



Planmeca PlanMill® 50 S

user's manual

The manufacturer, assembler and importer are responsible for the safety, reliability and performance of the unit only if:

- installation, calibration, modification and repairs are carried out by qualified authorised personnel
- electrical installations are carried out according to the appropriate requirements such as IEC 60364
- equipment is used according to the operating instructions.

Planmeca pursues a policy of continual product development. Although every effort is made to produce up-to-date product documentation this publication should not be regarded as an infallible guide to current specifications. We reserve the right to make changes without prior notice.

COPYRIGHT PLANMECA

Publication number 30018608 Revision 2

Released 15 May 2020

Table of contents

1	Introduction.....	1
1.1	Information regarding this manual.....	1
1.2	Limitation of liability.....	4
2	Associated documentation.....	5
3	Symbols on product labels.....	6
3.1	Protective equipment symbols.....	6
3.2	Packaging symbols.....	7
3.3	Disposal symbols.....	8
4	For your safety.....	9
4.1	Notes, cautions and warnings.....	9
4.2	Residual risks and fundamental dangers.....	9
4.3	Reasonably foreseeable misuses.....	10
4.4	Warning symbols.....	10
4.5	General hazards.....	11
4.5.1	Danger due to electrical energy.....	11
4.5.2	Mechanical hazards.....	12
4.5.3	Danger of fire.....	13
4.5.4	Substance hazards.....	13
4.5.5	Noise / sound emissions.....	14
4.6	In case of emergency.....	15
4.7	In case of fire.....	15
4.8	Dangers due to high temperatures.....	15
4.9	General hazards in the workplace.....	16
4.10	Operator's responsibility.....	16
4.11	Personnel requirements.....	17
4.12	Qualifications.....	18
4.12.1	User.....	18
4.12.2	Electrician.....	18
4.12.3	Qualified personnel.....	18
4.12.4	Manufacturer.....	18
4.13	Safety equipment.....	19
4.13.1	Description of safety equipment.....	19
4.13.2	Safety devices that must be provided by the operator.....	20
4.13.3	Fire protection.....	20
4.14	Environmental protection.....	20
5	System description.....	21
5.1	Materials.....	21
5.2	Cooling liquid.....	21
5.3	Milling tools.....	21
6	Milling unit.....	23
6.1	Front view.....	23
6.1.1	Lid.....	24
6.1.2	Milling unit controls.....	25
6.2	Side view.....	26

6.3	Rear view.....	26
6.4	Connection panel with maintenance unit.....	27
6.5	Tool magazine (direct changer).....	28
6.6	Cooling liquid system.....	29
6.6.1	Coolant tank.....	30
6.7	Axis arrangement.....	31
6.7.1	Coordinates system.....	31
6.7.2	Assignment of movement axes.....	31
7	Adapters.....	32
7.1	Glass ceramic adapter.....	32
7.1.1	Attaching glass ceramic adapter.....	32
7.2	Adapters for premilled abutments.....	34
7.2.1	DESS adapter.....	34
7.2.2	Medentika adapter.....	37
7.2.3	Nt-trading adapters.....	41
8	Operating milling unit.....	44
8.1	Safety instructions for operation.....	44
8.2	Procedure prior to operation.....	44
8.3	Switching unit on.....	44
8.4	Switching unit off.....	44
8.5	Procedure during operation.....	45
8.6	Using unit controls.....	45
8.6.1	Touch screen control panel.....	46
8.6.2	Control buttons.....	46
8.7	Processing modes.....	48
8.7.1	Dry processing.....	48
8.7.2	Wet processing.....	50
8.8	Modes of operation.....	51
8.8.1	Automatic mode.....	52
8.8.2	Set-up mode.....	52
8.8.3	Expanded set-up mode.....	52
8.9	Inserting workpiece.....	52
8.10	Removing workpiece.....	53
8.11	Registering tools in control software.....	54
8.12	Loading tool magazine.....	56
8.13	Changing tools.....	57
8.14	Replacing broken milling cutters.....	58
8.15	Before milling.....	59
8.16	Process description.....	59
8.17	Milling file identifiers.....	59
8.18	Milling.....	59
8.18.1	Dry milling.....	60
8.18.2	Wet milling.....	61
8.18.3	Switching between wet and dry milling.....	62
8.19	Switching off the unit.....	62
8.20	After operation.....	62
9	Control software.....	63
9.1	Starting software.....	63
9.2	User interface.....	64
9.3	Touch screen commands.....	64
9.4	Tool fields.....	67
9.5	Edit tool field.....	71
9.6	Registering tool in software.....	73

9.7	Information bars.....	74
9.8	Status indicators.....	75
10	Service, maintenance and cleaning.....	76
10.1	Safety instructions for service, maintenance and cleaning.....	76
10.1.1	Electrical system.....	77
10.1.2	Pneumatic system.....	77
10.2	Replacement parts.....	77
10.3	General cleanliness.....	78
10.4	Suitable cleaning products.....	78
10.5	Plastic panels.....	78
10.6	Extraction systems.....	79
10.7	Workpiece holder (clamping device).....	79
10.8	Tool holders and length measuring probe.....	79
10.9	Lid guide rails.....	79
10.10	Lubrication.....	79
10.11	Milling spindle.....	79
11	Preventive maintenance.....	81
11.1	Safety instructions for maintenance.....	81
11.2	Replacement parts.....	81
11.3	Maintenance instructions.....	82
11.3.1	Collet.....	82
11.3.2	Safety interlocking system.....	84
11.3.3	Fan filter.....	84
11.3.4	Cooling liquids.....	84
11.3.5	Water separator.....	85
11.3.6	Guide rails and drive shafts.....	85
11.3.7	Coolant tank.....	85
11.4	Maintenance plan.....	87
11.4.1	Before every start-up of unit.....	87
11.4.2	Daily.....	87
11.4.3	Weekly or after tool breakage.....	87
11.5	Calibrating milling system.....	88
11.5.1	Attaching workpiece.....	88
11.5.2	Milling zero point and B-axis calibration body.....	90
11.5.3	Measuring zero point and B-axis calibration body.....	93
11.5.4	Calibrating zero point and B-axis.....	94
11.6	Annual maintenance.....	95
12	Troubleshooting.....	96
12.1	Troubleshooting safety.....	96
12.1.1	Electrical systems.....	96
12.1.2	Moving parts.....	96
12.1.3	Improper troubleshooting.....	97
12.1.4	How to respond to malfunctions.....	97
12.2	Troubleshooting tables.....	97
12.3	Troubleshooting tasks.....	105
12.3.1	Deactivating emergency stop.....	105
12.3.2	Replacing fuses.....	106
13	Packaging and storage.....	107
13.1	Packaging.....	107
13.2	Packaging symbols.....	107
14	Transport.....	108
14.1	Safety instructions for transport.....	108

14.1.1	Eccentric centre of gravity.....	108
14.1.2	Improper transport.....	108
14.2	Transporting.....	108
15	Disassembly and disposal.....	110
15.1	Safety information for disassembly and disposal.....	110
15.2	Disassembly.....	110
15.3	Disposal.....	110
15.3.1	Collection.....	111
15.3.2	Return and collection systems.....	111
15.3.3	Disposal symbols.....	111
16	Customer information.....	112
16.1	Warranty.....	112
16.2	Limitation of liability.....	112
17	Technical specifications.....	113
17.1	Milling unit.....	113
17.2	Connected loads.....	114
17.3	Environmental conditions.....	114
17.4	Device plate.....	115
<hr/>		
Appendix A:	Suction unit (optional).....	116
A.1	Safety instructions.....	116
A.1.1	Symbols used.....	116
A.1.2	Electrical safety.....	116
A.1.3	Dangers to eyes, breathing and skin.....	116
A.1.4	Warning and information labels.....	116
A.2	Installation.....	118
A.2.1	Extractor overview.....	118
A.2.2	Installing extractor.....	118
A.2.3	Filter blocked signal.....	119
A.2.4	Remote stop/start.....	119
A.2.5	Electrical supply connection.....	119
A.2.6	General safety requirements.....	119
A.3	Operation.....	120
A.3.1	Manual operation.....	120
A.4	Maintenance.....	120
A.4.1	Cleaning unit.....	120
A.4.2	Replacing filters.....	121
A.4.3	Pre filter replacement.....	121
A.4.4	Consumable spares.....	122
A.4.5	Maintenance protocol.....	122
A.4.6	Filter disposal.....	122
A.5	Troubleshooting.....	122
A.6	Technical specifications.....	122

1 Introduction

Planmeca PlanMill 50 S is a milling unit intended for manufacturing of dental prostheses. This manual describes how to operate the Planmeca PlanMill 50 S milling unit.

NOTE

Read these instructions carefully before connecting or operating the unit and keep the instructions in the immediate vicinity of the unit and available at all times to persons operating the unit.

The smooth function and operational safety can only be guaranteed if the general safety precautions and the specific safety information provided in these instructions are observed when operating the unit.

The unit may only be operated in a technically flawless and reliable condition. Improper handling and use could cause danger to the users and damage the unit.

1.1 Information regarding this manual

NOTE

Read this user's manual through carefully before connecting and starting up the milling unit! As with all technical systems, it is only possible to guarantee the faultless functionality and operational safety of this milling unit if the generally applicable safety precautions and the special safety instructions in this user's manual are observed during its operation. Every person involved with the installation, operation, maintenance, repair and inspection of the system must have read and understood the following safety instructions! This user's manual must be kept throughout the entire service life of the milling unit. It must be freely accessible at all times and must be located in the immediate vicinity of the milling unit.

Despite every effort, it is not possible to fully exclude printing errors and mistakes. We welcome any suggestions for improvements and information regarding errors.

The information provided in this manual is based on a standard scope of supply, with which the milling unit is operational.

Milling units from Planmeca are CE compliant and labelled accordingly. For all other milling unit parts and components, for which the CE safety guidelines are applicable, start-up is prohibited until all corresponding requirements have been fulfilled. If a change is made to the system without agreement with the manufacturer (Planmeca), CE conformity is invalidated.

As soon as such changes are made to the milling unit, Planmeca accepts no liability whatsoever.

The ECM test only applies to the milling unit in its original configuration ex works.

The following documentation complies with the valid legal provisions, regulations and ordinances, as well as standard engineering practice at the time the milling unit was delivered.

NOTE

Before using the milling unit, it is essential to read this user's manual carefully!

The Planmeca PlanMill 50 S milling unit is intended for the production of dental indications and is specially developed to satisfy the requirements of the dental industry.

The Planmeca PlanMill 50 S milling unit is intended for dry and wet processing of the materials listed below.

Dry processing	Wet processing
Zirconium dioxide	Lithium disilicate
Aluminium oxide	Glass-ceramic
Plastics	Prefabricated titanium abutments
Wax	
Peek	
Prefabricated CoCr abutments	

Work pieces suitable for the Planmeca PlanMill 50 S, in disk sizes 98 mm and 98,5 mm and blocks in different sizes from the materials listed above, are available from Planmeca. Other materials are available on request and require the express approval of Planmeca.

NOTE

Before using other materials!

Processing other materials is prohibited and requires separate approval and permission from Planmeca. For further information please contact your local dealer.

- The processing of highly flammable and inflammable materials is prohibited!
- When processing titanium and other reactive materials, a general risk of fire exists depending on the material! Perform an assessment to determine the requirement for an automatic extinguishing system!
- Only use tools that are defined by Planmeca in the user's manual for the milling unit, or that have been retrospectively approved (see section "Milling tools" on page 21.)
- The milling unit must only be operated with approved cooling liquids from Planmeca.
- An extraction system must be used in the application cases defined in the user's manual. Only use extraction systems that are supplied or approved by Planmeca.
- DRY processing with this milling unit shall only take place with an extraction system.
- Wet processing with this milling unit shall only take place without an extraction system.
- The milling unit must only be operated within the values specified in the technical specifications, see section "Technical specifications" on page 113.
- Operation of the milling unit is only permissible if the protective devices are functioning correctly, see section "Safety equipment" on page 19.
- The milling unit and components of the milling unit must only be operated when in an operationally safe and technically faultless condition.

- The milling unit is designed for use in dry rooms (workshops, labs and similar rooms) and industrial operations (for maximum ambient temperature see section "Technical specifications" on page 113.
- Set the milling unit into a safe state for maintenance work. This includes de-energising as described in the user's manual, as well as other safety instructions!
- Compliance with the cleaning and maintenance intervals for the milling unit and its accessories.
- Observing all instructions contained in the user's manual, the safety instructions and the accident prevention guidelines.
- Transport, installation, commissioning, operation and maintenance of the system must be performed by instructed specialist personnel.
- The user's manual must be read carefully, understood and strictly followed.

CAUTION

Any use of the milling unit that exceeds the intended use or deviates from this is prohibited and is considered improper use. Any claims against the manufacturer or their authorised representatives due to damages arising from improper use of the milling unit are excluded. The operator alone is liable for any damages resulting from improper use.

CAUTION

All guarantee and warranty entitlements of the operator against the manufacturer are voided in case of improper use of the milling unit. Any use other than intended use is prohibited!

CAUTION

Unprofessional handling and improper use can lead to dangers and damage. You must therefore carefully read and precisely follow this user's manual and the associated documents.

NOTE

This user's manual must be stored in the immediate vicinity of the milling unit, and must be accessible to the personnel working on and with the milling unit at all times. The milling unit must only be operated when in an operationally safe and technically faultless condition.



WARNING

Risk of personal injury due to a lack of diligence! With improper or unintended use come:

- Risk to life and limb
- Risk of milling unit damage
- Risk of further property damage

CAUTION

In order to avoid personal injury or property damage, always observe all safety instructions!

1.2 Limitation of liability

All data, information and instructions in this user's manual have been provided under due consideration of applicable standards and regulations, current engineering practice, as well as our many years of experience.

The manufacturer assumes no liability for damage in the following cases:

- Disregard of this user's manual
- Improper use
- Deployment of untrained personnel
- Unauthorised conversions
- Technical modifications
- Use of replacement parts or accessories that have not been approved

The scope of delivery may vary from the explanations and representations provided in this manual in the case of special versions, with technical changes or if additional options are ordered. The obligations agreed in the delivery contract, the general terms and conditions, as well as delivery conditions of the manufacturer and the statutory regulations valid at the time the contract was concluded, apply.

Insofar as the exclusion of liability is legally permissible, the manufacturer shall not be liable for any loss or damage arising due to this product, regardless of whether this is due to direct, indirect, special, collateral or consequential damages, irrespective of the legal grounds, including guarantee, contract, negligence or malice.

The general terms and conditions (T & Cs) of the manufacturer apply.

2 Associated documentation

- Planmeca PlanMill 50 S Installation manual
- Planmeca PlanMill 50 S Technical manual

3 Symbols on product labels



Caution: ISO 7000-0434A.



Date of manufacture (Standard ISO 7000).



European conformity



Manufacturer (Standard ISO 7000).



Operating Instructions ISO 7000-1641.



Reference.



Separate collection for electrical and electronic equipment according to Directive 2002/96/EC (WEEE).



Serial number

3.1 Protective equipment symbols

The following symbols are used in all areas where it is necessary to use protective equipment.



Use protective gloves



Wear safety shoes



Use hearing protection



Use respiratory protection



Wear long-sleeved work clothing



Use eye protection

3.2 Packaging symbols

During transport always observe the symbols shown below that are applied to the packaging.



Fragile

Packages marked with this symbol contain fragile and sensitive goods.

Treat the package with care and do not let it drop or expose it to shock or impact.



Do not stack

Never stack any objects on packages marked with this symbol.



Keep dry

Protect packages with this marking from moisture and keep it dry.



Maximum stacking load

Observe the instruction ... *kg max.* above the arrow. This value states the maximum permissible stacking load. Do not exceed the load limit. Preferably store packages marked with this symbol in the uppermost position.



This way up

During transport and storage the arrow must point upwards. Do not tip, roll or lean the package.

3.3 Disposal symbols



All electrical and electronic equipment is marked with these symbols and, in accordance with the EU Directive, must not be disposed of with household waste.



4 For your safety

The following section discusses points relevant to maintaining the highest possible level of safety to personnel as well as to operating the unit safely and error free.

4.1 Notes, cautions and warnings

The following warning fields label hazards according to their risk level (hazard level) and contain important safety-relevant information on handling the milling unit. The information field contains (important) instructions and additional information. Also always observe the generally valid accident prevention regulations and the internal health and safety regulations.



WARNING

Danger with moderate degree of risk!

Provides information on hazards with a moderate degree of risk, which could result in death or serious injury unless avoided.

CAUTION

Danger with low degree of risk!

Provides information on hazards with a low degree of risk, which could result in minor or moderate injury unless avoided.

NOTE

Provides important information.

4.2 Residual risks and fundamental dangers

The general residual risks and fundamental dangers which arise during intended use of the milling unit are listed in this section.



WARNING

Risk of injury due to general residual risks.

Despite compliance with the protective measures, the following residual risks exist when working on the milling unit:

- **Risk of injury due to cutting, impacts and crushing!**
- **Hearing damage due to noise pollution!**
- **Health damage due to dust / fine dust pollution!**
- **Operation by two persons (simultaneously) is strictly prohibited for safety reasons!**

4.3 Reasonably foreseeable misuses



WARNING

Risk of injury due to general residual risks.

The (reasonably) foreseeable misuses include:

- Unintended use is any use that exceeds the intended use!
- The incorrect fastening of workpieces. The milling unit operator is responsible for ensuring that the workpiece clamping device used is suitable for the actual processing - i.e. that it is secure.

Unsuitable, insecure clamping devices may result in parts being ejected out of / from the workpiece clamping device due to the workpiece loosening. During processing, this can lead to serious accidents with physical injury or death or serious damage to the workpiece, the tool, the clamping device and other milling unit parts!

- Processing or use of an unapproved component or material!
- Risk of injury from sharp tools (wear protective gloves)!
- Risk of injury due to protruding tools (wear protective gloves)!
- Operation of the milling unit outside the specified performance data!
- Misuse of milling unit parts as storage locations or climbing aids!
- Deployment of insufficiently qualified personnel!
- A failure to comply with the cleaning and maintenance intervals for the milling unit and its accessories!
- Operating the milling unit without correctly functioning protective equipment!
- Manipulation of the protective equipment is fundamentally prohibited without exception!

Unintended use can result in serious physical injury or death, as well as significant property damage!

4.4 Warning symbols

This document uses symbols to emphasise particularly important sections. All sections highlighted with any of these symbols deserve special attention.



WARNING

This symbol is used wherever lack of care could lead to personal injury or death, or where conduct deviating from these instructions or unprofessional conduct could result in damage to the system or to the unit.



This symbol is used to indicate sections involving close proximity to electrical hazards and thus danger for personnel.



Danger of explosions or burns! This symbol is used wherever lack of care could lead to explosion and fire possibly resulting in personal injury or death.



Danger of crushing! This symbol is used to indicate hazards involving the crushing or pinching of body parts.



Danger of slipping! This symbol is used in all areas where oil or coolant on the floor can lead to personal injury.



Warning of sharp-edged or pointed objects! This symbol marks areas with potential hazards, which may cause cuts or punctures resulting in personal injury and even death.



Warning of rotating components and risk of being drawn in! This symbol is used in all areas where rotating components may cause serious personal injury or death.



Attention! Hot surfaces! This symbol marks hazard areas, in which hot surfaces may cause injuries in the form of burns.

4.5 General hazards

The following sections describe basic risks which are present even when the unit is used properly.

4.5.1 Danger due to electrical energy



WARNING

Risk of death due to electric shock! Contact with live parts or damage to insulation poses immediate danger to life and limb due to electric shock.





WARNING

Risk of death due to stored charges! After switching off the milling unit, electrical charges may still be stored in components. Contact with such components may be painful and even fatal. Wait until all such components have fully discharged before performing work on them. Always be aware that:

- Only electricians are permitted to work on the electrical system!
- Work on the electrical system must be carried out when in a safe (de-energised) state!
- With damaged insulation, switch off the power supply immediately and organise a repair!
- Never bypass fuses or render these ineffective. When replacing a fuse always ensure the correct current strength!
- Keep moisture away from live parts. Danger of a short circuit!

When working on active parts of the electrical system and operating equipment, de-energise the system for the duration of the work and observe the following safety rules:

1. Disconnect.
2. Secure against being switched on again.
3. Test to ensure a de-energised state.
4. Earth and short circuit.
5. Cover or close off any nearby live parts.

4.5.2 Mechanical hazards



WARNING

Danger due to rotating components and moving axes!

Risk of injury and death due to contact with rotating or moving components of the milling unit!

- Before starting work check that all covers, safety and protective equipment are correctly installed and functional.
- Never reach into the milling unit during operation.
- When cleaning inside the milling unit always unplug the milling unit's mains plug and secure it against being reconnected.
- Before starting work check that no loose parts are lying around the milling unit room.

Always be aware that:

- Bypassing or manipulating moving and fixed protective equipment is fundamentally prohibited without exception!
- After opening the lid, reaching into the milling chamber is strictly prohibited until all parts of the milling unit have come to a standstill without exception! For technical reasons, e.g. the processing spindle may run on!
- Before starting lubrication, maintenance and servicing work in the hazard area, safely disconnect the energy and secure it against reconnection!

4.5.3 Danger of fire



WARNING

Danger of fire with unfavourable conditions! Injury and death, as well as significant property damage may arise due to:

- Unsuitable tools
- Incorrect cutting speeds
- Processing highly combustible materials
- Overheating milling unit parts due to irregular cleaning and maintenance
- Sparks flying from tools
- Unsuitable cleaning or operating products



WARNING

Always ensure that:

- Only approved materials and milling cutter types are used
- Only approved extraction systems for dry dust are used
- The maximum cutting and feeding speed is not exceeded
- The operator of the milling unit is responsible for a risk assessment of the workstation
- If necessary, an extinguisher must be retrospectively installed by the operator
- Processing is observed when milling flammable materials (e.g. PMMA, wax, plastics, titanium) with new parameters
- Tools are checked for wear regularly
- Dirt must be removed from the components immediately
- Dirt must be removed from the components immediately
- When handling cooling liquids, the corresponding safety data sheet is used with particular awareness of the fire risks
- Only cooling liquids approved by Planmeca are used
- Every employee who works with this milling unit in any manner receives regular safety instructions, is sufficiently trained and has read the user's manual

NOTE

Mandatory risk assessment for workstations!

The risk of fire that applies to the milling unit is dependent on the materials and tools used. The milling unit operator, who selected the materials and tools, is therefore additionally responsible for conducting a risk assessment of the workstation in accordance with the industrial health and safety act, ArbSchG §§ 5 and 6!

4.5.4 Substance hazards

Dust

When working with certain materials, fine milling/drilling dust may arise. This may be harmful to health or flammable and should - if necessary - be

vacuumed with an extraction system approved by Planmeca, because this complies with the valid and applicable legal regulations!

The milling unit operator must ensure that:

- Employees receive regular safety training
- Employees are sufficiently sensitised in this regard (information security)
- Storage and disposal of health-endangering or flammable dust takes place correctly
- Dust is not inhaled and suitable personal protective equipment is made available if necessary (BGV A1)
- Eating, drinking and smoking are strictly prohibited in areas where health-endangering dust may arise!
- Warning signs are visibly displayed in areas where this is necessary!
- Operation and maintenance instructions for the extraction system are strictly observed!

Vapours

When working with certain materials, vapours (gases, aerosols) may arise. These may be harmful to health or flammable, and the operator must therefore ensure that:

- Employees receive regular safety training
- Employees are sufficiently sensitised in this regard (information security)
- User instructions and safety data sheets of the various substances are available to the employees and provide information on the dangers (user's manual)!
- Vapours are not inhaled and suitable personal protective equipment is made available if necessary (BGV A1)
- Eating, drinking and smoking are strictly prohibited (ban on flames and fire) in areas where healthendangering gas and vapours may arise!
- Warning signs are visibly displayed in areas where this is necessary!

4.5.5 Noise / sound emissions

The milling unit's emissions sound pressure level is lower than or equal to 75 dB(A) when using the approved materials and tools. However noise peaks may arise with certain processing combinations, and the operator must therefore ensure that:

- Employees are informed of noise risks and protective measures
- Suitable hearing protection is available if the daily noise exposure level exceeds 85 dB(A)
- Sufficiently trained personnel are available if necessary, in order to reduce the duration of exposure
- Warning signs are visibly displayed where this is necessary!

4.6 In case of emergency



In situations in which there is a danger to persons or property, the user must initiate an EMERGENCY STOP immediately (see also section "Description of safety equipment" on page 19).

If persons are injured:

- Administer first aid
- Inform emergency doctor or medic

Freeing trapped personnel

Freeing a person trapped in the milling unit's interior, e.g. due to trapping or catching on a drive axis, takes place after pressing the EMERGENCY STOP switch, in order to bring the milling unit to a standstill as quickly as possible and analyse the hazardous situation!

Proceed as follows to release trapped personnel:

- Assess the condition of the trapped person and inform an emergency doctor if necessary!
- Due to the low mass of the drives, it is possible to move the axes manually when de-energised!

4.7 In case of fire

In case of fire, only extinguish this at the milling unit with a CO2 fire extinguisher (carbon dioxide extinguisher). The use of extinguishers containing water must be avoided with electrical systems for safety reasons!

In case of fire:

- Press EMERGENCY STOP
- Disconnect the power supply (fuse box)
- Notify the fire brigade
- Extinguish milling unit fire with CO2 fire extinguishers

NOTE

IMPORTANT INFORMATION!

Important information regarding the use CO2 fire extinguishers!

Before using a CO2 fire extinguisher, all persons must be warned and evacuated! The person extinguishing the fire must wear respiratory protection and be supplied with oxygen! After using the extinguishing agent, ensure sufficient ventilation of the room before unprotected persons return to it.

4.8 Dangers due to high temperatures



WARNING

Of hot surfaces on materials and tools!

Risk of burns on heated materials or tools after processing! During milling unit operation, high temperatures may arise. Therefore ensure that surfaces have cooled to ambient temperature before commencing all work or activities. Tools, work pieces and chips may become very hot. Always wear heat-resistant work clothing and protective gloves during work!

4.9 General hazards in the workplace



WARNING

During operation the unit noise level in the work area is sufficient to cause hearing damage.

- Always keep the work area clean
- Remove any unnecessary objects from the work area
- Mark any unavoidable tripping hazards with yellow-black marker tape

4.10 Operator's responsibility

The operator is the person who uses the milling unit for commercial or industrial purposes, or who commissions a third party with this, and who bears the legal product responsibility for protecting the user, personnel or third parties during its operation. The milling unit operator is subject to the statutory obligations of industrial health and safety when using the milling unit in commercial areas.

The operator and the personnel authorised by him (who receive special instructions regarding hazards that may arise) are responsible for the fault-free operation of the milling unit, and for clear stipulations regarding the responsibilities when transporting, installing, operating, maintaining and cleaning the milling unit. In addition to the safety instructions and information in this user's manual, it is also necessary to observe and adhere to the local accident prevention regulations and the general health and safety provisions, as well as the valid environmental protection regulations relevant to the area of use of the milling unit.

NOTE

Observe the information in the user's manual fully and without limitation!

NOTE

IMPORTANT INFORMATION!

Important instructions for the milling unit operator!

Read this user's manual through carefully before connecting, starting up and operating the milling unit!

As with all technical systems, it is only possible to guarantee the faultless functionality and operational safety of this milling unit if the generally applicable safety precautions and the special safety instructions in this user's manual are observed during its operation!

1. The milling unit installation and commissioning must be performed by an authorised Planmeca service technician.
2. The milling unit must be used exclusively in accordance with the following instructions. We accept no liability for damage caused by use of the milling unit for any other applications.
3. The milling unit must only be operated with materials and accessory parts approved by manufacturer. The use of materials or accessory parts (e.g. milling cutters) that have not been approved may result in damage to the milling unit or to the work produced. We accept no liability in this instance.
4. Before starting up the milling unit, ensure that the mains voltage specified on the type plate for the individual components is the same as

the existing mains voltage. Incorrect mains voltage can destroy the milling unit and its components.

