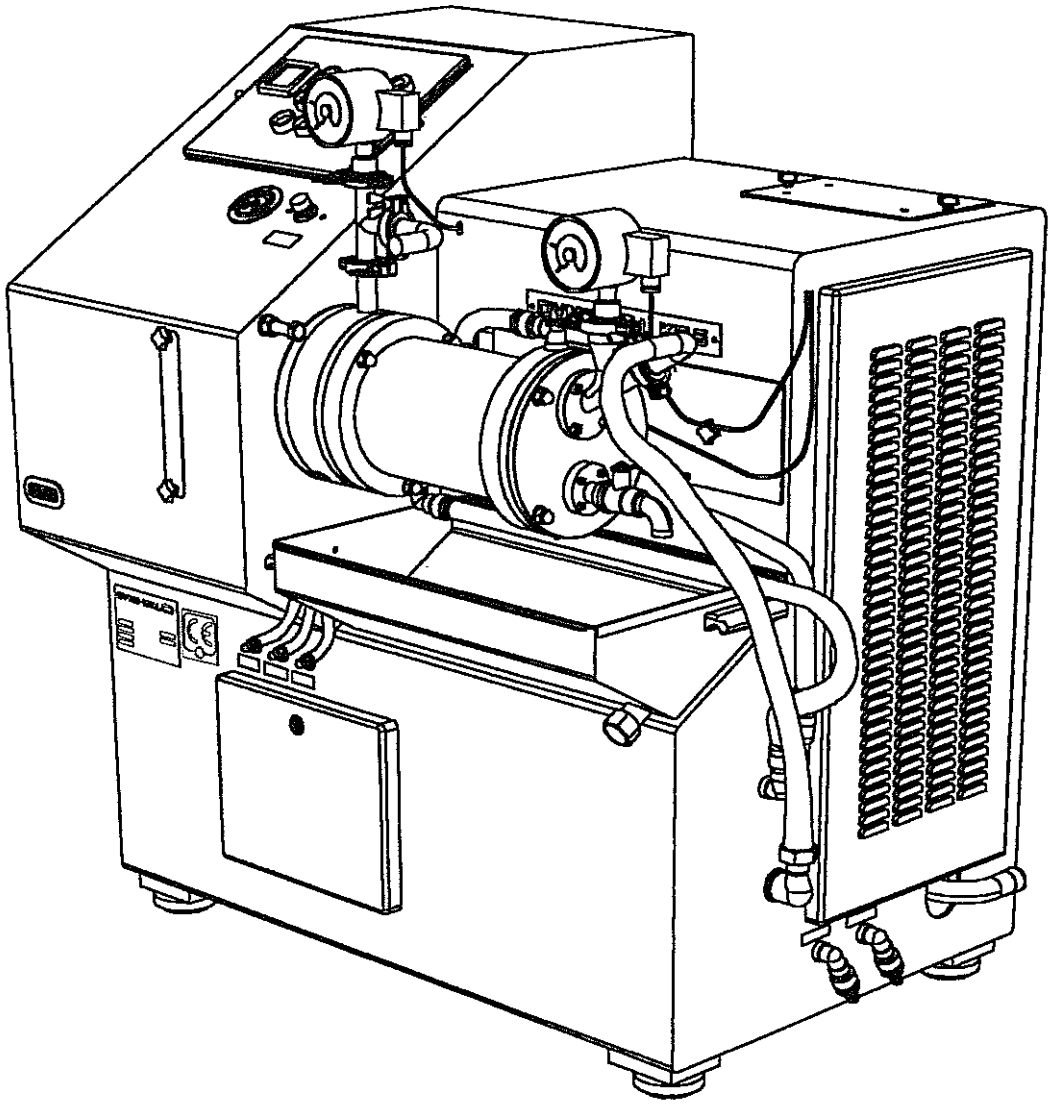
Operating Instructions

Agitator Bead Mill

DYNO®- MILL Type KD 6 (6)



End buyer: **LORD CORPORATION**
NORTH CAROLINA / USA

Machine-No.: **9 8 0 1 2 6**

WAB
Seit 1933

Willy A. Bachofen AG • Maschinenfabrik • Utengasse 15-17 • CH-4005 Basel

Telephone (~41) 061-681 51 51
Telefax (~ 41) 061-681 50 58

Dear Customer,

we would like to take the chance to congratulate you. Your decision, to buy the **"DYNO®MILL Type KD 6 (6)"**, will be an investment into the future. Now we take the opportunity and thank you very much for your wisely Buy.

Whenever you need our Support, don't worry! Just contact one of our WAB-Dealers or directly our Headquarters. If you have any requests about the Operating Instructions, or you'd like to give us a comment about it, just tell us. It is our pleasure to help and satisfy you.

And now we wish you all the best with your new investment, and we're sure it is it worth.

Kind regards,
your **WAB-Team.**

D

Achtung!
Nur Originalteile der Firma Willy A. Bachofen AG verwenden!

E

Attention!
Use only original parts of Willy A. Bachofen AG!

F

Attention!
N'utilisez que des pièces de rechange d'origine Willy A. Bachofen AG!

Operating Instructions Hand-Over Declaration

(1) Machine

Agitator Bead Mill
DYNO®- MILL

Type: KD 6 (6)

Machine No.: 98 01 26

Year of manufacture: 1998

(2) Customer's address

LORD CORPORATION

NORTH CAROLINA

USA

(3) Confirmation
The machine specified under (1) was purchased by us.
On delivery of the machine we were given the operation instructions for:

Machine number: 98 01 26

in the languages

ENGLISH — Quantity: 2

Quantity:

Company stamp

....
Date Customer's signature

(4) Machine delivery date

(5) Operating, maintenance and service personnel

The following persons were named by the customer and were introduced by me to the machine, instructed and informed about:

Safety features, sources of danger, incorrect operation, setting-up, operation, maintenance and servicing.

Name (Customer's personnel)	Signature

Company stamp Customer's signature

(6) The machine was handed over to the customer by

....
Date Customer-Service signature

Duplicate of the Hand-over Declaration, countersigned by supplier or manufacturer!

Willy A. Bachofen AG Utengasse 15/17 4005 Basel/CH Tel.: (061) 681 51 51 Fax: (061) 681 50 58

WARNING

Following products may only be used for rinsing the mechanical seal:

- **Butylene glycol (Butanediol, $C_4H_{10}O_2$)**
- **Diethylene glycol (Diglycol, $C_4H_{10}O_3$)**
- **Ethylene glycol (1,2-Ethanediol, $C_2H_6O_2$)**
- **Glycerine (1,2,3-Propanetriol, $C_3H_5(OH)_3$)**
- **Propylene glycol (1,2-Propanediol, $C_3H_8O_2$)**

Don't use water for cleaning the rinsing circuit.

Table of Contents

Appendix:

Certifications:

(See chap. 4 "Specifications")
(Mentioned and in this machine used certifications are available on customer's request!)

Drawings supplied:

Drawing 00803
Drawing 33896
Drawing 11590
Drawing 33647
Drawing 22366

Catchword-Index:

1 Machine Data

Customer's Name	**Lord Corporation**
Customer's Address	North Carolina **USA**
Machine Name:	**DYNO®- MILL**
Machine Type:	**KD 6 (6)**
Machine No.:	**9 8 0 1 2 6**
Date of Manufacture:	**1998**

Manufacturer's Address:

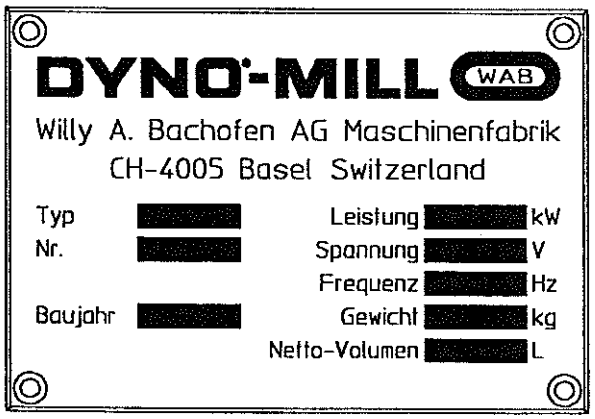
Willy A. Bachofen AG
Maschinenfabrik
Utengasse 15-17
CH-4005 Basel
Tel: (~41) 061-681 51 51
Telex 962 564 wab ch
Fax: (~41) 061-681 50 58

Customer Service Address:

CHICAGO BOILER - MILL DIVISION
1225 Busch Parkway
BUFFALO GROVE, IL 60015
USA
Tel. +1 847 459 0007
Fax +1 847 459 0598

Country of Origin: Made in Switzerland

The type plate is situated on the front of the machine.



When ordering spare parts please quote:

Machine Type
Machine No.
Drawing no. + Real pos.
Description + Item no.
Required quantity
(Please also use the fax-order in the appendix!)

Note

Only original WAB parts must be used. WAB does not accept any liability for damage resulting from the use of non WAB spare parts, wearing parts or accessories.

2 Application area and correct operation

The "Agitator Bead Mill DYNO-MILL" may only be used for the task specified. The correct application is the continuous dispersion and wet-grinding of solids suspended in liquid.

Instructions for Use

- No products/materials may be processed which, under the influence of pressure, temperature and shear, might produce uncontrolled reactions such as a rise in viscosity or temperature, spontaneous increase in hardness, foam formation or gas secretion, by which the machine ratings might be exceeded, be it only for a short time.
- We advise that even within the limits of the machine ratings, the milling process might change some product characteristics in an unacceptable way or even destroy them.
- Ensure before operating the machine that the product will not react in an undesirable or even totally uncontrollable way to the milling process.
- The material to be milled must be pumpable and its viscosity must not increase in the dispersion/milling process in such a way that the product pump can no longer discharge the milled material.

Proper use also includes the compliance with the manufacturer's commissioning-, operation- and servicing-instructions (operating instructions), as well as attention to avoidable inappropriate behaviour. The machine may only be operated and maintained by qualified employees who are familiar with the machine and have been informed about potential dangers.

Any other uses will be considered improper. The manufacturer does not accept liability for any damages resulting from improper use.

The operating instructions constitute part of the machine delivery and, in the case of resale, must be passed on to the new owner.

2.1 Residual Dangers

In spite of all precautions, some danger may remain. Residual dangers are potential, not very obvious hazards, such as e.g.:

- Injury during set-up, especially from worn, sharp-edged accelerators
- Fire risk from leakages
- Risks caused by the product or the rinsing medium, such as allergies, skin irritations or burns
- Risk because of malfunctions of the control system
- Risks involved in operating electronic controls

3 Safety

3.1 Explanation of Symbols and Notices

3.1.1 Work-Safety-Symbol

You will see this symbol next to all safety notices concerning danger to life and limb. Follow these instructions and act with caution. At the same time, all prevailing laws and safety and accident prevention regulations must be observed.

3.1.2 Warning-Notice

WARNING **marks places where special care should be taken, so that instructions and accurate procedures are followed and damage to the machine avoided.**

3.1.3 Note

Note **marks places which record application advice or correct working procedures.**

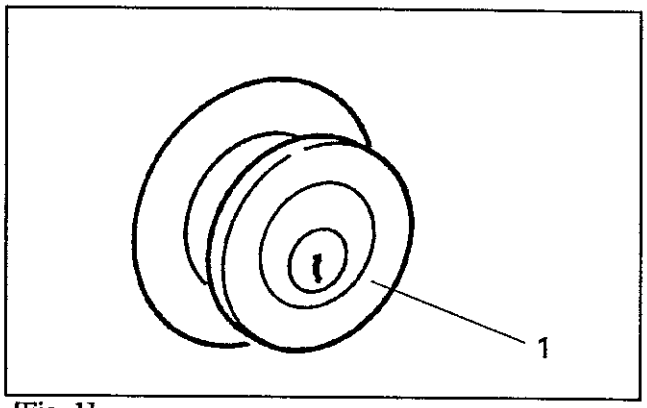
3.2 General Safety

The high performance mill DYNO-MILL, hereafter called 'the mill', is of technically sound construction and operationally reliable. Working procedures are, however, such, that certain places and parts of the mill cannot be made totally safe without impairing its operation. Therefore, it is of great importance that good personal safety practices be employed to safeguard personnel and mill.
This mill can be dangerous if used improperly by untrained personnel or employed for other uses than the one specified.

- **Read and carefully observe the mill's operating instructions as well as its safety notices before unpacking, installing and starting-up the machine.**
- **Store the operating instructions in an easily accessible place close to the mill.**
- **The mill may only be set up, operated and maintained by authorised, qualified employees, familiar with the machine.**
- **All local safety and accident prevention regulations apply for the operation of the machine; these should be taken note of and adhered to.**
- **Observe attached notices and warning signs.**
- **Always wear close-fitting clothes while working the machine.**
- **Tie away and cover long hair. Do not wear jewellery, such as necklaces and rings. They might get caught in the machine and cause injury.**
- **Immediately see a doctor in case of injuries, accidents or skin irritations.**

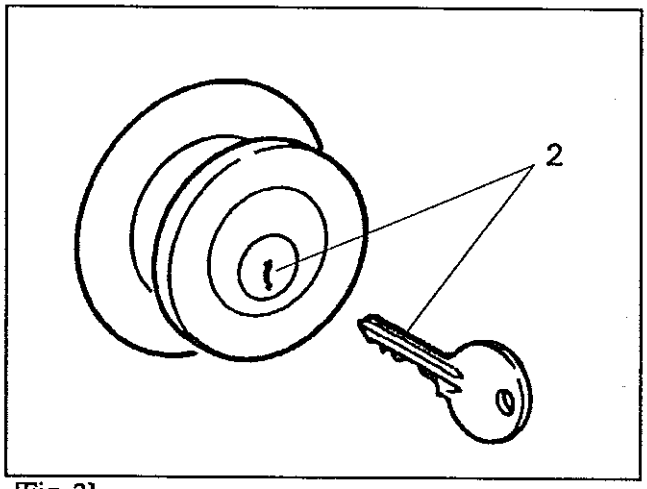
3.3 Operating Safety

- Before undertaking any mill maintenance work, the EMERGENCY-OFF-button (1) must be pressed. Store key in a safe place.
- Switch off main supply.
- It is only possible to restart the mill after the EMERGENCY-OFF-button has been released with the key (2).



[Fig. 1]

- In situations which may threaten the safety of the operating personnel or the mill, the mill can be stopped by pressing the EMERGENCY-OFF-button (1) in the control box.



[Fig. 2]

- Check, before starting the mill, whether any tools/devices have been left lying in the mill. Remove them.
- If the mill has stopped for no apparent reason, do not immediately switch it back on. It may be the case that someone stopped the mill to carry out some manual adjustments and has forgotten to secure it against

being restarted. An unexpected restart could lead to serious injuries to a colleague.

- During operational pauses the mill must be locked [Fig. 1] with the EMERGENCY-OFF-button (1) and key (2). Store key in a safe place.
- When a mill is coupled to other equipment / machines the preceding and subsequent connections must be secured.
- The milled product must not come into contact with mucous membranes or enter eyes, mouth and nose. If this should happen, rinse immediately with tap water, or follow in-house first aid measures.
- Do not change, dismantle, circumvent or bridge any safety devices.
- Immediately replace worn or damaged accelerators.
- **Dry running of the grinding device is forbidden!**

3.4 Safety during maintenance

All maintenance and repair work must be carried out by authorised, qualified personnel. The special risks of working on electrical equipment have to be taken into account. Therefore:

- Only allow experienced, qualified personnel to set up the mill, and only authorised electricians to carry out any electrical work.
- Before working on pumps and pressurised pipes these must first be depressurised, so that the risk of injury, explosion or fire is averted.
- Before starting any maintenance work or attempting to deal with any malfunctions, the mill must be locked [Fig. 1] with the EMERGENCY-OFF-button (1) and key (2). Store key in a safe place.
- Replace immediately any notices, warning signs or safety labels that have become damaged or been removed.
- Refit all safety devices that have been taken off for maintenance work.
- Unauthorised alterations and modifications of the mill impair the safety of its operators and of the mill itself and should not be undertaken.
- Spare parts must conform to the technical requirements of the machine manufacturer.
- Only use original spare parts obtained from the mill manufacturer.
- Before opening, rinse the machine through with an appropriate rinsing medium.
- Ensure that mill has cooled down before opening.

3.5 Suggestions for in-house operating guidelines

Operating guidelines are instructions given out by an employer to ensure safe operating processes. They are mandatory instructions imposed by the employer under his right to give directives. The employees are bound by the accident prevention regulations to observe these instructions.

The employer's general obligation to draw up and publicise such operating directives is based on national accident prevention regulations.

These operating instructions are therefore supplemented by national accident prevention regulations and environmental regulations.

Employees must agree to and/or be instructed concerning the following:

- The operator must agree only to run the machine in impeccable condition.
- The risks involved in the Handling of the materials, and the necessary safety measures and rules of conduct, including instructions for emergencies and First Aid.
- Methods and scope of regular inspections concerning the safe working condition of the machine.
- Permitted operational data (e.g. settings for the safety and monitoring devices).
- Servicing.
- Rectification of malfunctions.
- Environmental regulations.
- Safe Handling of the product.
- The operating company is responsible for ensuring, by way of instructions and supervision, a clean and orderly working environment for the machine.
- The operating company must establish unequivocal rules concerning the responsibilities for operation and servicing of the mill, to be observed by everyone, so that, from a safety point of view, all responsibilities are clearly defined.
- The mill operator is obliged to inform his superior immediately of any changes to the machine that could impair its safety.
- Observe attached notices and warning signs.
- The machine operator has joint responsibility for ensuring that no unauthorised persons interfere with the machine.

4 Specifications

4.1 Mill drive

Motor		
Operating voltage	V, Hz	
Nominal capacity	kW	
Nominal current	A	
Speed	min^{-1}	
Degree of protection		IP
Explosion protection		
Type/Make		
Motor No.		
PTB No.		
Power transmission		
Antistatic V-belt	Type	3 pcs. V-belts profile SPB,16.3 x 13 mm
Length (exchangeable)	mm	
Pulley		
- Agitator shaft	ø mm	
- Drive motor	ø mm	
Speed	min^{-1}	
Agitator-disc circumferential speed	m/s	

4.2 Product pump

Pumpgroup

Motor		
Operating voltage	V, Hz	
Nominal capacity	kW	
Nominal current	A	
Speed	min^{-1}	
Degree of protection		
Explosion protection		
Type/Make		
Motor No.		
PTB No.		
Pump		
Type		
Make		
Serial No.		
Transmission		
Type		
Make		
Serial No.		

4.3 Pressurised rinsing system

Motor

Operating voltage	V, Hz
Nominal capacity	kW
Nominal current	A
Speed	min^{-1}
Degree of protection	
Explosion protection	
Type/Make	
Motor No.	
PTB No.	

Pump

Type	
Make	

4.4 Shaft bearings

Maintenance	Self-lubricating, maintenance free

4.5 Grinding chamber

Net grinding chamber	litres	6.0
Grinding beads filling rate	litres	4.5 - 5.1 (Equivalent to 75-85 %)
Wall thickness of grinding cylinder	mm	6

4.6 Wiring diagram

Wiring diagram	No.

4.7 Control equipment

Control box	Type
Make	
Degree of protection	
Explosion protection	
PTB No.	
Serial No.	

4.8 Instruments and signal elements

4.9 Shaft seal

Type	1	Double mechanical seal
Sliding rings on primary side	2	Tungsten Carbide K 10
Sliding rings on secondary side	1	Carbon
	1	Chromium alloy
O-ring on primary side		Fep-O-Seal
O-ring on secondary side		Viton

4.10 Grinding beads - separating mechanism

Type	Gap-Separator
Rotor/Stator	Tungsten Carbide K 10

4.11 Mill equipment

Agitator discs SS,	2	stainless steel
Agitator discs SSP	4	stainless steel
Spacers	5	stainless steel
Tension locking cap	1	stainless steel
Inner cylinder	1	stainless steel
Front cover	1	stainless steel
Wearing parts	1	stainless steel
O-rings		Viton

4.12 Machine limiting values and supplies

Max. product pressure	bar	4
Max. product temperature	°C	80
Min. temperature of cooling water	°C	-20
Max. pressure cylinder cooling	bar	6
Max. pressure pressurised seal rinse system	bar	5
Max. pressure cooling rinsing liquid vessel	bar	5
Cooling water supply	litre/h	1800-2500
Min. cooling water pressure	bar	2

4.13 Noise information

Emission value to DIN 45635		
Idling	dB(A)	75
Working operation	dB(A)	75-77

4.14 Dimensions

Width (grinding chamber retracted)	mm	1300
Width (grinding container extended)	mm	1788
Height	mm	1420
Depth	mm	1000

4.15 Weight

Weight complete machine	kg

5 Description

Agitator Bead Mill with horizontal grinding chamber for continuous dispersion and fine wet-milling of semi-liquid to highly viscous, pumpable products.

The output depends on the product and the required fineness and lies between 50 - 200 kg/h.

The necessary energy for dispersion and grinding is transmitted to the grinding beads via easily exchangeable agitator discs mounted on an agitator shaft. The material to be milled is constantly fed into the mill by a separate product pump.

A dynamic gap separator retains the grinding beads inside the mill.

The efficiency of the mill is determined by the energy input to the grinding chamber and the optimal exploitation of this energy for the dispersion and grinding process. Because of its optimal geometry, the grinding chamber of the DYNO-MILL Type KD 6 (6) achieves a high degree of efficiency.

Special advantages

- Slimline grinding chamber with optimal length / diameter ratio.
- The special shape of the agitator discs guarantees the most energy-efficient use and prevents compaction of the grinding beads.
- Forced cooling water flow for high cooling efficiency.
- Shape and number of agitator discs can easily be adapted to the product to be processed.
- Wearing parts that come into contact with the product are easily exchangeable and are available, also for retrofitting, in various hard-wearing materials.

5.1 Construction details

Grinding chamber
The easily exchangeable inner cylinder is surrounded by a cooling cylinder; the assembly of both cylinders contains a forced cooling water feed.
The whole grinding chamber can be pulled out completely and swivelled after the screws on the stator flange have been loosened. The extension device consists of a pull-out frame, integral to the machine base, with hardened guidetracks and ball-bearing rollers.

Drive
Motor output, connection data and enclosure as required and ordered.

Speed transmission to the agitator shaft by antistatic V-belts.
Different speeds are achieved by fitting the appropriate motor pulleys.

Control devices
ON/OFF-button with indicator lamps for the control of the motor contactors and ammeters mounted in a control box in the style of a control panel.

Agitator discs
Easily exchangeable, mounted on agitator shaft with spacers.

Stator flange
The grinding beads separator, the shaft seal and the product outflow are mounted in the stator flange. With the machine stationary, the gap-width of the grinding beads separator is infinitely variable.

Front cover
The product feed as well as the product drain valve are mounted on the front cover. The product drain valve is equipped with a screen, to retain the grinding beads, so that it is possible to empty the liquid phase while retaining the grinding beads in the grinding chamber.
One of the inductive proximity switches is mounted in there as well.

Shaft seal
Sealing of the grinding chamber on the bearing side is achieved by a double mechanical seal. The materials for the sliding ring rotor and sliding ring stator on the product side are, depending on demand, either made of Tungsten Carbide or silicon carbide. On the atmospheric side carbon is employed for the sliding ring rotor and chromium molybdenum for the sliding ring stator.
All sliding rings are mounted flexibly in O-rings.
The seal is cooled and pressurized by a closed loop pressure system. Dry running must be strictly avoided.

Pressurised seal rinse system
The pressurised seal rinse system enables pulsation-free, adjustable pressurizing as well as the dissipation of frictional heat.
It consists of the following components:

- Storage vessel
- Gear pump
- Pressure regulator valve
- Manometer

Grinding beads separation
Separation of the grinding beads is achieved via a dynamic gap separator, consisting of a stator on the seal flange and a rotor on the agitator shaft, made of Tungsten carbide.

With the machine stationary, the gap width is infinitely variable between 0.15 and 1 mm.

Note

The gap width should be set to max. 1/3rd of the smallest grinding bead diameter.
The grinding beads diameter should not be smaller than 0.5 mm.

Grinding beads
Spherical grinding beads of various materials with a diameter of 0.5 to 3 mm. The choice of grinding beads depends on the product to be processed. They have to be able to withstand a certain amount of mechanical stress (break-proof), if in doubt contact WAB

6 Requirements at installation point

Foundation:
Horizontal industry floor with a permissible surface pressure of at least 200 kp/cm².

Installation room:
shock and vibration free.

Space requirement for operation and maintenance:
1.5 m clear space around the machine.

6.1 Customer supply

6.1.1 Electricity supply

Fuse according to regulations

6.1.2 Cooling water supply

The user must provide: See chapter 4.12

7 Transport and installation

Transport must be executed by experienced carriers. Transport should, if at all possible, be done by crane, as shown in [Fig. 3].

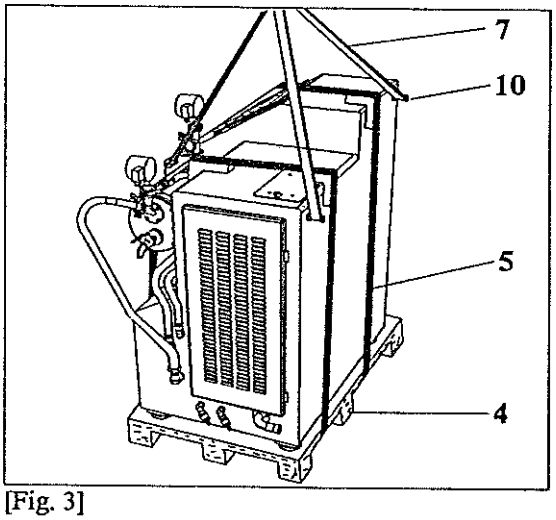
The machine is delivered fastened to a EUR pallet and wrapped in a plastic sheet or bolted to the base of a wooden crate.

- Remove all packaging apart from the pallet or crate base. In the latter case, the bolts should be removed from the base.
- Check delivery for transport damage and completeness.
- In case of transport damage, keep the packaging and immediately inform the carrier and the manufacturer.
- Ensure that all ropes or other lifting gear (7) are suspended freely and do not damage anything (safeguard machine parts by using wooden spacers).

7.2 Transport by crane

WARNING

- **Only lift the mill by the three lifting screws (10). The mill must not be lifted by the grinding cylinder or the agitator shaft!**
- **Secure ropes or other lifting gear against slipping and sliding off.**
- **Ensure that all ropes or other lifting gear (7) are suspended freely and do not damage anything (safeguard machine parts by using wooden spacers).**
- **The machine must hang horizontally from the crane. If necessary, the lighter side of the machine may have to be weighted. Avoid shocks and bumps.**
- **Transport the machine to its point of installation.**



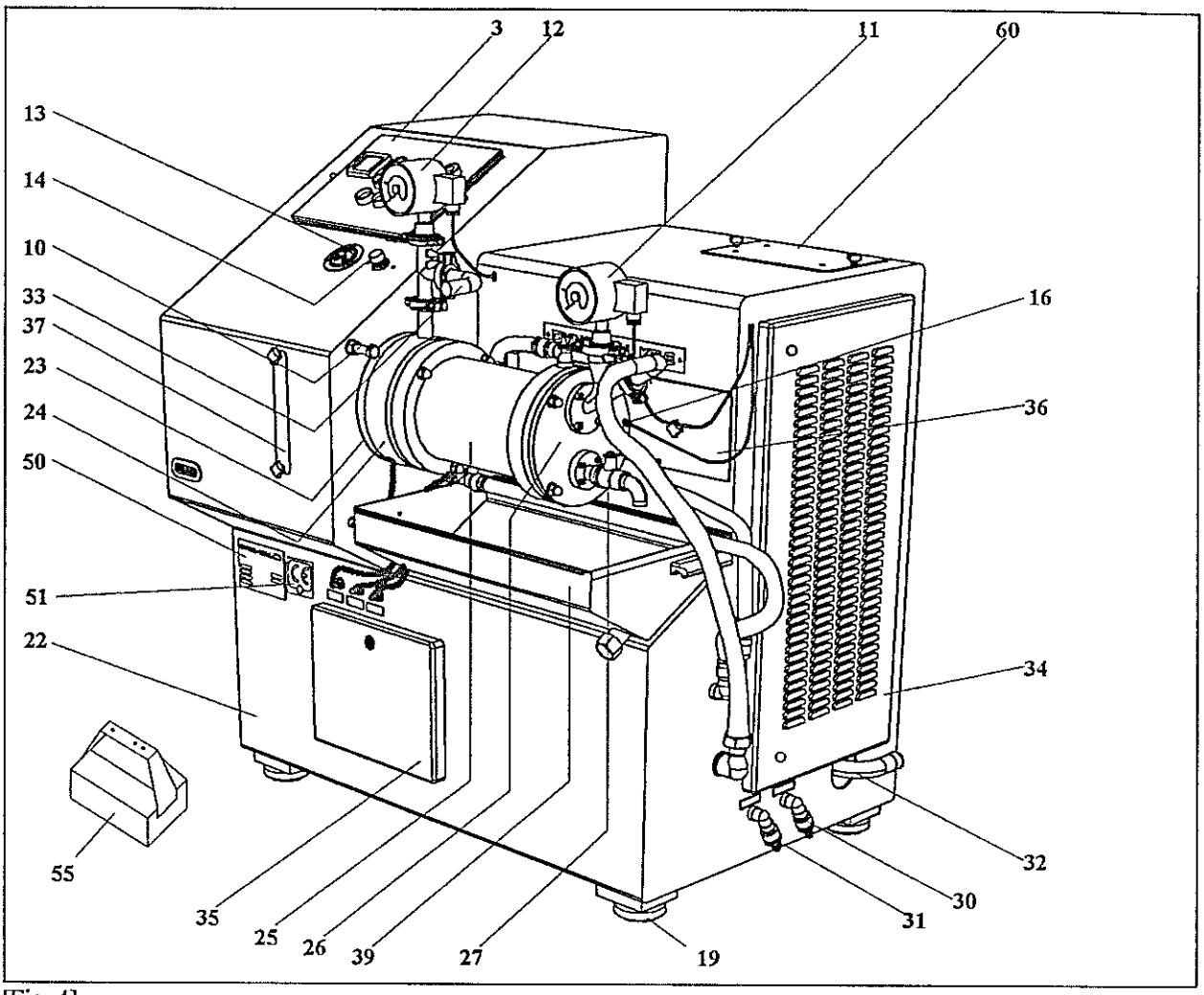
[Fig. 3]

7.1 Transport by fork lift truck

Only transport the mill with a suitable fork lift truck if no crane is available. Transport by fork lift truck is dangerous. There is a risk of tilting, as the mill's centre of gravity lies away from its centre. When unloading from a lorry, both the lorry and the fork lift truck must be standing on a level, smooth and firm industrial floor.

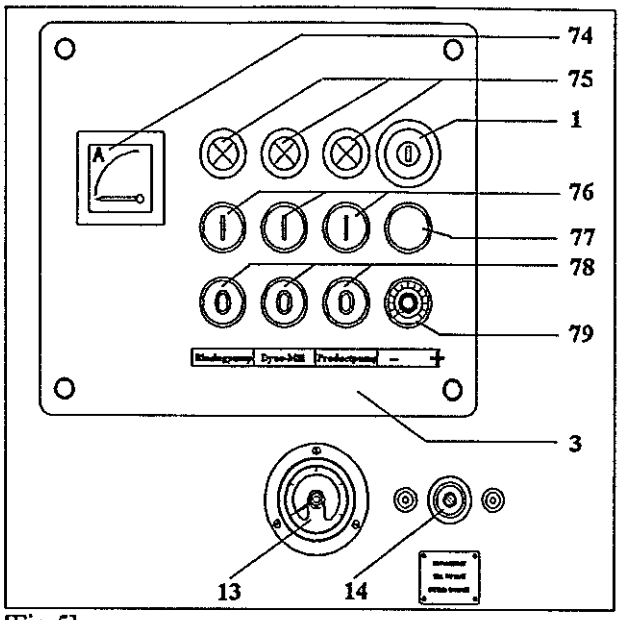
- Only lift a few centimetres from the floor and transport carefully to the point of installation.

8 Components, controls and indicators

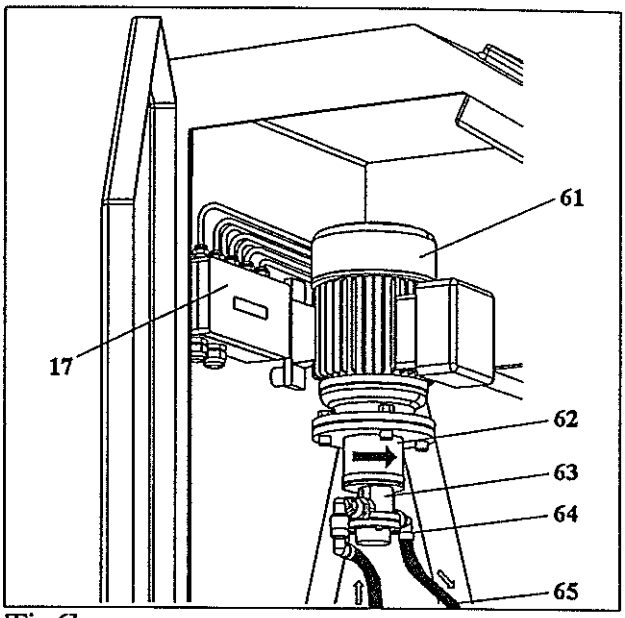


[Fig. 4]

3	Control panel	30	Coolant feed
10	Lifting bolts	31	Coolant return
11	Ind. pressure gauge, product inlet	32	Product feed
12	Ind. thermometer, product outlet	33	Product return
13	Ind. pressure gauge, pressurised seal rinse	34	Product pump access
14	Pressure control valve, pressurised seal rinse	35	Cover / motor adjustment door
16	Inductive switch	36	Cover / extension device
19	Machine foot	37	Cover / gap separator
22	Machine base	39	Bead collecting tray
23	Bearing housing	50	Type plate
24	Stator flange	51	CE - Sign
25	Grinding cylinder	55	Toolbox
26	Front cover	60	Cover / seal rinsing vessel
27	Outflow valve		



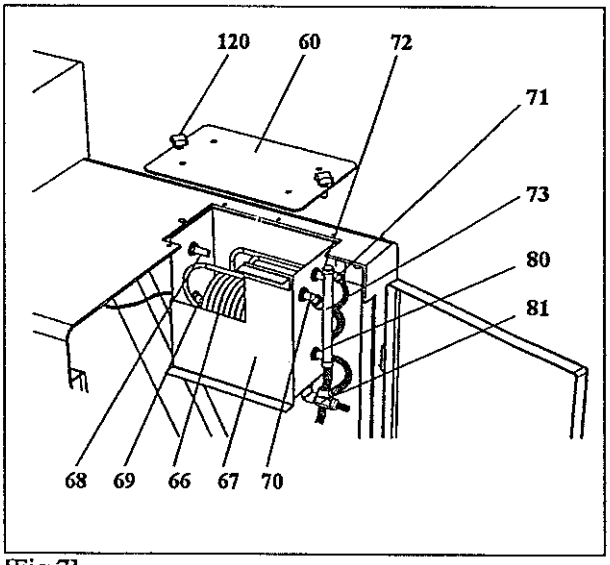
[Fig.5]



[Fig.6]

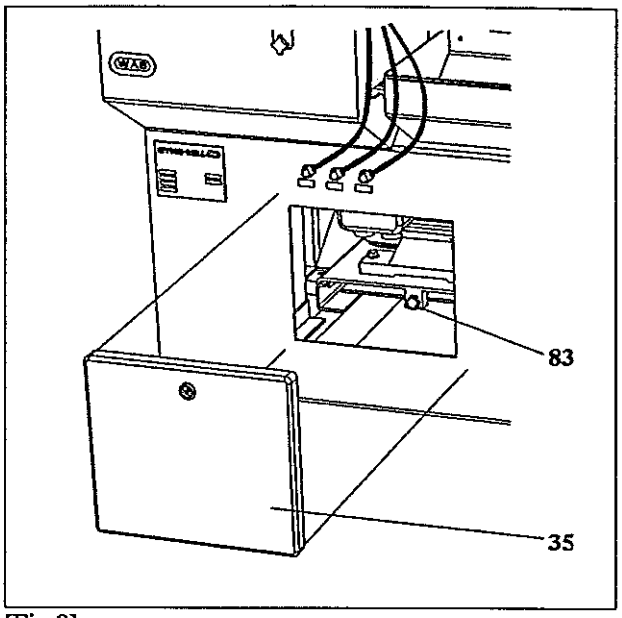
1	EMERGENCY-OFF-button with key-lock-switch
3	Control box
13	Ind. pressure gauge, pressurised seal rinse
14	Pressure control valve, pressurised seal rinse
74	Ammeter for main drive motor
75	Indicator lamps
76	ON-buttons
77	Blank disks
78	OFF-buttons
79	Potentiometer - (Option)

17	Connection box
61	Drive motor for rinsing pump
62	Gear box housing
63	Rinsing pump
64	Threaded coupling
65	Spiral hose (PTFE)



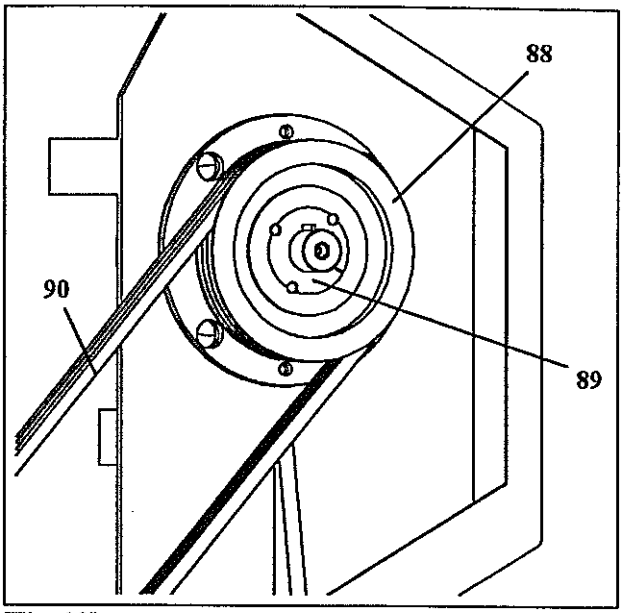
[Fig.7]

60	Cover-rinsing vessel
66	Cooling spiral
67	Rinsing medium reservoir
68	Cap. initiator (max. filling level)
69	Cap. initiator (min. filling level)
70	Rinsing liquid feed
71	Rinsing liquid return
72	Return pressurised seal rinse liquid
73	Flow control instrument
80	Rinsing liquid flow
81	Drain tap
120	Quick release knob



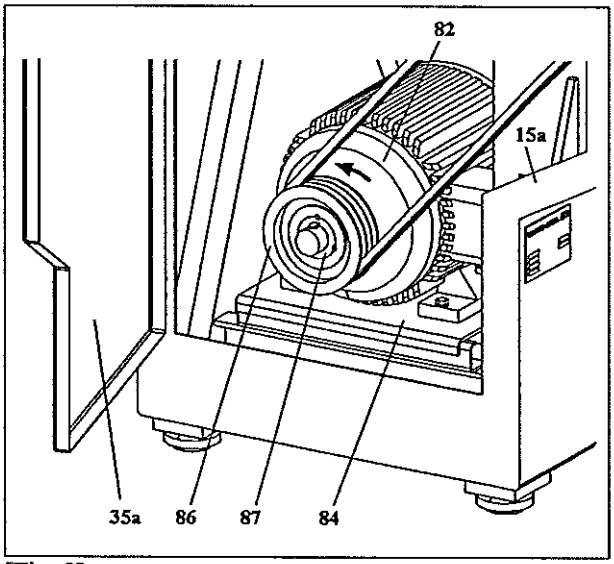
[Fig.8]

35 Motor adjustment door
83 Adjusting spindle



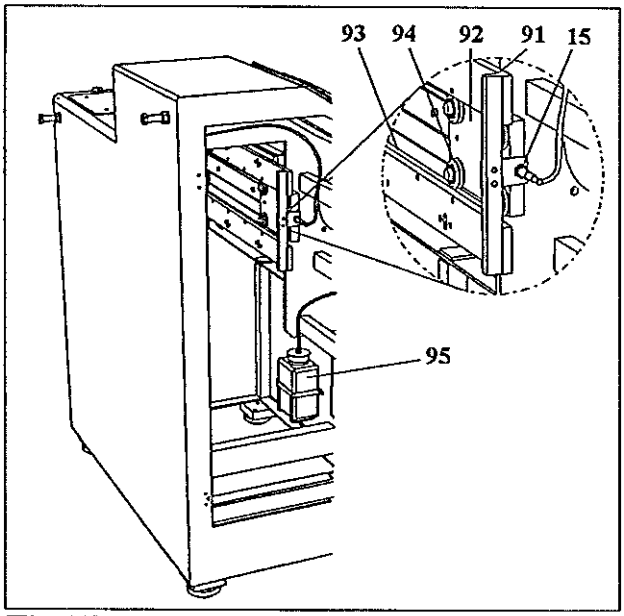
[Fig. 10]

88 Agitator shaft pulley
89 Taper lock bush
90 Antistatic V-belts



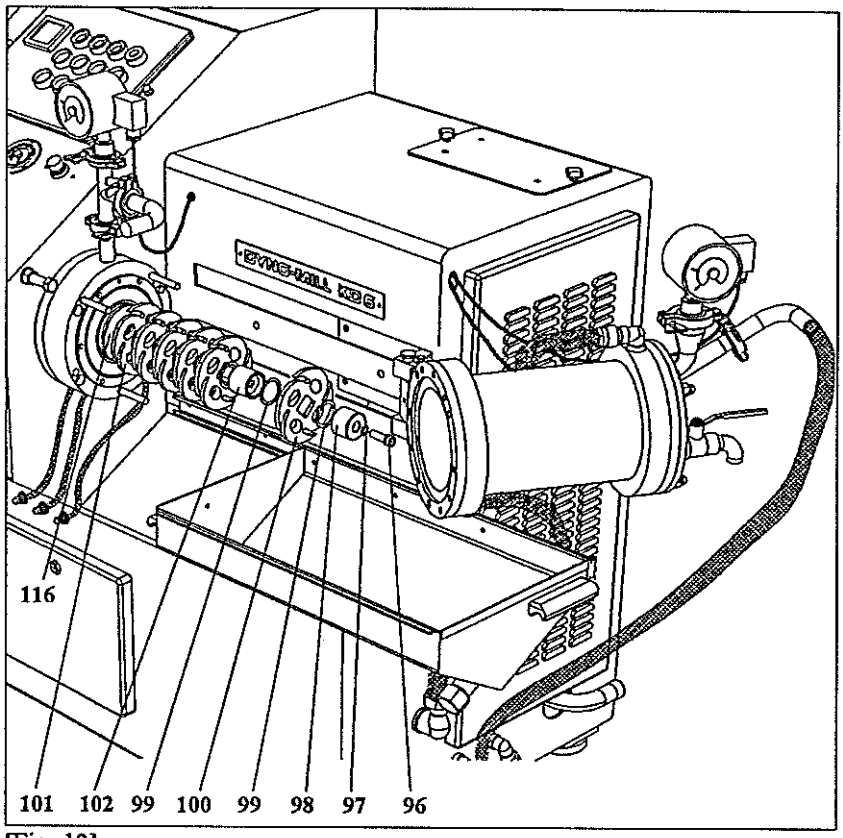
[Fig. 9]

15a Inductive switch
35a Door / main drive
82 Main motor
84 Motor platform
86 V-belt pulley for motor
87 Taper lock bush



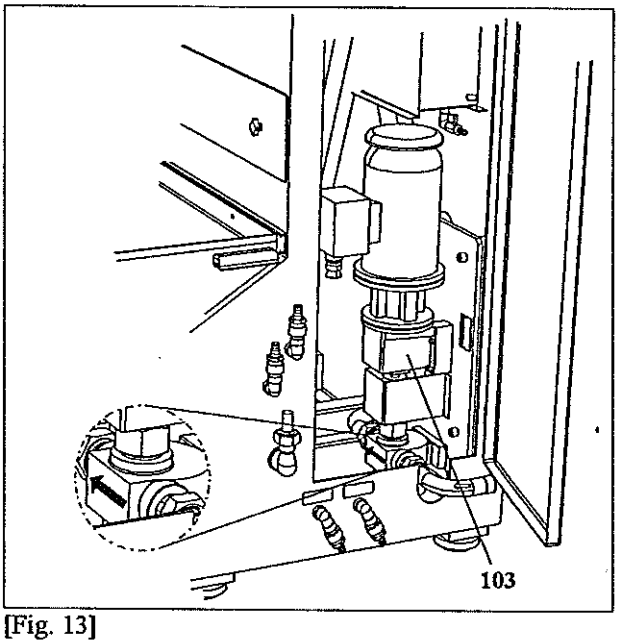
[Fig. 11]

15 Inductive switch
91 Extension frame
92 Guide track
93 Extension profile
94 Guide roller
95 Seal leakage vessel



[Fig. 12]

96	Tension screw
97	Lock washer
98	Tension cap
99	O-ring
100	Agitator disc
101	Agitator disc
102	Spacer
116	Cover ring



[Fig. 13]

103 Product pump

9 Steps before initial start-up

WARNING

Before the initial start-up the customer must carry out the following measures:

- Installation and alignment of the machine (Chapter 9.1)
- Connection to the electricity supply (Chapter 9.2)
- Installation of the cooling water connection (Chapter 9.3)
- Installation of the product feed and outflow (Chapter 9.4)
- Removal of corrosion proofing (Chapter 9.5)
- Setting of the gap separator (Chapter 9.6)
- Start-up of the pressurised seal rinse system (Chapter 9.7)
- Filling with grinding beads (Chapter 9.8)

9.1 Installation and alignment of the machine

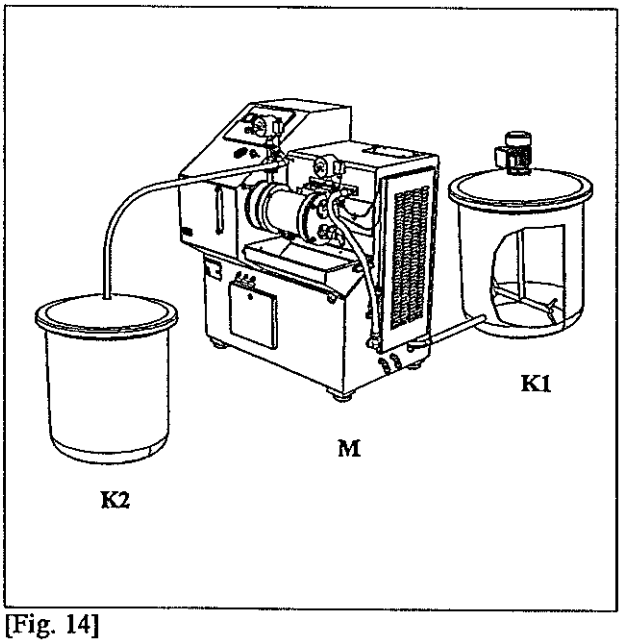
Layout suggestion [Fig. 12]

K1 Feed material container with bottom outflow

M Agitator Bead Mill DYNO-MILL Type KD 6

K2 Container for the milled product

It is sufficient if the foundation is a load-bearing and level industrial floor. It is not necessary to bolt the machine to the floor.

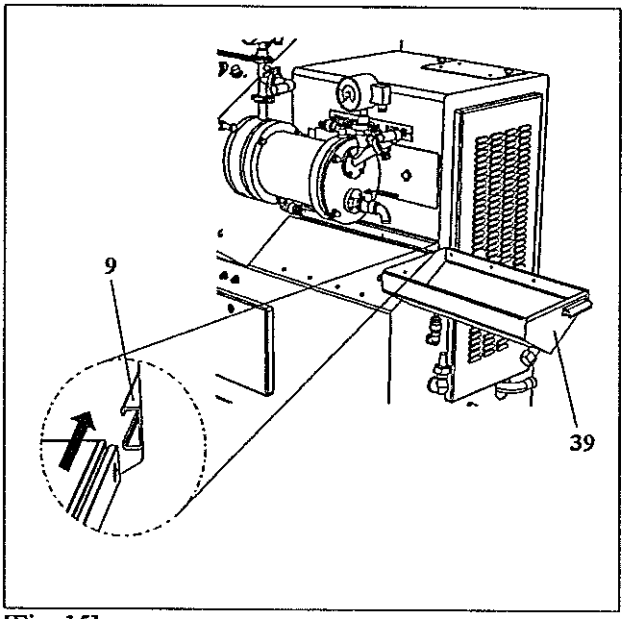


[Fig. 14]

If the machine was supplied on a EUR pallet, cut the strap retainers after the machine has reached its installation point.

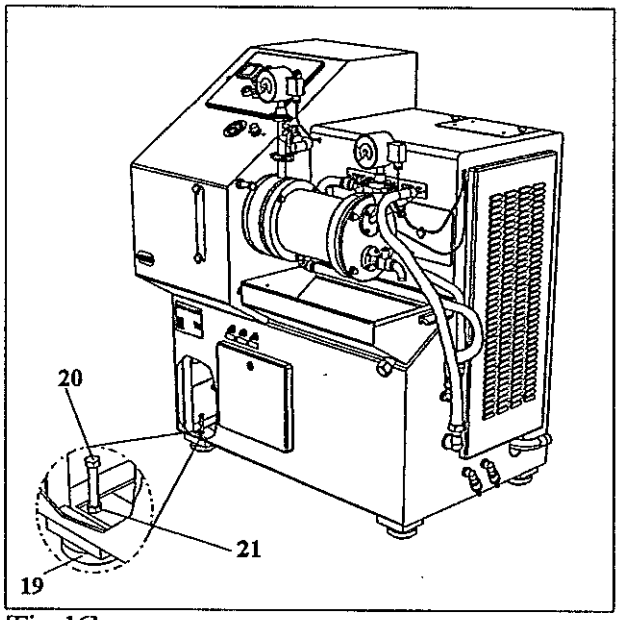
The strap retainers are under high tensile stress. Expect the strap ends to whip up and move suddenly.

- At its installation point, lift the machine just a few centimetres and pull away the EUR pallet (4).[Fig. 4]
- If the machine was delivered in a crate, unscrew it from the base of the crate.
- Lift machine a little, pull base of crate out from under the machine.
- Carefully lower down the machine.
- Take out the Bead collecting tray (Pos. 39) of the machine base (Pos. 22), remove the plastic wrap, and fix the Tub in the Guide track (Pos. 9).

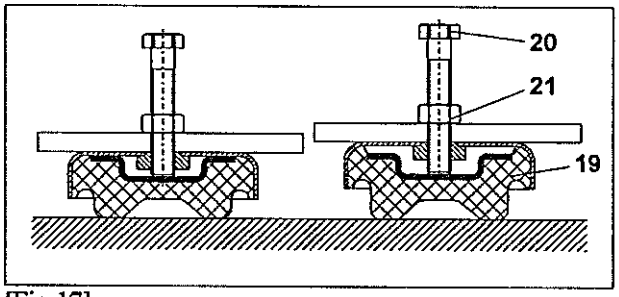


[Fig. 15]

- Align the machine with the help of a spirit level (scale 0.02 mm/m) in the lengthwise and crosswise direction. If necessary, the adjusting screw (20) can be used to change the height of the machine foot (19) by max. 4 mm.
- Lock the adjusting screw (20) into place with the hexagon nut (21).



[Fig. 16]



[Fig 17]

9.2 Connection to the electricity supply

WARNING

The initial switching-on of the machine must be carried out by qualified personnel.

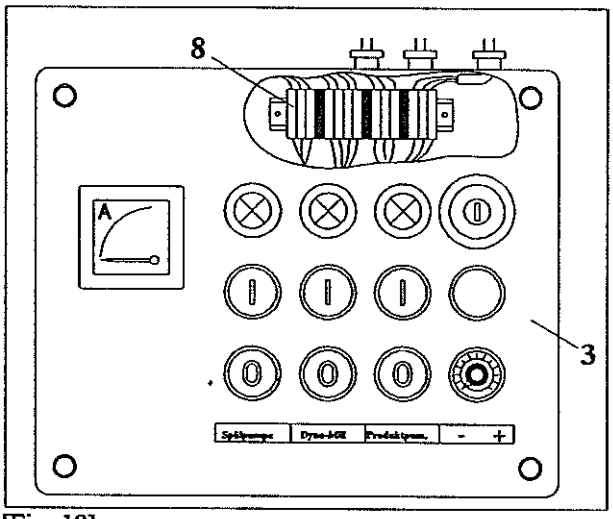
- Before and during the whole installation work the machine must be secured against unauthorised switching-on. Press the EMERGENCY-OFF-button (1).
- Store key in a safe place.

Connection must be carried out by an approved electrician according to the wiring diagram and the pertaining regulations.

The control switches for the contactor control of the electrical motors are mounted in a control box (3) on the mill.

The wiring of the control switches and relays has already been carried out by the manufacturer, according to the wiring diagram, on a terminal strip (8) within the control panel.

The wiring from the terminal strip in the control box to the control cabinet constitutes part of the on-site installation work.



[Fig. 18]

The following controls and indicators are mounted on the control box:

- EMERGENCY-OFF-button
- ON-OFF-button for rinsing pump motor
- ON-OFF-button for mill motor
- ON-OFF-button for product pump motor
- Ammeter
- Indicator lights
- Potentiometer (Option!)

Safety devices

The following safety devices are already installed in the Agitator Bead Mill:

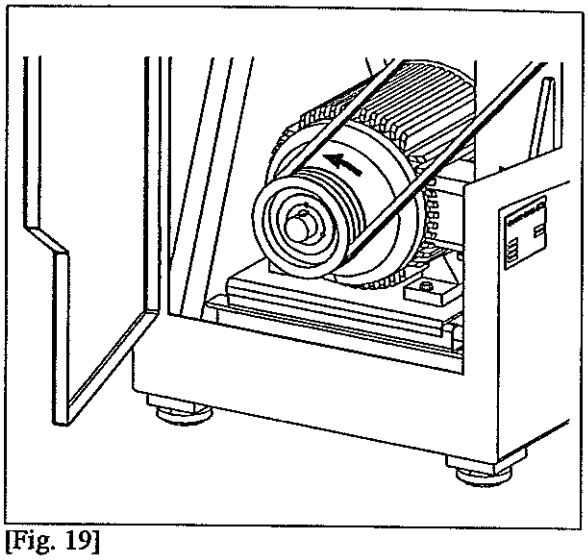
- Pressure gauge with inductive max.-min contacts (11) at the product inlet [Fig. 4]
- Thermometer with inductive max.-min contacts (12) at the product outlet [Fig. 4]
- Capacitive initiators (68,69) to monitor the level of the pressurised seal rinse liquid in the rinsing vessel (67) [Fig. 7].
- Pressure gauge with inductive max.-min contacts (13) to monitor the seal pressurisation by the pressurised seal rinse system [Fig. 5].
- Inductive proximity switch (16) to disable the start while front cover (26) is not fixed [Fig. 4]
- Inductive proximity switch (15) to disable or interrupt the start while grinding chamber (25) is pulled out [Fig. 11]
- Inductive proximity switch (15a) to disable or interrupt the start while door / maindrive (35a) is not closed [Fig. 9]

Note

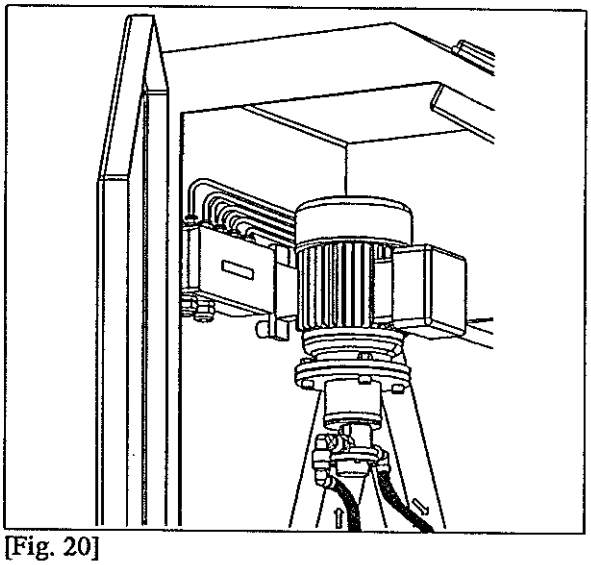
- The wiring of all safety devices has already been carried out by the manufacturer, according to the wiring diagram, on a terminal strip in the connector socket (17)].
- The monitoring and interrogative devices will process the signals via relays with an intrinsically safe circuit EEx i.
- The wiring from the terminal strip in the connector socket to the control cabinet constitutes part of the on-site installation work.
- Ensure that the local operating voltage, frequency and fuse protection corresponds to the data on the data plate and the specifications (Chapter 4). In case of discrepancies the machine must not be connected.
- Feed the power supply through the cable entry provided into the control cabinet and, according to the wiring diagram (in the electrical control cabinet), connect it to the terminals L1, L2, L3, zero = neutral, and to earth. After this, install all connecting cables between control cabinet and mill, according to the wiring diagram. When doing this the local standards must be observed.

WARNING

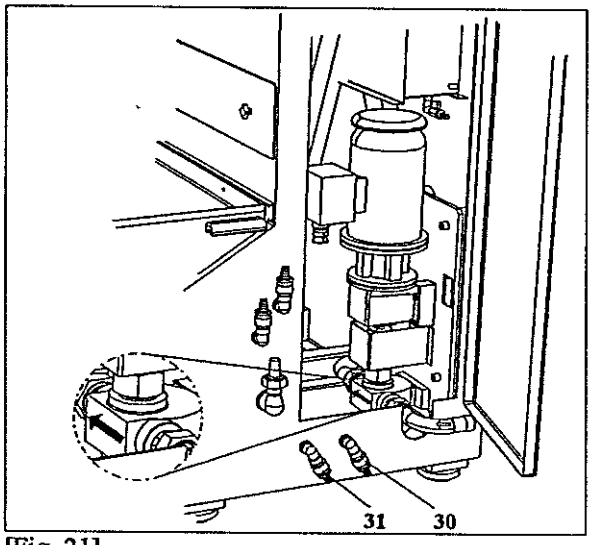
The mechanical seal must never run dry; therefore detach the V-belt (90) before checking the rotation. Ensure correctly phased connection and thereby correct rotation and feed direction.



[Fig. 19]



[Fig. 20]



[Fig. 21]

9.3 Installation of the cooling water connections

The grinding chamber and the rinsing of the mechanical seal is cooled.
The cooling water supply and return is effected via quick release hose couplings ø ¾ inch.
for the cooling water feed (30) [Fig. 21].
and the cooling water return (31) [Fig. 21].
The cooling water supply has already been carried out by the manufacturer.

9.4 Installation of the product connection

Product feed from a container to the product pump to the mill can either be effected via a rigid pipe or a flexible hose.
The connecting diameter of the product entry (32) has a 1 inch external thread. [Fig. 4]

The product outflow from the mill to a container for the milled product can either be effected via a rigid pipe or a flexible hose.
The connecting diameter of the product outlet (33) has a ¾ inch external thread. [Fig. 4]

9.5 Removal of corrosion proofing

All polished working parts not made of corrosion-free steel were coated with an anticorrosive agent in the factory. This protection will last ca. 3 months. If the machine is put into intermediate storage, the corrosion proofing will have to be renewed in time.

Remove the corrosion proofing with petroleum only outside hazardous areas. Allow the machine to dry thoroughly. Ventilate the room well.

Do not use the following for the removal:
- Pollutant or dangerous substances
- Scrapers, wire brushes or compressed air

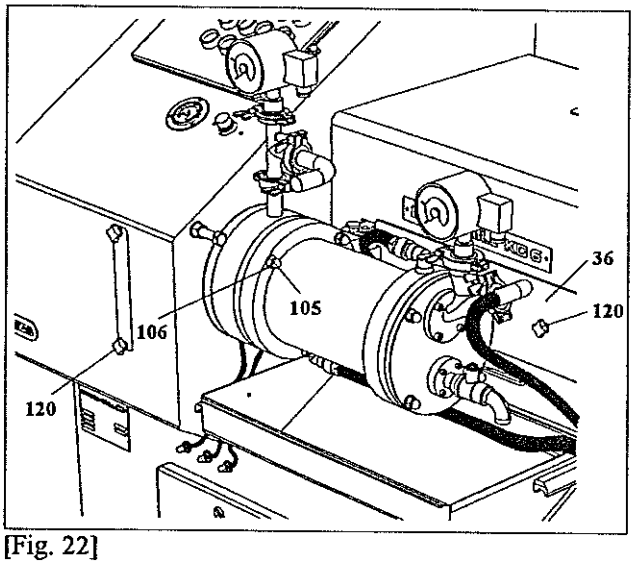
Should, in spite of the protective measures, some rust formation occur, remove it immediately in an expert way. Grease all polished machine parts and mechanisms with a high-quality and acid-free machine oil.

9.6 Setting of the gap separator

WARNING

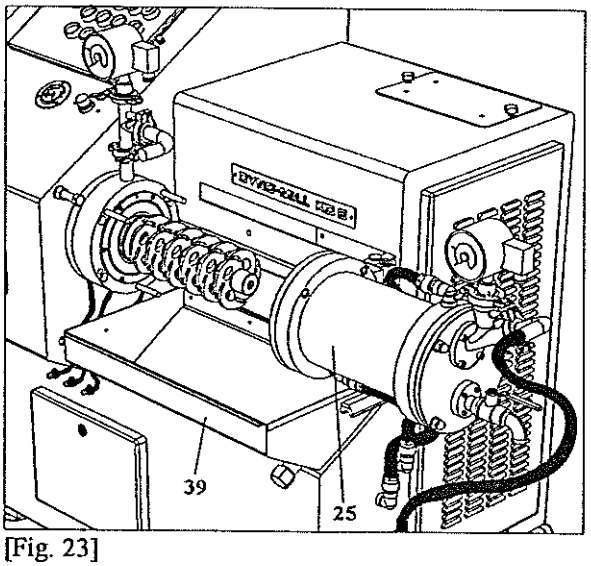
The separator consists of precision-made parts and must be treated with care in order to avoid damage. Only adjust the gap when the machine is stationary.

- Open the Quick release knob (120) and remove the Extension cover (36).
- Unscrew the three cap nuts (105) and washers (106).



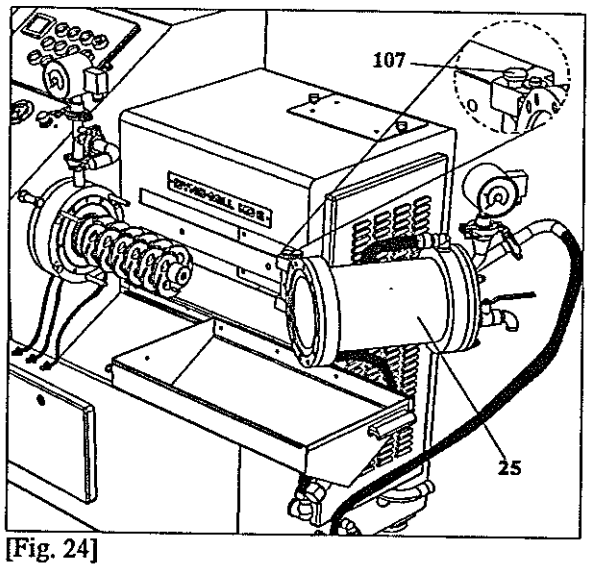
[Fig. 22]

- Pull out the grinding chamber (25) as far as it will go.



[Fig. 23]

- With the locking button (107) pulled up, carefully let the grinding chamber (25) swing to the right.
- Engage the locking button (107) again.

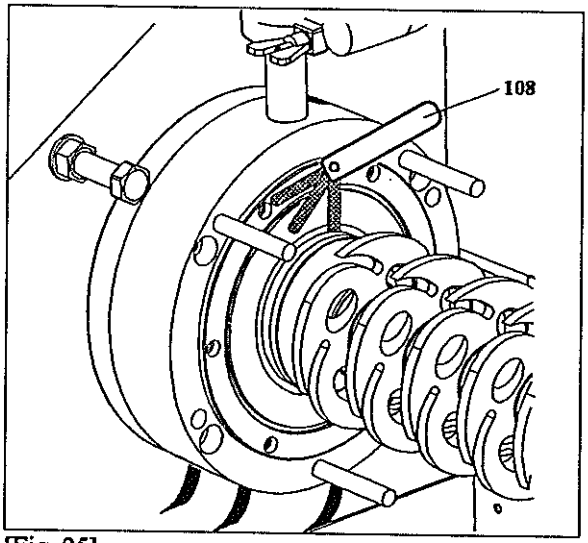


[Fig. 24]

- Use a feeler gauge (108) to check the gap width (161).

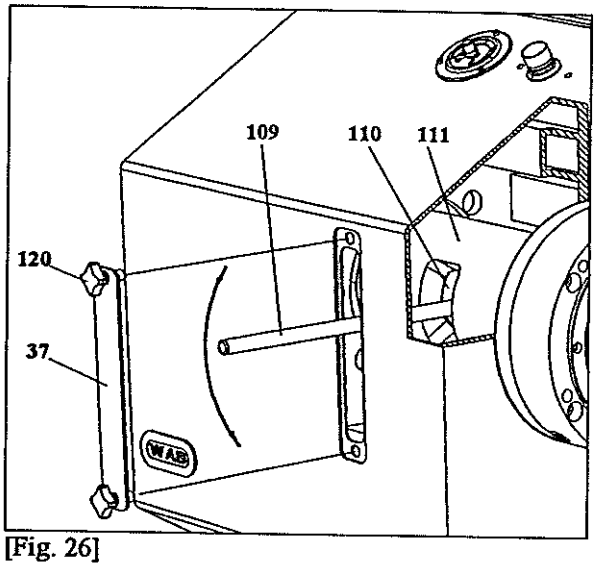
WARNING

Correct gap width = max. 1/3 of the smallest grinding bead diameter.



[Fig. 25]

- If necessary, adjust gap width on the adjusting ring (110) with the adjusting bar (109).
- Turn the Quick release knob (120) and take off the access cover (37). Insert adjusting bar through Support (111) into the adjusting ring (110).
- Turning downwards widens the gap-width.
- Turning upwards narrows the gap-width.
- Afterwards check gap with feeler gauge (108).



[Fig. 26]

Re-assemble grinding chamber (25) and access cover (37) in reverse order.

Refit the Extension cover (36).

Clean all contact and feed areas of grinding beads when reassembling. Grinding bead splinters can lead to skin or eye injury, damage components and cause leaking by damaging seals.

WARNING

Guide rolls and running tracks must be totally clean in all contact areas.

9.7 Setting of the rinsing system (SDA)

9.7.1 Filling with rinsing liquid

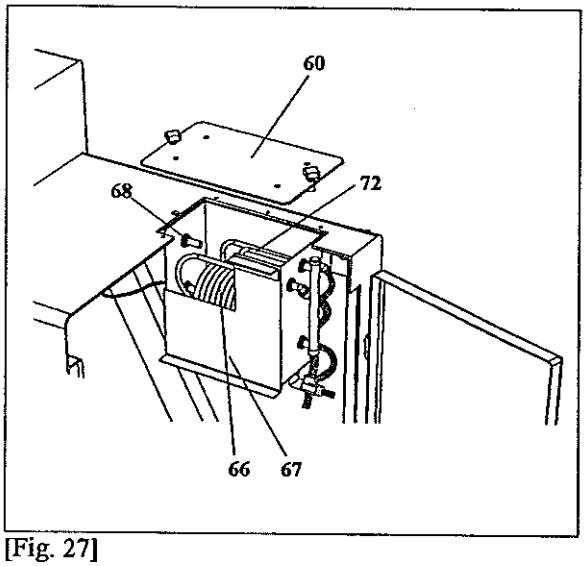
- Remove rinsing vessel cover (60).
- Fill up the container (67) with appropriate rinsing liquid till the cooling spiral (66) is covered. (If the rinsing liquid level in the container is too high, the filling level control (68) might avoid a start of the machine)!

WARNING

The rinsing fluid must be compatible with the mechanical seal and O-rings. If, through the use of a wrong rinsing fluid, the O-rings should swell up, the seal may be destroyed.

Note

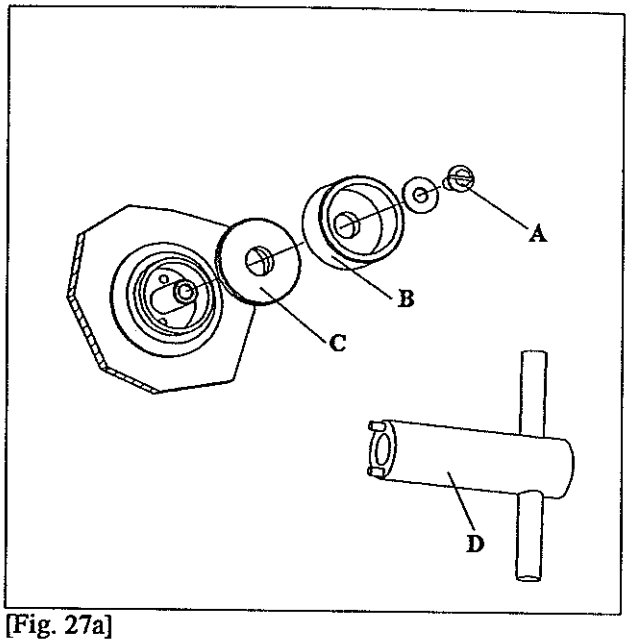
When set correctly, the seal rinse pressure will be ca. 1 bar above the product pressure in the grinding chamber.



[Fig. 27]

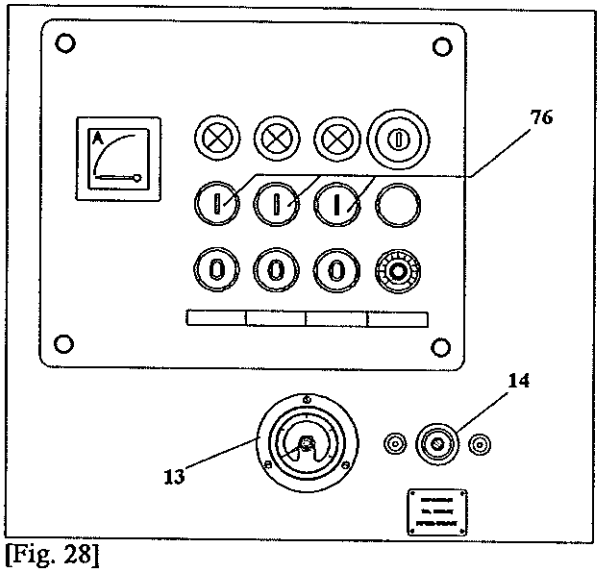
- Replace rinsing vessel cover (60).
- Switch on the pressurised rinsing pump with the appropriate ON-button (76) and check the circulation of the rinsing liquid. [Penetrate of the rinsing liquid out of the flow back (72)]

9.7.2 Setting procedure



[Fig. 27a]

- Adjustment is carried out with the pressurised seal rinse pump running!
- Remove the slotted screw (A) of the control nut (B).
- Counterclockwise screw out the control nut (B) and the cover disc (C).
- By using a special key (D), relieve the pressure control valve (14) by turning it counterclockwise.



[Fig. 28]

- Set the sealing pressure by using a special key (D) at the pressure valve (14) to 1.0 bar above the product pressure predicted in normal working conditions. Check the adjusted sealing pressure with the help of the pressure gauge (13)
- With the pressurised rinsing system running, set the MAX/MIN limits on the pressure gauge (13) to ca. 0.5 bar above and below the set sealing pressure by using the adjustment facility provided.

- Fine-set the pressure control valve (14). Check the set value after a certain time and correct it, if necessary.
- Duly refit the cover disc (C) into the pressure control valve (14).
- Refit the control nut (B) clockwise into the pressure control valve (14) and lightly tension the control nut (B) against the cover disc (C).

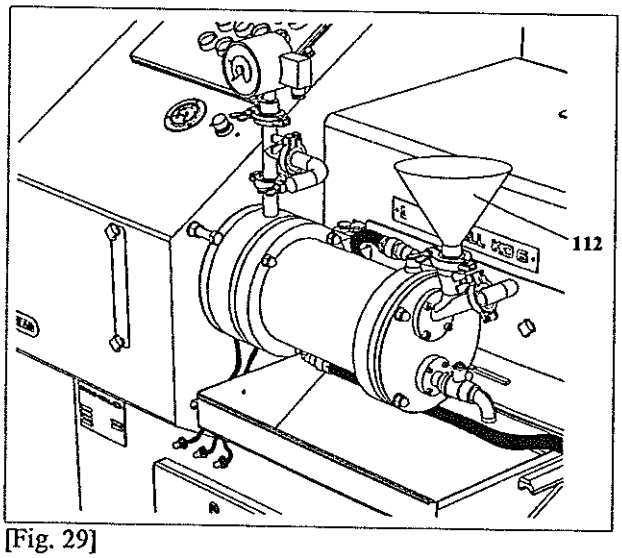
WARNING
(If the control nut (B) is tensioned too tight against the cover disc (C), the correct set of the sealing pressure get maladjusted)!

- Duly refit the slotted screw (A) clockwise into the control nut (B).

9.8 Filling the grinding beads

WARNING
Only carry out this work with the grinding chamber (25) depressurised and the connecting tube shut off.

- Loosen Tri Clamp Connection and take the pressure gauge (11) away.
- Insert funnel (112) into the product inlet pipe.



[Fig. 29]

- Press rinsing pump ON (76) button.
- Fill in grinding beads - filling level 80-85% of the grinding chamber volume. With the seal rinse system running, press the main motor ON-button (76) pulse by pulse, so that the agitator shaft distributes the grinding beads in the grinding chamber (25).

WARNING
Do not allow the mill to run dry for prolonged periods, i.e. when only filled with grinding beads, as this causes high wear of mill and grinding beads.

- Remove funnel (112) and refit the pressure gauge (11) by closing the Tri Clamp.

9.9 Initial start-up

The initial start-up must be performed by qualified personnel or by a trained authorised representative of WAB.

An improper initial start-up can cause injury and damage.

At this time comprehensive guidance and instruction will be given to the customer's personnel.

9.10 Prohibited modes of operation

Safety devices, such as protective doors, must not be bypassed and monitoring instruments, such as contact pressure gauge or contact thermometer, must not be manipulated or bypassed.
Interrogative signals must not be bypassed.
The setpoints of the monitoring instruments must not be set above the permitted operating value.
Only open the protective doors and panellings when the machine is stationary.

10 Start-up

Only qualified personnel who are familiar with the operating instructions and have been given the necessary guidance by a technician of the manufacturer are permitted to operate the mill. They must have sufficient experience in process engineering and be informed about accident prevention regulations in explosion protected areas.

Check before each start-up that:

- The rinsing medium container (67) has been filled
- All connections are free from leakages.

10.1 Starting the milling process

- Switch on the seal rinse pump (63).
- Turn on the cooling water to the cooling spiral and grinding cylinder cooling.
- Press product pump ON-button and set a low throughput volume.
- As soon as pressure increases in the grinding chamber (25), switch on the main motor for the agitator shaft.
- Check the milled product quality and, if necessary, decrease or increase the product feed rate with the product pump.

WARNING

The pressure can be reduced by slowing down the flow rate, increasing the agitator shaft speed or reducing the viscosity of the material to be milled.

Note

The rate of flow/pump pressure of the product to be milled depends on the required final fineness.
In many cases it will be more economical to grind the product in two fast passes rather than one extremely slow one.

The pressure reading of the pressure gauge in the product inlet should not exceed a value of ca. 1 bar. A higher pressure indicates that the milling conditions are not optimal.

The pressure can be reduced by slowing down the flow rate or reducing the viscosity of the product to be milled.

The speed of the agitator shaft influences the fineness and the milling temperature. The higher the speed, the greater the fineness achieved. High speeds increase the milling temperature and the wear of mill components and grinding beads.

The grinding beads, the flow rate, the agitator shaft speed and the product characteristics are all interrelated. Optimal milling conditions must be determined by varying these parameters during operation.

10.2 Break in production

The mill may be left filled with material to be milled for short periods, e.g. over night.
If there is, however, any danger that the material to be milled might sediment in the pump or feeding tubes, the system will have to be given a short rinse. The same is true for products that tend to thicken considerably when cooling down.

10.3 Starting the mill after using the EMERGENCY-OFF-button

If the mill has switched off for no apparent reason, do not immediately switch it back on. It may be that someone has stopped the mill to carry out some manual adjustments and has forgotten to secure it against being restarted.
An unexpected restart could lead to serious injuries to a colleague.

- Remedy cause of disruption.
- Check that no one else is working on the mill.
- Release EMERGENCY-OFF-button (1) by turning it to the direction of the arrow.

10.4 Change of product, cleaning

- when dealing with compatible products:
Rinse the system at the end of the batch, while the agitator shaft is still running, with part of the liquid phase of the feed (ca. 20-30l) that has been kept back for this purpose.
Should this not clean the machine sufficiently, pump, with the agitator shaft running, a high throughput of rinsing liquid in circulation through the system until the connecting tubes are also clean.
Pump the new product into the mill with a low pump setting and the agitator shaft stationary, until the pressure rises in the product inlet or until the new product emerges from the mill exit. Switch on the mill and set the required throughput.

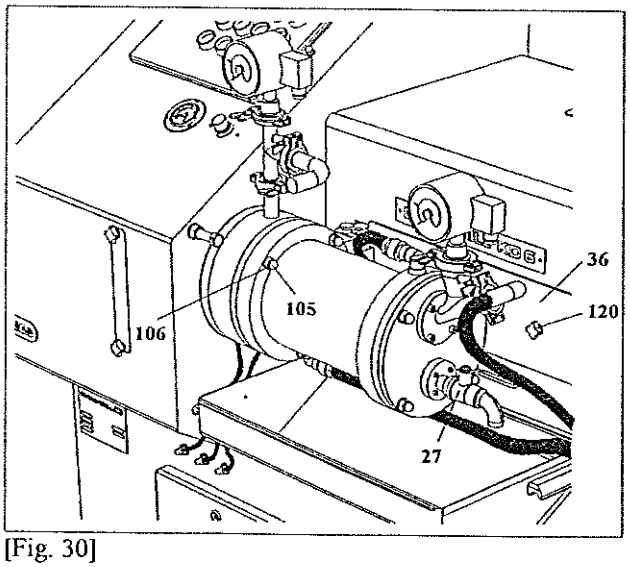
- when dealing with incompatible products:
Rinse the system at the end of the batch, while the agitator shaft is still running, with part of the liquid phase of the feed (ca. 20-30l) that has been kept back for this purpose.
Pump, with the agitator shaft running, a high throughput of rinsing liquid that is compatible with the new product in circulation through the system until the connecting tubes are also clean.
Pump the new product into the mill with a low pump setting and the agitator shaft stationary, until the pressure rises in the product inlet or until the new product emerges from the mill exit. Switch on the mill and set the required throughput.

10.5 Emptying of the grinding chamber

WARNING
Rinsing liquids must be chosen in accordance with the chemical durability of the seals!

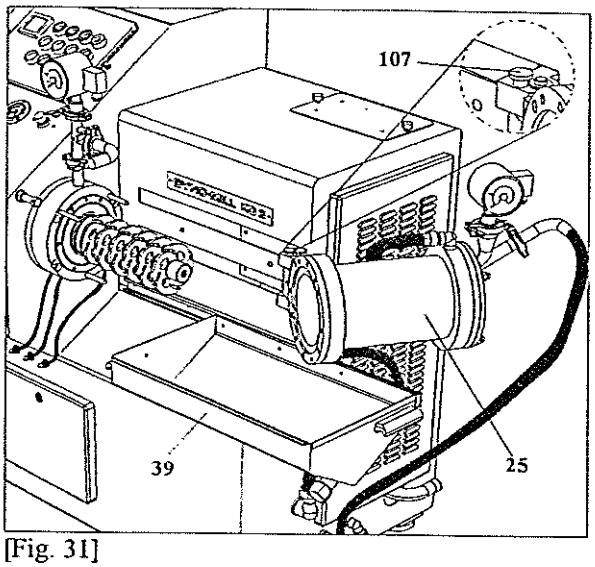
- With the agitator shaft running, rinse mill with a suitable liquid.
- Switch off the mill. Before undertaking any mill maintenance work, the EMERGENCY-OFF-button (1) must be pressed. Store key in a safe place.
- Switch off main supply.

WARNING
Grinding chamber must not be under pressure.



[Fig. 30]

- Loosen Quick release knob (120) and take away the Extension cover (36).
- Loosen three cap nuts (105) and remove washers (106) from the grinding chamber fixing.
- Carefully pull out the grinding chamber (25) as far as it will go.
- Clean the agitator and let it drain off.
- Pull the Tub 1/3 of it's length forwards.
- With the locking button (107) pulled up, carefully let the grinding chamber (25) swing to the right.
- Engage the locking button (107) again.



[Fig. 31]

- Rinse out the rest of the grinding beads from the grinding chamber (25) into the bead collecting tray (39).

10.6 Shutting down the mill

Should the mill be closed down for a longer period, e.g. for factory vacations, the following measures have to be carried out first:

- Empty the grinding chamber (Chapter 10.5) and dry any working parts that come into contact with the product.
- Retract the grinding chamber and bolt it down.

11 Notes

Only original WAB parts must be used. WAB does not accept any liability for damages resulting from the use of non-WAB-spare parts, wearing parts or accessories.

11.1 Pressurised seal rinse system

WARNING

The seal rinse fluid must be compatible with the mechanical seal faces and O-rings.
If, through the use of a wrong seal rinse fluid, the O-rings should swell up, the seal will be destroyed.

Note

When set correctly, the seal rinse pressure will be ca. 1 bar above the product pressure in the grinding chamber.

11.2 Grinding beads

Depending on the product to be processed and on the dispersing and grinding results to be achieved, grinding beads of various sizes and materials are used in the mill, e.g. glass beads, steel beads or zirconia based beads.
Grinding beads with a diameter of min. 0.5 mm to max. 3 mm can be used.

The size distribution of the beads should be as narrow as possible, i.e. don't use a grinding beads mix, as this would lead to disproportional wear of the smaller grinding beads. The grinding beads should be evenly shaped, ideally round.

Only high quality grinding beads without air bubbles and satellites should be used, so that they will not be crushed by the high mechanical stresses in the mill.

The separator gap should be 1/3 of the smallest grinding beads diameter.

The grinding beads have to be checked regularly for wear and must be sieved and replaced. The grinding beads filling level should be 75 - 85% of the mill volume (Chapter 4), but can, depending on the material to be milled and requirements, be reduced to min. 60%.

A high wear of the grinding beads will be caused by:

- Low viscosity of the material to be milled
- High proportion of abrasive solids in the material to be milled
- High agitator shaft speed
- A too fast product flow rate
- Protracted flushing with pure solvent or water
- Dry-running, i.e. mill running only filled with grinding beads and no product

The above reasons are also responsible for a disproportionately high wear of the mill components.

11.3 Grinding beads-separator

WARNING

The retention of the grinding beads is effected by a gap-separator.
The separator consists of precision built parts and must be treated with care in order to avoid damage.
The gap-width must not be adjusted while the machine is running.

Correct gap-width = max. 1/3 of the smallest grinding beads diameter.

Clean all contact and feed areas of grinding beads when reassembling. Grinding bead splinters can lead to skin or eye injury, damage components and cause leaking by damaging seals.

WARNING

Guide rolls and running tracks must be totally clean in all contact areas.

11.4 Loading the grinding beads

Only refill with grinding beads with the grinding chamber (25) depressurised. The mill should be rinsed through before it is being refilled.

WARNING

Do not run the mill dry for prolonged periods, i.e. only filled with grinding beads, as this leads to high wear of the mill and grinding beads.

11.5 Operating conditions

The rate of flow/pump pressure of the product to be milled depends on the required final fineness.
In many cases it will be more economical to grind the product in two fast passes rather than one extremely slow one.

The pressure reading of the pressure gauge (11) in the product inlet should not exceed a value of ca. 1 bar. A higher pressure indicates that the milling conditions are not optimal.

The pressure can be reduced by slowing down the flow rate, increasing the agitator shaft speed or reducing the viscosity of the material to be milled.

11.6 Agitator shaft speed

The speed of the agitator shaft influences the fineness and the milling temperature. The higher the speed, the greater the fineness achieved. High speeds increase the milling temperature and the wear of mill components and grinding beads.

The grinding beads, the flow rate, the agitator shaft speed and the product characteristics are all interrelated. Optimal milling conditions must be determined by varying these parameters during operation.

Wichtiger Hinweis
Important remark

Original-Teile

Sehr geehrter Kunde
Die Willy A. Bachofen AG, Hersteller dieser Rührwerkskugelmühle möchte Sie ausdrücklich darauf hinweisen, dass nur bei Einbau von WAB Original Ersatz-, Verbrauchs- oder Zubehörteilen die Garantieansprüche und die der Maschine erteilten Sicherheitszeichen sowie die Produktehaftung Gültigkeit haben.
Beim Einbau von nicht originalen Teilen können die Sicherheit sowie die Funktion stark beeinträchtigt werden. Eine Haftung für mittelbare beziehungsweise Folgeschäden wird ausdrücklich ausgeschlossen.
Die Willy A. Bachofen AG ist nach den Normen ISO 9001 qualitätszertifiziert und alle Original-Teile durchlaufen den Qualitätsnormen entsprechende Prüfungen. Nur mit solchen Original-Teilen kann ein sicherer Betrieb dieser Maschine garantiert werden.
Für weitere Auskünfte wenden Sie sich bitte an Ihre nächste WAB-Gebietsvertretung oder direkt an WAB.

original parts

Dear Customer
Willy A. Bachofen AG, the manufacturer of this Agitator bead mill, would like to draw your attention to the fact that only the installation of WAB original spare parts, wearing parts or accessories guarantees the validity of the lawful right of warranty, the safety approvals given to the machines and the product liability.
Installing not original parts can cause great damages to the safety and functionality. A liability for direct, respectively consequential damages is distinctively refused.
Willy A. Bachofen AG is quality certified according to the norms ISO 9001 and all original parts are tested according to these quality norms. Only with these original parts a safe functionality of the machine can be guaranteed.
For further information please contact your WAB area representative or WAB directly.

Tourner svp
Voltare pagina

12 Maintenance

12.1 Care and maintenance instructions

Maintenance work is to be undertaken only by experienced personnel in accordance with safety regulations. Before and during all maintenance operations, secure the mill against unauthorised switching on. Operate EMERGENCY-OFF key and safeguard key (2). Disconnect main power supply!

WARNING
Rinsing liquids must be chosen in accordance with the chemical durability of the seals.

12.1.1 Waste disposal

When choosing the rinsing liquids consider their environmental impact, health risks, disposal regulations and the feasibility of correct waste disposal on site.

Follow the manufacturer's instructions.

12.1.2 Care

Clean the mill regularly.
If you cover the mill with plastic sheeting to prevent soiling, then the ventilation grilles at the doors must be left uncovered. The main motor requires unimpeded air exchange!

12.1.3 Maintenance instructions

Regular monitoring and replenishment of the grinding beads.

Note
In practice, what has proved worthwhile is to empty the mill after approx. 100 - 200 hours of operation, to remove the grinding beads and replenish with the prescribed volume of new beads.

Depending on the lime content of the cooling water, rinse the cooling system, with an antiliming agent.

12.1.4 Keep a report book

It is recommended that a report book is kept for the mill. The following points should be noted down in it routinely:

- Date
- Running time of mill
- Information about the material being milled (batch size)
- Checks on grinding beads, seals etc.

In this way you will always know after how many operating hours routine maintenance steps, like the changing of grinding beads or seals, were carried out.

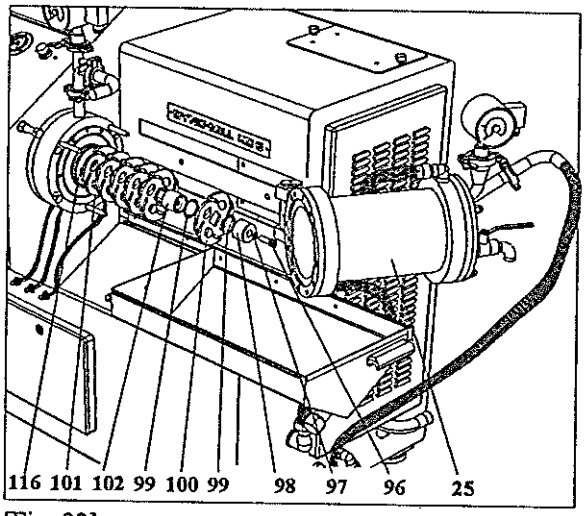
In the appendix you will find two specimen pages you might like to copy.

12.2 Changing the agitator discs

12.2.1 Dismantling

Follow the same steps as in chap. 10.5 until and including [Fig. 31]

- Unscrew tension screw (96) with hexagon socket key and remove it and its washer.
- Take off locking cap (98) and flat gasket (99).



[Fig. 32]

Risk of injury from worn, sharp edges.

- Put on protective gloves and carefully pull off the old agitator discs (101). Put them down in a safe place.

12.2.2 Assembly

We recommend: Use new flat gaskets (99) with every change or new fitting.

Insert new agitator discs (100) in the following order (according to arrangement [Fig. 32]):

- Gasket (99) with "large" outer diameter to the cover ring (116)
- Agitator disc type SSP LK 88 (101)
- Gasket (99) with "small" outer diameter, spacer (102), Gasket (99)
- SSP LK 75 agitator disc (100)
- and so on, until final agitator disc (100)
- Put on gasket (99) and locking cap (98) and screw firmly with washer (97) and locking screw (96). Including O-ring.
- Replace grinding chamber (25) and assemble in reverse order.

Note

Check regularly the weight of the agitator discs and when assembling fit the heaviest agitator disc directly in front of the grinding bead separator system. This ensures uniform wear of the agitator disc set. The agitator discs can be used until they are worn down to about half their weight when new.

12.3 Changing the mechanical seal (DGD)

WARNING

The double mechanical seal is a sensitive assembly and is to be changed only as a complete unit. Repair work on double mechanical seals is to be undertaken only by trained specialists, as special knowledge and skills are required for this. Neither of these are provided in these operating instructions.

You'll find detailed drawings in the appendix.

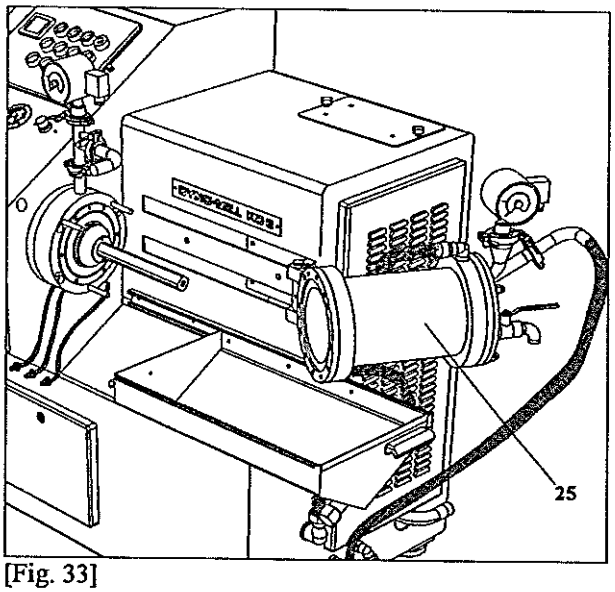
If required, orders may be made via our customer service department.

Detailed addresses you'll find in the chapter "Machine Data".

Risk of injury from worn, sharp edges.

Note

The mechanical seal DGD (129) is accessible after pulling away the grinding chamber (25) and disassembling the locking cap/agitator discs/spacers. (See also chapter 12.2.1)



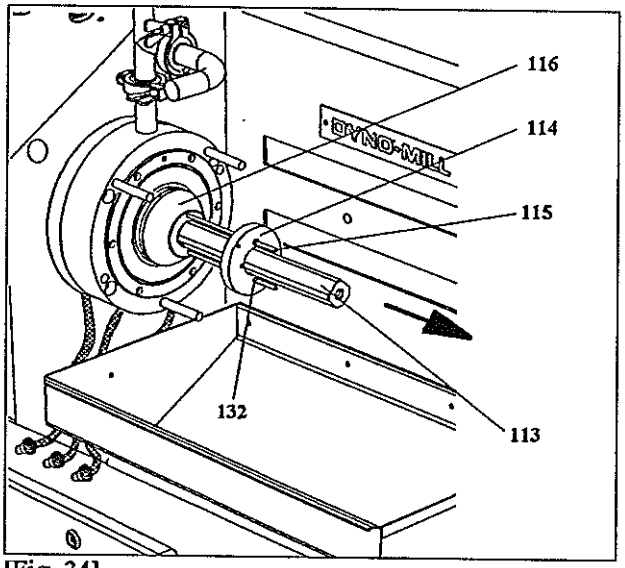
[Fig. 33]

ATTENTION:

Always widen the gap-width of the separator to the maximum, when changing the shaft seal! Whenever the axial position of the agitator-shaft will be changed, call the manufacturer or the customer service address first!

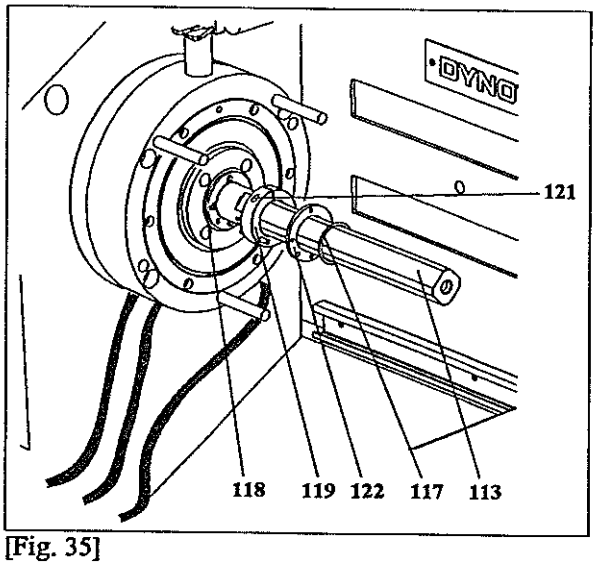
12.3.1 Dismantling

- Push dismantling plate (114) onto agitator shaft (113) and screw threaded rods (115) with hexagonal nuts (132) into the cover ring (116).
- With the help of dismantling plate (114) carefully pull off cover ring (116) by hand in direction of arrow.



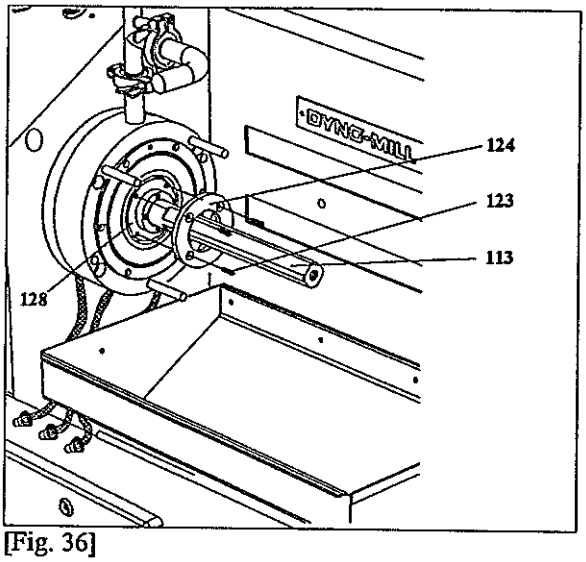
[Fig. 34]

- Remove O-ring (117).
- Remove intermediate washer (122) from agitator shaft (113).
- At clamp ring (119) loosen hexagonal socket screw (121) and dismantle clamp ring from agitator shaft (113).
- Remove O-ring (118).



[Fig. 35]

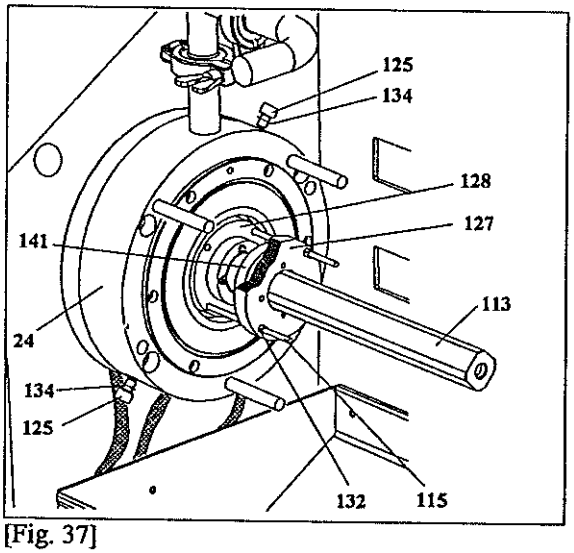
- Release countersunk screws (123) and dismantle rotor ring (124) from rotor holder (128).



[Fig. 36]

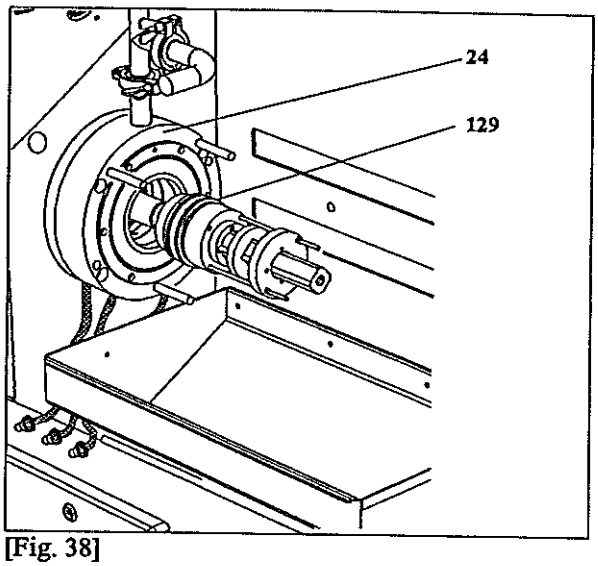
ATTENTION

- **Remove locating screws (125) with flat packing rings (134) from seal flange (24).**
- Push dismantling stop (141) to agitator shaft (113) as far as it will go. Push dismantling plate (127) along agitator shaft (113) and screw threaded rods (115) into the rotor holder (128).
- By pulling evenly on the hexagonal nuts (132) loosen the double mechanical seal out of the seal flange (24).



[Fig. 37]

- Carefully pull the DGD (129) over the agitator shaft and clean the seal flange (24).

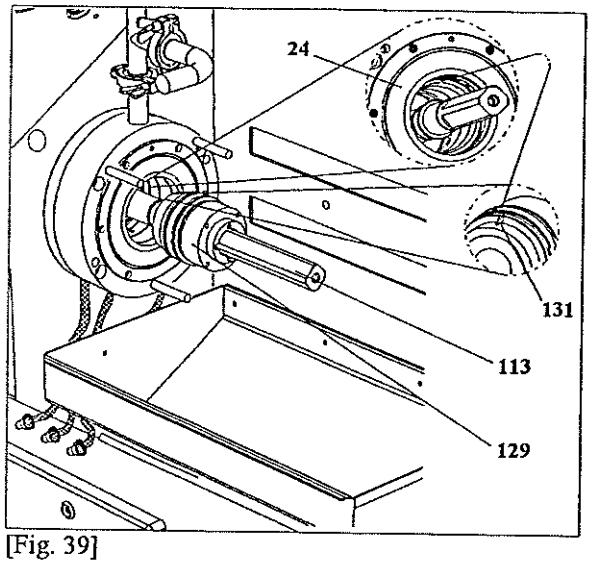


[Fig. 38]

12.3.2 Assembly

ATTENTION

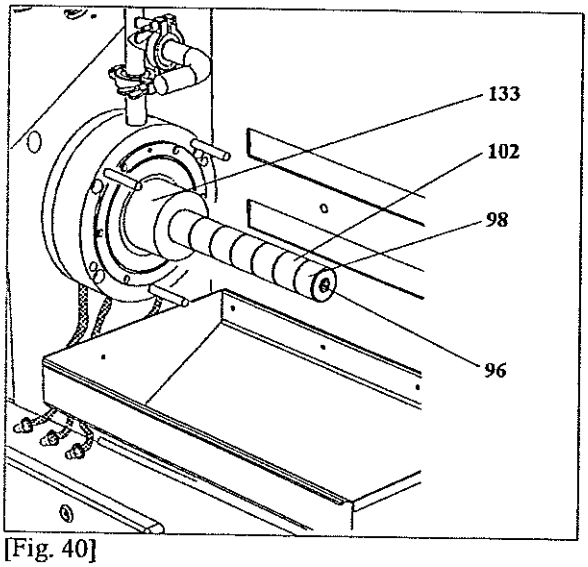
- **Clean rinsing system and fill it up with rinsing fluid.**
- **Clean all parts.**
- **Replace all old O-rings with new ones.**
- Clean seal flange (24) and agitator shaft (113) and lubricate lightly with non-corrosive grease.
- Carefully push the new double mechanical seal (129) onto the agitator shaft (113).



[Fig. 39]

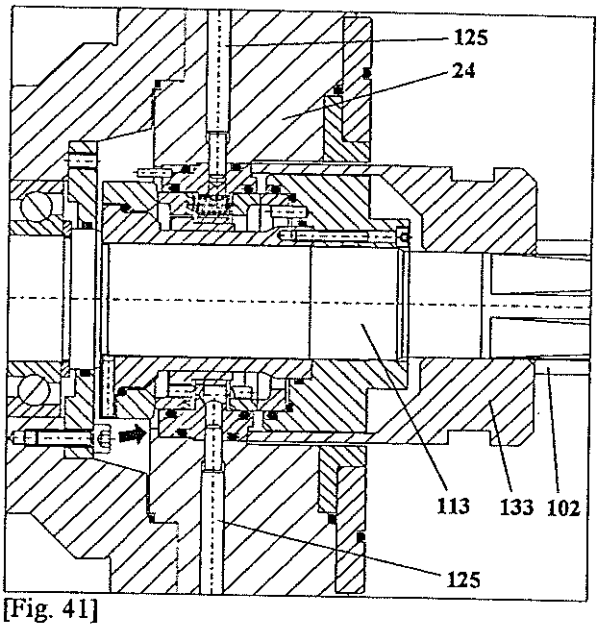
ATTENTION

- **Position the double mechanical seal in such a way that the parallel pin (131) lines up correctly with seal flange (24).**
- Push the DGD (129) into the seal flange (24) as far as possible by hand.



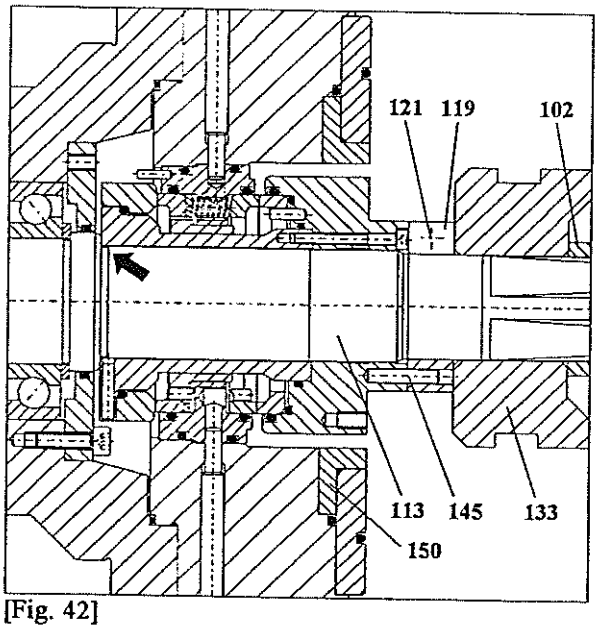
[Fig. 40]

- Assemble assembly bush (133), spacers (102) (possibly an agitator disc) and locking cap (98) onto the agitator shaft (113).
- Tighten firmly with the locking screw (96) until double mechanical seal (DGD) fits firmly against the stop in the seal flange (24). [Fig. 41]



[Fig. 41]

- Assemble locating screws (125) with flat packing rings (134) in the seal flange (24). [Fig. 37]
- Loosen the locking cap (98), and pull off spacers (102) and assembly sleeve (133) from the agitator shaft (113).
- Assemble clamping ring (119) to the agitator shaft (113). Note position of the parallel pin (145), do not push on yet!
- With the assembly bush (133) reversed, assemble spacers (102) and locking cap (98) to agitator shaft (113).
- With the locking screw (96) screw together again firmly until the double mechanical seal lies firmly against the stop on the shaft. [Fig. 42]
- Now lock clamp ring (119) firmly with Allen screw (121).



[Fig. 42]

- Loosen the locking cap (98), pull off spacers (102) and assembly sleeve (133) from agitator shaft (113).

ATTENTION

- **Assemble rotor ring (124) onto rotor holder and fasten with countersunk screws (123). [Fig. 36]**
- **The rotor ring (124) must not come into contact with the stator ring (150). Ensure a minimum gap of 0.5 mm when assembling!**

- Assemble O-ring (118). [Fig. 35]
- Assemble intermediate plate (122) onto agitator shaft (113). [Fig. 35]
- Assemble O-ring (117). [Fig. 35]
- Carefully assemble the covering ring (116). [Fig. 34]
- Assemble complete agitator parts according to instructions in chap. 12.2.2.
- Adjust gap according to instructions in chap. 9.6.

12.4 Changing internal cylinders

Note

The internal cylinder (147), [Fig. 46], is subject to wear and must be exchanged after half the wall thickness is worn.

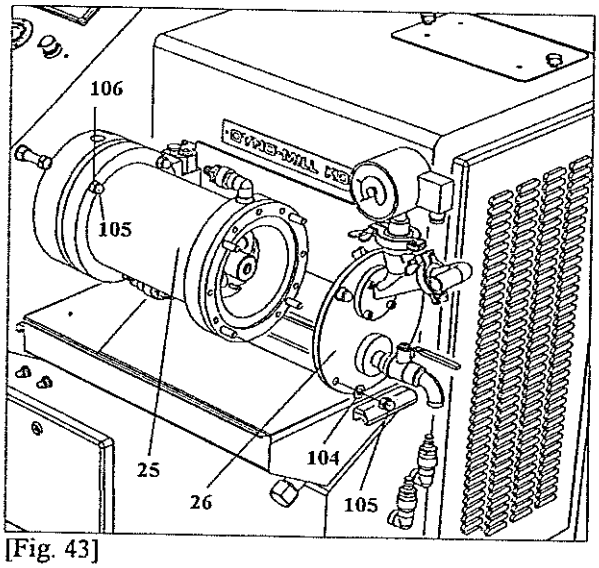
Maintenance work is to be carried out only by experienced specialists with due regard for safety regulations.

ATTENTION

- **Before and during the entire installation operation, safeguard machine against unauthorised switching on. Operate EMERGENCY-OFF key (1) and safeguard key (2)!**
- **Disconnect main power supply.**

12.4.1 Dismantling

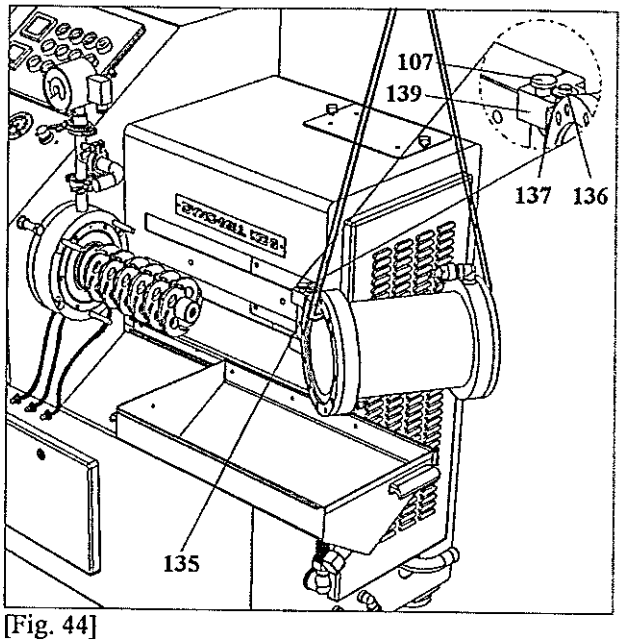
- Release piping on the front cover and mill chamber.
- Remove 4 cap nuts (105) with washers (104) on the front cover (26).
- Remove entire front cover (26) by hand and place in the vicinity of the machine. Attention: Take care of the connection to the inductive proximity switch.



[Fig. 43]

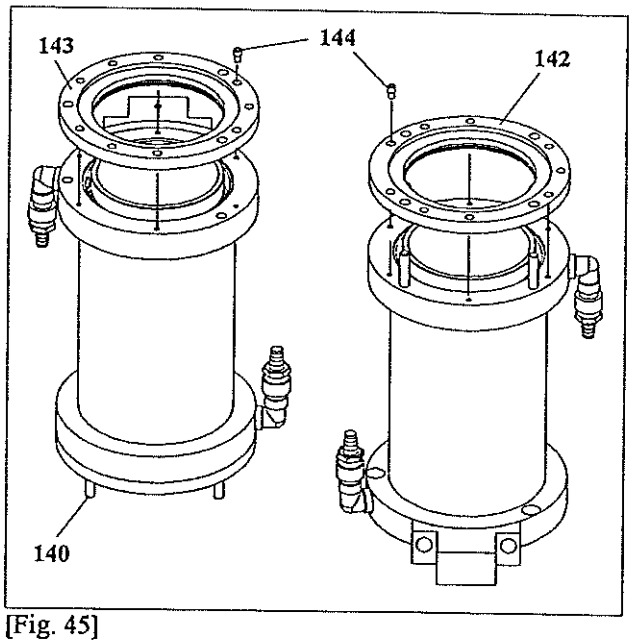
- Release quick-release knob (120) and remove cover to draw-out track (36). [Fig. 30]
- Release 3 cap nuts (105) with spring washer (106) of the grinding holder attachment.
- Carefully slide out mill chamber (25) as far as it will go.
- Raise the stop button (107) carefully swing the mill chamber (25) to the right. [Fig. 44]
- Let the stop button (107) latch in again.

- Support mill chamber (25) on a crane, without exerting upward stress.
- Release threaded rod (135).
- Release screw (136) with washer (137).
- Remove hinge pin (138) by pressing down.
- Carefully slide out mill chamber (25) from draw-out hinge (139).



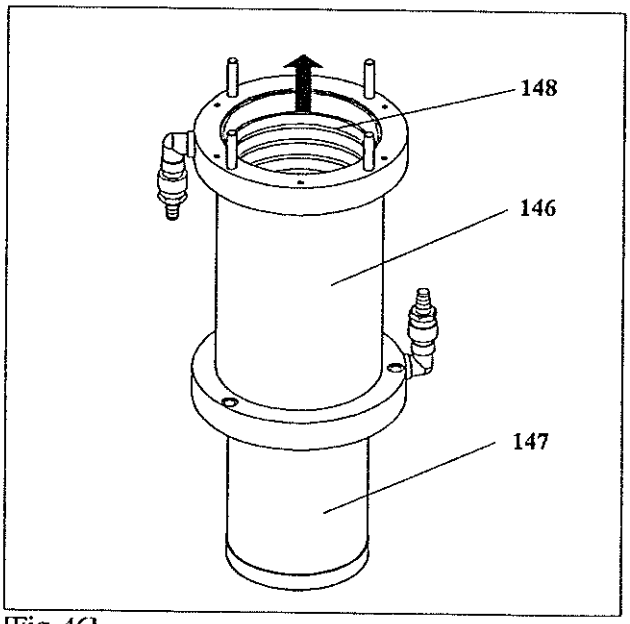
[Fig. 44]

- Carefully put down the mill chamber (25) onto studs (140). Put down flange with end cover side face down (142).
- Release the screws (144) in the flange on the bearing side (143). With the help of the threaded holes accommodated on the bearing side (143) in the flange, press out with extractor bolts.
- Place the mill chamber (25) with cover side of flange (142) uppermost.
- Release cheese head screws on the flange on the cover side (142) and with the help of the threaded holes accommodated in the flange on the cover side (142), press out, with extractor bolts.



[Fig. 45]

- Pull outer jacket (146) upwards off internal cylinder (147).

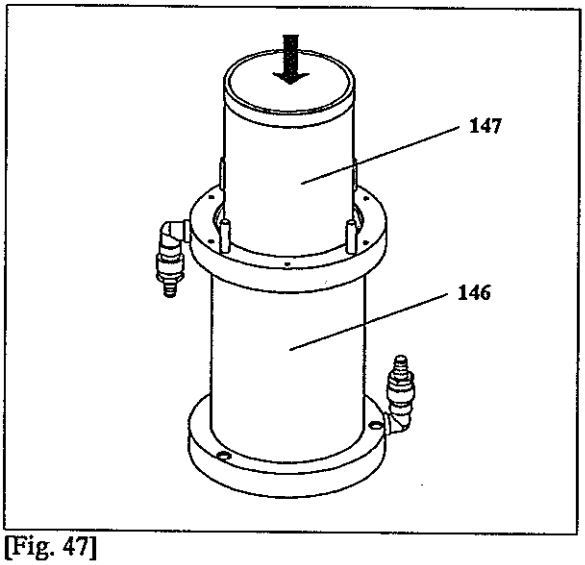


[Fig. 46]

- If rubber profile (148) has been damaged while dismantling, then this must be replaced.

12.4.2 Assembly

- Clean all parts before assembling new internal cylinder.
- Put O-rings into the flanges (142-143) and grease well.
- Put the mill chamber (25) in a vertical position with end cover-side uppermost (142).
- Push in the internal cylinder (147) vertically into outer jacket (146).



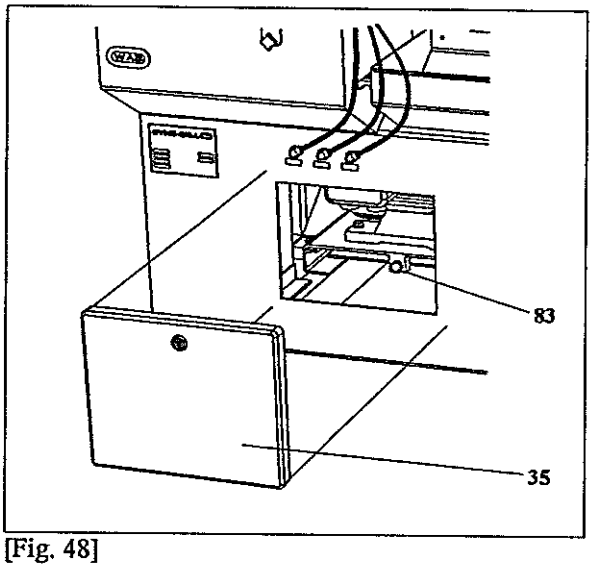
[Fig. 47]

- Assemble flange on cover side (142).
- Put mill chamber (25) with bearing side flange (143) uppermost. Then assemble flange on bearing side (143).
- After assembling mill chamber, test cooling system with mains water at 2-4 bar pressure for watertightness.
- Suspend mill chamber on a crane and assemble onto the machine in reverse order.

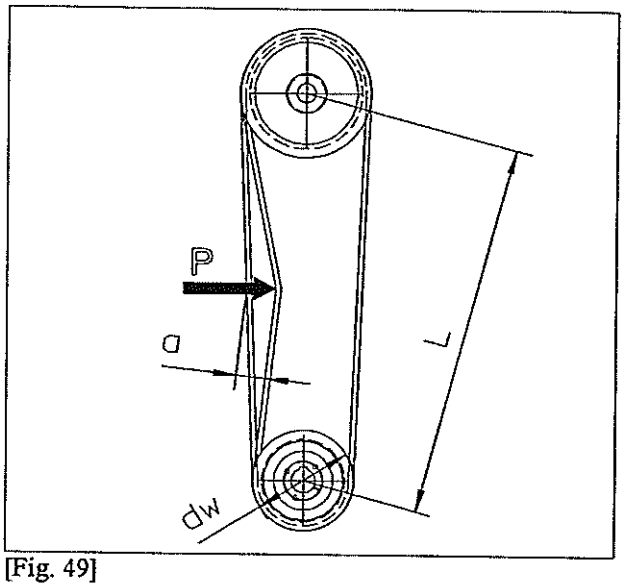
12.5 Tensioning the V-belt

Stop mill. Operate EMERGENCY OFF key (1) and keep key safe! Disconnect main power supply.

- Remove door (35) to gain access to motor Support platform.
- Tighten adjusting screw (83) on motor Support platform with a spanner until the right belt tension has been achieved.
- Test for correct V-belt tension, if possible with a V-belt tension measuring instrument.



[Fig. 48]



[Fig. 49]

Belt tension can be tested as follows:

Belt profile	Force of belt deflection, which deflects a belt 16mm per 1 metre axle-distance (a)		
	Small plate (dw mm)	P Newton (N)	P (kgf) (kp)
SPB	160 - 224	35 - 50	3.6 - 5.1
	236 - 315	50 - 65	5.1 - 6.6

Table A. - Tension of SPB V-belt.

12.6 Changing V-belts

Stop mill. Operate EMERGENCY OFF key (1) and keep key safe! Disconnect main power supply.

Used V-belts (chapter 4).

- Open door (35) to motor adjustment platform.
- Loosen adjusting screw (83) on motor slides, slacken V-belts and remove.

ATTENTION

Put the new V-belts without forcing them into the grooves. Forcing them on over the pulley edges results in damage!

- Tighten adjusting screw (83) on motor platform with a spanner until correct belt tension has been obtained.
- Test the correct V-belt tension, if possible with a V-belt measuring instrument, see also chapter 12.5.

As a rule, correct assembly and complying with correct belt tension as prescribed will guarantee lasting service from the V-belts.
Tension the V-belts as set out in table A, chapter 12.5.

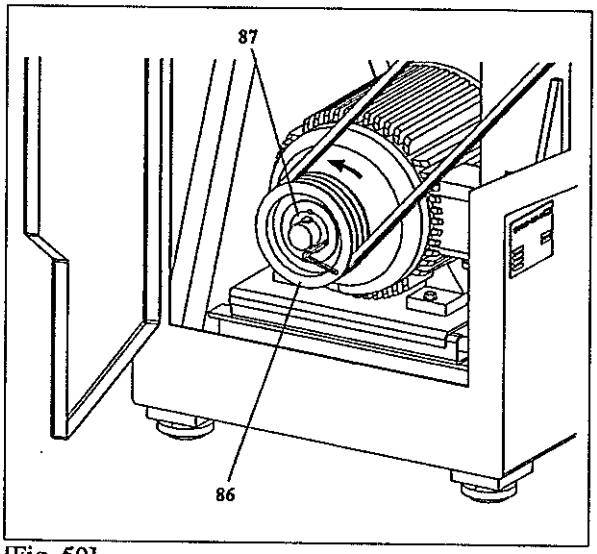
12.7 Changing RPM - changing the belt pulley on the main drive motor

The RPM of the agitator shaft can be changed by exchanging the V-belt pulley (86) on the main motor. A selection of belt pulleys for various RPM values is available. When changing the belt pulleys the corresponding V-belts must also be changed. (chapter 4.1)

- For dismantling V-belts, see chapter 12.6.

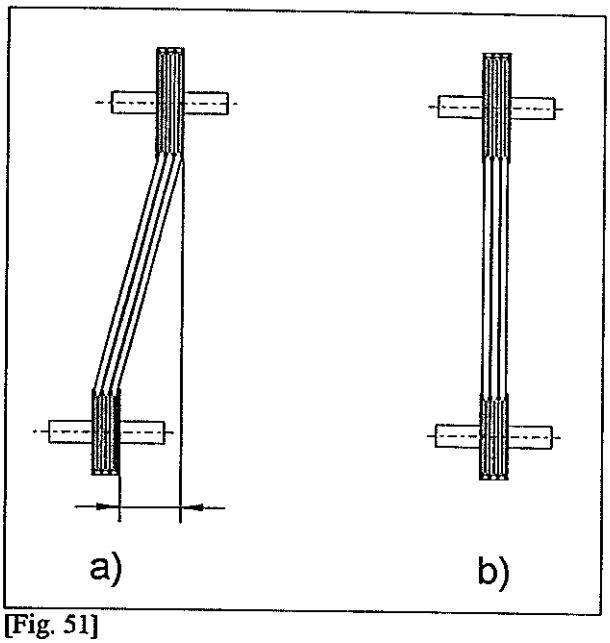
Dismantling taper lock bush with V-belt pulley.

- Loosen all surface screws.
- Remove 2 screws.
- Screw in 2 screws into the extractor holes and pull evenly until taper lock bush (87) is released from hub.



[Fig. 50]

- Pull off V-belt pulley (86) with taper lock bush (87).
- Assemble new V-belt (in reverse order).
- Put on V-belt.
- Tension V-belt (see chapter 12.5).
- Check alignment [Fig. 51].
- Close doors to motor adjustment platform.



[Fig. 51]

a) Incorrect assembly

Both shafts are parallel, but belt pulleys have been displaced to one side.

b) Correct assembly

Both shafts are parallel and the belt pulleys are in line.

12.8 Maintenance

ATTENTION

Maintenance work requires special tools, special knowledge and skills (neither of these are provided in these instructions) and should only be carried out by trained specialists.

Only original WAB parts may be used. WAB will accept no responsibility for any damage arising from components that are not WAB original replacement parts, non-repairable items or accessories.

If required, orders can be placed through our customer service department.

You will find the manufacturer's and agents' addresses in chapter 1 entitled "Machine ratings".

13 Fault / Cause / Remedy

No.	Fault	Cause	Remedy
13.1	Mill switches off by itself	• Product pressure too high	• Check and see 13.2
		• Product pressure too low	• Check and see 13.3
		• Product temperature too high	• Check and see 13.4
		• Power consumption of main motor too high	• Check and see 13.5
		• Power consumption of rinsing pump motor too high	• Check and see 13.7
		• Power consumption of product pump motor too high	• Check and see 13.6
		• Pressure in Seal Rinsing System too high or too low	• Check and see 13.8
		• Rinsing liquid vessel level exceeded or not reached	• Check and see 13.9
		• Inductive proximity switches (15), (15a) or (16) defective	• Operation check of proximity switch by electrician
		• Defective component in elect. cabinet	• Operation check by electrician
13.2	Product pressure too high	• Outflow pipes blocked or shut off	• Check outflow pipes
		• Product formulation unsuitable, viscosity too high	• Check (analyse) product formulation
		• Throughput too high	• Check product pump setting, lower if necessary
		• Grinding beads filling level too high	• Check filling level, remove some grinding beads, if necessary
		• Agitator discs in the wrong order (SSP,..)	• Check the agitator discs arrangement and direction of rotation
		• Wrong setting of gab separator (possibly too narrow)	• Check, adjust if necessary
13.3	Product pressure too low	• Feed container empty	• End operation
		• Product pump defective	• Interrupt operation, check pump output

No.	Fault	Cause	Remedy
13.4	Product temperature too high	• Cylinder cooling failure	• Check, turn on coolant if necessary
		• Cooling water throughput too low	• Check, reset cooling water flow, if necessary
		• Cylinder cooling in wrong direction	• Check, if necessary change connections to reverse flow
		• Product formulation unsuitable, viscosity too high	• Check (analyse) product formulation
		• Blocked cooling channels in the cooling cylinder	• Dismantle grinding and cooling cylinder, clean
		• Throughput too low or high	• Check product pump and throughput
		• Grinding beads filling level too high	• Empty grinding container, refill
13.5	Power consumption of main motor too high	• Throughput too high	• Check throughput, adjust if necessary
		• Grinding beads filling level too high	• Empty grinding beads, refill
		• Speed too high	• Check, change transmission, if necessary
		• Product formulation unsuitable, viscosity too high	• Check product formulation
		• Electrical supply incorrect	• Check connections and rotation direction of the agitator shaft
		• Agitator discs in the wrong order (SSP,..)	• Check the agitator discs arrangement and direction of rotation
13.6	Power consumption rinsing pump motor too high	• Product formulation unsuitable	• Check, analyse
		• Inlet and pump ducts blocked or shut or incorrectly fitted	• Check, clean if necessary, open or reconnect
		• Pump defective	• Check, inform manufacturer if necessary
		• Electrical supply incorrect	• Check connections and rotation direction

No.	Fault	Cause	Remedy
13.7	Power consumption rinsing pump motor too high	• Pump pipe blocked	• Check
		• Pressure control valve blocked or defective	• Check, clean, replace if necessary
		• Seal obstructed, blocked	• Check DGD-passage, contact manufacturer if necessary
		• Electrical supply incorrect	• Check connections and rotation direction
13.8	Pressurised seal rinse system pressure too high or low	• Pressure control valve maladjusted or defective	• Readjust or replace
		• Seal obstructed, throughflow blokked	• Check DGD-passage, contact manufacturer if necessary
		• DGD - leakage and / or DGD - destroyed	• Establish leakage rate, contact manufacturer, stating pressure conditions
		• Pump defective or leakage	• Check pump, contact manufacturer if necessary
13.9.1	Rinsing liquid vessel level exceeded	• Product leaking in direction of pressurised seal rinse system (SDA)	• Immediately stop machine, rinse SDA circuit
			• Empty SDA-vessel, fill with clean seal rinse medium, rinse until clean, avoid drying out
			• Check pressure gradient to product, adjust if necessary
			• Visually check the backflow of the pressurised seal rinse liquid
			• If still leaking, replace DGD
		• Leaking of cooling spiral in SDA vessel	• Empty rinsing vessel, locate cooling spiral leakage, repair or replace

No.	Fault	Cause	Remedy
13.9.2	Rinsing liquid vessel level not reached	• Leakage DGD secondary side > 1 L / 24h	• Check leakage visually, replace DGD
		• Leakage DGD primary side > 1 L / 24h	• Check, replace DGD
		• Tech. permissible leakage < 1 L / 24h	• Top up
		• Leakage within the SDA-circuit (tubes, controls, valves, etc.)	• Check, repair
13.10	SDA - pressure reading unstable	• Pump defective	• Check, replace if necessary
		• Pressure gauge fixing loose	• Check, tighten if necessary
		• Abnormal machine vibration	• (see 13.15)
		• Wrong adjustment of the pressure control valve	• Check whether rapid aeration has occurred
13.11	• Milling result too fine	• Inappropriate parameter setting	• Obtain process control advice
13.12	Milling result unsatisfactory	• Parameter setting not optimal	• Obtain process control advice
		• Bead filling level too low	• Check, top up
		• Grinding beads size unsuitable	• Check, exchange, obtain advice
		• Discs worn too much	• Check, replace
13.13	Leakage cooling circuit	• O-rings defective	• Check, replace
		• Inner cylinder worn	• Check, replace

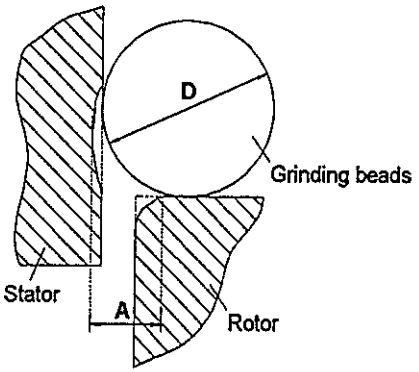
No.	Fault	Cause	Remedy
13.14	Leakage product circuit	• O-rings defective • Product contact parts worn • In- / outflow tube defective	• Check, replace • Check, replace • Check, replace
13.15	Unusual machine vibration	• Grinding bead level too low • Belt tension too low • Unbalanced pulley • Damaged bearing • Machine not standing correctly • No agitator disk tension, i.e. because of loose locking cap	• Check, replace • Check, re-tighten • Check, balance • Check, repair • Check, re-adjust • Check, re-tighten
13.16	Grinding beads and/or broken grinding beads in product	• Wrong gap width • Separator worn • Grinding beads worn • Grinding beads unsuitable	• Check, correction • Check, replace • Check, replace • Check, replace

14 Tips for keeping the production and maintenance report book

Detailed and correct keeping of report books is vital for determining the periodical maintenance measures and checks.

Production report book
Every batch produced in the mill should be noted down in the report book, together with all operating conditions.

Maintenance report book
All maintenance measures should be noted down in the report book.

Checks to be carried out	Description	Interval	Notes
Check of grinding beads	Empty all grinding beads from mill, wash and try them. Determine weight loss. Sieve the grinding beads using a sieve with a mesh size that corresponds to the nominal min. diameter of the grinding beads. Top up with new grinding beads to the prescribed level. Weigh the grinding beads and refill.	First check ca. 100h after initial start-up, afterwards according to experimental values.	Do not use the grinding beads until they are worn down and pass the separator. It would result in a high wear-rate and destruction of the separator rotor and stator.
Check of agitator discs	It is permissible for agitator discs to be worn down to 1/2 of the weight of new ones.	Check at every grinding beads inspection.	
Check separator	The separator rotor must be as sharp-edged as possible on the stator side and must not have any visible material faults. It is only permissible for the separator stator to show very minimal signs of grooved wear. The max. wear is dependent on the size of the grinding beads (see drawing). $\frac{Dmin}{2} \geq A$	Check at every grinding beads inspection.	
Wear-check	All machine parts must be replaced if they are so worn as to impair operation	Check at every grinding beads inspection.	The inner cylinder must be replaced when the wall thickness has been worn down to half by abrasion.

Maintenance report book DYNO-Mill Type KD 6 (6) No.: _____

Date	Product- No.	Process-No.	Batch in kg	Throughput in kg/h	Start	End	Pressure in bar	Temp. in °C	Running time in h	Production in kg	Notes

Maintenance report book DYNO-Mill Type KD 6 (6) No.: _____

Maintenance carried out	Date	Running time in h	Description of maintenance, notes	Signature

Wichtiger Hinweis
Important remark

Original-Teile

Sehr geehrter Kunde
Die Willy A. Bachofen AG, Hersteller dieser Rührwerkskugelmühle möchte Sie ausdrücklich darauf hinweisen, dass nur bei Einbau von WAB Original Ersatz-, Verbrauchs- oder Zubehörteilen die Garantieansprüche und die der Maschine erteilten Sicherheitszeichen sowie die Produktehaftung Gültigkeit haben.
Beim Einbau von nicht originalen Teilen können die Sicherheit sowie die Funktion stark beeinträchtigt werden. Eine Haftung für mittelbare beziehungsweise Folgeschäden wird ausdrücklich ausgeschlossen.
Die Willy A. Bachofen AG ist nach den Normen ISO 9001 qualitätszertifiziert und alle Original-Teile durchlaufen den Qualitätsnormen entsprechende Prüfungen. Nur mit solchen Original-Teilen kann ein sicherer Betrieb dieser Maschine garantiert werden.
Für weitere Auskünfte wenden Sie sich bitte an Ihre nächste WAB-Gebietsvertretung oder direkt an WAB.

original parts

Dear Customer
Willy A. Bachofen AG, the manufacturer of this Agitator bead mill, would like to draw your attention to the fact that only the installation of WAB original spare parts, wearing parts or accessories guarantees the validity of the lawful right of warranty, the safety approvals given to the machines and the product liability.
Installing not original parts can cause great damages to the safety and functionality. A liability for direct, respectively consequential damages is distinctively refused.
Willy A. Bachofen AG is quality certified according to the norms ISO 9001 and all original parts are tested according to these quality norms. Only with these original parts a safe functionality of the machine can be guaranteed.
For further information please contact your WAB area representative or WAB directly.

Tourner svp
Voltare pagina

15 List of replacement and wearing parts

WARNING !
Real positions do not correspond to figure positions

15.1 Seal elements

Order example: Machine type + Machine number + Real-position + Drawing-no. + Item no.

Real-Pos.	Drawing No.	Description	Comment	Item No.
75	11590	O-ring Viton	55.25x2.62 mm	D.OR1-22132
78	11590	O-ring Viton	72.69x2.62 mm	D.OR1-22031
81	11590	O-ring Viton	78.97x3.53 mm	D.OR1-23034
82	11590	O-ring Fep-O-Seal	78.97x3.53 mm	D.OR1-43034
84	11590	O-ring Viton	91.67x3.53 mm	D.OR1-23040
94	11590	O-ring Viton	63.09x3.53 mm	D.OR1-23133
100	11590	O-ring Viton	152.02x2.62 mm	D.OR1-22118
144	11590	O-ring Viton	164.69x3.53 mm	D.OR1-23061
147	11590	O-ring Viton	151.99x3.53 mm	D.OR1-23108
165	11590	O-ring Nitril	171.04x3.53 mm	D.OR1-13064
167	11590	O-ring Nitril	183.74x3.53 mm	D.OR1-13066
177	11590	O-ring Viton	13.94x2.62 mm	D.OR1-22010
195	11590	O-ring Viton	37.69x3.53 mm	D.OR1-23021
203	11590	O-ring Viton	59.92x3.53 mm	D.OR1-23028
209	11590	O-ring Viton	94.97x1.78 mm	D.OR1-21134
211	11590	O-ring Viton	114.02x1.78 mm	D.OR1-21135
265	11590	O-ring Viton	50.39x3.53 mm	D.OR1-23026
282	11590	O-ring Viton	34.52x3.53 mm	D.OR1-23020
98	11590	Flat seal Fibre	9.5/15x1 mm	D.DI1-9.5/15x1
152	11590	Flat seal Klinger-Sil	D=38/64x1 mm	D.DI1-38/64K1
153	11590	Flat seal Klinger-Sil	D=38/48x1 mm	D.DI1-38/48D
254	11590	Seal ring Viton	NW20/1	D.DI1-NW20
321	11590	Seal ring Viton	NW40	D.DI1-NW40
163	11590	Seal profile Nitril A 3334	10/8	B.VT1-4/566
3	33647	Seal Neoprene	complete	B.PT1-33784

15.2 Machine-components

Order example: Machine type + Machine number + Real-Pos. + Zeichnungs-Nr. + Item No. Nr.

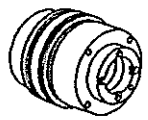
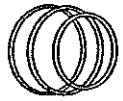
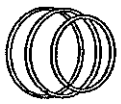
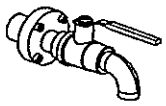
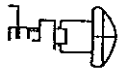
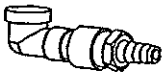
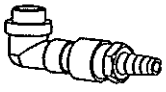
Real-Pos.	Drawing No.	Description	Item No.
2	11590	Angular contact ball bearing 7209-BUO	D.LA1-7209-BUO
12	11590	Nilos-ring 77.8/45x3 STvz	D.NI3-77/45x3/1
15	11590	Shaft nut M45x1.5 MRR	D.MU1-KM9/1
21	11590	Disc spring D=100/51x3.5	C.TE1-45565
23	11590	Four-point bearing D=40/90x23	D.LA1-308.TVP
28	11590	Shaft nut M40x1.5 MRR	D.MU1-KM8/1
63	11590	Straight pin D=3x20	D.28A-0858
65	11590	Pressure spring 4310	B.RE6-43717
129	11590	Cover ring 2080 D=107x36	C.RI2-47436
138	11590	Agitator disc SSP 2080 LK75	C.RU1-33670
139	11590	Agitator disc SSP 2080 LK88	C.RU1-33671
156	11590	Grinding chamber 2080 170/165	C.MA4-33696
169	11590	Tension screw M12x35	C.SC6-44858
171	11590	Front cover 2080 D=257x18	C.DE1-22308
174	11590	Cap nut M12	D.13E-0071
182	11590	Thrust washer M12 stainless	D.27G-0240
184	11590	Taper cap 2080	C.SP1-46560
191	11590	Spacer 3505 D=48/38	C.DI2-47488
208	11590	Flat head screw M6x16	D.21D-0273
214	11590	Rotor ring HM K10 107/61x8	B.NM1-47428
216	11590	Stator ring HM K10 140/102	B.NM1-47429
219	11590	Wear protection ring 2080 D=208x10	C.RI2-33697
225	11590	Flat head screw M6x12	D.21D-1056
241	11590	Nipple brass SW 17	C.NI1-46723
261	11590	Tri-Clamp NW 10-37	D.KL2-SH25
267	11590	Hexagon socket M8x20	D.21A-0091
269	11590	Spring washer M6	D.17G-0174
270	11590	Hexagon socket M6x16	D.21A-0085
271	11590	Thrust washer Seeger	D.27G-0173
273	11590	Sieve Ni D=30x0.6.	B.QQ6-45024
316	11590	Approach switch inductive	D.IN1-IND/1
320	11590	Tri-Clamp NW40-2"	D.KL2-SH50
5	22366	Running track St T3/745	C.SC9-47587
6	22366	Guide roll W-3X	D.RO2-W-3X
11	22366	Locking bolt St/PA D=14h9	C.BO1-47569
13	22366	Running track cover	L.BL1-22330
38	22366	Dowel screw D=12/M10x20	D.11F-1048
39	22366	Dowel disc D=12/18x0.5	D.17A-1060
41	22366	Plastic cover button PE black D=16	D.St4-16
42	22366	Quick release Vibrex St/PA6	D.VE5-5030

Real-Pos.	Drawing No.	Description	Item No.
1	22377	Gear pump R3/30 FU	D.PU1-3/30
20	22377	Elastic gear collar coupling D=55	D.KU1-55
21	22377	Coupling piece D=20h7	C.KU1-45236
22	22377	Coupling piece D=18h7	C.KU1-45524
28	22377	Base St 37 k	C.UN1-45525
32	22377	Tube joint. 1"	D.VE4-1"/368
33	22377	Pipe bend St 37 1"	C.RO1-31479
34	22377	Tube joint, cone seal	D.VE4-R1"ST
35	22377	Plastic cover button, white 35.5x20	D.ST4-4-355
37	22377	Round buffer, type C	D.FU1-75/M12
42	22377	Adjusting screw M5x6	D.11B-1044
44	22377	Hexagon head cap screw M12x35 8.8	D.12A-0296
45	22377	Spring washer M12	D.17B-0175
51	22377	Hexagon socket M12x25	D.11A-0396
52	22377	Spring washer M12	D.17B-0175
1	22385	Pressure gauge min.-max. 0-4 bar	D.MA1-0-4bI/MMD
2	22385	Flat seal ring Fibre 9.5/15x1	D.DI1-9.5/15F
3	22385	Fitting 3/8" inch	D.MU1-3/8"S
4	22385	Adjusting angle 3/8" D=10	D.WI1-3/8"-10
6	22385	Safety valve 0100/3/8"	D.VE1-0100
7	22385	Cable tube D=20/28/13	D.TVU1-20/28
8	22385	Flat head screw M6x20	D.11D-1037
9	22385	Disc for Flat head screw	D.17A-1037
10	22385	Hexagon nut M6x0.8	D.13A-0144
11	22385	Holder St 37	C.HA1-46741
12	22385	Flat ring Fibre 17/24x2	D.DI1-17724F
13	22385	Counter nut 3/8"	D.MU1-3/8"S24
14	22385	Tube joint 3/8"	D.VE4-3/8"1500
17	22385	Cable tube D=17/23	D.KA1-17723
18	22385	Rinsing vessel	C.BE1-44188
21	22385	Plug 4436 1/2"	D.ST4-1/2"x22J
11	33647	Approach switch kapacitive	D.IN1-KAP
12	33647	Counter nut brass	D.MU1-11/8011
13	33647	Cable joint PG11 MS	D.VE4-11/1111
14	33647	Flat seal ring D=18.5/24x1	D.DI1-18.5/24K
23	33647	Product drain valve R1/4"x39	D.HA1-1/4"MS
4	33839	Gear pump 75FAL	D.PU1-75FAL
10	33839	Round buffer C D=20M6	D.FU1-20/M6
11	33839	Raised cheese head screw M6x12	D.21E-0002
12	33839	Spring washer M6	D.27B-1059

Order parts not listed but positioned in drawings by quoting the position and drawing numbers!

15.3 Component sets and assemblies

Order example: Machine type + Machine number + Item no.

Description	Capacity / Comments	Item No.	Depiction / Symbol
DGD	Complete double action mechanical seal	K.000-11590.02	
			
			
Pos.501, O-ring Set-Viton Complete Pos.502,O-ring Set-Kalrez Complete	Complete Complete	T.000-3602 T.000-3607	
Pos.500,O-ring Set-Viton Complete, only DGD	Complete	T.000-3605	
Product drain valve	Stainless Stainless/hard chromed	K.000-45701 K.000-45701.01	
Outlet plug	Steel hardened	K.000-45516	
Approach switch	Complete	T.000-0191	
Cooling water coupling -Quick release-	Complete	K.000-22387.01	
Cooling water coupling	Complete	K.000-43887	

15.4 Tool kit

Order example: Machine type + Machine number + Item no.

Description	Comment	Item No.
Mounting bush	d100/38x100	C.BU1-47481
Dismantling bush	d120/40x8	C.SC2-47482
Adjusting bar	d20x400	C.B01-45527
Tool box	450x210x220	D.WE1-ST
Open-end wrench	SW 17/19	D.SC5-SW17/19
Open-end wrench	SW 13/14	D.SC5-SW13/14
Open-end and ring wrench	SW 24	D.SC5-SW24
Square key	SW 6	D.SC5-SW6/4kt
Hexagon key	SW 3	D.SC5-SW3
Hexagon key	SW 4	D.SC5-SW4
Hexagon key	SW 5	D.SC5-SW5
Hexagon key	SW 6	D.SC5-SW6
Hexagon key	SW 8	D.SC5-SW8
Hexagon key	SW 10	D.SC5-SW10
Screw driver	6.5/1 GR.4	D.SC6-GR4
Feeler gauge	0.05 - 1	D.WE1-13BL
Safety plug	d14.3x9.5	D.ST4-4-143
Threaded dismantling rods	M6x122	C.ST1-46467
Hexagon nut	M6x0.8D	D.13A-0144
Regulate wrench	/	D.SC5-301
Range change wrench	/	D.KN2-MA
Dismantling limit stop	d74x12	C.AN1-47691
Extension	d30x350	C.VE3-45935

How would you rate these operating instructions?

WAB is striving to give the user operating instructions that are as meaningful and user friendly as possible.

Please help us in this endeavour

WAB would like to hear about your opinions and experiences with these operating instructions. Do you think they are

- **on the whole well thought out?** **yes / no**
- **satisfactory, but with room for improvement?** **yes / no**
- **very much in need of improvement?** **yes / no**

Are the operating instructions

- **clearly laid out?** **yes / no**
- **easy enough to understand?** **yes / no**
- **too detailed?** **yes / no**
- **too difficult?** **yes / no**

How would you rate these operating instructions in comparison with other instructions? Are they

- **better?** **yes / no**
- **of similar quality?** **yes / no**
- **worse?** **yes / no**

As you have practical experience with the machine we would particularly appreciate your specific comments and tips.

- **What do you think is missing in these operating instructions?**
- **What would you personally improve?**

Please fill in the questionnaire, add your own comments and return it to us.

Thank you very much for your time and co-operation.

WAB
Seit 1933

Fax-order:

Note
Only original WAB parts must be used. WAB does not accept any liability for damage resulting from the use of non WAB spare parts, wearing parts or accessories.

To secure efficient maintenance and routine works on your WAB Products, please use this blank form. Trust us recognised experts, and also trust the **DIN 9001** qualified Services and Products of the **Willy A. Bachofen AG.** Please fill in all needed facts and use the following sheets for your order. The following instructions, and also the example, must be **noticed** very well.

Real-positions do not correspond to figure-positions! (Figure-positions in the sketches of the instructions do **not** correspond to the real-positions on the item-list!)

Always order like this following example:
Order example: machine type + machine number + real position + drawing no. + item no.

Example:

Mach. Type:	Machine No.:	Drawing No.:	Real-Pos.:	Description:	Item. No.:	Pieces:
KD 25C	950044	11702	125	Swing rod	C.ST7-46133	

Order:

Page 1 of ☐

(To find out the Manufacturer's address or the Customer Service address please check out chapter 1!)

To:		From:	
Firm:		Firm:	
Street:		Street:	
Town:		Town:	
Country:		Country:	
Fax. No.:		Fax. No.:	
Tel. No.:		Tel. No.:	
Attention: (Addressee)		Name: (Sender)	
		Division:	
		Ring back to you?	☐ Yes ☐ No
		Subject:	☐ Offer No.:
			☐ Letter from:
			☐ Conversation from:
		(Free space, e.g. for your own internal code)	

To guarantee you an outstanding service and delivery, please ensure this blank form is completely filled out. Also take care that all pages are correct and complete transmitted. Thank you very much for your order and we wish you a continue progress with your WAB Products.

Kind regards, your WAB Team.

WAB
Seit 1933

Mach. Type:	Machine No.:	Drawing No.:	Real-Pos.:	Description:	Item. No.:	Pieces:

(If you need more lines to order, please use the next sheet)

Mach. Type:	Machine No.:	Drawing No.:	Real-Pos.:	Description:	Item. No.:	Pieces: