1221) **(see section 5.3.2.)**
3. Unscrew the screws [Figure 26 / 1] of fixing frame [Figure 26 / 2] of wiper.

4. Move the Z axis out a little with up arrow button  [Figure 16 / 6] (see section 5.2.7.) to pull-out the wiper ring [Figure 26 / 3] from the internal frame [Figure 26 / 4].
5. Grease the inner surfaces of new wiper ring with **silicone grease included in package** before insert it.
6. At the insert of new wiper ring take care of its correct position in the internal frame!



Incorrect position of wiper ring causes wrong sealing efficiency furthermore quick damage of ring!

6.5. Cleaning coolant nozzles

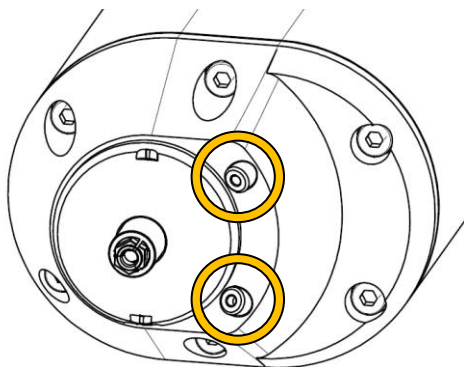



Figure 27 **Coolant nozzles**



Clogged nozzles cause insufficient amount of coolant, wrong cooling-lubricating effect then the damage of tools and blanks!

Cleaning nozzles is very important in case of switching from dry to wet process!

1. Close the door.
2. Push the Service position1 button  on settings page (passw. 1221) (see section 5.3.2.)
3. Move the Z axis out until stop with up arrow button  [Figure 16 / 6] (see section 5.2.7.)

4. Open the door and remove the tool from the spindle.
5. Push the Water pipe blowing button  [Figure 22 / 6] on tools page (see section 5.4.)
Note: Water pipe blowing button works at the opened door only in dry mode!
6. Hold the button pushed and clean the nozzles with cleaning brush and cleaning pin of spindle (see section 6.6.).

6.6. Cleaning the Milling Spindle's Collet Chuck



It is **PROHIBITED** to spray any lubricating material or other liquid to the surfaces and wholes of the milling spindle!

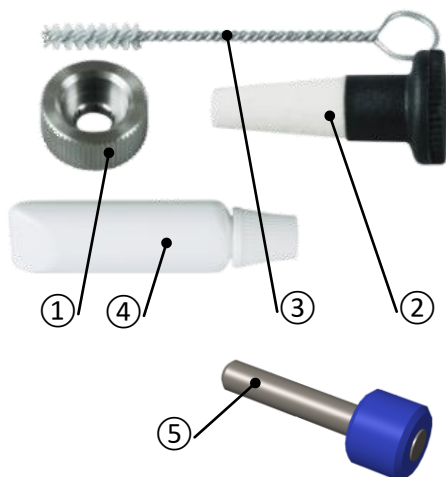
Further, it is **PROHIBITED** to clean the milling unit by high pressure compressed air because the contaminations entering the spindle in this way deteriorate the spindle bearings!

Only the original cleaning set supplied in the package of the machine can be used for the cleaning of the collet chuck and the holes of the spindle!




The use of any other instrument or lubricating materials (i.e. silicon spray) may damage the spindle!

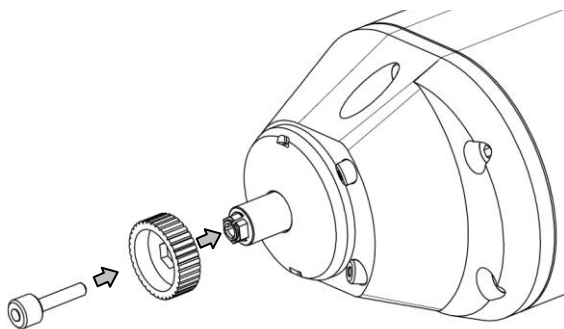


Figure 28 Spindle cleaning set

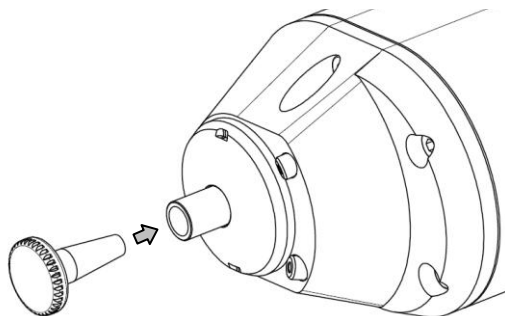


- ① assembly tool
- ② cleaning cone for spindle's hole
- ③ collet chuck cleaning brush
- ④ collet chuck grease
- ⑤ transport pin

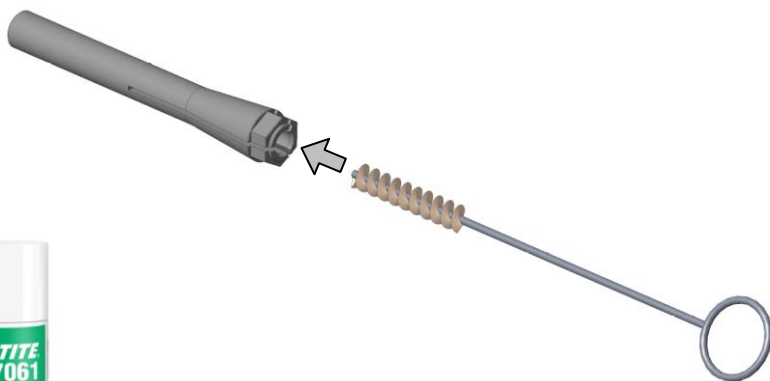
1. Close the door.
2. Push the Service position1 button  on settings page (passw. 1221) (see section 5.3.2.)
3. Move the Z axis out until stop with up arrow button  [Figure 16 / 6] (see section 5.2.7.)
4. Open the collet chuck using the  button and remove the milling tool from the collet chuck **carefully!**
5. Place the assembly tool ① on the end of the collet chuck and insert the transport pin ⑤ into the spindle.
6. Unscrew the collet chuck from the spindle using the assembly tool ①.



7. Clean the spindle hole using the spindle cleaning cone ②.



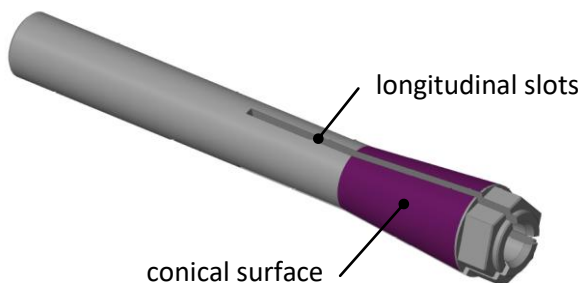
8. Clean the collet chuck hole using the collet chuck cleaning brush ③.




9. Clean the external surfaces of the collet chuck with clean, dry cloths as well as the three longitudinal slots (see below) e.g. with clean paper.

← For cleaning and degreasing collet chuck **Loctite SF 7061** spray is recommended!

10. Apply the collet chuck grease ④ **only on the external conical surface in a very thin layer!**



Caution! If the grease gets into the longitudinal slots the machine may get damaged! Slots and hole of collet chuck must be free of grease!

11. Install the collet chuck back to the spindle with the assembly tool ① and transport pin ⑤ (as shown in step 5.) **and tight the collet chuck only by hand.**
12. Place back the milling tool into spindle then close the spindle collet chuck using the  button.

Store the transport pin together with the other components of the spindle cleaning set.

6.7. Replacement of fan air-filter



Use air-filter approved by Pi dental Ltd only.

FILTER IS NOT WASHABLE!

1. Push the fan cover [Figure 28 / 1] up then pull it out.
2. Take out the dirty air filter [Figure 28 / 2] from the cover.
3. **At replacing take care of direction of filter: blue coloured side is outside!**

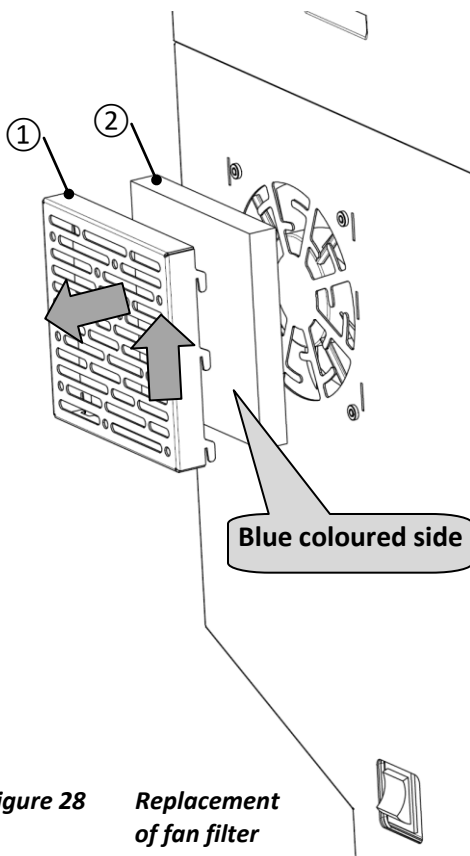


Figure 28 Replacement of fan filter

6.8. Automatic machine calibration

6.8.1. Calibration prerequisites

There are two instruments for the automatic machine calibration. One is the TouchProbe which is supposed to be in the spindle and the calibration plate which is supposed to be in the fixture. The calibration plate is supposed to be kept in oily environment when not being used to prevent any corrosion.



Before starting the actual calibration process check if the calibration plate has any mechanical damage or corrosion on the surface. Also check the TouchProbe for any mechanical damage or corrosion. If you experience any from above request new instruments.

Check the TouchProbe connection by plugging it in [Figure 33] and touching the fixture with the measuring head. Go to the settings page [Figure 18]. When the TouchProbe is connected status LED Touch Conn W is lit up. **On touch** you should see the status LED *Touch Probe W* light up. In case of different behavior contact support.

1. Clean the machine working space according to **Chapter 5**.
2. Place the Calibration Plate in the fixture and fasten it with 4 screws according to [Figure 29].

6.8.2. Machine calibration



Machine calibration is recommended to be done in every 6 months or if you experience constant deterioration.

1. Clean the machine working space according to **Chapter 5**.
2. Log in to Settings as seen in **section 5.3.2**.
3. Select **Machine Calib.**

A new window will appear where you can set the operation [Figure 30].

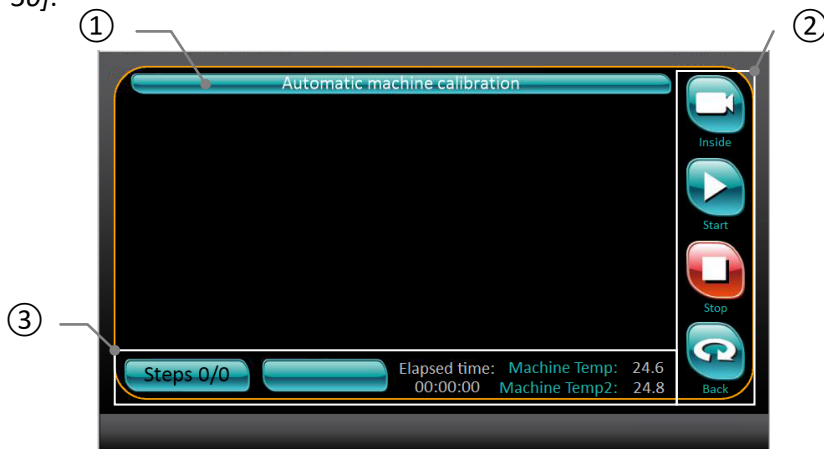
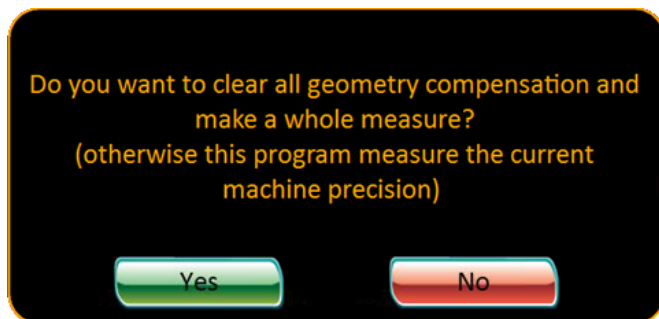


Figure 30 Machine Calibration Screen

4. Select *Automatic machine calibration* operation on the ribbon (1).
5. Press *Start* on the operating buttons (2), and follow the orders on the screen. (You can observe the operation progress on the telemetric bar (3))



6. Select option **Yes**. This will erase previous calibration, and makes a new one. If you select **No** the machine will measure the current precision.



Figure 31 TouchProbe insert

7. Insert the TouchProbe tool as seen on [Figure 31] and [Figure 32], then close spindle collet chuck by pressing *Cartridge*.



Make sure that the TouchProbe is properly put in the spindle, and the positioning pin is sitting in the slot making the probe unable to rotate around! For correct positioning see [Figure 32].

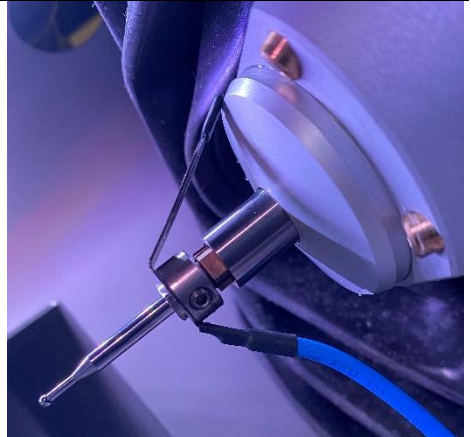


Figure 32 Correct probe position

8. Press *Start* to continue.



Start button is active, when the cartridge is closed.

9. Take out the tool magazine and remove the tools from it. Make sure the magazine is properly cleaned, then insert the measuring pots [Figure 33.]. Press *Start* to continue.

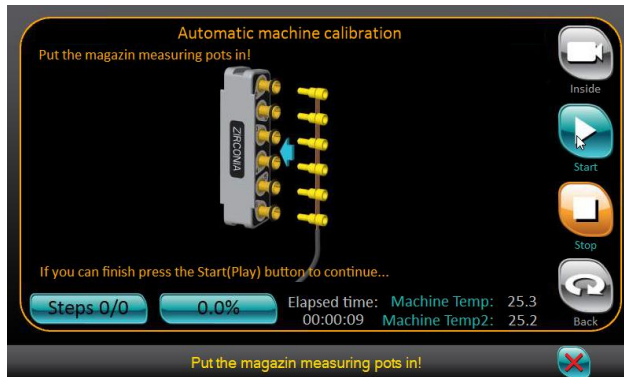


Figure 33 Measuring pots.

10. Remove the dummy from the **service connector** (See **Section 3.6 [Figure 3/8]**), and connect the ProbeTool plug **[Figure 34]**. Press **Start** to continue.

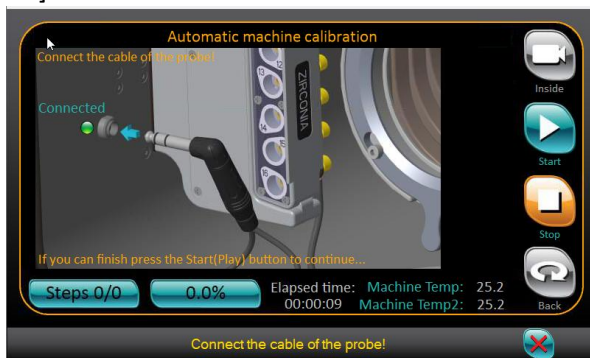


Figure 34 Probe cable

11. Turn the TouchProbe to 0° **[Figure 35]** and press **Start**.



The TouchProbe should fit correctly both in the collet chuck and the spindle slot **[Figure 32]**.



Figure 35 TouchProbe measure

12. Turn the TouchProbe 180° around and put the positioning pin in the bottom slot **[Figure 36]**, then press **Start**.

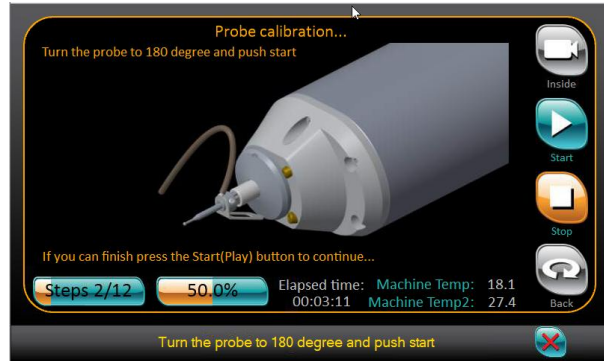


Figure 36 TouchProbe in 180° position.

13. Turn the TouchProbe back to 0°, the same way as in [Figure 35].
14. The calibration will run for ~4.5 hours. When the calibration has finished the results page will show with the corresponding message [Figure 36]. Press *Start* to return to the Machine Calibration Screen.

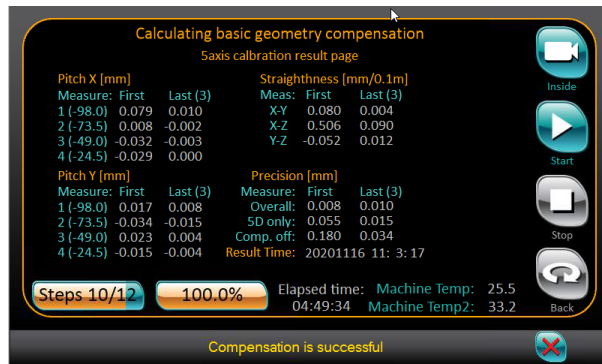



Figure 36 Succesfull calibration

6.8.3.Tool magazine calibration



You have the option to calibrate the tool magazine. This should be used, when after **Section 4.1.6** troubleshooting the machine fails to put down tools.

1. Clean the machine working space according to **Chapter 5**.
2. Log in to Settings as seen in **section 5.3.2**.
3. Select .
4. Select *Automatic cartridge calibration* on the ribbon [Figure 30/1]. Then press **Start**.
5. Go to **Section 6.8.2** and follow the steps from 5-13.
6. The process is finished when the progress bar is at 100% and the machine went to *HOME* position.

6.8.4. Removing ProbeTool



The TouchProbe can only be removed within the Machine Calib. function [Figure 30].

1. Select *TouchProbe (T60) remove* on the ribbon [Figure 30/1]. Then press **Start**.
2. Select **Yes**.
3. Disconnect the TouchProbe cable and plug back the dummy. [Figure 37]. Then press **Start**.

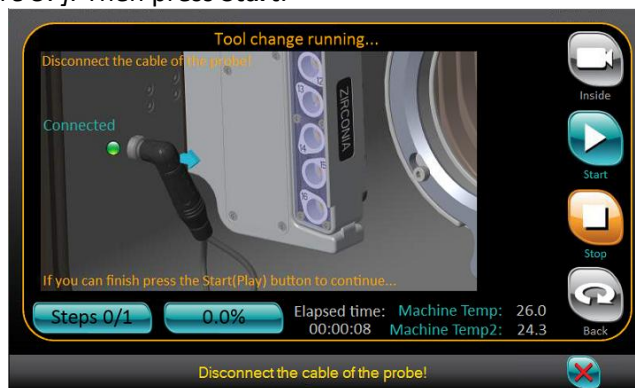


Figure 37 Disconnect the cable

4. Take out the magazine and remove the measuring pots [Figure 38]. Put back the magazine, then press **Start**.

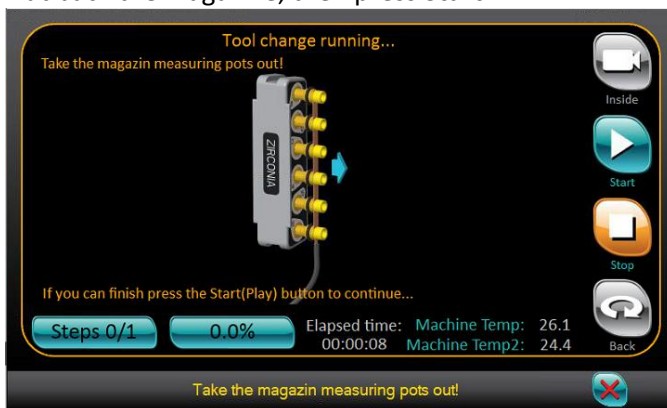


Figure 38 Removing the measuring pots.

5. Open the cartridge and remove the TouchProbe [Figure 39].

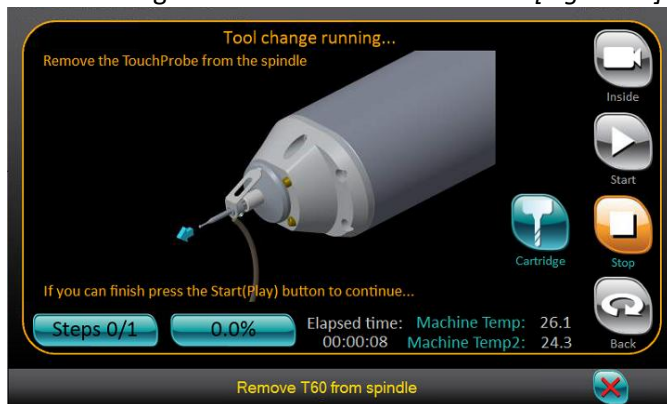


Figure 39 Removing TouchProbe

6. Remove the calibration plate.

The calibration plate has to be cleaned with degreaser and stored in oily environment to prevent corrosion!



Troubleshooting



If you run into any kind of error please contact PiDental Kft.:



Tel.1: **+36-1-363 2234**



Tel.2: **+36-1-221 2077**



Tel.3: **+36-1-251 4944**



Fax: **+36-1-251 4891**



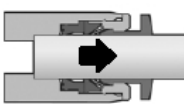

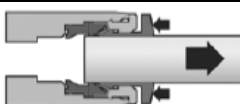


E-mail: sales.pidental@pidental.hu



Skype name: **pidental**

6.9. Connecting and disconnecting quick push fittings

	Ensure that the end of tube is cut square and free from burrs
	To connect, push the tube through the release button and the sealing until stop.
	Pull the tube back twice to check safe connection.
	To disconnect, push the tube into the fitting then push the release button also.
	Hold the release button pushed and pull the tube out.

6.10. Errors and their corrections



Problem / Error message	Mark(s) of possible reason(s)	
Tool is broken	A, B,	

Mark	Possible reasons	Solving errors	Relevant sections
A	Old or worn tool	- Replace old tool to new one	3.6.4.
B	Tool is not right	- Check the tool type in magazine	3.6.4.
	Incorrect inserting of tool	- Check the tool position in magazine - Check the collets of magazine - Change collet in magazine	3.6.4. Service manual
	Incorrect inserting of tool magazine	- Check the magazine position in machine - Clean the seat of magazine as well as the magazine	3.6.5
C	Dirty spindle collet chuck and/or dirty tool	- Clean collet chuck - Clean the tool	5.6. 3.6.4
D	Spindle collet chuck failure	- Check whether collet chuck tighten correctly in spindle - Change collet chuck	5.6.
E	Spindle failure	- Change spindle	Service manual

EC CONFORMITY DECLARATION

We, **PIDENTAL Fogászati Gyártó Kft., 83-85 Szugló Street, 1141 Budapest, Hungary** hereby declare that, according to its design and structure and in the implementation we released it for trade, the machine described below meets the relevant safety and health requirements of the EC Directives. Should the machine be subject to any modification without our written consent, this declaration shall be null and void.

Machine description: **Cobra6Xe**

Machine type: **5 axis dental CNC milling machine**

Serial number:

EC Directives: **98/37/EC Machine Directive**
2006/95/EC Low Voltage Directive
2004/108/EC Electromagnetic Compatibility Directive

Applicable harmonized rules:

EN 12100-1 Safety of machinery. Basic terminology, methodology

EN 12100-2 Safety of machinery. Technical principles

EN 55014-1 Electromagnetic compatibility. Emission

EN 55014-2 Electromagnetic compatibility. Immunity.

EN 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements

EN 61010-2-101 Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements

Budapest,

Tibor Hegedűs