

# ***VGX-21***

**Instruction manual  
English (EN)**

**Precision valve seat  
refacing device**



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## Safety Regulations



For the electronic installation activity, please pay attention to the local directives.

We would like to draw your attention to some dangers, which may occur. You should therefore read the following instructions carefully and proceed accordingly.

- ⚠ It is not allowed to use the device in a dusty, humid or explosive environment => Danger of shortcircuit!
- ⚠ The VGX-21 must not be used with a opened chassis!
- ⚠ To bypass or paste-over the handgrip-switch as well, can be very dangerous!
- ⚠ During processing the valve seats, there must be worn safety goggles! There must be worn a hairnet for long hair as well!
- ⚠ Risk of injury by the formtool of the rotating spindle!
- ⚠ Avoid to suck in any dirt or dust while the vacuum pump is running!
- ⚠ The filter and the suction cable should be controlled in constant intervals!
- ⚠ Clean the suction cable if it is polluted and exchange the filter!
- ⚠ Before working on electronic elements and repairs, the device must be fully isolated from the current electric circuits!
- ⚠ Repairs are only allowed by the local MIRA-dealer or the manufacturer (MINELLI Corporation) in every case!
- ⚠ Only use genuine MIRA spare parts, which are registered in the respective instruction manual!
- ⚠ Do not touch the electric circuits of the device = Contact with these circuits are dangerous to life!
- ⚠ Modifying of the electronical elements could cause severe aftermath!
- ⚠ Repairs of the VGX-21 must be basically accomplished ONLY by authorised personnel or the MINELLI Corporation.

### Safety advices for the VGX-21 valve seat refacing unit

The following safety advices must be observed in every phase of the launching, during processing valve seats and the maintenance or repairs. Disregarding of these assignments is a incorrect use of the device.

### Earthing of the device

To reach an optimum touch protection, the device must be earthed. Therefore the earth-clamp must be connected with the earthing of the main circuit.

### Do not use in explosive environment!

The use of the device in explosive environment (flammable gases, vapours or dust) may induce the lightning of these materials and are strictly forbidden.

### ATTENTION!

1. To avoid the risk of partial overheating, the device must not be used in dusty or steamy atmosphere.
2. The device must not be used in wet environment, respectively the device must not be exposed to rain or dew. This may induce an electric connection between electronic elements in the devices.
3. The User of this device must accomplish access, launching, setting and service by authorised personnel. Operations by the electronic elements of the device are dangerous because of the electric tension, that can be a high risk of an electric shock. The electric tension can even exist for a short time if the device is already switched off. Before starting service-operations on the device, make sure that the capacitors of the device do not carry electric tension.
4. The device builds no physical separation. It is prohibited to work on the connectors of the device if the electric tension is running. Running of the device without mechanical switch or fuse in the power supply is forbidden.
5. Service and adjusting operations must always be done by a minimum of 2 people. In an emergency, there must be a person that can cut off the electric circuit to execute first aid.
6. This device must not be used for emergency- and safety tests. A failure or damage of the connected VGX-21 by the running electric tension can be induced.
7. Every contact with the electric circuits must be avoid. During the operation, every contact with these circuits are dangerous to life. Therefore added, the device can be damaged by careless contact of sensitive elements.
8. To avoid further risks, you must gain the agreement of the manufacturer MINELLI Corporation, if you want to add, change, replace and/or manipulate some parts of the device by yourself.
9. If there are some repairs or replacing works to do, the VGX-21 must always be completely disconnect from the electric circuits. By Repairs and replacing works read carefully the certain chapters in the Instruction manual. (See "Maintenance of the VGX-21" on Page 27)

## Elementary safety-advice

### Advices in the instruction manual

- The knowledge of the Basic safety advices and safety regulation are basic conditions for the design to security using of this device in cooperation with the "Safety Regulations" on page 2.
- The instruction manual contains the core of the important advices, to use this device in a safety condition.
- The instruction manual, especially the safety advices, must be considered by all users, who work with this device.
- Beyond that it must be paid attention to the valid location regulation and the provisions of the accident control.

### Responsibility of the operator

The operator are committed to let only user working, if they

- will be intimate to the basic advices for working safety and accident control. They must also be instructed to the device application.
- have read, understood and signed the safety advices and warning notices in the instruction manual.

The safety-conscious work from the users will be controlled in constant intervals.

### Responsibility of the employees

The employees who work on the device have to commit, before beginning the work:

- that they pay attention to the basic safety advices of work safety and accident control.
- that they have read, understood and signed the safety advices and warning notices in the instruction manual.

### Risk in using the device

The device VGX-21 has been developed based on the newest state of technology and was constructed by the accepted safety-related regulation. However, it is possible by using the device, that there appear some risks for the user or third persons, especially if the device is misused and operated not accordingly to the MIRA operation manual. Only utilise the device:

- for designated use.
- in safety-related good condition.

Breakdowns are to correct immediately, if they become some violations to the safety-advice.

### Conventional utilisation

The MIRA VGX-21 device is exclusively designed for refacing and cutting valve seats and insert-counterbores of the cylinder heads for combustion engines. Another- or beyond going utilisation are not intended. The Minelli Corporation will not be liable for damages which evolved herefrom. To the intended utilisation also belongs:

- to pay attention of every advice from the instruction manual and
- to keep on the control- and service work.

## Warranty and liability

Warranty matters are described in MIRA's terms of sales and return policy conditions and are an integral part of any sales contract between MIRA and the customer. Warranty- and liability by people and material assets are void, if they had one or more of the following causations:

- Non-designated use of the device
- Incorrect mounting, launching, using and servicing of the device
- Operating of the device with damaged safety-apparates or incorrect and missing mounting of the safety- and protection apparates
- Non-observance of the advices in the instruction manual with regard to the transport, storage, assembling, launching, operating and servicing of the device
- Independent constructive manipulating of the device
- Independent manipulation of the VGX-21 (for example: magnetic plate or switches, protection and earthing against dangerous currents)
- Bad monitoring of the device components, which are wearout
- Incorrect executed repairs
- Emergencies by external-material influence and force majeure

## Symbol- and advice description

Following descriptions and icons will be used for risks in this instruction manual:



**Warning notice – Generally danger:** Shows a potentially dangerous situation, which can induce low to severe injuries up to death, if they will be ignored.



**Warning notice – Danger of an electric shock:** Shows a dangerous situation, which can induce an electric shock and severe burns up to death, if they will be ignored.



**Warning notice – Danger of squeezing:** Shows a potentially dangerous situation, which can induce low to severe constant injuries, if they will be ignored.



**Info – notice:** Shows Information and/or additions, which are important for the appropriate use of the machine and its functionality.



**Application – notice:** Shows accessories and further application features of the machine.

## Organisational provisions

- The operator must prepare the required safety-equipment.
- All safety-devices must be checked by constant intervalls.

## Protection-apparates

- Before launching the device, all protection-apparates must be correct installed and functioning.
- Protection-devices maybe only removed
  - after shutdown and
  - coverage against re-launching of the VGX-21
- By delivering of part-components, the protection-devices must be installed agreeable to the regulation by the operator.

**Informative safety provisions**

- The instruction manual must be always kept by the location of the device.
- Additional to the instruction manual, there must be paid attention to the generally and local regulation of the accident control and pollution control. They must be prepared.
- All safety- and warning advices on the device must be kept in a readable condition

**Training of the users**

- Only introduced and trained users may work on the device.
- The user competence must be clearly appointed for the mounting, launching, handling, servicing and repairing of the device.
- Beginners may only work on the device under the attendance of an experienced user.

**Device- and apparate electricis**

- Do not manipulate the magnetic plate and do not modificate the switches in any circumstances.
- Only introduced users are be able, to apply the VGX-21 device.

**Safety provisions in the standard mode**

- All protection-apparates must be absolute functioning, if the device is in operation.
- Before switching-on the device, there must be paid attention that nobody is exposed to the risks by starting the device.
- The device should be checked for external damages and safety device functioning in minimum one time by every shift.

**Risks by electrical energy**

- The works on the electrical supply must be done by an expert (Certified Electrician, etc.)
- The electrical equipment of the device must be checked in constant intevalls. Lose connections and damaged cables/wires must be removed immediately.
- If it is essential to do work on energised components, there must be a second person/user that guards the work and can remove the power cord from the main socket in case of an emergency.

**Especially danger areas**

- The VGX-21 valve seat refacing unit contains rotating machine parts, which are an upper risk for (long) hair, hands and fingers. Wear suitable safety equipment (e.g. hairnet etc.).
- The magnetic base of the VGX-21 may be a risk of squeezing fingers and hands by clamping down the device on a handling plate. The device must be clamped carefully and thoughtful.
- The mounted formtools maybe have very sharply and spiky turnings, which can induces severe lacerations or others injures. It must be worked careful and thoughtful by refacing and recutting the valve seats!

**Leaking of hazardous dust and vapours**

- During the refacing of the valve seats, metal dust, particles and vapour from the cutting oil can occur. They can irritate and injure the lungs and the eyes. Wear suitable safety equipment (e.g. protection goggles, mask etc.). Ensure enough ventilation during processing valve seats. Special safety precaution, for example: eyeflushing device.

## Service and repairs, trouble shooting

- Arrange the prescribed setting-, servicing- and checking works to the limit date.
- The users must be informed about imminent servicing and repairs of the device.
- All of the device pre- or after switched machine parts and operating mediums, e.g. electricity, must be ensured against accidentally launching.
- By all servicing-, checking- and repairing works, the device must be switched off from main supply and the main switch must be locked against unexpected restarting
  - Lock and strip of the key from the main switch, if it is possible.
  - Add a shield or Information on to the device, which the device may not be able to be switched on.
- Greater devices must be carefully mounted and ensured on lifting gears, by the replacing.
- Check loosened screw connections for a compact seat.
- After finishing the service work, the safety apparatuses of the device must be checked and verified.

## Constructive modifications on the device

- Without written authorisation by the manufacturer Minelli Corp. (MIRA), there is no right to add some components and/or making some modifications on the device. This is also valid for welding wearing components.
- All constructive modifications require a written affirmation from the Minelli Corp. (MIRA)
- Faulty device parts must be replaced by original replacements only.
- Only use original genuine mira replacement parts.
  - By replacements of externals, there is no guarantee, that they are constructed for the required operational demands and the required safety functions.

## Cleaning of the device and disposal of wastes

- Used stuff and materials must be correctly removed and handled, especially:
  - by works on greasing systems- and devices
  - by cleaning with solvents
- The device must be cleaned externally in constant intervals, with a flannel and less of machine- or industry cleaner.
- Further cleaning per grade of use and grade of pollution of the device.
- The packaging material of the VGX-21, after delivering, must be correctly disposed in the respective waste container and/or according to local environmental legislations!

## Noise emission of the device

- The noise pressure level going out from the VGX-21, behaves to 0dB(A)
- In combined use with the Vario Drive System, there is a noise pressure level up to 70dB(A) going out from the Vario Drive.
- Based on the local environment, there is a possibility of a higher noise pressure level. This can cause noise deafness. In this case, the users must be wearing protection devices (e.g. hearing protection, Oro-pax etc.)

## Safety advices for carrying

- For transport, the VGX-21 must be carried in the storage box (in the same as it was delivered from the Minelli Corporation).
- Ensure all moving parts from the device against loosening, by the transport.
- The device must be protected against damages by the transport. If essential, the device can be fully packed in.
- The MINELLI Corporation will not take liability for ignoring and not paying attention of the safety regulations by shipment.

**Copyright ©**

The exclusive copyright of this instruction manual remains in the hands of the MINELLI Corporation. (MIRA)

This instruction manual is appointed for the operator and his personal.

**Minelli Corporation  
MIRA Division  
Mattenstrasse 3  
CH-8330 Pfäffikon ZH  
Switzerland CH**

For the provided technical documentation see the assigned person at chapter “Declaration of conformity” on page 9.



## **Non-liability**

The valve seat refacing device VGX-21 may only be operated according to the Operating Instructions. The manufacturer refuses to accept any liability for accidents and damages caused by incorrect operation. He also refuses any liability for alienated use of the device.