5. In order to avoid an electric shock, do not insert objects in the milling unit; the only exception is the intended replacement of parts in accordance with this user's manual.
6. In order to perform maintenance work always first disconnect the milling unit from the mains power supply and wait for a few minutes before starting work.
7. Never operate the milling unit from locations in which there is a risk that water or other liquids might penetrate the device or the control.
8. The surface upon which the milling unit is installed must be sufficiently stable. Observe the permissible load capacity and have this checked by a structural engineer if necessary.
9. Opening the milling unit housing and repairing the milling unit must be performed by an authorised Planmeca service technician exclusively.
10. Note that there is a risk of injury when a milling cutter is clamped in the milling spindle.

This can lead to serious injuries and even death.

11. The milling unit may only be operated with original Planmeca accessories or accessories that have been approved by Planmeca. When replacing parts in accordance with this user's manual, it is essential to use original Planmeca parts. No liability shall be accepted for damage that results from the use of accessories or external parts that have not been approved.
12. Do not use the milling system in areas at risk of explosion.
13. Avoid tripping hazards and damage to the lines when laying network lines, data lines and the pneumatic hose.
14. If a change to the milling unit or components is made without the written permission of Planmeca then the issued EC declaration of conformity is voided and we exclude any liability for injuries or damages to the milling unit that arise as a result of this.
15. Clean the milling unit using suitable cleaning products only.
16. When cleaning the milling unit avoid inhaling any dust or gases that arise (wear respiratory protection).
17. Mobile phones should not be used in close proximity to the milling unit to avoid interference with the unit.

4.11 Personnel requirements

The tasks described in this user's manual place different requirements on the qualifications of the persons entrusted with these tasks.



WARNING

With insufficient qualification of personnel! Insufficiently qualified personnel are unable to correctly assess risks posed when working with the milling unit. These persons may therefore put themselves and others at risk of serious and even fatal injuries. In order to avoid this, all work must be carried out by appropriately qualified personnel exclusively. Persons whose reactions are impaired, for instance through drugs, alcohol, or medication, are not permitted to perform any work on the milling unit.

4.12 Qualifications

The tasks described in this user's manual require different kinds of qualifications of the persons entrusted with these tasks.



WARNING

Hazard due to insufficient qualification of personnel! Risks that arise due to the operation of the unit by unqualified persons cannot be properly assessed. Such persons may place themselves or others at risk of death or serious injury. To avoid this risk all work must only be carried out by suitably qualified persons. Insufficiently qualified persons must be kept away from the work area. Persons with impaired coordination or responsiveness due to drugs, alcohol, or medication should not perform any work on the unit.

The qualifications for the various tasks are listed below.

4.12.1 User

The operator must instruct the user on the duties assigned to them and the possible hazards of improper conduct. All tasks that go beyond operation in normal mode may only be performed by the user if the operator has expressly assigned them the task.

4.12.2 Electrician

A qualified electrician can independently perform work on electrical systems and recognize and avoid possible dangers due to their technical training, knowledge and experience as well as their knowledge of relevant standards and regulations.

A qualified electrician is familiar with all relevant standards and regulations applicable to the working environment in which they work.

4.12.3 Qualified personnel

Qualified personnel can independently recognise and avoid possible dangers and hazards due to their technical training, knowledge and experience.

4.12.4 Manufacturer

Certain work may only be performed by manufacturer's technical personnel. Contact your local dealer if any such work needs to be carried out.



WARNING

The attachment of accessories to the milling unit and any other modifications require the express permission of the manufacturer. All attachments and modifications that may affect the operational safety of the milling unit are strictly prohibited!

4.13 Safety equipment

4.13.1 Description of safety equipment

EMERGENCY STOP switch



An EMERGENCY STOP switch is located on the milling unit control panel that enables the unit to be stopped as quickly as possible.

The EMERGENCY STOP switch must always be freely accessible.

NOTE

The main power switch on the unit has no EMERGENCY STOP function.

Position of the EMERGENCY STOP switch:

The EMERGENCY STOP switch is located on the front panel beneath the touch screen.

An EMERGENCY STOP switch is located on the right side of the milling unit beneath the control panel. Pressing the switch interrupts the power supply to the power electronics (motor output stages) and the frequency converter for the main spindle drive. The standstill occurs after stop-category 1 (controlled standstill and subsequent interruption of the energy supply to the drives).

Location of the EMERGENCY STOP switch:

The EMERGENCY STOP switch is located on the right, beneath the control panel.

Always be aware that:

- The EMERGENCY STOP switch must always be freely accessible.
- The milling unit main switch does not include an EMERGENCY STOP function!
- The EMERGENCY STOP switch does not protect against an unexpected milling unit start!

NOTE

After actuating the EMERGENCY STOP switch, the mains power supply is still connected. Only the operating voltage for the motor output stages and the milling spindle is interrupted.

Milling chamber lid

When the unit is running the lid is locked and cannot be opened. The lid must be neither removed nor modified. The lid protects from dust and reduces grinding noise. The lid that enables access to the working area of the unit.

Lid monitoring

The lid is monitored. If the lid is open the unit controls will not start.

Locking lid

When the unit is in operation the lid is locked and can only be opened when all unit axes and spindles are at a standstill.

Lid button

The lid button enables the lid to be opened and provides access to the working area of the unit. The lid button is only active when the unit is at a standstill. The lid must be closed and the safety lock engaged before the unit can be restarted. The lid must be opened to feed the unit with material to be worked and to fit milling tools.

4.13.2 Safety devices that must be provided by the operator

When dry milling the operator must fit an extraction system to remove the resulting fine dust.

Extraction system

When dry processing certain materials, the operator must install an extraction system, in order to vacuum off fine dust that is harmful to health. Only use original Planmeca extraction systems because these are designed for the requirements of the milling unit. Other extraction systems require the approval of Planmeca.

For further information please contact your local dealer.

4.13.3 Fire protection

When processing flammable materials a risk assessment of the workstation must be performed in accordance with ArbSchG §§ 5 and 6 (see also industrial health and safety regulation). The risks of fire with consideration to the materials and tools must be assessed, and if necessary define measures for their reduction (e.g. extinguisher equipment, temperature monitoring, monitored operation by employees).

Always observe the safety information and data sheets from the cooling liquid and materials manufacturers! In accordance with the organisational fire protection, suitable extinguisher equipment (fire blankets and fire extinguishers of class A, B, C, D) must be available as is expedient and in sufficient quantities. When selecting the extinguisher equipment it is essential to observe the limitations of use and the distance information.

For further information please contact Planmeca customer service department.

4.14 Environmental protection

To protect the environment ensure proper disposal of working materials and comply with the safety instructions.

5 System description

The Planmeca PlanMill 50 S is a milling unit intended for the production of dental indications and has been specially developed to satisfy the requirements of the dental industry. The Planmeca PlanMill 50 S is not suitable for the application of conventional milling techniques. The Planmeca PlanMill 50 S is suitable for both for dry and wet processing using the materials listed in section "Materials" on page 21.

The tool magazine can be equipped with up to 12 tools and the milling unit kinematics enable simultaneous processing in 5 axes.

5.1 Materials

The following materials can be processed with PlanMill 50 S milling unit:

- Zirconium dioxide
- Aluminium oxide
- Plastics
- Wax
- Peek
- Prefabricated CoCr abutments
- Prefabricated Ti abutments

Work pieces suitable for Planmeca PlanMill 50 S, in disk sizes 98mm and 98,5mm and blocks in different sizes from the materials listed above, are available from Planmeca. Other materials are available on request and require the express approval of Planmeca.

NOTE

Before using other materials!

Processing other materials is prohibited and requires separate approval and permission from Planmeca. For further information please contact your local dealer.

5.2 Cooling liquid

Only use cooling liquid from Planmeca. The mixture ratio can be found in the cooling liquid description. For further information regarding handling and disposal, refer to the separate safety data sheet, which you can request from the Planmeca customer service at any time.

- Cooling liquid 1000ml (10036920)

5.3 Milling tools

The tools approved by Planmeca for use in the Planmeca PlanMill 50 S milling unit are listed in the table below.



WARNING

If unapproved tools are used there is a risk of serious injury and substantial damage.

Please contact the Planmeca customer service department for the approval of other tools.

In order to process work-pieces, the milling unit must be equipped with at least one tool. The appropriate and ready-ringed tools for the direct change holder are available from Planmeca Sales.

Tool number	Diameter/geometry	Material(s) to be used with	Name on the user interface
2	2.0 mm / Radius	Ti	2.0 mm Ti Radius
3	1.5 mm / Radius	Ti	1.5 mm Ti Radius
4	1.0 mm / Radius	Ti	1.0 mm Ti Radius
7	2.0 mm / Radius	CoCr	2.0 mm CoCr Radius
8	1.5 mm / Radius	CoCr	1.5 mm CoCr Radius
9	1.0 mm / Radius	CoCr	1.0 mm CoCr Radius
11	2.5 mm / Radius	PMMA/Wax	2.5 mm PMMA-Wax Radius
12	1.0 mm / Radius	PMMA/Wax	1.0 mm PMMA-Wax Radius
13	2.5 mm / Radius	Zr/Al	2.5 mm Zr-Al Radius
14	1.0 mm / Radius	Zr/Al	1.0 mm Zr-Al Radius
15	0.6 mm / Radius, conical shaft	Zr/Al/ PMMA/Wax	0.6 mm Zr-Al-PMMA-Wax Radius
17	1.5 mm / toric long shaft	Zr/Al/ PMMA/Wax	1.5 mm Zr-Al-PMMA-Wax SHAFT
21	2.5 mm / Radius	Glass ceramic	2.5 mm ceramic Radius
22	1.0 mm / Radius	Glass ceramic	1.0 mm ceramic Radius
23	0.6 mm / Radius, conical shaft	Glass ceramic	0.6 mm ceramic Radius

6 Milling unit

6.1 Front view



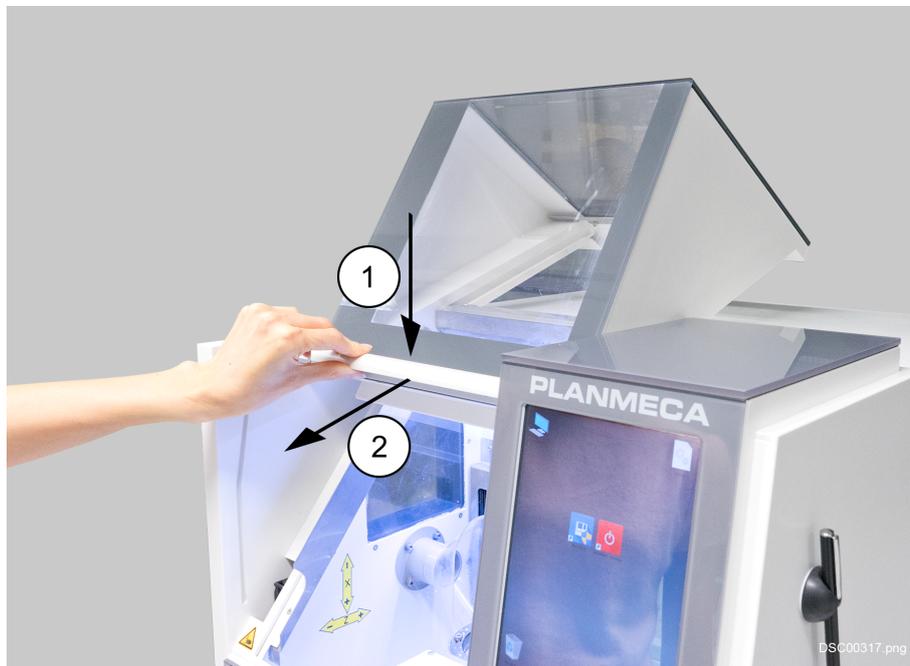
1. Lid
2. Access door for coolant tank
3. Milling unit foot
4. Operating keys
5. Touch screen

6.1.1 Lid

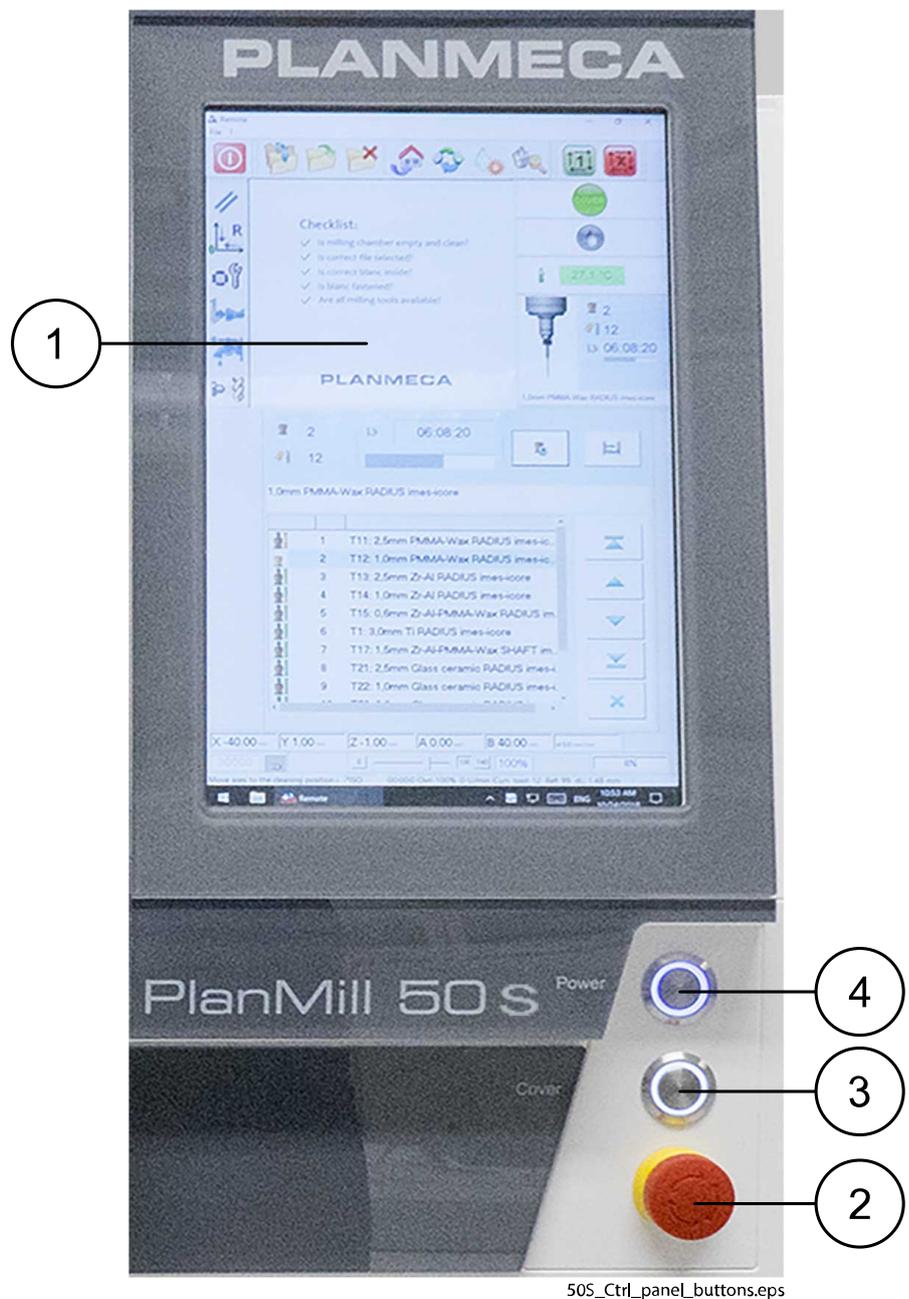
The milling unit lid must be locked during milling. If the lid is open the milling cannot be started.

After milling the lid is locked until all axes and the spindle have stopped

To close the lid pull downwards (1) and then towards yourself (2).



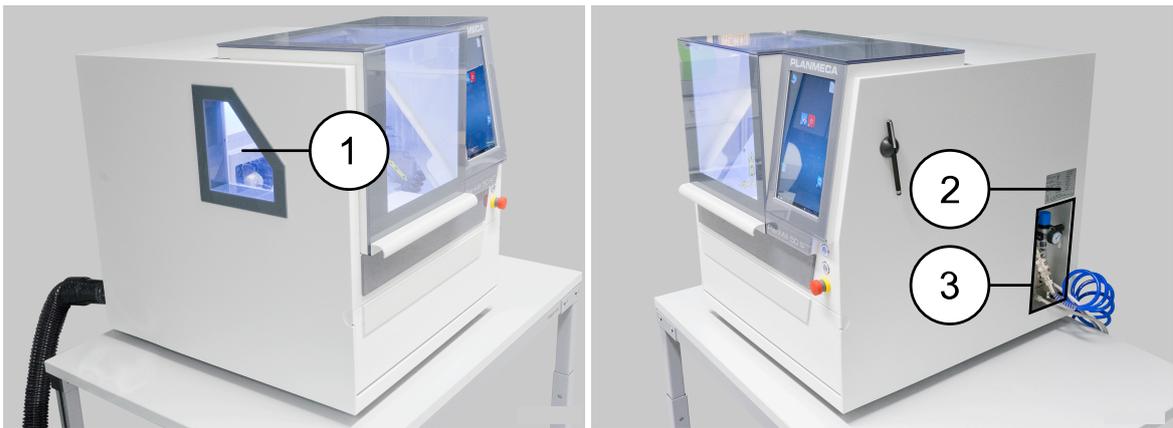
6.1.2 Milling unit controls



50S_Ctrl_panel_buttons.eps

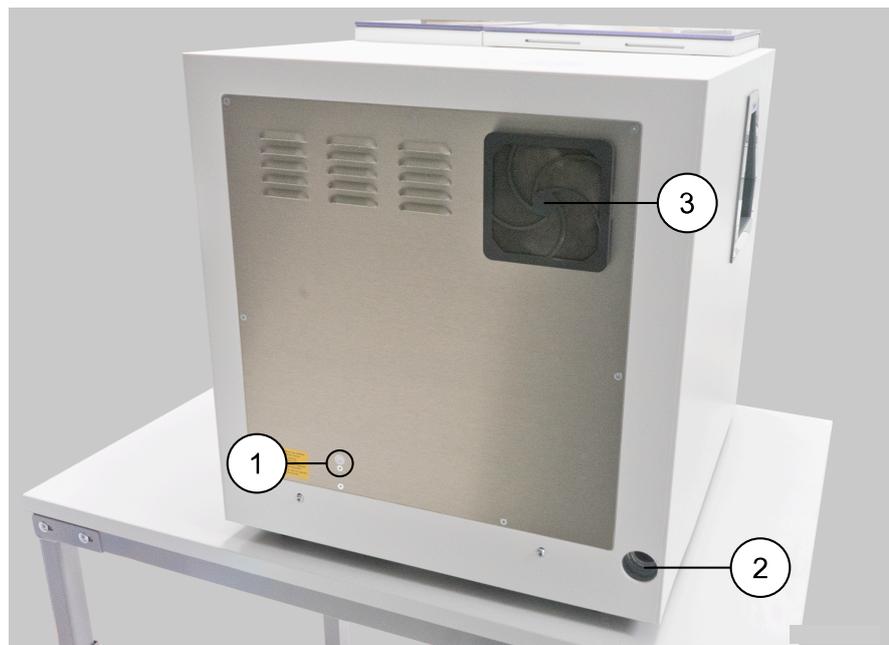
1. Touch screen control panel
2. EMERGENCY STOP switch
3. Lid button
4. Power button

6.2 Side view



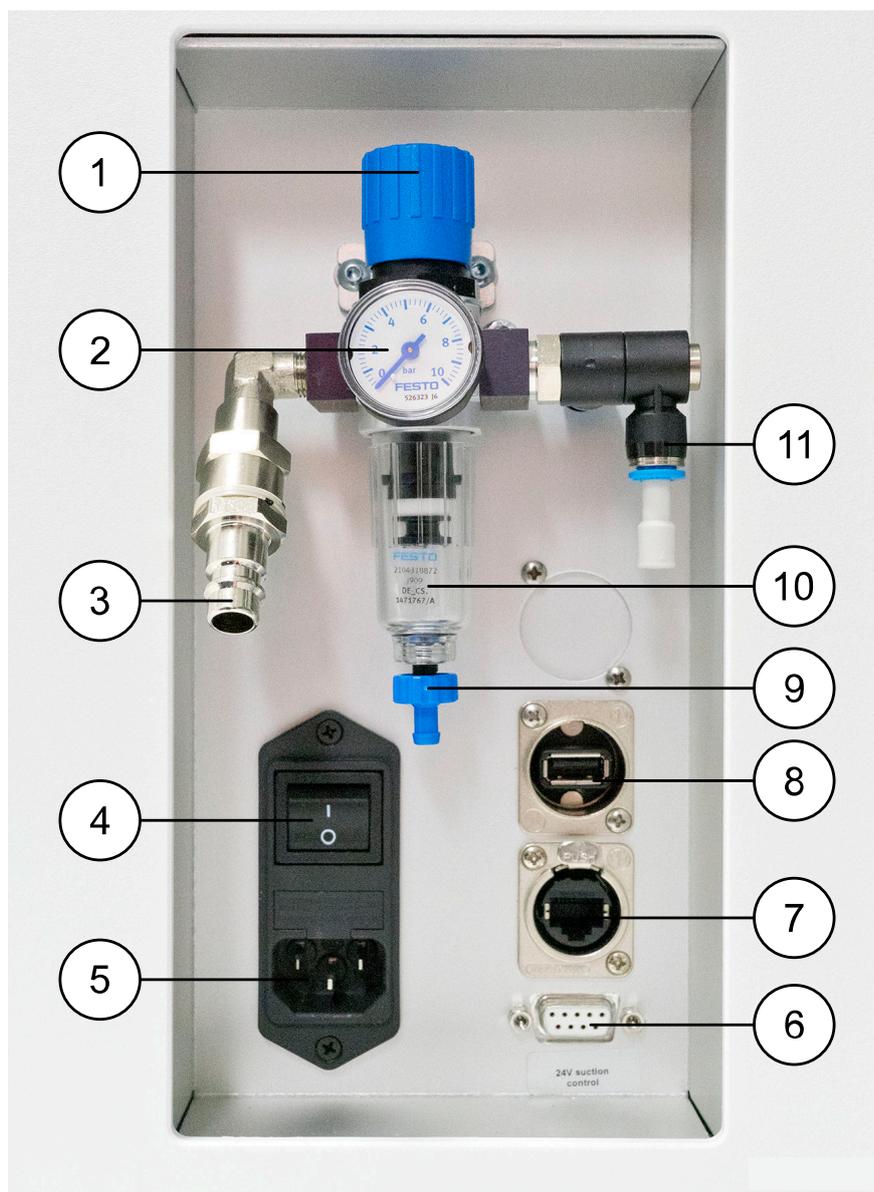
1. Side window
2. Type plate
3. Connection panel

6.3 Rear view



1. Earthing connection, housing rear wall
2. Connection for suction hose of the extraction system
3. Housing fan with integrated filter

6.4 Connection panel with maintenance unit

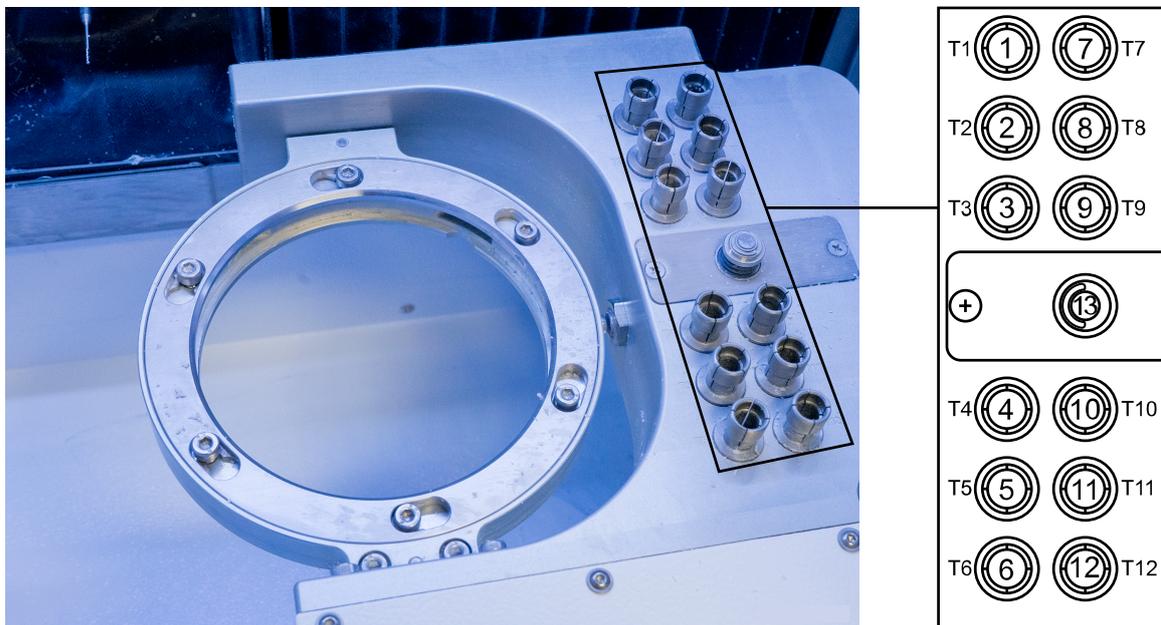


50S_Connection_panel.eps

1. Compressed air adjusting valve (> 6 to 9 bar)	2. Pressure display (bar)	3. Compressed air connection (plug-in nipple NW 7.2 (quick connection))	4. Mains switch (on/off switch)
5. Mains connection for cold units - connection cable	6. Control line for extraction system (sub-D connection)	7. Network connection (RJ-45)	8. USB-B connection
9. Drainage valve on the separation tank	10. Separation tank	11. Additional compressed air outlet (blank)	

6.5 Tool magazine (direct changer)

The milling unit's tool magazine contains a total of 12 tool positions for ready-ringed tools. The arrangement of the tool positions (1) to (12) is shown in figure below. Between the tool positions is a length measuring probe (13), which serves to measure the length of tool currently in use.



The appropriate tools for this milling unit can be found in section "Milling tools" on page 21 and ordered from your local dealer.

6.6 Cooling liquid system

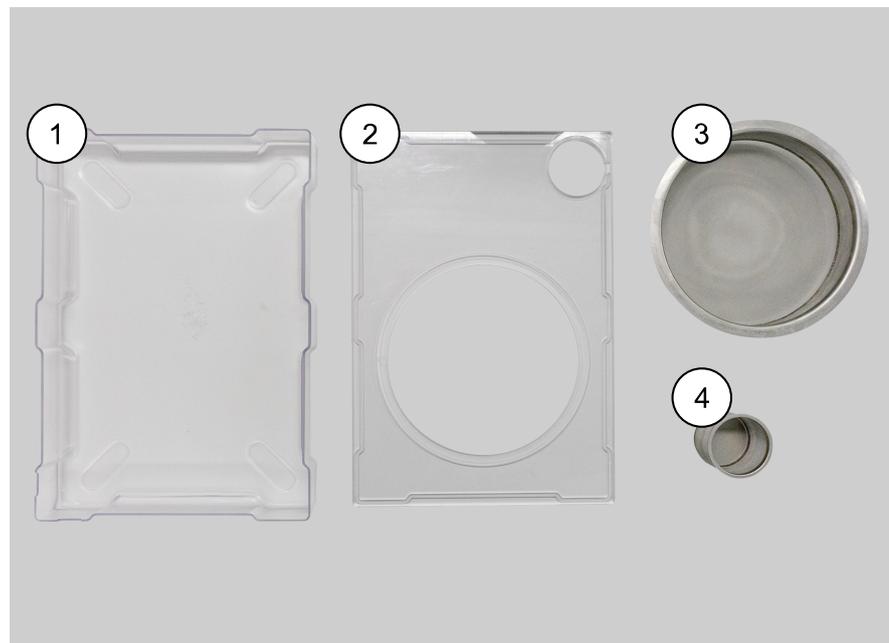
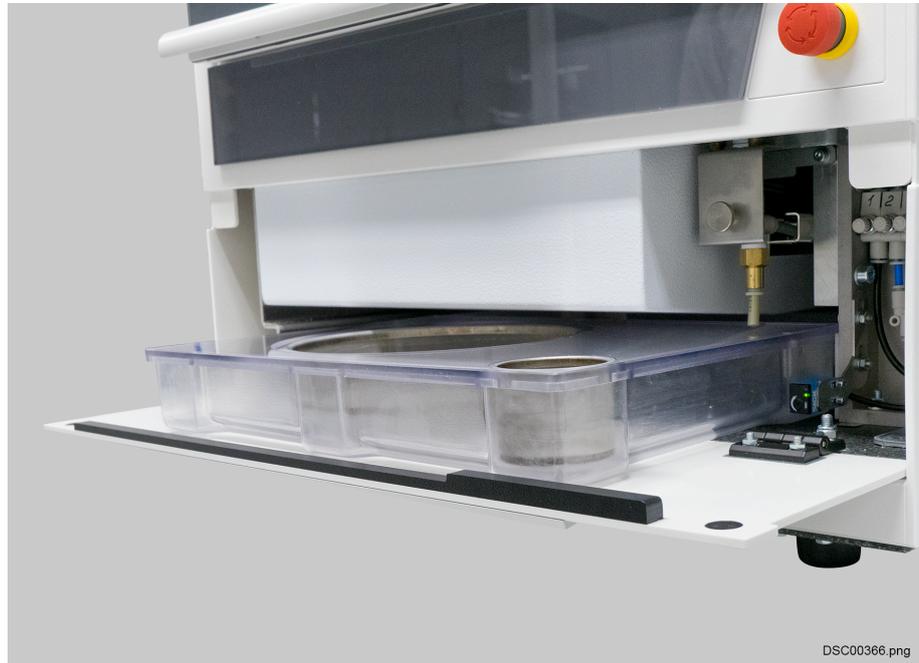
The cooling liquid system is only installed with milling units of type Planmeca PlanMill 50 S and is optimally tailored to the milling unit in the factory. Only use approved cooling liquid from Planmeca, because this is optimally tailored to the requirements of the milling unit and guarantees a seamless processing sequence.



1. Extraction device (manually extending and retracting)
2. Throttle valve (spindle sealing air)
3. Throttle valve (air purge device)
4. Throttle valve (tool changer)
5. Coolant tank
6. Capacitive filling level sensor

6.6.1 Coolant tank

The capacity of the Planmeca PlanMill 50 S milling unit's coolant tank is 1.8 litres. The tank consists of sump, lid, filter, and screen insert. The filter and screen insert filter milling dust from the used cooling liquid. Clean the filter and screen insert regularly.



1. Sump
2. Tank
3. Filter
4. Screen insert

6.7 Axis arrangement

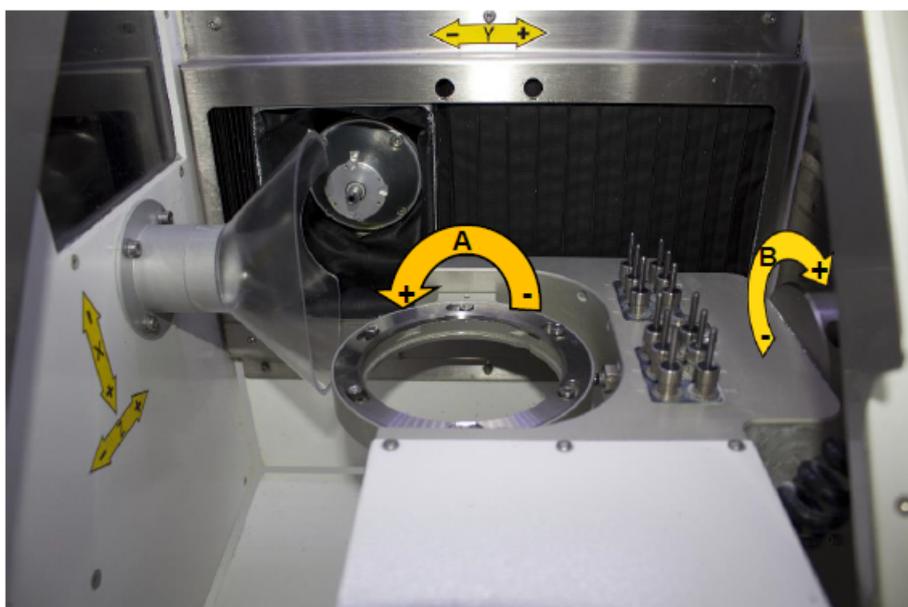
6.7.1 Coordinates system

Yellow stickers on the axes of the milling unit label the axes and the positive and negative axis alignment with linear axes, or the positive and negative direction of rotation with rotating axes. X, Y, Z: generally the axis address letter for linear axes. A, B, C: generally the axis address letter for swivelling or pivoting axes.

6.7.2 Assignment of movement axes

With systems of type Planmeca PlanMill 50 S:

- X axis = lifting axis (+X down; -X up)
- Y axis = lateral axis (+Y right; -Y left)
- Z axis = longitudinal axis (+Z back; -Z forwards)
- A axis = pivoting axis (+A pivot left; -A pivot right)
- B axis = swivelling axis (+B swivel forwards; -B swivel backwards)

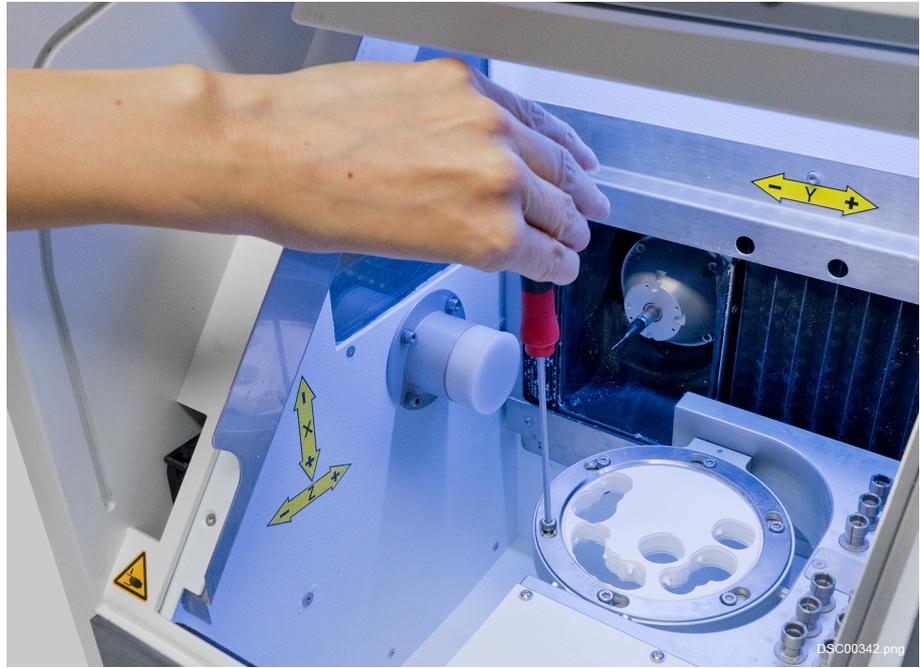


7 Adapters

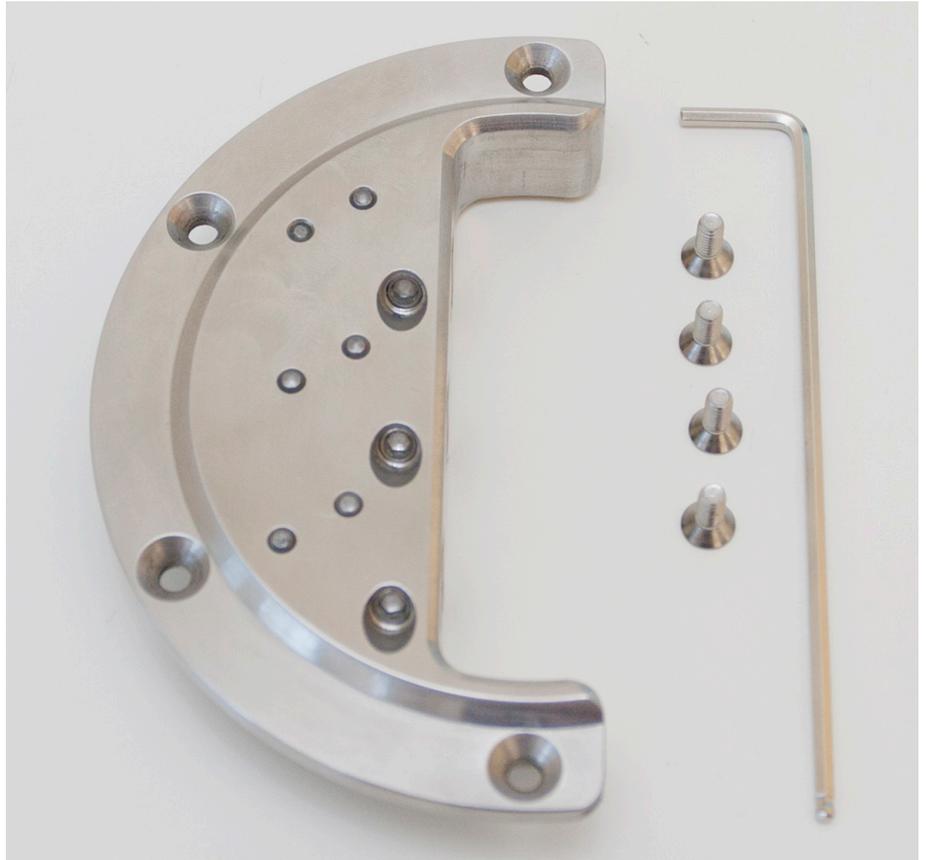
7.1 Glass ceramic adapter

7.1.1 Attaching glass ceramic adapter

1. Detach the current adapter by removing the six attachment screws.



For attaching the glass ceramic adapter you'll need an Allen key and four screws.



2. Place the adapter on the left side of the adapter.
3. Insert the screws in the screw holes and tighten using an Allen key.



4. Tighten the three middle screws using an Allen key.



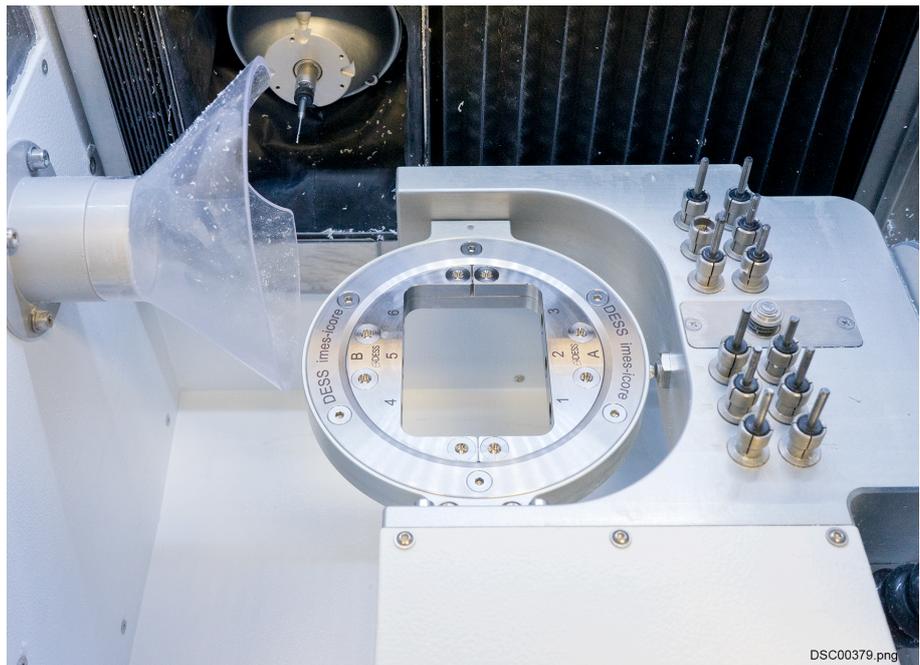
7.2 Adapters for premilled abutments

Before milling adapter calibration pieces, ensure that the milling unit is calibrated properly. See section "Calibrating milling system" on page 88 for more information.

Pins for calibrating adapters can be ordered from your local premilled blank supplier.

The calibrating file for milling test pins is available from your local dealer and after installing can be found from folder *C:\INC_Daten\Planmeca Plan Mill 50 S\Adapter Calibration*.

7.2.1 DESS adapter



7.2.1.1 General cleanliness and handling

The adapter has to be calibrated in Planmeca PlanMill 50 S milling units before the first use to ensure an optimal positioning of the DESS system. Therefore the following aspects must be considered:

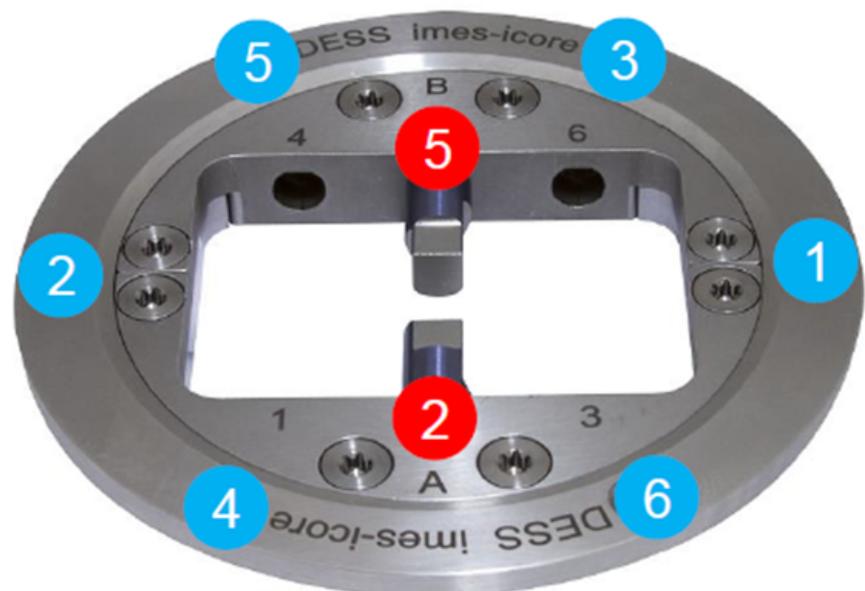
- Cleanliness of the blank adapter (milling unit) and of the DESS adapter
 - General Cleanliness
 - No damages in the bearing surface
- The milling unit and its zero-point must be set correctly
- Always clamp the adapter in the same position
- Screw connections
 - The 6 screws should always be tightened in the same order for a reproducible positioning
 - Only screw the 6 countersunk screws loosely at first
 - Afterwards tighten the screws crosswise (always in the same order)

7.2.1.2 Preparing adapter for test milling

NOTE

Please follow directions on general cleanliness and handling.

- The two test pins, available from your local premilled blank supplier, are thoroughly inserted into the middle positions (2 + 5), pushed in to the limit, and firmly clamped with the clamping screw by using a torque wrench.
- The DESS adapter is then fixed into the clean milling unit reception. The screws should always be screwed in loosely at first and tightened afterwards in the same order, 1 - 6.
- The test pins are milled directly on the milling unit with the scripted test program available from your local dealer. A 2mm metal tool (T2) is required for the milling process.



7.2.1.3 Measurement

- The two test pins are unscrewed from the adapter
- The test pins have to be clean and free of burrs for measuring

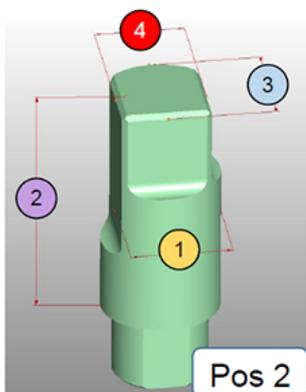


Measurements

- width (X-axis) (1)
- length (Y-axis) (2)
- height (Z-axis) (3)
- width control measurement / only Pos 2 (4)
- customer:
- milling unit type:
- serial number:

Take the following measurements with a precision of 10 μm and send the results to your local dealer to be inserted into the offset calculation program.

- Position 2:
- Position 5:

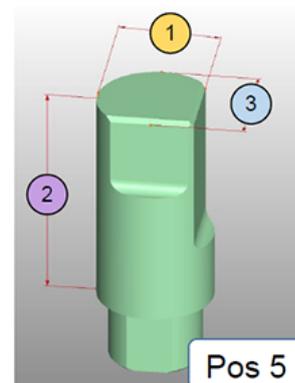


Pos 2:

1	<input type="text"/>
2	<input type="text"/>
3	<input type="text"/>
4	<input type="text"/>

Pos 5:

1	<input type="text"/>
2	<input type="text"/>
3	<input type="text"/>

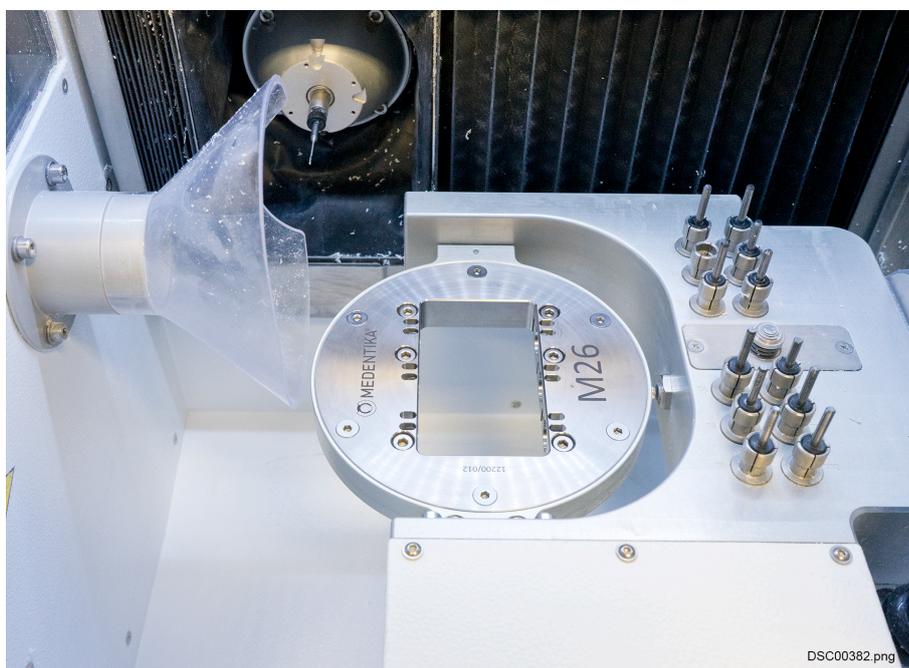


7.2.1.4 Calculation and data transfer

The offset values for the Planmeca PlanCAM software are determined after the measurement results are entered into the calculation program.

Please contact the local dealer of your Planmeca PlanCAM software to implement the offset data.

7.2.2 Medentika adapter



7.2.2.1 General cleanliness and handling

The adapter has to be calibrated in Planmeca PlanMill 50 S milling units before the first use to ensure an optimal positioning of the Medentika system. Therefore the following aspects must be considered:

- Cleanliness of the blank adapter (milling unit) and of the Medentika adapter
 - General Cleanliness

- No damages in the bearing surface
- The milling unit and its zero-point must be set correctly
- Always clamp the adapter in the same position
- Screw connections
 - The 6 screws should always be tightened in the same order for a reproducible positioning
 - Only screw the 6 countersunk screws loosely at first
 - Afterwards tighten the screws crosswise (always in the same order)

7.2.2.2 Preparing adapter for test milling

NOTE

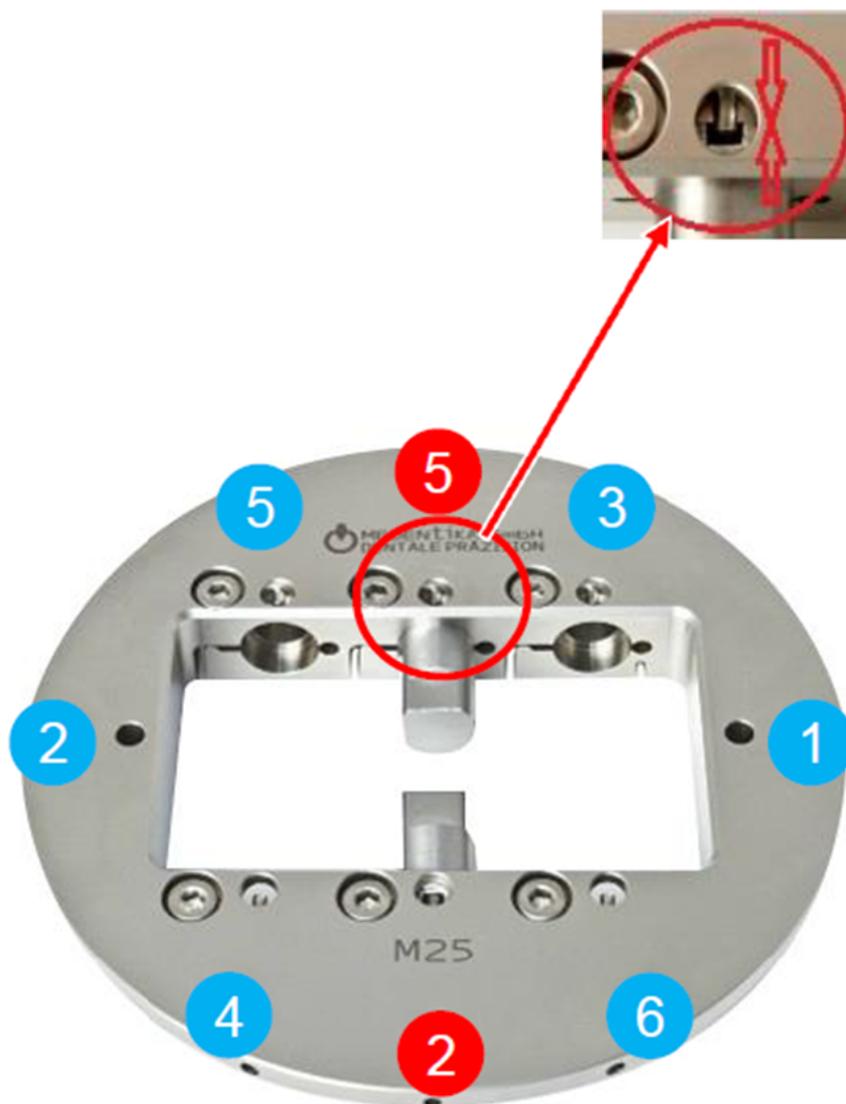
Carefully follow the directions on general cleanliness and handling.

The two test pins, available from your local premilled blank supplier, are thoroughly inserted into the middle positions (2 + 5), pushed in to the limit, and firmly clamped with the clamping screw by using a torque wrench.

Check that both test pins are attached directly without a gap to the supporting surface.



Fix the adapter into the clean milling unit reception.



NOTE

The screws should always be screwed in loosely at first and tightened afterwards in the same order.

The test pins are milled directly on the milling unit with the scripted test program available from your local dealer. A 2 mm metal tool (T2) is required for the milling process.

7.2.2.3 Measurement

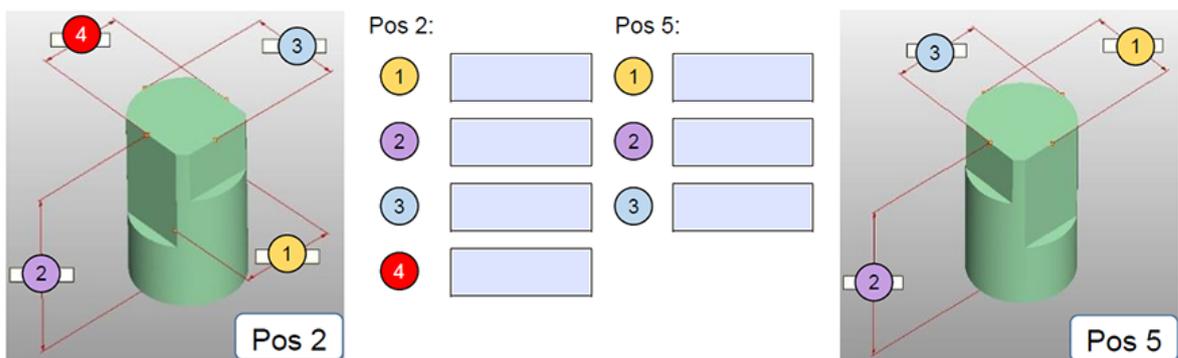
The two test pins are unscrewed from the adapter.

The test pins have to be clean and free of burrs for measuring.



- width (X-axis) (1)
- length (Y-axis) (2)
- height (Z-axis) (3)
- width control measurement / only Pos 2 (4)
- serial number:
- milling unit type:
- customer:

Take the following measurements with a precision of 10 μm and send the results to your local dealer to be inserted into the offset calculation program.

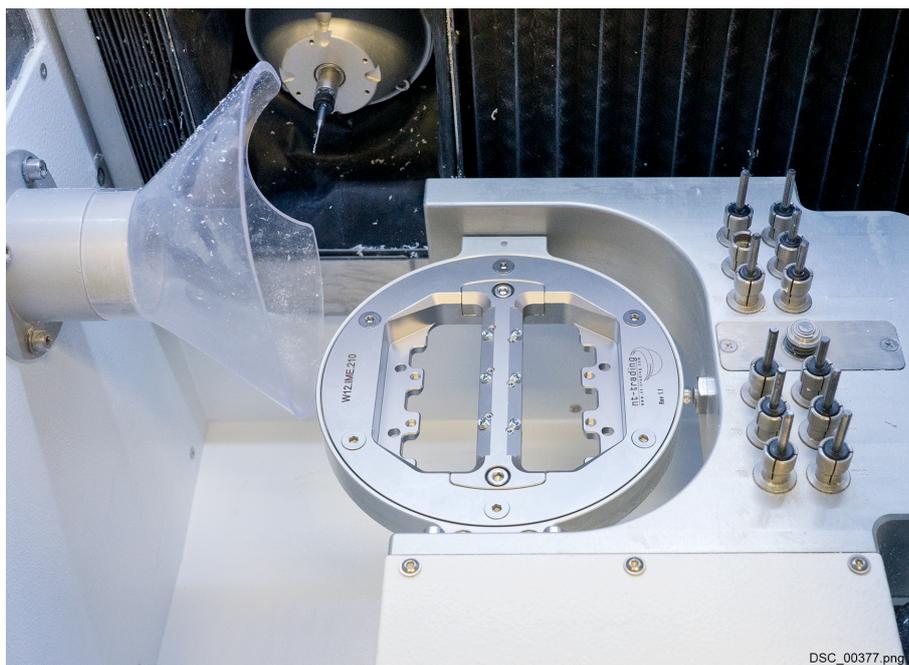


7.2.2.4 Calculation and data transfer

The offset values for the Planmeca PlanCAM software are determined after the measurement results are entered into the calculation program.

Please contact the local dealer of your Planmeca PlanCAM software to implement the offset data.

7.2.3 Nt-trading adapters



7.2.3.1 General cleanliness and handling

To ensure an optimal positioning of the nt-trading system, the adapter has to be calibrated in Planmeca PlanMill 50 S milling units before the first use. Therefore the following aspects must be considered:

- Cleanliness of the blank adapter (milling unit) and of the nt-trading adapter
 - General Cleanliness
 - No damages in the bearing surface
- The milling unit and its zero-point must be set correctly
- Always clamp the adapter in the same position
- Screw connections
 - The 6 screws should always be tightened in the same order for a reproducible positioning
 - Only screw the 6 countersunk screws loosely at first
 - Afterwards tighten the screws crosswise (always in the same order)

7.2.3.2 Preparing adapter for test milling

NOTE

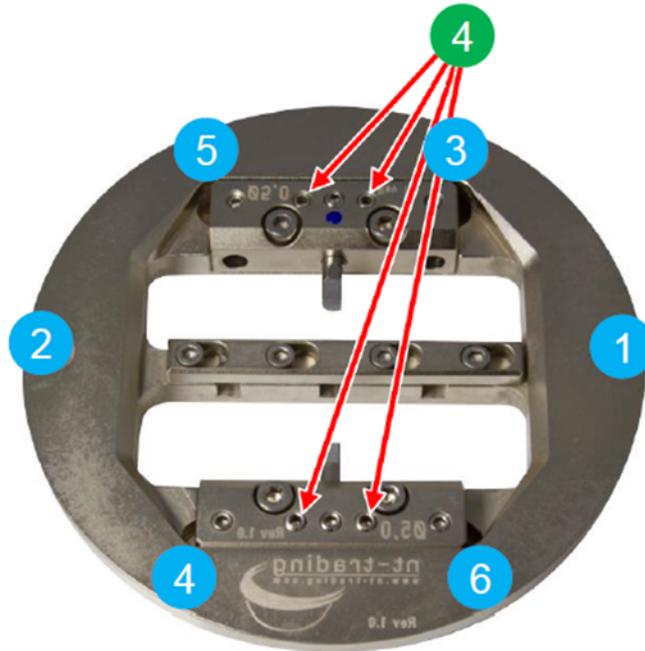
Carefully follow directions on general cleanliness and handling.

