Operating Instructions

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Huber & Grimme

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Revision status	Date	Details to revision

All information are supplied without liability. Technical modifications and errors excepted.

1.0 General

This device has been built in accordance with German and European standards and regulations and complies with the latest technical standards.

1.1 Introduction

The equipment has been designed and built in accordance with following guidelines and directives:

- Declaration of manufacturer
- EC Machinery Directive — EG 89/392/EWG
- VDE Directives — EN 60204
- Safety of machinery — EN 292
- German accident prevention directive, Electrical Installations and Media — BGV A 2
- General accident prevention directives (Germany) — BGV A 1
- German Safety Law — GSG, CHV 3

The purpose of these Operating Instructions is to provide the user with helpful information that will enable safe and proper working and help to ensure that all maintenance work is kept as easy as possible.
Any person instructed with transport, setting up, commissioning, operating or maintenance of our machining system and additional equipment must have read and understood

- The Operating Instructions
- The safety regulations
- The safety information in the individual chapters and paragraphs.

In order to prevent the risk of equipment being used incorrectly and to make that no problems are encountered during operation of our products, all operating personnel must have access to the Operating Instructions at all times.

1.1.1 Copyright

The contents of these Operating Instructions are to be treated confidentially. They should only be used by authorized group of persons. The Operating Instructions must not passed on to third parties without the written consent of HG Bearbeitungssysteme GmbH Huber & Grimme. All documents are protected by copyright.
It is not permitted to pass on or duplicate documents or parts thereof, nor to make use of nor share their contents, unless express authorization to do so is granted. Any violations are punishable and will render the offending party liable to pay compensation. We reserve all rights to exercise industrial property rights.

1.1.2 Customer service

Our customer service department (or, if you are outside Germany, our local representatives in your country) will be glad to assist you with technical information for products supplied by HG Bearbeitungssysteme GmbH Huber & Grimme and their applications in technical systems. Please contact the relevant agency or the manufacturer plant directly if you have a queries about any of our products,

HG Support GmbH & Co. KG
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Tel: 0049(0)8241 960820
Fax: 0049 (0)8241 960856
E-Mail: info@hg-grimme.de

When contacting us or ordering replacement parts, please quote the serial or order number for your installation (located on the type plate).

Quoting this number ensure that we can provide you with the correct information and parts.

1.1.3 Warranty

Always read these Operating Instructions carefully before assembling the Machining system and taking it into operation. We accept no liability for damage or operational problems resulting from failure to follow the instructions laid out in these Operating Instructions.
Our warranty does not cover any wearing parts, including:
Spindle drives, racks, guides, bearings, pneumatic hoses, high-pressure water lines, tools, clamping fixtures etc.
Any damage caused by incorrect handling or by foreign objects brought into the equipment will be at the cost of the customer.

In addition, following also apply:

Our General Terms of Business,
Which are used in the basis when the order is placed and can be sent to you on request. Any claims under warranty must be registered **as soon as** you notice the defect(s). Please quote the serial or order number as well.

The warranty will expire if, for example:

- The equipment is not operated or maintained in accordance with the Operating Instructions.
- Equipment is connected incorrectly or devices are used which are not part of our scope delivery.
- Cables and lines are routed or connected incorrectly or unprofessionally, inasmuch as they are not part of our scope of delivery or range of services.
- Non-genuine replacement parts or accessories are used.
- The equipment is converted or modified without written agreement from HG Bearbeitungssysteme GmbH Huber & Grimme.
- The equipment fails for reasons that are beyond our control and for which we therefore cannot be held responsible.

Warranty
The warranty covers the functional components of the installation (excluding wearing components) for duration of 6 months after the installation is taken into operation in single-shift operation or for 900 operating hours, whichever is reached first.

1.1.4 Warranty exclusions

All of the technical information, data and other information relating to the operation of the equipment are correct at the time of going to print. This information is provided to the best of our knowledge on the basis of our previous experience and understanding. We reserve the right to make technical changes as part of the continuous development of the machining system covered in these Operating Instructions.
We accept no liability for damages or operational problems resulting from incorrect operation, failure to follow the instructions laid out in these Operating Instructions or improper maintenance. We wish to emphasise that only approved genuine replacement parts and accessories supplied by Hg Bearbeitungssysteme GmbH Huber & Grimme must be used. This also applies analogously to any used components / component groups which are supplied by other manufacturers.

Our liability expires upon installation or use non approved replacement parts or accessories.
The **CE-Mark, declaration of conformity** and our **liability** expire if any unauthorized modifications or changes are undertaken.
HG Bearbeitungssysteme GmbH Huber & Grimme are liable for any mistakes or omissions, under the exclusion of further claims, within the framework of the warranty obligations laid out in the main contract. All claims for compensation are excluded, regardless of their legal grounds.
All translations are performed to the best of our knowledge. We cannot accept any liability for translation errors, even if the Translation was performed or commissioned by us. Only the original text is binding.
It is possible that there may be discrepancies between the text or drawings and the scope of delivery or actual replacement parts supplied. The drawings and graphics are not to scale.

1.1.5 Concepts and definitions

Operator: The operator (contractor / company) is the person / company who operate(s) the equipment and uses it in accordance with its designated purpose or who employs suitable personnel to do this on his / her behalf.

Operating personnel: The operating personnel is / are person(s) appointed by the operator of the installation to operate and / or transport the installation.

Specialist personnel: Specialist personnel are persons who are appointed by the operator of the installation to perform special tasks, such as installation, set-up, maintenance and fault rectification.

Electrical engineer: Electrical engineers are qualified to assess the tasks to which they are assigned and identify potential hazards on the ground of their knowledge of the relevant standards.

Trained person: A person counts as trained if he / she has been trained / taught in relation to his / her assigned duties with regard to the potential hazards of improper behaviour, as well as the necessary safety equipment, protection measures, relevant directives, accident prevention directives and operating conditions. This person must have also verified his / her competence.

Specialist engineer: The specialist engineer is a person who, on the basis of his / her professional training and experience, has obtain sufficient knowledge in the field of pneumatics and is familiar with the relevant industrial safety regulations, accident prevention directives, guidelines and general technical standards to the point where he / she is capable of assessing the safety of pneumatic installations.

Machining system: Machining system are multi-axis milling machines with continuous path control which are used to machine plastic parts.

1.2 General safety information

1.2.1 Explanation of used symbols

All of the safety information contained in these Operating Instructions must be followed. The safety information is labelled as follow:

Note
This symbol is used to identify explanations that help to improve understanding and optimise working with the machining system.

Operating reliability of the machining system endangered
This symbol is used in the Operating Instruction s to highlight precautions that must be followed. Failure to do so could result damages of the machining system or the materials being processed.

Hazard warning
This symbol is used in the Operating Instructions to highlight safety precautions that must be followed. Failure to do so could result in injury or even death.
These precautions must be followed at all times and particular care and caution are required.
The safety precautions should be passed to anybody working on the machining system or its energy supply system.
The general safety regulations must also be followed at all times.

Warning – hazardous voltage
This symbol is used in the Operating Instructions to highlight warnings of hazardous voltage. Touching live parts can kill instantly. Coverings (e.g. hoods and covers) which are marked with this label must only be opened by a qualified electrical engineer after first switching off the relevant operating voltage (input terminal voltage, operating voltage or external voltage).

Attention laser beam
This symbol is used in the Operating Instructions to highlight precautions of laser radiation hazard. Pass the precautions to anybody working on the machining system of a direct or diffused irradiation into eyes or onto skin.

Attention magnetic fields
This symbol is used in the Operating Instructions to highlight precautions of magnetic fields.

Attention hand injury
This symbol is used in the Operating Instructions to highlight precautions, which have hand injuries as consequences, if they are not followed.

Explosion hazard
This symbol is used in the Operating Instructions to highlight precautions, which have a danger of explosion as consequence, if they are not followed.

1.2.2 Proper use and operation

Only approved materials must be processed in the machining system.

The Machining – Systems are up to 8 axis machines with continuous path control (optionally also with a rotary table) which are used for machining plastic parts. The parts that are to be machined can be clamped via a central vacuum system and machined within the traversing paths of the machine.
This type of attachment can be achieved in different ways:

- Via the central vacuum system on a separately mounted clamping fixture.
- Via direct screw attachment onto the machine table by means of the threaded mores.
- Via clamps.

No other forms of attachment are permitted.

The milling spindles are shape cutting (DIN 8589 TO) by dint of rotating tools with at least one geometrical defined blade.

The cutting heads are for shape cutting by dint of special blades. Use only original blades by company HG Bearbeitungssysteme GmbH Huber & Grimme.

The tool changing milling spindle has an engine power of 2.5 kW – 13 kW and a rotation speed of max. 18000 – 62000 $^{1}/_{min}$ depending on type and manufacturer. It is temperature monitored (PTC / KTY) in order to avoid damage by overheating.
Also the status of the tool ninepin clamping is monitored.

The milling spindle **Perske VUS-50** and **Ibag HF90** have two spindle endings, an engine power of 1 – 2.5 kW and a rotation speed of max. 17500 – 24000 $^{1}/_{min}$.

Cutting tools are clamp by dint collets up to max. 16mm diameter (depending on ninepin and type of the milling spindle).

Basically is to pay attention to use only rotationally symmetric tools and that the tools are clamped in an optimum way.

The maximum rotation speed of the tools and the ninepins must not passed over – s. datasheet cutter bit. The milling spindle can be damaged by using the wrong tools.

The machining system must only be operated in technically perfect condition by trained operating personnel, with due consideration for applicable safety regulations and accident prevention directives. This also includes compliance with the operating conditions and maintenance conditions specified in the Operating Instructions.

The power supply is provided via movable lines. These systems are live up to the connecting terminals of the main switches (mains connection switch, isolating switch).

Serious damage to health or severe material damage can cause if:

- Covers or safety devices are removed improperly.
- The installation is used improperly.
- The installation is operated incorrectly.
- Work is carried out on live or pressurised components.
- Maximum permitted rotational speed and linear speeds are exceeded.

1.2.3 Improper use

Arises from non compliance with the specified:

- Materials
- Operating pressures (compressed air, vacuum)
- Voltages
- Control process (PLC)

1.2.4 General safety information

- Machining systems must be assembled, taken into operation, operated, serviced or dismantled by any person who is under the influence of drugs, alcohol or any medication which affects his / her responsiveness.
- Any conversion work or alternations carried out on the installation must satisfy the technical safety requirements.

All work on the electrical parts of the machining system must only be carried out by qualified electrical engineers in accordance with electro technical regulations, under the instructions of HG Bearbeitungssysteme GmbH Huber & Grimme employees. In the event of a malfunction, the machining system must be immediately stopped and switched off and the corresponding main switch must be locked.

The supplier should be notified of all malfunctions! Fault must be rectified immediately!

- Absolute compliance with the **national** accident prevention directives and general safety regulations must be ensured during operation.
- Important information is highlighted with corresponding symbols. It is important to follow these instructions and safety regulations in order to prevent accidents and material damage.
- It is the responsibility of the operator to train all personnel accordingly.
- Failure to comply with these Operating Instructions and the safety information contained in them can lead to injury or even death.

In addition to the Operating Instructions, compliance with the following is also required:

- General statutory or otherwise binding rulings on the prevention of accidents, protection of the environment and fundamental health and safety requirements. This type of requirement may also affect e.g. the way in which hazardous materials are handled or the provision / use of personal protective equipment.
- These regulations and the general accident prevention directives and / or works regulations applicable at the side of use must be followed and complied with during all work on the machining system.
- Despite this, the machining system can still represent a risk of injury or even death if it is improperly operated, assembled, maintained or used by untrained personnel.
- The operator should add instructions to the Operating Instructions relating to work organisation, working procedures, deployed personnel etc.
  The Operating Instructions must be stored at the site of use in a location that is accessible to the operating personnel.
  The duty of supervision and the duty of notification must be satisfied, together with any special works requirements.
  All personnel who are assigned duties relating to the machining system must have read and understood the Operating Instructions, in particular the section on safety information.
  The operator must endure that all personnel are aware of safety and potential hazards and that they comply with the Operating Instructions at all times.
  The operator must ensure that the machining system is only operated when it is in perfect working order, and that all applicable safety requirements and regulations are complied with.
- The installation must be taken out of operation immediately if any faults or irregularities in its function are noticed. In case where the installation is shut down (e.g. in response to faults affecting operational safety or reliability, emergency situations, operating problems or maintenance work, if damage is noticed or after the end of the work shift) the operator / specialist engineer should carry out all of the required safety measures or monitor them if they are performed automatically.
- Protective clothing should be worn where necessary or prescribed by the regulations.

- Every operating personnel must not wear loose clothing or jewellery (including rings). Personnel with long hair must not wear it open and they must wear a snood – type cap. Otherwise there is a risk of injury, e.g. by getting caught or pulled into the machinery.

- **In set – up and automatic mode or automatic operation, the user must wear ear defenders and protective goggles for eyes.**

- **It is prohibited for persons or even their extremities to stay under the vertical axis. The running noise of the feed spindle of the vertical axis must be checked on a <u>weekly</u> basis. The supplier should be notified of all malfunctions! Faults must be rectified immediately!**

- ATTENTION: During changing the blade of the cutting head it is necessary to wear safety gloves.
- All safety information and warning notices on the installation, its access point and mains connection switches must be maintained in a clearly legible condition.
- Modifications, extensions and conversions to the installation that could affect its safety must not be undertaken without the approval of HG Bearbeitungssysteme GmbH Huber & Grimme. This also applies to the installation and setting up of safety equipment and to welding work on load – bearing components.

- **Safety equipment must not be switched off. Always use genuine replacement parts from HG Bearbeitungssysteme GmbH Huber & Grimme.**
- Any stipulated intervals for recurring tests / inspections, or any similar interval specified in the Operating Instructions, must be met.

1.2.5 Selection and qualification of operating personnel

The operator must only instruct persons to independently operate or maintain the machining system who:

- Are mentally and physically suited to the task.
- Have demonstrated to the operator their ability to operate or maintain the installation primarily on the basis of the written Operating Instructions.
- Can be expected to reliably fulfil their assigned duties.
- In the workplace, the operator is responsible to third parties.

1.2.6 Safety instructions for assembly, disassembly and initial commissioning

- Specialist engineers from HG Bearbeitungssysteme GmbH Huber & Grimme must only carry out installation and disassembly work.
- Installation and disassembly work should be agreed and arranged between the person who is responsible for the performance of the work and the operator who has the responsibility for the installation.
- The assembly / installation area should be secured.
- The installation should be connected to and disconnected from the plant power supply in accordance with the relevant electrical regulations.
- Any customer – specific regulations must also be taken into account.
- Only suitable, tested and calibrated tools must be used.
- When the installation is initially commissioned must only be done by a specialist engineer from HG Bearbeitungssysteme GmbH Huber & Grimme.

1.2.7 Safety instructions for operating the equipment

The installation is equipped with the necessary safety devices, but in the event of incorrect operation or misuse there is a risk of:

- Injury, potentially fatal, to the person operating the equipment.
- Material damage to the machine or other property of the operator.
- Reduced efficiency when working on the machine.

Your safety is at risk!

- At the start of work, the operator must check that the installation is working properly.
- All of the measures and information described in the Operating Instructions with regard to operational safety and reliability, and all general safety aspects and accident prevention measures which apply before, during or after the commissioning phase must be followed to the letter. Failure to comply with any of these instructions can result in accidents with potentially severe consequences in terms of personal injury.

- In the event of any faults or defects on the machine that relate to its operational safety and reliability, it should be immediately shut down (or not started up if it is not already running).
- Safety devices must not be switched off or modified contrary to their intended purpose.
- The installation must only be operated when all safety devices and safety relevant equipment, such as disconnect able safety devices and shut – off devices, are present and in working order.
- Any person who becomes aware of an immediate danger to himself / herself or any other person must press the **EMERGENCY STOP switch** without delay. This also applies if any faults or defects arise on parts of the installation or equipment that immediate shut – down. Following a STOP, the operator must not switch the installation back on and get it running again until a specialist engineer is convinced that the reason, which assumed the function, is eliminated and no danger is caused by the further operation.

The installation should be switched off immediately if any of following occur:
- Damage to electrical equipment or parts of the insulation.
- Failure of safety devices.
- Presence of person who could be endangered by operating of the installation. Do not restart the machine until these persons are back outside the danger area.

Work on the installation is only permitted in cases where the work is ordered and the person performing the work has been given instructions on how the machine is operated and what functions it has. The working area and danger area must also be closed off.

Cooling equipment such as ventilation slots must remain operational (i.e. they must not be covered).
It is possible that, due to the special nature of certain local conditions or in cases which are exceptional for other reasons, situations may arise which were not envisaged when this chapter was written. In such cases it is the responsibility of the operator to put in place special safety measures.

1.2.8 Safety instructions for maintenance

The term "maintenance" is used to describe measures relating to maintenance, inspection and repairs.

Maintenance work must only be carried out by suitably qualified personnel (i.e. specialist engineers).

Specialist engineers from HG Bearbeitungssysteme GmbH Huber & Grimme or under their supervision must only carry out mechanical and electrical repairs. These specialist engineers must also receive specific product training.

The adjustment and maintenance work described in the Operating Instructions as well as all inspection clearances, including requirements for replacing parts / components, must be carried out as specified.

Check all electrical parts on zero-potential before start working at electrical equipment. After finishing all works at the installation the customer approve the installation into operation.

For unauthorized persons it is prohibited to perform any kind of work on machinery or equipment belonging to the installation. The installation should be switched off for maintenance work and measures must be put in place to ensure that the installation cannot be switched back on accidentally or without due authorisation (the relevant switches should be locked).

It should be ensured that:
- The installation is switched off and has been checked to ensure it is voltage – free. In special cases it may be necessary to short-circuit the installation.
- Moving parts are stationary and switched off.
- It is not possible for stationary moving parts to start moving again while the maintenance work is being carried out.
- It is possible to accidentally switch the power supply back on while the machine is stopped for maintenance work.

It must be ensure that all consumables, fluid, oils etc. And any replacement parts are disposed of safely and responsibly.

Notes on maintenance during partial operation or manual operation
Mark the danger area with warning signs and use red/white safety chains or safety tape to close it off.

In each case the operator or the person appointed by the operator must judge whether the specified work can be performed safely without endangering any persons during operation. This judgment must be made on the basis of local conditions and specific requirements of the locale.

In order to avoid personal injury, only use suitable and calibrated tools and auxiliary equipment.

Always maintain a safe distance to rotating parts to prevent the risk of clothing, arms/fingers or hair being caught up in the machine.

Naked flames, extreme temperatures and flying sparks must be avoided in the proximity of cleaning agents and components which are flammable or could distort/deform under the effects of extreme temperatures (e.g. wood, plastic parts, oil, grease), as well as in or around electrical systems – otherwise there is a risk of fire. Harmful gases could also be generated, and/or insulations could be damaged.

Additional information for maintenance work on electrical assemblies:

- Only use genuine fuses with the prescribed current rating and tripping characteristics.
- Defective fuses must not be repaired or bridged. Always replace a faulty fuse with a new fuse of the same type.
- The installation must be switched off immediately if there are any faults/defects in the electrical power supply.
- Work on electronic components, other electrical components and operating media must only be carried out by employees of HG Bearbeitungssysteme GmbH Huber & Grimme or by electrical engineers under the supervision of these employees.
- Components on which maintenance work is to be carried out must be made voltage-free (if this is stipulated).
- Before carrying out any work at these components, first check that no voltage is present.
- The electrical parts of the installation should be inspected and tested on a regular basis. Any defects, such as loose connections, damaged lines/cables and worn contacts on contactors, must be rectified immediately.
- As a precautionary measure, all electrical equipment should be replaced when the service life limit is reached.
- If work needs to be carried out on live components then it is essential that a second person is present who can operate the mains connection switch / isolating switch in the event of an emergency. The second person must be trained in resuscitation measures.
- Only tools that are voltage before unplugging or connecting them (with the exception of mains connections, provided they do not carry dangerous contact voltages in the sense of the safety regulations).

1.2.9 Safety notes for machines with linear drive

Connected because of very strong magnetic fields of permanent magnets starting out as well as this one high ferromagnetic with that endangering know himself for health for appeals, directly (e.g. for persons with cardiac pacemakers) but also indirectly (e.g. fast motor movements and high thrusts) arise.

!!WARNING!!

- Clocks and magnetically data carrier e.g. credit cards, diskettes, mobile telephones etc. Keeping away.
- Carry work gloves at maintenance works.
- Strong attraction on magnetisable materials cause high squeezing danger during work at close range of the secondary parts (distance smaller than 100mm).
- No heavy metallic objects to the secondary parts would drive near.
- Always switching the machine off in the proceeding area (switching for certain unstressed) before work.
- Cleaning motor area of shaving regularly.
- Guarantee function the linear motor – cooling system.
- Persons with cardiac pacemakers must not work on the machine.
- Persons with metal implants must not work on the machine.

Safety devices (e.g. emergency switch, bumper etc.) must be checked in regular intervals.

1.3 Technical specifications

During operation, the HG Machining – System draw a power of around 7 – 80 kW. This power draw includes the servomotors and vacuum pumps. You will be sent more detailed specifications about the connection of your installation before it is delivered.

The tool changing milling spindle has an engine power of 2.5 kW – 13 kW and a rotation speed of max. 18000 – 62000 $^{1}/_{min}$ depending on type and manufacturer. It is temperature monitored (PTC / KTY) in order to avoid damage by overheating.
Also the status of the tool ninepin clamping is monitored.
The milling spindles are dynamically balanced with a quality grade Q<0,4. According to this the tool must be laid out.

The milling spindle **Perske VUS-50** and **Ibag HF90** have two spindle endings, an engine power of 1 – 2.5 kW and a rotation speed of max. 17500 – 24000 $^{1}/_{min}$. Cutting tools are clamped by dint collets up to max. 16mm diameter (depending on ninepin and type of the milling spindle).

The tool change magazine has 12 or 13 tool places. The tool can be changed manually or automatically.

The RENISHAW measuring probe MP15 or OMP40 is used for precise setting up and measuring work pieces and geometry.

The RENISHAW measuring probe TS27R is used for tool setting. For tool length measurements and broken tool detection, the tool is driven against the probe stylus.

The BLUM Lasersystem is an optical high precision measuring device for automatically tool setting and breakage detection in the working area of a machining centre. Tool setting and breakage detection of a rotating tool is possible. The utilized Laser is visible, has a wave length of 670nm (Nanometre) and an output capacity of less than 1mW. Thus ranges within Laser Protection Class 2.

The Laser Scanner SICK PLS / S3000 is an optical sensor that scans its surrounding area with infrared laser beams. It is used to monitor the danger area of a machine.

The ultrasonic generator changes the mains voltage into high tension and high frequency (from 35kHz to 20kHz). This electromagnetic vibration is changed into a mechanical vibration.

BRANKAMP monitoring systems are designed for use in the following industrial environment: EN61000-6-4, EN61000-6-2, and EN61000-4-2.

The INDUTEC minimal crowds cool smear system serves the fine order of viscous media. It is reduction of medium consumption to an absolute minimum under consideration of the environment.

Special notes for HG cutting systems:

- The cut is performed by dint of a special blade.
- The cutting fixture to process leather and slash foils parts are manufactured off material permeable to air in order to CAD-data.
- Before every cutis the possibility to measure the position and the contour of the fixture (allowance $^{+}/_{-}$ 0,02mm).
- An optical measuring device verifies the blade on abrasion, burst, and fouling before and after every cut.
- Spectral pyrometers detect the temperature of the inlaid skin before every cut.
- To be up to the mark of high accuracy it is necessary to keep the reference temperature of 20°C $^{+}/_{-}$ 2°C.
- The internal space of the casing is air-conditioned and in many places are sensors to monitor the temperature.
- All measurement data of temperature, allowance and abrasion are saved to reconstruct the conditions of the day of production.
- After machining a file with the saved data will be added to the available barcode.

Please refer to the relevant user manuals and operating instructions for all assembly components that are not described here.

1.3.1 Sound pressure level measurement according to DIN 45635

At full load, the sound pressure level at the control panel (on the front of the installation) is:
Average value per shift: L≈74 dB(A)
Maximum value: L≈78 dB(A)

Measuring conditions:
- Material used: PP / PE
- Tool used: Single cutter made of solid hard metal, pushing right
- Milling spindle speed: 20 000 rpm
- Ambient noise level: 70 dB(A)

The specified values are emission values and do not therefore also have to represent safe workplace values. There is no direct correlation between emission and immission levels, so it is not possible to draw any reliable conclusions as to whether or not additional protection measures are required. Factors that influence the current immission noise levels at the workplace include the acoustic properties of the room and other sources of noise that may be present (e.g. the number of machines and other adjacent working processes). The permissible workplace values may also vary from country to country. However, this variation should enable the user to form better assessment of the potential hazard and risks involved.

2.0 Site requirements

Certain site requirements will need to be met in order to set up your installation.

2.1 Load-bearing capacity of the floor

The installation will need to be supported on a reinforced concrete floor (quality B25) with a load-bearing capacity of at least 2500 $^{kg}/_{spm}$.

2.2 Access dimensions

For an HG machining system, the door opening should be at least 3.5 m wide and 4m high.

2.3 Pneumatic connection

A compressed air connection is required for operation of the installation.
The supply line should have a diameter of at least $^{3}/_{4}''$.
The operating pressure must have at least 6 bar (87 psi).
The air should be cleaned, dried and free of oil.
At 7 bar (101 psi) the air consumption is around 0.4 $^{m^3}/_{min}$.

2.4 Electrical connection

The installation must be supplied with 3 phases + neutral conductor 3x400V 50Hz $^{+}/_{-}$ 10%.
The protection of each phase must be carried out with lead fuses.
A separate system ground must be connected to the machine ground.
The HG machining system should be connected at a 63 A CEKON socket.
These specifications apply to a standard installation. You will be sent more detailed specifications about the connection of your installation before it is delivered.

3.0 Transport

It is absolutely essential that every HG machining system is protected against hard impacts and vibrations when it is transported to the installation site, as these will adversely the accuracy of the installation.
Only specialist engineers from HG Bearbeitungssysteme GmbH Huber & Grimme must carry out assembly and disassembly work.

The machining system is designed to be transported via fork – lift truck or crane. Special brackets are provided for the attachments.

For transporting individual parts with a fork – lift truck, the truck should have a load bearing capacity of at least 4 to. and a fork length of 1800mm.

A crosshead should be used to spread the crane cables when transporting the installation with crane.

The entire area of the Z-axis must not be involved in the transport.

Depending on the type, the weight of a Standard version installation is approximately 3000 to 15000kg.

4.0 Safety

HG machining systems must be installed and taken into operation only by employees of the supplier.

The installation must be operated only by personnel who have been trained accordingly by the supplier and have read and understood these Operating Instructions.
Any manipulation of the machinery that could compromise the safety of the operating personnel or put them at risk is prohibited. All malfunctions should be communicated to the supplier.

Please refer to the relevant user manuals and operating instructions for assembly components.

4.1 Main switch

The main switch must be set to "0" for all repair and maintenance work on the installation. Always secure it with a padlock.

4.2 EMERGENCY STOP

Several EMERGENCY STOP switches are located on the installation and on the hand terminals. The electrical supply to the entire installation is switched off if one of the EMERGENCY STOP switched on the HG machining system is pressed, including the Motors, milling spindle and vacuum system. The CNC control system is not affected by this.

After an EMERGENCY STOP switch has been pressed, pull on the mushroom-shaped button or turn it left to release it. However, before doing this always make sure that the dangerous situation has been rectified.

4.3 Restriction of the axis

The axis traverse paths are limited by the CNC.

!!CAUTION!! (Only versions with linear drives / absolute measuring system)
After switching on the system, approach the reference point first, as otherwise the axis restrictions will not be activated.

4.4 Milling tools

Always ensure that only tools in a balanced state are used. The tools must have a minimum balancing quality of 2.5 $^{g}/_{mm}$.

The maximum permissible tool and tool fixture speed must not be exceeded (see manufactures instructions and details on the tool).

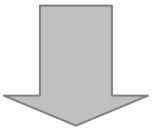
4.5 Safety guidelines for the Blum measuring device

Avoid eye contact at all times!
Never look directly into the beam – not even with optical equipment!
All employees working on the machine must be informed about dangers of looking directly at the laser and prolonged direct irradiation onto skin!
The laser should only be available for use for the duration of the measurement!
Use the protective doors to block access to the laser when it is not in use!

Attach a laser warning notice in a highly visible location on the machine.

4.6 Indications for problem solution

Indications for the problem solution in the business and for the choice of the right operating conditions:

	Reducing	Being increased
		
Blade wear	Pushing forward per tooth	Cut speed Toughness of the hard metal Blade phase Stability of the machine
Blade outbreak	Cut speed	Pushing forward per tooth Wear resistance of the hard metal Blade phase
Carbonised	Cut speed Pushing forward per tooth	Wear resistance of the hard metal Coolant pressure
Bad surfaces Quality of the work piece	Pushing forward per tooth Cut depth Blade phase	Cut speed Stability of the machine Spin angle Concentricity of rotary grinder
Vibrations Rattling	Cut depth Cut speed Blade phase	Stability of the machine Stability of the tension
Tilting outbreak at this work piece	Pushing forward per tooth Cut depth Blade phase	Material quality
The overload 2 machine	Cut speed Pushing forward per tooth Cut depth	

5.0 Maintenance and lubrication

5.1 General information about maintenance

5.1.1 Vacuum filter

The vacuum filter is located on the rear side of machine.

- Check the filter element of the vacuum system on a weekly basis. Clean it as required or replace it with a new one if necessary.
- Filter G11/4, type 0 100

5.1.2 Compressed air

It is essential that only dried and cleaned air is used.
The compressed air monitoring system is set **6 bar (87 psi)**. It will send an error message if the pressure of the compressed air drops below.

- Check the humidifier cartridge at the maintenance unit on a daily basis and empty it as required.

5.1.3 Swarf / chips and waste

Please ensure that no swarf / chips or other types of waste are blown underneath the installation.

- Swarf and chips should be removed from underneath the installation every 2 – 4 weeks.
- This time should be reduced accordingly if there is more waste to be removed.
- On installation with linear drive motors, regularly clean the area around the motor to remove any swarf or chips.

5.1.4 Guides, racks and feet spindles

- Clean the guide rails, racks and fees spindles on a weekly basis with a dry cloth (never use compressed air for this purpose). A visual inspection, a check of the backlash and a check of the running noise has to be done weekly. In case of malfunctions the supplier must be notified and the machine must be switched off! Malfunctions must be rectified immediately!

5.1.5 Vacuum pump

- Check the oil level on a daily basis.
- The first oil change is required after 100 operating hours.
- After that the oil should be changed every 500 to 2000 operating hours or every six months, whichever comes first (in the event of severe contamination it may be necessary to change the oil earlier).
- The oil filter type W712 should also be changed every time the oil is changed
- Recommended type of oil: Shell Rimula X30

5.1.6 Central lubrication

5.1.6.1 Automatic central lubrication

With automatic central lubrication, each type of machine is adjusted at the factory to the correct lubrication intervals and lubricant quantities. The lubrication pump is equipped with a pressure switch. As a result, the pressure gets too low if the fill level reaches the minimum level or one of the lubricating hoses is defective, and an error message indicating a "Fault in the central lubrication system" is shown on the screen.
Check the metering distributor and supply lines for correct operation on a weekly basis and check the fill level against the min. / max. marks on the reservoir.

- When refilling the central lubrication system it is essential to ensure that no dirt is allowed to enter the reservoir. Clean the reservoir if it does become dirty.
- Recommended type of oil: Shell Tonna S 220

Never mix different types of grease and oil!

5.1.6.2 Manual central Lubrication

The manual central lubrication should be actuated at least once at the beginning of each shift. Check the metering distributor and supply lines for correct operation on a weekly basis and check the fill level against the min. / max. marks on the reservoir.

- When refilling the central lubrication system it is essential to ensure that no dirt is allowed to enter the reservoir. Clean the reservoir if it does become dirty.
- Recommended lubricating oil: Shell Tonna S 220

Never mix different types of grease and oil!

5.1.7 Gears

5.1.7.1 A-axis, B-axis, C-axis (Type Portal / Gantry)

These axes are operated by AC-Hollow-shaft Servo-System. This system is maintenance free.

5.1.7.2 A-axis, B-axis, C-axis (Type Rt - ... - 1400)

Check the oil levels on a monthly basis.

The oil change intervals of the gear **NCT 301** are depending on the ambient conditions. The oil should be changed by increased pollution degree to be seen in the inspection glass. Recommended oil: Oil according to **DIN 51506 VBL 220 centi-Stog** e.g. Esso NUTO 220.

The oil change intervals of the gear **NCT 201** are depending on the ambient conditions. The oil should be changed by increased pollution degree to be seen in the inspection glass. Recommended oil: Oil according to **DIN 51506 VBL 220 centi-Stog** e.g. Esso NUTO 220.

5.1.7.3 Rotary table (Type G-Rt-...)

This axis is operated by index drive.

Special technical requirements that the user must comply with:

- During operation can still represent a risk of injury or even death if it is improperly operated, assembled, maintained or used by untrained personnel.
- From time to time check basic position.
- Check mechanical installation every 6000 operating hours.
- Check lubrication and oil level.
- Every 500 operating hours the ball ring must be greased.

Specific instructions can be found in relevant installation/user manual.

5.1.8 Cooling systems for milling spindle rather linear drives

- Check the liquid level on a weekly basis and refill the system as required. Coolant additive **IBAG XTREMECOOL**.
- Check the coolant for pollution and deposits on a monthly basis.
- At the cooling unit a temperature of **24°C (75.2°F)** must be adjusted.

Coolant additive IBAG XTREMECOOL: Ratio of a mixture 1:10
(1 litre of Greencool and 10 litres "water")
Use warm and clean water of approx. 20°C (68°F). Durability approx. 6 months depending on water quality.
System cleaner IBAG TST:
For cleaning and disinfection of the coolant circulation. Add portion of the system cleaner before the renewal of the old liquid (1%, 0,3 litres of cooling water) and at least having had an effect 24 hours. A continuing to work is interim possible without hindrance.

Special notes:
XTREMECOOL: Injurious to health when swallowing
TST: Provokes the eyes, respiratory organs and the skin
Prefer to the relevant safety datasheet!
At contraventions no guarantee is taken.

5.1.9 Milling spindle

5.1.9.1 Type Perske VUS-50

- After every 1000 operating hours the spindle should be greased with 3g fat.
- Before greasing clean the smearing nipple well, so that no dirt can come into the opening of the nipple.
- For greasing only use fat on Lithium basis with Ester oil consistency nr.2, e.g. **Klüber – Isoflex LDS 18**.
- Higher amount of fat results higher temperature of the bearings and might damage your spindle.

5.1.9.2 Type Jäger KS4 – 40000rpm or KS5 – 30000rpm

The milling spindle should be overhauled generally every 2 years in the one layer business. The time is reduced correspondingly at multiple – shift operation. To ensure the process liability, it is necessary that all screw connections are tightened and that all tubes are not bended.

- Clean the milling spindle daily. Use the relevant cleaning – set, a clean and soft brush or a clean and soft cloth to clean the milling spindle (use not any compressed air).
- Examine the values of the compressed air weekly and adjust it as required:

Function	**Setting value**	
Collet chuck	6 bar	87 psi
Cone cleaning	4,5 bar	65.3 psi
Airseal	1 – 1,5 bar	14.5 – 21.75 psi

- Examine the coolant on deposits monthly.
- Replace damaged tool ninepins immediately to avoid damages at the spindle.
- Leave the Airseal (jamming air) switched on and a tool ninepin busy so that no dirt can penetrate into the gaskets of the spindle.

5.1.9.3 Type IBAG HF80 / HF90 / HF100 / HF120

The milling spindle should be overhauled generally every 2 years in the one layer business. The time is reduced correspondingly at multiple – shift operation. To ensure the process liability, it is necessary that all screw connections are tightened and that all tubes are not bended.

- Clean the milling spindle daily. Use the relevant cleaning – set, a clean and soft brush or a clean and soft cloth to clean the milling spindle (use not any compressed air).
- Examine the values of the compressed air weekly and adjust it as required:

Spindle type	**Function**	**Setting value**	
HF80 / HF90	Airseal	1 bar	14.5 psi
HF80	Cone cleaning	1 bar	14.5 psi
HF100	Airseal	1,5 bar	21.75 psi
HF100	Lubrication	5 bar	72.5 psi
HF120	Airseal	2,5 bar	36.25 psi
HF80 / HF100 / HF120	Collet chuck	6 bar	87 psi

- Examine the oil level in the tank of the oil mist lubricator weekly and top it up as required. Use only lubricating oil type **Mobil – Oel DTE – Light**.
- Examine the coolant system on deposits monthly.
- Replace damaged tool ninepins immediately to avoid damages at the spindle.
- Leave the Airseal (jamming air) switched on and a tool ninepin busy so that no dirt can penetrate into the gaskets of the spindle.
- A new spindle and one that has been not used for a while must be run in slowly. Let the spindle run for about 30 minutes at 25% of maximum rpm. Afterwards for 15 minutes at 50%. Then increase slowly to the maximum rpm.

!!ATTENTION!!
Attention has to be paid to that a tool ninepin is always tense in the milling spindle. He milling spindle must not get high revolved without tense tool ninepin. For protecting the milling spindle a tool ninepin or a protection ninepin always should be tense so that no dirt / dust can reach into the gaskets of the milling spindle.
Examine the instep cones of the tool ninepin at every change of shifts on wear and solid! A worn out or loosened instep cone leads to insufficient seat of the tool ninepin in the spindle and can lead to a solving of the tool ninepin during operation!

Specific instructions can be found in relevant installation/user manual.

5.1.10 Tool magazine Gantry – System

Tool ninepins can be too tight up to thirteen.
The magazine is maintenance-free.

5.1.11 Tool change unity Portal – System

Tool ninepins can be too tight up to twelve.

- Examine weekly the fit of the tool ninepins in the magazine.
- Clean the leadership weekly and grease at the smearing nipples (fig. 5.1.11) provided for this. Recommended lubrication grease **Klüber – Isoflex LDS18**.

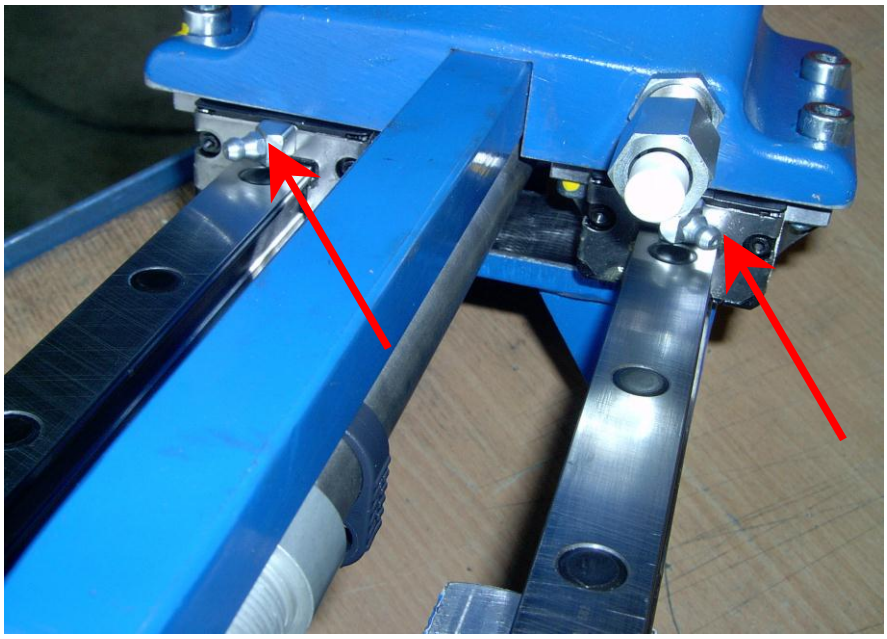


Fig. 5.1.11

5.1.12 Measuring probe systems

5.1.12.1 Renishaw measuring probe OMP40 and MP15

- The RENISHAW measuring probe MP15 or OMP40 is used for precise setting up and measuring work pieces and geometry.
- The OMP40 does not need to be accelerated for activation.
- The MP15 is fixed mounted and sends the signals via cable to the interface.
- The power supply to the Renishaw probe is provided via a battery, which should be checked weekly for correct operation.
- The probe must always run with optimum concentricity.
- When checking the geometry, the measuring probe must be located in its programmed location.
- Renishaw measuring probes should only be serviced rarely, as the accuracy of measurements will be impaired if dirt, swarf/chips or fluids get into the inside of the measuring probe. Therefore it is important to keep all parts clean and free of lubricants and oil. Use a dry or damp cloth for cleaning. He OMP40 is protected against liquids. Periodically check the cables and connections for signs of damage, corrosion or loose connections.

Specific instructions can be found in relevant installation/user manual.

5.1.12.2 Renishaw measuring probe TS27R

- The RENISHAW measuring probe TS27R is used for tool setting. For tool length measurements and broken tool detection, the tool is driven against the probe stylus.
- Do not allow excessive waste material to build up around the probe.
- Keep all electrical connections clean.

Specific instructions can be found in relevant installation/user manual.

5.1.13 Laser Scanner Sick PLS / S3000

The PLS / S3000 is an optical sensor that scans its surroundings with infrared laser beams. This safety device is maintenance-free. The front panels of the transmission and receiver unit should be cleaned regularly, using a clean and soft brush and then a clean and soft cloth. Do not open the sensor. It does not contain any user-serviceable parts.
After switching on the machining system the monitored area has to be entered once!

Specific instructions can be found in relevant installation/user manual.

5.1.14 Laser measuring system (Blum)

The Blum laser measuring system is a high-precision optical measuring system for automatic tool measurements under operating conditions in the working area of machining systems.
The measuring system uses a visible laser that operates with a wavelength of 670nm (Nanometres) and has an output power less than 1mW. It is classified accordingly as a Class 2 Laser.

5.1.14.1 Safety guidelines

- Avoid eye contact at all times.
- Never look directly into beam – not even with optical equipment.
- All employees working on the machining system must be informed about the dangers of looking directly at the laser and prolonged direct irradiation onto the skin.
- The laser should only be available for use for duration of the measurement.
- Use the protective doors to block access to the laser when it is not in use.
- Attach a laser warning notice in a highly visible location on the machine.

5.1.14.2 Maintenance

- Carry out regular maintenance of the filters and water separators to ensure that the Airseal remains clean. Immediately replace any dirty Airseal lines or damaged seals/gaskets.
- The system should be cleaned at regular intervals depending on how dirty it gets.

Specific instructions can be found in relevant installation/user manual.

5.1.16 Minimal smearing system

- The compressed air must be absolutely cleaned.
- To cleaning the spraying heads may no metallic, sharp-edged but only soft brushes to be used.
- Pieces of equipment which are soiled by the use must thoroughly be washed. This is correct in special measure, if the spraying head is changed.
- The pressure vessel only may get filled with suitable media. Depending on the type of the medium special safety measures has to be followed.
- No aggressive substances like acid, lye, cleaning agents, chemicals or something like that may be sprayed. Please consult the manufacture if you have doubts, which medium is suitable. Menzel Metallchemie GmbH, Tel.: 0049 (0)7331 98780

Filling of the pressure vessel:

- Close the shut-off valve for the medium.
- Close the valve of the pressured air to depressurise the container.
  Attention! The system can only be refilled when depressurised!
- Open the sealing of the container and top it up with the medium to the maximum filling level.

Special notes:

- For cleaning a neutrally cleaner should be used.
- The gaskets in the spraying heads consist of Viton. There may be s danger of corrosion by using abrasively cleaners.

5.2 Engaging overload couplings

The coupling are set to a carriage load of 250kg on the Y-axis, of 350 – 480kg on the X- and U-axis of the HG Portal – System and respectively.
In the event of these load been exceeded the couplings separates the motor from the mechanic components, the control voltage drops and a message is displayed on the screen.

a) Switch off the system completely. The main switch must be set to "0" for all repair work on the installation. Always secure it with a padlock.
b) Remove the left guide protector and front end plate **(Fig. 5.2a)**.
c) Apply an open-ended or ring spanner size 19 **(Fig. 5.2a)**.
   !!NOT if Wiesel drive units have been used!!
d) Apply an Allen key size 10 at the other side **(Fig. 5.2b)**.
e) Turn the Allen key in one direction until the coupling can be heard to click in **(Fig. 5.2b)**.
f) Remove the tool and close the cover.
g) Switch the system on and perform the reference run.
h) Move the axis to the position printed on the label.
i) The carriage and the axis marking must be aligned **(Fig. 5.2c)**.
   Example:
   Position the X-, U- or Y-axis **(Fig 5.2c)**.
j) The markings are offset by 10mm, proceed as described in items **a) – i)**.

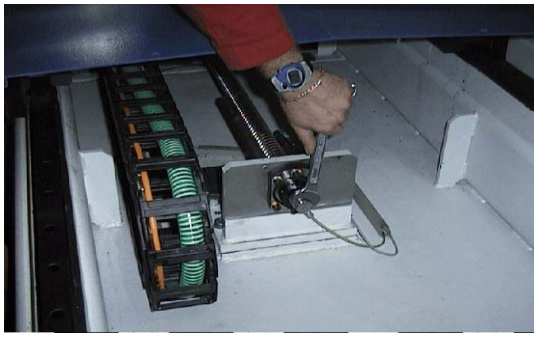


Fig. 5.2a

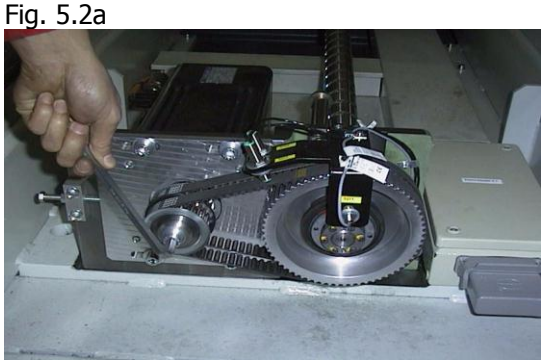
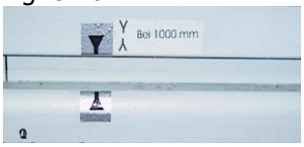


Fig. 5.2b



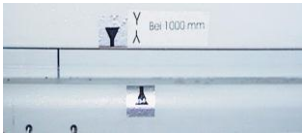


Fig. 5.2c
(NOT with external absolute Encoder)

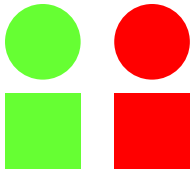
5.3 Lubrication and maintenance plan

Lubrication and maintenance plan		
How often?	**What needs to be done?**	**Notes / tools**
Daily	Maintenance unit (compressed air): check the dehumidifier cartridge on the maintenance unit, drain and empty as required.	Minimum 6 bar Optimum 7 bar
	Clean the tool changer magazine with tool fixture and the milling spindle	Cleaning – Set Brush
	Renishaw measuring probe Check the concentric running Clean the parts from oil and lubricants	Dial gauge $^{1}/_{100}$ mm Clean with dry or wet cloth
	Laser Scanner Sick PLS Clean the transmission and receiver unit	Brush (soft) Cloth (soft)
Weekly	Automatic central lubrication Check the operation of the metering distributor and supply lines and fill level in the reservoir. Clean the reservoir if necessary.	Recommended lubricating oil: Shell Tonna S 220; **Different types of grease and oil must not be mixed!**
	Vacuum pumps Check the oil level and top up with oil as required	Recommended oil: Shell Rimula X30 SAE30
	Milling spindle Check the screw joint of tubes Check the setting of the Airseal, oil level	Airseal Max. 1,5 bar (21.75 psi) Mobil Oel DTE Light
	Remove the filings and the waste from inside and underneath the installation	
	EXPERT rotary table Check oil level	Petroleum viscosity CLP460
	Check lubrication of tool changer	Recommended grease: Klüber – Isoflex LDS18
	Check the level of the cooling medium in the cooling unit of the milling spindle and top up as required	Unsoiled water with app.20°C Additional specification: XTREMECOOL Mixing ratio 1:10
	Check the filter elements of the vacuum system (on the rear side of the machine). Clean or replace as required.	G$1^{1}/_{4}$ Type: 0 100
	Guides, racks and feed spindles: remove the covers and clean the guide rails, racks and feed spindles	dry cloth (do not use compressed air)
	Visual inspection, check backlash of feed spindles; Check running noise vertical feed spindle	
	Check oil level maintenance unit braking guides and top up as required	Festo 152811 OFSW-32

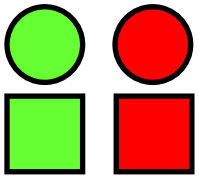
Lubrication and maintenance plan		
How often?	**What need to be done?**	**Notes / tools**
2-4 Weeks	Renishaw measuring probe Visual inspection cables and plugs of damage	Installation- and operating instructions Cap. 3
	Blum laser measuring device Check the airseal of cleanness (check the dehumidifier cartridge on maintenance unit, drain and empty as required). Check function of the shutter Clean system	Operating instructions BLUM Cap.7 Maintenance
Monthly	Cooling unit milling spindle Check the cooling medium of deposit For details see also datasheet / operating instructions GREENCOOL	Deposit, clean the whole circulation with TST system cleaner for 24 hrs. 1% system cleaner in the cooling medium
	Check oil levels of the gears for the rotary axes	
	Visual inspection of the mechanical installations e.g. gates, maintenance doors etc.	To move freely NO damage
14 Weeks ($^1/_4$ year)	EXPERT rotary table Check bias of V-belt drive Check basic position	Mounting and operating instructions EXPERT Cap.3 and 4
	Linear drive	Cooling medium XTREMECOOL
500 – 2000 Operating Hours	Vacuum pumps Renewal of the oil charge, at heavy pollution earlier. Change oil filter	Recommended oil: Shell Rimula X30 SAE 30 Filter: Type W 712
500 Operating Hours	EXPERT rotary table Lubrication	Mounting and operating instructions EXPERT
2000 Operating Hours	BLUM laser measuring probe Pneumatic unit	Operating instructions BLUM Type P87.0634 Kap.7.5
6000 Operating Hours	EXPERT rotary table Maintenance of the mechanical installation Guides of gates	Mounting and operating instructions EXPERT Changing oil tank

6.0 Operation

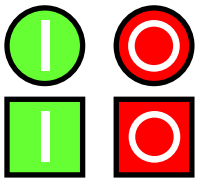
6.1 Signs and symbols



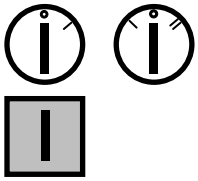
Lamps green / red



Illuminated pushbutton green / red

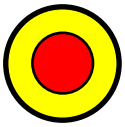


Pushbutton green / red



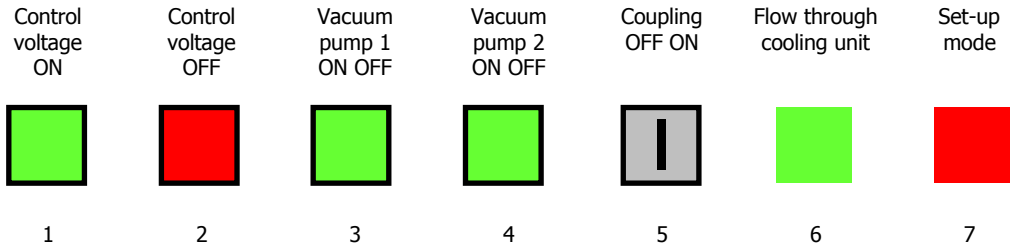
Key switch

Selector switch



EMERGENCY OFF

6.2 Control console operator panel



1 Control voltage ON
By actuating this button the supply voltage of the machining system is switched on and the machine gets into closed-loop control. If this lamp is illuminated the control voltage is ON.

2 Control voltage OFF
By actuating this button the supply voltage of the machining system is switched off. The CNC-control remains however further under voltage. If this lamp is illuminated the axes are disabled.

!!ATTENTION!!
For all works at electrical components turn the main switch in position OFF.

3 Vacuum pump 1 ON OFF
Activate this button one time the vacuum pump is switched on. If this lamp is illuminated the vacuum pump is in operation. With a further activation the vacuum pump is switched off.

4 Vacuum pump 2 ON OFF (optional)
Activate this button one time the vacuum pump is switched on. If this lamp is illuminated the vacuum pump is in operation. With a further activation the vacuum pump is switched off.

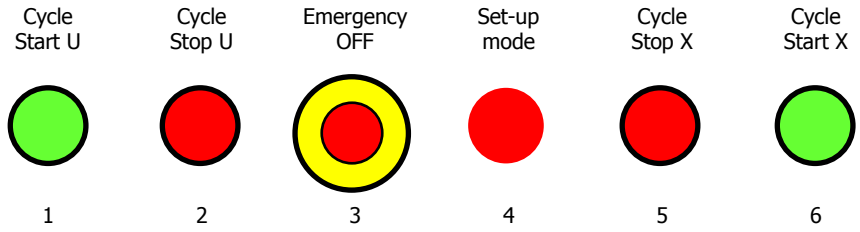
5 Coupling OFF ON (optional)
By turning the key switch in position **I** the axes can be synchronised and can be moved in a coupled way.

6 Flow through cooling unit
If this lamp is illuminated the cooling unit is in operation.

7 Set-up mode
If this lamp is illuminated the set up mode is activated.

6.3 Control console machine

6.3.1 Control console front



1 Cycle Start U

By activating this button the relative CNC program cycle is started. If this lamp is illuminated the program cycle is started.

2 Cycle Stop U

By activating this button the relative CNC program cycle is stopped. If this lamp is illuminated the program cycle is stopped. The cycle may be resumed by pressing the **CYCLE START** button.

3 Emergency OFF

4 Set-up mode

If this lamp is illuminated the set up mode is activated.

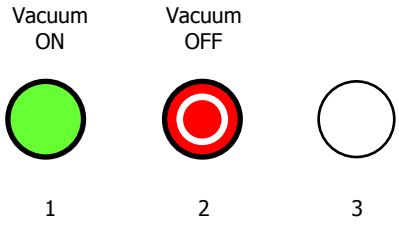
5 Cycle Stop X

By activating this button the relative CNC program cycle is stopped. If this lamp is illuminated the program cycle is stopped. The cycle may be resumed by pressing the **CYCLE START** button.

6 Cycle Start X

By activating this button the relative CNC program cycle is started. If this lamp is illuminated the program cycle is started.

6.3.2 Control console table

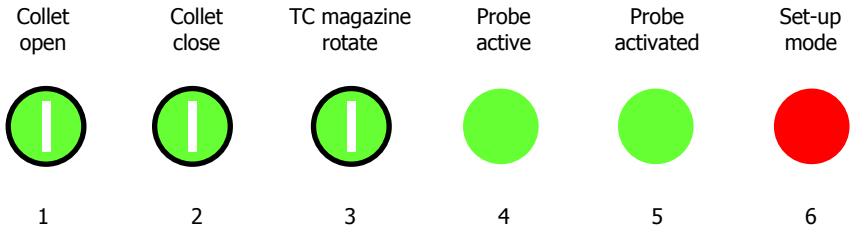


1 Vacuum ON
By activating this button the vacuum will be activated. This lamp is illuminated when the adjusted set value is reached.

2 Vacuum OFF
By activating this button the vacuum will be deactivated and while pressing the button the blast air is activated.

3 Reserve

6.3.3 Control console tool changer (TC) portal system



1 Collet open
By activating this button the collet of the milling spindle will be opened.
Prerequisite:
- Operating mode switch in position SET-UP MODE
- TC manual activated on the control panel

!!!ATTENTION!!!
Hold the inserted tool.

2 Collet close
By activating this button the collet of the milling spindle will be closed.
Prerequisite:
- Operating mode switch in position SET-UP MODE
- TC manual activated on the control panel

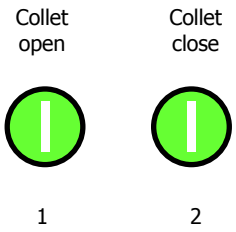
3 TC magazine rotate
This function is used to assemble the TC-magazine. The magazine is rotated further by one position per press of the button.
Prerequisite:
- TC manual activated on the control panel

4 Probe active
If this lamp is illuminated the measuring probe is active.

5 Probe activated
If this lamp is illuminated the measuring probe is activated.

6 Set-up mode
If this lamp is illuminated the set up mode is activated.

6.3.4 Control console tool changer (TC) gantry system

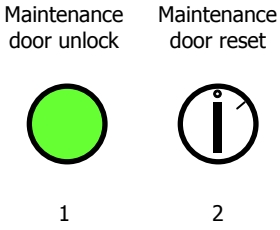


1 Collet open
By activating this button the collet of the milling spindle will be opened.
Prerequisite:
- Operating mode switch in position SET-UP MODE
- TC manual activated on the control panel

!!!ATTENTION!!!
Hold the inserted tool.

2 Collet close
By activating this button the collet of the milling spindle will be closed.
Prerequisite:
- Operating mode switch in position SET-UP MODE
- TC manual activated on the control panel

6.3.5 Control console maintenance door



1 Maintenance door unlock
By activating this button the notification is given that the maintenance door will be unlocked. When all movements of the axes are stopped the maintenance door will be unlocked and the lamp is illuminated.

2 Maintenance door reset
Turn the key switch right to lock the closed door and to enable the controls to go into automatic mode.

6.4 Control panel

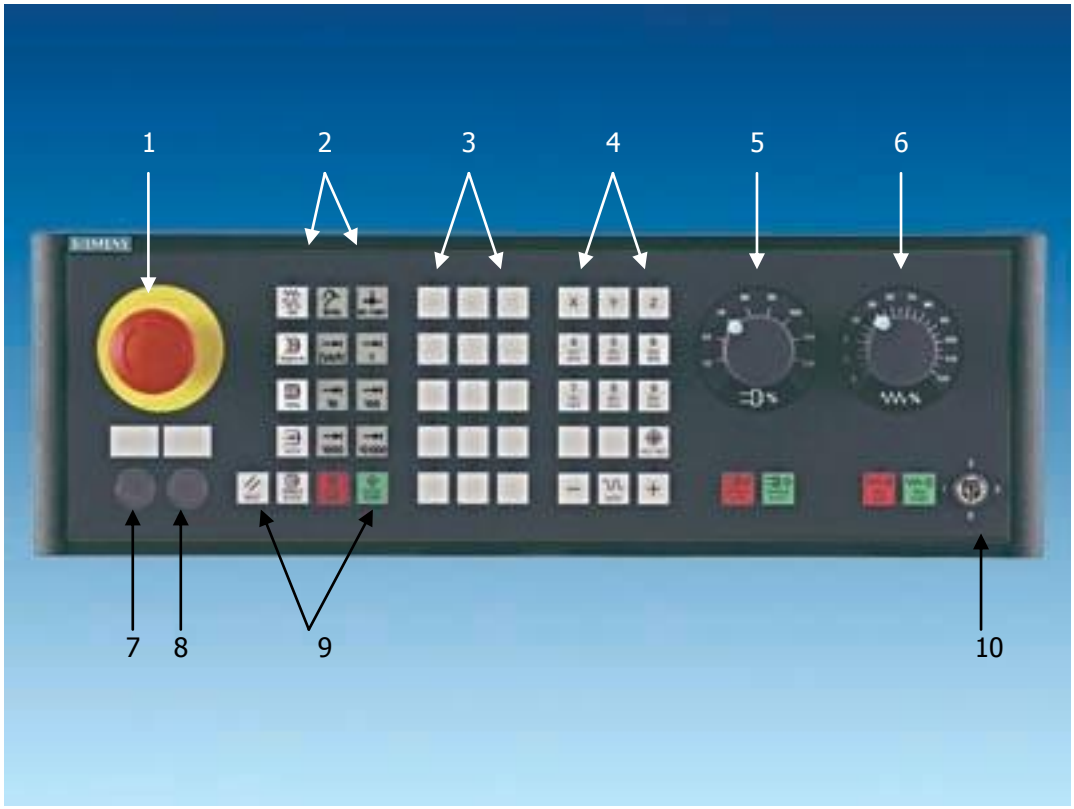


Fig.6.4 Control panel

1 EMERGENCY OFF

By actuating the EMERGENCY off switch the machining system is cut off from the power line, including servo-motors, milling spindle and vacuum pump. The control system however continues to be powered.

2 Operation modes

These buttons are to select the different operational modes like Manual, MDA, reference run, TC manual etc.

3 Function buttons

These buttons are to select the different functions like HT6 active, M01, basic position etc.

4 Movement

These buttons are to move the axis, which is selected, in operational mode MANUAL. **–** button is for minus direction, **+** button for plus direction. **Rapid** is to increase the movement.

5 Spindle potentiometer

Turn this rotary control to regulate the speed of the milling spindle in per cent from 50% to 100% of the reference value.

!!ATTENTION!!

The maximum permissible tool and tool fixture speed must not be exceeded.

6 Feed potentiometer

Turn this rotary control to regulate the feed speed of the axes in per cent from 0% to 120% of the reference value.

7 Supervisor Mode

Optional

8 Operating mode switch

When the key switch is set to PRODUCTION the machining system may only be used for production purposes. Manual, MDI, reference run and JOG operating modes are not possible to choose. The running of a CNC program is only possible when the following prerequisites are given:

a) Closed maintenance doors
b) Set minimum value for vacuum reached (vacuum monitoring)

When the key switch is set to SET UP the axes buttons of the control panel are enabled. Manual, MDA, reference run and JOG operating modes are possible. CNC programs may be run without vacuum and monitoring functions.

For working in the correct and prescribed mode the operator is fully responsible. The operator of the plant has to guarantee that only trained personal may work in the operation mode SET-UP MODE, which are urgently informed about the risks and working conditions! The operation mode SET-UP MODE makes high demands on the operating personal, because of the existing danger of mobile machine parts!

9 Function buttons

- Reset — Acknowledge messages or stop processes
- Single Block — to process CNC-programs step – by – step
- Cycle Stop — to stop CNC-programs
- Cycle Start — to start CNC-programs

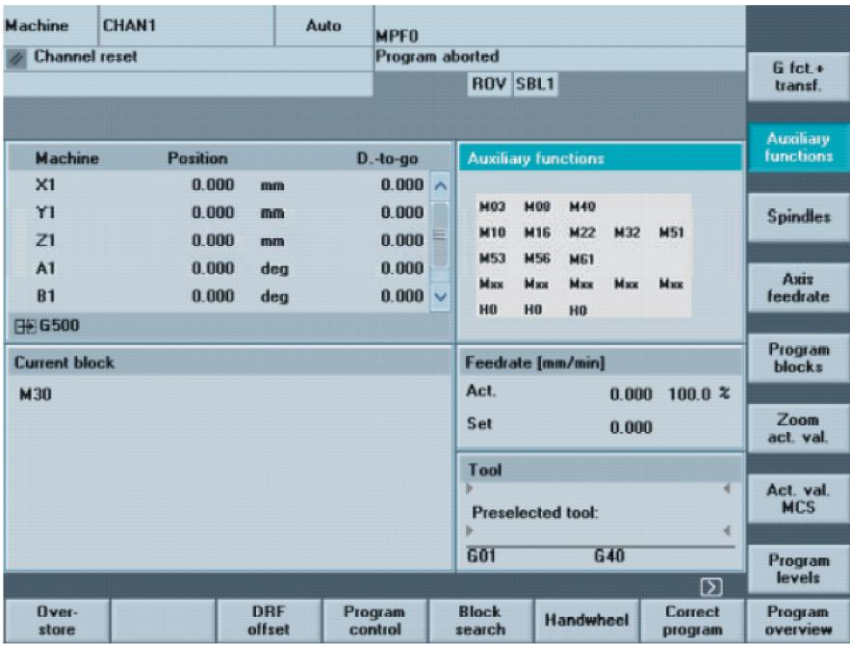
10 Key switch for safety levels

This key switch is to enable different levels of access to the CNC control unit. For each level you need following keys

Position 0	=	No key necessary
Position 1	=	Black key
Position 2	=	Green key
Position 3	=	Red key

!!ATTENTION!!
If the switch layout in this Operating Instruction does not correspond to that on your machine, the machine labeling is to be regarded as definitive!
The switch layout of the control panel is included in the wiring diagram.

6.5 HMI (Human Machine Interface)



The use of the HMI is performed by context – menus. A context is a working area where similar tasks belonging to a same group may be performed.

For more details refer to the relevant operating instructions or in the internet
http://www.automation.siemens.com/doconweb

6.6 Handheld terminal HT6

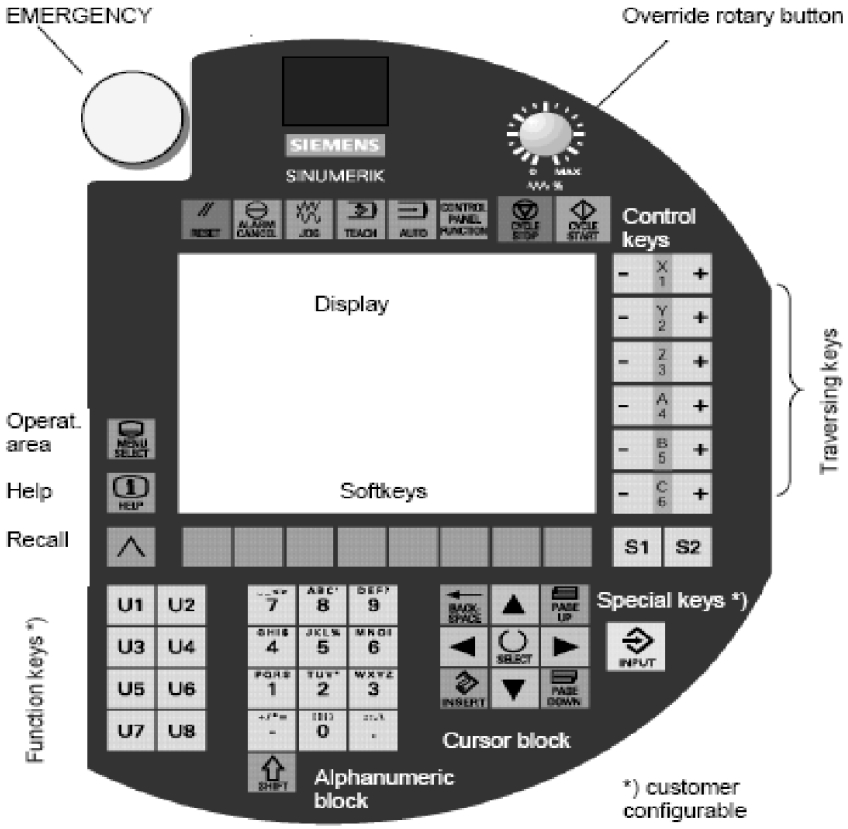


Fig.6.6 Handheld terminal

The user interface of the HT6 is made up of:

- EMERGENCY OFF switch
- Override – rotary button
- Control keys with machine function
- Display
- (JOG -) Traversing keys
- Keys „Operating area", „Help" und „Recall"
- Soft keys
- Special keys S1 / S2
- Function keys – Block U1 ... U8
- Alphanumeric – Block with shift key
- Cursor block
- Input – key

For more details refer to the relevant operating instructions or in the internet
http://www.automation.siemens.com/doconweb