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## **Warranty**

In case of manufacturing or material defects Minelli Corporation will replace the defective part or parts at no charge within 12 months after the date of final purchase. No further claims can be covered under the warranty. Defective parts must be returned along with proof of purchase. The warranty does not cover any subsequent damage caused by these defective parts. The warranty does not cover unprofessional handling, the use of incorrect electronic parts or deliberate damage, nor does it cover shipping and packing costs.

## Declaration of conformity

**MINELLI®**

Minelli AG  
 Mattenstrasse 3  
 8330 Pfäffikon ZH  
 Schweiz / Switzerland  
 www.minelli.ch  
 sales@minelli.ch

**Konformitätserklärung**  
*Déclaration de conformité*  
**Declaration of conformity**  
**Dichiarazione di Conformità**

Wir/Nous/We/Noi,

Minelli AG  
 Mattenstrasse 3  
 CH-8330 Pfäffikon ZH

erklären in alleiniger Verantwortung, dass das  
**Produkt**

*déclarons de notre seule responsabilité que le  
 produit*

bearing sole responsibility, hereby declare that the  
 product

dichiariamo sotto la nostra sola e completa responsabilità  
 che il prodotto

**Beschreibung des Produkts**

VGX-21 Präzisions-Ventilsitzbearbeitungsgerät

**Description du produit**

*VGX-21 Equipement de précision pour l'usage des  
 sièges de soupapes*

**Description of product**

VGX-21 Precision valve seat refacing device

**Descrizione del Prodotto**

VGX-21 Macchina di precisione per la lavorazione  
 dell'assetto valvola

**Typenreihe/ Série type / Type Series/ Serie Tipo**  
 963

auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder normativen Dokumenten übereinstimmt:

*auquel se rapporte la présente déclaration est conforme aux normes ou aux documents normatifs suivants:*

referred to by this declaration is in conformity with the following standards or normative documents:

riferente a questa dichiarazione è conforme alle seguenti regole e normative:

**Bestimmungen der Richtlinie***Désignation de la directive*

Provisions of the directive

Denominazione della Direttiva

**Titel und/oder Nummer sowie Ausgabedatum der Norm(en)***Titre et/ou numéro ainsi que date d'émission de la/des norme(s)*

Title and/or number and date of issue of the standard(s)

Titolo e/o numero e data di promulgazione della norma

**2006/42/EG: Maschinenrichtlinie***2006/42/CE: Directive sur les machines*

2006/42/EC: Machinery directive

2006/42/CE: Direttiva Macchine

SN EN 1037+A1: 2008-09

SN EN ISO 13849-1: 2016-05

SN EN 14120: 2016-03

DIN EN ISO 12100: 2011-03

**2014/30/EU: EG-EMV Richtlinie***2014/30/UE: Directive CEM*

2014/30/EU: EMC directive

2014/30/UE: Direttiva CEM

EN 60745-1:09 + A11:10

EN 55014-1:06 + A1:09 + A2:11

EN 55014-2:15

EN 61000-3-2:14

EN 61000-3-3:13

EN 61000-6-2:05

EN 61000-6-3:07 + A1:11

EN 62233:08

**2014/35/EU: Niederspannungsrichtlinie***2014/35/UE: Directive basse tension*

2014/35/EU: Low voltage directive

2014/35/UE: Direttiva bassa tensione

Ort und Datum

*Lieu et date*

Place and date

Luogo e Data

Pfäffikon ZH, 18.07.2023

Reto Minelli (CEO/Geschäftsführer)

*L'administrateur délégué*

General Manager

Amministratore delegato

# VGX-21 Valve seat refacing unit

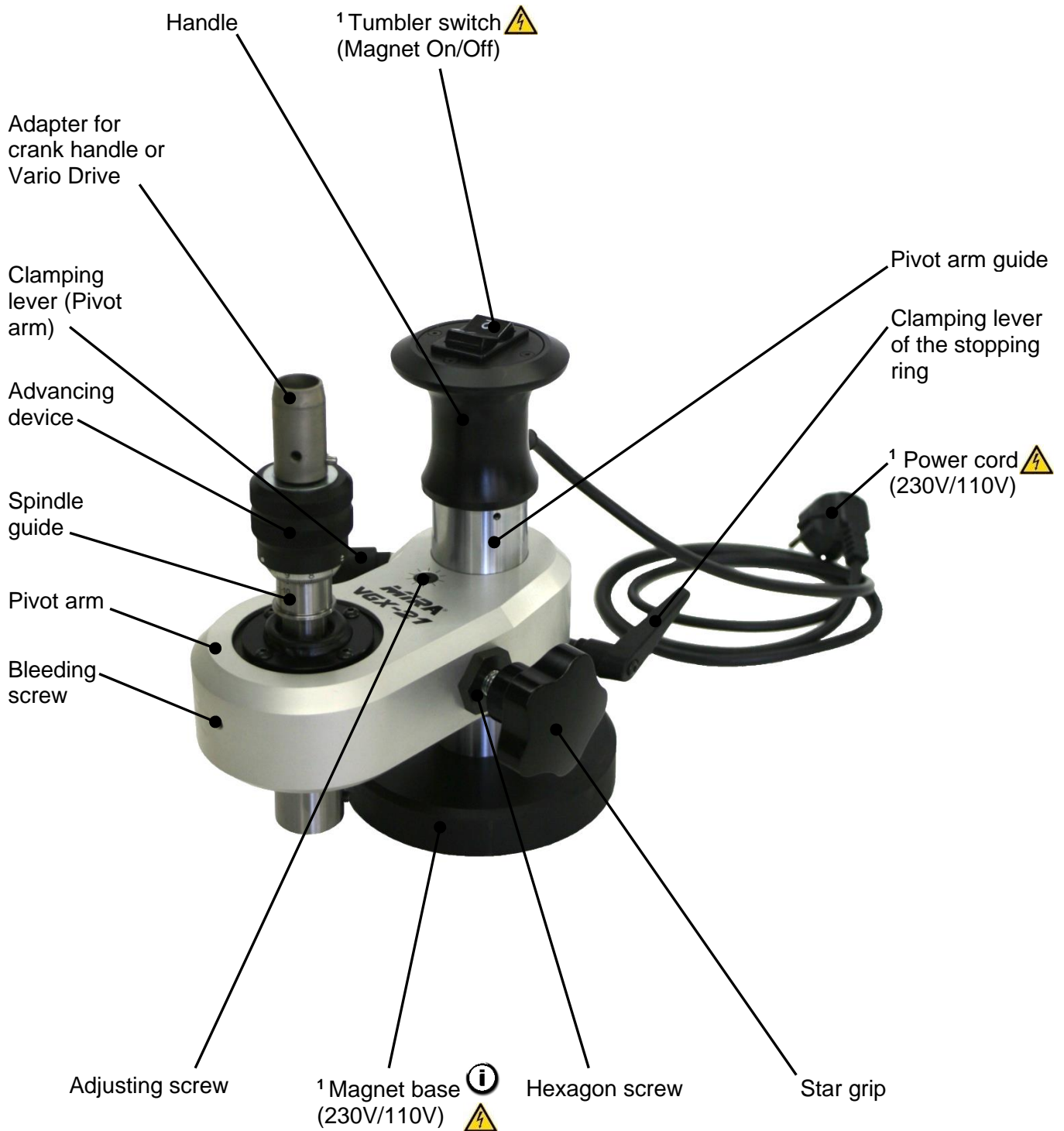
We congratulate you for your purchase of the VGX-21 valve seat refacing unit with hydraulic clamping system. The VGX-21 allows to process extremely precise valve seats in a very efficient way. This device is the product of many years of experience in valve seat recutting.

The simplicity of handling and simultaneous processing of the three angles (seat with correction angles) are the outstanding features of the VGX-21.

We are sure that this device will serve you well in your workshop and we recommend you to follow the suggestions for preparation and starting to operate it.



1 Device parts VGX-21

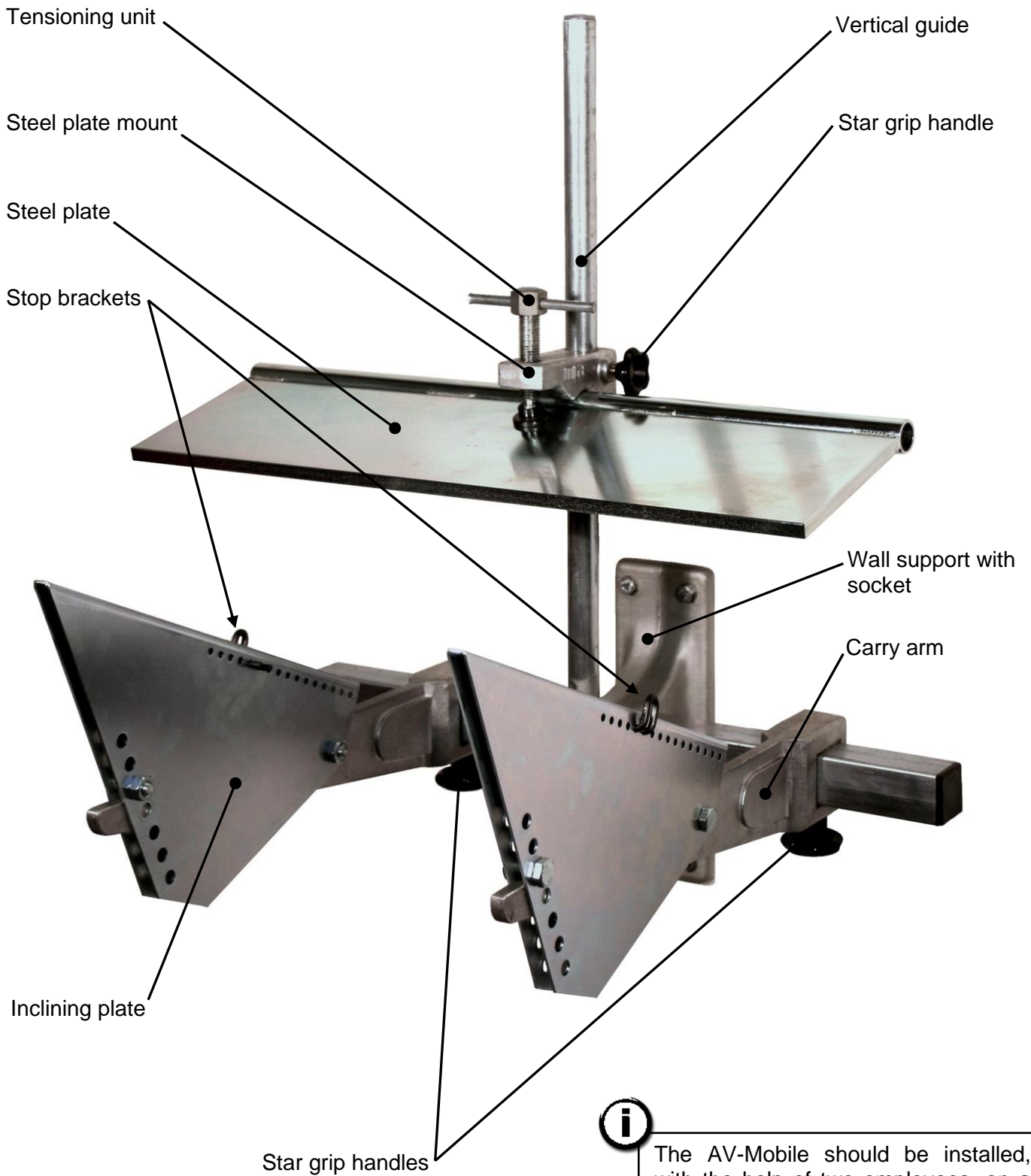


**i** It is recommended to disengage the magnetic base, when not in use.



**1** Disconnect power, first, if there are any work to do at the electrical components in the VGX-21.

1.1 Device parts AV-Mobile



The AV-Mobile should be installed, with the help of two employees, on a **solid wall** side!

## 2 Installation of the cylinderhead support AV-Mobile

The universal cylinderhead support requires a clean, proper installation on a solid wall in order to ensure best results with the Mira VGX-21 Valve seat refacing device. The carry arms are installed, approximately 90cm, above the floor. Fig. 1



Fig. 1

When you place the steel plate, ensure that the milled side is on top, because of the slightly bended (convex) steel plate. The steel plate becomes straight when it is tightened.



(See also "Processing of valve seats" on page 15)

### Installation of the wall support:

(1) To mount the support base, there must be drilled 4 bores in the footprint. (2) The included expansion bolts (1N0307M08) can be inserted into the bores and the wall support can be mounted on the footprint against a **solid wall**. (3) Use the included hexagonal screws (1N0056M08x030) to fastening the wall support. Tighten the screws firmly.



To avoid damages and injuries, there are two employees required to mount the wall support!

The carrier arms, the steel plate and the steel plate mount, can now be fixed on the wall support.



Fig. 2

The standard AV-Mobile cylinderhead-support includes inclining plates.

The inclining plates for cylinderheads with inclined valve seats, allows processing of the valve seats in an appropriate position (Fig. 2).



See also page 14 and 33 for "Clamping of the cylinderheads" and "Special accessories".

### 3 Clamping of the cylinderheads

There are different possibilities for clamping cylinderheads. When fixing cylinderheads, attention must be paid that the magnet base and the clamping plate are in a clean condition and placed at level.

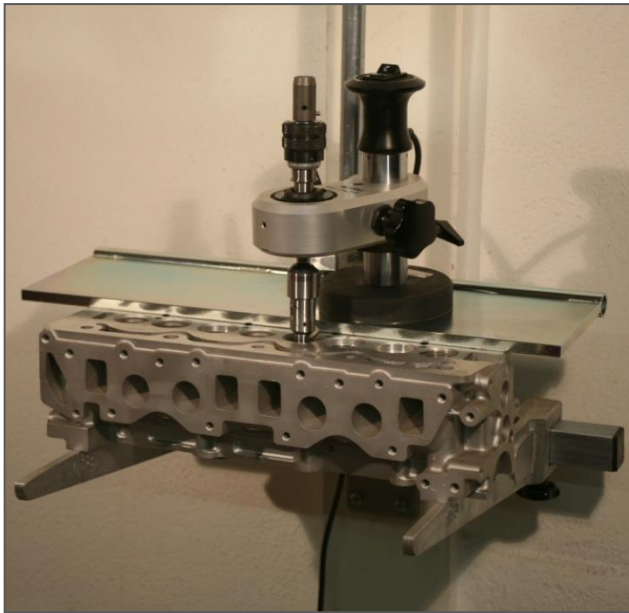


Fig. 3

At Fig. 3, the cylinderhead is fixed upright on to the MIRA cylinderhead support AV. This situation shows the standard position for straight valve seat processing.



#### PLEASE PAY ATTENTION!

The clamping of the cylinderheads and the processing of the valve seats must be done careful! To avoid injuries by squeezing or by cuts of sharp formtool edges, wear safety equipment (E.g.: Safety shoes, goggles etc.)!

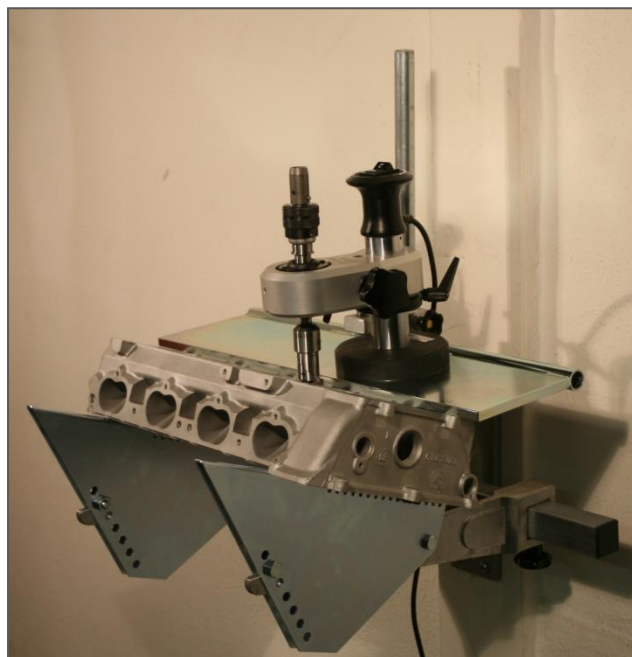


Fig. 4

If the cylinderhead includes inclined valve seats, like Fig. 4, the cylinderhead support must be equipped with the inclination plates (SH).

The inclination plates are delivered with 2 pairs of screws, nuts and a pair of stop brackets. See also "Special accessories" on page 33.

The plates can be mounted easily and accommodate a safe and solid base for the valve seat refacing with the VGX-21. Fig. 4

## 4 Processing of valve seats

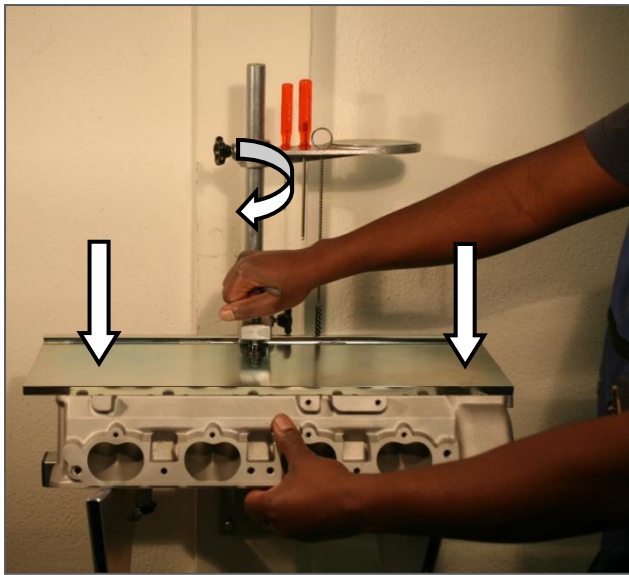


Fig. 5

1. The cylinderhead must be clamped down on the MIRA cylinderhead support AV (Fig. 5). The clamping plate should be positioned parallel and nearly even to the valve seats. For inclined valve seats mount the inclination plates SH, for further informations see pages 12, 14 and 33.



Use the stop brackets from the inclining plates, to secure the cylinderhead from slipping.

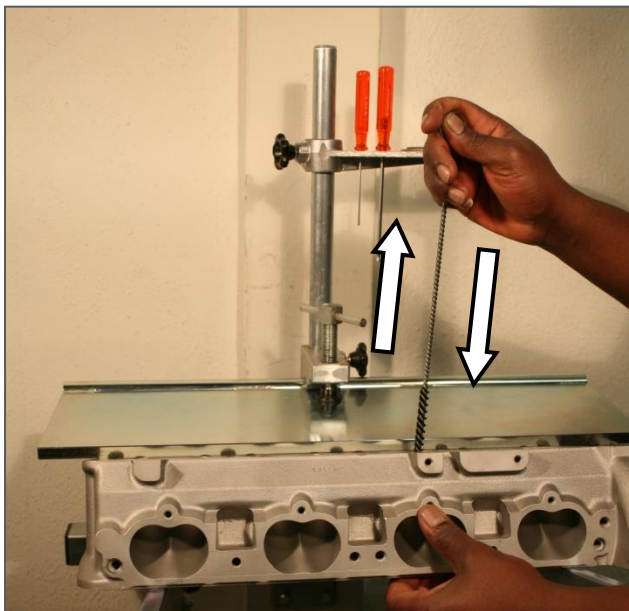
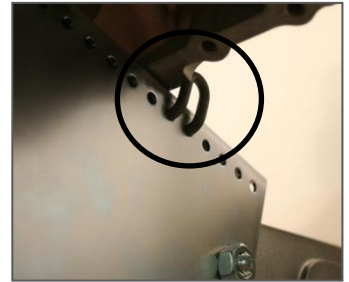


Fig. 6

2. Clean the guidances of the valves with a *flex-hone* brush. **Note:** We always recommend using a brush in a clean condition. Dip in the brush into industrial cleaner before using. Fig. 6

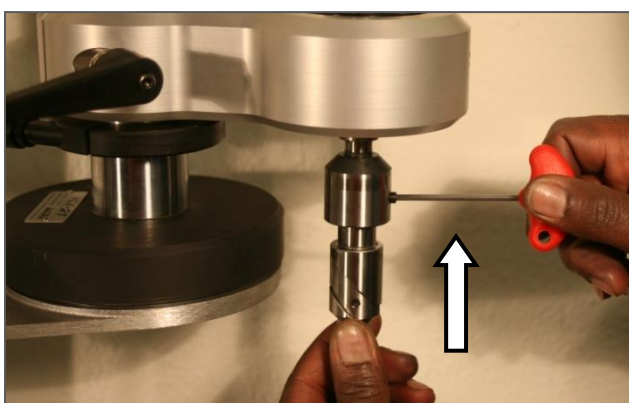


Fig. 7

3. Clamp the VGX-21 on the storage table (AT) or on a clean workbench surface by activating the magnet base (Pos.1), clamp the pivot arm and lock the star grip. Select a suitable tool-head (see the MIRA formtool catalogue) for optimal valve seat processing. Insert the tool-head firmly into the spindle. Control that the markpoint of the tool-head and the setscrew of the spindle guide are aligned (Fig. 7). For further informations see "Changing tool-heads" on page 26.



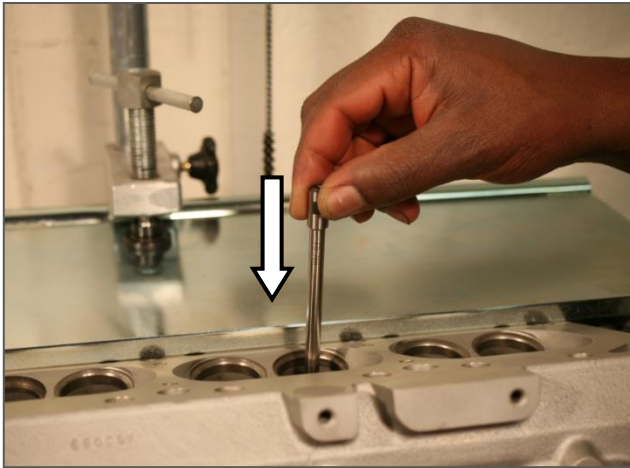


Fig. 8

4. Select the biggest possible pilot. For high precision processing a pilot must be inserted in the guidance with a maximum clearance of **0.01mm**, against the inner guide-diameter. The Pilot should be moveable without resistance. (Fig. 8) See formtool and pilot catalogue.

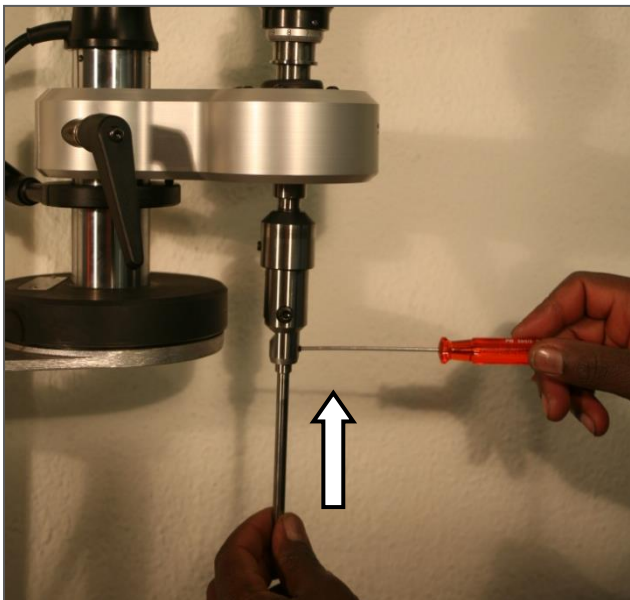


Fig. 9

5. Insert the correct pilot into the tool-head and secure the lower setscrew, by using the enclosed inhex key. Turn the advancing device to the upper position. Fig. 9



Fig. 10

6. Select the formtool, considering of the prescriptions of the factory, or based on your own experience. See also the formtool catalogue. Fig. 10

#### Description on the formtool:

Example, 115A 1,5/45°

|     |   |                        |
|-----|---|------------------------|
| 115 | = | Number of the formtool |
| A   | = | Type of tool-holder    |
| 1,5 | = | Seat width in mm       |
| 45° | = | Seat angle in °degrees |

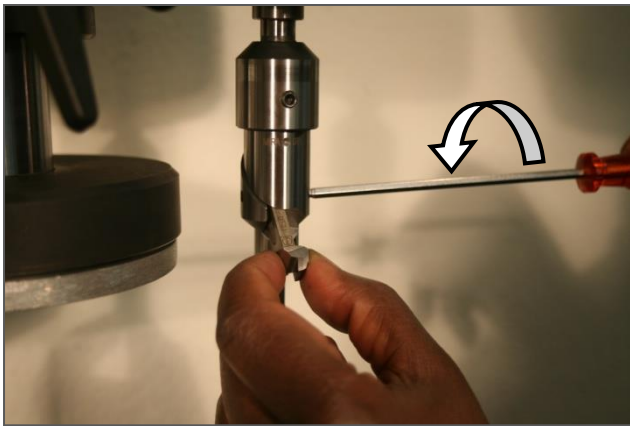


Fig. 11

7. The formtool must be tightened slightly. It must remain moveable for the following adjusting works. Fig. 11



#### PLEASE PAY ATTENTION!

The formtools may have some sharp edges and angles! Avoid cut-injuries by careful handling of the formtools!

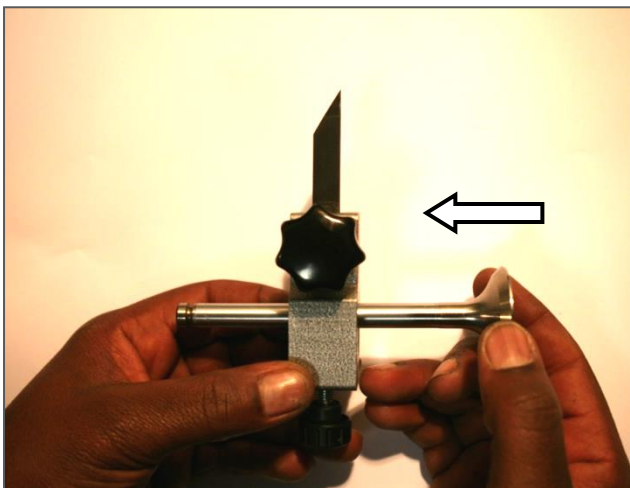


Fig. 12

8. The grinded valve can be inserted in the formtool setting gauge and the knurled head screw can be slightly tightened. In this position the valve stem must remain moveable. Fig. 12

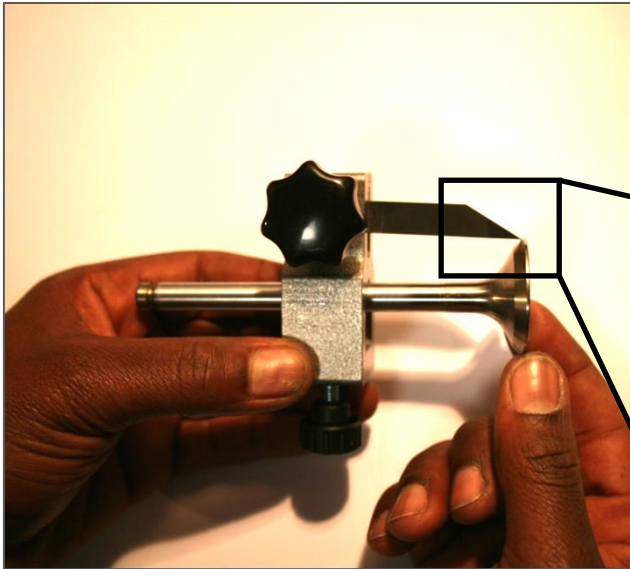


Fig. 13

9. The tip of the adjusting tongue must now be placed in the upper quarter of the valve head just like Fig. 13. Carefully but firmly fix and tighten the valve with the knurled head screw as well as the adjusting tongue with the star grip handle.

Check if the adjusting tongue is placed as in Fig. 13 showed

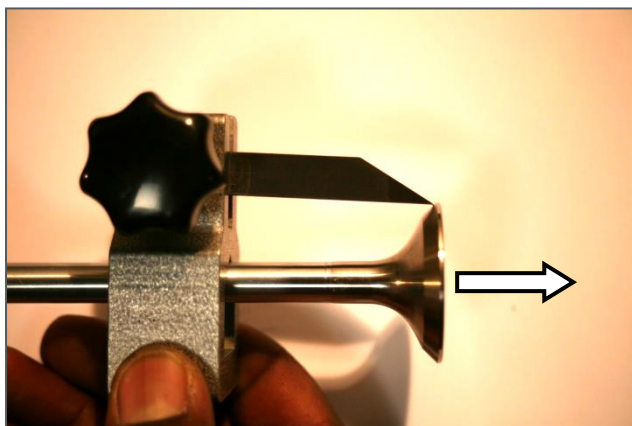
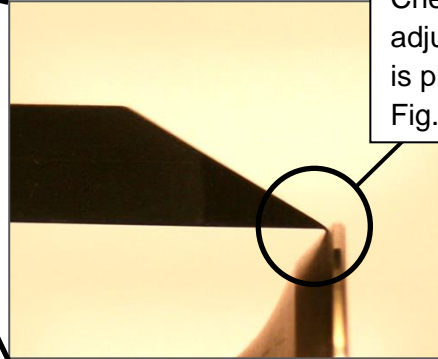


Fig. 14

10. The knurled head screw must be loosened slightly by a  $\frac{1}{4}$  rotation in order to check the adjusting through moving the valve. **Make sure that you are not loosening the star grip handle!** After checking the setting, the knurled head screw can be released and the valve can be removed from the formtool setting gauge. Fig. 14

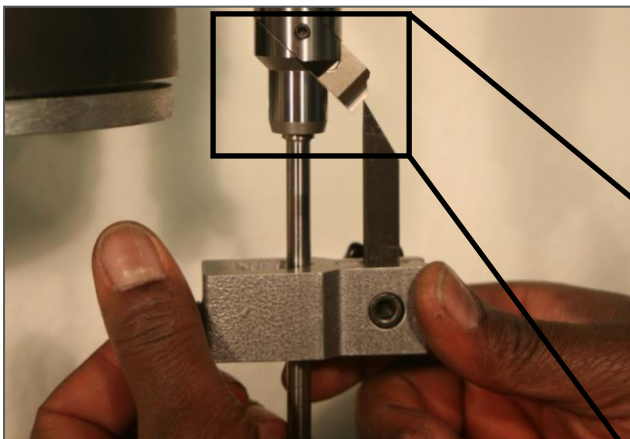


Fig. 15

11. Fit the formtool setting gauge on the pilot and fix the gauge slightly by the knurled head screw. Adjust the formtool in the way that the adjusting tongue will match with the corner (line) of the upper correction angle (Fig. 15). Tighten the formtool in following and remove the formtool setting gauge.

Correct final adjustment

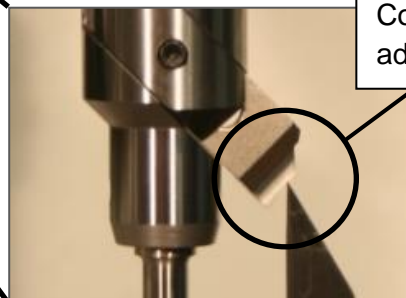




Fig. 16

12. Unlock the clamping lever handle and place the pivot arm at the upper position by means of the adjusting screw and the stopper ring (the stopper ring is below the pivot arm and is fixed by a clamping lever). Loosen the star grip until the spindle is free moving. Fig. 16



Fig. 17

13. Disengage the magnetic base by pushing against Position 2 of the tumbler switch. Remove the device from the clamping plate. Insert the pilot carefully into the first valve guide. Fig. 17



**Please keep the contact area on the steel table and magnet base always clean!**

14. Place the magnet base careful and flat onto the clean steel table. Push on Position 1 of the tumbler switch => magnet base activated. Turn the spindle clockwise 2-3 rotations for self-centering the pilot in the valve guide. Fig. 17



Fig. 18

- i** Place one hand on the magnetic base, when you clamping down the VGX-21 on the steel table. By activating the magnetic base, you can feel any unevenness on your finger tips. Fig. 18

If unevenness on the magnet base occurs, repeat step 13-14.



Fig. 19

15. By using the adjusting screw and the stopper ring, you can lower the loosened pivot arm down to nearly 1mm distance from the formtool to the seat. Use the adjusting screw as fine-adjustment. Fig. 19

The stopper ring = for raw elevating adjustment. See step 12 on page 19

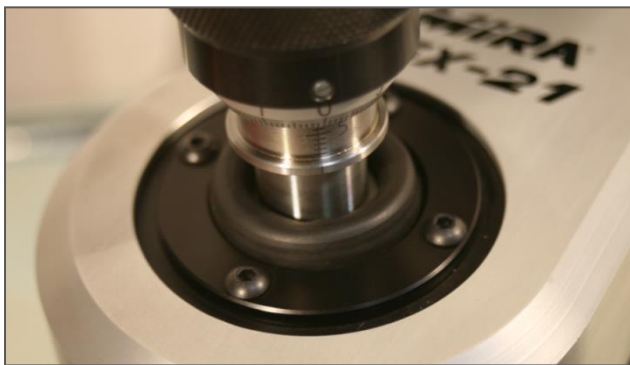


Fig. 20

16. Before clamping the pivot, have a look at the rubber cover for checking the raw centering of the pilot. The rubber cover should be even around the spindle guide like Fig. 20.

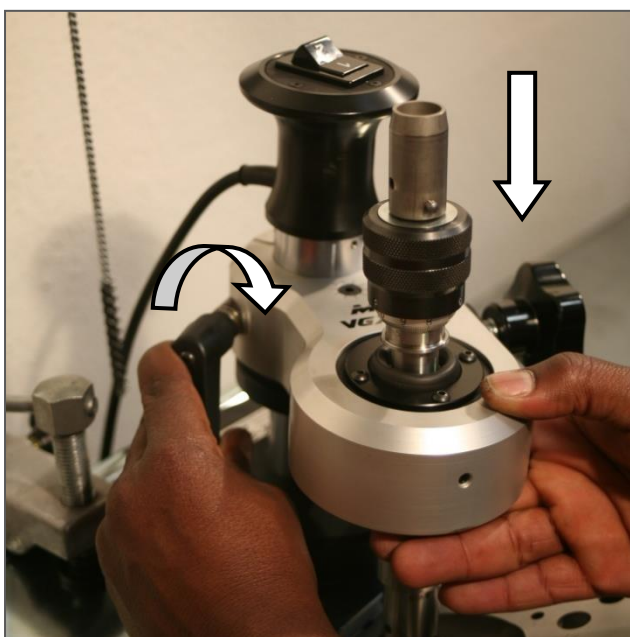


Fig. 21

17. **Important operation** ⚠️  
Bring the pivot arm to the highest level. Let it sliding down to the adjusting screw by itself, without touching the device.

After this check, pay attention again to step 16! Accordingly the pivot arm must be clamped firmly by the clamping lever of the pivot arm. Fig. 21

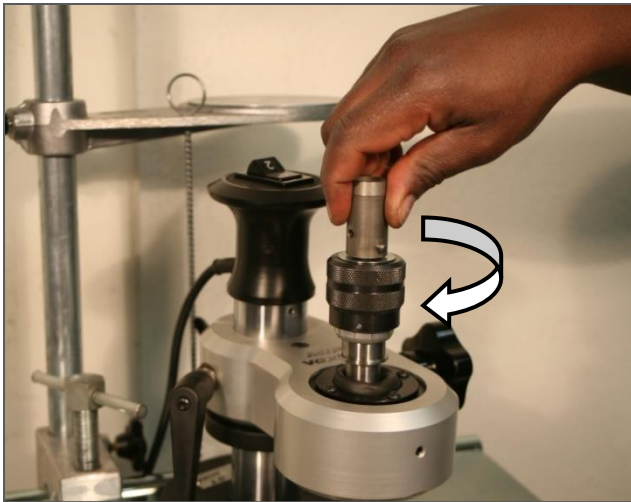


Fig. 22

### 18. Checking

Turn the adapter by hand in order to fine center the pilot in the valve guide. Simultaneously tighten the stargrip carefully until the spindle is fixed firmly.  
Fig. 22

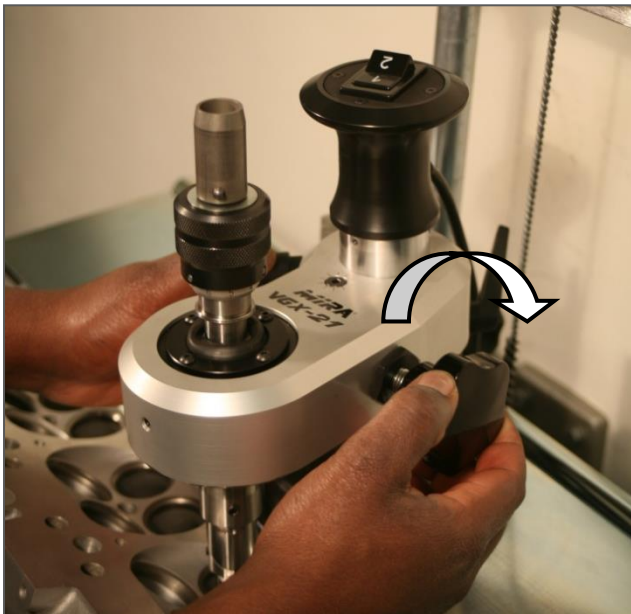


Fig. 23

19. Hold the handle firmly and tighten the stargrip until the spindle bearing is locked firmly. The spindle guide will now be fixed precise, solid and safe.  
Fig. 23



**PLEASE PAY ATTENTION!**  
(For the following operations)

During processing of the valve seats, there occur metal cuttings and dust from the raw valve seats. Please wear safety equipment (goggles etc.) to avoid injuries!  
Attention: Sharp formtools!

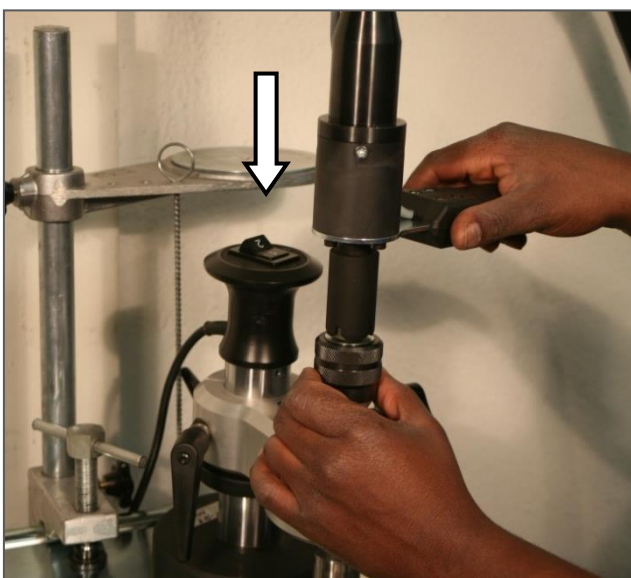


Fig. 24

20. Put the Vario Drive on the adapter until the pin engages in the shaft. Place your left hand around the advancing device. With your right hand hold the handle of the Vario Drive firmly. Fig. 24



Fig. 25

21. To process the valve seats with the MIRA VGX-21 we highly recommend to work with the electrical Vario Drive (See "Special accessories" on page 33) as following:

Switch on the Vario Drive and select the suitable rotation speed, by turning the knob clockwise of the control box. Fig. 25

- i** Rule of thumb: Adjust a high rotation for little diameters and a low rotation for great diameters.  
E.g.:  $\varnothing 70\text{mm} \Rightarrow 50\text{rpm}$   
 $\varnothing 20\text{mm} \Rightarrow 180\text{rpm}$

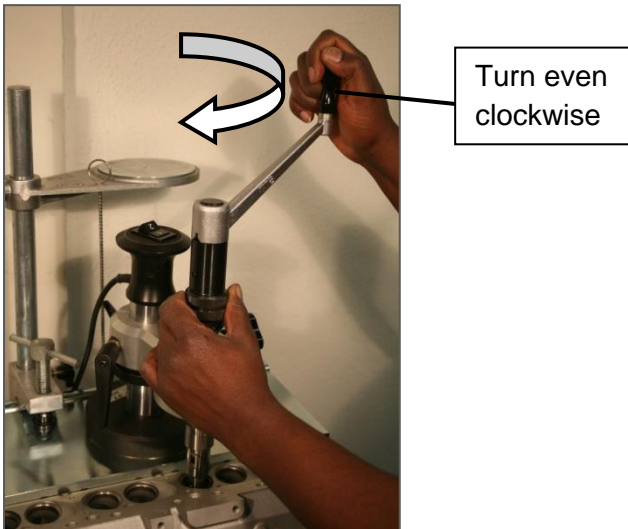


Fig. 26

22. Push the knob on the handle of the Vario Drive (the unit will start after a delay of one second). Turn the advancing device slowly (The formtool will be driven downwards) until the formtool starts cutting. Fig. 24 / Fig. 26

23. Continue the processing while holding the handle firmly. Turning the advancing device regularly until the formtool has completely refaced the seat as well as the corrections all around. Fig. 24 / Fig. 26

- i** Use cutting oil or a coolant lubricant for better and easier processing of the valve seats!

24. Reduce the operating power by a slow counterclockwise turn of the advancing device. Then turn the advancing device back in 1 to 2 full rotations and release the knob of the Vario Drive handle. Let the Vario Drive running down.

- i** Alternatively you may work with the manual crank handle (Fig. 26) instead of the Vario Drive.



Fig. 27

25. To release the magnetic base, push on position 2 and then back to the mid-position of the tumbler switch. Remove the VGX-21 carefully from the steel plate. Place the device beside the cylinderhead on the steel plate or on the storage table (AT) See "Special accessories" on page 33. Fig. 27

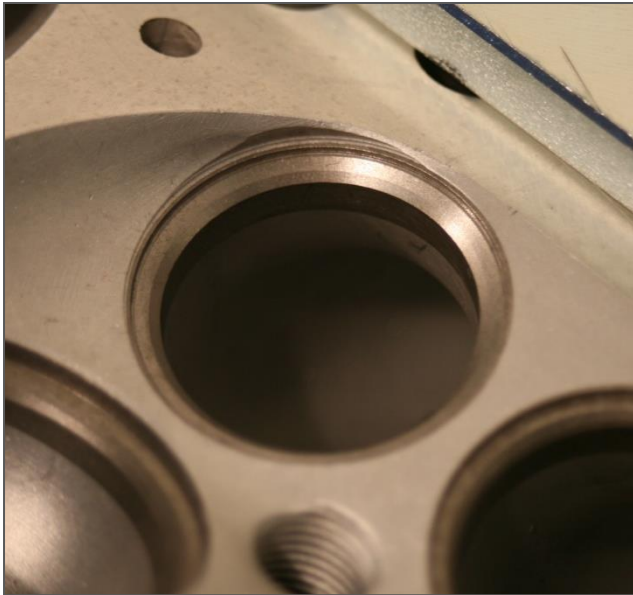


Fig. 28

26. Check the first valve seat with regard to the position of the seat on the valve face. If no correction is necessary, the next valve seats can be processed by repeating **step 13 to 26** (except step 15!). Fig. 28

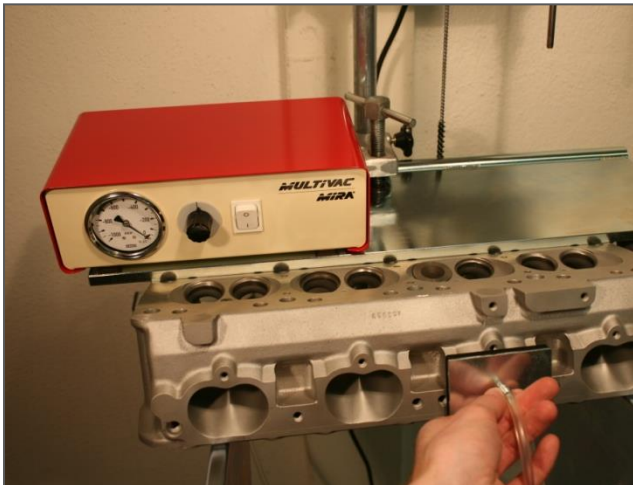


Fig. 29

27. After finishing the valve seats, check the seat for proper sealing, preferably using the separate MIRA MUV Multivac Vacuum tester (See "Special accessories" on page 33). Fig. 29

**i** **How do you get a constant seat surface?**

You may use suitable cutting grease or cutting oil and let the formtool give some rotations without feed motion before the device will be released from the valve seat.

**i** **How do you avoid surface defects (machining-, chatter marks etc.)?**

Hold the handle of the Vario Drive or the crank handle firmly and turn the advancing device very slowly. The use of an appropriate formtool is imminent.



## 5 Processing of insert counterbores (ring seats)

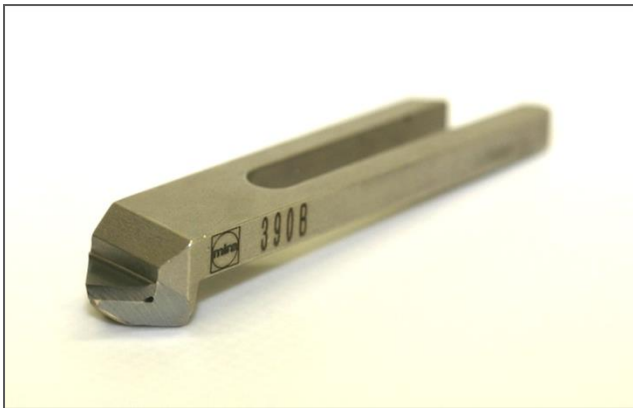


Fig. 30

1. Select the ring formtool type 390 (A, B or C formtool) which suits the inside diameter (Fig. 30). See separate formtool catalogue.

**i** Alternatively: **For heavy duty valve seat processing**, we recommend the use of the Double edged tool-heads with high quality carbide tips. (See “Special accessories” on page 33)



Fig. 31

2. For setting the formtool, preferably use the direct-reading micrometer MIRA EM19-75 (See also “Special accessories” on page 33). For this purpose the included gauge must be used. Fig. 31



**PLEASE PAY ATTENTION!**

The formtools may have some sharp edges and angles! Avoid cut-injuries by careful handling of the formtools!

**i** For correct micrometer settings, refer to the EM19-75 Micrometer with gauge instruction manual.

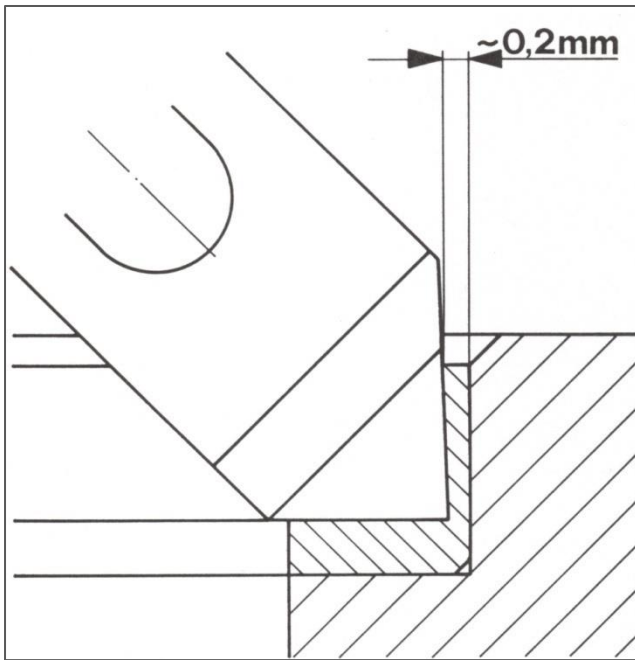


Fig. 32

3. The old insert valve seat ring can be removed in a swift and easy operation. The formtool must be set in order to have a 0.2mm wall remaining, which can be removed easily by hand. Fig. 32



**PLEASE PAY ATTENTION!**  
(For the following operations)



During processing of the valve seats, there occur metal cuttings and dust from the raw valve seats. Please wear safety equipment (goggles etc.) to avoid injuries! Attention: Sharp formtools!

## 5.1 Processing the Counterbores



Fig. 33

4. The processing of a counterbore is done in two operations. The first operation goes approximately 1mm to the final dimension. The final diameter is reached by a second operation. This diameter shows the press-fit for the new valve seat ring. Fig. 33



**Pay special attention to the correct press-fit!**  
An incorrect press-fit can lead to a total damage of the cylinderhead!

## 6 Changing tool-heads

In order to be able to processing valve seats with small or big diameters, there are different tool-heads available: DT05 (smallest), DT1 (standard), DT2 (medium) and DT3 (HD, for 16mm formtools). Fig. 34



Fig. 34



Fig. 35

1. To change the tool-head, it is recommended to place the device on the clamping plate or on a metal working bench and activate the magnet base (Fig. 35). Lock the clamping lever and the star grip of the VGX-21 for a solid work base.

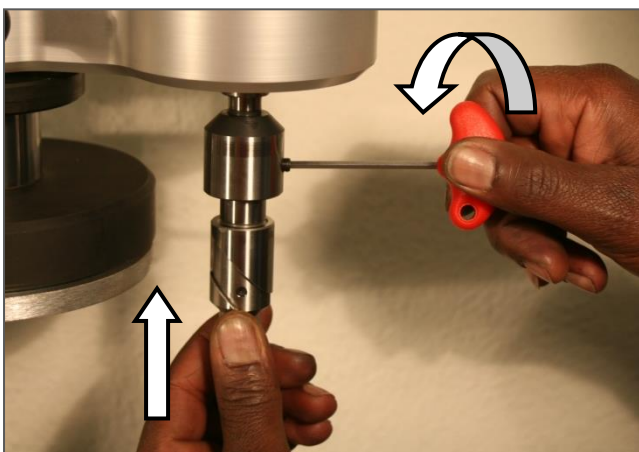


Fig. 36

2. The setscrew can be released by using the gripped inhex key. The tool-head can be pulled out by lightly hand-rotating. Insert the other tool-head in the spindle guide. Check, if the markpoint on the tool head has the same direction as the setscrew in the spindle guide. Adjust the tool-head accordingly and tighten the setscrew to fix it. Fig. 36

## 7 Maintenance of the VGX-21

The VGX-21 valve seat refacing unit is a precision device which asks for careful handling and maintenance. It is recommended to keep it always clean and to spray the blank parts with an anti-rust liquid after each use. Do not use aggressive cleaners for external cleaning!



**IMPORTANT:** Disconnect power before working on electrical components, first!

Use only genuine MIRA spare parts as listed in this instruction manual.  
(See page 29)

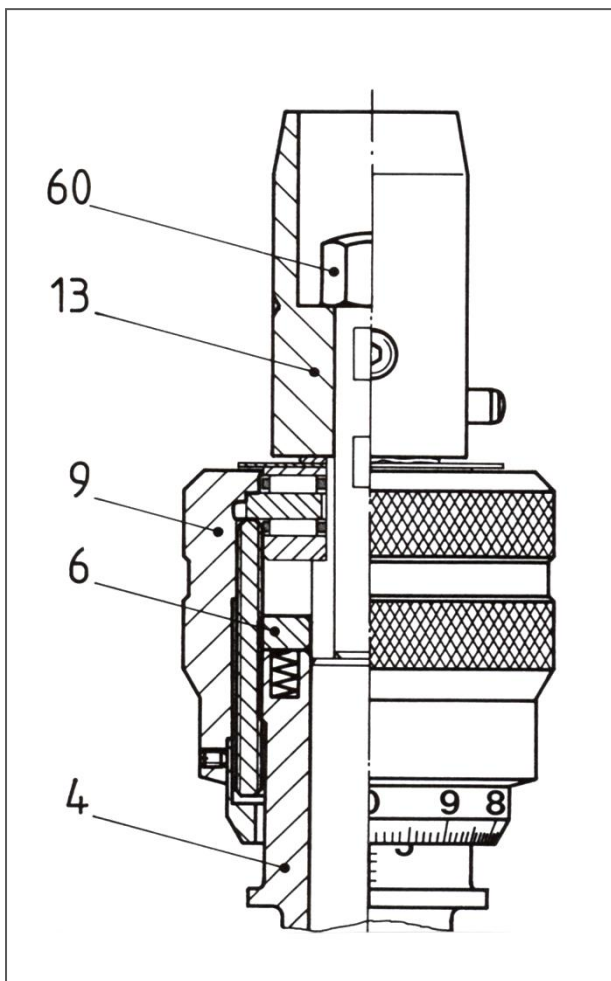


Fig. 37

### 7.1 Advancing device (Feed nut)

The advancing device has a spring system, which compensates the play and therefore must not be readjusted (Fig. 37). If the advancing device should be hard to turn, then the thread of the inner threaded ring must be cleaned and lightly greased. The blind nut (60) has to be released and the adapter (13) must be removed. Now unscrew and remove the advancing device (9) from the spindle guide (4). You can now see a threaded ring (6), which is spring mounted on the spindle guide (4). Mark the current position by means of a marking tool and dismount the threaded ring (6). Clean the threaded ring, grease it and place the ring, shifted in one position (shown from the old position), back on the spindle guide. Now screw the advancing device (9) back on again, **using uniform pressure**, and install the adapter (13).



**Attention!**

This work must be carried out only by appropriately instructed personnel, because it is possible to damage the advancing device by handling carelessly!

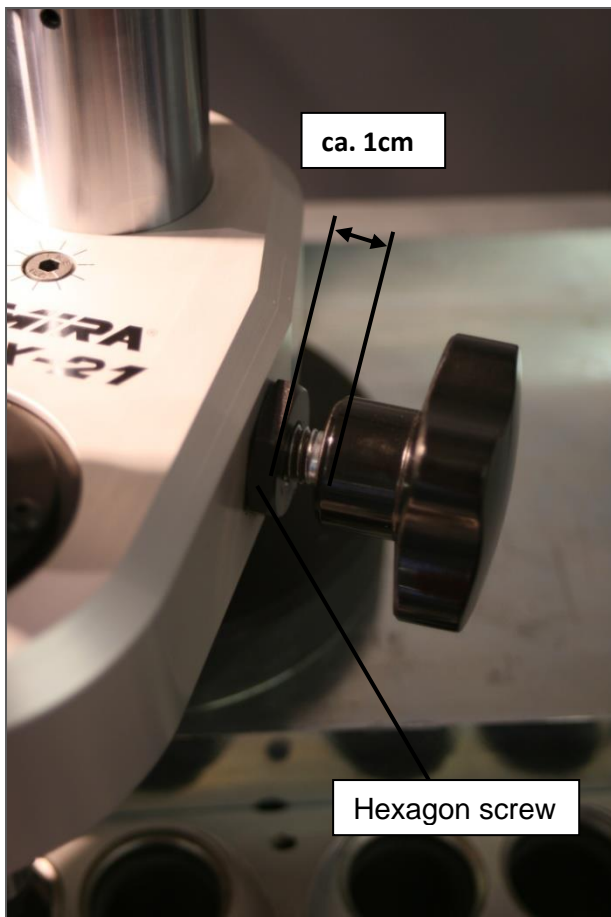


Fig. 38

## 7.2 Hydraulic oil clamping system

The VGX-21 has an innovative hydraulic oil clamping system that allows, to clamp the spindle guide tight and safely.

Under full clamping condition, a gap of ca. 1cm should remain between star grip and hexagon screw. See (Fig. 38)

In rare cases, it is possible that hydraulic oil can leak out through the bleeding screw. In this case hydraulic oil must be refilled as following:

Tilt the VGX-21 to the side. To fill-in hydraulic oil, the star grip must be carefully turned out. Dismount the hexagon screw and turn out carefully the piston by using a long M6 screw or a threaded rod. Fill-in carefully the hydraulic oil **ISO68** (Fig. 39), through the star grip opening, until to the upper edge of the insert-chamfer (Fig. 40)! Set in the piston, turn in the hexagon screw and fix it solidly. The bleeding screw must be unscrewed just a little out to venting the hydraulic system. Turn in the star grip carefully until some hydraulic oil leaking out from the bleeding screw. After finishing bleeding, the bleeding screw must be screwed in immediately. The clamping system will now work again with full efficiency and precision.



Fig. 39

**i** Tip: For clean and fast oil re-filling, use a medical injection gun to fill in the hydraulic oil. Fig. 39  
Use only the hydraulic oil **ISO68** or other equivalent hydraulic oil!

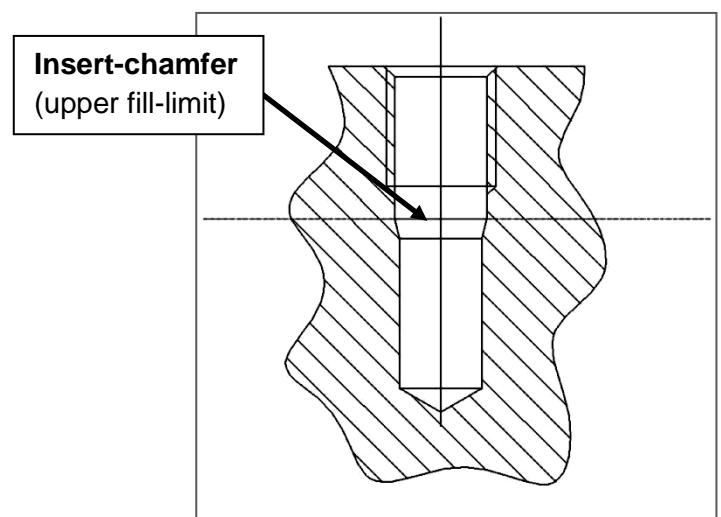


Fig. 40

## 8 Spare parts list

From manufacturing-No.: 50400      Serial-No.: 963

When ordering spare parts, the serial- and the manufacturing number of the units must always be indicated.

| Description               | Pos. | Part-No.      |
|---------------------------|------|---------------|
| Magnetic base 230V 50Hz   | *1   | 10142.3.3786A |
| Magnetic base 110V 60Hz   | *2   | 10142.3.3786B |
| Cover disc                | 3    | 10542.4.5257  |
| Clamping ring             | 4    | 10142.4.3791  |
| Spacer                    | 5    | 10142.4.3793  |
| Pivot arm                 | 6    | 10142.2.3794  |
| Adjusting screw           | 7    | 10142.4.3797  |
| Piston                    | 8    | 10142.4.3798  |
| Upper ball lock ring      | 9    | 10542.4.2517  |
| Spindle guide             | 10   | 10542.4.2872  |
| Sealing ring              | 11   | 10542.4.2532  |
| Threaded ring             | 12   | 10142.4.3799  |
| Cover ring                | 13   | 10542.4.2522  |
| Rubber cover              | 14   | 10542.4.2533  |
| Spindle                   | 15   | 10142.3.3800  |
| Tool-head DT1, complete   | 16   | 14432.4.3493  |
| Threaded ring             | 17   | 10542.4.2873  |
| Threaded bushing          | 18   | 10542.4.2874  |
| Vernier                   | 19   | 10542.4.2877  |
| Advancing device          | 20   | 10142.4.2885  |
| Intermediate ring         | 21   | 10542.4.2881  |
| Cover disc                | 22   | 10542.4.2882  |
| Adapter                   | 23   | 10542.4.2883  |
| Hand-piston               | 24   | 13541.4.3445  |
| Hexagon Screw             | 25   | 13541.4.3446  |
| Sleeve                    | 26   | 10142.4.3801  |
| Electronic cartridge      | 27   | 10142.2.2966  |
| Tumbler switch            | 28   | 10142.3.3802  |
| Handle                    | 29   | 10142.3.3806  |
| Switch plate              | 30   | 10142.4.3807a |
| Cable with CH-plug        | *31  | 10142.4.3808A |
| Cable with Schuko-plug    | *32  | 10142.4.3808B |
| Cable with USA-plug       | *33  | 10142.4.3808C |
| Rotation crank handle     | 34   | 10142.3.3809  |
| Fabrication plate VGX-21  | 35   | 10152.4.3020C |
| Slotted countersink screw | 36   | 1N0357M03x006 |
| Countersink screw         | 37   | 1N0020M03x010 |
| Lens head screw           | 38   | 1N0019M04x006 |
| Lens head screw           | 39   | 1N0019M04x008 |
| Setscrew                  | 40   | 1N0024M04x004 |
| Setscrew                  | 41   | 1N0024M06x006 |
| Blind nut                 | 42   | 1N0154M06     |
| Washer                    | 43   | 1N0715M04     |
| Spring washer             | 44   | 1N0760M04     |
| Lock washer               | 45   | 1N0782M04     |
| O-Ring ø13x2              | 46   | 1ORM0130-20   |
| O-Ring ø69.5x3            | 47   | 1ORM0695-30   |
| O-Ring ø74.5x3            | 48   | 1ORM0745-30   |

| Description                 | Pos. | Part No.        |
|-----------------------------|------|-----------------|
| Axial needle bearing        | 49   | 1LAN10          |
| Axial disc                  | 50   | 1LLS10          |
| Axial disc                  | 51   | 1LAS10          |
| Grooved axial ball bearing  | 52   | 1LAR08a         |
| Compensating spring         | 53   | 1MAS10.5        |
| Compensating spring         | 54   | 1MAS64          |
| Compression spring          | 55   | 1MDF03          |
| Joint protector Ø7 / L=69mm | 56   | 1KKT00494       |
| Strain relief clip TH Ø12mm | 57   | 1KZB00493       |
| Star grip                   | 58   | 1HSG12KA        |
| Clamping lever              | 59   | 1HKH06KI        |
| Clamping lever              | 60   | 1HKH08KI        |
| Ball                        | 61   | 1N086904.5      |
| Earth symbol                | 62   | 1EEZ04          |
| Cable ties                  | 63   | 1EKB02.2        |
| Hammer bolt                 | 90   | 1N08961.85x4.76 |
| Type plate 230V 50Hz        | *91  | 10152.4.3812A   |
| Type plate 110V 60Hz        | *92  | 10152.4.3812B   |

*(The following items are not visible on the assembly drawing:)*

|                           |     |              |
|---------------------------|-----|--------------|
| Hydraulic oil             | 64  | ISO 68       |
| VGX-21 wooden case        | 65  | 10151.2.4128 |
| Gripped Inhex key 2mm     | 66  | 1WIG2.0      |
| Normal Inhex key 3mm      | 67  | 1WSSS3.0     |
| Ball headed inhex key 4mm | 68  | 1WKS4.0      |
| Cleaning brush            | 69  | 1WBP01       |
| Formtool setting gauge EL | 70  | 11031.4.1885 |
| Instruction manual DE     | *71 | 1PBA01b      |
| Instruction manual EN     | *72 | 1PBA01c      |
| Formtool catalogue        | 73  | 1PKA03       |
| Cardboard box             | 74  | 1VKS09       |

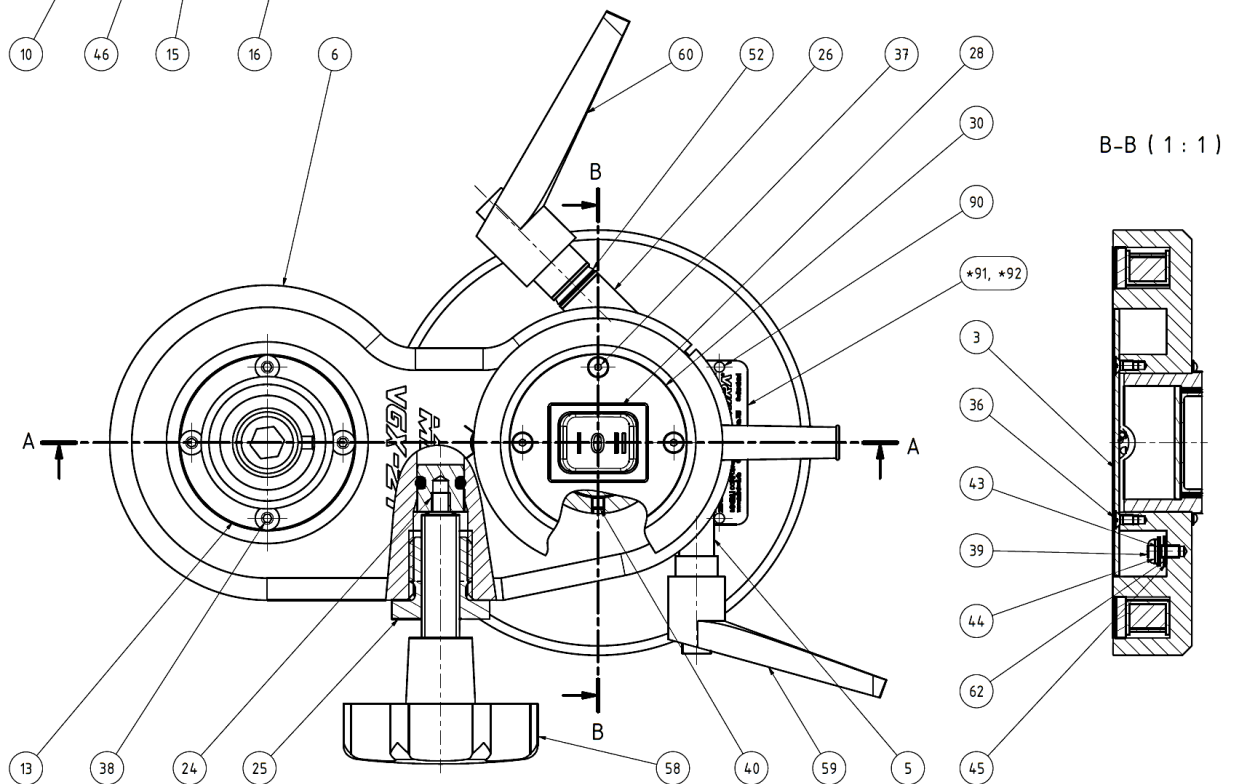
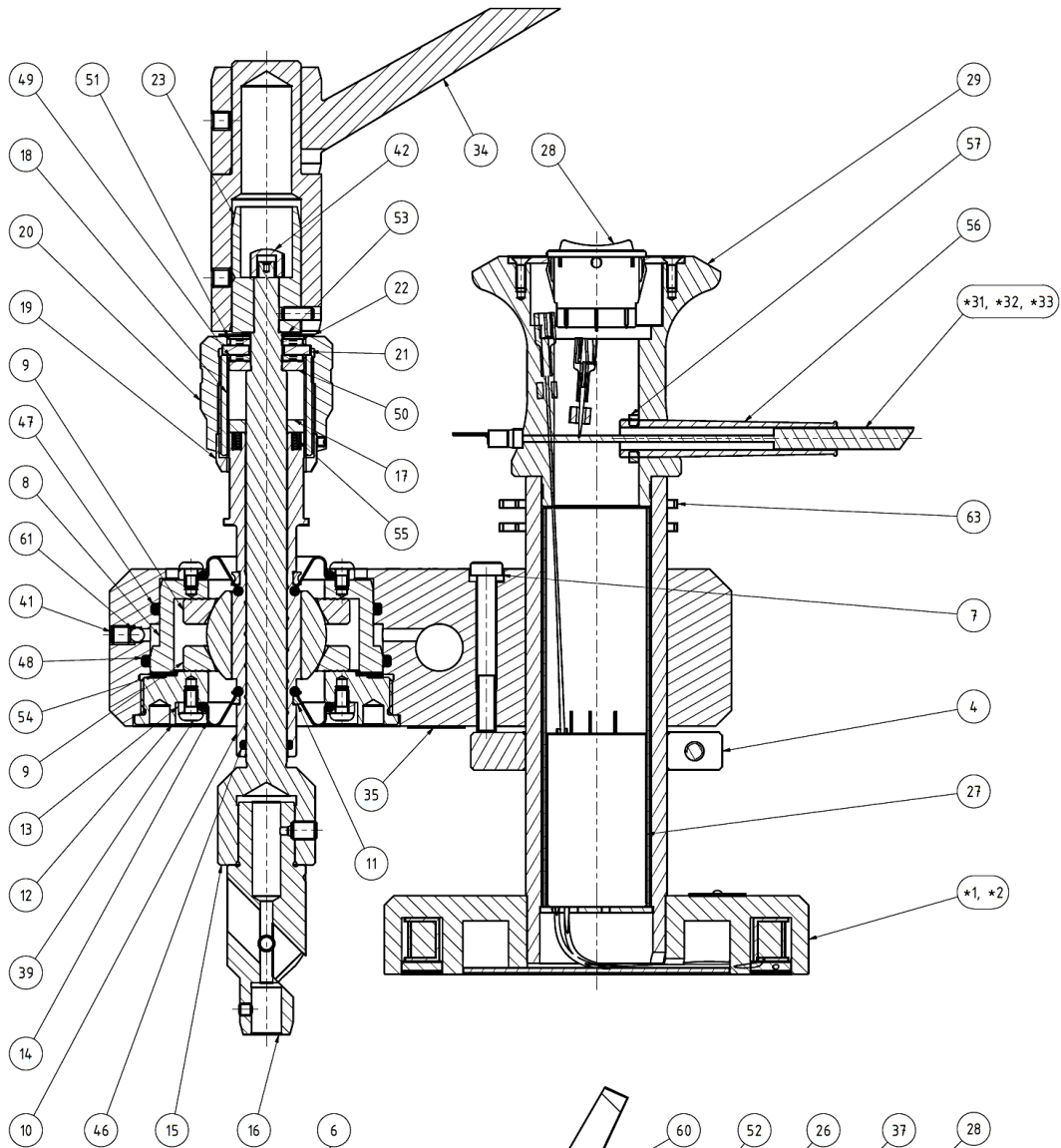


### Special accessories

See page 33

9 Assembly drawing of the VGX-21 (with crank handle)

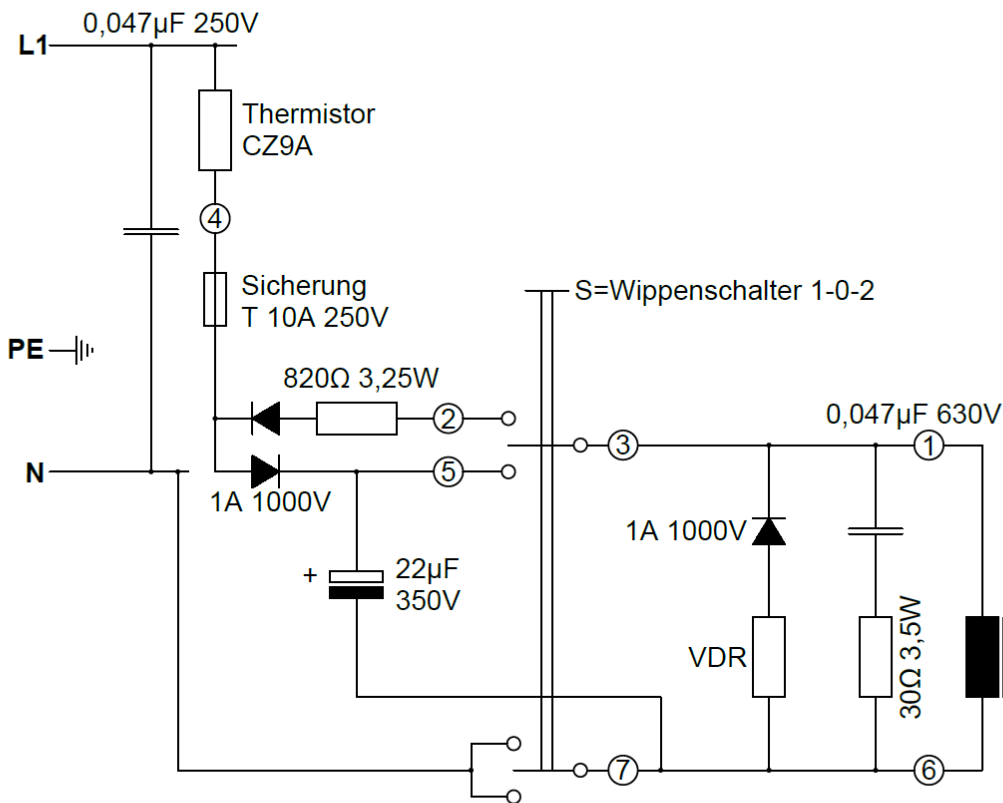
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10 Schematic diagram