- The test pins, available from your local premilled blank supplier, are inserted into the middle positioning holes in the bars until the stop and are tightly fixed by screws **(2)** and **(5)**.
- Both bars are then inserted into the nt-trading adapter and screwed tightly. The screws marked with **(4)** have to be turned back and are not allowed to have any contact to the adapter.

- The nt-trading adapter is then fixed into the clean milling unit reception.

NOTE

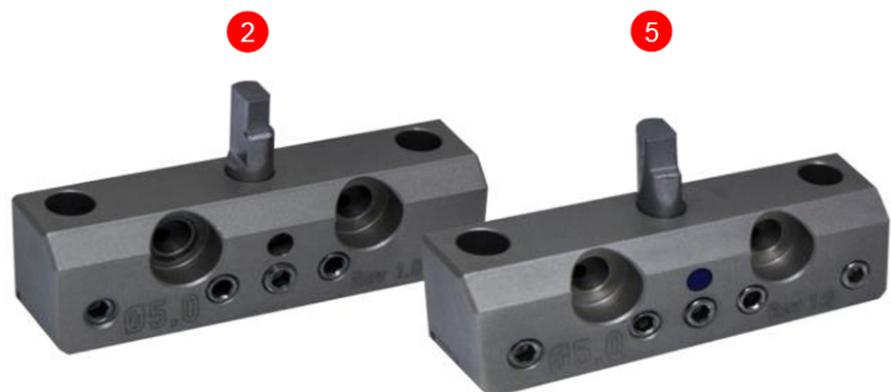
Always attach the screws loosely at first and then tighten in the same order (1) - (6).



- The test pins are milled directly on the milling unit with the scripted test program available from your local dealer. A 2 mm metal tool (T2) is required for the milling process.

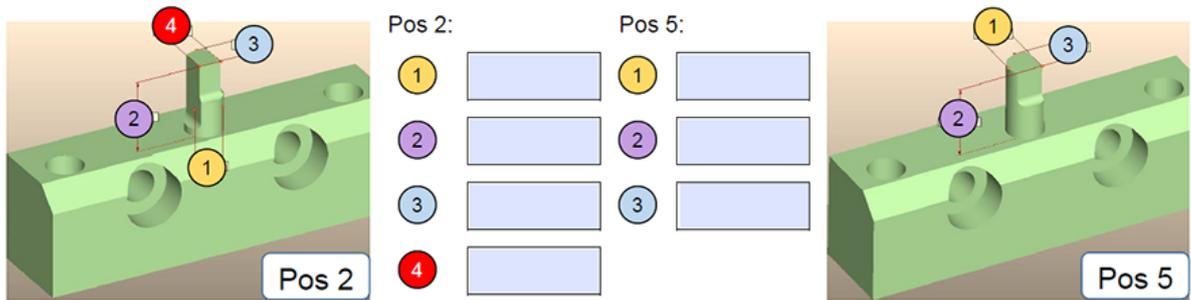
7.2.3.3 Measurement

- The two test pins are unscrewed from the adapter
- The test pins have to be clean and free of burrs for measuring



- width (X-axis) (1)
- length (Y-axis) (2)
- height (Z-axis) (3)
- width control measurement / only Pos 2 (4)

Take the following measurements with a precision of 10 µm and send the results to your local dealer to be inserted into the offset calculation program.



7.2.3.4 Calculation and data transfer

- The offset values for the Planmeca PlanCAM software are determined after the measurement results are entered into the calculation program.
- Please contact the local dealer of your Planmeca PlanCAM software to implement the offset data.

8 Operating milling unit

8.1 Safety instructions for operation



WARNING

**Risk of injury due to improper operation!
Serious injury and considerable damage could result from improper operation.**

- Follow all of the operating steps set out in these safety instructions
- Pay attention to the following points before commencing work:
 - Make sure that all covers and safety devices are installed and working properly
 - Never disable or bridge safety devices during operation

8.2 Procedure prior to operation

Follow the steps below before using the unit:

1. Make sure that all of the unit's covers are installed.
2. Make sure that all connections are seated properly.
3. Make sure that the emergency stop switch is released.
4. Check the room temperature.

NOTE

The individual parts of the unit have different coefficients of expansion. Inaccurate operation can only be prevented at a room temperature of 18 - 30 °C.

Consequently only operate the unit at an ambient temperature of 18 - 30 °C.

8.3 Switching unit on

Authorised personnel: User

Follow the steps below to switch on the unit:

1. Turn the main switch located in the connection panel of the unit to ON.
2. Start the control software from the desktop.
3. Close the lid.
4. Press the POWER button.
5. Start the referencing of the unit when prompted by the control software.

8.4 Switching unit off

1. End the control software by selecting End from the File menu.
2. Shut down the control PC in the customary manner (Windows® start button > shut down)
3. Now switch off the main switch on the milling unit's connection panel
4. If necessary, also switch off additional accessories (e.g. extraction system)
5. If necessary, perform cleaning or maintenance work.

8.5 Procedure during operation

Referencing unit

NOTE

At every start the unit must be referenced using the control software. The unit cannot be operated unless referencing has been performed.

Follow the steps below to reference the unit:

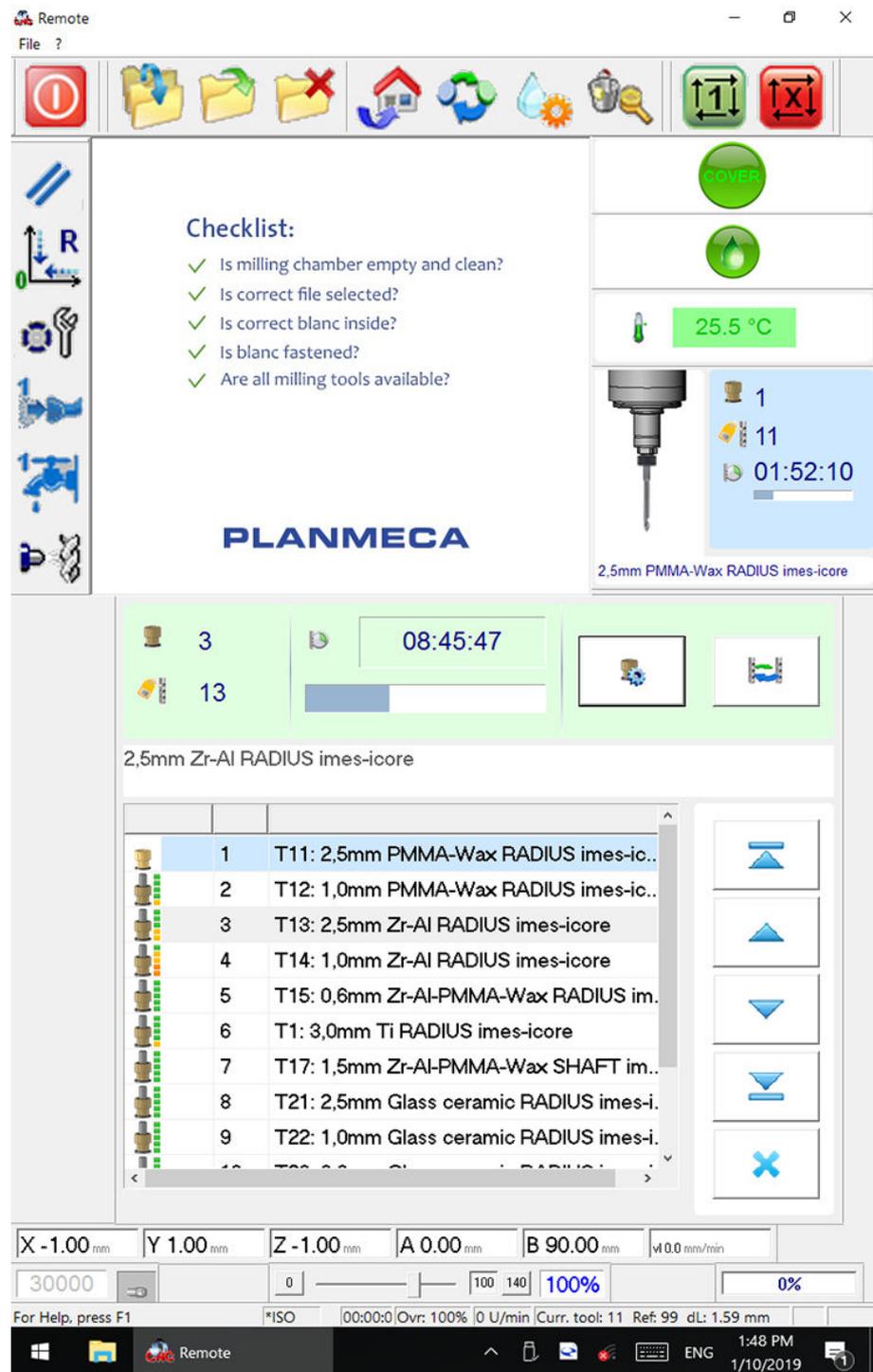
1. Turn the main switch located in the connection panel of the unit to ON.
2. Start the control software from the desktop.
3. Close the lid.
4. Press the POWER button.
5. Start the referencing of the unit when prompted by the control software.

8.6 Using unit controls

The Planmeca PlanMill 50 S is equipped with a touch screen control panel which is used for navigation and entering data.

The control buttons are located on the right side of the unit.

8.6.1 Touch screen control panel



8.6.2 Control buttons

All three buttons / switches are located on the operating panel adjacent to the lid on the right hand side.

Power button

Pressing the power button switches on the milling unit's power electronics. It is only possible to switch on the power electronics if all safety-relevant milling unit equipment is correctly set, e.g. emergency stop switch disengaged.

The power button must be pressed before starting the control software or after a prompt from the control software.

Lid button

To open the lid, press the lid button. The lid opens only when the button is constantly illuminated. The button illumination signals that all drives of the milling unit are at a standstill.

Hold down the lid button when opening the lid.

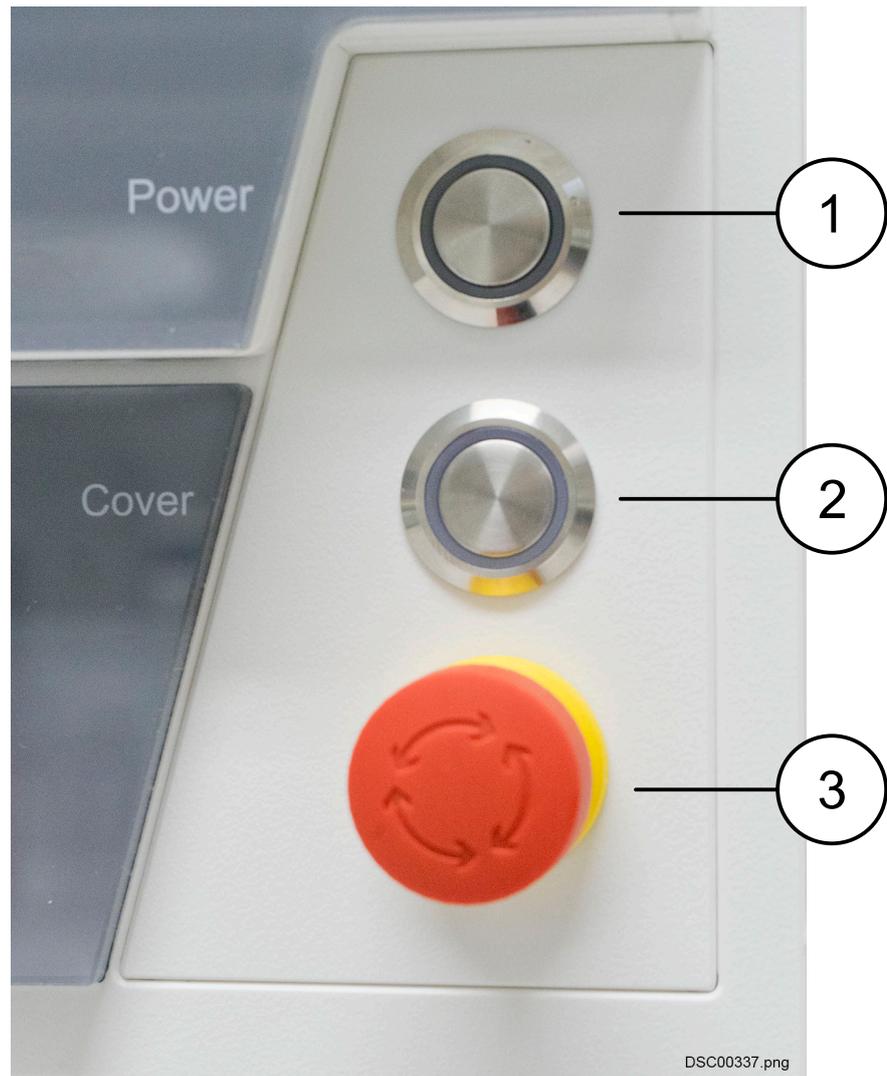
EMERGENCY STOP switch

The EMERGENCY STOP switch implements the fastest possible milling unit stop. Pressing the switch stops all drives immediately and the power electronics are disconnected from the power supply. After it is pressed, the EMERGENCY STOP switch remains latched.

NOTE

IMPORTANT INFORMATION!

After pressing the EMERGENCY STOP switch, before disengaging the EMERGENCY STOP switch, make sure that all faults have been remedied. Turn the EMERGENCY STOP switch to the right to disengage it.



1. POWER button
2. Lid button
3. EMERGENCY STOP switch

8.7 Processing modes

NOTE

It is essential to thoroughly clean the interiors of the milling unit when changing from dry to wet or from wet to dry processing to prevent the build-up of material residue in order to ensure the proper functioning of the system.

8.7.1 Dry processing

NOTE

Extraction systems from Planmeca are only suitable for dry dust! The extraction systems supplied by Planmeca are intended to vacuum dry milling dust only. Do not vacuum cooling liquid residue with the extraction systems supplied. This can lead to serious damage and even destruction of the extraction system.

During dry processing, the material is processed without a coolant system. As such, fine dust and gases can be produced, which may have harmful effects on health. Furthermore, the dust that is not extracted may damage the milling unit and result in an increased risk of fire. The connection and operation of an extraction system approved by Planmeca is therefore required for the dry processing of materials.

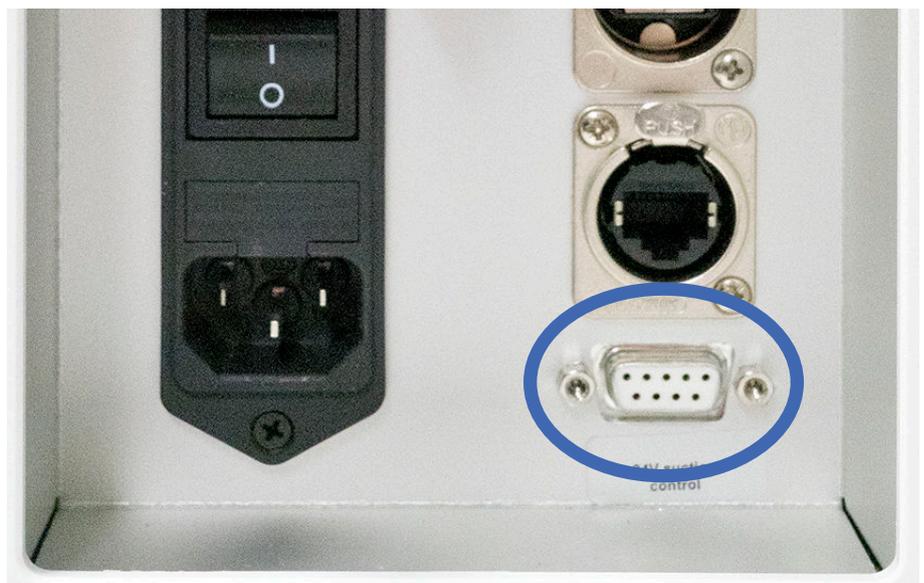
The following materials are usually dry-processed:

- Aluminium oxide
- Zirconium dioxide
- Plastics
- Wax
- Prefabricated CoCr abutments

1. Remove the protective cap and fit the suction funnel on the suction port in the milling unit, as shown in figure below (the recess on the funnel points in the direction of the milling spindle).



2. Connect the extraction system via the control cable supplied (included with the extraction system) with the control connection on the milling unit.



3. Plug the hose of the extraction system into the suction port.



4. Check that the extraction system is correctly connected.
5. Start the milling process with the extraction system switched on.

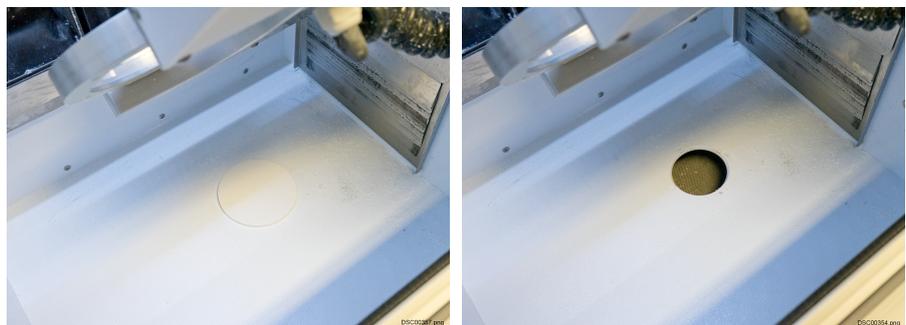
8.7.2 Wet processing

The following materials are generally wet-processed:

- Lithium disilicate
- Glass-ceramic
- Prefabricated titanium abutments

In order to start wet-processing a workpiece, proceed as follows:

1. Thoroughly clean the milling unit interior, the filter fleece chips and dry milling dust (wear protective gloves and safety goggles throughout!).
2. Remove the suction funnel and fit the protective cap on the suction port.
3. Remove the cover from the drainage hole.

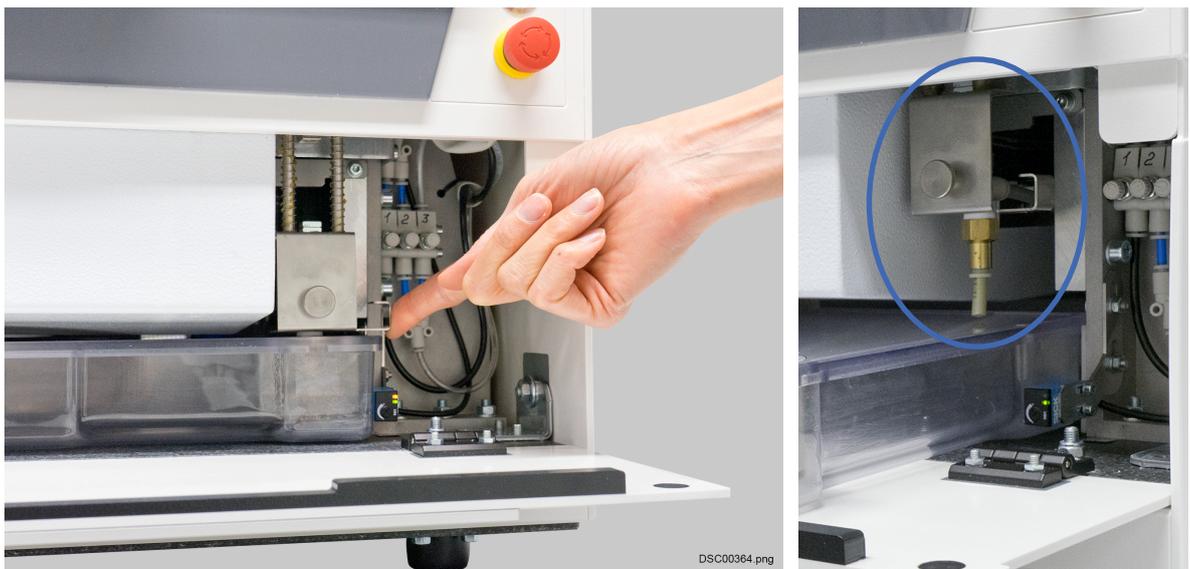


4. Open the access door to the coolant tank by pulling the door corners.



50S_Press_door_corners.cps

5. Slide the suction device fully upwards.



6. Remove the coolant tank.
7. Thoroughly clean all filters and the sump of contaminants.
8. Fill the sump with 1.8 L of diluted cooling liquid mixture (observe the mixture ratio according to the coolant system description).
9. Reinsert the cooling liquid tank.
10. Slide the suction device fully downwards again, see step 5.
11. Close the access door to the coolant tank, see step 4.
12. Start the milling with the coolant system switched on and without an extraction system.

8.8 Modes of operation

The unit can be operated in three modes.

8.8.1 Automatic mode

- With a closed cover, the system is in automatic mode
- The drives and milling spindle can only be actuated in this operating mode
- A program start can take place in this milling unit state

8.8.2 Set-up mode



WARNING

Increased risk of injury in set-up mode!

In the milling unit's set-up mode there is an increased risk of injury due to sharp milling tools, protruding tools, sharp or pointed chips! Always wear protective gloves and safety goggles when operating in setup mode!

- With an open lid, the milling unit is in set-up mode
- This operating mode is used to:
 - equip the milling unit with work-pieces (see section "Inserting workpiece" on page 52 and milling tools (see section "Milling tools" on page 21)
 - clean the milling unit (see section "Service, maintenance and cleaning" on page 76)
- If all drives are at a standstill, the lid can be opened by pressing the lid button
- The drives and milling spindle cannot be actuated in this operating mode
- No program start can take place in this milling unit state

8.8.3 Expanded set-up mode

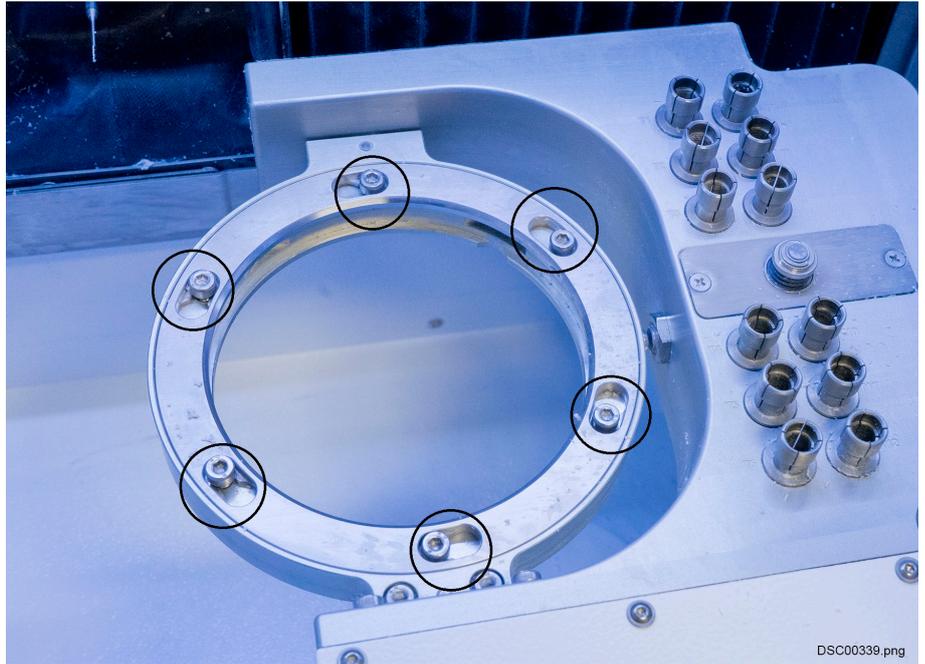
Expanded set-up is only accessible to authorised and trained specialist personnel (service personnel) of Planmeca. Access to this mode is protected by password.

8.9 Inserting workpiece



1. Drive the milling unit to the blank change position by touching this button.
2. Stop all drives and the spindle.
3. Open the milling chamber lid by pressing the lid button.

- Loosen the clamping screws of the clamping ring (do not remove).



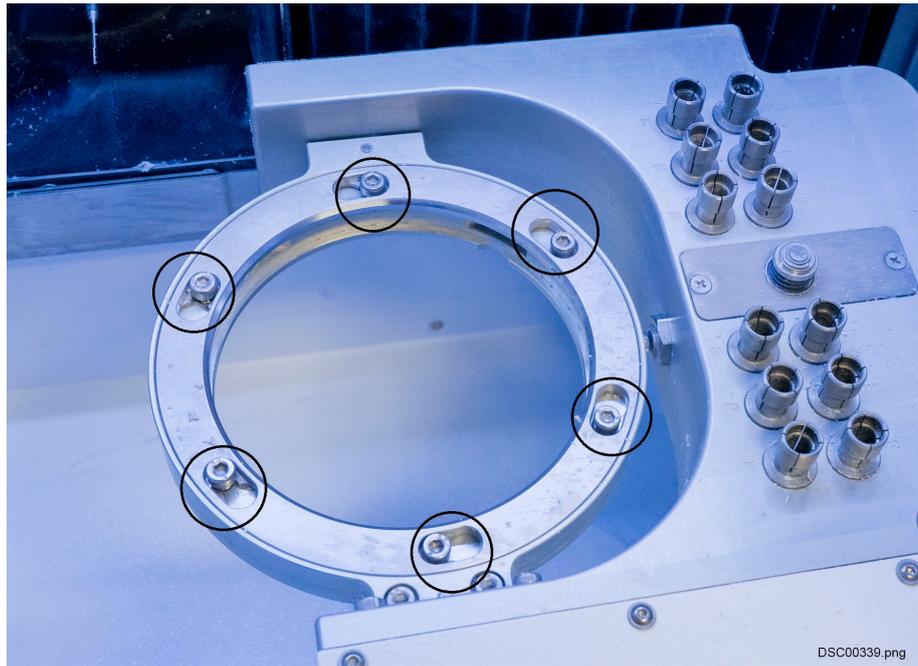
- Remove the clamping ring by turning this in a clockwise direction to the right
- Remove the workpiece in it, if present
- Insert the workpiece in the workpiece adapter.
- Make sure the workpiece is correctly aligned.
- Insert the clamping ring and turn it counter-clockwise, until it stops turning.
- Tighten the clamping screws of the clamping ring until hand-tight.
- Check the secure seating of the workpiece.

8.10 Removing workpiece



- Drive the unit to the blank change position by touching this button.
- Stop all drives and the milling spindle.
- Open the lid by pressing the lid button.

- Loosen the clamping screws of the clamping ring (do not remove).



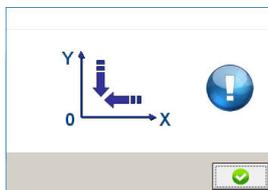
- Remove the clamping ring by turning this in a clockwise direction to the right
- Remove the workpiece.
- Insert the clamping ring and turn this anticlockwise to the left, until reaching the stop
- Tighten the clamping screws of the clamping ring until hand-tight.

8.11 Registering tools in control software

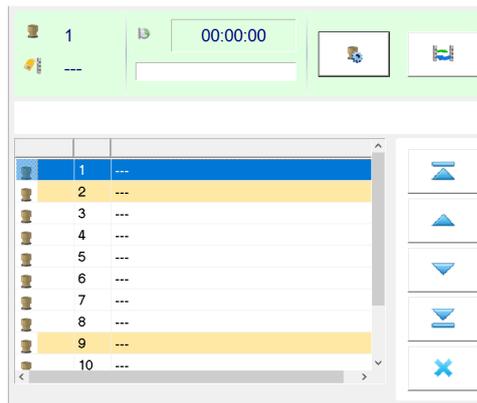
- Start **Remote DENTAL** by double-clicking the **PlanMill 50 S** icon on the desktop.



- Click the green **Confirm** button to start the automatic reference run.



3. Select the desired tool position, for example number 1.



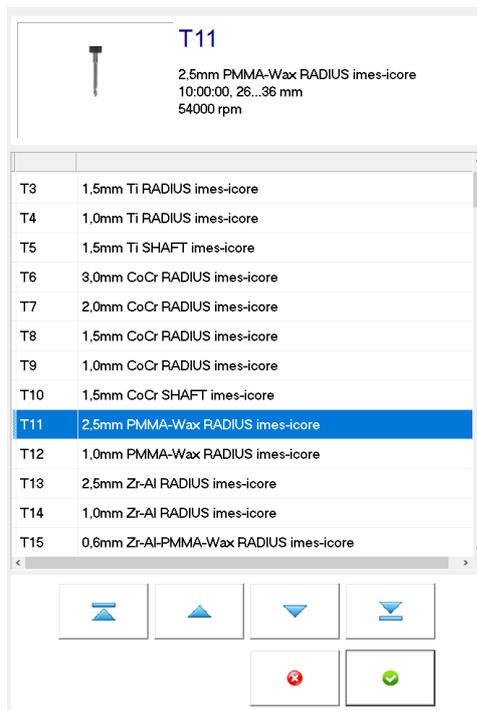
4. Press the **Edit tool field** button.



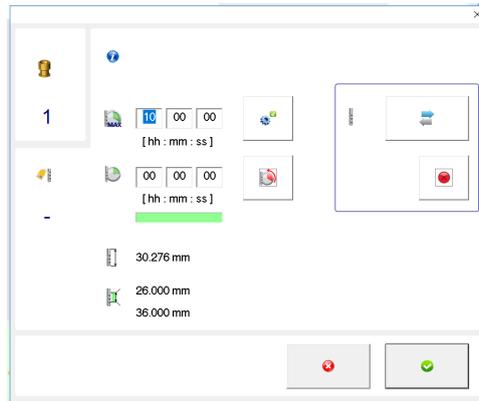
5. In the appearing window, click the tool registration button.



6. Click the tool you will install inside the magazine and confirm your choice by clicking the green **Confirm** button.



7. Confirm your choice in the **Edit tool field** window by clicking the green **Confirm** button.



8. The updated tool information should be visible in the **Status indicator** field and at tool position line.



For more information on editing tool information, see section "Tool fields" on page 67.

8.12 Loading tool magazine

NOTE

The list of approved tools can be found in section "Milling tools" on page 21.

Only use milling tools from Planmeca. The milling tools from Planmeca are ready-ringed in the correct projecting length and are available from the local dealer.

The tool magazine for this milling unit can be equipped with max. 12 tools. Each available tool position can be assigned an arbitrary tool type.

In order to equip the tool magazine with tools, proceed as follows:

1. Stop all drives and the spindle.
2. Open the lid by pressing the lid button.
3. Put on protective gloves.

4. Insert the tool into the corresponding tool position in the tool magazine with the cutting edge to the front.



5. Make sure you do not strike or damage the tools during insertion
6. Make sure the tool is correctly and securely seated in the tool changer.
7. Check the control software, to ensure the tool assignment in the tool changer matches with the assignment in the software, for more information see section "Registering tool in software" on page 73.

NOTE

IMPORTANT INFORMATION!

Note regarding the assignment of the tool fields!

The software does not check whether the milling cutters in the tool fields are also physically inserted in the device. If an incorrect milling cutter type or no milling cutter type is stored then this can result in serious damage to the milling cutters, the material or the milling unit!

8.13 Changing tools

The running time of the milling tools in use is logged in the control software. The recommended preset of the maximum running time of the milling tools can vary depending on the used material and can be adjusted in the control software. If worn, replace milling tools.

Always replace the broken tools.

In order to perform a tool change, the user must be familiar with the fundamental operation of the milling unit and the control software.

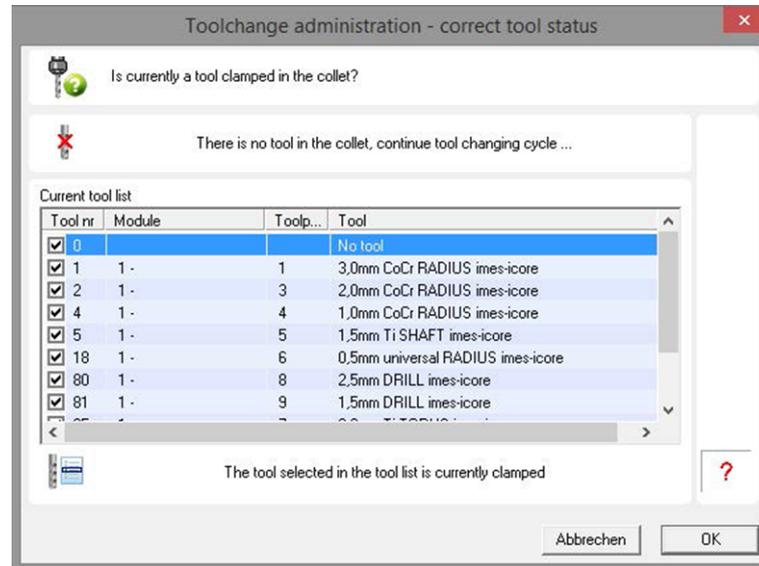
Only qualified personnel are permitted to perform the tool change!

The tool change always takes place in the tool magazine! If the tool to be changed is in the collet chuck then drive the spindle into the service position, see section "Touch screen commands" on page 64. With this process, the tool is stored in its original position. It is subsequently possible to perform the change as described in section "Loading tool magazine" on page 56.

The tools must be stored with the correct tool number in the corresponding tool field (see section "Service, maintenance and cleaning" on page 76) to ensure the correct assignment of the tools.

If, during the tool change, it is unclear which tool is presently in the collet chuck, the following definition window will be displayed on the screen of the control PC.

In this window the user must mark the corresponding tool position from which the tool in the collet chuck originates and confirm the entry. If no tool is located in the collet chuck then the user must enter a "0". If the entry was correct then the red symbol appears in green. After the entry, the milling unit performs the tool change.

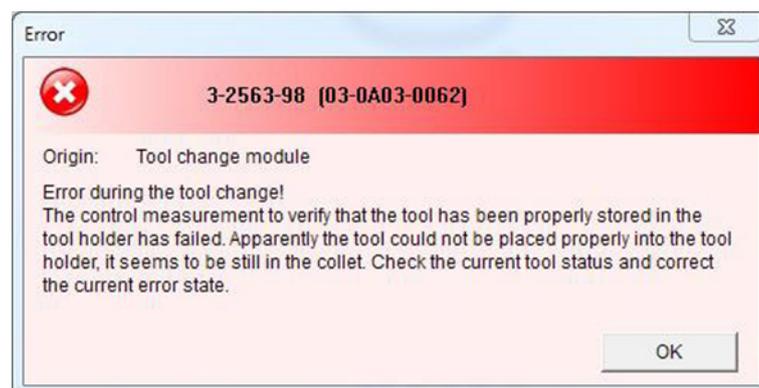


8.14 Replacing broken milling cutters

After each tool pick-up and before each tool set-down, the length of the tool in the collet chuck is measured. The length of the measured tool must lie within the predefined range.

If a deviation should arise when the tool length is measured, the following error message appears on the screen of the control PC.

The error that occurs results in the tool being marked as defective in its position in the tool magazine. In place of the tool symbol, a red warning triangle now appears, which labels the tool as defective. Until the tool is replaced and the new tool is measured successfully, the defective tool is blocked by the control software and cannot be used.



NOTE

After replacing a defective tool:

If the attempt to use a defective tool results in a milling process being interrupted, the process must be restarted after the defective tool is replaced!

8.15 Before milling

Every time before starting to mill:

- Check the milling unit for visible defects and ensure integrity
- Make sure that all covers and safety equipment are installed and functioning perfectly
- Make sure that all plug-in connections are securely seated
- Check the ambient temperature; this should correspond with the information provided in the technical data
- Make sure the EMERGENCY STOP switch is not latched
- Make sure that all necessary accessories (e.g. extraction system) are correctly connected and ready for operation
- Make sure that milling units with a coolant system have sufficient cooling liquid in the coolant tank and that the filters/screens are clean
- Check that the tools required are in the milling unit's tool changer and that the assignment corresponds with the assignment in the control software
- Check the milling unit interior for any loose parts and tools lying around
- Check the alignment and correct fastening of the workpiece
- Ensure that successful referencing of the milling unit has taken place

8.16 Process description

The templates for components to be milled are transferred as an STL file to the Planmeca PlanCAM software. The components are positioned in a blank in the Planmeca PlanCAM. Subsequently, settings such as process speed, insertion depth of the milling cutter, milling sequence and scaling are automatically specified for further processing. The Planmeca PlanCAM generates the milling paths and calculates a milling file. The completed milling file is saved to the control PC of the milling unit in the folder `C:\NC_Daten\Planmeca Plan Mill 50 S`. The control software processes this information and controls the milling unit.

8.17 Milling file identifiers

After processing the work-piece to be produced in the Planmeca PlanCAM software, a file is created with the ending `.iso`.

This file contains all relevant data that is required for executing the milling process. The created file name contains the date and time of creation. Once the file has loaded, the milling can be started by selecting **Open milling program** and pressing the **Start** button in the control software.

8.18 Milling

Before starting a milling program make yourself familiar with the basic operation of the unit (see section "Operating milling unit" on page 44) and the software (see section "Control software" on page 63).

Make sure to comply with the safety precautions (see section "For your safety" on page 9).

Follow these steps to start milling:

1. Make sure that a successful referencing of the unit has been performed.

2. Set the workpiece in the adapter and check for correct seating of the workpiece (see section "Inserting workpiece" on page 52).
3. Make sure that all necessary tools are present in the tool magazine and in the correct position (see section "Loading tool magazine" on page 56).
4. Close the milling chamber lid.
5. Select the desired milling program from the menu by selecting *Open milling program* (see section "Touch screen commands" on page 64).
6. Start the milling process.

8.18.1 Dry milling

NOTE

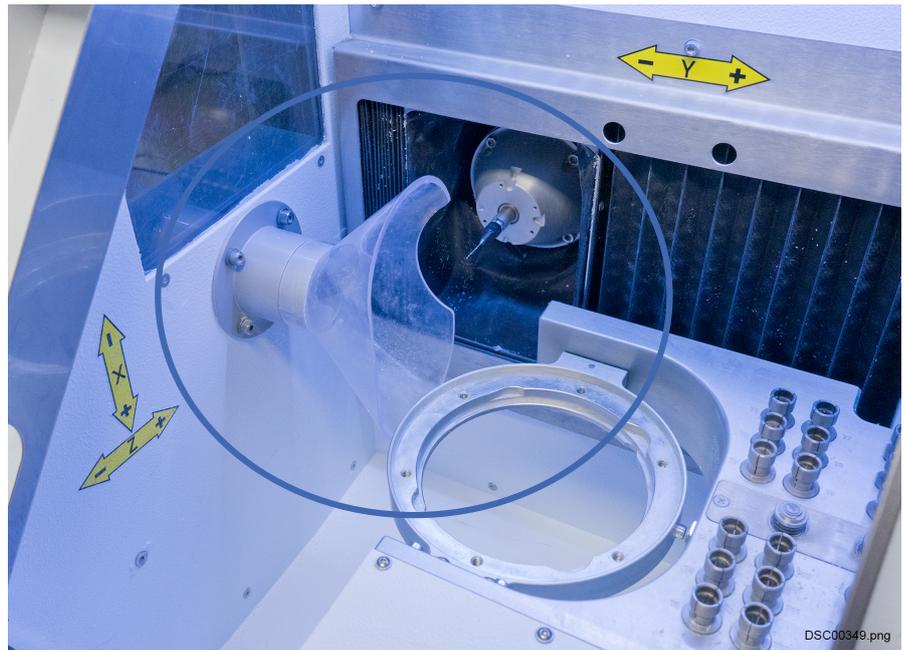
Always use the suction system for dry milling.

1. Open the milling chamber lid.
2. Remove the protective cap from the extraction nozzle.



DSC00352.png

3. Fit the extractor funnel onto the extraction nozzle.



4. Connect the extraction unit to the milling unit using the cable provided.
5. Check the proper connection of the extraction unit.
6. Start the milling process.

8.18.2 Wet milling

Follow the steps below before starting wet milling.

1. Open the milling chamber lid.
2. Remove the extraction funnel.



3. Close the extraction nozzle by placing the protective cap onto it.
4. Start the milling process (for instructions see both "Wet processing" on page 50 and "Milling" on page 59).

8.18.3 Switching between wet and dry milling



WARNING

The unit must be thoroughly cleaned before changing from wet to dry milling and vice versa. Avoid any mixing of dry dust with the coolant. This dust/coolant mixture can lead to severe contamination of the unit.

Use disposable towels to remove any residual coolant from the unit.

Do not use compressed air to remove milling dust from the unit. This may cause fine dust to get into the mechanics of the unit and lead to the unit being damaged or destroyed

Cleanliness and regular cleaning will increase the service life of the unit.



WARNING

The extraction unit provided by Planmeca is intended solely for the extraction of DRY milling dust. Do not extract any coolant with the extractor provided by Planmeca. This may lead to damage or even destruction of the extraction unit.

8.19 Switching off the unit

1. Close the software on the control PC.
2. Shut down the PC as usual.
3. Turn the main switch located on the connector panel of the unit to OFF position.

8.20 After operation



WARNING

Risk of injury by swarf! Swarf in the unit may have sharp edges and cause deep lacerations.

NOTE

Protective clothing, safety shoes and gloves are required.

1. Switch the unit off as instructed in section "Switching off the unit" on page 62.
2. Clean the unit (for detailed instructions, see section "Service, maintenance and cleaning" on page 76).

9 Control software

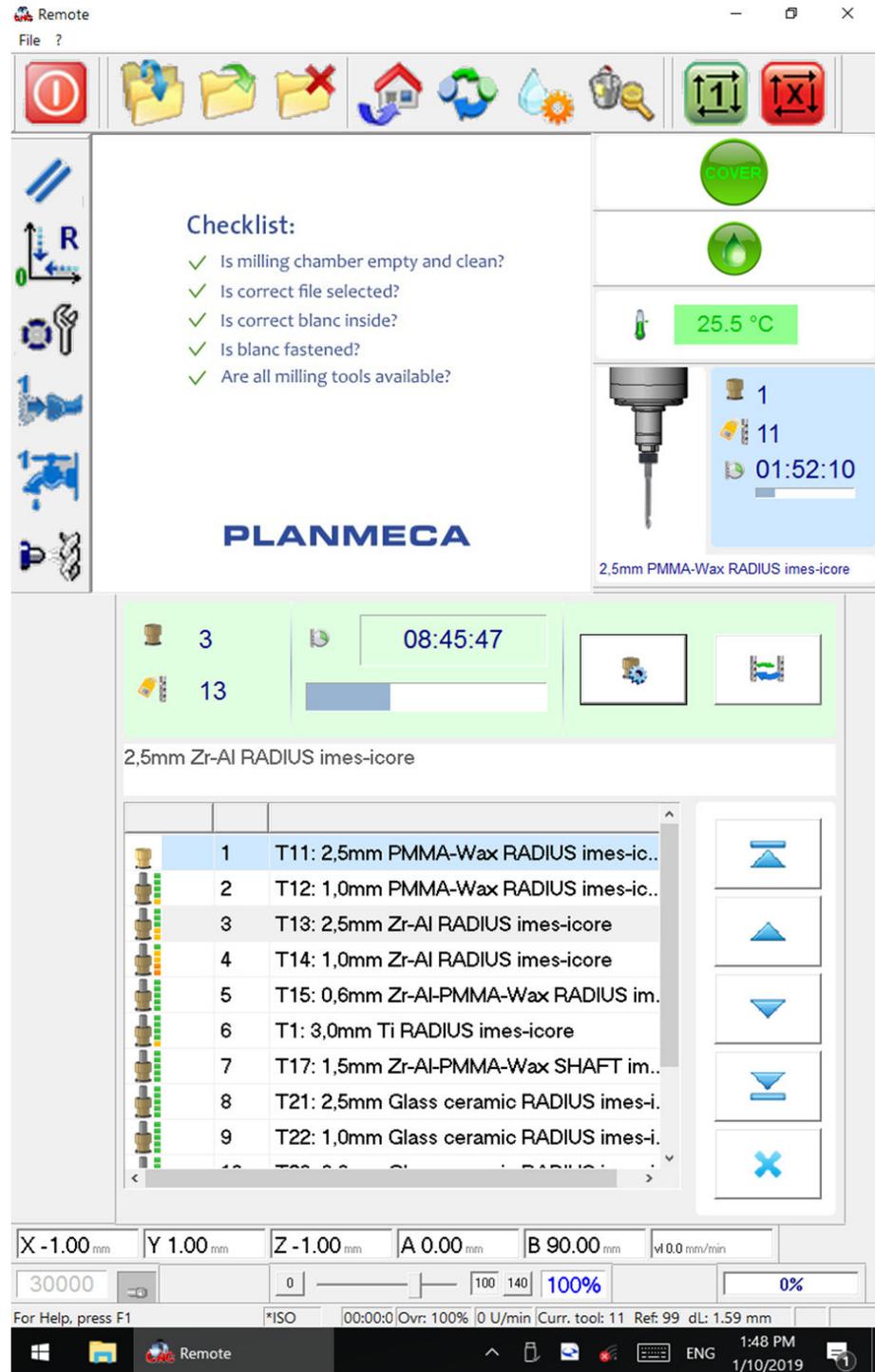
9.1 Starting software



To start the control software, double-click this icon on the desktop.

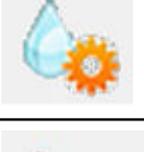
9.2 User interface

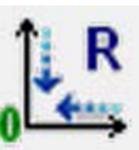
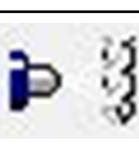
The following illustration shows the control software user interface. The window appears on the screen after starting the control PC software.



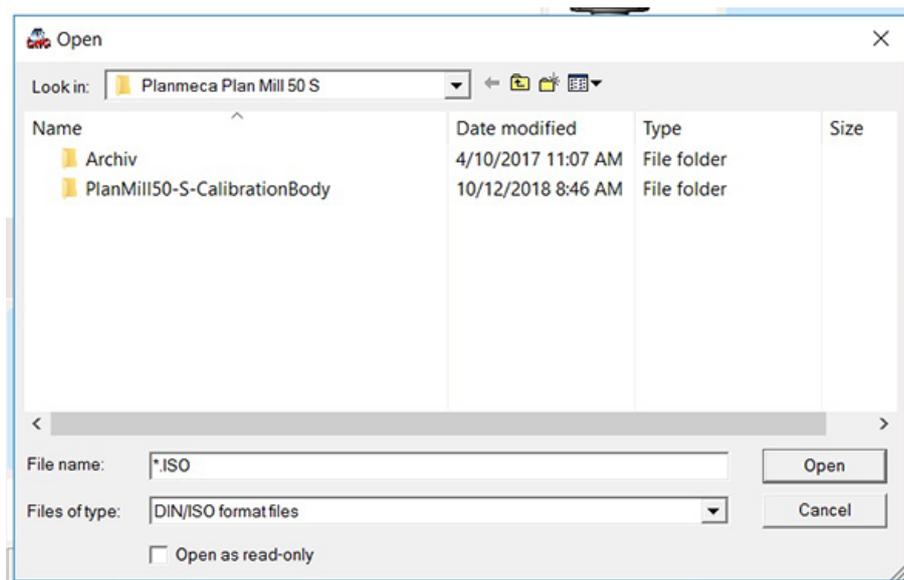
9.3 Touch screen commands

In the upper area of the overview screen is a function bar with integrated function buttons. The functions of the individual buttons are explained in the following section.

Symbol	Designation	Description
	End program	The control software is exited and closed. The control is also reset. In order to access the control software again, it must be restarted (see section "Starting software" on page 63).
	Transfer milling files	The milling files from CAM software are transferred over the local network into the folder C:\NC_Daten\Planmeca Plan Mill 50 S (see section "Process description" on page 59).
	Open milling program	Opens a new window, see the figure below this table. In this window it is possible to open stored milling files. The folder Planmeca PlanMill 50 S is opened by default. This folder contains the sub-folders archive and calibration body, as well as the milling files stored in this folder by the function transfer milling files (see section "Process description" on page 59). The archive folder contains milling files moved into this folder with the Archive milling files function. The calibration body folder contains milling programs for the creation of a calibration body ("Process description" on page 59).
	Archive milling files	This button moves all files out of the Planmeca PlanMill 50 S folder into the archive folder.
	Return to home position	Use this button to move the milling unit to home position.
	Blank change position	The workpiece adapter is turned in the horizontal position and is now in the blank change position.
	Start wet milling	
	Drive to cleaning position	The milling unit drives to a cleaning position. This eases the cleaning of areas inside the milling unit that are difficult to access.
	Program start	Starts a loaded milling program. If no milling program is loaded then pressing this button takes the user into the Open milling program menu, from which it is possible to select a milling program.

Symbol	Designation	Description
	Program stop	Using this button, currently executed milling programs are stopped and the milling unit drives directly back into the "home position".
	Reset control	With an error the control can be reset with this. It is subsequently necessary to perform a reference run again.
	Reference run	With this it is possible to start the system referencing manually.
	Drive to service position	<p>The milling cutter in the spindle is placed in its assigned tool position.</p> <p>The milling unit subsequently drives into the service position. The collet chuck opens and a window displays (see the Service position window below).</p> <p>This function is primarily suitable for free access to the collet chuck for cleaning. Once the service work is complete, close the lid on the milling unit again. After selecting a tool position and confirming it, the milling unit automatically picks up the corresponding tool in the collet chuck and measured it.</p>
	Extraction system on / off	<p>If an extraction system is properly connected with the milling unit via a control cable, it can be switched on and off manually using this button.</p> <p>In automatic mode the extraction system is switched on and off automatically with dry processing.</p>
	Cooling liquid on / off	The cooling liquid flow is switched on or off. During automatic operation, the cooling liquid flow is switched on and off automatically after the program start.
	Purging on / off	Manual switch on and off of the air nozzle. During automatic operation, switching on and off takes place automatically.

The following figure shows the **Open milling program** window.



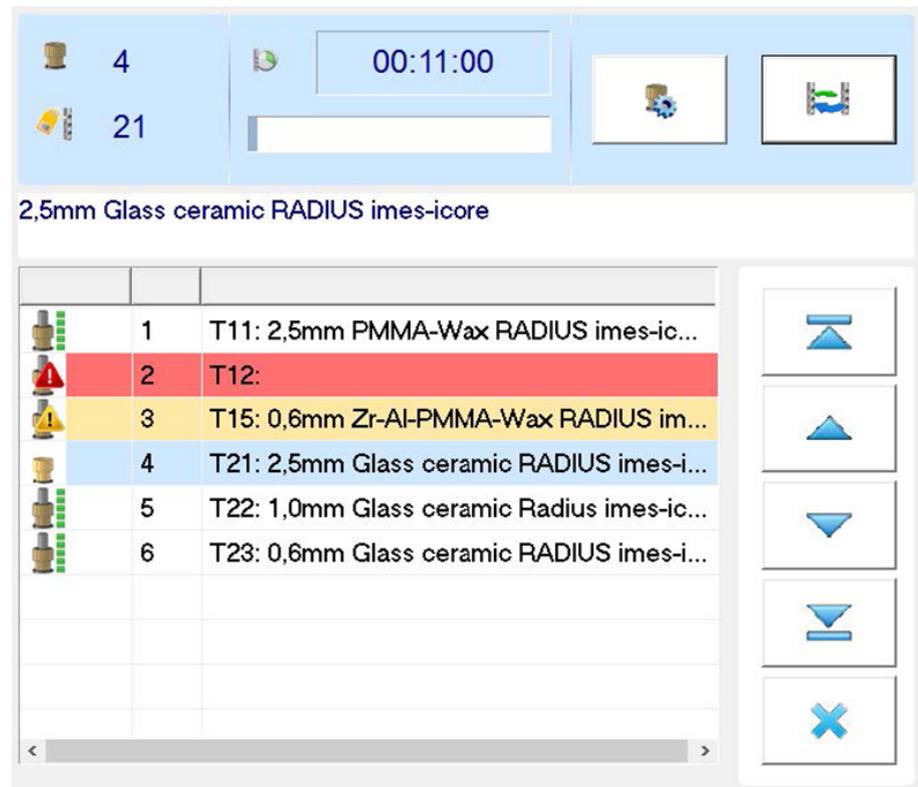
The following figure shows the **Service position** window.



9.4 Tool fields

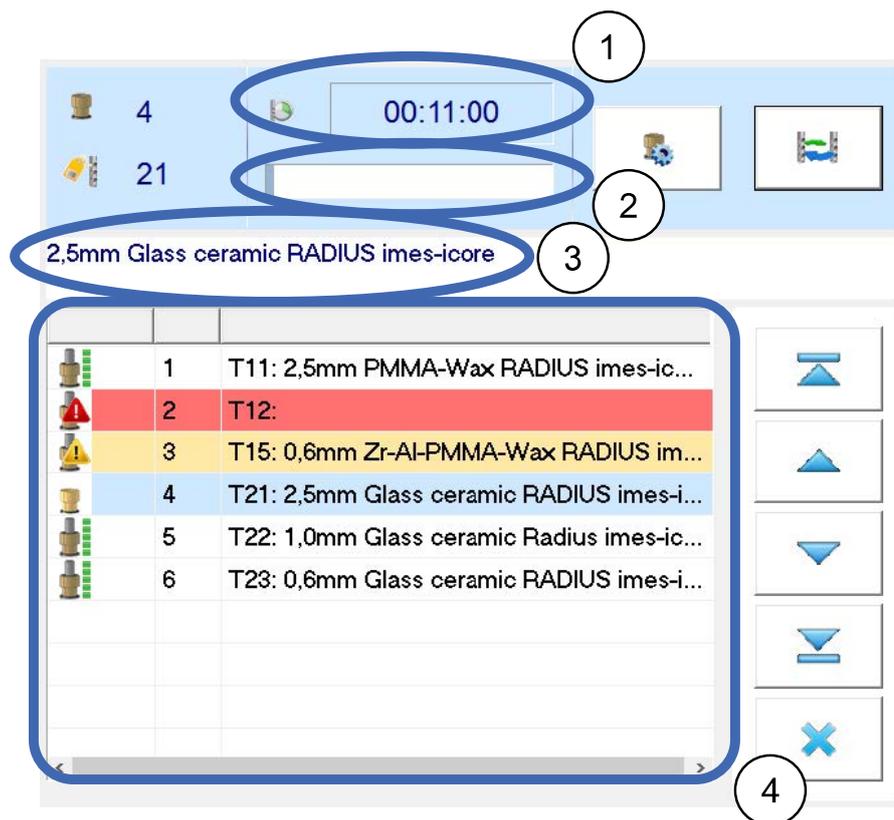
To enable correct access to the tools, all tools located at the tool positions must be represented on the software interface. Only this way is it guaranteed that the milling unit uses the right tool.

The representation of the tools in the software takes place by means of the tool fields which exhibit the following functions and representations:



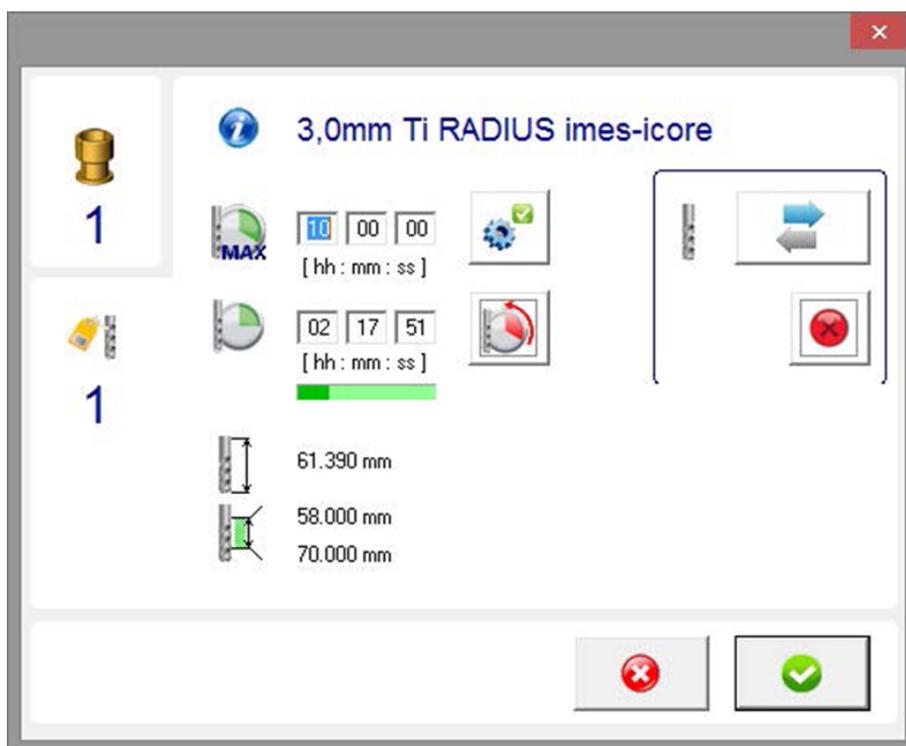
Symbol	Designation	Description
	Tool position	The tool position number is shown in this field.
	Tool type	The tool type is shown in this field.
	Edit tool field	For editing the respective tool field. If the milling tool is in use, this symbol is deactivated. This button opens a new window where information, such as tool length, service time, etc. is displayed (see section "Edit tool field" on page 71 for more information).
	Change tool	Performs a tool change. The tool in the collet chuck is replaced by the selected tool.
	Navigation arrow (ten steps up)	For navigating upwards through the tool list, ten steps at a time.
	Navigation arrow (one step up)	For navigating upwards through the tool list in single steps.
	Navigation arrow (one step down)	For navigating down through the tool list in single steps.

Symbol	Designation	Description
	Navigation arrow (ten steps down)	For navigating down through the tool list, ten steps at a time.
	Remove	For removing the marked tool.
	Service time symbol	The five green squares next to the symbol show the service time of the tool and change from green to yellow and then red after a predefined time.
	Attention symbol	Signals that the tool must be measured.
	Warning symbol	Signals that the tool is broken or lies outside the defined tool length, after measuring.
	Tool life elapsed	Signals that the tool life has elapsed and it must be replaced.



<p>1. Tool service life</p> <p>Indicates how long the tool has been in use for. The time is reset to 0 with a new tool. The time runs during use of the tool. If the tool is stored in its position, the time stops and only starts to run on with the next use.</p>	<p>2. Service time bar display</p> <p>The bar visually displays the tool wear. If approx. 90% of the maximum service time has been reached then the bar colour changes from green to red and the tool should be replaced.</p>
<p>3. Information field</p> <p>Shows the type of the selected tool.</p>	<p>4. Tool list</p> <p>Shows which tool is presently located in which tool position. The symbols provide information on the condition of the respective tool.</p>

9.5 Edit tool field



Symbol	Designation	Description
	Tool information	Indicates the current tool type.
	Tool position	Shows the current assigned tool position.
	Tool type	Shows the current tool type number.
	Maximum tool life (tool service life)	It is possible to change the maximum service life of a tool here. Planmeca specifies a suitable tool service life. This service life is based on many years of experience and should not be changed. However, the service life can be specifically adjusted here under your own responsibility.
	Tool life (tool service life)	The service life displayed is the actual service life of the tool. The service life can be manually adjusted with an entry. However, overrunning this time can lead to an increase in quality problems when milling (e.g. chipping on zirconium dioxide). After making an entry in the Tool type field, the service life is reset automatically.

Symbol	Designation	Description
	Tool length	Shows the current tool length.
	Minimum and maximum tool length	Shows the defined minimum and maximum length of the tool. If the tool lies outside these values, it is marked with a warning symbol and blocked.
	Standard value for maximum tool service life	This button sets the predefined standard value for the maximum tool service life (tool life) for this tool type.
	Reset tool service life	Pressing this button resets the service life to "0". This function must be used for example if an existing worn tool is replaced with a new tool. Resetting the service life signals to the software that a new tool is now in the respective tool field.
	Register tool in the software	This button opens a new window. Here, you can change the tool type for the selected tool position and register this in the software.
	Delete tool	This button is used to delete the assigned tool.
	Cancel process	This button can be used to cancel the current process. Any changes made are not saved.
	Confirm process	This button can be used to confirm the current process. Any changes made are saved.
	Warning symbol	Signals that the tool is broken or lies outside the defined tool length, after measuring.
	Attention symbol	Signals that the tool must be measured.
	Tool length error	Indicates a tool length error. In this case, the tool length is below or above the predefined minimum value.

Symbol	Designation	Description
	Tool broken	Indicates a tool length error. In this case check whether the tool is broken.

9.6 Registering tool in software

1. Click the tool registration button.
- 2.

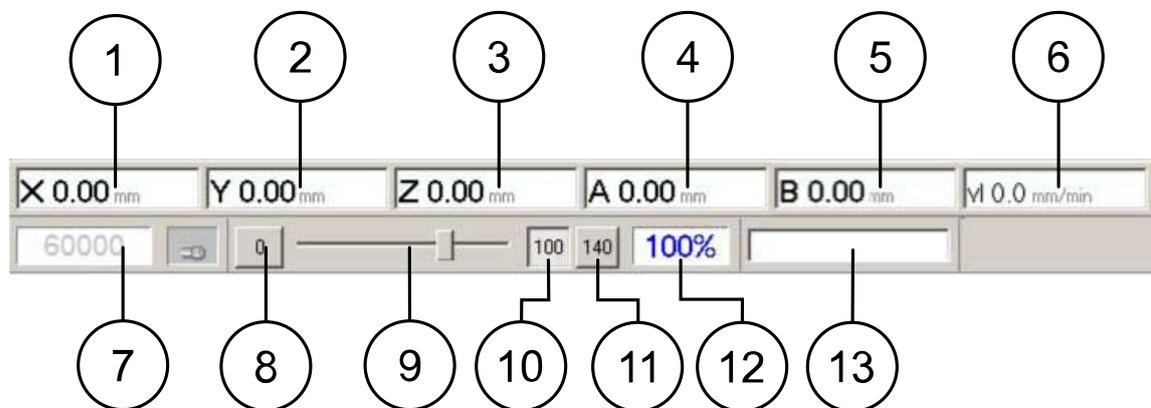
In the following window, click on the tool you would like to register.



Symbol	Designation	Description
	T1 3,0mm Ti RADIUS 06:00:00, 58...70 mm 50000 rpm	When a tool is selected on the list its properties are shown in this field.
	Navigation arrow (ten steps up)	For navigating upwards through the tool list, ten steps at a time.
	Navigation arrow (one step up)	For navigating upwards through the tool list in single steps.
	Navigation arrow (one step down)	For navigating down through the tool list in single steps.

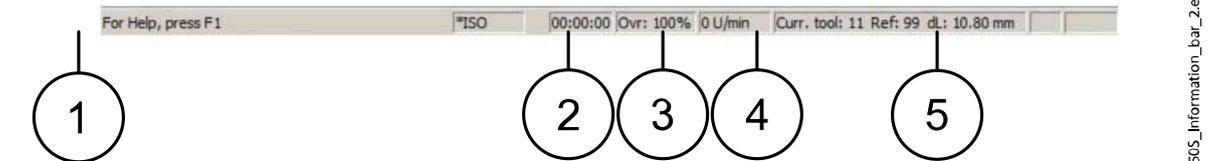
Symbol	Designation	Description
	Navigation arrow (ten steps down)	For navigating down through the tool list, ten steps at a time.
	Cancel	Cancel current modifications without saving.
	Confirm	Confirm changes.

9.7 Information bars



50S_Information_bareps

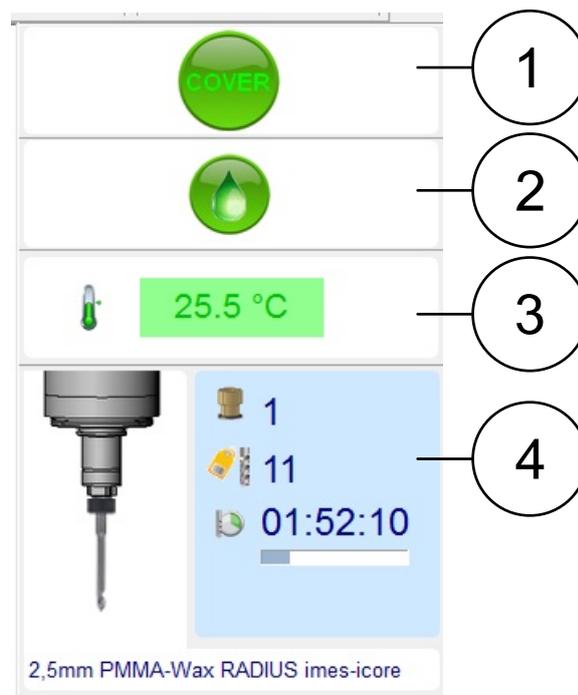
Item	Designation	Description
1	Current position of X axis	Displays the current position of the X axis.
2	Current position of Y axis	Displays the current position of the Y axis.
3	Current position of Z axis	Displays the current position of the Z axis.
4	Current position of A axis	Displays the current position of the A axis.
5	Current position of B axis	Displays the current position of the B axis.
6	Current movement speed	Shows the current movement speed.
7	Current spindle speed	Displays the current rotational speed of the spindle.
8	Override button "0"	The override value is set to 0%. This results in an axis standstill.
9	Override slide control	Using the slide control it is possible to manually change the override value. It is also possible to change the override during program processing.
10	Override button "100"	The override value is set to 100%.
11	Override button "140"	The override value is set to 140%.
12	Override indicator	Shows the current override value setting. When the control software is started, the override value is set to 100% as standard.
13	Progress indicator	Shows the progress of the milling program started as a percentage.



Item	Designation	Description
1	Information field	Shows current information.
2	Time display	Displays the time of the ongoing milling process that has currently elapsed.
3	Override indicator	Shows the current override value set with ongoing processing.
4	Spindle speed display	Displays the current spindle rotational speed with ongoing processing.
5	Tool information	This field displays information on the currently clamped tool.

505_Information_bar_2.eps

9.8 Status indicators



<p>1. Lid open/closed</p> <p>This icon indicates whether the lid is closed (the icon is green) or open (the icon is red).</p> <p>To activate/deactivate the lid status monitoring, right-click on the on/off selection. When deactivated the icon shows in grey.</p>	<p>2. Cooling liquid</p> <p>If the symbol lights up green then sufficient cooling liquid is in the coolant tank. If the quantity is too low then the symbol lights up red.</p> <p>To activate/deactivate the coolant liquid monitoring, right-click on the on/off selection. When deactivated, the icon shows in grey (as in dry processing).</p>
<p>3. Temperature sensor</p> <p>Displays the actual temperature inside the unit.</p>	<p>4. Displays information about the current used tool in the spindle: tool position, tool type, tool service life and faults that arise.</p>

10 Service, maintenance and cleaning

10.1 Safety instructions for service, maintenance and cleaning

Personnel required: Specialist personnel / manufacturer

Protective equipment required: Protective work clothing, protective gloves, safety footwear, respiratory protection, safety goggles.



WARNING

Risk of injury due to a lack of diligence! Before performing cleaning, maintenance and servicing work, switch off the milling unit's main switch and unplug the mains plugs in order to prevent the milling unit being switched on accidentally (establish safe milling unit state)!

- Only use suitable climbing aids for cleaning, maintenance or servicing!
- Wear protective gloves and safety goggles as a general risk of injury exists due to sharp-edged or pointed chips!

CAUTION

Risk of injury due to sharp-edged or pointed milling tools!



WARNING

Risk of injury and death when reaching into the milling unit interior due to sharp-edged or pointed tools!

Be aware of protruding tools!

Always wear protective gloves when reaching into the milling unit's interior!



WARNING

Risk of injury due to sharp-edged or pointed chips!

Risk of injury when reaching into the milling unit's interior. The chips inside may be sharp-edged or pointed and could cause deep cuts or injuries!

Always wear protective gloves and safety goggles when cleaning the milling unit!



WARNING

Danger of explosion and fire!

The combination of oil mist and air can produce a highly explosive mixture! Therefore refrain from blowing out the milling unit with compressed air or oxygen and avoid naked flames (smoking)! When cleaning the milling unit never use flammable cleaning products. These can cause a milling unit fire during operation, maintenance or servicing!

NOTE

Cleanliness increases the service life of the individual components and prevents malfunctions. Therefore clean the milling unit regularly with a hand brush, paintbrush or vacuum cleaner. Ensure that no dirt penetrates the milling unit mechanism.

NOTE

Cleaning with compressed air is prohibited because fine dust can penetrate the system mechanism damaging or destroying it.

NOTE

Reporting obligation of maintenance personnel!

NOTE

Maintenance personnel have a duty to immediately report and eliminate anomalies or faults that could affect safety! This also includes checking for possible corrosion damage or the appearance of component fatigue! The milling unit must not be operated after such faults arise and must be disconnected from the mains power and compressed air supply until the faults have been remedied by qualified specialist personnel!

NOTE

The operational safety and service life of the milling unit are increased by regular maintenance and care.

On request, replacement and wearing parts are available from the local dealer.

10.1.1 Electrical system

**WARNING**

Mortal danger from electric shock!

All work on the electrical system, such as connecting the mains supply network, maintenance and repair, must be performed by qualified specialist personnel only. Even when the main switch is switched off, parts of the electrical system are still live! Wait a few minutes before commencing with maintenance!

10.1.2 Pneumatic system

**WARNING**

Personal injury due to a lack of diligence!

All work on the pneumatic system, such as commissioning, maintenance and repair, must be performed by qualified specialist personnel only. The pneumatic system must be switched off and the pressure relieved prior to commencing work!

10.2 Replacement parts

**WARNING**

Risk of injury due to the use of incorrect replacement parts!

The use of incorrect or faulty replacement parts brings with it extreme danger for personnel. This can result in damage, malfunctions or a total failure of the milling unit.

- Only use original replacement parts or replacement parts approved by Planmeca!
- Use of replacement parts that have not been approved voids the manufacturer's guarantee!

10.3 General cleanliness

In case of ambiguities contact the local dealer.

Cleanliness increases the service life of individual parts and prevents malfunctions.

Clean the unit regularly with a vacuum cleaner. Make sure no dirt gets into the mechanics of the unit. Planmeca recommends the use of disposable towels for cleaning away cooling liquid residues inside the milling unit.

The extraction unit supplied by Planmeca is only to be used for DRY milling dust. The extraction of coolant residues with the Planmeca extraction unit is not permitted and will damage the extraction unit.

Cleanliness and regular cleaning extend the service life of the milling unit. Clean plastic windows and surfaces with a suitable liquid cleaner.

Never use abrasive cleaning products or cleaning products that attack plastics, rubber or paint. These can damage (pneumatic) hoses, cables and seals. Cleaning products can contain substances that are harmful to health. Always observe the instructions of the respective manufacturer!

The milling unit operator must ensure that the cooling liquid and vacuumed milling dust are stored and disposed of professionally and correctly. Observe the legal regulations in this regard!

Cleaning with compressed air is not permitted as fine dust will permeate into the mechanics and could cause damage.

10.4 Suitable cleaning products

Only use suitable cleaning products to clean the milling unit. Never use any aggressive, caustic or flammable cleaning products. Cleaning products can contain substances that are harmful to health.

Observe the instructions of the respective manufacturer in this regard.

NOTE

Cleaning products that attack plastics, rubber or paint must not be used. These can damage (pneumatic) hoses, cables and seals!

10.5 Plastic panels

The plastic panels consist of polycarbonate and must not be treated with an abrasive plastic cleaner (liquid cleaner).

CAUTION

The plastic panels, which serve as guards inside the milling unit, must be replaced in accordance with the German accident prevention regulations (DGUV) with reference to DIN EN 13218 after no more than two years, in order to ensure the safe operation of the milling unit! If it is no longer possible to observe the production process due to wear then the panels must also be replaced!

10.6 Extraction systems

Extraction systems supplied by Planmeca serve exclusively to vacuum dry milling dust. It is prohibited to vacuum cooling liquid residues with the extraction systems supplied by Planmeca, and this leads to damage and even destruction of the extraction system!

Extraction systems from Planmeca must be cleaned and maintained regularly. Observe the separate operating and maintenance instructions depending on the selected extraction system! Dispose of contaminants that have collected in the filter and collection container professionally and correctly, in accordance with the legal provisions and local regulations!

10.7 Workpiece holder (clamping device)

The workpiece holder must be cleaned of chips and dust before every insertion of a blank, so that optimum clamping is possible. We recommend using a suitable paintbrush for this. The screws and threads are to be kept clean at all times.

10.8 Tool holders and length measuring probe

The tool holders (in the tool changer) and the length measuring probe must also be kept clean of dust and chips, in order to guarantee a faultless tool change. The measuring surface of the probe must be kept clear of contaminants at all times, because this is of elementary importance for the precision of the milling unit. Clean the tool positions (tool holders) and length measuring probe with a suitable paintbrush.

Defective or worn tool holders must be replaced. In this case contact the local dealer.

10.9 Lid guide rails

Clean the guide rails of the lid at least once daily with a suitable paintbrush.

10.10 Lubrication

The guide rails and drive shafts are provided with long-term lubrication and are maintenance free. If necessary they will be re-lubricated during maintenance by qualified Planmeca personnel.

10.11 Milling spindle

In order to guarantee a long service life of the main spindle drive, the following points must be observed when handling:

- Proceed with the necessary caution. Avoid the application of force, e.g. impacts, striking, excessive pressure on the shaft or forceful clamping, because the precision and service life of the spindle will be impaired.
- The spindle nose and tools used must be clean. Dirt and the increased centrifugal forces that arise from this result in a heavy load on the spindle bearing, which significantly increases the spindle wear.
- The hybrid ball bearing of the spindle is equipped with permanent grease lubrication and is therefore maintenance-free. In order to achieve the longest possible service life of the hybrid ball bearing, only well-balanced tools should be used (reduced centrifugal forces).
- In order to guarantee concentricity, the clamping device must not be damaged. To check this, open the collet chuck, remove the tool and check the collet chuck for damage, corrosion or soiling (deposits).

NOTE

Never spray with spray oils, liquids or compressed air directly onto the centrifugal disc of the spindle nose because moisture or dirt can penetrate right to the bearing.

11 Preventive maintenance

11.1 Safety instructions for maintenance

Regular maintenance and care will increase the operational reliability and service life of the unit. Turn the unit off before any cleaning or maintenance work for which a particular position (*Service position* or *Cleaning position*) is necessary. Remove the power supply plug to prevent unintentional reconnection.



WARNING

Mortal danger! Parts of the electrical system remain under power even when the main switch is off. Please wait a few minutes before beginning maintenance work.

To clean the unit use a damp cloth and, if necessary, a suitable cleaning agent. Never use abrasive cleaning agents or detergents that may attack plastics, rubber or paint.

These may damage hoses (pneumatic), cables and seals. Cleaning agents may contain substances that are hazardous to health.

Comply with the manufacturer's instructions.



WARNING

Mortal danger! All work on the electrical system, such as connection to the network, maintenance and repairs should only be performed by qualified personnel.

Parts of the electrical system remain under power even when the main switch is off.

NOTE

All work on the pneumatic system such as commissioning, maintenance and repairs may only be performed by qualified personnel.

Before working on the pneumatic system the system must be shut down and depressurised.

11.2 Replacement parts



WARNING

Risk of injury due to using incorrect replacement parts! Using incorrect or substandard replacement parts can pose a risk for personnel and potentially cause damage, incorrect operation or total failure of the unit.

- Use only the manufacturer's original replacement parts or replacement parts authorised by the manufacturer.
- In case of doubt contact the local dealer.

NOTE

The use of unapproved replacement parts will void the manufacturer's warranty.

Acquire spare parts only from the local dealer.

A list of spare parts is available from the local dealer on request.

11.3 Maintenance instructions

11.3.1 Collet

Use the collet maintenance kit supplied for cleaning and maintaining the collet. The following figure shows the accessories included in that collet maintenance kit.



1. Jaw grease	2. Felt cone	3. Turning piece
4. Cleaning brush	5. Ejector pin	

The collet must be removed and cleaned at least once per week and after every tool breakage. The collet must be checked for damage during the process.

CAUTION

Never close the spindle without a collet inserted. The spindle may be destroyed if rotated without a collet inserted.

CAUTION

There should always be a tool in the collet. If the collet is repeatedly closed without a tool inserted it may lose its accuracy and will have to be replaced.

CAUTION

Long-term contact with jaw grease may cause irritation to the skin and/or dermatitis.

The following measures are recommended:

1. Avoid long and intensive contact with the skin.
2. Ensure that the skin is thoroughly cleaned after work and before breaks.
3. Preventive skin protection using skin protection creams is recommended.

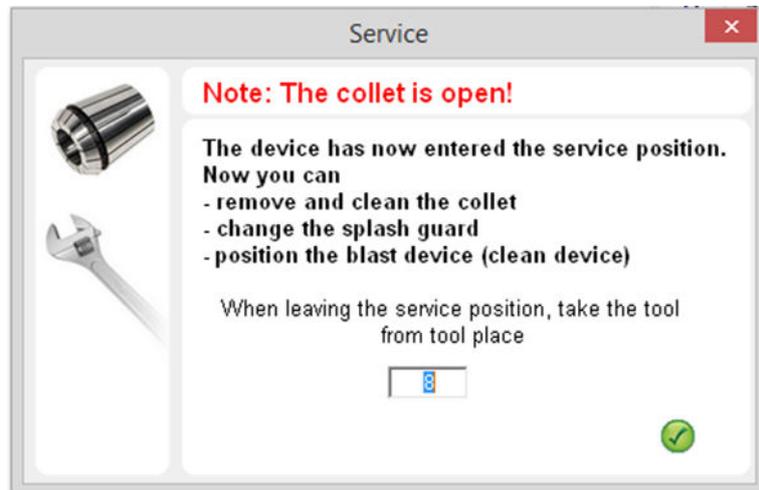
- Safety sheet advice for handling jaw grease is available from the local dealer.

To clean the collet proceed as follows:



- Drive the spindle to the *Service* position by pressing the **Service** button.

The following window opens.



- Ensure that the shaft is not turning.
- Using the turning piece (**3** in the maintenance kit figure), unscrew the collet chuck from the shaft.
- Clean the cone in the shaft with the felt cone (**2** in the maintenance kit figure).
- Clean the collet chuck using the cleaning brush (**4** in the maintenance kit figure).

Ensure that no dirt is present in the collet chuck and that no dirt penetrates here during cleaning.

If a tool should break and residue should be left in the collet chuck, you can remove this using the ejector pin (**5** in the maintenance kit figure).

- Apply a light film of jaw grease (**1** in the maintenance kit figure) to the outer cone of the collet chuck (**5** in the maintenance kit figure).
- Screw the collet chuck back into the spindle by hand. Make sure that the collet chuck is screwed in hand-tight up to the stop.
- If you are unable to screw the collet chuck in by hand to the stop, use the turning piece (**3**)
- Exit the *Service* position.

The spindle is now ready for operation.

11.3.2 Safety interlocking system

Fine milling dust can enter the safety interlocking system of the lid after dry processing and the safety interlocking system should therefore be cleaned thoroughly at least once weekly. The safety interlocking system is a safety-relevant component and must never be manipulated or rendered ineffective!



11.3.3 Fan filter

The fan filter must be removed during the weekly cleaning of the milling unit, and cleaned or replaced. A fan cover with integrated filter is located on the rear side of the milling unit. You can access the fan filter by carefully taking off the black plastic cover by hand. You can order new filters from the local dealer.

11.3.4 Cooling liquids

Cooling liquids must be used in accordance with the manufacturer's instructions. It is essential to strictly observe the data sheets and safety

instructions of the manufacturer in this regard. The required intervals for replacing the liquids must always reflect the manufacturer's instructions. Always dispose of operating substances correctly, in accordance with the legal provisions and local regulations! The cooling liquid is available from Planmeca.

11.3.5 Water separator

A water separator is located on the rear or the right side of the unit. This water separator removes any residual moisture from the compressed air. However, clean, dry and oil-free compressed air must be provided. If water accumulates in the sight glass, it can be drained using the drain screw.

To empty the water separator follow the steps below:

1. Turn off the compressed air supply.
2. Turn the drain screw in a counter-clockwise direction (left) until the water separator is open.
3. Wait until the water separator is empty.
4. To close the water separator turn the drain screw in the clockwise direction (right) until hand tight.

The water separator must be checked at least once per day and emptied if necessary. If contaminants are found check the compressed air supply immediately.

11.3.6 Guide rails and drive shafts

The guide rails and drive shafts are provided with long-term lubrication and are maintenance free. If necessary they will be re-lubricated during maintenance by qualified Planmeca personnel.

11.3.7 Coolant tank

The following steps must be performed before each wet milling:

1. Clean the swarf filter in the coolant tank.
2. Remove the swarf from the outlet to ensure trouble-free flow of coolant.
3. Check the coolant level. An adequate volume of coolant must always be available to prevent the pump from running dry and being destroyed. The capacity of the coolant tank is 1,8 litres.
4. To top up the coolant tank dilute the coolant with distilled water. The concentration of the coolant is given in the instructions for use for the coolant.
5. Empty and clean the coolant tank at least every two weeks. For heavier use, the coolant tank must be emptied and cleaned at shorter intervals.
6. Replace the entire coolant at least once per week.
7. When disposing of the coolant, ensure proper disposal.

Filling or emptying coolant tank

1. Open the coolant tank access door by pulling the two upper corners of the access door to release the locking mechanism.



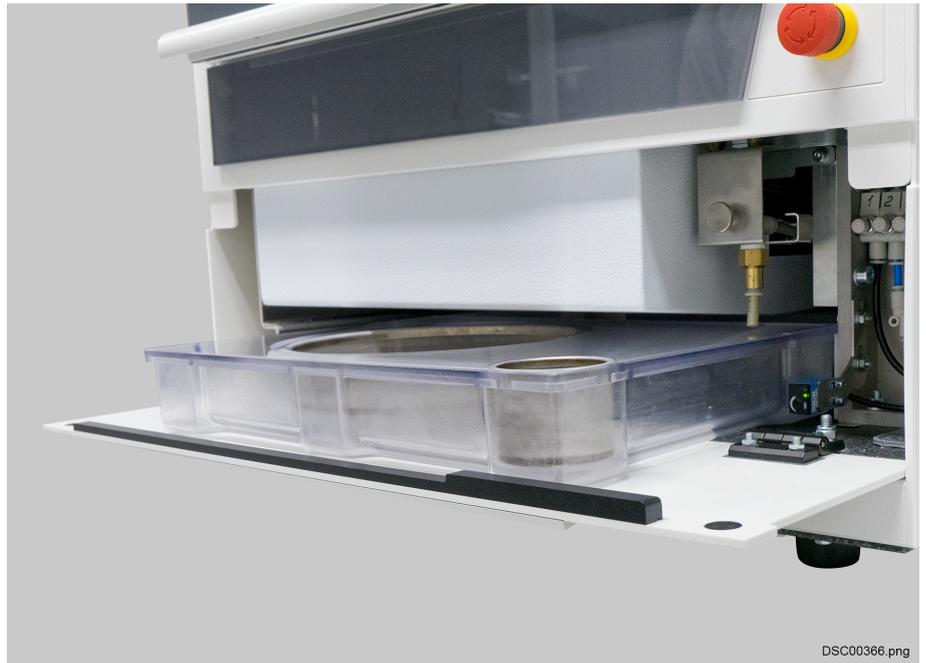
50S_Press_door_corners.eps

2. Using a finger push the feed line and the float upwards until they reach the end.



DSC00364.png

3. Pull out the coolant tank.



4. Remove the coolant tank lid.
5. Fill or empty the coolant tank. The capacity of the coolant tank is 1.8 litres.
6. Close the coolant tank lid.
7. Make sure that the feed line and the float are in the uppermost position.
8. Push the coolant tank all the way to the back of the unit.
9. Push the feed line and the float downwards.
10. Make sure that the feed line and the float are positioned in the recess provided in the lid of the coolant tank and that the function of the float is guaranteed.
11. Close the coolant tank access door.

11.4 Maintenance plan

11.4.1 Before every start-up of unit

- Clean the workpiece holder
- Clean the tool holder
- Clean the tool shank on all tools
- Clean the length probe
- Clean the interior of the unit

11.4.2 Daily

- Check the water separator and empty if necessary

11.4.3 Weekly or after tool breakage

- Remove the collet chuck
- Clean the collet chuck
- Check the collet chuck for damage

- Remove the cone
- Grease the cone
- Clean the collet chuck holder with the felt cone provided
- Replace the entire coolant

11.5 Calibrating milling system

A couple of calibration bodies are milled to check the zero point and axis calibration of the milling unit. As a factory setting, all the calibrations are made, but those must be checked and adjusted, if needed.

11.5.1 Attaching workpiece

1. Select the correct workpiece.

CAUTION

Not every workpiece is suitable for milling a calibration body. Only use suitable workpieces for this purpose.

For calibrations, use the Calibration disc (part number 10036901).



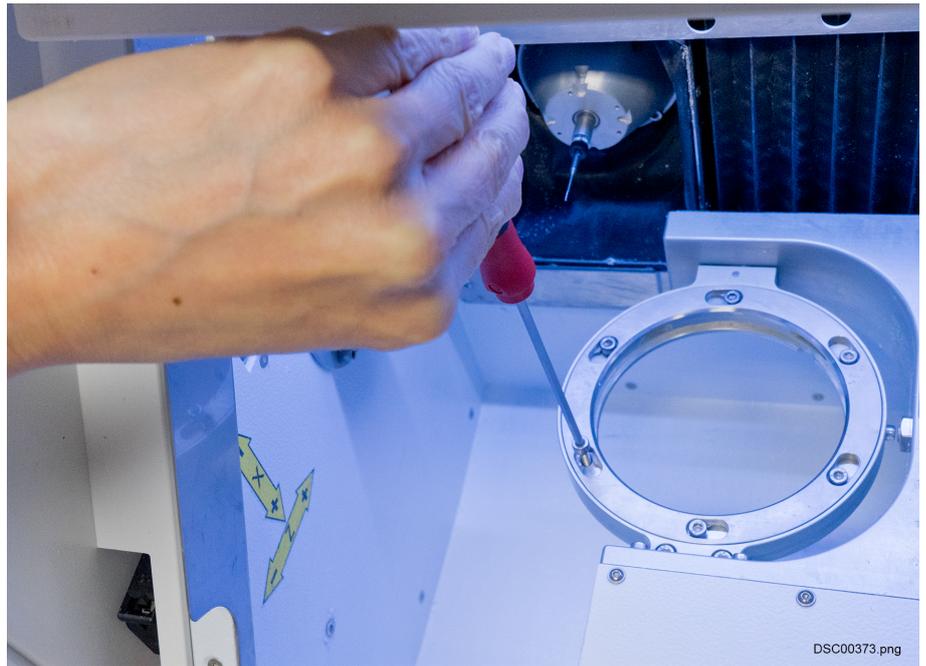
The workpiece is available in the delivery package.

2. Stop all drives and the milling spindle.
3. Turn the workpiece holder to horizontal position (Special position 1) by pressing the **approach to special position 1** button:



4. Push **Cover** button in the front side of the milling unit and open the lid.

5. Loosen the locking screws on the workpiece holder's clamping ring.



6. Remove the clamping ring.



7. Place the new workpiece in the workpiece holder.



If not using a new blank workpiece, ensure that the workpiece is positioned and oriented correctly so that the milling is made on blank space of the workpiece.

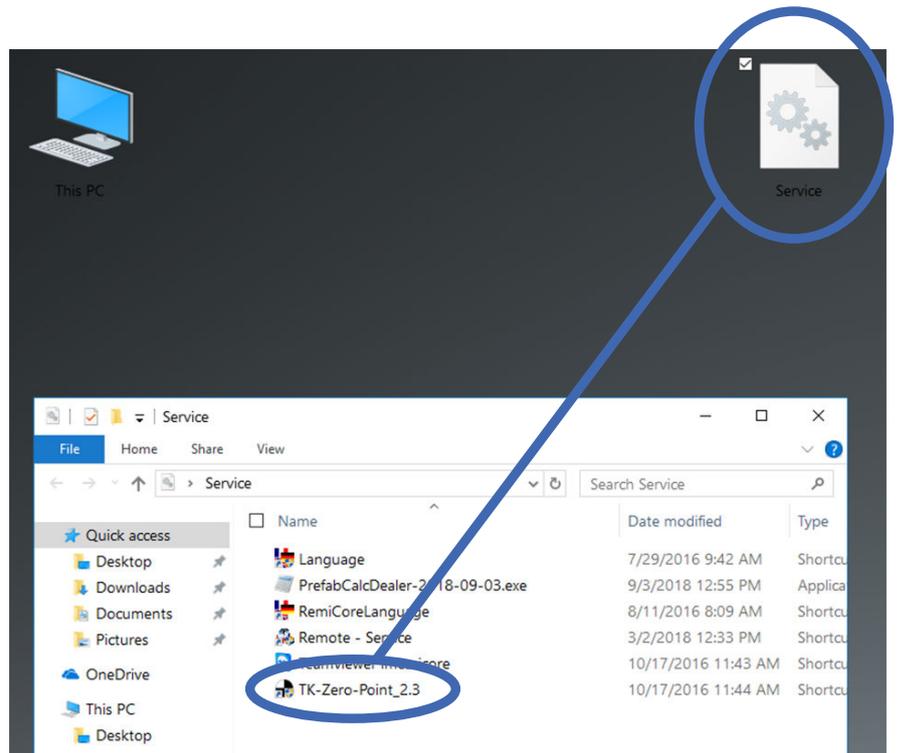
8. Insert the clamping ring and turn in an anti-clockwise direction up to the stop.
9. Tighten the locking screws on the clamping ring hand tight.
10. Check the tightness of the workpiece.
11. Close the lid.
12. Move the workpiece holder to home position by pressing the **move to home position** button:



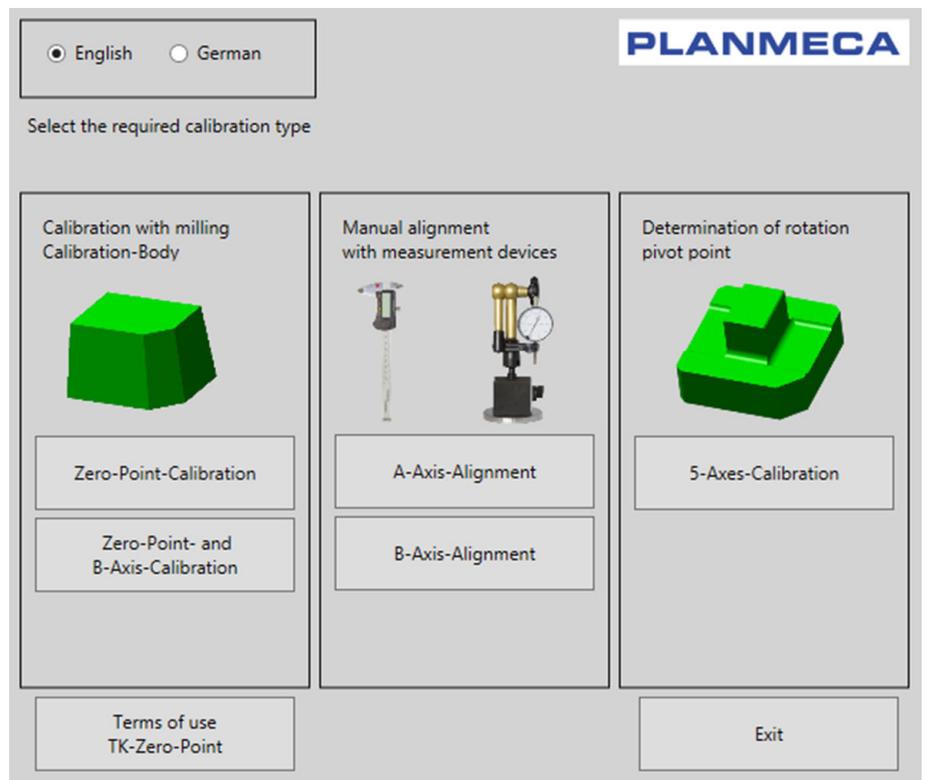
11.5.2 Milling zero point and B-axis calibration body

1. Attach work piece, as described in section "Attaching workpiece" on page 88, if not yet attached.
2. Switch on the suction.
3. On the desktop you will find a **Service** shortcut. Open the folder by double clicking the **Service** icon.

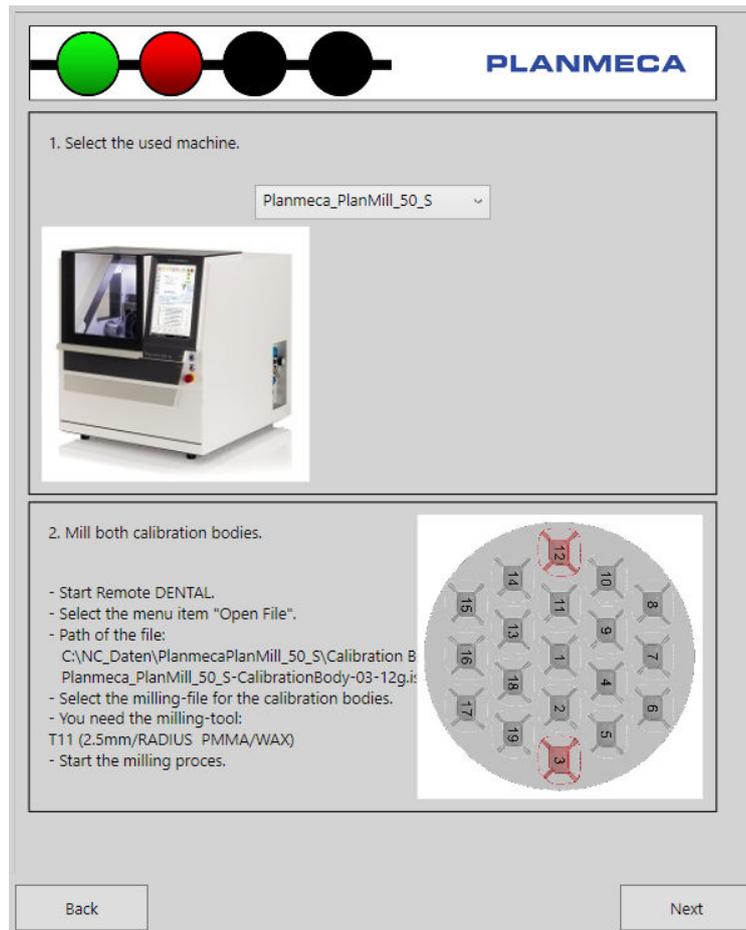
4. Inside the **Service** folder you will find some shortcuts to different service layers and service tools.



5. Double-click the **TKZeroPoint** option.
6. In the appearing **Select the required calibration type** window, click **Zero-Point-and-B- Axis-Calibration** button.



7. Select **PlanMill 50 S** from the **Select the used machine** drop-down menu.

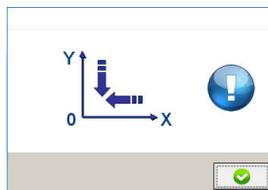


As instructed in under the **2. Mill both calibration bodies** phase, do the following before continuing this dialog:

1. Start **Remote DENTAL** by double-clicking the **PlanMill 50 S** icon on the desktop.



2. Click the green **Confirm** button to start the automatic reference run.



3. Select the **Open** button from the tool bar.



4. Browse and select the file:

C:\NC_Daten\Planmeca Plan Mill 50 S\PlanMill150-S-CalibrationBody\PlanMill150-CalibrationBody-03-12g.iso

NOTE

Milling-tool T11 (2.5mm/RADIUS PMMA/WAX) must be available. For more information, see section "Registering tools in control software" on page 54 and the *Planmeca PlanMill 50 S user's manual*.

5. Start the milling process, click the **START** icon:



Milling unit starts the calibration body milling. Wait until the milling process is completed.

8. Open the lid and remove the workpiece.
9. Close the **Remote DENTAL**.
10. Loose the milled calibration bodies from the workpiece.
11. Continue in the **TK-Zero_Point** dialog and click **Next** button.

11.5.3 Measuring zero point and B-axis calibration body

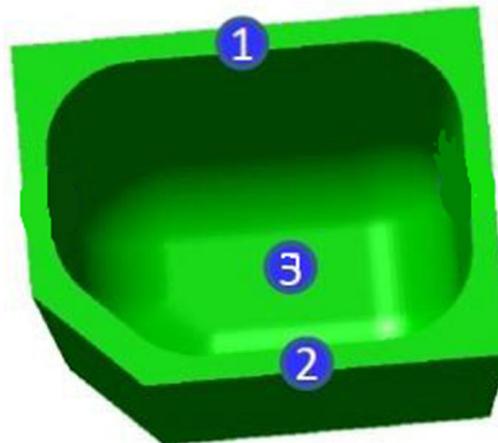
Three points must be measured on the both milled calibration bodies to perform the zero point and B-axis calibration.

Tools required

Thickness gauge with an accuracy of at least 0.01 mm.

Measuring calibration body

In the following figure, the individual measuring points needed to measure are marked with number 1, 2 and 3.



<p>1. Wall thickness in the Y-long direction: Using the thickness gauge measure the wall thickness of the Y-long wall in the middle of the wall.</p>	<p>2. Wall thickness in the Y-short direction: Using the thickness gauge measure the wall thickness of the Y-short wall in the middle of the wall.</p>	<p>3. Wall thickness in the Z-top: Using the thickness gauge measure the wall thickness in the Z-top wall in the middle of the plate.</p>
--	--	---

1. Measure the three points **1**, **2** and **3** of the **both** milled calibration bodies.

NOTE

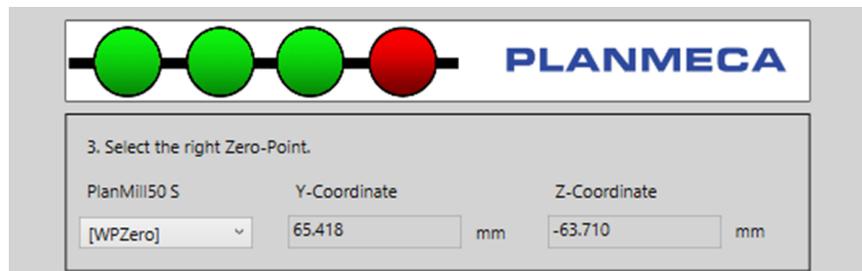
The calibration bodies are identified: the other milling body is marked with three furrows on the bottom side of the body, see the figure below.



2. Write down the results, separately for the “three furrows” milling body and the milling body without furrows. The results are needed during the next steps.

11.5.4 Calibrating zero point and B-axis

1. In the **TK-Zero-Point** dialog select **[WPZero]** from the drop-down menu in the **3.Select the right Zero-Point** section.



- Fill in the measured values (1, 2 and 3) to the appropriate fields in the 4. **Type in the measured values of the wall thickness** section.

NOTE

Fill the correct milling body measurement results to the correct fields, that is, the “three furrows” milling body results are filled on the left side fields.

All the wall thickness values should be:

0.50 mm, with allowed tolerance of **+/- 0.03 mm**.

NOTE

If the Y-long or Y-short measurement results differs between the milling bodies, contact your dealer for more instructions.

- Click the **Calculate** button.
- Click the **Save** and **OK** buttons to save the new values.
- Click **Exit** button.
- Mill another calibration body for confirmation of the changed values.
- Repeat the process until the values are within tolerance.

11.6 Annual maintenance

The unit should be serviced once a year by personnel authorised by Planmecca. This ensures a long service life and reliable operation.

12 Troubleshooting

WARNING

Isolate from the power supply before starting troubleshooting on electrical parts. Contact with live conductive parts can be fatal. Parts under power may make unexpected movements and lead to serious injury.

WARNING

Switch off all of the unit's moving parts before starting troubleshooting on moving parts and wait until they have all come to a standstill. Mortal danger due to moving parts. Rotating or linearly moving parts can cause serious injuries.

WARNING

Risk of injury due to improper troubleshooting. Improperly conducted troubleshooting measures can cause serious injury and significant damage.

- Before beginning the work ensure that sufficient free space is available for the work.
- Keep the installation site clean and orderly. Loosely stacked or scattered parts and tools are potential causes of accidents.
- After removing parts ensure that you reassemble them correctly and that you use all parts were removed.
- Before starting for the first time be sure to observe the following:
 - Ensure that the installation work is safely carried out and completed in accordance with the specifications and directives in these safety instructions.
 - Make sure that all covers and safety devices are installed and working properly.

12.1 Troubleshooting safety

12.1.1 Electrical systems



WARNING

Contact with live conductive parts can be fatal. Parts under power may make unexpected movements and lead to serious injury.

Isolate from the power supply before starting troubleshooting on electrical parts.

12.1.2 Moving parts



WARNING

Rotating or linearly moving parts can cause serious injuries.

Switch off all of the machine's moving parts before starting troubleshooting on moving parts and wait until they have all come to a standstill.

12.1.3 Improper troubleshooting

CAUTION

Improperly conducted troubleshooting measures can cause serious injury and significant damage.

Before beginning the work ensure that sufficient free space is available for the work.

Keep the installation site clean and orderly. Loosely stacked or scattered parts and tools are potential causes of accidents.

After removing parts ensure that you reassemble them correctly and that you use all parts were removed.

Before starting for the first time be sure to observe the following:

- Ensure that the installation work is safely carried out and completed in accordance with the specifications and directives in these safety instructions
- Make sure that all covers and safety devices are installed and working properly

12.1.4 How to respond to malfunctions

In the event of a malfunction always follow the steps below:

1. Immediately activate the emergency stop if there is a danger to any persons or property.
2. Determine the cause of the malfunction.
3. If there is a need to work in the danger area, switch the machine off.
4. Eliminate the malfunction or have the malfunction eliminated by authorized personnel if necessary.

The tables in the following sections provide information on those persons authorised to deal with a malfunction.

12.2 Troubleshooting tables

Hardware troubleshooting

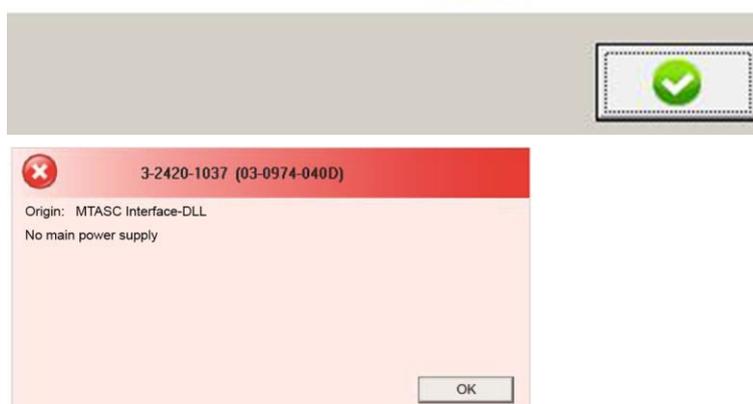
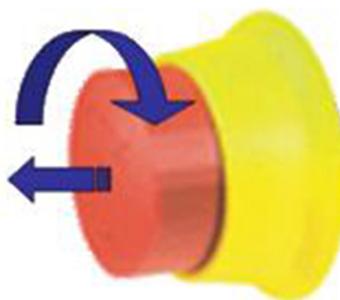
Error	Cause	Solution	Contact personnel
System cannot be switched on	No connection to the power supply	<ul style="list-style-type: none"> • Check power circuit • Check mains plug • Check power socket strip 	User
	Main switch is not turned on	Turn on the main switch	User
	Fuse triggered/ defective	Disconnect power plug, check fuse	Electrician

Error	Cause	Solution	Contact personnel
Power button not working	At least one motor output stage signals a fault	Diagnose fault cause and remedy	User
	Emergency stop not released	Release the emergency stop	User
	Fuse triggered/ defective	Disconnect power plug, check fuse	Electrician
	Protective hood not closed correctly	Close protective hood	User
Software not working correctly	System is not switched on	Switch on the system (main switch)	User
	Output stage is not switched on	Switch on the output stage (POWER button)	User
	Connection between control PC and machine not correct	Contact Planmeca After Sales and have the output stage replaced	User
Drive motor of an axis does not react	No power supply to the output stage, fuse defective	Check fuses in the switch cabinet or power output stage	Electrician
	Temperature protection of the output stage is active	<ul style="list-style-type: none"> • Check fan in the rear wall • Check / clean filter in the fan 	User
	Output stage defective	Replace output stage (send in)	Electrician
	Connection plug has loosened	Check plug on the control output and the motor	Electrician
	Cable break	Contact Planmeca After Sales and have the cable replaced	User
	Protective hood not closed correctly	Close protective hood	User
Processing machine (spindle) not functioning, i.e. cannot be switched on	Not released by SC module	Check spindle release signal	User
	Protective hood interlocking not closed	Close protective hood	User
	Protective hood not closed correctly	Close protective hood	User
	Emergency stop not released	Release the emergency stop	User

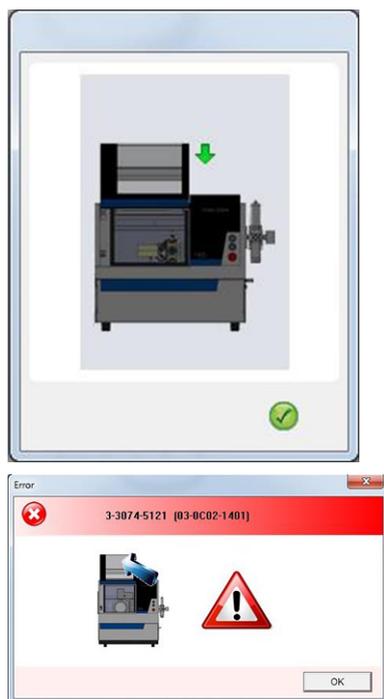
Software error notifications



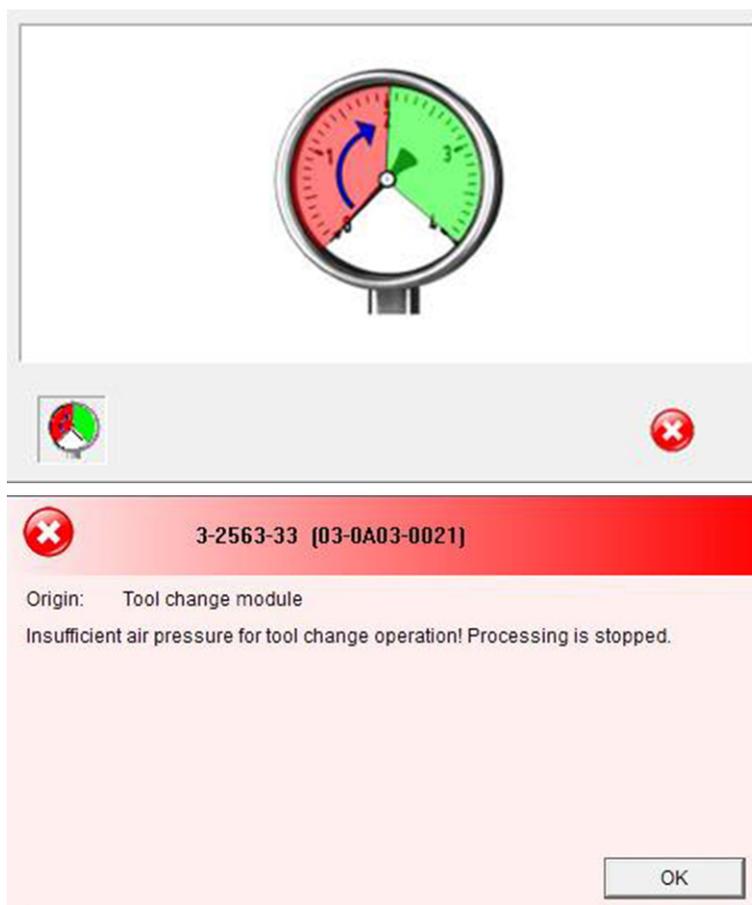
Possible cause	Solution	Contact personnel
Power button not pressed	Press the power button	User
Machine switched off	Switch the machine on	User



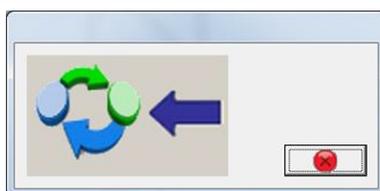
Possible cause	Solution	Contact personnel
Emergency stop not released	Release the emergency stop	User



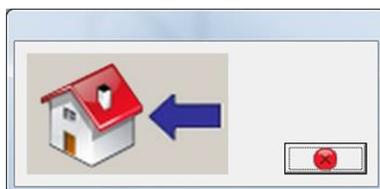
Possible cause	Solution	Contact personnel
Protective hood not closed	Close the protective hood	User



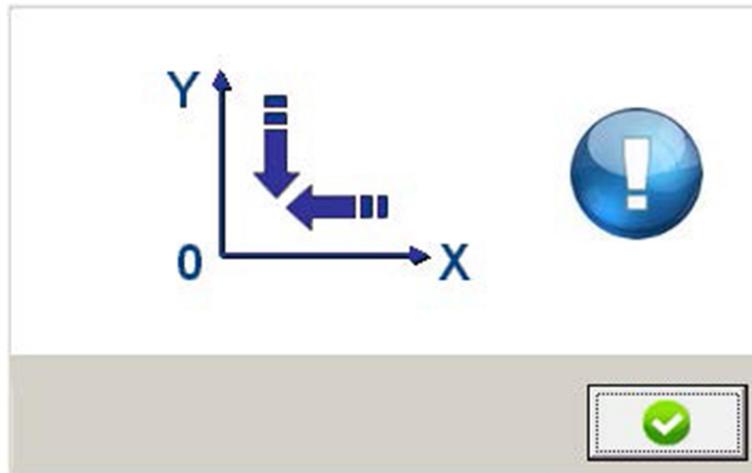
Possible cause	Solution	Contact personnel
Inadequate compressed air	Check the input pressure of the machine (after reaching the operating pressure the machine resumes processing).	User



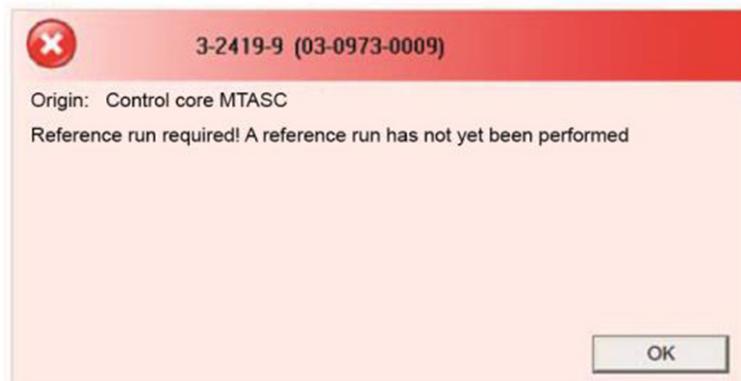
Possible cause	Solution	Contact personnel
Blank change position	The machine drives to the blank change position	User



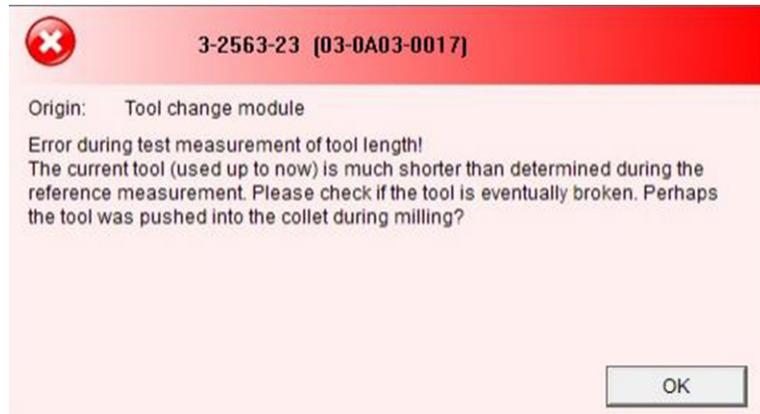
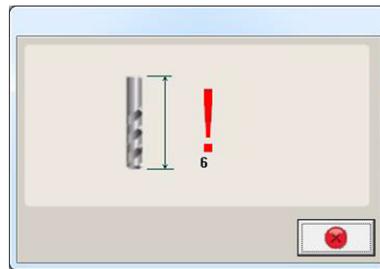
Possible cause	Solution	Contact personnel
Home position	The machine drives to the home position	User



Possible cause	Solution	Contact personnel
Reference run	The machine must be referenced Confirm the start of the reference run by clicking on the button	User



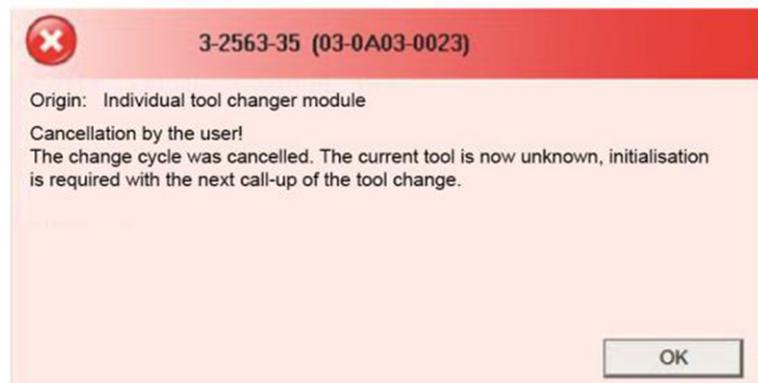
Possible cause	Solution	Contact personnel
Reference run required	The machine must be referenced Start the reference run manually	User



Possible cause	Solution	Contact personnel
Error when measuring the length of the tool	Check the tool in use for damage and replace if necessary	User



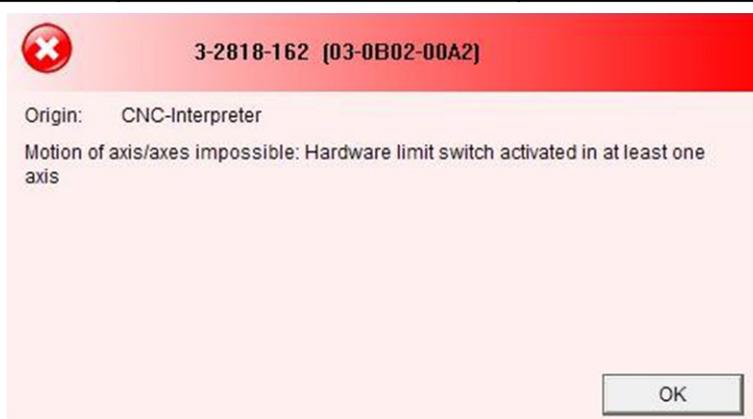
Possible cause	Solution	Contact personnel
Connection error	Check the connection between the control PC and machine	User
	Press the power button	User
	Switch the machine on	User



Possible cause	Solution	Contact personnel
Cancellation by user	Start the desired action again	User



Possible cause	Solution	Contact personnel
Spray position not defined	Define the spray position	Specialist personnel



Possible cause	Solution	Contact personnel
Axis driven into end switch	Drive the axis out of the end switch	User

12.3 Troubleshooting tasks

12.3.1 Deactivating emergency stop

1. Determine and eliminate the source of the malfunction.
2. Release the emergency stop switch by turning.

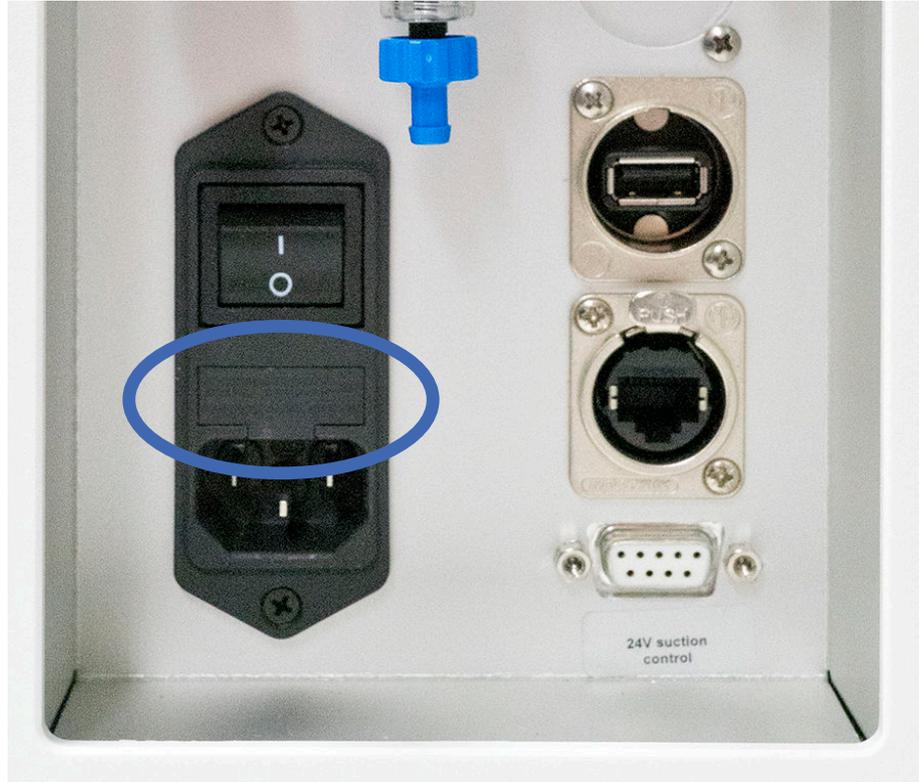
12.3.2 Replacing fuses



WARNING

All work on electrical systems such as the connection to the power supply, maintenance and repair may only be performed by qualified electricians.

Parts of the electrical system remain under power even when the main switch is off.



To replace a fuse:

1. Switch the machine off.
2. Remove the plug from the power supply.
3. Open the cover above the main switch.
4. Remove the defective fuse.
5. Make sure that the replacement fuse is of the correct rating.
6. Insert the new fuse.
7. Close the fuse cover.
8. Connect the machine to the power supply.
9. Switch the machine on.

13 Packaging and storage

WARNING

For the installation and subsequent use of the milling unit, it is required that the operator's user and maintenance personnel are competent in the handling of transport packaging. The following instructions are to be complied with carefully.

13.1 Packaging

Transport packages are packed in accordance with the expected transport conditions. The packaging is designed to protect against transport damage, corrosion and other damage. Therefore remove the packaging only immediately before installation. The individual pieces of packaging material are made exclusively from environmentally friendly materials.



WARNING

Keep the packaging that the unit is delivered in for use in a possible return transport.

13.2 Packaging symbols

During transport always observe the symbols shown below that are applied to the packaging.



Fragile

Packages marked with this symbol contain fragile and sensitive goods.

Treat the package with care and do not let it drop or expose it to shock or impact.



Do not stack

Never stack any objects on packages marked with this symbol.



Keep dry

Protect packages with this marking from moisture and keep it dry.



Maximum stacking load

Observe the instruction ... *kg max.* above the arrow. This value states the maximum permissible stacking load. Do not exceed the load limit. Preferably store packages marked with this symbol in the uppermost position.



This way up

During transport and storage the arrow must point upwards. Do not tip, roll or lean the package.

14 Transport

14.1 Safety instructions for transport

14.1.1 Eccentric centre of gravity



WARNING

Risk of injury due to falling or tilting transport packaging!

Packages may have an offset centre of gravity. If incorrectly handled the package could fall or tilt.

This could result in severe injury or death.

- Always observe markings and information regarding the centre of gravity on the packages
- During transport with a crane always sling the package so that the crane hook is directly above the centre of gravity
- Use caution when lifting a package, look to see if it begins to tip; if necessary, lower the package and adjust the slinging

14.1.2 Improper transport



WARNING

Improper transport may result in goods in transit falling or tipping. This could cause significant property damage.

- Upon delivery always proceed cautiously when unloading goods in transit and while transporting in-plant, observe the notices and symbols on the packaging.
- Use only the specified attachment points.
- Remove packaging materials only immediately before installation.

Transport of pallets with forklift or pallet truck

Items in transit on a pallet can be transported with a forklift or pallet truck if the following conditions are met:

- The forklift or pallet truck must be rated for the weight of the item in transit
- The item in transit must be securely fixed to the pallet
- To drive and operate industrial trucks with a driver's seat or driver's platform the driver must be authorised in accordance with national regulations

14.2 Transporting

1. Position the forklift or pallet wagon so that the forks are between or under the pallet beams.
2. Insert the forks far enough that they protrude from the opposite side.
3. The package being transported must be securely fixed.
4. Check to ensure that pallets with an offset centre of gravity cannot tip.

5. Lift the pallet and item to be transported and commence transport.

15 Disassembly and disposal

Once the period of use has expired the unit must be dismantled and disposed of in an environmentally responsible manner.

- Disassembly may only be performed by qualified personnel
- Work on the electrical system must be performed only by qualified electricians

15.1 Safety information for disassembly and disposal

WARNING

Risk of injury due to improper disassembly!

The unit may contain stored residual energy, sharp components, points, corners and sharp edges which can cause serious injury.

- Before beginning the work ensure that sufficient free space is available.
- Take care when handling sharp-edged parts
- Keep the installation site clean and orderly. Loosely stacked or scattered parts and tools are potential causes of accidents
- Ensure the proper disassembly of parts
- Be aware that some parts may be heavy. Use lifting equipment where necessary.
- Secure parts against tipping and falling.
- If in any doubt contact the manufacturer.

15.2 Disassembly

Before beginning with disassembly note the following points:

1. Switch the unit off.
2. Disconnect the unit from the power supply.
3. Physically disconnect the entire power supply from the unit and discharge residual energy.
4. Disassemble and clean the components properly in accordance with local applicable safety and environmental regulations.

15.3 Disposal

Unless agreements are in place for the return or disposal of the equipment send the disassembled parts for recycling.

- Scrap all metal parts
- Send plastic parts for recycling
- Sort all remaining parts according to their material properties



WARNING

Risk to the environment due to incorrect disposal!

Incorrect disposal can pose a risk to the environment.

- Use reputable, authorised companies to dispose of electrical, electronic components, liquids and other excipients

- If in doubt, consult the local municipal authority or specialised disposal companies for advice on environmentally friendly disposal

15.3.1 Collection

Users of electrical and electronic equipment are obliged to collect old electrical and electronic equipment separately in accordance with the country-specific regulations. Electrical equipment cannot be disposed as part of unsorted municipal waste. Separate collection is the precondition for the recycling and recovery thereby saving environmental resources.

15.3.2 Return and collection systems

The Planmecca PlanMill 50 S may not be disposed of with household waste.

15.3.3 Disposal symbols



All electrical and electronic equipment is marked with these symbols and, in accordance with the EU Directive, must not be disposed of with household waste.



16 Customer information

No person is authorised to provide any information which deviates from the information in these instructions.

16.1 Warranty

Planmeca warrant this product is free from defects in material and workmanship. Planmeca MAKE NO OTHER WARRANTIES INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. The user is

responsible for the use and proper intended use of the product. If damage that falls under warranty coverage occurs to the product during the warranty period, Planmeca have the sole obligation and your only claim is the repair or replacement of the Planmeca product.

16.2 Limitation of liability

Insofar as an exclusion of liability is allowed by law, Planmeca have no liability for loss or damage arising from this product, regardless of whether they are the result of direct, indirect, special, incidental or consequential cause, regardless of the legal basis, including warranty, contract, negligence or intent.

17 Technical specifications

Name: Planmeca PlanMill 50 S

Planmeca

Asentajankatu 6,

00880 Helsinki

FINLAND

Tel.: +358 20 7795 500

<http://www.planmeca.com>

17.1 Milling unit

Type of drive	High torque stepper motor
Control	Stepper motor controller IME 482
Milling chamber lid	Lid hinged to open upwards
Guides	Precision steel guides in the X, Y, Z axis
Traverse paths	X axis: 150 mm (5.9 in.) Y axis: 115 mm (4.5 in.) Z axis: 90 mm (3,5 in.) A axis: 360 degrees B axis: 110 degrees
Tool changer	12 tools
Coolant tank	1.8 l
Maximum installation height	2,000 m (6562 ft) above sea level

Dimensions (W x H x D)

566 x 612 x 665 mm

(22,3 x 24,1 x 26,2 in.)

Weight

Approx. 95 kg (209 lbs)

Air supply

Required air pressure: 6 - 9 (continuously applied) bar

Required air volume: 60 l/min (2.1 ft³/min)

Coolant tank

1.8 l (0.48 gal)

High-frequency spindle

Housing	Ø33/69 mm (1.3/2.7 in.)
Tool change	Pneumatic, direct changer
Collet chuck clamping range	3 mm (0.12 in.)
Acceleration and braking value	10,000 rev/min

Maximum speed	60,000 rev/min
Weight	approx. 2.1 kg (4.6 lbs)

17.2 Connected loads

Mains voltage, frequency and power

Voltage: 100/230 V

Nominal current: Max. 6 A

Frequency: 60/50 Hz

Nominal power: 750 W

Required air pressure: 6 to 9 bars (constantly present)

Required air flow rate: 60 l / min

17.3 Environmental conditions

Unit operating conditions

Temperature range: 18 - 25 °C (64 - 77 °F)

Max. air humidity: 60%

Altitude: < 2000 m (6 562 ft) above sea level

Storage conditions

Temperature range: 10 - 50 °C (50 - 122 °F)

Max. air humidity: 80%

Transportation conditions

Temperature range: -10 - 55 °C (14 - 131 °F)

Max. air humidity: 80%

NOTE

The individual components of the milling unit possess varying expansion coefficients. Imprecision during processing can only be ruled out with an ambient temperature from +18 to +25°C. If your ambient temperatures do not lie inside this range then we recommend an air conditioning unit. Please contact your local dealer in this regard.

Air supply

The compressed air supply must comply with the following conditions:

Specification according to ISO 8573-1, Compressed Air for General Use, Part 1: Impurities and Quality Classes.

Air pressure

6-9 bar

Connection: Plug-in nipple NW 7.2 mm (quick connection)

Air purity

Solid contaminants class 3 – degree of filtration better than 5µm for solids

Water content class 4 – maximum pressure dew point +3 °C (37 °F)

Total oil content class 3 – maximal oil content 1mg/m³

Noise level

Sound pressure level (milling of plastic): <70 dB(A)

17.4 Device plate

 imes-icore GmbH Im Leibolzgraben 16 36132 Eiterfeld Germany	Type :	Planmeca PlanMill 50 S
	REF	511001 2253
	SN	123456 / 1
		2018 - 01
	Voltage :	100 - 230V~
	Frequency :	50 / 60 Hz
	Current :	max 6 A
	Main Fuse :	T 10 A 230V
	Air Pressure :	6 - 9 bar
	Air Volume:	60 L/min






Indoor use only!
Read instructions before use!
When opening the unit always pull off the main plug!

rev. 3

Appendix A: Suction unit (optional)

A.1 Safety instructions

A.1.1 Symbols used



WARNING

Refers to a possibly dangerous situation. If it is not avoided, it could result in death or severe injury. Please consult the manual where this symbol is displayed.

CAUTION

Refers to a possibly harmful situation. If it is not avoided, damage could be caused to the product or to something in its environment.

NOTE

Refers to handling tips and other particularly useful information. This does not signify a dangerous or harmful situation.

A.1.2 Electrical safety

This extraction unit is designed to meet the safety requirements of the Low Voltage Directive 2006/95/EC (previously numbered 73/23/EEC).



WARNING

During works with the pump/motor housing open, live, 230/115 volt components are accessible. Make sure that rules and regulations for work on live components are always observed.

NOTE

To reduce the risk of fire, electric shock or injury always isolate the system from the mains power supply before removing the pump/motor panel.

Use only as described in the manual.

Connect to a properly grounded outlet.

A.1.3 Dangers to eyes, breathing and skin

Once used, the filters in the extraction unit may contain a mixture of particulates, some of which may be sub micron size. When the used filters are moved it may agitate some of this particulate, which could get into the breathing zone and eyes of the operative.

Additionally, depending on the materials being used, the particulate may be an irritant to the skin.

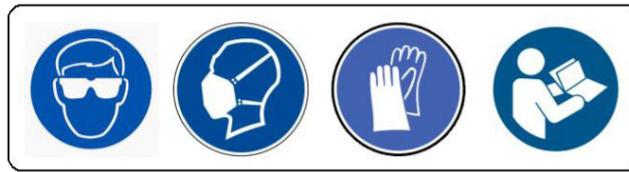
CAUTION

When changing used filters always wear mask, safety glasses and gloves.

A.1.4 Warning and information labels

The following figures show the labels and symbols and list their location on the unit.

Inside filter door (at top):



Top left of rear panel:



Rear of unit, next to power connection:



Above motor cooling on rear of unit:



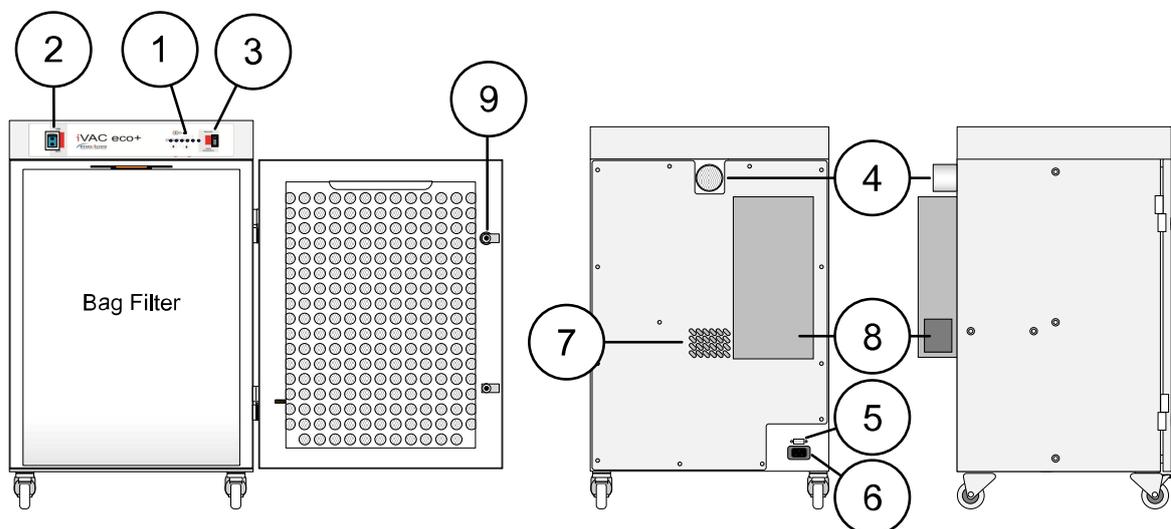
Top left of front door:



A.2 Installation

A.2.1 Extractor overview

This unit provides extraction and filtration of the fume generated by marking, milling, cutting, etching or engraving. The units are of robust design and feature ease of use with minimal maintenance. The main components are shown below.



1. Unit/filter condition display	2. On/off switch	3. Motor function switch
4. Hose inlet connection 50mm	5. Signal / interface connection	6. Power inlet
7. Cooling air inlet	8. Exhaust/cooling air outlet	9. Filter door catch

A.2.2 Installing extractor

CAUTION

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Read all instructions in this manual before using this extractor.

1. Move the unit to the location where it is going to be installed and remove the unit from its packaging. The unit should be installed in a well ventilated room.

CAUTION

Due to the weight involved the extractor unit should only be lifted using suitable lifting equipment and with regard to appropriate safety precautions. (See Appendix for product weight details).

2. Ensure that a 0.5m space is available around any louvered areas of the unit to ensure adequate air flow. Lock the two braked castors, if fitted.

CAUTION

Do not block or cover any louvers or cooling holes on the unit as this severely restricts air flow and may cause damage to the unit.

CAUTION

Under no circumstances should the exhaust outlet/s be covered as this will restrict the airflow and cause overheating.

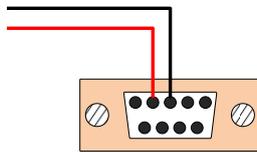
3. Check filters are located in their correct position and carefully replace lid/ close door.
4. Connect the extraction ducting between the extractor inlet and the fume capture device.

A.2.3 Filter blocked signal

With this, the extraction unit has been fitted with a pressure switch to monitor the condition of the filters. This is displayed via the Red LED on the front of the unit. This circuit will not directly stop the extractor motor.

A.2.4 Remote stop/start

This enables the extractor unit to be turned on and off by a signal from the customer. Pins 3 & 4 of the connector need to be connected to a 24v dc supply to start the unit. However the mains power switch must be in the "on" position for the signal to be effective.



Remote operation can be overridden by using the override switch, which is mounted on the front the unit. For more information, see section "Front view" on page 23.



A.2.5 Electrical supply connection

Check the integrity of the electrical power cable.

Connect the power cable to an isolated electrical supply. The mains socket outlet should be installed near the equipment and be easily accessible. The cable run to the unit should be arranged so as not to create a trip hazard.

CAUTION

Check that the mains input at the isolated supply is the same as the voltage Supply detail on the Serial Number label before plugging the extractor unit in.

A.2.6 General safety requirements

CAUTION

Do not block or cover the cooling vents on the unit, as this severely restricts airflow and may cause damage to the unit.

CAUTION

This unit is over 18 kg in weight and should only be lifted with suitable lifting equipment.

CAUTION

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Read all instructions in this manual before using this extractor.



WARNING

Mains voltage. Dangerous voltages exist in this equipment. Ensure all covers are fitted before operating this equipment.

The unit is now ready for use.

A.3 Operation

A.3.1 Manual operation

The extraction unit is turned off and on by means of an illuminated rocker switch on the front of the unit.



Filter condition signal – indicators and component controls

The LED on the front panel (see above Fig) indicate when the filter is blocked.

The right switch will allow the vacuum motor to be either On/Off/Auto. Auto will require a voltage input to the interface connector on the rear of the unit. (see Fig 3)

A.4 Maintenance

User maintenance is limited to cleaning the unit and replacing the filters with new. Only Planmeca trained maintenance technicians are authorised to carry out component testing and replacement. Unauthorised work or the use of unauthorised replacement filters may result in a potentially dangerous situation and/or damage to the extractor unit, and will invalidate the manufacturer's warranty.

A.4.1 Cleaning unit

The powder coated finish can be cleaned with a damp cloth and non aggressive detergent. Do not use an abrasive cleaning product as this will damage the finish.

The cooling inlets and outlets should be cleaned once a year to prevent build up of dust and overheating of unit.

A.4.2 Replacing filters

The filter package needs attention when the filter change LED is illuminated or, when the unit no longer removes the fume efficiently.

A log of filter changes should be maintained by the user.

All filters are tested to BS3928. A certificate on conformity for each filter is available on request.

It is recommended that a spare set of filters are kept on site to avoid prolonged unit unavailability. Part numbers for replacement filters can be found on the filters fitted in your system. Alternatively, refer to the consumable spares table.

CAUTION

To prevent overheating, units should not be run with a blocked filter condition, or with dust obstruction of inlets or outlets.

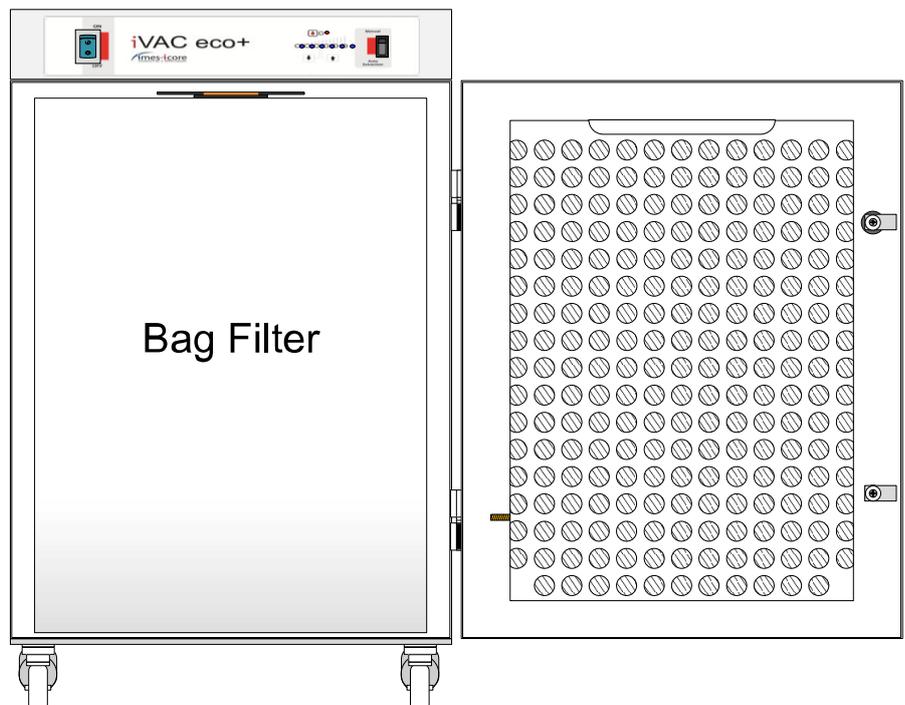
CAUTION

When changing used filters always wear mask, safety glasses and gloves.

A.4.3 Pre filter replacement

The pre filter needs changing when the filter change is illuminated. Isolate the electrical supply to the extractor.

1. Undo the filter compartment latches on the front of the unit.
2. Remove the pre filter by lowering the supporting plate and replace with a new pre filter.
3. Push the supporting plate back up so it clips in place, close and fasten filter compartment latches.
4. Reconnect the electrical supply.



A.4.4 Consumable spares

Unit	Part number	Description
iVAC eco+	513002 0050	5 layer bag filter

A.4.5 Maintenance protocol

Unit serial number:	
Prefilter	
Date	Name
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

A.4.6 Filter disposal

Pre filters are manufactured from non-toxic materials.

Filters are not re-usable, cleaning used filters is not recommended.

Disposal of the used filters depends on the material deposited on them. For more information, see the following table.

Deposit	EWC listing*	Comment
Non-hazardous	15 02 03	Can be disposed of as non-hazardous waste.
Hazardous	15 02 02 M	The type of hazard needs to be identified and the associated risks defined. The thresholds for these risks can then be compared with the amount of material in the filters to see if they fall into the hazardous category. If so, the filters will need to be disposed of in line with the local/national regulations.

* European waste catalogue

A.5 Troubleshooting

In the unlikely event of a problem with your extractor please contact your local representative or:

Planmeca
 Asentajankatu 6
 FIN-00880 Helsinki
 FINLAND

A.6 Technical specifications

Unit	iVAC eco+
------	-----------

Capacity	260 m ³ /hr (9182 ft ³ /hr)
Size	H 750mm x D 460mm x W 440mm (30 x 18 x 17 in.)
Weight	30 kg (66 lbs)
Exhauster	Centrifugal blower
Electrical supply	115-230v 1ph 50/60Hz
FLC	12.5 A
Noise level	Below 75dB (A)
Filters	Pre filter
Efficiency F8	95% @ 0.9μ
Environmental operating range	
Temperature	+5°C to +40°C (41°F to 104°F)
Humidity	Max 80% RH up to 31°C (88°F) to Max 50% RH at 40°C (104°F)
Altitude	Below 2000m (6562 ft)
Pollution degree	2

PLANMECA

Planmeca Oy | Asentajankatu 6 | 00880 Helsinki | Finland

tel. +358 20 7795 500 | fax +358 20 7795 555 | sales@planmeca.com | www.planmeca.com

