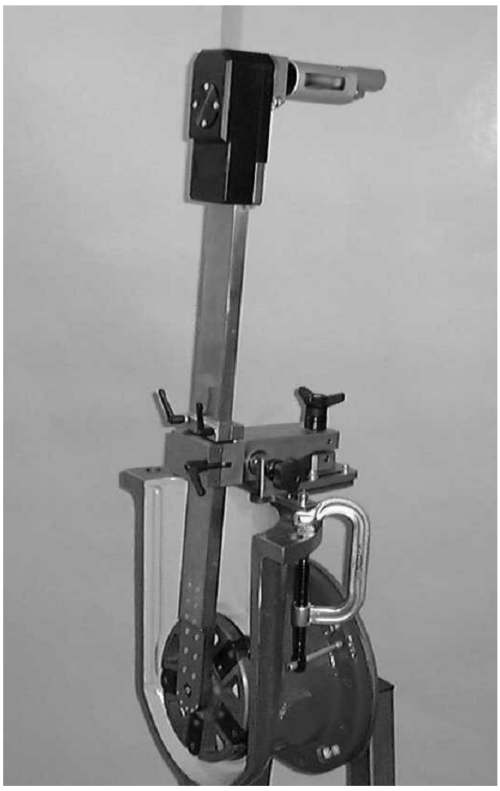
CE

VM1350-1500-1600

Gate Valve Grinding and Lapping Machine

OPERATING MANUAL

ORIGINAL INSTRUCTIONS



CLIMAX
Portable Machining & Welding Systems

P/N 89800
May 2017
Revision 2

CLIMAX | BORTECH CALDER H&S TOOL

At CLIMAX, we value your opinion.

For comments or questions about this manual or other CLIMAX documentation, please e-mail documentation@cpmt.com.

For comments or questions about CLIMAX products or services, please call CLIMAX or e-mail info@cpmt.com. For quick and accurate service, please provide your representative with the following:

- Your name
- Shipping address
- Telephone number
- Machine model
- Serial number (if applicable)
- Date of purchase

CLIMAX World Headquarters

2712 East 2nd Street
Newberg, Oregon 97132 USA

Telephone (worldwide): +1-503-538-2815
Toll-free (North America): 1-800-333-8311
Fax: 503-538-7600

H&S Tool World Headquarters

715 Weber Dr.
Wadsworth, OH 44281 USA

Telephone: +1-330-336-4550
Fax: 1-330-336-9159
hstool.com

CLIMAX | H&S Tool (UK Headquarters)

Unit 7 Castlehill Industrial Estate
Bredbury Industrial Park
Horsfield Way
Stockport SK6 2SU, UK

Telephone: +44 (0) 161-406-1720

CLIMAX | H&S Tool (European Headquarters)

Am Langen Graben 8
52353 Düren, Germany

Telephone: +49 (0) 242-191-7712
E-mail: info@cpmt.de

CLIMAX | H&S Tool (Asia Pacific Headquarters)

316 Tanglin Road #02-01
Singapore 247978

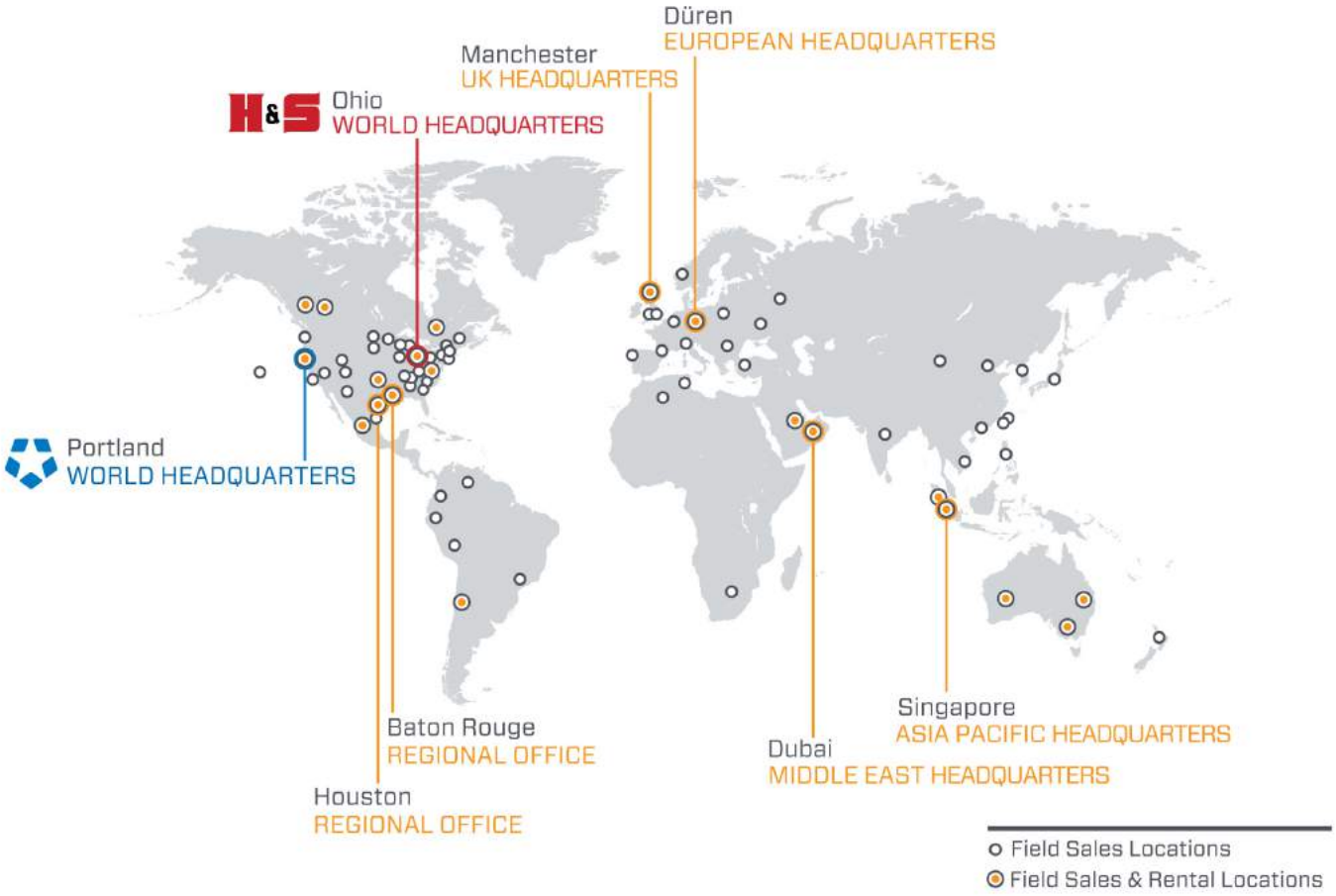
Telephone: +65-9647-2289
Fax: +65-6801-0699

CLIMAX | H&S Tool (Middle East Headquarters)

Warehouse #5, Plot: 369 272
Um Sequim Road
Al Quoz 4
PO Box 414 084
Dubai, UAE

Telephone: +971-04-321-0328

CLIMAX GLOBAL LOCATIONS



CE DOCUMENTATION

According to Machinery Directive 2006/42/EG, Appendix IIA

The manufacturer:	**CLIMAX GmbH** **Am Langen Graben 8** **D-52353 Düren / Germany**
hereby declares that the machine described below: year of construction:	**Gate Valve Grinding Machine** **Model VM 1350(S), VM1500(S), VM1600(S)** **Machine-No.: 440-1104** **2011**

complies with the health and safety protection requirements of the following EC-directives:

- Machine directive 2006/42/EG
- Low voltage directive 2006/95/EG
- Directive for electromagnetic compatibility 2004/108/EG

Harmonised standards used

DIN EN 792-8:2001+A1:2008	Hand-held non electric power tools - Safety requirements – Part 8: Sanders and Polishers
DIN EN ISO 14121-1	Safety of Machinery – Risk assessment – Part 1: Principles
DIN EN 349:1993+A1:2008	Minimum distance to avoid squeezing of body sections

Contact: CLIMAX GmbH
Franz Werheid
Am Langen Graben 8
D-52353 Düren

Düren, 20.03.2009

Dipl. Ing. Franz Werheid
Director Engineering

Willi Saric
Managing Director

LIMITED WARRANTY

CLIMAX Portable Machine Tools, Inc. (hereafter referred to as “CLIMAX”) warrants that all new machines are free from defects in materials and workmanship. This warranty is available to the original purchaser for a period of one year after delivery. If the original purchaser finds any defect in materials or workmanship within the warranty period, the original purchaser should contact its factory representative and return the entire machine, shipping prepaid, to the factory. CLIMAX will, at its option, either repair or replace the defective machine at no charge and will return the machine with shipping prepaid.

CLIMAX warrants that all parts are free from defects in materials and workmanship, and that all labor has been performed properly. This warranty is available to the customer purchasing parts or labor for a period of 90 days after delivery of the part or repaired machine or 180 days on used machines and components. If the customer purchasing parts or labor finds any defect in materials or workmanship within the warranty period, the purchaser should contact its factory representative and return the part or repaired machine, shipping pre-paid, to the factory. CLIMAX will, at its option, either repair or replace the defective part and/ or correct any defect in the labor performed, both at no charge, and return the part or repaired machine shipping prepaid.

These warranties do not apply to the following:

- Damage after the date of shipment not caused by defects in materials or workmanship
- Damage caused by improper or inadequate machine maintenance
- Damage caused by unauthorized machine modification or repair
- Damage caused by machine abuse
- Damage caused by using the machine beyond its rated capacity

All other warranties, express or implied, including without limitation the warranties of merchantability and fitness for a particular purpose are disclaimed and excluded.

Terms of sale

Be sure to review the terms of sale which appear on the reverse side of your invoice. These terms control and limit your rights with respect to the goods purchased from CLIMAX.

About this manual

CLIMAX provides the contents of this manual in good faith as a guideline to the operator. CLIMAX cannot guarantee that the information contained in this manual is correct for applications other than the application described in this manual. Product specifications are subject to change without notice.

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

FIGURE **PAGE**

LIST OF FIGURES (CONTINUED)

FIGURE **PAGE**

LIST OF TABLES

TABLE **PAGE**

This page intentionally left blank

1 INTRODUCTION

IN THIS CHAPTER:

1.1 How to use this manual

This manual describes information necessary for the setup, operation, maintenance, storage, shipping, and decommissioning of the VM1350-1500-1600.

The first page of each chapter includes a summary of the chapter contents to help you locate specific information. The appendices contain supplemental product information to aid in setup, operation, and maintenance tasks.

Read this entire manual to familiarize yourself with the VM1350-1500-1600 before attempting to set it up or operate it.

1.2 Safety alerts

Pay careful attention to the safety alerts printed throughout this manual. Safety alerts will call your attention to specific hazardous situations that may be encountered when operating this machine.

Examples of safety alerts used in this manual are defined here[1]:

DANGER

indicates a hazardous situation which, if not avoided, ***WILL*** result in death or severe injury.

WARNING

indicates a hazardous situation which, if not avoided, ***COULD*** result in death or severe injury.

1. For more information on safety alerts, refer to *ANSI/NEMA Z535.6-2011, Product safety Information in Product Manuals, Instructions, and Other Collateral Materials*.

⚠ CAUTION

indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

indicates a hazardous situation which, if not avoided, could result in property damage, equipment failure, or undesired work results.

1.3 GENERAL SAFETY PRECAUTIONS

CLIMAX leads the way in promoting the safe use of portable machine tools and valve testers. Safety is a joint effort. You, the end user, must do your part by being aware of your work environment and closely following the operating procedures and safety precautions contained in this manual, as well as your employer's safety guidelines.

Observe the following safety precautions when operating or working around the machine.

Training – Before operating this or any machine tool, you should receive instruction from a qualified trainer. Contact CLIMAX for machine-specific training information.

Risk assessment – Working with and around this machine poses risks to your safety. You, the end user, are responsible for conducting a risk assessment of each job site before setting up and operating this machine.

Intended use – Use this machine in accordance with the instructions and precautions in this manual. Do not use this machine for any purpose other than its intended use as described in this manual.

Personal protective equipment – Always wear appropriate personal protective gear when operating this or any other machine tool. Flame-resistant clothing with long sleeves and legs is recommended when operating the machine. Hot chips from the workpiece may burn or cut bare skin.

Work area – Keep the work area around the machine clear of clutter. Restrain cords and hoses connected to the machine. Keep other cords and hoses away from the work area.

Lifting – Many CLIMAX machine components are very heavy. Whenever possible, lift the machine or its components using proper hoisting equipment and rigging. Always use designated lifting points on the machine. Follow lifting instructions in the setup procedures of this manual.

Lock-out/tag-out – Lock-out and tag-out the machine before performing maintenance.

Moving parts – CLIMAX machines have numerous exposed moving parts and interfaces that can cause severe impact, pinching, cutting, and other injuries. Except for stationary operating controls, avoid contact with moving parts by hands or tools during machine operation. Remove gloves and secure hair, clothing, jewelry, and pocket items to prevent them from becoming entangled in moving parts.

Sharp edges – Cutting tools and workpieces have sharp edges that can easily cut skin. Wear protective gloves and exercise caution when handling a cutting tool or workpiece.

Hot surfaces – During operation, motors, pumps, HPUs, and cutting tools can generate enough heat to cause severe burns. Pay attention to hot surface labels, and avoid contact with bare skin until the machine has cooled.

1.4 MACHINE-SPECIFIC SAFETY PRECAUTIONS

Eye hazard – This machine produces metal chips during operation. Always wear eye protection when operating the machine.

Sound level – This machine produces potentially harmful sound levels. Hearing protection is required when operating this machine or working around it. During testing, the machine produced the sound levels[1] listed in Table 1-1.

TABLE 1-1. SOUND LEVELS

	Motor
Sound power	>85 dBA
Operator sound pressure	>85 dBA
Bystander sound pressure	>85 dBA

Hazardous environments – Do not operate the machine in environments where potentially explosive materials, toxic chemicals, or radiation may be present.

Machine mounting – Do not operate the machine unless mounted to a workpiece in accordance with this manual. If mounting the machine in an overhead or vertical position, do not remove hoist rigging until the machine is mounted to the workpiece in accordance with this manual.

1. Machine sound testing was conducted in accordance with European Harmonized Standards EN ISO 3744:2010 and EN 11201:2010.

1.5 RISK ASSESSMENT AND HAZARD MITIGATION

Machine Tools are specifically designed to perform precise material-removal operations.

Stationary Machine Tools include lathes and milling machines and are typically found in a machine shop. They are mounted in a fixed location during operation and are considered to be a complete, self-contained machine. Stationary Machine Tools achieve the rigidity needed to accomplish material-removal operations from the structure that is an integral part of the machine tool.

In contrast, Portable Machine Tools are designed for on-site machining applications. They typically attach directly to the workpiece itself, or to an adjacent structure, and achieve their rigidity from the structure to which it is attached. The design intent is that the Portable Machine Tool and the structure to which it is attached become one complete machine during the material-removal process.

To achieve the intended results and to promote safety, the operator must understand and follow the design intent, set-up, and operation practices that are unique to Portable Machine Tools.

The operator must perform an overall review and on-site risk assessment of the intended application. Due to the unique nature of portable machining applications, identifying one or more hazards that must be addressed is typical.

When performing the on-site risk assessment, it is important to consider the Portable Machine Tool and the workpiece as a whole.

1.6 RISK ASSESSMENT CHECKLIST

The following checklist is not intended to be an all inclusive list of things to watch out for when setting up and operating this Portable Machine Tool. However, these checklists are typical of the types of risks the assembler and operator should consider. Use these checklists as part of your risk assessment:

TABLE 1-2. RISK ASSESSMENT CHECKLIST BEFORE SET-UP

	Before set-up
☐	I took note of all the warning labels on the machine.
☐	I removed or mitigated all identified risks (such as tripping, cutting, crushing, entanglement, shearing, or falling objects).
☐	I considered the need for personnel safety guarding and installed any necessary guards.
☐	I read the machine assembly instructions (Section 3.3).
☐	I created a lift plan, including identifying the proper rigging, for each of the setup lifts required during the setup of the support structure and machine.
☐	I located the fall paths involved in lifting and rigging operations. I have taken precautions to keep workers away from the identified fall path.
☐	I considered how this machine operates and identified the best placement for the controls, cabling, and the operator.
☐	I evaluated and mitigated any other potential risks specific to my work area.

TABLE 1-3. RISK ASSESSMENT CHECKLIST AFTER SET-UP

	After set-up
☐	I checked that the machine is safely installed (according to Section 3) and the potential fall path is clear. If the machine is installed at an elevated position, I checked that the machine is safeguarded against falling.
☐	I identified all possible pinch points, such as those caused by rotating parts, and informed the affected personnel.
☐	I planned for containment of any chips or swarf produced by the machine.
☐	I followed the required maintenance checklist (Section 5.1) with the recommended lubricants (Section 5.2).
☐	I checked that all affected personnel have the recommended personal protective equipment, as well as any site-required or regulatory equipment.
☐	I checked that all affected personnel understand and are clear of the danger zone.
☐	I evaluated and mitigated any other potential risks specific to my work area.

This page intentionally left blank

2 OVERVIEW

IN THIS CHAPTER:

2.1 Features and components

The Gate Valve Grinding and Lapping Machine, Models VM1350-1500-1600 (in the following called Gate Valve Grinder or machine) are specifically designed for grinding and lapping of gate valve seats. The VM 1350 for Gate Valves size DN 40 – DN 350, the VM 1500 for size DN 80 DN 500 and the VM 1600 for size DN 80 DN 600. The models with an additional "…S" written behind the model number are designed for grinding only. They don't include the lapping equipment.

Options are also described. The basic machine includes an electric or a pneumatic drive system. Optionally, the machine can be delivered with electric and pneumatic drive system. However, both drive systems are described in this operating manual.

Also the grinding tools are described from DN 40 – DN 600, but the different models don't include all sizes of tools.

The lapping is also described, however the "…S" models (grinding only) don't include the lapping equipment.

DANGER

The Gate Valve Grinder should only used as prescribed. If the Gate Valve Grinder is not used accordingly, safe operation is not guaranteed.

Any danger to people and all damage to the Gate Valve Grinder resulting from misuse will be the customer's responsibility.

Any modifications of the Gate Valve Grinder made by the customer will be at their own responsibility. This applies especially to any changes that do not comply with the safety requirements of the Gate Valve Grinder.

TABLE 2-1. COMPONENTS

Item	Description
1	Drive Motor
2	Gear
3	Machine arm
4	Drive shaft with ball joint
5	Tools (grinding and lapping tools)
6	Tilting adapter

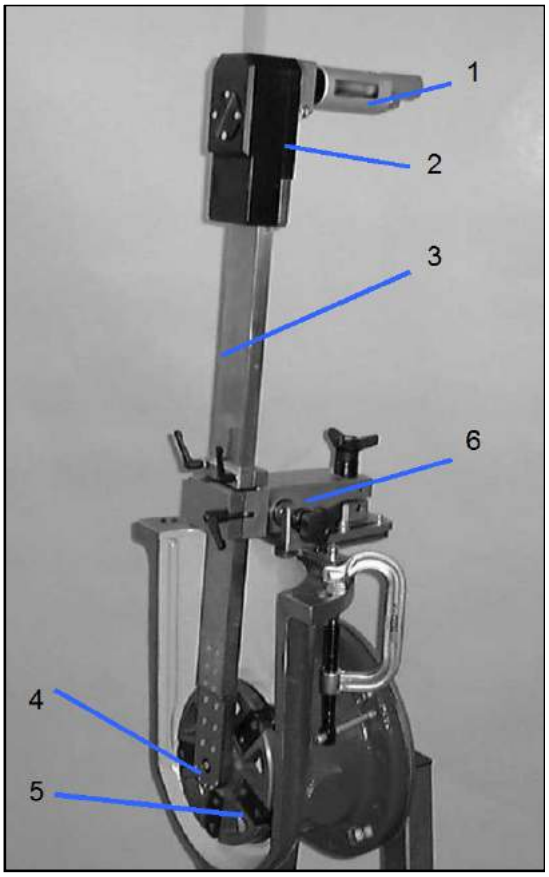


FIGURE 2-1. VALVE MACHINE WITH PNEUMATIC DRIVE MOTOR

The Gate Valve Grinder is driven by an electric or a pneumatic motor, which is mounted to the upper gear housing. Both drives are adapted to the machine by means of a drive flange with clamping screw. Depending on the application, the Gate Valve Grinder can be delivered with an electric and pneumatic drive unit. The machine arm connects the gear drive with the machine spindle. During operation, the machine spindle is driven by a chain drive system. The tools are adapted to the machine spindle by means of a drive shaft with ball joint and a self-aligning coupling. This ensures that the tools are automatically aligned during machine operation.

Planet grinding and lapping wheels (in the following called planet grinding wheels) are used as tools.

The planet grinding wheels consist of:

- a ball joint coupling for self-alignment of planet wheels
- a planet wheel
- planet arms with integrated spindle bearing system
- grinding or lapping discs to put onto planet arms
- abrasives for grinding (for lapping operation, a lapping paste is used instead of abrasives)

Each planet grinding wheel covers a wide working range. To adjust the wheel to the machining diameter, the planet arms can be moved into the planet wheel guides. The planet arms are clamped with one screw quick clamping system.

The abrasives are put onto the grinding discs which are mounted to the planet arms. This system ensures a quick change from grinding with abrasives to CBN-grinding discs or to lapping discs.

For smaller gate valve seats (DN 40, 50 ,65), solid grinding discs are provided (model VM1350(S) only).

The solid grinding discs consist of:

- a ball joint coupling with ball joint for self-alignment of grinding discs
- solid grinding disc
- abrasives

The solid grinding discs are covered with self-adhesive abrasives.

Before machine operation, the Gate Valve Grinder has to be mounted to the gate valve body by means of a tilting adapter with clamping elements (included in basic scope of supply). With this tilting adapter, the machine can easily be set up and centred to the valve seat. In addition, it enables the operator to apply the required grinding pressure by tilting the machine against the valve seat and to take the machine system out to change the abrasives without dismantling the tilting adapter and its clamping elements.

The machine configuration with electric drive motor is started with the trigger button. The machine spindle is rotating as long as the trigger button is being pushed. For permanent operation, the trigger button can be locked.

The spindle speed can be adjusted at the top of the electric drive motor.

The machine configuration with pneumatic drive is started by pushing the red safety button of the maintenance unit. This maintenance unit is available as an option or it can be supplied by the customer.

To increase the speed range, the electric drive motor is equipped with a 2-stage mechanically switching gear.

Due to the fact that the pneumatic drive motor has already a wide range of adjustment, an additional gear system is not necessary.

The Gate Valve Grinder and accessories are delivered in high-quality, durable carrying cases with foam inlet for safe transportation and storage.

2.2 SPECIFICATIONS

TABLE 2-2. SUB-COMPONENT MASS

Unit	Specification
Machining Data	
Machining range VM1350	DN40 – DN350
Machining range VM1500	DN80 – DN500
Machining range VM1600	DN80 – DN600

TABLE 2-2. SUB-COMPONENT MASS

Unit	Specification
Machining Data	
Submerging depth VM1350	600 mm
Submerging depth VM1500	800 mm
Submerging depth VM1600	1000 mm
Max. speed (electric / pneumatic)	700 U/min / 375 U/min
Power requirements	
Connection (electric / pneumatic)	230 V, 50 Hz or 110 V, 60 Hz / 12 l/s - 6,3 bar
Drive power (electric / pneumatic)	685 W (at 1000 W Pauf)/ 550 W
Weights	
Basic machine without tools (VM1350)	11 kg
Weight of machine case VM1350, VM1500	33 kg
Weight of machine case VM1600	45 kg
Weight of accessory case VM1350	21 kg
Weight of accessory case VM1500	32 kg
Weight of accessory case VM1600	32 kg

3 SETUP

IN THIS CHAPTER:

This section describes the setup and assembly procedures for the VM1350-1500-1600 Gate Valve Grinding and Lapping Machine.

3.1 Receipt and inspection

Your CLIMAX product was inspected and tested prior to shipment, and packaged for normal shipment conditions. CLIMAX does not guarantee the condition of your machine upon delivery.

When you receive your CLIMAX product, perform the following receipt checks:

1. Inspect the shipping containers for damage.
2. Check the contents of the shipping containers against the included invoice to make sure that all components have been shipped.
3. Inspect all components for damage.

Contact CLIMAX immediately to report damaged or missing components.

NOTICE

Keep the shipping container and all packing materials for future storage and shipping of the machine.

The machine ships from CLIMAX with a heavy coating of LPS 3. The recommended cleaner is LPS PreSolve Orange Degreaser. All parts must be cleaned before use.

To protect the equipment, the cases should always be locked during transportation. To avoid an uncontrolled opening of the case, the locks are firmly tightened. It is recommended to push the case's cover down to get the case easily opened.

⚠ CAUTION

The weight of the cases should not be underestimated. The cases are to be secured during transportation to avoid any harm to people or damage to other equipment by parts falling out of the case.

Especially during work at high levels, all parts are to be secured against dropping. This is also important for parts that are not directly used for the operation.

TIP: case should always be closed and secured against dropping.

After transportation, check all parts for visible damages before connecting the machine to power supply again.

FIGURE 3-1. MACHINE CASE (HERE VM 1350; INCLUDING SOME OPTIONS)

FIGURE 3-2. ACCESSORY CASE (HERE VM 1350)

FIGURE 3-3. MACHINE CASE (HERE VM 1500; INCLUDING SOME OPTIONS)

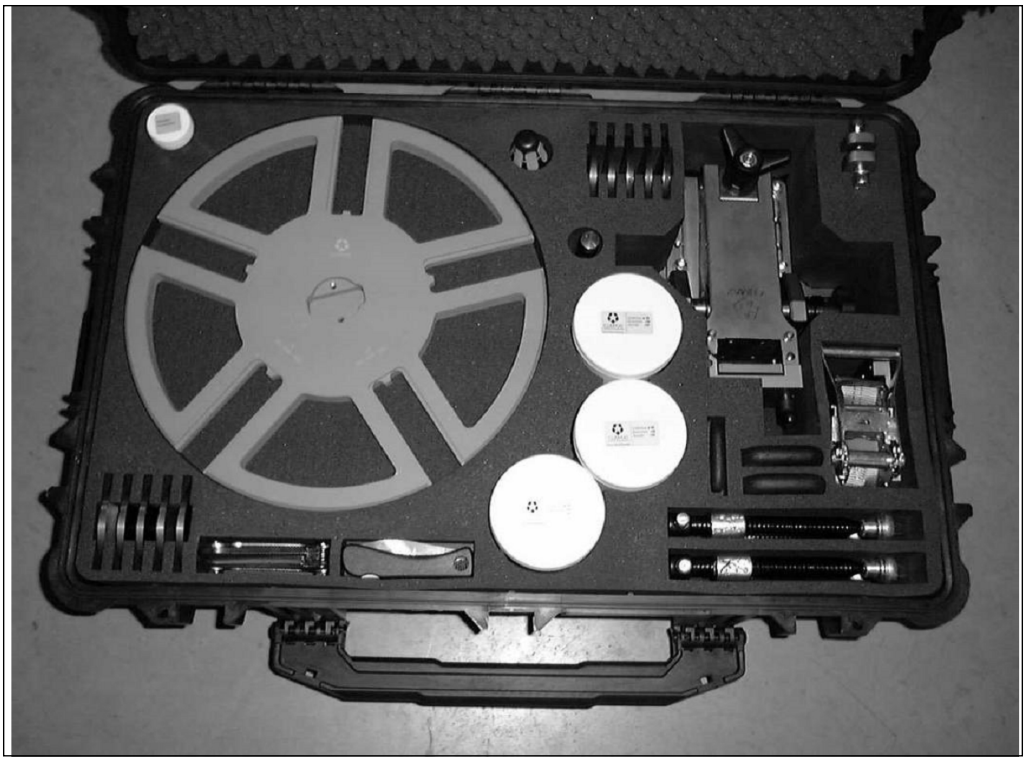


FIGURE 3-4. ACCESSORY CASE (HERE VM 1500)

3.2 SELECTING AND PREPARING TOOLS

3.2.1 Selecting tools for planet wheels DN 80–DN 600

Select tool size according to application (working diameter, width of seat).

To assure a definite rotation of the grinding discs, the planet arms should be adjusted that the pitch circle of the grinding discs (centre point of grinding discs) is smaller than the inner diameter of the valve seat to be ground.

- Selection of proper tool components according to the maximum machine diameter table that follows:
- Planet wheel of applicable size
- Planet arms of applicable size
- Grinding discs (no need if spindle diameter 30 mm is sufficient)
- abrasives (size and grain according to application) – no need for lapping operation and grinding operation with CBN-grinding discs
- proper screws

The basic scope of supply includes the following grinding discs:

- 5 pcs. grinding discs, diameter 50 mm (4 mm thick, steel)
- 5 pcs. CBN-grinding discs, diameter 50 mm (detectable by CBN-coating)
- 5 pcs. lapping discs, diameter 30 mm (5 mm thick, cast iron)

- 5 pcs. lapping discs, diameter 50 mm (5 mm thick, cast iron)

Additionally for the VM 1500 and VM1600:

- 5 pcs. grinding discs, diameter 80 mm (6 mm thick, steel)
- 5 pcs. lapping discs, diameter 80 mm (6 mm thick, cast iron)

For machines with the additional "…S" (only grinding) there are no lapping disks included in the scope of supply.

⚠ CAUTION

Make sure that always proper grinding discs are being used, otherwise the machine or the valve body can be damaged.

If grinding discs are used for lapping operation, they will be damaged.

If already used lapping discs are utilised for grinding operation, the required accuracy cannot be guaranteed and the valve seat might be damaged.

Planet	Grinding	Diameter of planet wheel [mm]							
arms	discs	100		135		220		380 (VM 1500 and VM 1600)	
[Typ]	[mm]	min	max	min	max	min	max	min	max
I	30	101	136	136	172				
ength 30 mm	50	121	156	156	192				
II	30			192	222	220	310	380	460
ength 60 mm	50			212	242	240	330	380	480
	80			242	272	270	360	380	510
III	30					330	400	410	550
ength 115 mm	50					350	400	430	550
	80					380	400	450	550
IV									
ength 190 mm	50							560	670
	80							580	700

The diameters mentioned above are valid for recommended combinations and ranges. However, in some cases it is possible to extend the grinding range.

Planet arm IV had to be clamped with both of the clamps.

Maximum machining diameters for planet wheels DN 80 – DN 600

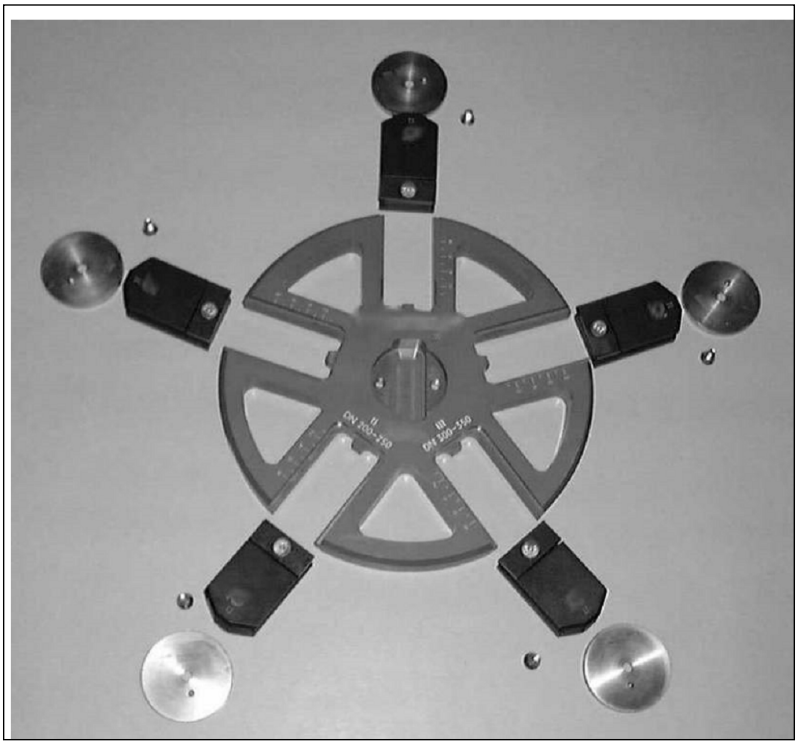


FIGURE 3-5. TOOL COMPONENTS FOR PLANET GRINDING WHEEL

Figure 3-5 shows a planet wheel dia. 220 mm, planet arms size II, CBN-grinding discs dia. 50 mm.

3.2.2 Preparing tools for DN 80–DN 600

If necessary, clean the grinding discs with oil-free cleaning fluid (i.e. lacquer thinner).

Put abrasives onto grinding discs (not applicable for lapping operation and grinding with CBN-grinding discs).

During assembly of selected tool components, observethe applicable torque for screws. If too low, components get loose, if too high, screw might be damaged.

Do the following:

- Put grinding discs onto grinding spindles of planet arms by using counter sunk screws M5 x 8 – 8.8-ZN according to DIN 7991. Make sure that the pin for transmitting the torque is locked. All mating surfaces have to be cleaned prior to assembly; otherwise the accuracy will be influenced.

- Move planet arms into the guides on the planet wheel. Also here, all mating surfaces have to be clean.
- Planet arms are positioned and clamped onto planet wheel by means of the counter sunk screws mentioned above (planet arm Type I has 2 screws, planet arm Type IV has 2 clamps). A scale is provided to position the planet arms on each guide. To assure a definite rotation of the grinding discs, the pitch circle of the discs should be smaller than the inner diameter of the seat to be ground.

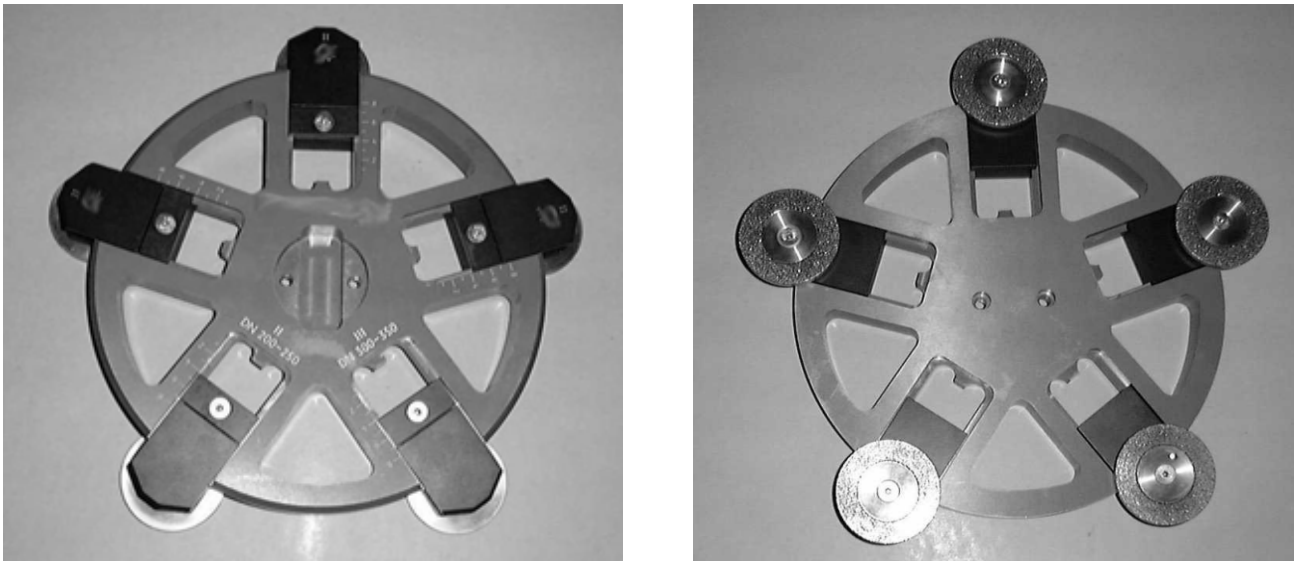


FIGURE 3-6. PLANET GRINDING WHEEL, COMPLETELY ASSEMBLED

3.2.3 Selecting solid grinding discs for DN 40–DN 65

For grinding of seats DN 40 to DN 65 (only VM 1350), solid grinding discs are provided.

The standard scope of supply includes the following solid grinding discs.

TABLE 3-1. DIAMETERS FOR SEATS AND GRINDING DISCS

Seat Ø DN [mm]	Grinding discs Ø [mm]
40	55
50	65
65	85

The solid grinding discs consist of the following components:

- drive shaft with ball joint and coupling
- solid grinding discs
- abrasives

FIGURE 3-7. SOLID GRINDING DISC COMPONENTS

For the assembly of the grinding discs, socket head screws M5 x 8-8.8-Zn according to DIN 6912 are provided.

After cleaning, the bottom surface of the solid grinding discs is covered with self-adhesive abrasives.

3.3 MOUNTING THE TILTING ADAPTER ON THE VALVE BODY

The mounting of the tilting adapter onto a valve body depends on the application. The different types of application are:

- Gate Valve Bodies with flange (mounting with base plate and standard clamping elements)
- Gate Valve Bodies without flange (mounting with collar band system)

3.3.1 Mounting the tilting adapter on valves with flange

Select all clamping elements for mounting the base plate:

- tilting adapter
- base plate
- forged steel clamps (2 pieces)
- socket head screws M8 x 20-8.8-Zn according to DIN 912 (4 pieces)
- washers Ø 8,4-140HV-Zn according to DIN 433 (4 pieces)
- clamping pads (2 pieces)
- socket head screws M10 x 20-8.8-Zn according to DIN 912 (2 pieces)
- washers Ø 10,5-140HV-Zn according to DIN 433 (2 pieces)

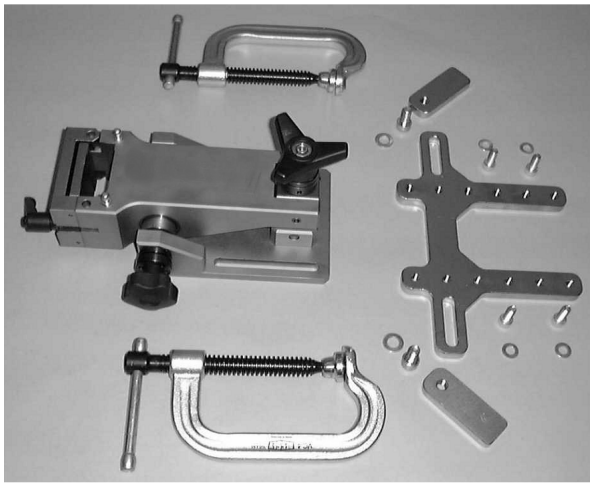


FIGURE 3-8. TILTING ADAPTER WITH BASE PLATE AND STANDARD CLAMPING ELEMENTS

Do the following:

1. Connect the clamping pads to the base plate by using socket head screws M10x20-8.8-Zn according to DIN 912 and washers Ø 10.5-140HV-Zn according to DIN 433.

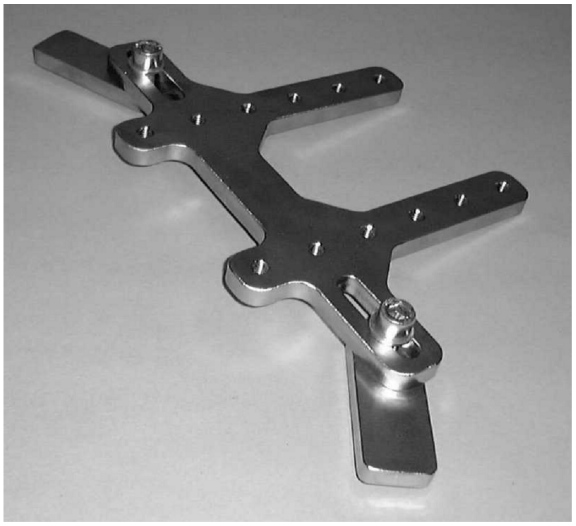


FIGURE 3-9. CONNECTING CLAMPING PADS TO BASE PLATE

2. Connect the base plate to the flange of the gate valve body.

FIGURE 3-10. MOUNTING OF BASE PLATE TO FLANGE BY MEANS OF FORGED STEEL CLAMPS

NOTICE

If there are threaded studs in the flange and these cannot be removed, there may not be enough room for the tilting adapter. As an option there are extended clamping pads available. These offset the tilting adapter above the studs so that the machine can be assembled as described in the following without getting problems with the threaded studs.

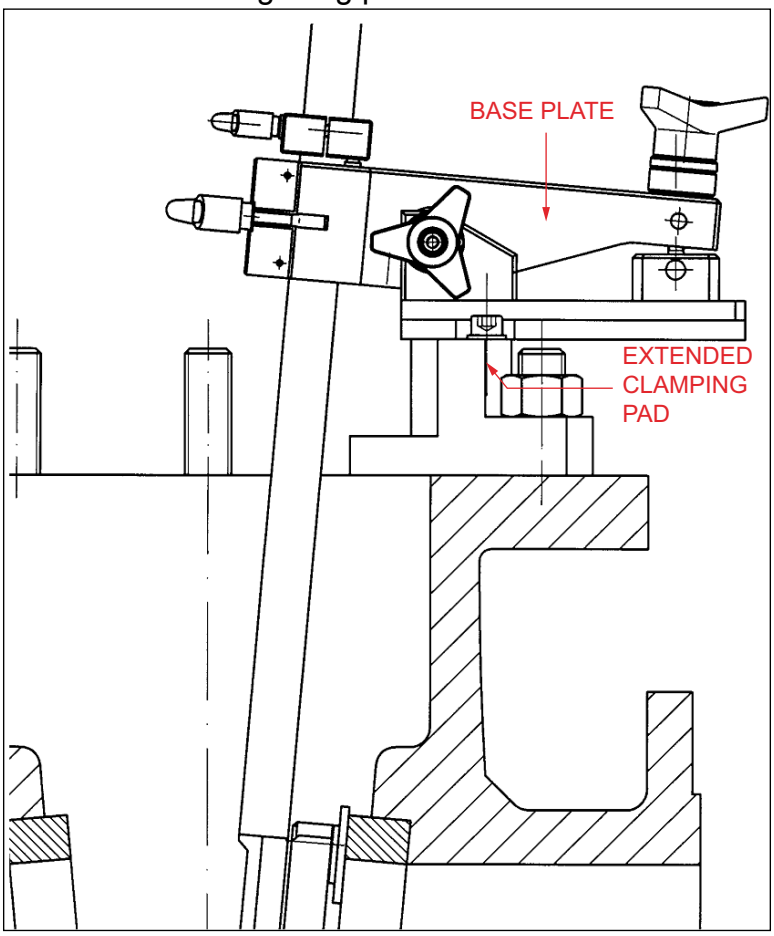


FIGURE 3-11. OPTIONAL EXTENDED CLAMPING PADS

3. Connect the tilting adapter onto base plate using 4 socket head screws M8 x 20-8.8-Zn according to DIN 912 with washers Ø 10,5-140HV-Zn according to DIN 433. Make sure that the location for the machine arm is approximately in centreline to the valve seat.

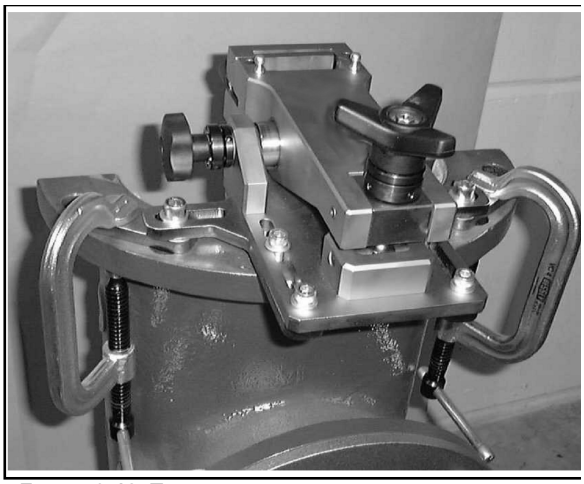


FIGURE 3-12. TILTING ADAPTER AND BASE PLATE MOUNTED TO VALVE BODY

TIP:

For higher rigidity, it is recommended to leave one empty tap hole between the connecting screws.

⚠ CAUTION

Make sure that the location for the machine arm is positioned to leave enough space between the machine arm and the rotating tool to avoid any collision.

4. After mounting the tilting adapter onto the valve body, make sure that all screws are securely tightened.

3.3.2 Collar band mounting

All elements for mounting the tilting adapter onto a valve body without top flange are also included in the scope of supply.

Do the following:

1. Select all components for collar band mounting:
   - tilting adapter
   - collar band mounting plate
   - socket head screws M8 x 20-8.8-Zn according to DIN 912 (4 pieces)
   - washers Ø 8,4-140HV-Zn according to DIN 433 (4 pieces)
   - collar band

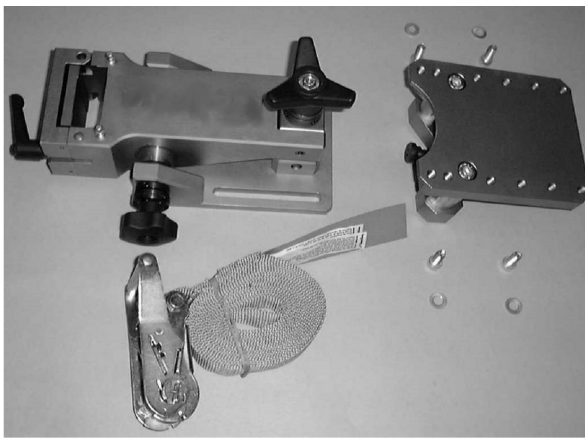


FIGURE 3-13. COMPONENTS FOR COLLAR BAND MOUNTING

2. Locate the collar band mounting plate onto the upper rim of the valve body. Adjust the collar band plate into a parallel position to the top face of the valve body by using a socket head wrench, size 5 mm.

FIGURE 3-14. ADJUSTMENT OF COLLAR BAND MOUNTING PLATE

3. Put the collar band around the valve body and through the lock of the collar band fastening system.
4. After the collar band is located around the valve body and the mounting plate, it is slightly fastened.

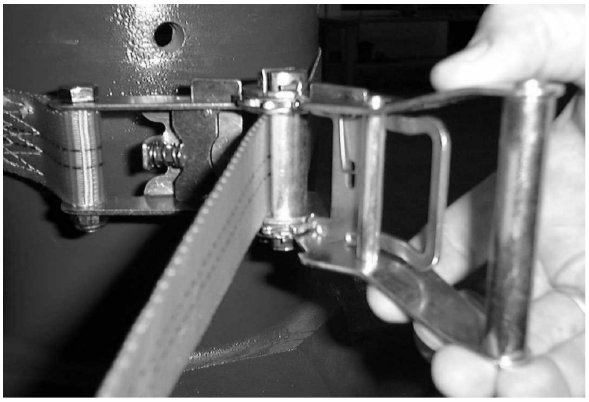


FIGURE 3-15. POSITIONING OF COLLAR BAND INTO FASTENING SYSTEM

5. Move the collar band mounting plate into position. On the spacers of the mounting plate, a raised surface is provided to avoid the collar band from slipping.

FIGURE 3-16. LOCATING THE COLLAR BAND AND MOUNTING PLATE

6. After positioning of the collar band and the mounting plate, the collar band is securely fastened.

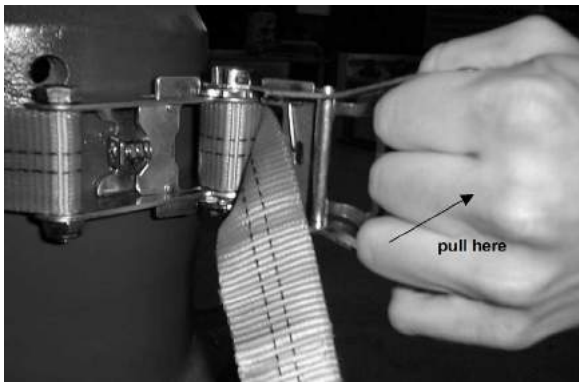


FIGURE 3-17. FASTENING OF THE COLLAR BAND

The collar band locks automatically and fixates the mounting plate to the valve body.

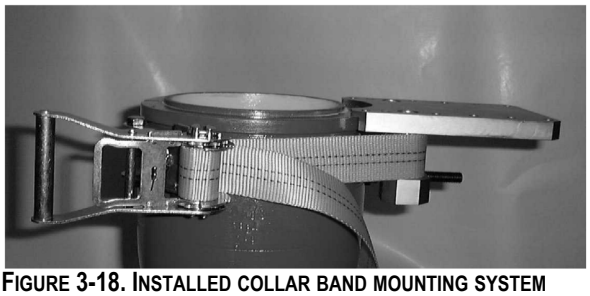


FIGURE 3-18. INSTALLED COLLAR BAND MOUNTING SYSTEM

7. Connect the tilting adapter onto base plate using 4 socket head screws M8 x 20-8.8-Zn according to DIN 912 with washers Ø 8,4-140HV-Zn according to DIN 433.
8. Make sure that the location for the machine arm is approximately in centreline to the valve seat.

FIGURE 3-19. TILTING ADAPTER ON COLLAR BAND MOUNTING PLATE

TIP:

For higher rigidity, it is recommended to leave one empty tap hole between the connecting screws.

⚠ CAUTION

Make sure that the location for the machine arm is positioned to leave enough space between the machine arm and the rotating tool to avoid any collision.

9. After mounting the tilting adapter, make sure that all connecting screws and levers are securely tightened.

After operation, the collar band mounting system can be opened by pulling the lever of the collar band lock mechanism. The collar band can easily be removed by pulling.

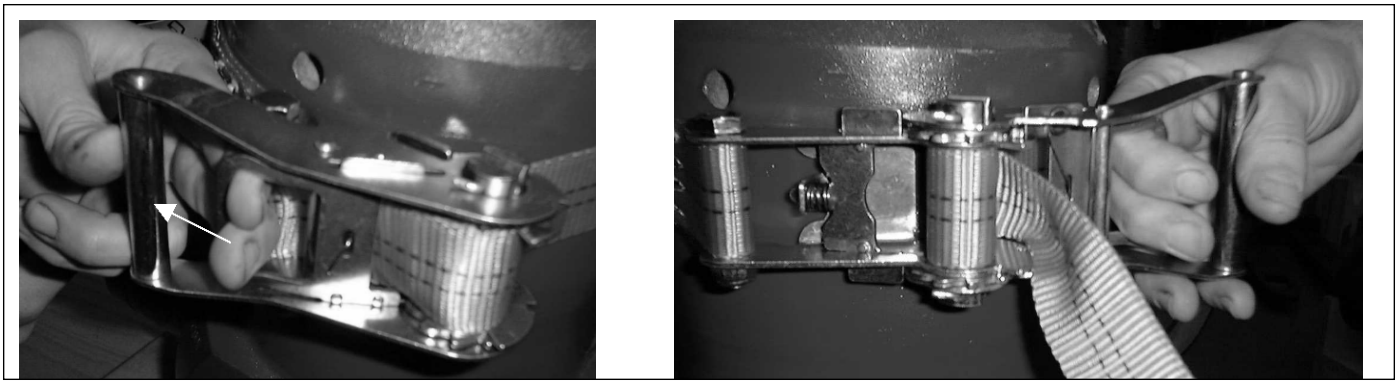


FIGURE 3-20. UNLOCKING THE COLLAR BAND

3.3.3 Mounting the bracket

After the tooling and the mounting system are prepared, the machine is taken out of the case.

First, the bracket is mounted to the machine arm and locked according to the approximate submerging depth. The side with the pocket holes should point to the side of the drive system and they should be in downward direction.

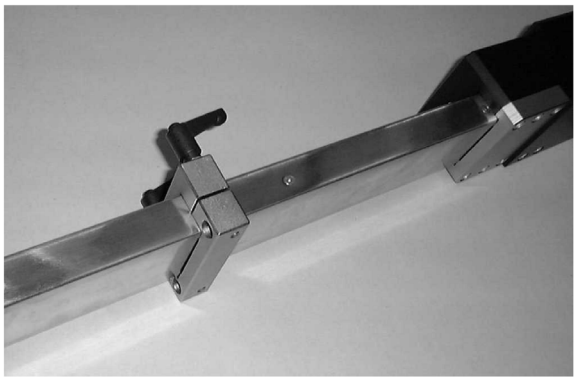


FIGURE 3-21. MOUNTING THE BRACKET

3.3.4 Mounting the drive shaft with ball joint

For the adaptation of a planet wheel, a drive shaft with ball joint Type 15 G has to be mounted (if not located in machine spindle already).

Put the drive shaft with its splines into the machine spindle. The ball joint points into the direction of the drive system. The drive shaft is secured on the opposite side by using a washer (Ø 19 x Ø 6,6 x 2) and a countersunk screw M5 x 10-8.8-Zn according to DIN 7991.

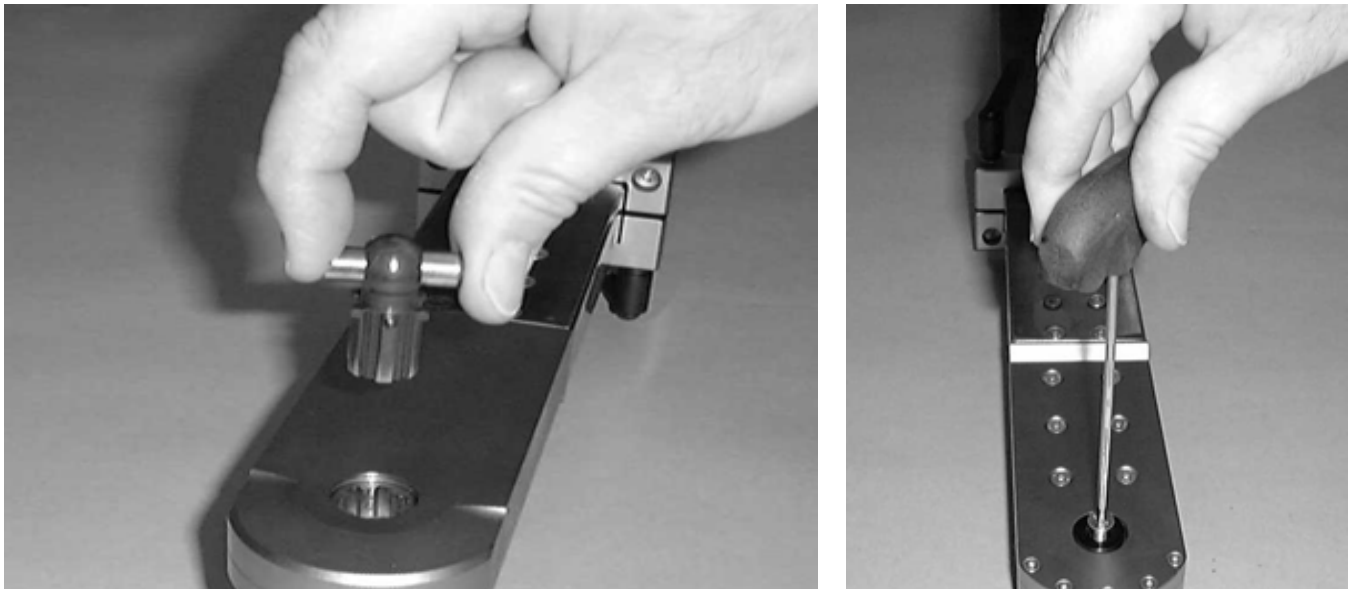


FIGURE 3-22. MOUNTING OF DRIVE SHAFT WITH BALL JOINT TYPE 15 G

The drive shaft with ball joint Type 10 G (only VM 1350) for the solid grinding discs is mounted in the same way.

For some applications, it might be required that the machine drive points into the opposite direction (with optional drive shaft). In this case, the bracket also has to be turned 180 degrees.

In addition, the drive shaft has to be mounted in opposite direction. To avoid any collision between machine arm and rotating tooling, only use the optional drive shaft.

Due to the danger of collision, this set-up should only be used with the optional drive shaft!

⚠ CAUTION

Due to the danger of collision, the set-up with drive and tooling 180 degrees opposite should only be used if necessary and with the optional drive shaft.

After the tooling is adapted, check for collision at low speed prior to operation.

3.3.5 Adaptating the planet wheel dia. 100 or dia. 135

Planet wheels dia. 100 mm or dia. 135 mm can directly be adapted to the drive shaft with ball joint of the machine spindle. After the set screw of the planet wheel is released (1 – 2 rotations), the planet wheel can be engaged to the ball joint of the machine spindle and the set screw can be tightened again. The planet wheel is safely adapted to the machine spindle.

Before operation, the ball joint of the machine spindle has to be lubricated with grease (i.e. Molykote or Unimoly or similar).

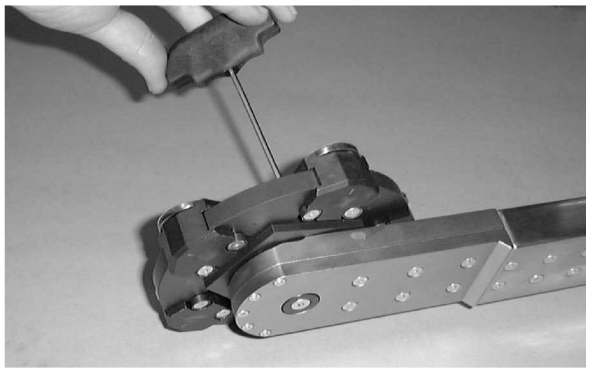


FIGURE 3-23. ADAPTATION OF PLANET WHEEL DIA. 100 MM OR DIA. 135 MM

3.3.6 Adaptating the planet wheel dia. 220 mm or bigger

In case a grinding wheel dia. 220 mm or bigger is used, a ball joint coupling has to be mounted to the machine spindle first. After the set screw of the ball joint coupling is released (1 – 2 rotations), the coupling can be engaged to the machine spindle. Prior to operation, the ball joint of the machine has to be lubricated with grease (i.e. Molykote or Unimoly or similar).

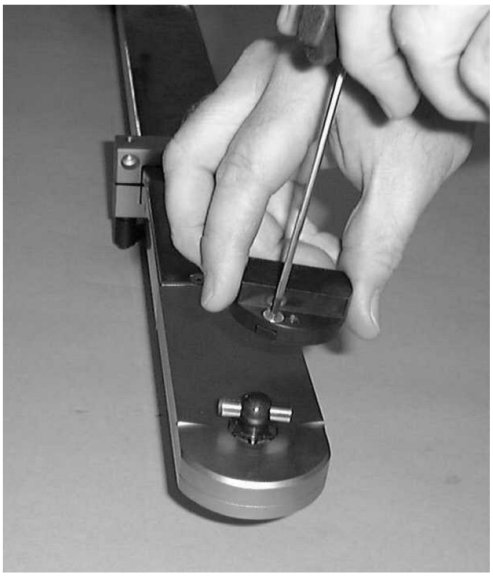


FIGURE 3-24. MOUNTING OF BALL JOINT COUPLING TO MACHINE SPINDLE

After this, the prepared planet wheel can be adapted to the ball joint coupling with two socket head screws M5 x 12 according to DIN 912.

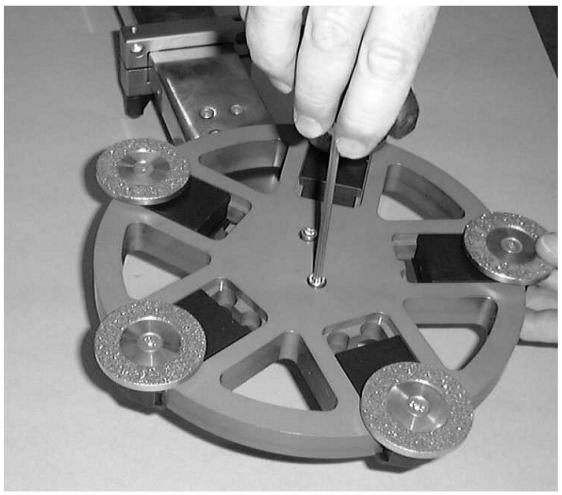


FIGURE 3-25. ADAPTATION OF PLANET WHEEL TO BALL JOINT COUPLING

3.3.7 Adaptating the solid grinding discs

Remove drive shaft with ball joint Type 15 G from the machine spindle and replace it by the drive shaft and solid disc assembly (spline location). The solid grinding disc should point into the direction of machine's drive system. Secure the drive shaft from the opposite side with the washer (Ø 19 x Ø 6,6 x 2) and the countersunk screw M5 x 10-8.8-Zn according to DIN 7991.

Before operation, the ball joint of the machine has to be lubricated with grease (i.e. Molykote or Unimoly or similar).

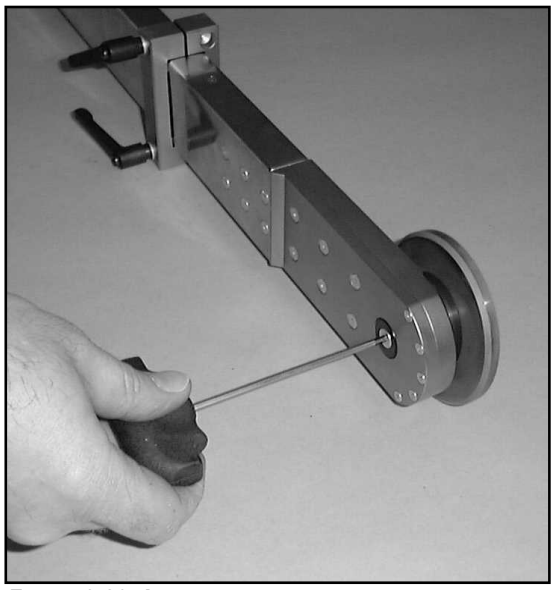


FIGURE 3-26. ADAPTATION OF SOLID GRINDING DISC

3.4 LOCATING AND ALIGNMENT OF MACHINE IN TILTING ADAPTER

Do the following:

1. Open the flap of the tilting adapter.

2. Place the machine arm is placed with the bracket and the two ball locations into the tilting adapter.
3. Hold the machine arm by hand, unlock the bracket and move the machine arm down to its working position until the tool is in centre with the valve seat.

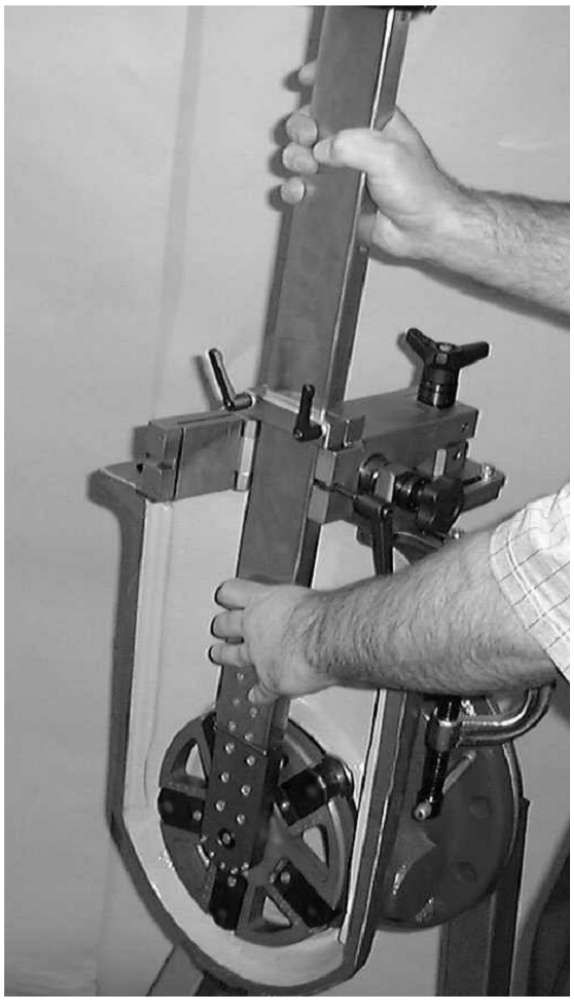


FIGURE 3-27. LOCATING THE MACHINE ARM INTO THE TILTING ADAPTER

4. Lock the bracket and close the flap of the tilting adapter. Clamp the machine arm by tightening the lever of the flap.

⚠ CAUTION

When placing the machine arm into the tilting adapter, hold it by hand to avoid slipping. The machine arm is protected against slipping when the bracket is locked and resting in the ball locations.

FIGURE 3-28. MACHINE ARM IN CLAMPED POSITION

5. The machine can be centered horizontally by means of the adjustment mechanism of the tilting adapter.

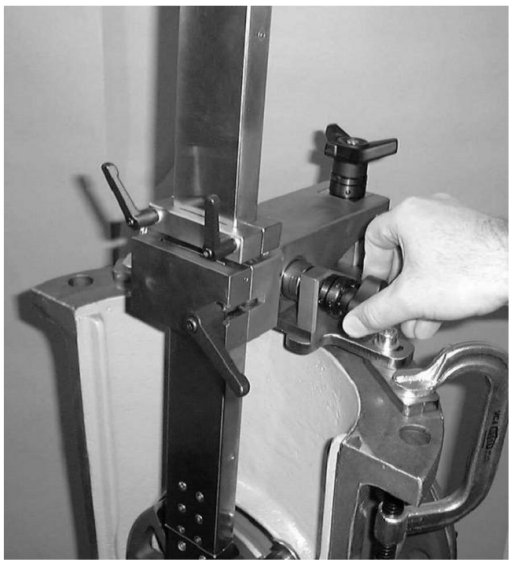


FIGURE 3-29. CENTERING THE MACHINE ARM

3.5 INSTALLATION

⚠ CAUTION

All instructions mentioned in Section 1.3 on page 2 and Section 1.4 on page 3 also apply for handling and operating the Valve Seat Grinding and Lapping Machine.

For all screws being used as connecting elements, the following max. torque has to be observed:

- Socket head screw according to DIN 912, Quality 8.8:
  - M4, wrench size 3 mm: 1,8 Nm
  - M5, wrench size 4 mm: 3,5 Nm
- Countersunk screw according to DIN 7991, Quality 8.8:
  - M4, wrench size 2,5 mm: 1,8 Nm
  - M5, wrench size 3 mm: 3,5 Nm

In addition, all screws with visible damages must be replaced immediately. If disregarded, damaged screws can only be unscrewed with extreme effort and parts of the machine might be damaged.

After the machine is completely assembled, make sure that all screws and levers are securely tightened.

Then connect the machine to the power supply.

To avoid the danger of stumbling:

- All cables and hoses for the machine power supply have to be covered or installed in such manner that no person can stumble
- Before connecting the machine to the power supply, check all cables and hoses for damages.

CAUTION

For grinding and lapping operation, always wear eye protection glasses.

For machines with electric drive motor, make sure that the trigger button is in unlocked position before connecting to the power supply.

WARNING

Machines with pneumatic drive may not be used without maintenance unit (filter and oil lubricator).

The air supply line must offer a minimum pressure of 6,3 bar to the maintenance unit.

The air supply must be free from humidity and particles to protect the unit from damage.

All supply lines must be provided for the air pressure and volume requirements.

This page intentionally left blank

4 OPERATION

IN THIS CHAPTER:

4.1 Pre-operation checks

Do the following checks before operating the machine:

1. Complete the risk assessment checklist in Table 1-3 on page 5.
2. Check that the work area is clear of non-essential personnel and equipment.
3. Check that the machine control/observation area will not be in the path of hot flying chips during machine operation.
4. Check the machine is securely mounted to the workpiece.
5. Check that air hoses are routed and secured to avoid tripping, entanglement, damage from hot chips, or other damage should an air hose or connection fail.
6. Check the tool condition and sharpness.
7. On the PCU, check that the oil drip rate is set to 6 drips per minute.
8. Check all hand tools are removed from inside the machine and the work area.

⚠ CAUTION

Do not reach with hands or other sections of the body into rotating tools. Wear eye protection glasses during grinding and lapping operation.

⚠ WARNING

Make sure that proper grinding discs are always being used, otherwise the machine or the valve body can be damaged:

If grinding discs are used for lapping operation, they will be damaged!

If already used lapping discs are utilised for grinding operation, the required accuracy cannot be guaranteed and the valve seat might be damaged

The grinding pressure is applied with the star knob of the tilting adapter.

For best performance, the grinding pressure should not be too high or too low. If the grinding pressure is too high, it might result in heat creation at the grinding disc and the abrasive might shear off. If grinding pressure is too low, it could result in low performance.

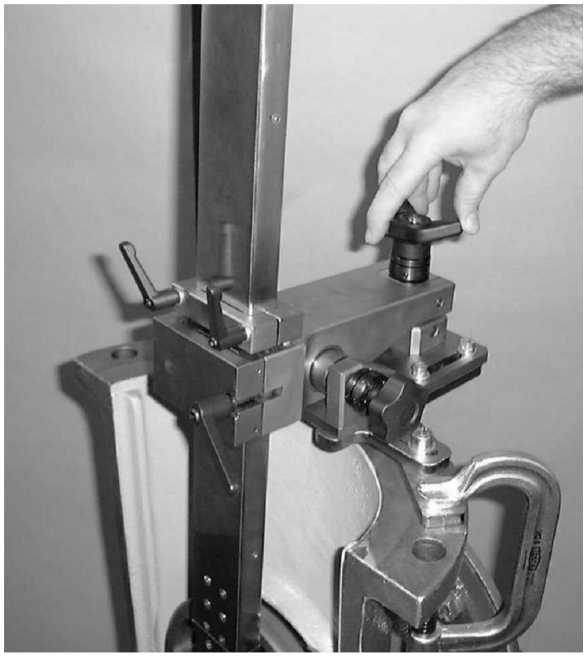


FIGURE 4-1. APPLIANCE OF GRINDING PRESSURE AT STAR KNOB OF TILTING ADAPTER

To get the perfect grinding pressure, please consider diagram 4.5.0.2. This diagram shows the grinding pressure resulting from the torque applied to the star knob of the tilting adapter. The different lines are standing for the submerging depth. The diagram gives the values for pre-setting the pressure and it shows that the torque at the star knob is fairly low since the ratio of the tilting table is very high.

⚠ CAUTION

If grinding pressure is too high, it might result in damage of the machine.

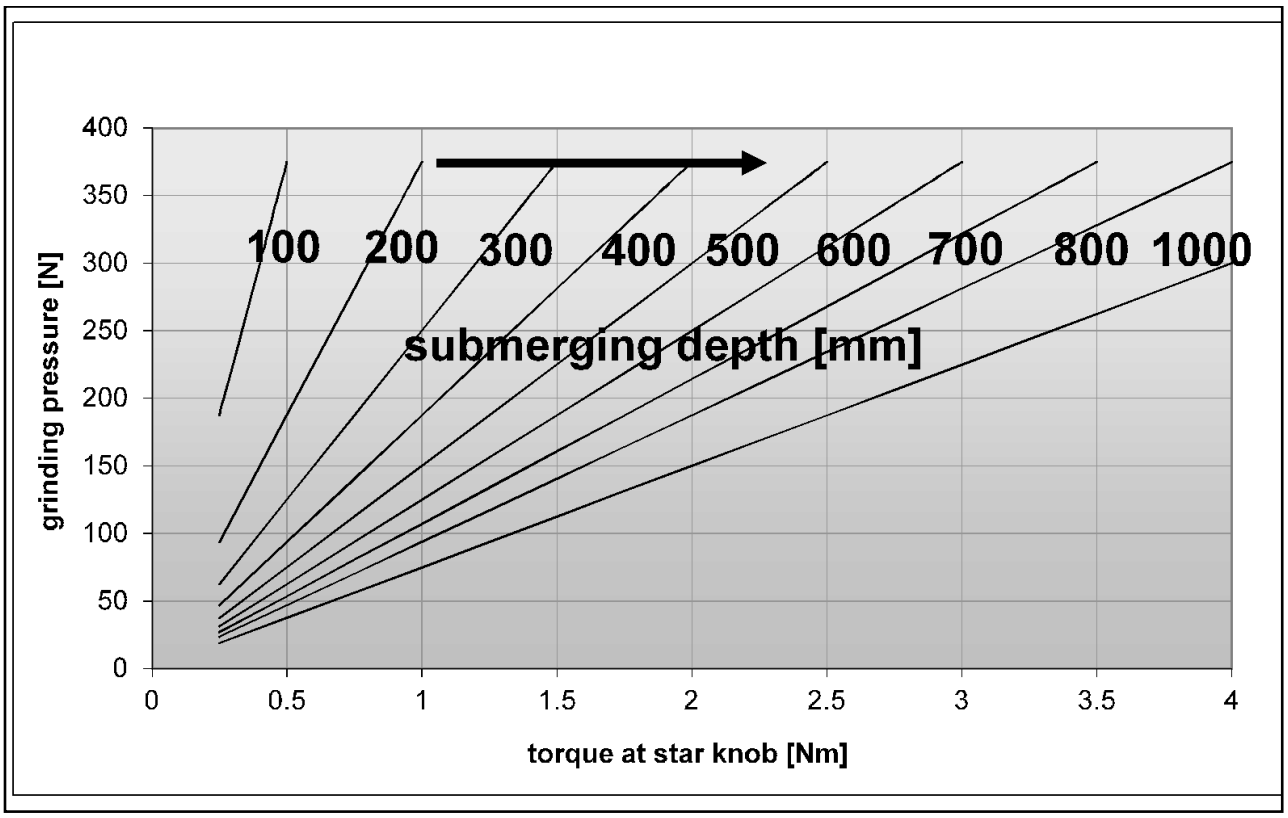


FIGURE 4-2. GRINDING PRESSURE IN RELATION TO THE TORQUE APPLIED AT THE STAR KNOB OF THE TILTING ADAPTER

4.2 ELECTRIC DRIVE MOTOR

Push the trigger button and adjust the speed on top of the drive motor. For permanent speed, the trigger button can be locked at the bottom of the handle.

After locking, the trigger button can be released and the machine keeps running. In addition, it is possible to select the direction of the rotation (cw, ccw). It is always recommended to use the clockwise direction, because only in clockwise direction, the machine can reach its max. speed (white arrow points to the top).

On top of the electric drive motor, the direction of the rotation is indicated by two diodes (“R” means clockwise”. The electric drive motor is equipped with an additional 2-stage mechanically switching gear. The switch for the mechanical gear is located on the bottom side of the electric drive motor.

The switch is marked with a turtle and a rabbit. The turtle means high ratio (max. speed = 245 rpm, high torque). The rabbit means low ratio (max. speed = 700 rpm, lower torque).

The speeds marked on the electric drive housing indicate the speed of the electric drive motor itself and not the speed of the valve grinder's spindle.

To get the spindle speed of the valve grinder, these figures have to be divided by 3.6

The electric drive motor also has a switch for a percussion drill function. This switch is located at the side of the electric drive housing. However, for the general function of the valve grinder, this switch and its function is not required.

The machine should always run in drilling mode (symbol = drill) and never in percussion drill function (symbol = hammer).

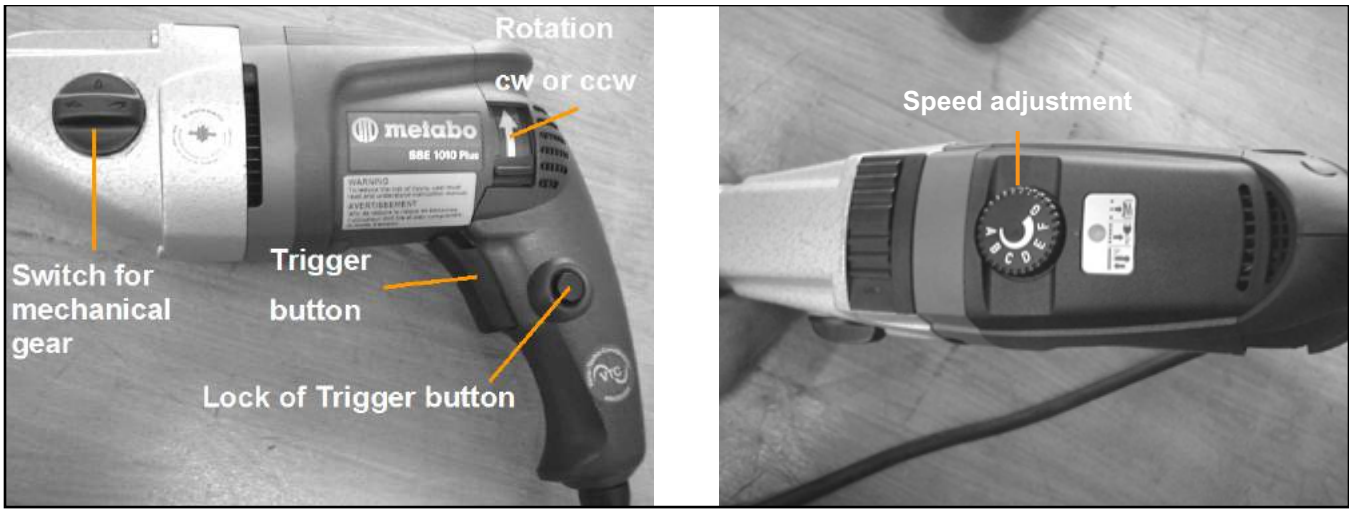


FIGURE 4-3. ELECTRIC DRIVE MOTOR CONTROLS

4.3 PNEUMATIC DRIVE MOTOR

(Operating with the optional maintenance unit). The spindle speed is activated by pushing the red safety button of the maintenance unit to its upper position. The speed can be adjusted by the regulating knob on the maintenance unit. The operating pressure is indicated at the gauge on the maintenance unit. If customer is using his own maintenance unit, the operation might be different, however, the basic operating buttons should be provided.

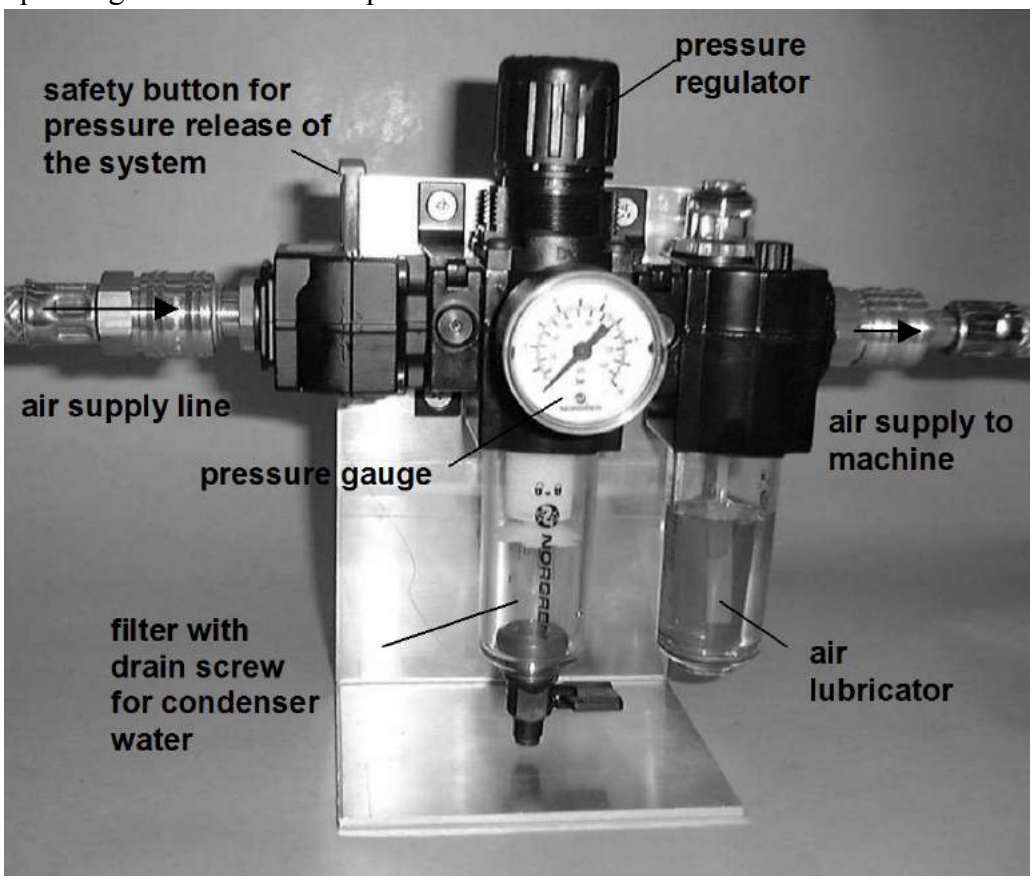


FIGURE 4-4. MAINTENANCE UNIT WITH OPERATING BUTTONS FOR PNEUMATIC DRIVE (OPTIONAL)

⚠ CAUTION

The operating pressure of the machine is 6,3 bar. Higher pressure can result in damaging the machine and therefore, it is not applicable.

Never operate the pneumatic drive without maintenance unit with lubricator and filter. The lubricator must always be filled with oil.

NOTICE

The air supply line must always offer an air pressure of 6,3 bar to the maintenance unit.

The air supplied to the maintenance unit must be free from humidity and other particles to protect the machine against damages.

All air supply lines, fittings, etc. must be provided according to the air pressure and volume requirements.

The grinding pressure can be adjusted during machining operation as required.

For lapping operation, make sure that sufficient lapping paste is put onto the surface to be machined.

For grinding operation, make sure that the abrasive is still in proper condition. Always change abrasives in time, otherwise it will result in poor performance.

Over proportional heat creation of abrasive might result into shearing off and the valve seat might be damaged.

4.4 CHANGE OF ABRASIVES

Stop the machine with trigger button (electric drive) or with red safety button on maintenance unit (pneumatic drive)

- Release grinding pressure. To release grinding pressure, use the star knob of the tilting adapter.
- Disconnect machine from power supply
- Hold machine arm and open the flap of the tilting adapter
- Take the machine arm with the bracket out of the ball locations. Be careful - avoid any collision between tool and valve body
- Put the machine arm into a stable position to change the abrasive
- Change the abrasive
- Put machine back into position, adjust grinding pressure and go on with the grinding operation (steps vice versa as described above)

4.5 CHANGE OF DRIVE MOTOR

⚠ CAUTION

The Gate Valve Grinder may only be used with the original drive motors delivered with the machine.

Otherwise, due to higher speeds and torque or wrong mechanical connections, the machine can be damaged and it may result into harm to the operator.

4.5.1 Change of mounted drive motor

After release of the clamping screw, the drive can be pulled off. With the electric drive motor, there is an additional adapter bushing in the drive flange bore (dia. 43 mm /48 mm). This bushing has to be removed for mounting the pneumatic drive motor.

After the drive motor is taken out of the machine, the coupling can be disconnected. This step is unnecessary when the machine is delivered with electric and pneumatic drive motor since both drives are prepared with a coupling. Since the electric drive motor offers a rotation in both directions, the coupling is secured

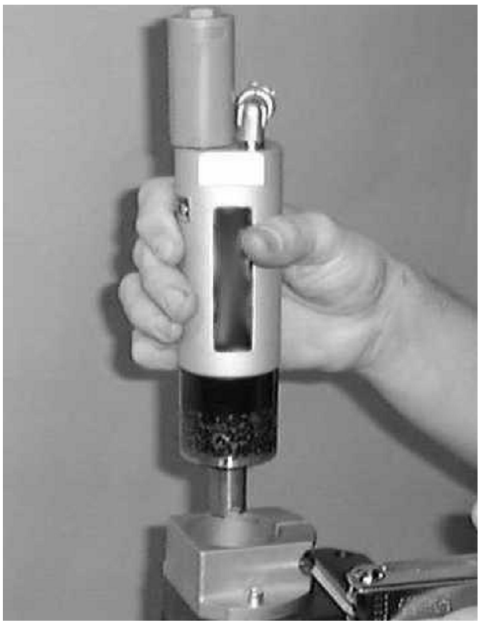


FIGURE 4-5. CHANGE OF MOUNTED DRIVE MOTOR

with an additional left-hand threaded screw. To disconnect the coupling, this screw has to be taken off first (high torque required, since the screw is secured with glue). For a machine with pneumatic drive, this screw is not provided since the drive only rotates in clockwise direction. To take the coupling off, the motor spindle has to be blocked with a fixed spanner (size 19 mm).

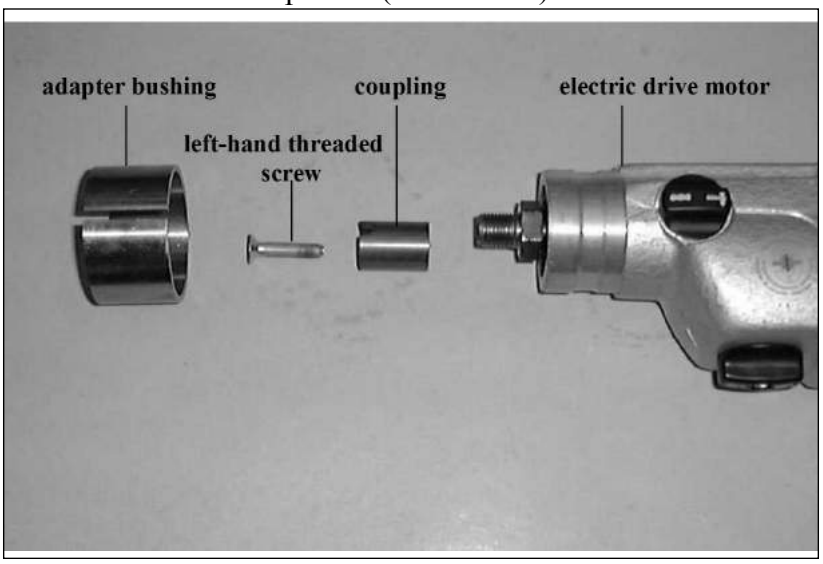


FIGURE 4-6. DISCONNECTION OF COUPLING

4.5.2 Mounting of new drive motor

To mount a new drive motor, the coupling has to be connected to the ½" – 20 UNF-2A thread of the motor spindle. Due to the fact that the electric drive motor offers spindle rotation in both directions, the coupling has to be secured with a left-hand threaded screw (see 4.7.1.2). If the machine is delivered with electric and pneumatic drive, this step is unnecessary since both drives are prepared with couplings.

After connection of the coupling, the electric drive can be moved into the drive flange by using the adapter bushing. For pneumatic drive motors, this bushing is unnecessary since the pneumatic drive directly fits into the drive flange bore. Make sure that the coupling of the drive motors engage the drive pin inside the gear. This is achieved when the shaft of the electric drive is completely moved into the drive flange.

5 MAINTENANCE

IN THIS CHAPTER:

5.1 Maintenance checklist

CAUTION

Cleaning, lubricating and general maintenance may only be performed by authorised and trained personnel. All safety regulations have to be observed.

Disregard of safety regulations may result in danger of life and health of persons.

For all maintenance work, the machine has to be disconnected from power supply line!

All lubrication fluids have to be disposed in suitable containers.

CAUTION

For all work on the machine, the electrical power supply line must be disconnected to avoid any danger to the life and health of persons due to uncontrolled rotation of the tools.

Alternatively, the machine can be sent to CLIMAX for proper maintenance.

Under normal circumstances and proper handling the maintenance as described in maintenance is sufficient.

Under unfavourable circumstances, such as rough operation or operation under harmful environmental conditions (high temperature, high humidity etc.) the inspection period should be shorter.

Table 5-1 lists maintenance intervals and tasks

TABLE 5-1. MAINTENANCE INTERVALS AND TASKS

Interval	Task	Reference
Before each use	Lubricate the ball joint coupling of the machine spindle with grease.	
	Check power supply lines for visible damages.	--
	Check the maintenance unit (with pneumatic drive).	--
	Check the ventilating slots of electric drive motor	--
Before and after each use	Clean the machine and check for visible damage.	--
After 150 hours	Disassemble, clamp, clean, and lubricate the gear of the pneumatic drive motor with Bosch-special grease.	Section 5.3.1
After 300 hours	Inspect the drive chain integrated in the machine arm and the upper gear.	Section 5.3.2
	Lubricate the drive chain and upper gear.	--

5.2 APPROVED LUBRICANTS

CLIMAX recommends using the following lubricants at the locations indicated. Failure to use the appropriate lubricants can result in damage and premature machine wear.

⚠ CAUTION

Avoid damage, premature machine wear, and protect your warranty by using only approved lubricants.

TABLE 5-2. APPROVED LUBRICANTS

Application Area	Lubricant	Frequency
Ball joint	Dow Corning Molykote G-N	Each use
Pneumatic drive gear	CASTROL MOLUB-Alloy 6040/150	Yearly
Chain drive	CASTROL Chain Oil 22	Yearly
Upper gear	CASTROL MOLUB-Alloy 6040/150	--
Pneumatic motor	CASTROL Hyspin AWS-32	A/R 6 oz
Long-term storage	LPS Labs LPS-3	6 months

5.3 LUBRICATING THE MACHINE MODULES

Most of the machine components are maintenance-free.

The gear of the electric drive is lubricated for lifetime, i.e. there is no need of additional lubrication.

5.3.1 Pneumatic drive motor gear

The gear of the pneumatic drive motor has to be disassembled and cleaned after 150 working hours and then be lubricated with Bosch-special grease. This procedure has to be repeated every 300 working hours. CLIMAX offers this service.

5.3.2 Drive chain

The drive chain integrated in the machine arm and the upper gear has to be inspected every 500 working hours (after 1 year at the latest). For this inspection, the cover of the upper gear has to be removed and the gears as well as the chain have to be thoroughly lubricated with Tunap Tunfluid HT 2200.

After replacing the cover, the drive chain tension has to be adjusted.

We recommend having this service done by the manufacturer due to the experience required.

In case of a rattling noise coming out of the machine arm, most likely the drive chain is not sufficient anymore. To adjust the tension of the drive chain, untie the screws of the machine arm clamping plate 20T-021 and adjust the tension by means of the adjusting screw 20N-026.

After every half rotation of the adjusting screw, check if the noise disappears. After adjusting the tension of the drive chain, tighten the screws of the clamping plate. After this procedure has been repeated several times, the chain will be stretched to its limits and must be replaced.

5.3.3 Ball joint coupling

Before every machine operation, the ball joint coupling of the machine spindle should be lubricated with grease. See the lubrication table.

5.4 LUBRICATING THE PNEUMATIC DRIVE MOTOR

Make sure that the lubricator of the maintenance unit is always filled with oil. In addition, make sure that the pneumatic drive motor is always operated with clean air. Check the filter on the maintenance unit regularly.

Drain condenser water if required.

5.5 TROUBLESHOOTING

If the machine cannot be started or if there are any malfunctions during operation, the operator has to inform qualified maintenance personnel immediately.

The operator has to inform the supervisor. He should never try to resolve any problem on the electrical equipment by himself.

⚠ CAUTION

To avoid any danger to life and health of person due to electrical short circuit:

All work on the machine's electrical equipment must be carried out by trained electrical specialists only.

The operator may only resolve any faults resulting from wrong operation or lag of maintenance.

⚠ CAUTION

All work on the machine's mechanical equipment must be carried out by trained mechanical specialists only.

⚠ CAUTION

During all work on the machine, the electrical power supply line has to be disconnected to avoid any danger to the life and health of people due to uncontrolled rotation of machine spindle.

TABLE 5-3. TROUBLESHOOTING FOR POSSIBLE FAULTS

Possible fault	Operating or maintenance error	Recovery of fault
Machine does not start	Power supply line is not connected	Make sure that power supply line is plugged in
	Default in power source	Check energy source (fuses, plugs, connections, air pressure etc.)
	Only with electric drive: Machine overloaded. The heat protection is activated	Let the machine cool down. As soon as the heat protection of the electric drive is deactivated, let the machine run at high speed to cool down by its ventilating system Clean ventilating slots if necessary
	Only with pneumatic drive: Machine has been run in cool environment and the supply lines are iced	De-ice the supply lines
Grinding pressure cannot be activated	Tilting adapter is not firmly connected to the base plate	Tighten connecting screws of tilting adapter
Tighten connecting screws of tilting adapter	Grinding pressure exceeds 300 N	Reduce grinding pressure

TABLE 5-3. TROUBLESHOOTING FOR POSSIBLE FAULTS

Possible fault	Operating or maintenance error	Recovery of fault
Unusual noise (rattling in machine arm)	Pretension of drive chain is insufficient	Adjust tension of drive chain (see chapter “Maintenance”)

This page intentionally left blank

6 STORAGE AND SHIPPING

IN THIS CHAPTER:

6.1 Storage

Proper storage of the Gate Valve Grinding and Lapping Machine will extend its usefulness and prevent undue damage.

Before storing, do the following:

1. Clean the machine with solvent to remove grease, metal chips, and moisture.
2. Drain all liquids from the pneumatic conditioning unit.

Store the Gate Valve Grinding and Lapping Machine in its original shipping container. Keep all packing materials for repackaging the machine.

6.1.1 Short-term storage

Do the following for short-term storage (three months or less):

1. Retract the tool head from the workpiece.
2. Remove the tooling.
3. Remove hoses.
4. Remove the machine from the workpiece.
5. Clean the machine to remove dirt, grease, metal chips, and moisture.
6. Spray all unpainted surfaces with LPS-2 to prevent corrosion.
7. Store the Gate Valve Grinding and Lapping Machine in its original shipping box.

6.1.2 Long-term storage

Do the following for long-term storage (longer than three months):

1. Follow the short-term storage instructions, but use LPS-3 instead of LPS-2.
2. Add a desiccant pouch to the shipping container. Replace according to manufacturer instructions.
3. Store the shipping container in an environment out of direct sunlight with temperature < 70ºF (21ºC) and humidity < 50%.

6.2 SHIPPING

The Gate Valve Grinding and Lapping Machine can be shipped in its original shipping container.

6.3 DECOMMISSIONING

To decommission the Gate Valve Grinding and Lapping Machine prior to disposal, remove the drive assembly from the RDU and dispose of the drive assembly separately from the rest of the machine components. Refer to Appendix A for component assembly information.

APPENDIX A ASSEMBLY DRAWINGS

Drawing list

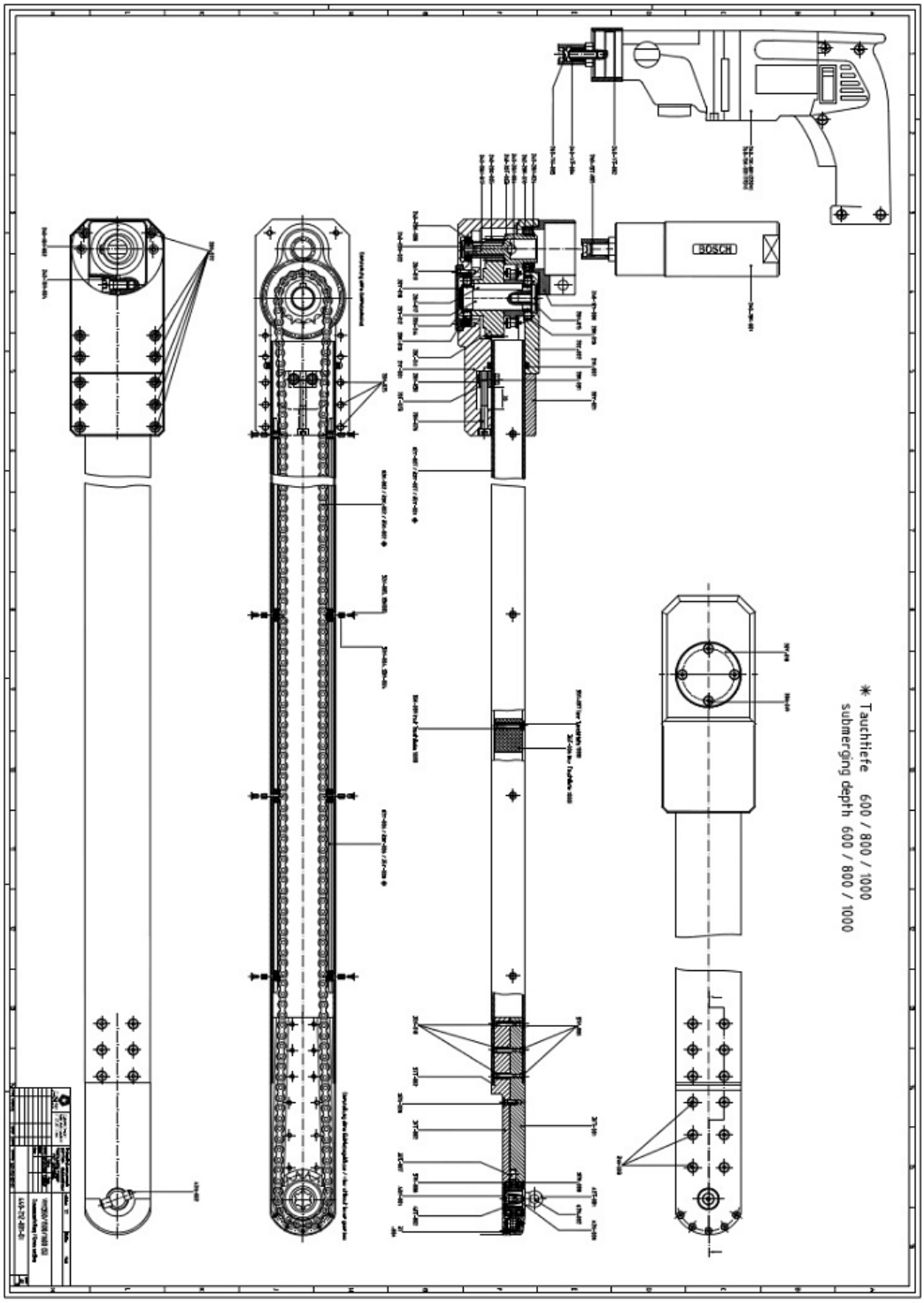
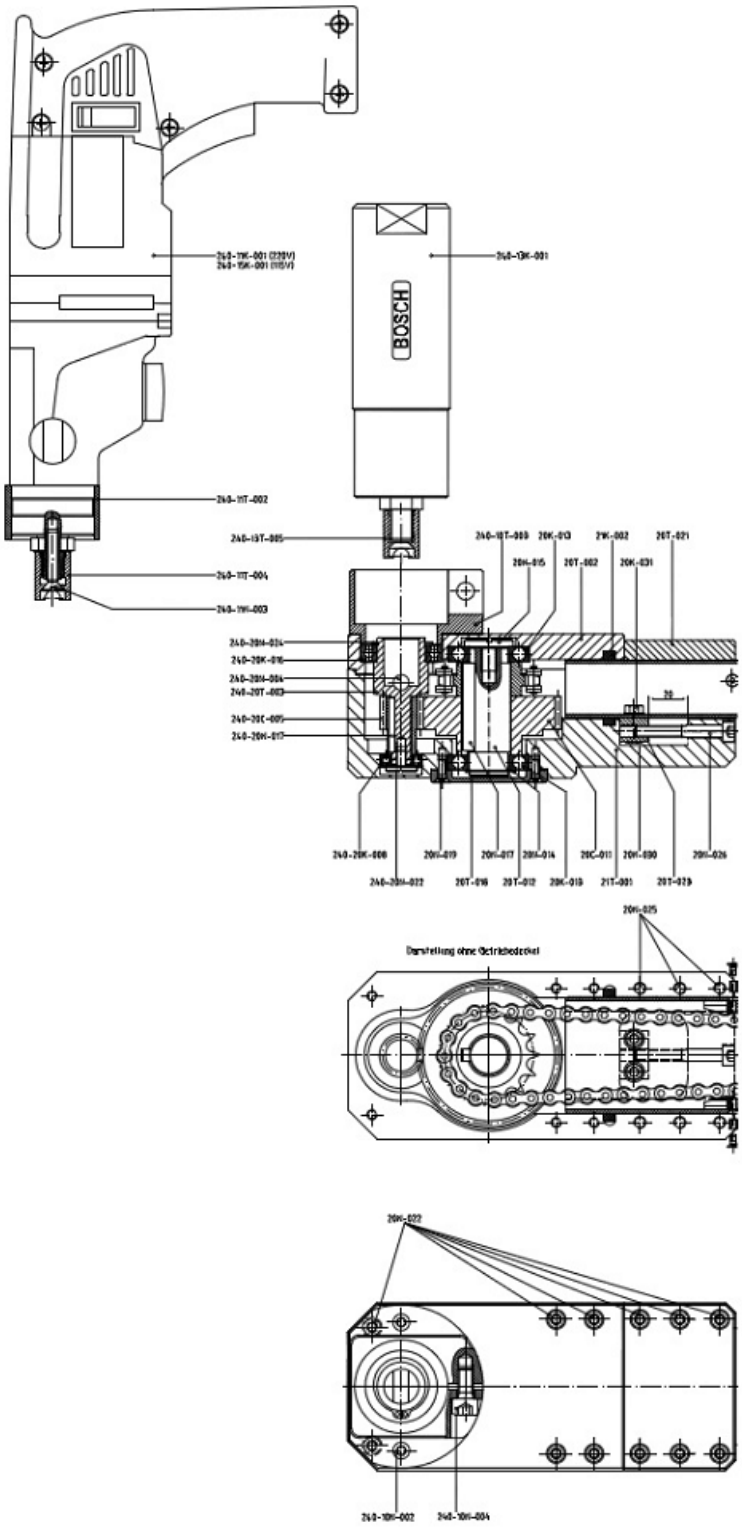
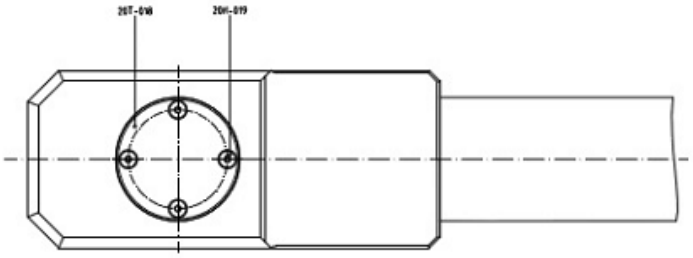
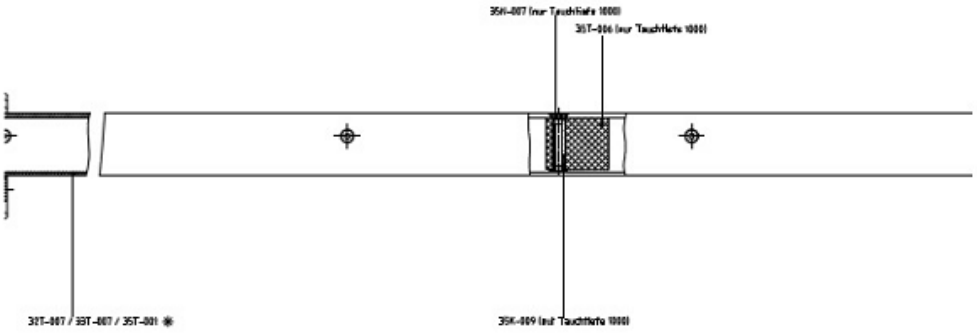


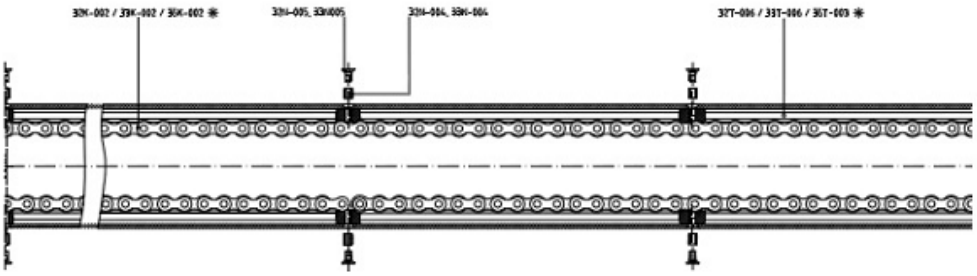
FIGURE A-1. GATE VALVE GRINDING AND LAPPING MACHINE


BOSCH
Darstellung ohne Getriebedeckel

✳ Tauchtiefe 600 / 800 / 1000
submerging depth 600 / 800 / 1000







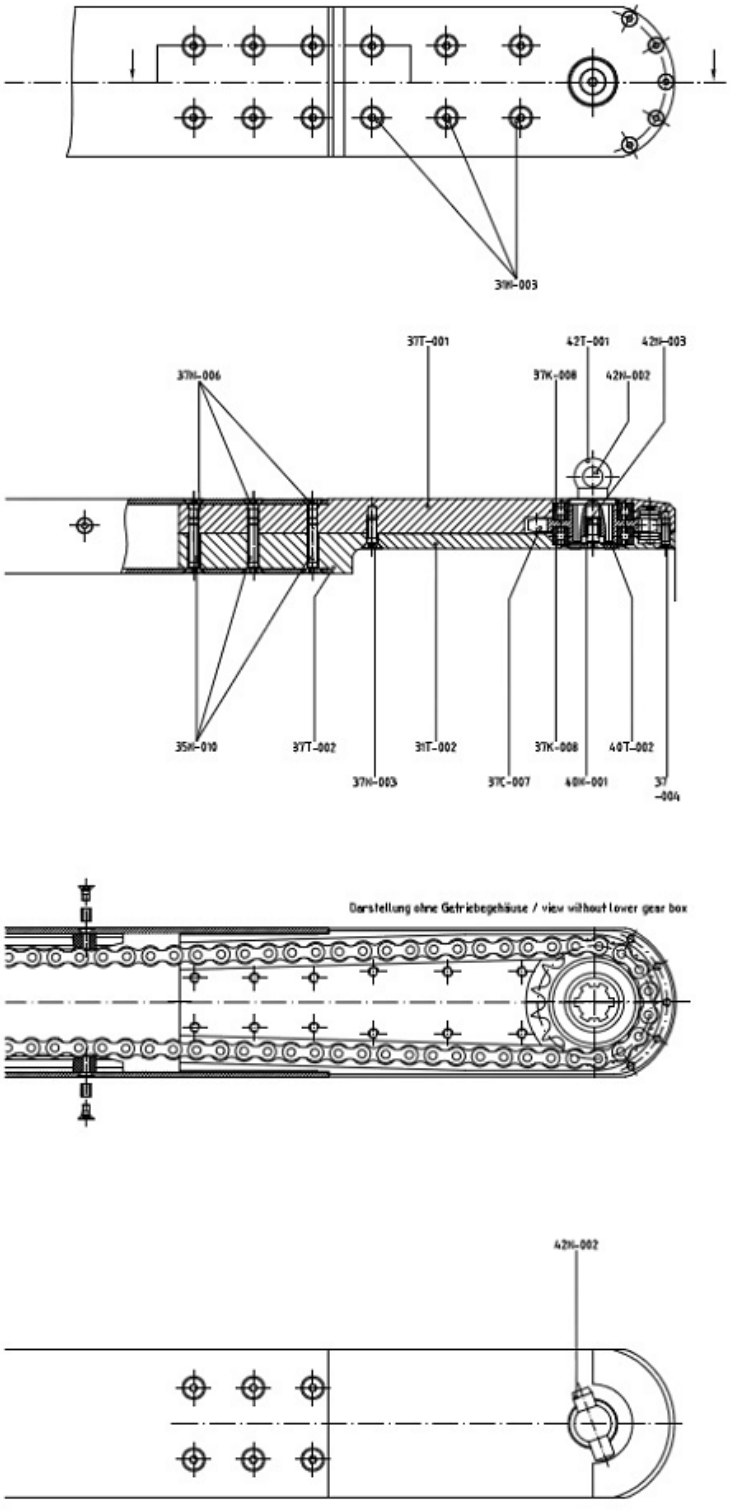


FIGURE A-2. 440-10S-N01-00 BASIC MACHINE

Stkliste / Part list #: 440 - 10 S - N01 - 00 **Datum / Date: 17.07.1999**

Ersteller / Creator: Werheid

Zeichnung / Cross section #: 440-00Z-001-00

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
S	1		240 - 11 S - N01	Elektroantrieb / Electric Drive 220V
S	1		240 - 13 S - N01	Druckluftantrieb Stab / Air Drive
S	1		240 - 14 S - N01	Wartungseinheit (Option) / Maintenance Unit
S	1		240 - 15 S - N01	Elektroantrieb / Electric Drive 115V

Stkliste / Part list #:	240 - 11 S - N01 - 00	Datum / Date: 01.06.1999
Ersteller / Creator:	Werheid	
Zeichnung / Cross section #:		

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		240 - 11 K - 001	Antriebsmaschine / Motor Metabo Sb E 1000/2-R+L Signal
002	1	x	240 - 11 T - 002	Reduzierhülse / Bushing Elektro Metabo
003	1		240 - 11 N - 003	Senkkopfschraube / Screw M6 x 30 - 8.8 -LH
004	1	x	240 - 11 T - 004	Kupplungsstück / Coupling
005	1		240 - 11 N - 005	U-Scheibe DIN433 - 13
006	1		240 - 11 F - 006	Distanzscheibe

FIGURE A-3. 240-11S-N01-00 ELECTRIC DRIVE

Stkliste / Part list #:			**240**	**-**	**13**	**S**	**-**	**N01**	**-**	**00**			**Datum / Date: 01.06.1999**	
Ersteller / Creator:			**Werheid**											
Zeichnung / Cross section #:														
Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #										Benennung Description	
001	1		240	-	13	K	-	001					Druckluftantrieb / Air Motor Bosch Stab	
002	1		240	-	13	K	-	002					Winkelstück / Fitting (90 grad, innen/außen, 1/4")	
003	1		240	-	13	K	-	003					Stecker / Fitting (Rectus Type 26)	
004	1		240	-	13	K	-	004					Anschlußschlauch kompl. 2 m / Hose assy 2 m	
005	1	x	240	-	13	T	-	005					Kupplungsstück / Coupling	
006			240	-	13	K	-	006					Rectus Kupplung Typ 26 3/8" (Lieferumfang Wartungseinh.)	
007			240	-	13	K	-	007					Ersatzteil: Druckanzeige	
008			240	-	13	K	-	008					Ersatzteil: Regler	
009			240	-	13	K	-	009					Ersatzteil: Sicherheitsschieber /Safety Valve	

FIGURE A-4. 240-13S-N01-00 PNEUMATIC DRIVE

Stkliste / Part list #:	**240**	**-**	**15**	**S**	**-**	**N01**	**-**	**00**		**Datum / Date: 01.06.1999**
Ersteller / Creator:	**Werheid**									
Zeichnung / Cross section #:										

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		240 - 15 K - 001	Antriebsmaschine / Motor Metabo Sb E 1000/2-R+L Signal 115
002	1	x	240 - 15 T - 002	Reduzierhülse / Bushing Elektro Metabo
003	1		240 - 15 N - 003	Senkkopfschraube / Screw M6 x 30 - 8.8 -LH
004	1	x	240 - 15 T - 004	Kupplungsstück / Coupling

FIGURE A-5. 240-15S-N01-00 ELECTRIC DRIVE 115 V

Stkliste / Part list #:			**440**	**-**	**20**	**S**	**-**	**N01**	**-**	**00**			**Datum / Date: 17.07.1999**		
Ersteller / Creator:			**Werheid**												
Zeichnung / Cross section #:											**440-00Z-001-00**				
Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #										Benennung Description		
L01	1	x	240	-	20	S	-	L01					Antriebswelle / Drive shaft		
~~001~~	~~1~~		~~440~~	~~-~~	~~20~~	~~T~~	~~-~~	~~001~~					~~Getriebegehäuse oben / Gear box~~		
002	1		440	-	20	T	-	002					Getriebedeckel oben / Gear cover		
011	1		440	-	20	C	-	011					Zahnrad 1 / Gear 1		
012	1		440	-	20	T	-	012					Abtriebswelle / Shaft		
013	2		440	-	20	K	-	013					RiKuLa / Ball bearing 16004-2Z		
014	1		440	-	20	N	-	014					Sicherungsring / Snap ring 20 x 1,2		
015	1		440	-	20	N	-	015					Flachkopfschraube / Flat head screw M8x12		
016	1		440	-	20	C	-	016					Kettenritzel oben / Upper chain gear		
017	1		440	-	20	N	-	017					Paßfeder / Key A6x6x45		
018	1		440	-	20	T	-	018					Lagerdeckel / Cover		
019	4		440	-	20	N	-	019					Senkschraube / Screw M4x12		
~~020~~	~~1~~		~~440~~	~~-~~	~~20~~	~~K~~	~~-~~	~~020~~					~~Dichtungselement / Sealing~~		
021	1		440	-	20	T	-	021					Klemmplatte / Clamping plate		
022	12		440	-	20	N	-	022					Innensechskantschraube / Screw M5x20		
023	1		440	-	20	T	-	023					Spannklotz / Clamping log		
025	6		440	-	20	N	-	025					Gewinde-Einsatz/ Heli coil SLM 5x0,8 AC 12,5		
026	1		440	-	20	N	-	026					Innensechskantschraube / Screw M6 x 45 - 8.8 Zn		
027	2		440	-	20	N	-	027					Innensechskantschraube /Screw M5 x 20 - 8.8 Zn		
028	1	x	440	-	20	T	-	028					Motorflansch / Motor flange		
029	1		440	-	20	N	-	029					Innensechskantschraube / Screw M8 x 16 - 8.8 Zn		
030	2		440	-	20	N	-	030					Innensechskantschraube / ScrewM5x16 - 8.8 Zn		
031	2		440	-	20	K	-	031					Selbstsichernde Mutter / Nut M5-Zn		

FIGURE A-6. 440-20S-N01-00 UPPER GEAR

Stkliste / Part list #:	**440**	**-**	**21**	**S**	**-**	**N01**	**-**	**00**			**Datum / Date: 17.07.1999**	
Ersteller / Creator:	**Werheid**											
Zeichnung / Cross section #:											**440-00Z-001-00**	

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #								Benennung Description
S	1		440	-	20	S	-	N01			Getriebe oben / Upper gear assy
001	1		440	-	21	T	-	001			Getriebegehäuse oben / Upper gear box
~~002~~	~~1~~		~~440~~	~~-~~	~~21~~	~~K~~	~~-~~	~~002~~			~~Dichtungselement / Sealing~~
003	1		440	-	21	K	-	003			Dichtungselement / Sealing
ent 1	*1*		*440*	*-*	*20*	*T*	*-*	*001*			*ENTFÄLLT / Replaced*
ent 2	*1*		*440*	*-*	*20*	*K*	*-*	*020*			*ENTFÄLLT / Replaced*

FIGURE A-7. 440-21S-N01-00 UPPER GEAR (ADDITIONAL PARTS FOR T = 1000)

Stkliste / Part list #:	**440 - 32 S - N01 - 00**		**Datum / Date: 17.07.1999**
Ersteller / Creator:	**Werheid**		
Zeichnung / Cross section #:		**440-00Z-001-00**	

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
L01	1		440 - 32 T - L01	Rohr mit Führung / Arm assy [Pos 4,5,6,7]
~~*001*~~	~~*1*~~		~~*440 - 32 T - 001*~~	~~*Rechteckrohr / Pipe 60 x 25 x 2,0*~~
002	1		440 - 32 K - 002	Kette / Chain06 B-1
~~*003*~~	~~*2*~~		~~*440 - 32 T - 003*~~	~~*Kettenführung / Chain guiding*~~
004	*8*		*440 - 32 N - 004*	*Gewinde-Einsatz / Heli coil SLM 3 x 0,5 AC 4,5*
005	*8*		*440 - 32 N - 005*	*Senkschraube / Screw M3x6 A2*
006	*1*		*440 - 32 T - 006*	*Kettenführung / Chain guiding*
007	*1*		*440 - 32 T - 007*	*Rechteckrohr / Pipe 60 x 30 x 2,0*

FIGURE A-8. 440-32S-N01-00 MACHINE ARM WITH SUBMERGING DEPTH T=600

Stkliste / Part list #:	**440**	**-**	**33**	**S**	**-**	**N01**	**-**	**00**			**Datum / Date: 17.07.1999**	
Ersteller / Creator:	**Werheid**											
Zeichnung / Cross section #:											**440-00Z-001-00**	

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
L01	1		440 - 33 S - L01	Rohr mit Führung / Arm assy [Pos 1,4,5,6]
~~001~~	~~1~~		~~440 - 33 T - 001~~	~~*Rechteckrohr / Pipe 60 x 25 x 2,0*~~
002	1		440 - 33 K - 002	Kette / Chain06 B-1
~~003~~	~~2~~		~~440 - 33 T - 003~~	~~*Kettenführung / Chain guiding*~~
004	10		440 - 33 N - 004	*Gewinde-Einsatz / Heli coil SLM 3 x 0,5 AC 4,5*
005	10		440 - 33 N - 005	*Senkschraube / Screw M3x6 A2*
006	*1*		*440 - 33 T - 006*	*Kettenführung / Chain guiding*
007	*1*		*440 - 33 T - 007*	*Rechteckrohr / Pipe 60 x 30 x 2,0*

FIGURE A-9. 440-33S-N01-00 MACHINE ARM WITH SUBMERGING DEPTH T=800

Stkliste / Part list #:		**440 - 34 S - N01 - 00**		**Datum / Date: 17.07.1999**
Ersteller / Creator:		**Werheid**		
Zeichnung / Cross section #:			**440-00Z-001-00**	

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		440 - 34 T - 001	Gehäuse / Housing
002	1		440 - 34 T - 002	Flansch / Flange
003	1		440 - 34 T - 003	Gegenflansch / Counter flange
004	1		440 - 34 T - 004	Zwischenkupplung / Coupling
005	1		440 - 34 T - 005	Kugeldorn / Ball joint Swing Check
006	1		440 - 34 C - 006	Kreuzgelenk / Couling
007	2		440 - 34 K - 007	Rikula / Ball bearing 6005 2RS1
008	1		440 - 34 N - 008	Zylinderstift gehärtet / Pin hardened 8m6x30-St
009	2		440 - 34 N - 009	Gewindestift / Set screw M4x8
010	1		440 - 34 N - 010	Passfeder geradstirnig / Key B - 5x5x20
011	4		440 - 34 N - 011	Senkschraube /Screw M5x12-8.8-Zn
012	4		440 - 34 N - 012	Zylinderschraube /Screw M5x12-8.8-Zn
~~013~~	~~1~~		~~440 - 34 N - 013~~	~~Spannstift / Pin3x10~~
014	1		440 - 34 N - 014	Sicherungsring / Snap ring 47x1,75
015	2		440 - 34 N - 015	Gewindestift / Set screw M4x6

Figure A-10. 440-34S-N01-00 swing check spindle extension 100

Stkliste / Part list #:	**440**	**-**	**35**	**S**	**-**	**N01**	**-**	**00**			**Datum / Date: 17.07.1999**	
Ersteller / Creator:	**Werheid**											
Zeichnung / Cross section #:											**440-00Z-001-00**	

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
L01	1		440 - 35 T - L01	Rohr mit Führung / Arm assy [Pos 1,3,4,5]
001	*1*		*440 - 35 T - 001*	*Rechteckrohr / Pipe 60 x 30 x 2,0*
002	1		440 - 35 K - 002	Kette / Chain06 B-1
003	*2*		*440 - 35 T - 003*	*Kettenführung / Chain guiding*
004	*12*		*440 - 35 N - 004*	*Gewinde-Einsatz / Heli coil SLM 3 x 0,5 AC 4,5*
005	*12*		*440 - 35 N - 005*	*Senkschraube / Screw M3x6 A2*
006	*1*		*440 - 35 T - 006*	*Zusatzführung / Additional guide*
007	6		440 - 35 N - 007	Senkschraube / Screw M4 x 20 - 8.8 Zn
008	1		440 - 35 T - 008	Zwischenplatte / Intermediate plate
009	4		440 - 35 K - 009	Gew .einsatz / Thread adapter TAPPEX-Trisert, Typ 336M4
010	4		440 - 35 N - 010	Senkschraube / Screw M4 x 25 - 8.8 Zn

FIGURE A-11. 440-35S-N01-00 MACHINE ARM WITH SUBMERGING DEPTH T=1000

Stkliste / Part list #:			**440 - 36 S - N01 - 00**	**Datum / Date: 17.07.1999**
Ersteller / Creator:			**Werheid**	
Zeichnung / Cross section #:				**440-00Z-001-00**

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		440 - 36 T - 001	Gehäuse / Housing
002	1	x	440 - 36 T - 002	Flansch / Flange
003	1	x	440 - 36 T - 003	Gegenflansch / Counter flange
004	1	x	440 - 36 T - 004	Zwischenkupplung / Coupling
005	1		440 - 36 T - 005	Kugeldorn / Ball joint Swing Check
006	1	x	440 - 36 C - 006	Kreuzgelenk / Couling
007	1		440 - 36 K - 007	Rikula / Ball bearing 6005 2RS1
008	1		440 - 36 N - 008	Zylinderstift gehärtet / Pin hardened 8m6x30-St
009	4		440 - 36 N - 009	Gewindestift / Set screw M4x8
010	1		440 - 36 N - 010	Passfeder geradstirnig / Key B - 5x5x19
011	4		440 - 36 N - 011	Senkschraube /Screw M5x12-8.8-Zn
012	4		440 - 36 N - 012	Zylinderschraube /Screw M5x12-8.8-Zn
013	1		440 - 36 N - 013	Spannstift / Pin3x10
014	1		440 - 36 N - 014	Sicherungsring / Snap ring 47x1,75
015	1		440 - 36 N - 015	Sicherungsring / Snap ring 25x1,2
016	1		440 - 36 K - 016	Rikula / Ball bearing 6204 2RS1

FIGURE A-12. 440-36S-N01-00 SWING CHECK SPINDLE EXTENSION 150

Stkliste / Part list #:	440 - 37 S - N01 - 00			Datum / Date: 17.07.1999
Ersteller / Creator:	Cramer			
Zeichnung / Cross section #:				440-00Z-001-00

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
L01	1		440 - 37 S - L01	Austauschbaugruppe f.TT600 / Assy for SD600
L02	1		440 - 37 S - L02	Austauschbaugruppe f.TT800 / Assy for SD800
L03	1		440 - 37 S - L03	Austauschbaugruppe f.TT1000 / Assy for SD1000
001	1		440 - 37 F - 001	Getriebegehäuse unten / Lower gear box
002	1		440 - 37 F - 002	Getriebedeckel unten / Lower gear cover
003	6		440 - 37 N - 003	Senkschraube / Screw M4 x 12 - 8.8 Zn
004	5		440 - 37 N - 004	Senkschraube / Screw M3 x 10 - 8.8 Zn
005	6		440 - 37 N - 005	Senkschraube / Screw M4 x 16 - 8.8 Zn
006	6		440 - 37 N - 006	Senkschraube / Screw M4 x 8 - 8.8 Zn
007	1	x	440 - 37 C - 007	Kettenritzel unten / Lower chain gear
008	2		440 - 37 K - 008	RiKuLa Ball bearing 61804 - 2RS1

FIGURE A-13. 440-37S-N01-00 MACHINE ARM GENERAL PARTS

Stkliste / Part list #:		440	-	40	S	-	N01	- 00	Datum / Date: 17.07.1999
Ersteller / Creator:		Werheid							
Zeichnung / Cross section #:									440-00Z-001-00

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #						Benennung Description
S	1		440	-	41	S	-	N01	Kugelkupplung 10 / Ball joint coupling 10
S	1		440	-	42	S	-	N01	Kugelkupplung 15 / Ball joint coupling 15
001	1		440	-	40	N	-	001	Senkschraube / Screw M5 x 10 - 10.9 Zn
002	1		440	-	40	T	-	002	Scheibe / Washer
003	1		440	-	40	N	-	003	U-Scheibe / Washer 17

FIGURE A-14. 440-40S-N01-00 BALL JOINT

Stkliste / Part list #:	**440**	**-**	**41**	**S**	**-**	**N01**	**-**	**00**				**Datum / Date: 17.07.1999**	
Ersteller / Creator:	**Werheid**												
Zeichnung / Cross section #:									**440-00Z-001-00**				

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #									Benennung Description
001	1		440	-	41	T	-	001				Kugeldorn 10G / Ball adapter 10G
002	1		440	-	41	N	-	002				Zylinderstift / Pin A-5m6 x 18 -St
003	1		440	-	41	N	-	003				Sicherungsring / Snap ring 13 x 1
S	1		170	-	30	S	-	N01				Kugelkupplung / Ball coupling 10G

FIGURE A-15. 440-41S-N01-00 BALL JOINT TYPE 10

Stkliste / Part list #:	**170 - 30 S - N01 - 00**	**Datum / Date: 20.09.1999**
Ersteller / Creator:	**Werheid**	
Zeichnung / Cross section #:		

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		170 - 30 T - 001	Kugelkupplung / Ball couling 10G
002	1		170 - 30 K - 002	Sicherungsring / Snap ring
003	2		170 - 30 N - 003	Flachkopfschraube / Flat head screw M5 x 8

FIGURE A-16. 170-30S-N01-00

Stkliste / Part list #:		**440 - 42 S - N01 - 00**		**Datum / Date: 17.07.1999**
Ersteller / Creator:		**Werheid**		
Zeichnung / Cross section #:			**440-00Z-001-00**	

Pos. Item	Menge Qantity	Stücklisten-, Teile # Assy or Part #	Benennung Description
~~001~~	~~1~~	~~440 - 42 T - 001~~	~~Kugeldorn 15G / Ball adapter 15G~~
002	1	440 - 42 N - 002	Zylinderstift B-8m6 x 30 -St
003	1	440 - 42 T - 003	Kugeldorn 15G / Ball adapter 15G
004	1	440 - 42 T - 004	Kugeldorn 15G lang / Ball adapter 15G long
005	1	440 - 42 N - 005	Sprengring Snap ring SW 16x1,2
S	1	170 - 10 S - N01	Kugelkupplung Typ 15 / Ball couling 15

FIGURE A-17. 440-42S-N01-00 BALL JOINT TYPE 15

Stkliste / Part list #:	**170 - 10 S - N01 - 00**		**Datum / Date: 20.09.1999**
Ersteller / Creator:	**Werheid**		
Zeichnung / Cross section #:			

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		170 - 10 T - 001	Kugelkupplung / Ball coupling 15
002	1		170 - 10 T - 002	Halteklaue / Clamping pad
003	1		170 - 10 N - 003	Senkschraube / Screw M4 x 6 - 8.8 Zn
004	2		170 - 10 N - 004	Innensechskantschraube / Screw M5x12

FIGURE A-18. 170-10S-N01-00

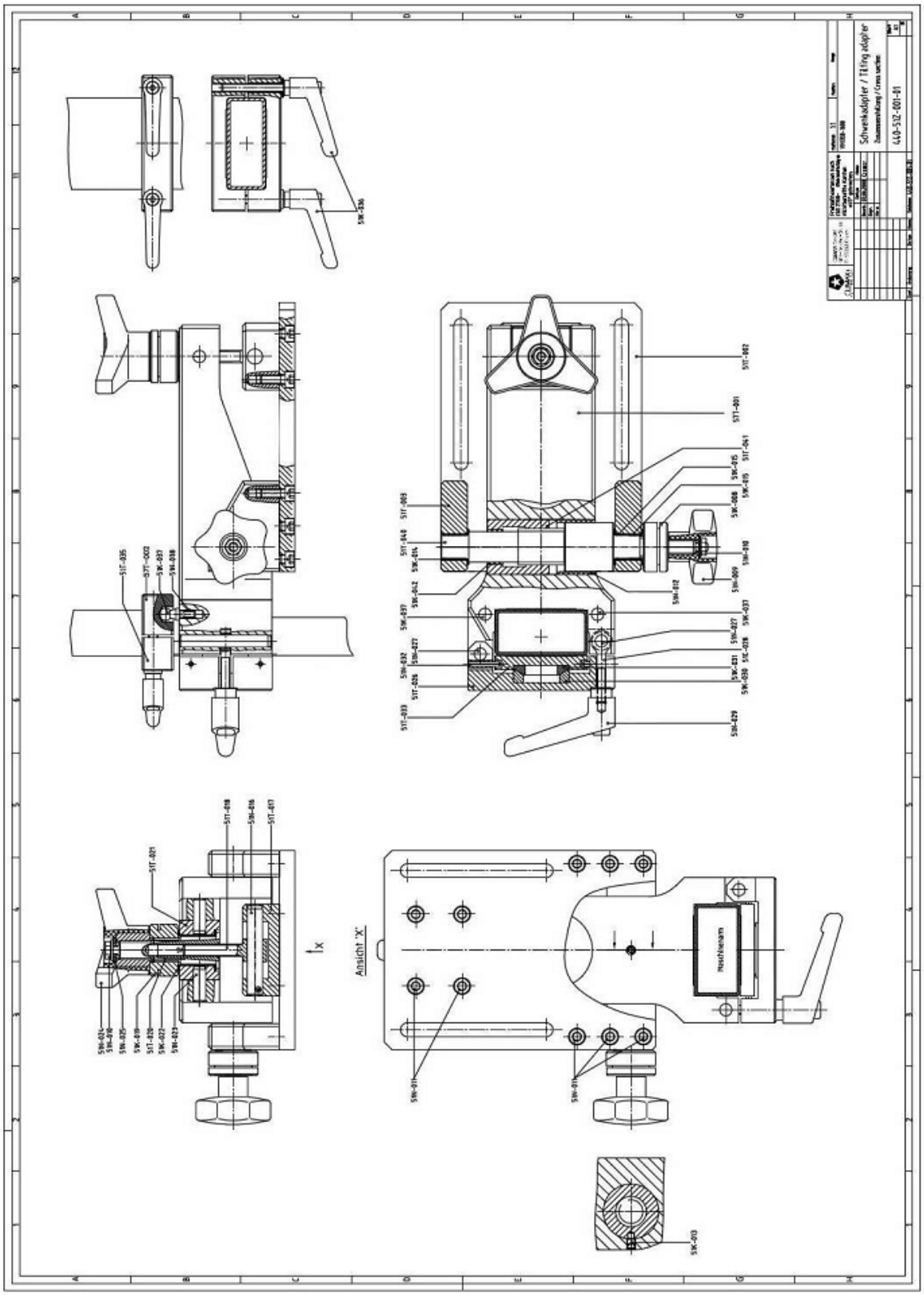


FIGURE A-19. MOUNTING SYSTEM

Stkliste / Part list #:	440 - 51 S - N01 - 00	Datum / Date: 17.07.1999
Ersteller / Creator:	Werheid	
Zeichnung / Cross section #:	440-00Z-001-00	

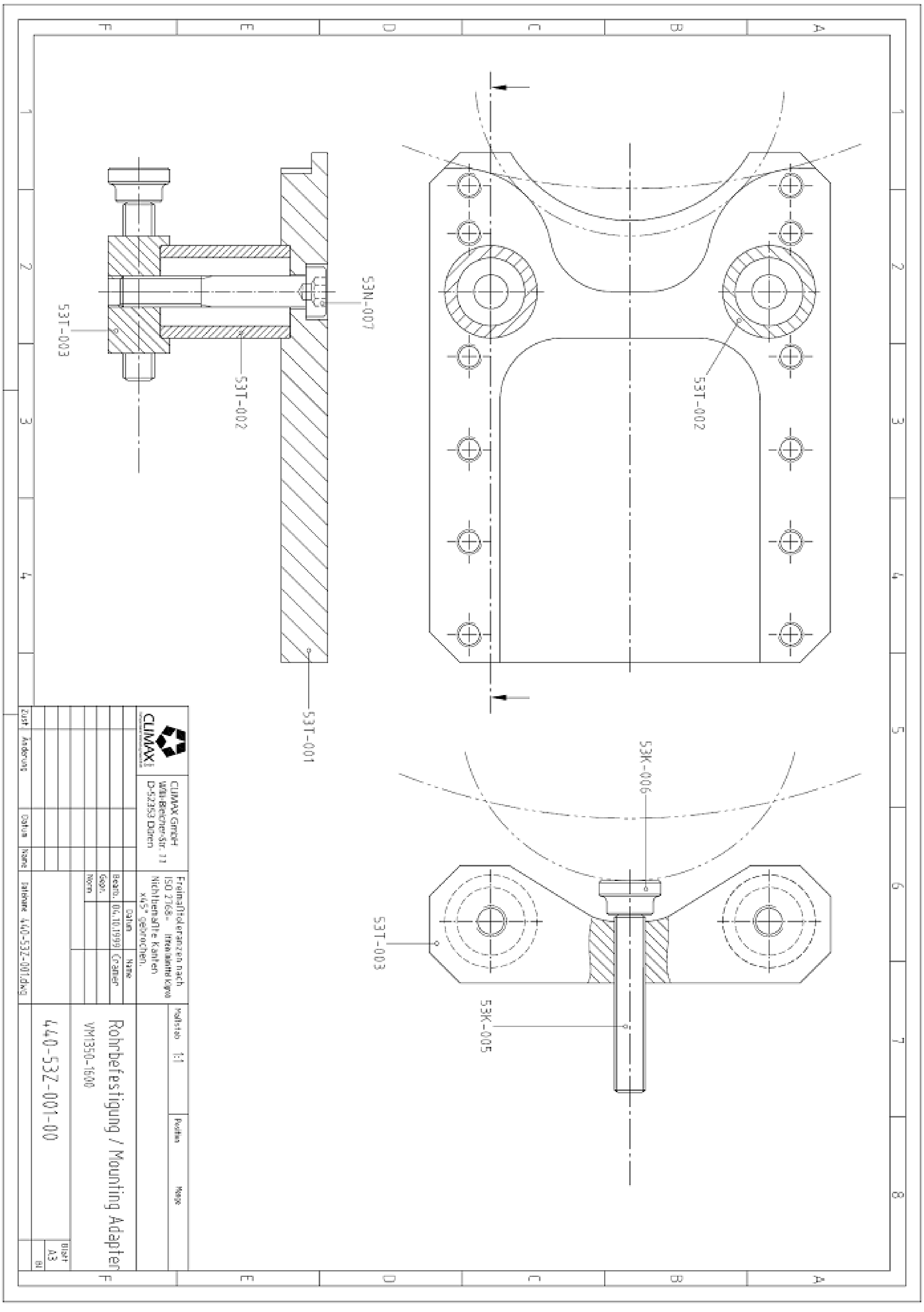
Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
L01	1		440 - 51 S - L01	Adapter / Adapter [Pos. 2-33,37-42]
L02	1		440 - 51 S - L02	Rohrklammer / Clamp [Pos: 34,35,36]
~~001~~	~~1~~		~~440 - 51 T - 001~~	~~Schwenkkörper / Housing~~
002	1		440 - 51 T - 002	Grundplatte / Base plate
003	2		440 - 51 T - 003	Lagerbock / Bearing log
008	1		440 - 51 K - 008	Spieth Stellmutter / Spieth nut MSR 14 x 1,5
009	1		440 - 51 K - 009	Sterngriff / Star wheel GN 5337.2-50-M10-E
010	2		440 - 51 K - 010	Selbstsichernde Mutter / Nut Serpress M6
011	10		440 - 51 N - 011	Innensechskantschraube / Screw M 6 x 16 - 8.8
012	1		440 - 51 K - 012	Gleitbuchse / Bushing 3230 DU (32/36/30)
013	1		440 - 51 N - 013	Gewindestift / Pin M6 x 10 - 8.8
014	1		440 - 51 K - 014	Gleitbuchse / Bushing BB 1517 DU (15/17/17)
015	2		440 - 51 K - 015	Gleitbuchse / Bushing BB 1509 DU (15/17/9)
016	1		440 - 51 N - 016	Zylinderstift / Pin 10m6 x 60
017	1		440 - 51 T - 017	Lagerbock hinten / Bearing log back
018	1		440 - 51 T - 018	Augenschraube Sonder / Eye screw special
019	1		440 - 51 K - 019	Spieth Stellmutter / Spieth nut MSR 16 x 1,5
020	1		440 - 51 T - 020	Anzugsspindel / Spindle
021	1		440 - 51 T - 021	Gelenkstück / Joint
022	2		440 - 51 K - 022	Gleitbuchse / Bushing BB 1812 DU (16/18/12)
023	2		440 - 51 N - 023	Zylinderstift / Pin 8m5 x 24
024	1		440 - 51 K - 024	Dreisterngriff / Star wheel GN 5330-80-M12-D
025	1		440 - 51 N - 025	Scheibe / Washer 8
026	1		440 - 51 T - 026	Verschlußklappe / Clamp tip
027	2		440 - 51 N - 027	Zylinderstift / Pin 8m6 x 60
028	1		440 - 51 C - 028	Augenschraube / Eye screw 6 x 40 -8.8
029	1		440 - 51 K - 029	Verstellbarer Spannhebel / Lever GN 300-63-M6-SW
030	1		440 - 51 K - 030	Kugelpfanne / Ball pan 23,2 - D
031	1		440 - 51 K - 031	Kugelscheibe / Ball washer 21 - C
032	4		440 - 51 N - 032	Spannstift / Pin 3 x 20 - Fst
033	1		440 - 51 T - 033	Halteplatte / Plate
~~*034*~~	~~*1*~~		~~*440 - 51 T - 034*~~	~~*Klemmstück A / Clamp A*~~
035	*1*		*440 - 51 T - 035*	*Klemmstück B / Clamp B*
036	*2*		*440 - 51 K - 036*	*Verstellbarer Spannhebel / Lever GN 300-45-M6-40-SW*
037	2		440 - 51 K - 037	Kugelzapfen für Winkelgelenke / Ball pin
038	2		440 - 51 K - 038	Gewinde-Einsatz / Keen Sert M5 x M8 x 8
039	4		440 - 51 N - 039	Innensechskantschraube / Screw M 8 x 20 - 8.8 Zn
040	1		440 - 51 T - 040	Spindel / Spindle
041	1		440 - 51 T - 041	Mutter / Nut
042	1		440 - 51 K - 042	Gleitbuchse / Bushing 2010 DU (23/20/10)

FIGURE A-20. 440-51S-N01-00 TILTING ADAPTER

Stkliste / Part list #:	**440**	**-**	**52**	**S**	**-**	**N01**	**-**	**00**			**Datum / Date: 17.07.1999**	
Ersteller / Creator:	**Werheid**											
Zeichnung / Cross section #:									**440-00Z-001-00**			

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #									Benennung Description
L01			440	-	52	S	-	L01				Standard Lieferumfang [Pos. 1-7]
001	1		440	-	52	T	-	001				Montageplatte / Mounting plate
002	2		440	-	52	T	-	002				Lasche / tongue
003	2		440	-	52	N	-	003				Zylinderschraube / Screw M10x20-8.8-Zn
004	2		440	-	52	N	-	004				U-Scheibe / Washer 10.5
005	4		440	-	52	N	-	005				Zylinderschraube / Screw M8x20-8.8-Zn
006	4		440	-	52	N	-	006				U-Scheibe / Washer 8.4
007	2		440	-	52	K	-	007				C-Schraubzwinge / C-Clamp
008	2		440	-	52	T	-	008				Spannadapter für Montage auf Stehbolzen / Adapter
009	2		440	-	52	T	-	009				Lasche / tongue L=150

FIGURE A-21. 440-52S-N01-00 MOUNTING FOR VALVE BODIES WITH FLANGES


53N-007
53T-003
53T-002
53T-001
53K-006
53K-005
CLIMAX GmbH
Willi-Bleicher-Str. 11
D-52353 Düren
Rohrbefestigung / Mounting Adapter
VM1350-1600
440-53Z-001-00

Stkliste / Part list #:	**440**	**-**	**53**	**S**	**-**	**N01**	**-**	**00**		**Datum / Date: 17.07.1999**
Ersteller / Creator:	**Werheid**									
Zeichnung / Cross section #:										**440-00Z-001-00**

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
L01	1		440 - 53 S - L01	Flanschlosplatte / Base plate [Pos. 1-7]
001	1		440 - 53 T - 001	Oberplatte / Upper plate
002	2		440 - 53 C - 002	Distanzrohr / Distance plate
003	1		440 - 53 T - 003	Unterplatte / Lower plate
005	1		440 - 53 N - 005	Gew indestift mit Druckzapfen M10-80-SK / Set screw
006	1		440 - 53 N - 006	Druckstück / Pressure plate 20-S
007	2		440 - 53 N - 007	Innensechskantschraube / Screw M10 x 60 - 8.8
008	1		440 - 53 K - 008	Ratschen-Zurrgurt / Collar band 2000 daN, 4m

FIGURE A-22. 440-53S-N01-00 MOUNTING FOR VALVE BODIES WITHOUT FLANGES

Stkliste / Part list #: 440 - 55 S - N01 - 00 **Datum / Date: 17.07.1999**

Ersteller / Creator: Werheid

Zeichnung / Cross section #: 440-00Z-001-00

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		440 - 55 T - 001	Oberplatte / Upper plate
002	1		440 - 55 T - 002	Unterplatte / Lower plate
003	2		440 - 55 T - 003	Lagerbock-Bohrung / Bearing log
004	2		440 - 55 T - 004	Lagerbock-Gewinde / Bearing log threaded
005	2		440 - 55 T - 005	Klemmlasche-Langloch / Clamping tongue
006	2		440 - 55 T - 006	Klemmlasche-Gewinde / Clamping tongue threaded
007	2		440 - 55 K - 007	Verstellbarer Klemmhebel / Lever GN300-63-M8-25-SW
008	2		440 - 55 N - 008	Sechskant Paßschraube / Screw M8x25 - 8.8
009	16		440 - 55 N - 009	Zylinderschraube / Screw M6x16 - 8.8 - Zn
010	2		440 - 55 N - 010	Scheibe für Bolzen / Washer DIN 1440-10-St

FIGURE A-23. 440-55S-N01-00 SWING CHECK ADAPTER

Stkliste / Part list #:	440 - 57 S - N01 - 00	Datum / Date: 17.07.1999
Ersteller / Creator:	Werheid	
Zeichnung / Cross section #:	440-00Z-001-00	

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
L01	1		440 - 57 S - L01	Adapter / Adapter [Pos.:51S-001...033,51S-037...042]
L02	1		440 - 57 S - L02	Rohrklammer / Clamp [Pos: 002,51S-035,51S-036]
S	1		440 - 51 S - N01	Schwenkadapter / Tilt adapter
001	1		440 - 57 T - 001	Schwenkkörper / Housing [Replace]
002	1		440 - 57 T - 002	Klemmstück A / Clamp A
ent1	*1*		*440 - 51 T - 001*	*Wenn komplett neu ENTFÄLLT /Replaced*
ent2	*1*		*440 - 51 T - 034*	*Klemmstück A ENTFÄLLT / Replaced*

FIGURE A-24. 440-57S-N01-00 TILTING ADAPTER (ADDITIONAL PARTS FOR T = 1000)

Teileliste für Planetenschleif- und Läppwerkzeuge Zeichn. Nr.: 110-00E-N01
Partlist for Planet Grinding and Lapping Tools Drawing No: 110-00E-N01

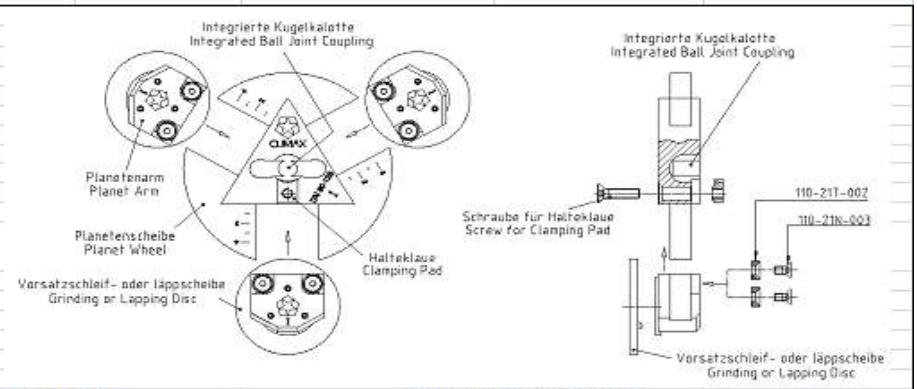
Planetenscheiben Planet Wheels ø [mm]	P/N	Kugelkalotte Ball Joint Coupling P/N	Schrauben der Kugelkalotte Screws for Ball Joint Coupling According to DIN912	Halteklaue Clamping Pad P/N	Schraube der Halteklaue Screw of Clamping Pad According to DIN7991
100	110-10T-001	integrated	-	110-11T-001	M5x20-8.8
135	110-10T-002	integrated	-	110-11T-001	M5x20-8.8
220	110-10T-003	170-10T-001	M5x12-8.8	170-10T-002	M4x6-8.8
380	110-10T-004	170-10T-001	M5x12-8.8	170-10T-002	M4x6-8.8

Standard-Planetenarme Standard Planet Arms			Planetenarme mit geneigter Spindel Planet Arms with tilted Spindles	
Planetenarm Planet Arm Type	Länge Length [mm]	P/N	Planetenarm 3° Planet Arms 3° P/N	Planetenarm 5° Planet Arms 5° P/N
I	30	110-21S-N01		
II	60	110-22S-N01	110-51S-N01	110-61S-N01
III	115	110-23S-N01	110-52S-N01	110-62S-N01
IV	190	110-24S-N01		

Vorsatzschleifscheiben Grinding Discs ø [mm]	P/N
50	110-31S-N01
80	110-32S-N01
50 CBN coated	110-33S-N01
80 CBN coated	110-34S-N01

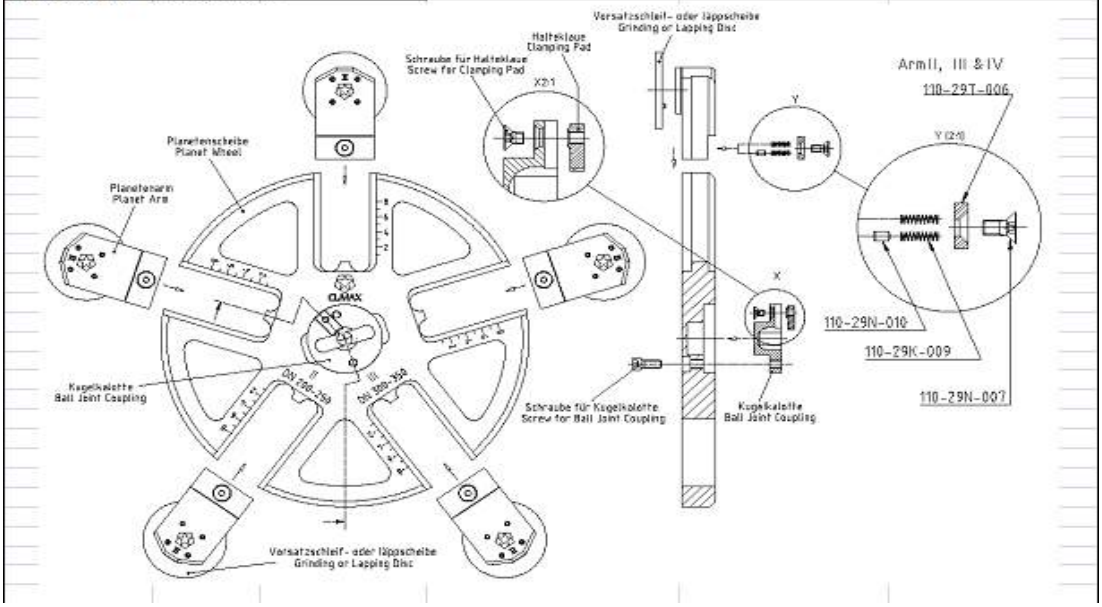
Vorsatzläppscheiben Lapping Discs ø [mm]	P/N
30	110-41S-N01
50	110-42S-N01
80	110-43S-N01

Planetenscheiben ø 100 und 135
Planet Wheels dia 100 and 135



gezeigt: Planetscheibe ø 100 (ø 135 besitzt 5 Stk. Planetenarme)
here shown: Planetwheel dia 100 (dia 135 consists of 5 pcs.of Planet Arms)

Planetenscheiben ø 220 und 380 | *Planet Wheels dia 220 and 380*



List of Abrasives / *Schleifmittelliste* (05/2003)

Diameter / Durchmesser [mm]	*Part Number / Artikelnummer* — *Grain / Körnung*		
	100 or /bzw. 80	*500*	*1000*
Quantity 25 Pieces / Stückzahl 25			
20	-	140-22C-001	140-32C-001
25	-	140-22C-002	140-32C-002
30/0 *	140-12C-003	140-22C-003	140-32C-003
30	-	140-22C-004	140-32C-004
35	-	140-22C-005	140-32C-005
40	-	140-22C-006	140-32C-006
45	-	140-22C-007	140-32C-007
50/0 *	140-12C-020	140-22C-020	140-32C-020
50	140-12C-008	140-22C-008	140-32C-008
55	140-12C-009	140-22C-009	140-32C-009
60	-	140-22C-010	140-32C-010
65	140-12C-011	140-22C-011	140-32C-011
73	140-12C-012	140-22C-012	140-32C-012
80/0 *	140-12C-021	140-22C-021	140-32C-021
80	140-12C-013	140-22C-013	140-32C-013
85	140-12C-014	140-22C-014	140-32C-014
90	140-12C-015	140-22C-015	140-32C-015
100	140-12C-016	140-22C-016	140-32C-016
105	140-12C-017	140-22C-017	140-32C-017
110	140-12C-018	140-22C-018	140-32C-018
120	140-12C-019	140-22C-019	140-32C-019
Quantity 50 Pieces / Stückzahl 50			
73	-	140-23C-012	140-33C-012
80	-	140-23C-013	140-33C-013
85	-	140-23C-014	140-33C-014
90	-	140-23C-015	140-33C-015
100	-	140-23C-016	140-33C-016
105	-	140-23C-017	140-33C-017
110	-	140-23C-018	140-33C-018
120	-	140-23C-019	140-33C-019
Segment S1/95	140-15C-001	140-25C-001	140-35C-001
Segment S2/115	140-15C-002	140-25C-002	140-35C-002
Segment S3/165	140-15C-003	140-25C-003	140-35C-003
Segment S4/270	140-15C-004	140-25C-004	140-35C-004
Quantity 100 Pieces / Stückzahl 100			
20	140-14C-001	140-24C-001	140-34C-001
25	140-14C-002	140-24C-002	140-34C-002
30/0 *	140-14C-003	140-24C-003	140-34C-003
30	140-14C-004	140-24C-004	140-34C-004
35	140-14C-005	140-24C-005	140-34C-005
40	140-14C-006	140-24C-006	140-34C-006
45	140-14C-007	140-24C-007	140-34C-007
50/0 *	140-14C-020	140-24C-020	140-34C-020
50	140-14C-008	140-24C-008	140-34C-008
55	140-14C-009	140-24C-009	140-34C-009
60	140-14C-010	140-24C-010	140-34C-010
65	140-14C-011	140-24C-011	140-34C-011
80/0 *	140-14C-021	140-24C-021	140-34C-021
80	140-14C-013	140-24C-013	-
CBN Grinding Discs / CBN Schleifscheiben			
50 **	110-33S-N01	(Grain B252 / *Körnung B252*)	
80 **	110-34S-N01	(Grain B252 / *Körnung B252*)	
Lapping Discs / Läppscheiben			
30 **	110-41S-N01	(Cast Iron / *Gusssscheiben*)	
50 **	110-42S-N01	(Cast Iron / *Gusssscheiben*)	
80 **	110-43S-N01	(Cast Iron / *Gusssscheiben*)	

* For planet grinding wheels only / Nur für Planetenschleifscheiben

** One set can consist of 3, 5 or 7 pieces so you have to order the relevant quantity
Ein Satz kann aus 3, 5 oder 7 Stück bestehen, deshalb bestellen Sie die benötigte Anzahl

Stkliste / Part list #: 240 - 71 S - N01 - 00 **Datum / Date: 01.06.1999**

Ersteller / Creator: Werheid

Zeichnung / Cross section #:

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
S	2		110 - 11 S - N01	Allg. Teile Planetenscheiben k / General parts planet tooling
S	1		110 - 20 S - N01	Planetenarme / Planet arms
S	5		110 - 31 S - N01	Vorsatzscheiben Schleifen konventionell / Grinding disc 50
S	5		110 - 33 S - N01	Vorsatzscheiben Schleifen / Grinding disc CBN 50
S	5		110 - 41 S - N01	Vorsatzscheiben Läppen / Lapping disc 30
S	5		110 - 42 S - N01	Vorsatzscheiben Läppen / Lapping disc 50
001	1	x	240 - 71 T - 001	Planetenscheibe k, / Planet wheel D=100
002	1	x	240 - 71 T - 002	Planetenscheibe k, / Planet wheel D=135
003	1	x	240 - 71 T - 003	Planetenscheibe / Planet wheel D=220

FIGURE A-25. 240-71S-N01-00 PLANET WHEELS DN 80 ... DN 350

Stkliste / Part list #:		**240 - 73 S - N01 - 00**		**Datum / Date: 01.06.1999**
Ersteller / Creator:		**Werheid**		
Zeichnung / Cross section #:				

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
S	5		110 - 32 S - N01	Vorsatzscheiben Schleifen / Grinding disc 80
S	5		110 - 43 S - N01	Vorsatzscheiben Läppen / Lapping disc 80
001	1	x	240 - 73 T - 001	Planetenscheibe / Planet wheel D=380

FIGURE A-26. 240-73S-N01-00 PLANET WHEELS DN 400 ... DN 500 (VM 1500/1600 ONLY)

Stkliste / Part list #:	**110 - 20 S - N01 - 02**			**Datum / Date: 27.05.1999**
Ersteller / Creator:	***Werheid***			
Zeichnung / Cross section #:				**110-21Z-001, 110-22Z-001, 110-23Z-001**

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
S	1		110 - 21 S - N01	Arm I / Planet arm I, l=30mm
S	1		110 - 22 S - N01	Arm II / Planet arm II, l=60mm
S	1		110 - 23 S - N01	Arm III / Planet arm III, l=115mm
S	1		110 - 24 S - N01	Arm IV / Planet arm IV, l=190mm

FIGURE A-27. 110-20S-N01-02 PLANET ARMS

Stkliste / Part list #:			**440**	**-**	**72**	**S**	**-**	**N01**	**-**	**00**	**Datum / Date: 17.07.1999**
Ersteller / Creator:			**Werheid**								
Zeichnung / Cross section #:											**440-00Z-001-00**
Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #								Benennung Description
L01			440	-	72	S	-	L01			Tooling DN40 ... DN80 [Pos:41S-N01;72S-N01;82S-N01]
001	1	x	440	-	72	T	-	001			Schleifscheibe / Grinding disc 55-40-3
002	1	x	440	-	72	T	-	002			Schleifscheibe / Grinding disc65-50-3
003	1	x	440	-	72	T	-	003			Schleifscheibe / Grinding disc 85-65-3

FIGURE A-28. 440-72S-N01-00 SOLID GRINDING DISCS DN 40 ... DN 65 (VM 1350 ONLY)

This page intentionally left blank


CLIMAX
BORTECH
CALDER
H&S TOOL