Das Urheberrecht an dieser Zeichnung, die dem Empfänger persönlich anvertraut wird, verbleibt unserer Firma. Ohne schriftliche Genehmigung darf die Zeichnung weder kopiert noch vervielfältigt, noch Dritten mitgeteilt oder zugänglich gemacht werden.  
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MIRA Gerätevarianten

| MIRA Gerät              | Netzspannung | Widerstand (Magnetspule) |
|-------------------------|--------------|--------------------------|
| VG20                    | 230VAC       | 6000Wi ~ 3000Ω           |
| VG20                    | 110VAC       | 3160Wi ~ 800Ω            |
| BB-86 M20               | 230VAC       | 2800Wi ~ 1900Ω           |
| BB-86 M10               | 110VAC       | 2390Wi ~ 1100Ω           |
| BB-86 Giant MG20        | 230VAC       | 2850Wi ~ 2000Ω           |
| BB-86 Giant MG10        | 110VAC       | 2240Wi ~ 1100Ω           |
| BB-86 Mini MD20         | 230VAC       | 3000Wi ~ 1960Ω           |
| BB-86 Mini MD10         | 110VAC       | n/a                      |
| VG85 / 91 / 96 / VGX-21 | 230VAC       | 4400Wi ~ 2160Ω           |
| VG85 / 91 / 96 / VGX-21 | 110VAC       | 2700Wi ~ 750Ω            |

**MINELLI**®  
 CH-8330 Pfäffikon ZH

Masstab  
 1:1

|           |             |                 |
|-----------|-------------|-----------------|
| ---       | 0.00kg      | ---             |
| Werkstoff | Gewicht kg. | Zusammenst. Nr. |

|   | Datum      | Name |
|---|------------|------|
| 8 |            |      |
| 7 | 25.11.2019 | OBA  |
| 6 | 17.02.2020 | OBA  |
| 5 |            |      |
| 4 |            |      |
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| 2 |            |      |
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Gezeichnet  
 Kontrolliert  
 Norm

DIN ISO 5456  
 (DIN 6: links FR)

BB-86, VGX-21  
 Elektroschema allgemein

10152.4.1203 rev. 1

|        |            |       |      |                                  |         |
|--------|------------|-------|------|----------------------------------|---------|
| Status | Änderungen | Datum | Name | Minelli Zeichnungskopf: rev. 1.0 | Seite 1 |
|--------|------------|-------|------|----------------------------------|---------|

## 11 Special accessories

MIRA tooling and equipment are available through the MIRA Webshop [www.miratool.ch](http://www.miratool.ch)!



Fig. 41

### Tool-heads

To process different valve seat diameters, there are three tool-heads available in variable diameter-sizes (Fig. 41). The tool-head DT1 is included in the standard MIRA VGX-21 package and can also be reordered:

#### Replacement parts:

| Description     | Pos. | Order No.    |
|-----------------|------|--------------|
| Tool-head DT05  | 100  | 14432.4.3491 |
| Tool-head DT1   | 101  | 14432.4.3493 |
| Tool-head DT2   | 102  | 14432.4.3495 |
| Tool-head DT3   | 103  | 14432.4.3512 |
| Tool-head DT1AM | 104  | 14432.3.5317 |
| Tool-head DT1A  | 105  | 14432.4.5324 |

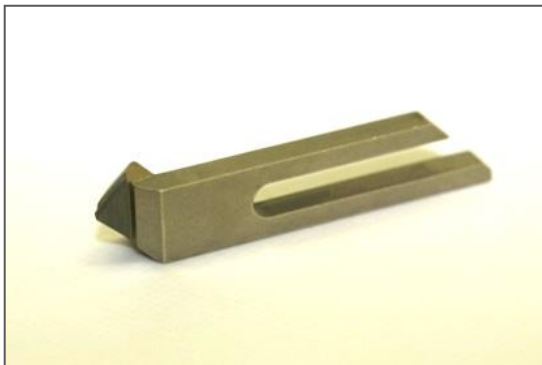


Fig. 42

### Counterbore tool

For preparing counterbores, special tools are available. Fig. 42  
See formtool catalogue separately.



Fig. 43

### Tool-heads double edged

The double edged tool-heads, with exchangeable hard alloy carbide tips, makes it easy to rationally turn out valve seat rings and to manufacture ring seat counterbores with great accuracy Fig. 43:

#### Replacement parts:

| Description                                  | Pos. | Order No.     |
|--|------|---------------|
| Tool-head double $\varnothing 55-75/5^\circ$ | 106  | 11432.4.3502B |
| Tool-head double $\varnothing 55-75/0^\circ$ | 107  | 11432.4.3502A |
| Tool-head double $\varnothing 45-55/5^\circ$ | 108  | 11432.4.3500B |
| Tool-head double $\varnothing 45-55/0^\circ$ | 109  | 11432.4.3500A |
| Tool-head double $\varnothing 35-45/5^\circ$ | 110  | 11432.4.3497B |
| Tool-head double $\varnothing 35-45/0^\circ$ | 111  | 11432.4.3497A |
| Tool-head double $\varnothing 26-36/5^\circ$ | 112  | 11441.4.4225B |
| Tool-head double $\varnothing 26-36/0^\circ$ | 113  | 11441.4.4225A |
| Tool-head double $\varnothing 21-26/5^\circ$ | 114  | 10440.2.5321  |
| Tool-head double $\varnothing 21-26/0^\circ$ | 115  | 10440.2.5323  |

**Fig. 44**

## Pilots

Pilots are available in many different sizes. Special sizes can be produced and supplied upon request. Fig. 44 See formtool catalogue separately.

**Fig. 45**

## Formtools

Formtools are available in a multitude of shapes. For certain vehicle types there are special formtool with the original shape. Fig. 45 See formtool catalogue separately.



Fig. 46

### Micrometer with gauge EM19-75

By means of this direct reading micrometer, the counterbore tool can be positioned perfectly according to the corresponding insert (Fig. 46):

**Installation-Kit No: 11331.4.3650**

**Replacement parts:**

| Description         | Pos. | Order No.     |
|---------------------|------|---------------|
| Body                | 116  | 11342.4.3651  |
| Mounting micrometer | 117  | 11342.4.3652  |
| Calibration gauge   | 118  | 11342.3.2794  |
| Threaded spindle    | 119  | 11351.4.3654A |
| Inhex screw         | 120  | 1N0272M04x016 |
| Spindle knob        | 121  | 1HGK14K       |
| Knob cover          | 122  | 1HGK14Ka      |
| Stop                | 123  | 11342.4.2863  |
| Hook spanner        | 124  | 1WHS02        |
| Instruction Manual  | 125  | 1PBA13a       |



Fig. 47

### Micrometer with gauge EM25-75

The Mira adjusting micrometer EM25-75 makes it possible to rapidly adjust the selected double edge tool-heads for seat ring processing to the exact and desired overdimension. Based on the rapid adjustability a high degree of productivity is achieved (Fig. 47):

**Installation-Kit No: 11331.4.3660**

**Replacement parts:**

| Description           | Pos. | Order No.     |
|-----------------------|------|---------------|
| Body                  | 126  | 11331.4.3661  |
| Holder for micrometer | 127  | 11331.4.3622  |
| Mounting micrometer   | 128  | 11342.4.3652  |
| Calibration gauge     | 129  | 11331.4.3623  |
| Threaded spindle      | 130  | 11351.4.3654B |
| Inhex screw           | 131  | 1N0272M04x016 |
| Lock screw            | 132  | 1N0444M10x1   |
| Special allen-key     | 133  | 1N135908M6x12 |
| Spindle knob          | 134  | 1HGK12A       |
| Compression spring    | 135  | 1MDF06.3/02   |
| Ball                  | 136  | 1MKG08        |
| End plug-in buffer    | 137  | 1GAP05        |
| Hook spanner          | 138  | 1WHS02        |
| Instruction manual    | 139  | 1PBA18a       |





Fig. 48

### Vario Drive EVO

With the Vario Drive you can improve the efficiency of your cylinderhead workplace. The Vario Drive is well adapted to complete the hand-driven MIRA equipment. (Fig. 48)

**Installation-Kit No: 12011.2.6409**

**Replacement parts:**



See separate Vario Drive instruction manual.



Fig. 49

### Multivac EVO

The Multivac is a mobile test unit for sealing tests on cylinderheads before and after rebuilding and on installed engines for rapid diagnosis (Fig. 49):

**Installation-Kit No: 16011.2.6604**

**Replacement parts:**



See separate Multivac instruction manual.



Fig. 50

### Storage table (AT)

To be fixed on the vertical guide post of the wall support AV. The MIRA units (VGX-21, VG-91 and Centronic NG) can be placed on this storage table and gives an ideal platform for replacing tools and pilots (Fig. 50):

**Installation-Kit No: 11232.2.1111**

**Replacement parts:**

| Description          | Pos. | Order No.     |
|----------------------|------|---------------|
| Round plate          | 140  | 11251.4.1486  |
| Triple star handling | 141  | 1HSG08KA      |
| Countersink screw    | 142  | 1N0357M06x012 |



Fig. 51

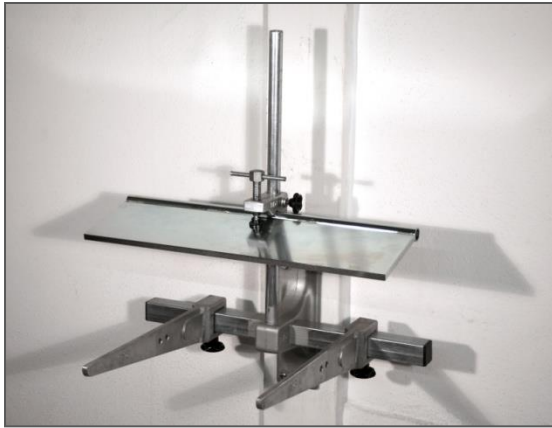


Fig. 52

## AV-Mobile cylinderhead wall support

To process valve seats from small and medium cylinderheads, best results will be achieved with the cylinderhead support. The wall support reaches a high precision level in combination with the devices VG-91 and VGX-21 (Fig. 52):

**Installation-Kit No: 11211.1.1571**

### Replacement parts:

| Description                  | Pos. | Order No.     |
|------------------------------|------|---------------|
| Wall support                 | 143  | 11252.1.1001  |
| Carry arm                    | 144  | 11242.2.1002  |
| Steel plate mount            | 145  | 11242.3.2423  |
| Steel plate (clamping plate) | 146  | 11242.3.1153  |
| Tensioning unit, long        | 147  | 11242.4.2887  |
| Tensioning unit, short       | 148  | 11242.4.2888  |
| Hexagonal screw              | 149  | 1N0056M08x030 |
| Expansion bolt               | 150  | 1N0307M08     |
| Washer                       | 151  | 1N0715M08     |
| Special plug                 | 152  | 1KVS25        |
| Catch plug                   | 153  | 1KVS40V       |
| Decal picture (top)          | 154  | 1BAB03        |



Fig. 53

## Pair of inclination plates (SH)\*

Especially made for inclined valve seats and allows to bringing them to the horizontal position for a comfortable processing (Fig. 53):

**Installation-Kit No: 11232.3.1731**

### Replacement parts:

| Description          | Pos. | Order No.     |
|----------------------|------|---------------|
| Inclined steel sheet | 155  | 11232.3.1731A |
| Stop bracket         | 156  | 11241.4.2359  |
| Hexagon head screw   | 157  | 1N0056M10x025 |
| Hex nut              | 158  | 1N0117M10     |

**i** \*The pair of inclination plates is included in the AV-Mobile package.



**Notes**

Lined area for notes, consisting of numerous horizontal lines.



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Manufacturer and worldwide distributor:

**MINELLI CORPORATION**  
Mattenstrasse 3  
8330 Pfäffikon ZH  
Switzerland

[www.miratool.ch](http://www.miratool.ch)

Your local distributor: