CE

VM2150

GLOBE VALVE GRINDING MACHINE

OPERATING MANUAL

ORIGINAL INSTRUCTIONS

CLIMAX
Portable Machining & Welding Systems

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Revision 1

CLIMAX | BORTECH CALDER H&S TOOL

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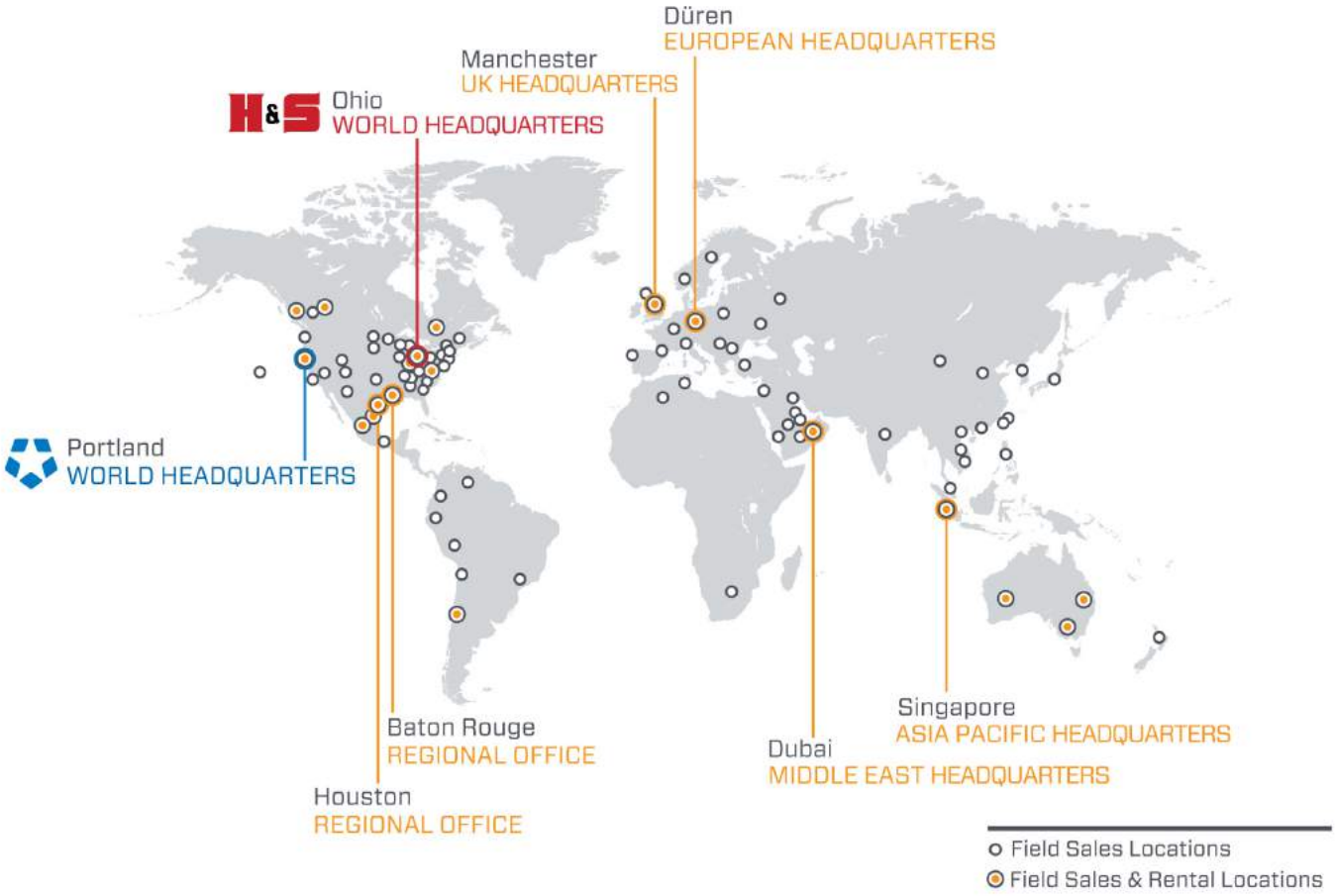

CE DOCUMENTATION

EC-Declaration of Conformity

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

The manufacturer: **CLIMAX GmbH**
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hereby declares that the machine described below: **Globe Valve Grinding Machine**
Modell VM 2150, VM 2150S, VM 2105SV, VM 2150SVL

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

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Düren, 18.03.2013

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.

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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

CHAPTER/SECTION PAGE

1 INTRODUCTION 1
1.1 How to use this manual 1
1.2 Safety alerts 1
1.3 General safety precautions 2
1.4 Machine-specific safety precautions 3
1.5 Risk assessment and hazard mitigation 4
1.6 Risk assessment checklist 5
2 OVERVIEW 7
2.1 Features and components 7
2.1.1 Hand-held operation 10
2.1.2 Operation with column mounting device 10
2.2 Specifications 11
3 SETUP 13
3.1 Receipt and inspection 13
3.2 Selecting tools and preparation 19
3.2.1 Selecting tools 19
3.2.2 Preparing tools 22
3.2.3 Preparing the machine 22
4 OPERATION 25
4.1 Pre-operation checks 25
4.2 Operation 25
4.3 Operation with column mounting device (VM2150 only) 29
4.3.1 Set-up of column mounting device 29
4.3.2 Selecting tools 32
4.3.3 Preparing tools 32
4.4 Change of abrasives 35
4.5 Grinding of valve plugs 35
5 MAINTENANCE 39
5.1 Maintenance checklist 39
5.2 Lubricating the machine modules 40
5.3 Lubricating the pneumatic drive motor 40
5.4 Maintenance tasks 40
5.4.1 Electrical tasks 41
5.4.2 Pneumatic equipment tasks 41
5.5 Troubleshooting 41

TABLE OF CONTENTS (CONTINUED)

CHAPTER/SECTION **PAGE**

6 STORAGE AND SHIPPING 45

6.1 STORAGE 45

6.1.1 Short-term storage 45

6.1.2 Long-term storage 45

6.2 SHIPPING 45

APPENDIX A ASSEMBLY DRAWINGS 47

LIST OF FIGURES

FIGURE **PAGE**

2-1 Machine with electric drive motor and hand-held operation . . . 8
2-2 Machine with pneumatic drive system and hand-held operation . . . 9
2-3 Machine with electric drive motor and column setup . . . 9
2-4 Machine as shown with pneumatic drive system and column setup . . . 10
3-1 Machine case VM2150 (VM2150 SVL) with electric drive . . . 14
3-2 Machine case VM2150 with pneumatic drive . . . 15
3-3 Accessory case VM2150 (VM2150 SVL) . . . 15
3-4 Machine case VM2150S with electric drive . . . 16
3-5 Machine case VM2150S with pneumatic drive . . . 16
3-6 Accessory case VM2150S . . . 17
3-7 Machine case VM2150SV as shown including electric drive . . . 17
3-8 Machine case VM2150SV as shown including pneumatic drive . . . 18
3-9 Accessory case VM2150SV . . . 18
3-10 Tool components for hand-held operation with ball joint coupling type 10 (solid grinding disc with guide) . . . 21
3-11 Tool components for hand-held operation with ball joint coupling type 10 (solid grinding disc with guide) . . . 21
3-12 Tool components for hand-held operation with ball joint coupling type 10 (solid grinding disc with adjustable guides) . . . 21
3-13 Assembled tool for hand-held operation . . . 22
3-14 Tool adaptation . . . 22
4-1 Indicator of grinding pressure . . . 26
4-2 Indicator of grinding pressure at grinding spindle VM2150 and VM2150S . . . 26
4-3 Indicator of grinding pressure at grinding spindle VM2150SV . . . 26
4-4 Electric drive (Bosch) with trigger button and direction of rotation . . . 27
4-5 Electric drive (Duss) with trigger button and direction of rotation . . . 28
4-6 Maintenance unit with operating buttons for pneumatic drive (optional) . . . 28
4-7 Brackets with base plate mounted onto valve body (flange mounting) . . . 29
4-8 Brackets and base plate mounted to the valve (valve body without flange) . . . 29
4-9 Adjustable support mounted to base plate . . . 30
4-10 Column mounting device completely mounted . . . 31
4-11 Machine and column mounting device assembly . . . 31
4-12 Adjustment of vertical guides on column . . . 34
4-13 Tool components for grinding discs with adjustable guides . . . 36
4-14 Solid grinding disc with adjustable guides for grinding of valve plugs (OD-guided) . . . 37
A-1 Valve grinder assembly . . . 48
A-2 220-11S-N01-00 electric drive . . . 49
A-3 220-12S-N01-00 pneumatic drive . . . 50
A-4 220-20S-N01-00 spring system . . . 51
A-5 220-21S-N01-00 spring standard machine . . . 52
A-6 220-22S-N01-00 spring SV-Machine . . . 53
A-7 220-31S-N01-00 ball joint coupling type 10 . . . 54
A-8 170-20S-N01-00 . . . 55
A-9 220-32S-N01-00 ball joint coupling type 15 . . . 56

LIST OF FIGURES (CONTINUED)

FIGURE **PAGE**

A-10 170-10S-N01-00 57
A-11 220-40S-N01-00 mounting device for valves with flange 58
A-12 220-41S-N01-00 mounting device for valves without flange. 59
A-13 Solid grinding and lapping discs diameter .4–2.6" (10–65 mm) 60
A-14 Solid grinding and lapping discs diameter 3.2–3.9" (80–100 mm) 60
A-15 Solid grinding discs with adjustable bearings diameter 3.2–5.9" (80–150 mm) 61
A-16 List of abrasives 62

LIST OF TABLES

TABLE **PAGE**

1-1 Sound levels 3
1-2 Risk assessment checklist before set-up 5
1-3 Risk assessment checklist after set-up 5
2-1 Components 8
2-2 Specifications 11
3-1 Solid grinding discs with guides for diameter .39–3.94" (10–100 mm) 20
3-2 Solid grinding discs with adjustable guides for diameter 3.15–5.9" (80–150 mm) 20
4-1 Selection of grinding disc for grinding of valve plugs with solid grinding discs and adjustable guides . 36
5-1 Troubleshooting for possible faults 43

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1 INTRODUCTION

IN THIS CHAPTER:

1.1 HOW TO USE THIS MANUAL - - - - - 1
1.2 SAFETY ALERTS - - - - - 1
1.3 GENERAL SAFETY PRECAUTIONS - - - - - 2
1.4 MACHINE-SPECIFIC SAFETY PRECAUTIONS - - - - - 3
1.5 RISK ASSESSMENT AND HAZARD MITIGATION - - - - - 4
1.6 RISK ASSESSMENT CHECKLIST - - - - - 5

1.1 HOW TO USE THIS MANUAL

This manual describes information necessary for the setup, operation, maintenance, storage, shipping, and decommissioning of the VM2150.

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 VM2150 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

Typical A-weighted sound pressure level (with electric drive)	81 dBA
Typical A-weighted sound pressure level (with pneumatic drive)	75 dBA
The noise level when working can exceed	85 dBA
Hand-arm-vibration typically less than	2.5 m/s²

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

The VM2150 globe valve grinding machine was designed and built on the basis of a risk analysis and under consideration of all relevant harmonised standards as well as further national standards and technical specifications. The machine thus conforms to the current level of technology and guarantees the highest possible degree of safety.

This level of safety can only be achieved in practice if all necessary measures are observed in dealing with the machine. It is therefore part of the duty of care of the machine's operator to plan these measures and check that they are correctly executed.

In particular, the operator must ensure that:

- the globe valve grinding machine is only used as prescribed (see Section 2.1 on page 7)
- the globe valve grinding machine is operated only in a fault-free, operational condition and in particular the safety devices are regularly checked to ensure that they function as stipulated.
- any necessary protective equipment for the operating, maintenance and repair personnel is available and is used
- the operating manual is always legible and is available in full at the globe valve grinding machine’s location
- the machine is operated, maintained and repaired only by sufficiently qualified and authorised personnel
- these personnel are regularly instructed in all matters relating to occupational safety and environmental protection and are familiar with the operating manual and in particular the safety instructions it contains
- all safety instructions and warnings on the globe valve grinding machine are visible and legible and are not removed.

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.

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).
☐	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).
☐	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.

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2 OVERVIEW

IN THIS CHAPTER:

2.1 Features and components - - - 7
2.1.1 Hand-held operation - - - 10
2.1.2 Operation with column mounting device - - - 10
2.2 Specifications - - - 11

2.1 Features and components

The globe valve grinding machine, Model VM2150, is specifically designed for grinding of globe and safety valve seats, diameter size .39–5.9" (10–150 mm).

The VM2150S does not include the lapping equipment and the VM2150SV is specially made for safety valves.

The specifications in Section 2.2 on page 11 and all other technical data must be met. In addition, Section 1.5 on page 4, Section 4 on page 25, and Section 5 on page 39 must be followed to ensure a safe operation of the globe valve grinding machine.

Any faults during the warranty period will be recovered according to CLIMAX's terms of warranty. Excluded are damages due to dismantling the machine by the customer's maintenance personnel. Damages attributable to normal wear and tear, overload or improper handling will be excluded from warranty.

Not all accessories are included in the basic scope of supply. Options are also described. For instance, 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.

The column mounting device is not included to the VM2150S and VM2150SV machines.

⚠ CAUTION

The globe valve grinding machine is only to be used as prescribed. If the globe valve grinding machine is not used accordingly, safe operation is not guaranteed.

Any danger to the life and health of people and all damage to the globe valve grinding machine resulting from use not as prescribed will be the customer's responsibility.

Any modifications of the globe valve grinding machine made by the customer will be at their own responsibility. This applies especially for any changes that will not comply with the safety requirements of the globe valve grinding machine.

The following figures show the different setups available with components identified in Table 2-1.

TABLE 2-1. COMPONENTS

Position	Component
1	Drive Motor
2	Machine shaft
3	Grinding spindle
4	Quick-lock coupling
5	Tool (grinding disc)
6	Column mounting device

FIGURE 2-1. MACHINE WITH ELECTRIC DRIVE MOTOR AND HAND-HELD OPERATION

FIGURE 2-2. MACHINE WITH PNEUMATIC DRIVE SYSTEM AND HAND-HELD OPERATION

FIGURE 2-3. MACHINE WITH ELECTRIC DRIVE MOTOR AND COLUMN SETUP

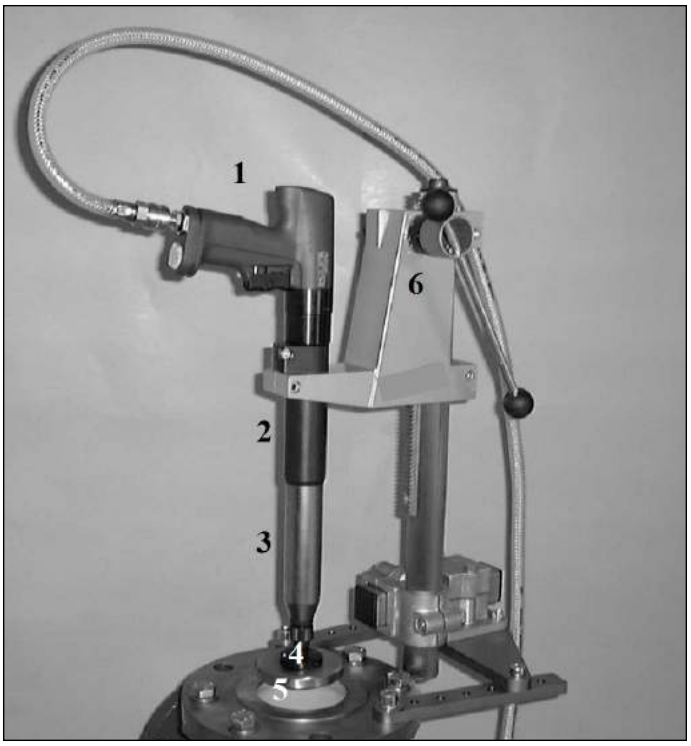

FIGURE 2-4. MACHINE AS SHOWN WITH PNEUMATIC DRIVE SYSTEM AND COLUMN SETUP

The machine spindle of the globe valve grinding machine is driven by an electric or a pneumatic motor. The tool is adapted to the machine spindle by the quick-lock coupling which is located at the bottom end of the machine spindle. The grinding pressure is indicated at the grinding spindle by means of serrated range rings.

The grinding tool consists of:

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

2.1.1 Hand-held operation

For grinding operation, the machine is held with both hands and the grinding pressure is manually adjusted. The tool system is equipped with a guide to ensure that the grinding disc is centred during the grinding operation.

2.1.2 Operation with column mounting device

The globe valve grinding machine is clamped into the column mounting device and centred to the valve seat. When using the column mounting device the guides for the grinding disks are not needed.

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.

The trigger button should not be locked during manual operation even though a button is provided.

The spindle speed can be adjusted at the trigger button of the electric drive. For the machine with pneumatic drive, the spindle speed is adjusted with the regulating valve at the maintenance unit for air supply. This maintenance unit is available as an option or can be supplied by the customer.

2.2 SPECIFICATIONS

TABLE 2-2. SPECIFICATIONS

Unit	Specification
Machining Data	
Machining range	diameter .39–5.9" (10–150 mm)
Submerging depth manual operation	11.8" (300 mm)
Maximum speed (electric / pneumatic)	550 U/min / 640 U/min
Power requirements	
Connection (electric/pneumatic)	230 V – 50 Hz / 10.5 l/s – 91 psi (6.3 bar)
Drive power (electric Bosch / electric DUSS / Air)	550 W / 650 W / 400 W
Weights	
Basic machine without tools	8.8 lbs (4 kg)
Weight of machine case (with electric drive)	46 lbs (21 kg)
Weight of machine case (with pneumatic drive)	62 lbs (28 kg)
Weight of accessory case	51 lbs (23 kg)

⚠ CAUTION

Before using the globe valve grinding machine, make sure that the data of the power source match the values in Table 2-2.

Different voltages can result into non-repairable damage to the globe valve grinding machine.

Pneumatic drives may only be operated with filtered and lubricated and dry air. Failure to observe can result into non-repairable damage to the globe valve grinding machine.

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3 SETUP

IN THIS CHAPTER:

3.1 Receipt and inspection - 13
3.2 Selecting tools and preparation - 19
3.2.1 Selecting tools - 19
3.2.2 Preparing tools - 22
3.2.3 Preparing the machine - 22

This section describes the setup and assembly procedures for the VM2150 globe valve grinding 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.

The machine and accessories are delivered in high-quality, durable carrying cases with foam inlet for safe transportation and storage (see Figure 3-1 on page 14 through Figure 3-9 on page 18).

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.

Even if the case provides a perfect protection of the equipment, any shocks and collisions should be avoided.

⚠ CAUTION

The weight of the cases should not be underestimated. Secure the cases 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, secure all parts against dropping. This is also important for parts not directly used for the operation.

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

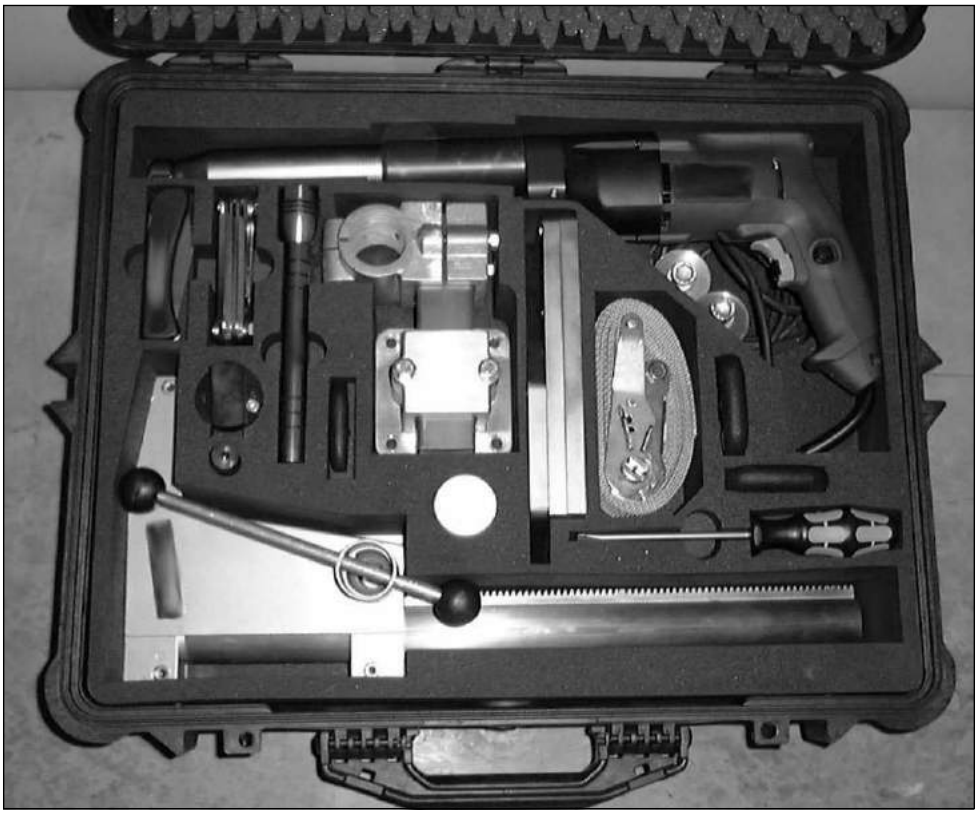

FIGURE 3-1. MACHINE CASE VM2150 (VM2150 SVL) WITH ELECTRIC DRIVE

FIGURE 3-2. MACHINE CASE VM2150 WITH PNEUMATIC DRIVE

FIGURE 3-3. ACCESSORY CASE VM2150 (VM2150 SVL)

FIGURE 3-4. MACHINE CASE VM2150S WITH ELECTRIC DRIVE

FIGURE 3-5. MACHINE CASE VM2150S WITH PNEUMATIC DRIVE

FIGURE 3-6. ACCESSORY CASE VM2150S

FIGURE 3-7. MACHINE CASE VM2150SV AS SHOWN INCLUDING ELECTRIC DRIVE

FIGURE 3-8. MACHINE CASE VM2150SV AS SHOWN INCLUDING PNEUMATIC DRIVE

FIGURE 3-9. ACCESSORY CASE VM2150SV

3.2 SELECTING TOOLS AND PREPARATION

For all screws being used as connecting elements, the following maximum torque must 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

⚠ CAUTION

All screws with visible damages must be changed immediately. Damaged screws can only be unscrewed with extreme effort and might damage the machine.

3.2.1 Selecting tools

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

Selection of proper tool components according to Table 3-1:

- Grinding or lapping disc
- Guide (for hand held operation)
- Ball joint coupling
- Abrasives (grain and size according to application)
- Adequate screws

For operations on the column mounting device, mount the tools in the same way, but leave the guides away.

⚠ CAUTION

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

Never use grinding disks for lapping. This will result into damage of the grinding discs and the valve seat.

Never use lapping disks for grinding. This will result into damage of the valve seat.

TABLE 3-1. SOLID GRINDING DISCS WITH GUIDES FOR DIAMETER .39–3.94" (10–100 MM)

Diameter range in inches (mm)	Grinding disk diameter in inches (mm)	Lapping disk diameter in inches (mm)	Guides diameter in inches (mm)	Ball joint coupling type	Screw with Guide DIN 912	Screw without Guide DIN 912
.39" (10)	.79" (20)			10	M5 x 10	M5 x 10
	.98" (25)	.98" (25)				
.79" (20)	1.18" (30)	1.18" (30)	.75" (19)		M5 x 16	M5 x 8
.98" (25)	1.38" (35)	1.38" (35)	.94" (24)		M5 x 16	M5 x 8
	1.57" (40)					
1.26" (32)	1.77" (45)	1.77" (45)	1.22" (31)		M5 x 16	M5 x 8
	1.97" (50)					
1.57" (40)	2.17" (55)	2.17" (55)	1.54" (39)		M5 x 16	M5 x 8
1.97" (50)	2.36" (60)		1.89" (48)		M5 x 16	M5 x 8
	2.56" (65)	2.56" (65)				
2.56" (65)	2.87" (73)		2.48" (63)		M5 x 16	M5 x 8
	3.15" (80)	3.15" (80)				
	3.35" (85)					
3.15" (80)	3.54" (90)		3.07" (78)	15	M5 x 20 (2Stk)	M5 x 16 (2Stk)
	3.94" (100)	3.94" (100)				
	4.13" (105)					
3.94" (100)	4.33" (110)		3.86" (98)		M5 x 20 (2Stk)	M5 x 16 (2Stk)
	4.72" (120)	4.72" (120)				

TABLE 3-2. SOLID GRINDING DISCS WITH ADJUSTABLE GUIDES FOR DIAMETER 3.15–5.9" (80–150 MM)

Diameter range in inches (mm)	Grinding disk diameter in inches (mm)	Guides diameter in inches (mm)	Ball joint coupling type	Screw DIN 912
3.15" (80)	3.74" (95)	2.48–3.7" (63–94)	15	M5 x 20 (2 pcs.)
4.92" (125)	5.51" (140)	3.74–5.47" (95–139)		M5 x 20 (2 pcs.)
5.9" (150)	6.5" (165)	3.81–6.46" (97–164)		M5 x 20 (2 pcs.)

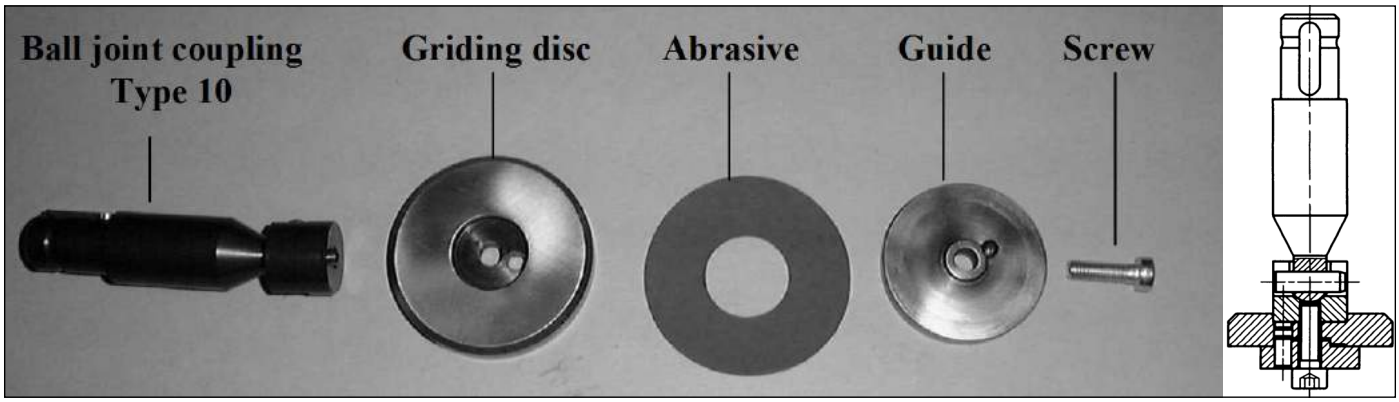

FIGURE 3-10. TOOL COMPONENTS FOR HAND-HELD OPERATION WITH BALL JOINT COUPLING TYPE 10 (SOLID GRINDING DISC WITH GUIDE)

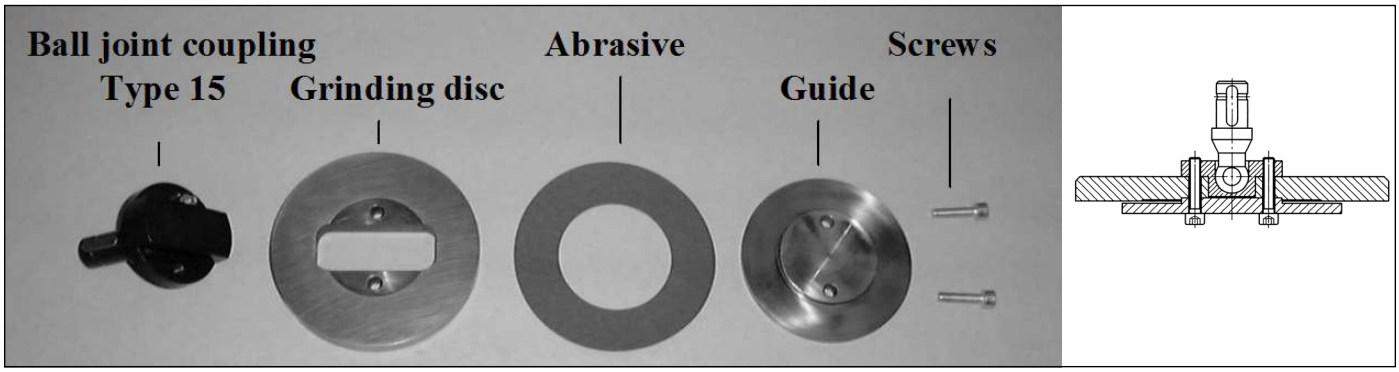

FIGURE 3-11. TOOL COMPONENTS FOR HAND-HELD OPERATION WITH BALL JOINT COUPLING TYPE 10 (SOLID GRINDING DISC WITH GUIDE)

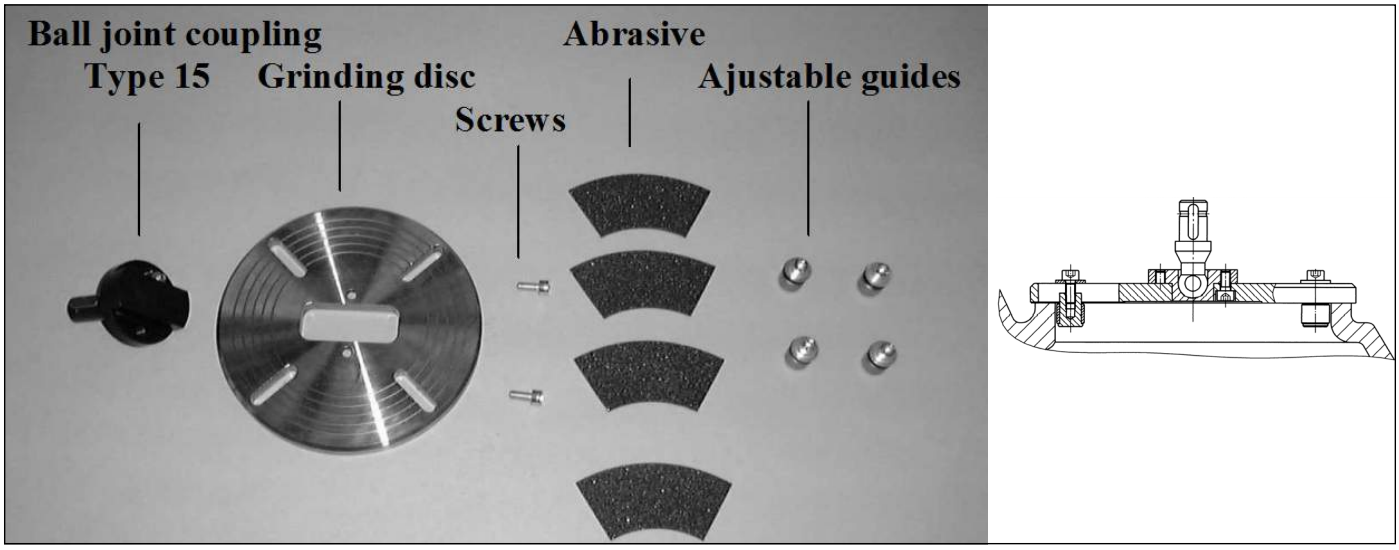

FIGURE 3-12. TOOL COMPONENTS FOR HAND-HELD OPERATION WITH BALL JOINT COUPLING TYPE 10 (SOLID GRINDING DISC WITH ADJUSTABLE GUIDES)

3.2.2 Preparing tools

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

Put abrasives on the grinding discs (not needed for lapping).

Assemble the selected tool components (see Figure 3-10 on page 21, Figure 3-11 on page 21, and Figure 3-12 on page 21):

- Grinding or lapping disc
- Guide
- Ball joint coupling
- Adequate screws

Before operation, the ball joint coupling of the machine has to be lubricated with grease (i.e. Molykote or Unimoly GL82 or similar).

FIGURE 3-13. ASSEMBLED TOOL FOR HAND-HELD OPERATION

The lapping discs are made out of cast iron.

3.2.3 Preparing the machine

Do the following:

1. Take machine out of the machine case.
2. Adapt tool to the machine spindle by means of quick-lock coupling (see Figure 3-14).
3. Pull release ring back.
4. Locate tool into quick-lock coupling according to location of key.
5. Lock tool with release ring.
6. Check that the tool is firmly connected to machine spindle.

FIGURE 3-14. TOOL ADAPTATION

NOTICE

For lapping operation, check that sufficient lapping paste is put onto the surface to be machined. Use low pressure for lapping operations.

7. Connect the machine to energy supply.

⚠ CAUTION

All cables and hoses for the machine power supply must be covered or installed to prevent stumbling.

Before connecting the machine to the power supply, check all cables and hoses for damages.

For grinding operation, always wear eye protection glasses.

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

⚠ CAUTION

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 91 psi (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.

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4 OPERATION

IN THIS CHAPTER:

4.1 PRE-OPERATION CHECKS - 25
4.2 OPERATION - 25
4.3 OPERATION WITH COLUMN MOUNTING DEVICE (VM2150 ONLY) - 29
4.3.1 SET-UP OF COLUMN MOUNTING DEVICE - 29
4.3.2 SELECTING TOOLS - 32
4.3.3 PREPARING TOOLS - 32
4.4 CHANGE OF ABRASIVES - 35
4.5 GRINDING OF VALVE PLUGS - 35

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. Check all hand tools are removed from inside the machine and the work area.

4.2 OPERATION

Do the following:

1. Move machine into valve body.
2. Locate grinding disc onto valve seat with guide centered.

3. Adjust grinding (or lapping) pressure according to application (see Figure 4-1).

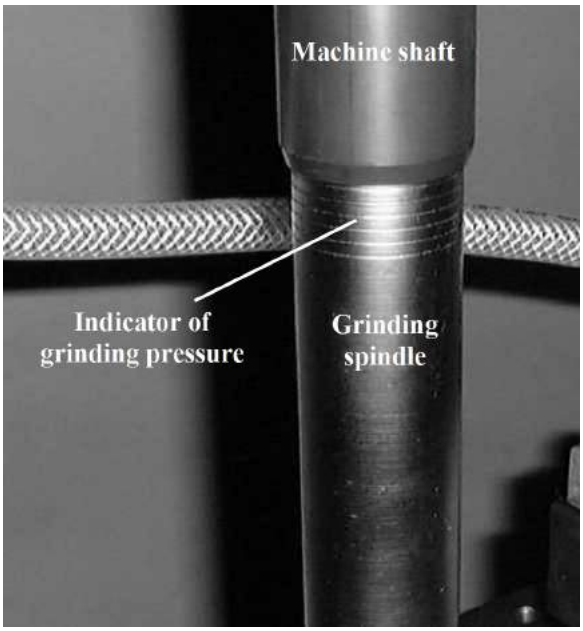

FIGURE 4-1. INDICATOR OF GRINDING PRESSURE

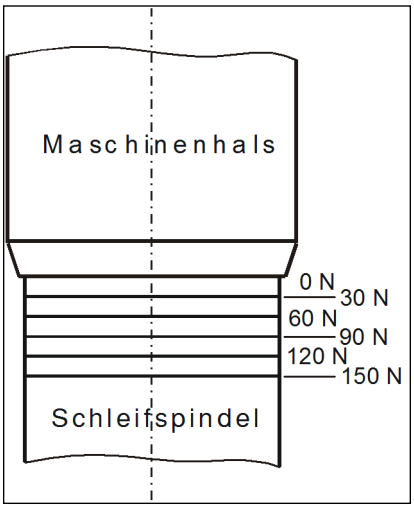

FIGURE 4-2. INDICATOR OF GRINDING PRESSURE AT GRINDING SPINDLE VM2150 AND VM2150S

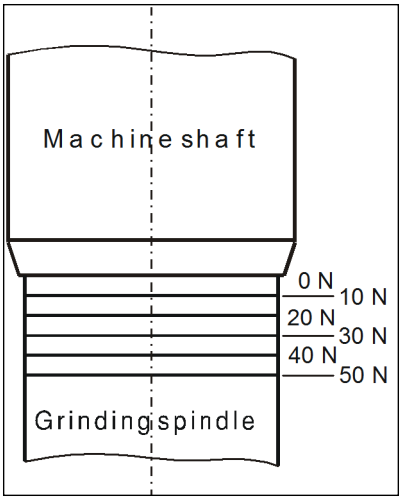

FIGURE 4-3. INDICATOR OF GRINDING PRESSURE AT GRINDING SPINDLE VM2150SV

For machines with electric drives, adjust speed at the trigger button. For machines with pneumatic drive, adjust speed at the maintenance unit (see Figure 4-4 and Figure 4-5).

For machine with electric drive, it is possible to select the direction of the rotation (that is, clockwise or counter-clockwise). It is always recommended to use the clockwise direction although the machine is designed to use also the counter-clockwise direction as well.

The optionally available maintenance unit has the following operating elements:

- Pressure regulation for speed control
- Pressure gauge
- Filter with drain screw for condenser water
- Safety button for pressure release of the system
- Air lubricator

If customers are using their own maintenance unit, the operation might be different, however, the basic functions as described above must be provided.

Adjust grinding and lapping pressure according to application. For best results, readjust grinding pressure during operation.

⚠ CAUTION

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

Do not lock the trigger button of the electric drive unit during manual operation since the machine will not stop in case of spindle blockade. If disregarded, the machine can be damaged and it may result into harm to the operator.

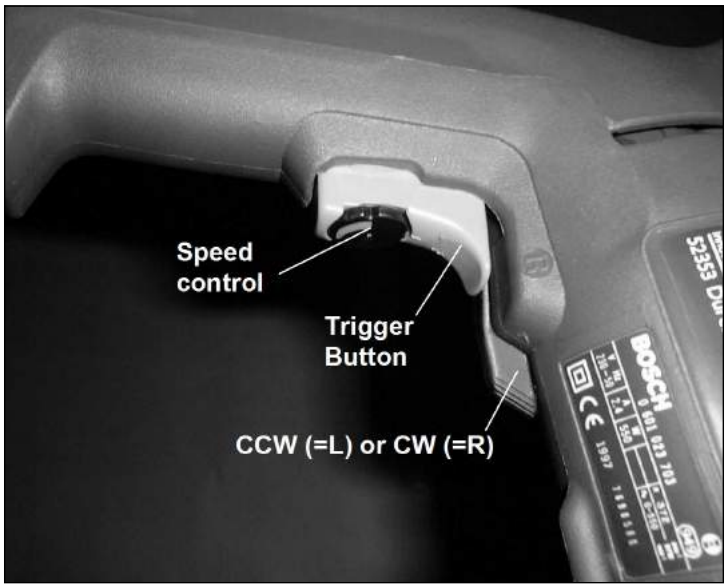

FIGURE 4-4. ELECTRIC DRIVE (BOSCH) WITH TRIGGER BUTTON AND DIRECTION OF ROTATION

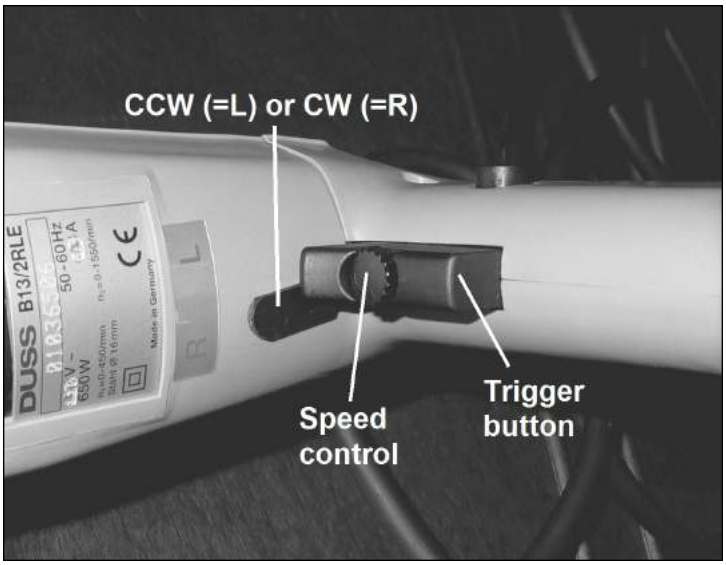

FIGURE 4-5. ELECTRIC DRIVE (DUSS) WITH TRIGGER BUTTON AND DIRECTION OF ROTATION

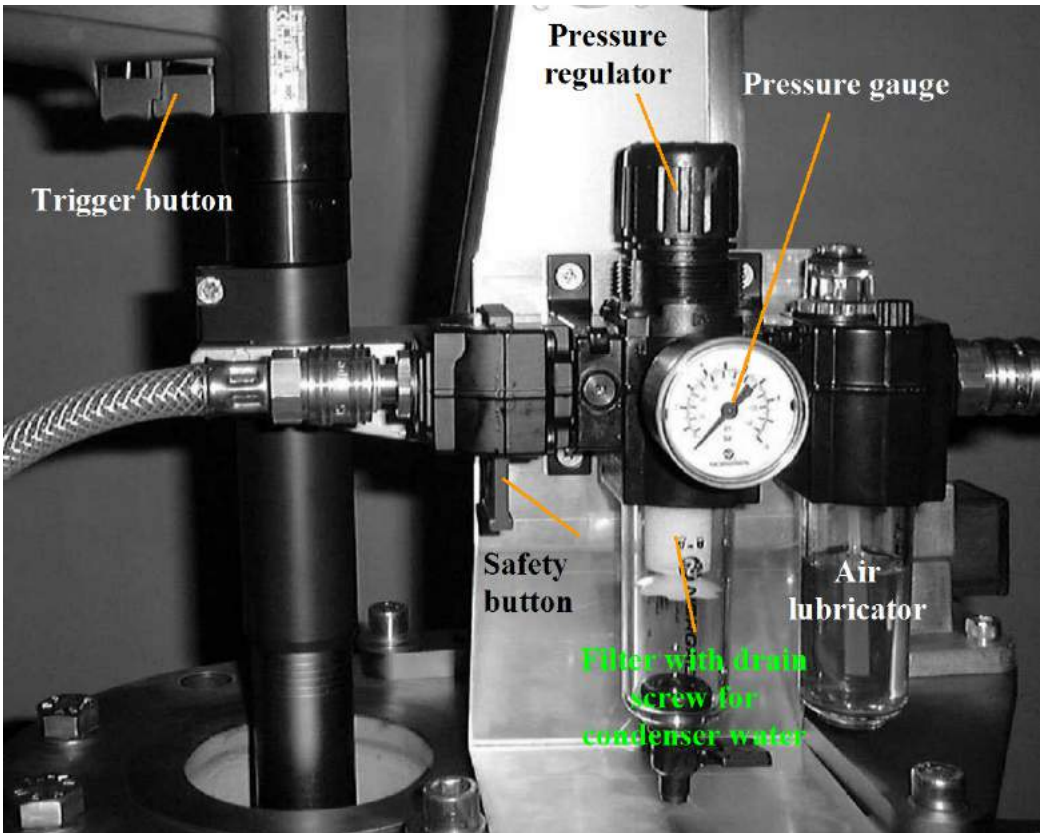

FIGURE 4-6. MAINTENANCE UNIT WITH OPERATING BUTTONS FOR PNEUMATIC DRIVE (OPTIONAL)

4.3 OPERATION WITH COLUMN MOUNTING DEVICE (VM2150 ONLY)

4.3.1 Set-up of column mounting device

Do the following:

1. Take the brackets and base plate out of the case.
2. For connecting the brackets and base plate, use screws M10 x 20 DIN 912. Do not tighten the screws, it should still be possible to move the brackets. Select the tapped holes so that the front of the base plate is approx. 180 – 200 mm from the centre of the valve.

Flange mounting

Mount the brackets with base plate onto flange.

Mounting to valve without flange

Do the following:

1. Connect the two fixators to the brackets by using screws M10 x 20 DIN 912.
2. Adjust the base plate parallel to the valve seat by using the set screws in the fixators.
3. Put the collar band around the valve and clamp the fixators to the valve body.

FIGURE 4-7. BRACKETS WITH BASE PLATE MOUNTED ONTO VALVE BODY (FLANGE MOUNTING)

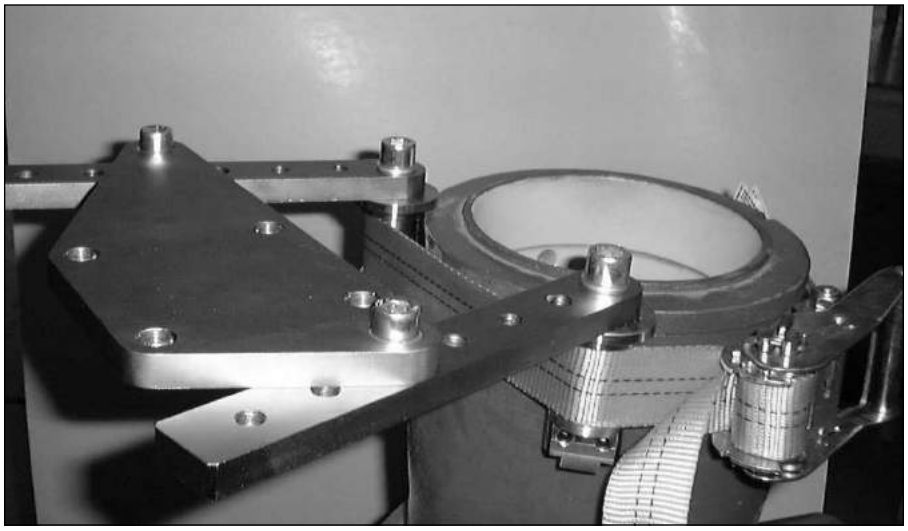

FIGURE 4-8. BRACKETS AND BASE PLATE MOUNTED TO THE VALVE (VALVE BODY WITHOUT FLANGE)

4. After alignment, tighten all screws. Check that the distance from front of base plate to center of valve is still approximately 7.09–7.87" (180–200 mm).
5. Connect the adjustable support of the column mounting device to the base plate using screws M8 x 20 DIN 912 (see Figure 4-3).

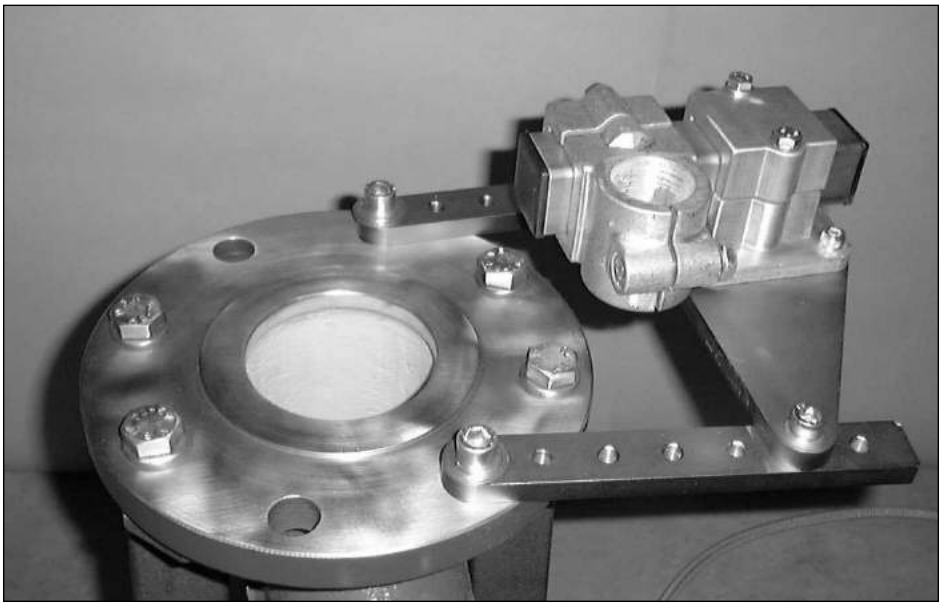

FIGURE 4-9. ADJUSTABLE SUPPORT MOUNTED TO BASE PLATE

6. Locate and clamp column into adjustable support (see Figure 4-10).

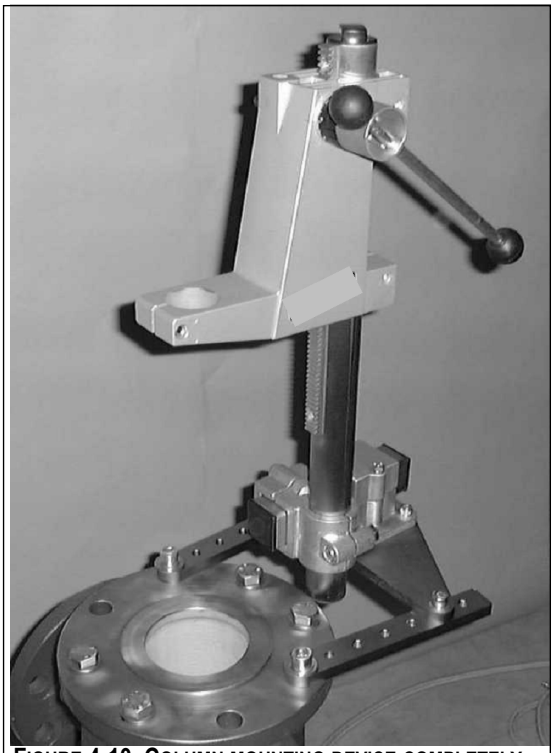

FIGURE 4-10. COLUMN MOUNTING DEVICE COMPLETELY MOUNTED

7. Locate and clamp the machine into the column mounting device (see Figure 4-11).

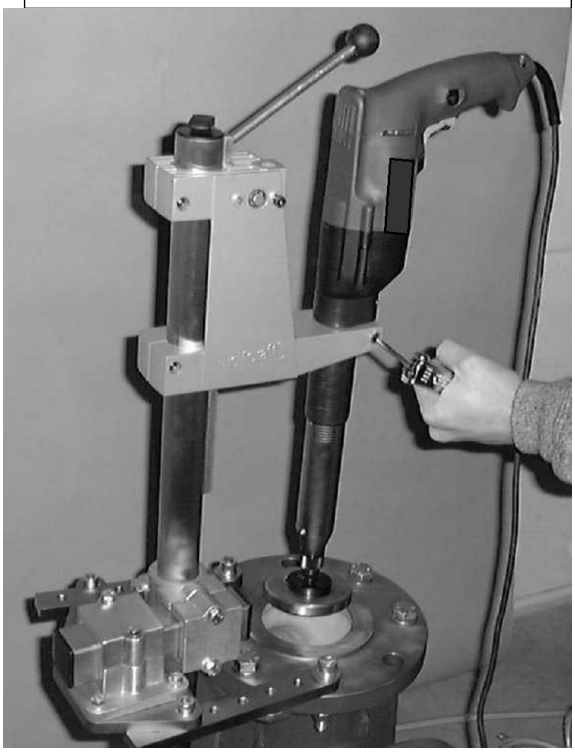

FIGURE 4-11. MACHINE AND COLUMN MOUNTING DEVICE ASSEMBLY

4.3.2 Selecting tools

Select the size of tools according to valve seat outer diameter.

Combine the proper tool components according to Figure 3-10 on page 21 and Figure 3-11 on page 21.

- Grinding or lapping disc
- Ball joint coupling
- Abrasives (not needed for lapping)
- Adequate screws

NOTICE

Different lengths of screws are needed for operation without guides.

Operation with column mounting device does not require guides.

4.3.3 Preparing tools

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

Put abrasives onto the grinding discs (not needed for lapping).

Assemble the selected tool components:

- Grinding or lapping disc
- Ball joint coupling
- Adequate screws

Adaptating tools by means of quick-lock coupling (see Figure 3-14 on page 22):

1. Pull the release ring back.
2. Locate the tool into the quick lock coupling according to the location of the key.
3. Lock the tool with the release ring.

Tool is firmly connected to machine spindle

Connect the machine to the energy supply.

⚠ CAUTION

All cables and hoses for the machine power supply must be covered or installed to preve stumble.

Before connecting the machine to the power supply, check all cables and hoses for damages.

For grinding operation, always wear eye protection glasses.

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

⚠ CAUTION

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 91 psi (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.

Move the machine slowly into the valve body and adjust the tool to the center of the valve seat.

Adjust the grinding pressure accordingly (see Figure 4-1 on page 26 and Figure 4-2 on page 26).

The back lash of the vertical slide to the column can be adjusted, however, the system has already been properly pre-adjusted.

The adjustment of the backlash is correct when the down movement requires a force of approximately 20 N (2 kg) on a lever length of 7.9" (200 mm).

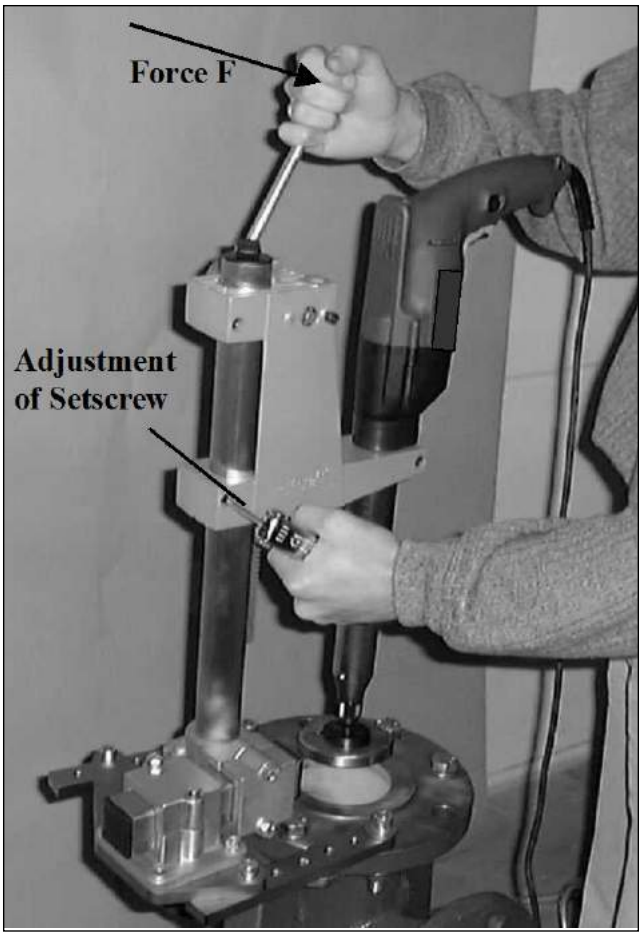

FIGURE 4-12. ADJUSTMENT OF VERTICAL GUIDES ON COLUMN

WARNING

If the set screws of the vertical guides are not tight enough, the self-locking is not guaranteed and the vertical slide will not keep its vertical position.

After aligning the machine, tighten all screws carefully.

For machines with electric drives, adjust speed at the trigger button. For machines with pneumatic drive, adjust speed at the maintenance unit (see Figure 4-4 and Figure 4-5).

For machine with electric drive, it is possible to select the direction of the rotation (that is, clockwise or counter-clockwise). It is always recommended to use the clockwise direction although the machine is designed to use also the counter-clockwise direction as well.

The optionally available maintenance unit has the following operating elements:

- Pressure regulation for speed control
- Pressure gauge

- Filter with drain screw for condenser water
- Safety button for pressure release of the system
- Air lubricator

If customers are using their own maintenance unit, the operation might be different, however, the basic functions as described above must be provided.

Adjust grinding and lapping pressure according to application. For best results, readjust grinding pressure during operation.

4.4 CHANGE OF ABRASIVES

1. Stop the machine by releasing the trigger button.
2. Remove machine from valve body.
3. Disconnect machine from power supply.
4. Remove tool from quick-lock coupling.
5. Disassemble tool.
6. Change abrasives.
7. Assemble grinding tool as described in Section 3.2.2 on page 22.

⚠ CAUTION

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

4.5 GRINDING OF VALVE PLUGS

Assure safe clamping of valve plug in a fixture or jaws.

⚠ CAUTION

Under no circumstances should it be possible to remove the valve plug during machining operation out of its fixture. The valve plug must be clamped safely to avoid endangering personnel.

Select proper grinding disc according to the outer diameter of the valve plug (see Table 4-1).

TABLE 4-1. SELECTION OF GRINDING DISC FOR GRINDING OF VALVE PLUGS WITH SOLID GRINDING DISCS AND ADJUSTABLE GUIDES

Valve plug diameter in inches (mm)	Grinding disc diameter in inches (mm)	Guide diameter range for OD guiding in inches (mm)	Ball joint coupling type	Connecting screws DIN 912
1.97" (50 mm)	3.74" (95)	2.17–2.72" (55–69)	15	M5 x 20 (2 pcs.)
2.56–3.94" (65–100)	5.51" (140)	2.95–4.37" (75–111)		
2.56–4.92" (65–125)	6.5" (165)	2.95–5.35" (75–136)		

Take the tool components out of the accessory case:

- Solid grinding disc for adjustable guides
- Adjustable guides
- Ball joint coupling, type 15
- Connecting screws
- Abrasive segments

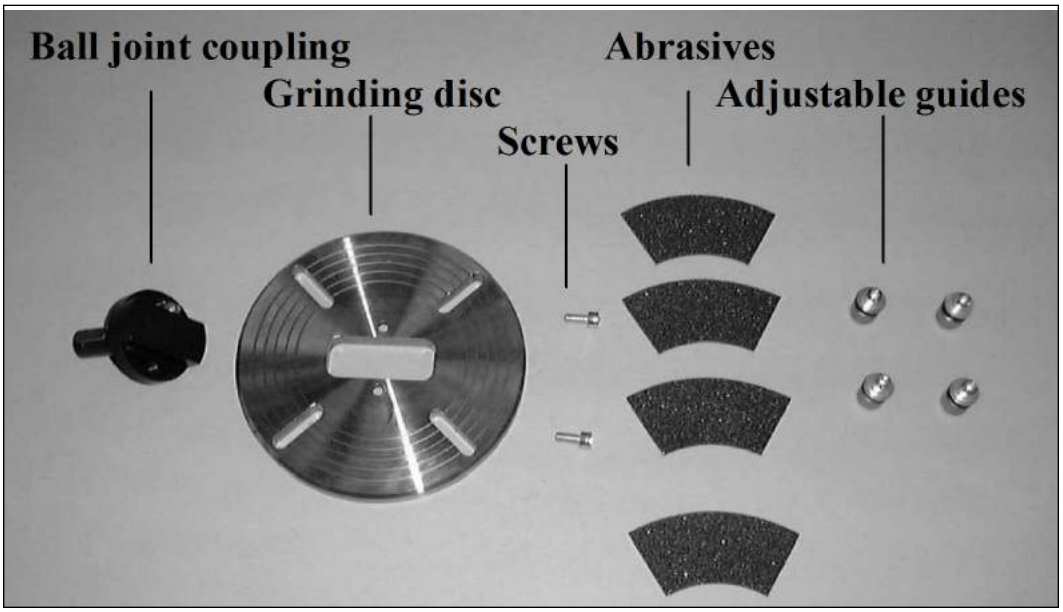

FIGURE 4-13. TOOL COMPONENTS FOR GRINDING DISCS WITH ADJUSTABLE GUIDES

Mounting and adjustment of guides according to the outer diameter of the valve plug.

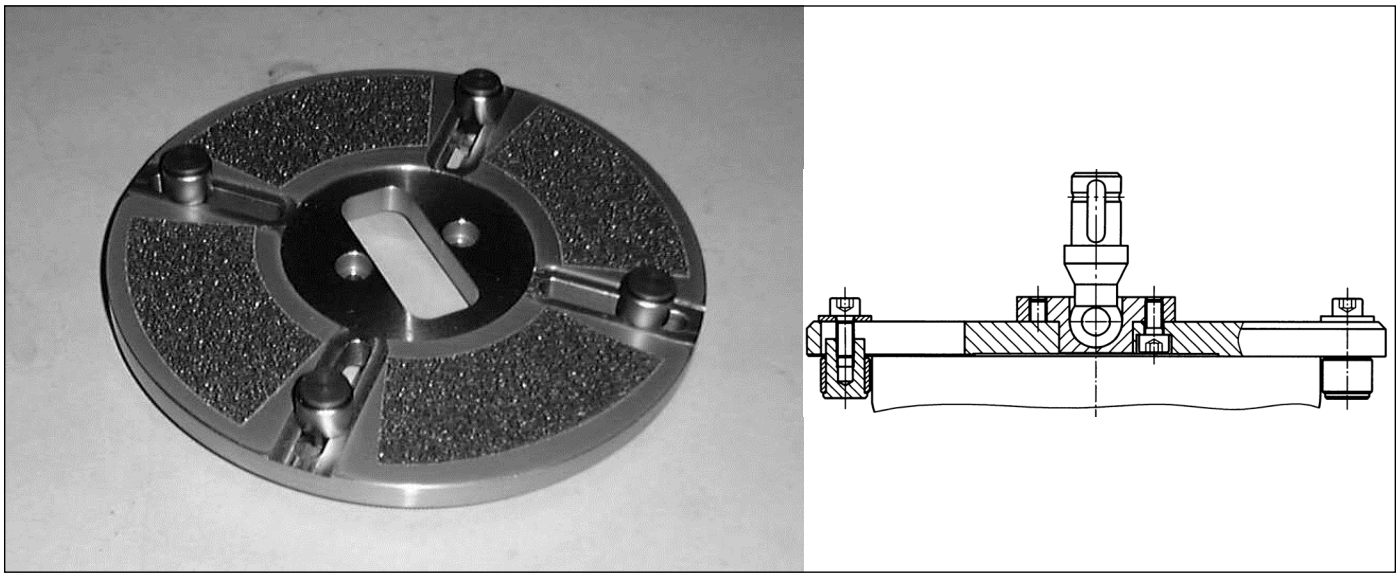

FIGURE 4-14. SOLID GRINDING DISC WITH ADJUSTABLE GUIDES FOR GRINDING OF VALVE PLUGS (OD-GUIDED)

Check manually that the grinding disc with the adjustable guides can rotate easily on the valve plug (play between adjustable guides and valve plug should be approximately .004" [1 mm]).

WARNING

The grinding disc must be able to rotate easily during operation. If the grinding disc will block, it may endanger personnel.

If necessary, clean the grinding disc with oil-free cleaning fluid (for example, lacquer thinner).

Put abrasives onto the grinding disc.

Locate the tool into the quick-lock coupling of the grinding spindle.

Connect the machine to the energy supply.

⚠ CAUTION

All cables and hoses for the machine power supply must be covered or installed to prevent stumbling.

Before connecting the machine to the power supply, check all cables and hoses for damages.

For grinding operation, always wear eye protection glasses.

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

⚠ CAUTION

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 91 psi (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.

Locate the machine and grinding disc as straight as possible onto valve plug and make sure that the guides have enough play to the O.D. of the valve plug

Adjust grinding pressure according to the application (see table 4.1.4.2).

For machine with electric drive, it is possible to select the direction of the rotation (that is, clockwise or counter-clockwise). It is always recommended to use the clockwise direction although the machine is designed to use also the counter-clockwise direction as well.

Adjust grinding pressure according to application. For best results, re-adjust grinding pressure during operation.

5 MAINTENANCE

IN THIS CHAPTER:

5.1 MAINTENANCE CHECKLIST - - - 39
5.2 LUBRICATING THE MACHINE MODULES - - - 40
5.3 LUBRICATING THE PNEUMATIC DRIVE MOTOR - - - 41
5.4 MAINTENANCE TASKS - - - 41
5.4.1 ELECTRICAL TASKS - - - 41
5.4.2 PNEUMATIC EQUIPMENT TASKS - - - 41
5.5 TROUBLESHOOTING - - - 42

5.1 MAINTENANCE CHECKLIST

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

⚠ 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.

Before performing any service work, disconnect the machine from the power supply line to avoid danger to the life and health of persons due to uncontrolled rotation of the tools.

It is recommended to perform preventative maintenance to the machine as described in Section 5.2 on page 40 and Section 5.3 on page 40 as well as under Section 5.4.1 on page 41 and Section 5.4.2 on page 41.

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

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

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

5.2 LUBRICATING THE MACHINE MODULES

NOTICE

All lubrication fluids must be disposed in suitable containers.

Most of the machine components are maintenance-free.

The gear of the electric drive is lubricated for life-time; therefore, there is no need of additional lubrication.

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. This service is offered by CLIMAX.

The integrated anti-friction spline shaft has to be inspected every 1000 working hours or every 2 years at the latest. For the inspection of the spline shaft, the machine spindle has to be dismantled. After the anti-friction spline shaft bushing is removed, it has to be cleaned carefully to avoid the loss of steel balls. Prior to re-assembly, the complete anti-friction spline shaft and bushing have to be lubricated by using special grease type Klüber 46MR401 (0.5 mm thick over the full length). It is very important that all components have to be mounted in exactly the same position as they were before. The bushing of the anti-friction spline shaft has to be moved onto the spline shaft very carefully to avoid loss of steel balls. The machine is re-assembled in horizontal position.

We recommend to have this service done by CLIMAX due to the experience required.

Before every machine operation, the ball joint coupling of the machine spindle should be lubricated with grease Molykote or Unimoly GL82 (Klüber).

5.3 LUBRICATING THE PNEUMATIC DRIVE MOTOR

The lubrication of the pneumatic drive motor is a loss lubrication.

Check that the lubricator of the maintenance unit is always filled with oil. Use any oil according to the manufacturer’s manual.

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.

5.4 MAINTENANCE TASKS

Maintenance tasks are described in the following sections.

5.4.1 Electrical tasks

⚠ CAUTION

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

Electrical equipment must be checked regularly. Loose connections must be made secure.

Damaged wires or cables must be replaced immediately.

Never clean electrical apparatus with water or similar liquids.

5.4.2 Pneumatic equipment tasks

⚠ CAUTION

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

Before any service and maintenance work, the pressure has to be released.

Disconnection of lines under pressure should only be done with adequate tooling and according to all safety regulations that apply.

All hoses should be changed according to the preventative maintenance regulations even if there are no visible damages (observe the manufacturer's recommendations).

Before start-up and service or maintenance work:

- Check that all bolt connections for tightness
- Check that all covers, filters, etc. are in place

After service and maintenance work and before putting the machine into operation again, check that:

- All objects and other material, which are/is not required for operation of the machine must be removed from the machine's operating area.
- All liquids that might appear are removed
- All safety devices of the machine are properly working.

5.5 TROUBLESHOOTING

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

⚠ CAUTION

The operator must inform the supervisor and should never try to resolve any problem on the electrical equipment on their own.

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

⚠ CAUTION

All work on the machine's electrical equipment must be carried out by trained electrical specialists. The operator may only resolve any faults resulting from wrong operation or lag of maintenance.

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 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.

⚠ 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 faults resulting from wrong operation or lag of maintenance.

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

To solve mechanical faults, a complete part list and assembly drawing is supplied with the operator's manual in Appendix A.

TABLE 5-1. 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 the energy source (fuses, plugs, connections, air pressure, etc.).
	Only for the electric drive: the machine is 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 through its ventilating system. Clean the ventilating slots if necessary.
	Only for the pneumatic drive: the machine has been run in cool environment and the supply lines are iced.	De-ice the supply lines.
Tool cannot be located into quick-lock coupling	Quick-lock coupling dirty or other particles in tool location	Cleaning of quick-lock coupling by dismantling of release ring. Use cautione, because the two locking steel balls can get lost easily.

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6 STORAGE AND SHIPPING

6.1 STORAGE

Proper storage of the globe valve grinding 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 globe valve grinding 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 globe valve grinding 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 globe valve grinding machine can be shipped in its original shipping container.

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APPENDIX A ASSEMBLY DRAWINGS

The general design of the machine is shown in the assembly drawings as enclosed.

For ordering any spare part, please always mention position and part number.

Also for the universal clamping device and the tooling, you will find part lists as enclosed. However, since these items are clearly described in the manual, an additional assembly drawing is not required.

Drawing list

FIGURE A-1. VALVE GRINDER ASSEMBLY - - - 48
FIGURE A-2. 220-11S-N01-00 ELECTRIC DRIVE - - - 49
FIGURE A-3. 220-12S-N01-00 PNEUMATIC DRIVE - - - 50
FIGURE A-4. 220-20S-N01-00 SPRING SYSTEM - - - 51
FIGURE A-5. 220-21S-N01-00 SPRING STANDARD MACHINE - - - 52
FIGURE A-6. 220-22S-N01-00 SPRING SV-MACHINE - - - 53
FIGURE A-7. 220-31S-N01-00 BALL JOINT COUPLING TYPE 10 - - - 54
FIGURE A-8. 170-20S-N01-00 - - - 55
FIGURE A-9. 220-32S-N01-00 BALL JOINT COUPLING TYPE 15 - - - 56
FIGURE A-10. 170-10S-N01-00 - - - 57
COLUMN MOUNTING DEVICE - - - 58
FIGURE A-11. 220-40S-N01-00 MOUNTING DEVICE FOR VALVES WITH FLANGE - - - 58
FIGURE A-12. 220-41S-N01-00 MOUNTING DEVICE FOR VALVES WITHOUT FLANGE - - - 59
TOOLS - - - 60
FIGURE A-13. SOLID GRINDING AND LAPPING DISCS DIAMETER .4–2.6" (10–65 MM) - - - 60
FIGURE A-14. SOLID GRINDING AND LAPPING DISCS DIAMETER 3.2–3.9" (80–100 MM) - - - 60
FIGURE A-15. SOLID GRINDING DISCS WITH ADJUSTABLE BEARINGS DIAMETER 3.2–5.9" (80–150 MM) - - - 61
FIGURE A-16. LIST OF ABRASIVES - - - 62

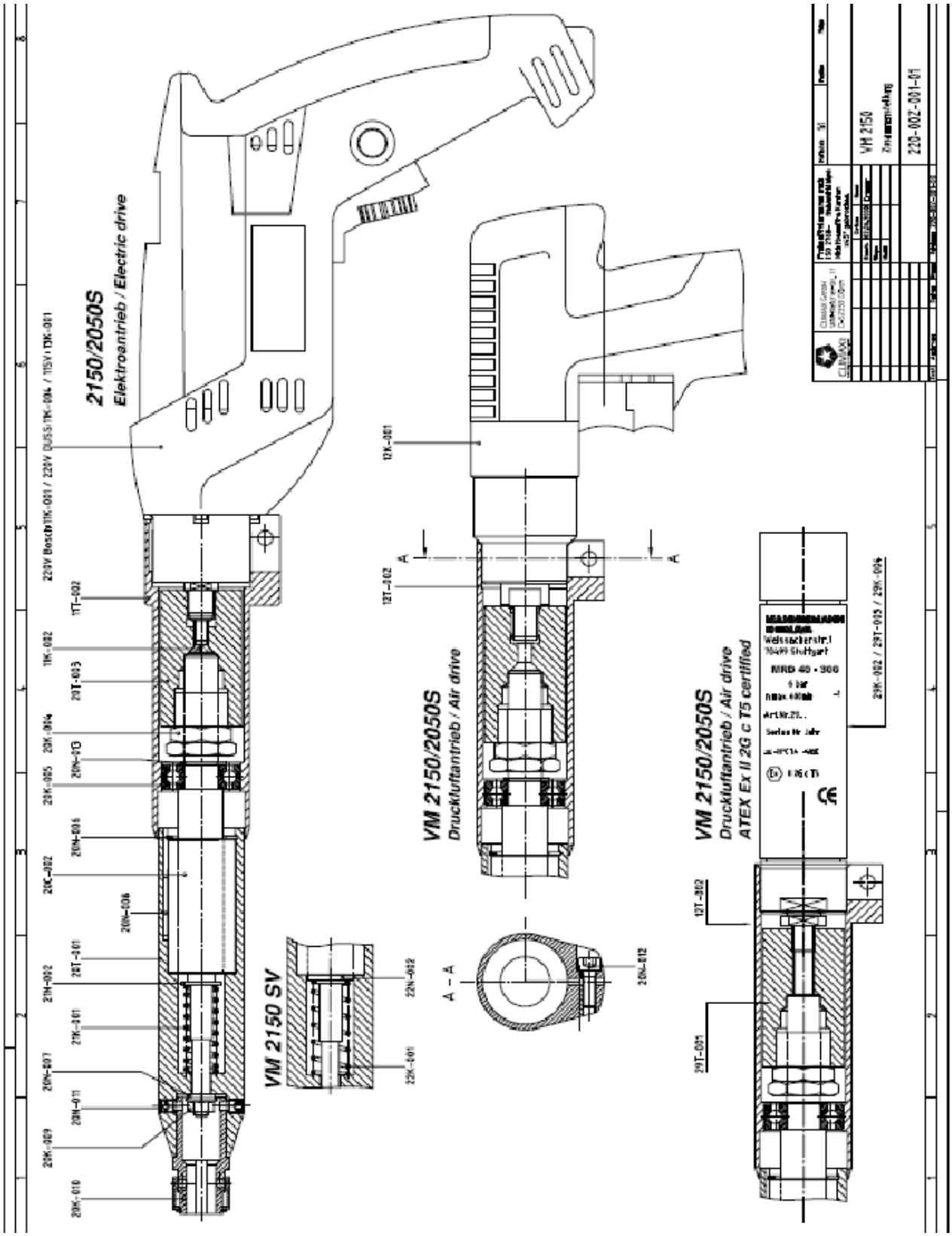


FIGURE A-1. VALVE GRINDER ASSEMBLY

Stkliste / Part list#: 220 - 11 S - N01 - 00 Datum / Date: 17.07.1999

Ersteller / Creator: Werheid

Zeichnung / Cross section #: 220-00Z-001-00

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		220 - 11 K - 001	Antriebsmaschine Bosch 220V
002	1		220 - 11 T - 002	Hülse E-Antrieb
003	1	x	220 - 11 K - 003	Senkschraube Linksgewinde M6
004	1		220 - 11 K - 004	Alternativ zu Pos. 001: DUSS 220V

FIGURE A-2. 220-11S-N01-00 ELECTRIC DRIVE

Stkliste / Part list #: **220 - 12 S - N01 - 00** **Datum / Date: 17.07.1999**

Ersteller / Creator: **Werheid**

Zeichnung / Cross section #: **220-00Z-001-00**

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		220 - 12 K - 001	Druckluftantrieb Bosch
002	1		220 - 12 T - 002	Hülse D-Antrieb
003	1	x	220 - 12 K - 003	Stecker (Passend z. Kupplung Rectus Type 26)
004	1	x	220 - 12 K - 004	Anschlußschlauch 2 m (Stecker/Kupplung Rectus Type 26)

FIGURE A-3. 220-12S-N01-00 PNEUMATIC DRIVE

Stkliste / Part list#: 220 - 20 S - N01 - 00 **Datum / Date: 17.07.1999**

Ersteller / Creator: Werheid

Zeichnung / Cross section #: 220-00Z-001-00

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		220 - 20 T - 001	Stößel
002	1		220 - 20 C - 002	Kugelkeilwelle
003	1		220 - 20 T - 003	Kupplungsstück
004	1		220 - 20 K - 004	Spannsatz LSE S 1524 K
005	1		220 - 20 K - 005	RiKuLa 6202 2RS1
006	1		220 - 20 N - 006	Sicherungsring 30 x 1,2
007	1		220 - 20 N - 007	U-Scheibe A 6
008	1		220 - 20 N - 008	Paßfeder A 4 x 4 x 26
009	1		220 - 20 K - 009	Sechskantmutter Selbstsichernd M6
010	1		220 - 20 K - 010	SWK-Nabe
011	2		220 - 20 N - 011	Gewindestifte M6 x 10 - 8.8
012	1		220 - 20 N - 012	Zylinderschraube M6 x 16 - 8.8 - Zn
013	1		220 - 20 N - 013	Sicherungsring 15 x 1

FIGURE A-4. 220-20S-N01-00 SPRING SYSTEM

Stkliste / Part list #: **220 - 21 S - N01 - 00** **Datum / Date: 17.07.1999**

Ersteller / Creator: **Werheid**

Zeichnung / Cross section #: **220-00Z-001-00**

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		220 - 21 K - 001	Druckfeder
002	1		220 - 21 N - 002	Distanzscheibe 10,5

FIGURE A-5. 220-21S-N01-00 SPRING STANDARD MACHINE

\

Stkliste / Part list#: 220 - 22 S - N01 - 00 Datum / Date: 17.07.1999

Ersteller / Creator: Werheid

Zeichnung / Cross section #: 220-00Z-001-00

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		220 - 22 K - 001	Druckfeder
002	1		220 - 22 N - 002	Distanzscheibe 13

FIGURE A-6. 220-22S-N01-00 SPRING SV-MACHINE

Stkliste / Part list #: **220 - 31 S - N01 - 00** **Datum / Date: 17.07.1999**

Ersteller / Creator: **Werheid**

Zeichnung / Cross section #: **220-00Z-001-00**

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		220 - 31 T - 001	Kugeldorn Typ 10
002	1		220 - 31 N - 002	Zylinderstift gehärtet 5m6 x 18 DIN 6325-St
003	1		220 - 31 N - 003	Paßfeder 5x5x18
S	1		170 - 20 S - N01	Kugelkupplung Typ 10 V

FIGURE A-7. 220-31S-N01-00 BALL JOINT COUPLING TYPE 10

Stkliste / Part list#: 170 - 20 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 - 20 T - 001	Kugelkupplung 10 V
003	1		170 - 20 N - 003	Zylinderstift 4m6 x 8

FIGURE A-8. 170-20S-N01-00

Stkliste / Part list #: **220 - 32 S - N01 - 00** **Datum / Date: 17.07.1999**

Ersteller / Creator: **Werheid**

Zeichnung / Cross section #: **220-00Z-001-00**

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		220 - 32 T - 001	Kugeldorn Typ 15
002	1		220 - 32 N - 002	Zylinderstift 8m6 x 30t DIN 6325-St
003	1		220 - 32 N - 003	Paßfeder 5x5x18
S	1		170 - 10 S - N01	Kugelkupplung Typ 15

FIGURE A-9. 220-32S-N01-00 BALL JOINT COUPLING TYPE 15

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-10. 170-10S-N01-00

Column mounting device

(not delivered with S and SV machines)

Stkliste / Part list #: **220 - 40 S - N01 - 00** **Datum / Date: 17.07.1999**

Ersteller / Creator: **Werheid**

Zeichnung / Cross section #: **220-00Z-001-00**

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	1		220 - 40 T - 001	Grundplatte
002	2		220 - 40 T - 002	Spannlasche
003	4		220 - 40 N - 003	Zylinderschraube M8x20 - 8.8 Zn
004	4		220 - 40 N - 004	U-Scheibe 8.4
005	2		220 - 40 N - 005	Zylinderschraube M10x20 - 8.8 Zn
006	4		220 - 40 K - 006	Gewindeeinsatz M8x12 (außen M12x1.25)
007	1		220 - 40 K - 007	Flanschklemmstück FKV 40 Industrieform sw
008	1		220 - 40 K - 008	Kreuzklemmstück KVR 40 Industrieform sw
009	1		220 - 40 K - 009	Quadratrohr Edelstahl 40x40x3 Zuschnitt 0,18 m
010	2		220 - 40 K - 010	Vierkantverschlußstopfen 40x3
~~011~~	~~1~~		~~220 - 40 K - 011~~	~~Säule~~
~~012~~	~~1~~		~~220 - 40 K - 012~~	~~Oberteil komplett~~
~~013~~	~~1~~		~~220 - 40 K - 013~~	~~Baugruppe Zahnleiste~~
~~014~~	~~1~~		~~220 - 40 K - 014~~	~~Zubehörbeutel~~
~~015~~	~~1~~		~~220 - 40 K - 015~~	~~Kabelhalter~~
016	1		220 - 40 K - 016	Bohrständer

FIGURE A-11. 220-40S-N01-00 MOUNTING DEVICE FOR VALVES WITH FLANGE

Stkliste / Part list#: 220 - 41 S - N01 - 00 Datum / Date: 17.07.1999

Ersteller / Creator: Werheid

Zeichnung / Cross section #:

Pos. Item	Menge Qantity		Stücklisten-, Teile # Assy or Part #	Benennung Description
001	2		220 - 41 T - 001	Aufspannbolzen Rohrbefestigung
002	2		220 - 41 N - 002	U-Scheibe 13 (13x35x12)
003	2		220 - 41 N - 003	Innensechskantschraube M12 x 35 - 8.8 Zn
004	4		220 - 41 N - 004	Kugelspannschraube M8 - 25 - B
005	1		220 - 41 K - 005	Ratschen-Zurrgurt 2000 daN, 4m

FIGURE A-12. 220-41S-N01-00 MOUNTING DEVICE FOR VALVES WITHOUT FLANGE

Solid Grinding and Lapping Discs
DN 10 ... DN 65
(Ball joint coupling 10 mm)

			P/N		
Nominal dia DN [mm]	Dia ofGrinding- resp. Lapping disc [mm]	Dia of guiding [mm]	Grinding disc	Lapping disc	Guiding
10	20	9	130-11T-001		
	25	(Screw head)	130-11T-002	130-12T-002	
20	30	19	130-11T-003	130-12T-003	130-13T-001
25	35	24	130-11T-004	130-12T-004	130-13T-002
	40		130-11T-005		
32	45	31	130-11T-006	130-12T-006	130-13T-003
	50		130-11T-007		
40	55	39	130-11T-008	130-12T-008	130-13T-004
50	60	48	130-11T-009		130-13T-005
	65		130-11T-010	130-12T-010	
65	73	63	130-11T-011		130-13T-006
	80		130-11T-012	130-12T-012	
	85		130-11T-013		

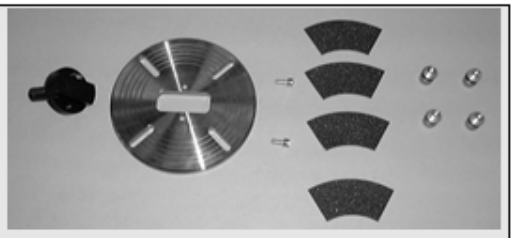
FIGURE A-13. SOLID GRINDING AND LAPPING DISCS DIAMETER .4–2.6" (10–65 MM)

Solid Grinding and Lapping Discs
DN 80 ... DN 100
(Ball joint coupling 15 mm)

			P/N		
Nominal dia DN [mm]	Dia ofGrinding- resp. Lapping disc [mm]	Dia of guiding [mm]	Grinding disc	Lapping disc	Guiding
80	90	78	130-31T-001		130-33T-001
	100		130-31T-002	130-32T-002	
	105		130-31T-003		
100	110	98	130-31T-004		130-33T-002
	120		130-31T-005	130-32T-005	

FIGURE A-14. SOLID GRINDING AND LAPPING DISCS DIAMETER 3.2–3.9" (80–100 MM)

Solid Grinding Discs
with adjustable bearings
DN 80 ... DN 150
(Ball joint coupling 15 mm)



		P/N
Nominal dia DN [mm]	**Dia ofGrinding- resp. Lapping disc [mm]**	**Grinding disc**
80	95	130-41T-001
100	115	130-41T-002
125	140	130-41T-003
150	165	130-41T-004
Guide (1 Piece) (4 Pieces are required)		130-42S-N01

FIGURE A-15. SOLID GRINDING DISCS WITH ADJUSTABLE BEARINGS DIAMETER 3.2–5.9" (80–150 MM)

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 / *Gusscheiben*)	
50 **	110-42S-N01	(Cast Iron / *Gusscheiben*)	
80 **	110-43S-N01	(Cast Iron / *Gusscheiben*)	

* 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

FIGURE A-16. LIST OF ABRASIVES


CLIMAX
BORTECH
CALDER
H&S TOOL