

Single-disc Flat Lapping and Polishing Machine EL 380



Instruction Manual

for

Single-disc Flat Lapping and Polishing Machine

Type: EL 380

Sold by:

joke Technology GmbH

Asselborner Weg 14-16
D-51429 Bergisch Gladbach

Telephone +49 (0) 22 04 / 8 39 - 0
Telefax: +49 (0) 22 04 / 8 39 - 60
Internet: www.joke.de
Email: joke@joke.de

joke 02/2011

Subject to changes due to technical progress and improvements.

1 List of contents

1	List of contents	1-1
2	Notes on the manual.....	2-1
3	Safety instructions	3-2
4	Warranty / identification	4-1
5	Machine overview	5-2
6	Technical data.....	6-1
7	Operation / control	7-23
8	Troubleshooting	8-1
9	Care and maintenance	9-1
10	Consumables	10-1
11	Spare parts list	11-1
12	Annex.....	12-12

2 Notes on the manual

This manual has been written for the device user to ensure a problem-free operation, care and maintenance.

Important instructions and information concerning safety and operational reliability have been highlighted.

The symbols used in the manual have the following meanings:

CAUTION!

Working and operating processes which must be observed to the letter to exclude any risk to persons. .



Working and operating processes which must be observed to the letter to avoid any damage to the machine.



Technical information to which the device operator must give special attention.

The illustrations and diagrams are numbered in sequence within each chapter. Some of these illustrations have keys. References to illustrations within the text e. g. (5.1/2) have the following meaning:

5.1 = Figure 5.1

2 => Position 2 in the key to the figure.

Please feel free to call our customer service department at any time should you encounter technical problems which are not dealt with in this manual:

Telephone +49 (0) 2204/839-77

Telefax +49 (0) 2204/839-60.

3 Safety instructions

- (1) This machine has been built according to the latest technical standards and generally accepted safety regulations. Nevertheless, it can constitute danger to life and limb for operator or third parties and a hazard to the device itself or other equipment during use.
- (2) Only use the device if in perfect working order and for its intended purpose. You must always pay attention to the instruction manual and safety instructions therein and be aware of the risks! Repair any faults which could affect the device's safety immediately by yourself or have these repaired.



The device is designed exclusively for lapping, polishing or honing according to the disc type used. Any other use will be deemed to be contrary to its intended purpose. The manufacturer cannot be held liable for any resulting damages. The risk is borne solely by the user.

Correct use also includes compliance with the instruction manual and observation of the care and maintenance conditions.

- (3) Keep the instruction manual handy at the device's place of use.
- (4) Pay attention to and observe generally applicable statutory and otherwise binding regulations relating to accident prevention and environmental protection in addition to the information provided in the instruction manual!
- (5) All personnel commissioned to work on or with the machine must have read this instruction manual, and particularly the safety instructions chapter, before starting work. This applies especially for personnel who only work with the device occasionally.
- (6) Observe safety instructions on the machine and keep them legible.
- (7) Stop the device immediately should you notice changes to the device or its operating behaviour that are relevant to its safety. Have these remedied by suitable specialists before restarting work.

CAUTION!

3 Safety instructions



- (8) Do not carry out yourself or have carried out any modifications, additions or conversions to the device!
- (9) Spare parts must meet the technical requirements specified by the manufacturer. This can only be guaranteed with original JOKE[®] spare parts.
- (10) Any work on/with the device may only be carried out by qualified, appropriately trained and authorised personnel. Pay attention to minimum statutory age limits!
- (11) Personnel undergoing training or in a general apprenticeship should only be allowed to work with the machine under the constant supervision of an experienced operator!
- (12) Restrain from any type of work that could jeopardise your safety.
- (13) The machine may only be used if all protective and safety equipment is in place and in proper working order.
- (14) Do not leave the machine unattended when switched on!
- (15) Stop and secure the machine immediately in the event of malfunctions! Faults must be remedied at once by suitable specialists!
- (16) Pay attention to adequate ventilation of the workroom when using the polishing and lapping system!



Install air extraction if necessary in case of small rooms!

4 Warranty / identification

Joisten & Kettenbaum warrants the correct manufacture of every Joisten & Kettenbaum product which is delivered in accordance with the terms of contract and delivery.

This warranty does not cover damages caused by normal wear and tear, incorrect handling, negligent use, the fitting of non-original spare parts, inadequate care and/or a failure to comply with this technical manual.



The machine may only be used by appropriately trained and commissioned personnel. If it is not, all warranty claims will be forfeited according to the terms of delivery.

Machine identification

The manufacturer's code, type code, and series number can be found on the rear of the machine.

5 Machine overview

Purpose

The joke single-disc flat lapping and polishing machines are intended for lapping, polishing or flat honing.

Depending on the application, the machines are fitted with a lapping disc, polishing and lapping disc, solid grit disc or a carrier disc for stick-on polishing cloths.

Discs in conjunction with various different lapping and polishing media are tailored to the desired result of the processing method.

The machines are suitable for achieving flat surfaces with low surface roughness values on workpieces made of almost all materials.

The main applications are in production of mechanical components and components for electronics and optics.

5 Machine overview

Structure of a single-disc flat lapping and polishing machine

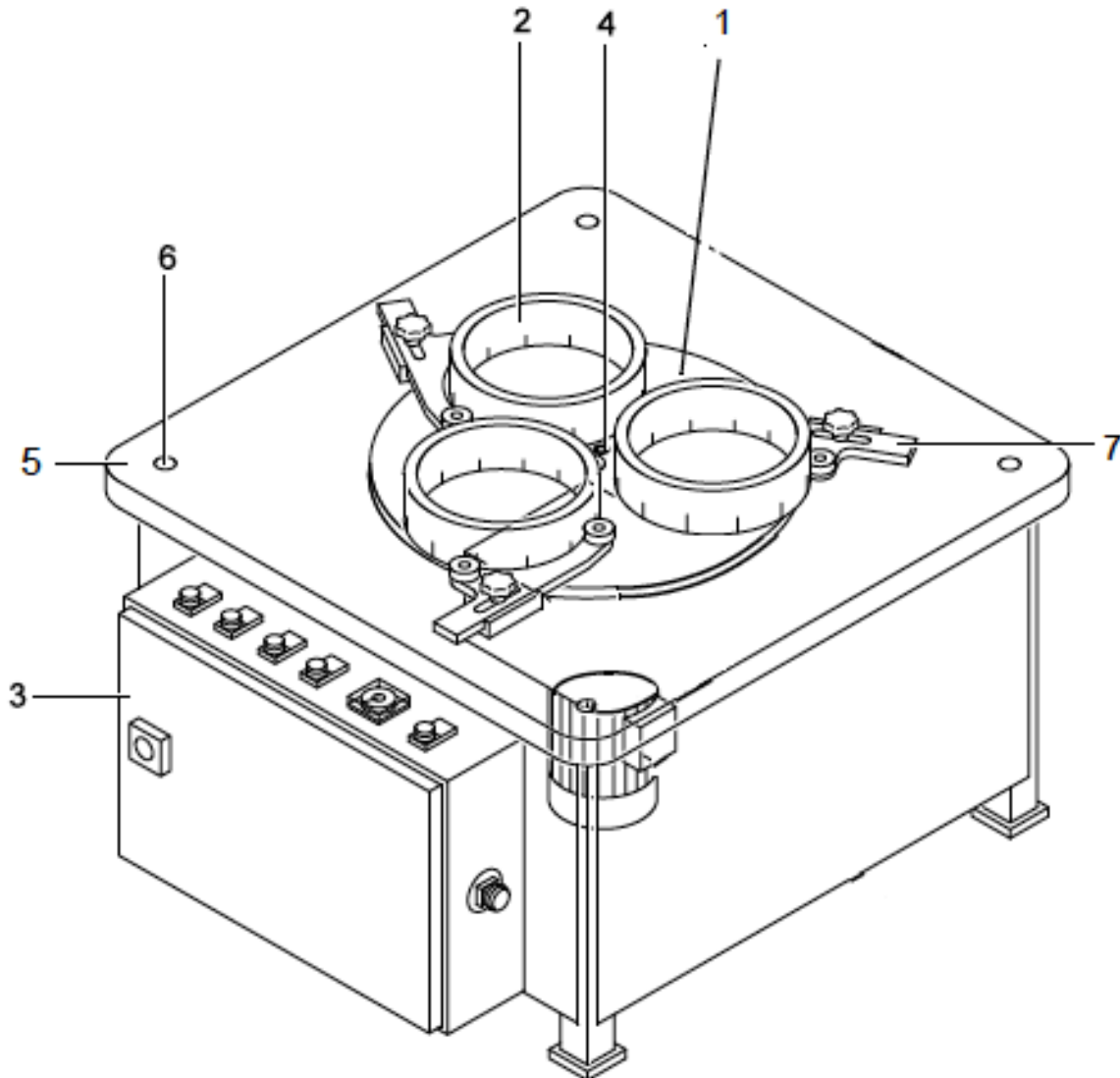


Fig. 5.1 Machine overview

- 1 – Table plate
- 2 - Dressing rings
- 3 - Control cabinet and control box
- 4 – Screws for lapping disc fixing
- 5 - Machine table
- 6 - Screws for table height adjustment
- 7 - Roller yoke and guide rail

6 Technical data

Technical data for EL 380

Number of dressing rings	3 items
Dressing ring internal Ø	140 mm
Lapping disc Ø	380 mm
Speed control.....	no
Lapping disc speed.....	60 rpm
Machine length without pneumatics.....	725 mm
Machine width	620 mm
Machine height without pneumatics.....	400 mm
Machine height with pneumatics.....	1075 mm
Supply load.....	400 volts, 3~50 Hz
Fuse	16 A, slow-blow
Connected load.....	1.2 KVA
Drive motor	0.55 kW
Pump motor.....	0.08 kW
Lapping medium /tank contents.....	6 l.

Weight

Weight without pneumatics.....	approx. 150 kg
Weight with pneumatics.....	approx. 200 kg

7 Operation / control

Unpacking the machine

- (1) Remove all packaging materials.



Dressing rings, weights and lapping discs are precision parts!

Handle them carefully and protect against damage.

- (2) Securely grasp the machine by the bottom crossmembers and position the machine at the machine location.

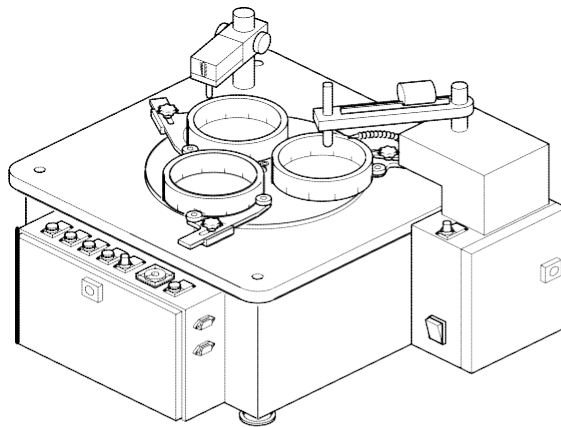
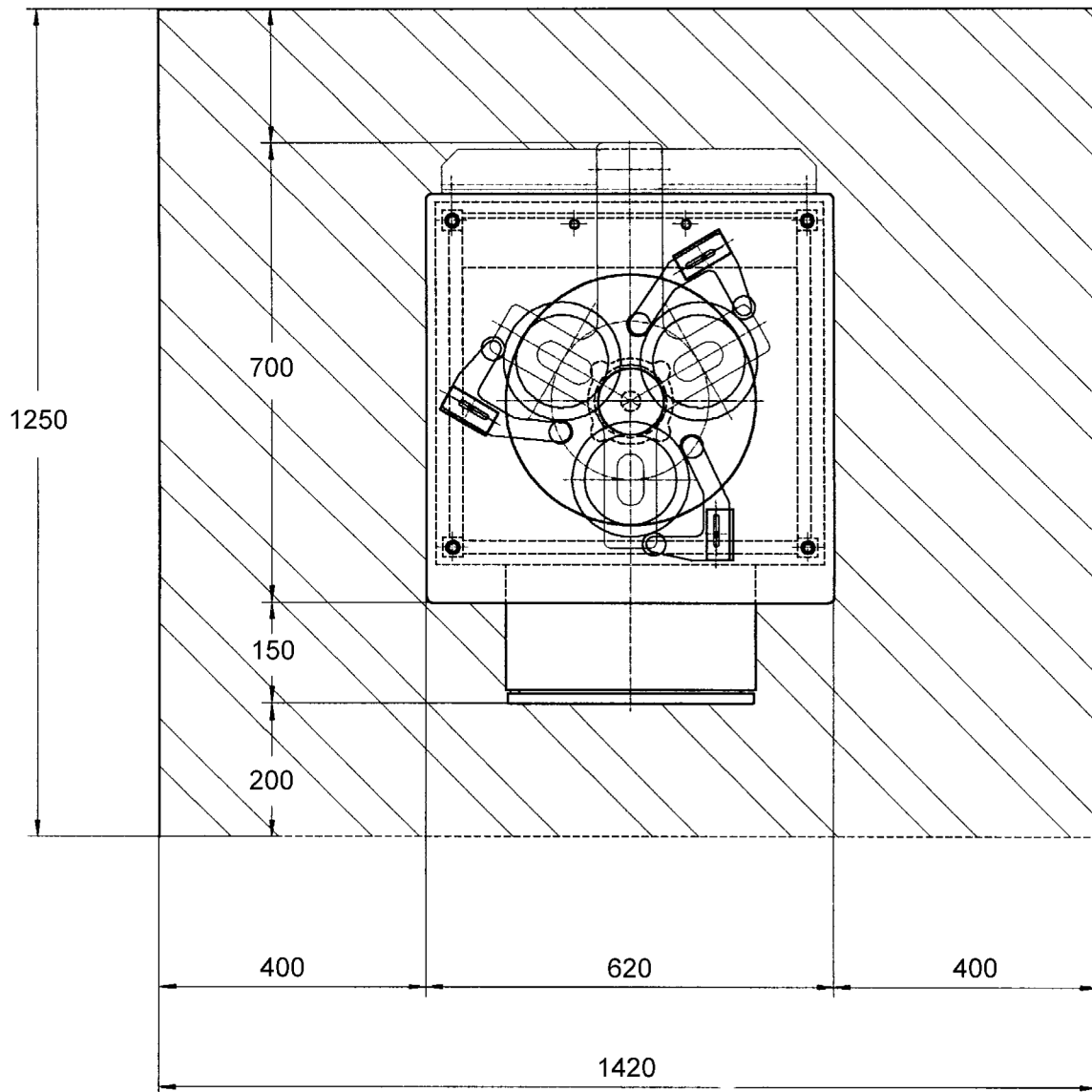


Figure 7.1

7 Operation / control

EL 380 layout plan



Dimensions in millimetres

Fig. 7.2

7 Operation / control

Machine location

- (1) Refer to layout plan in Fig. 7.2. for spatial requirements.



The machine location must not be exposed to any emissions caused by other machines (dust, vibrations)!

- (2) Align the machine using a spirit level; the lapping disc represents the reference surface.

Starting up the machine

- (1) Remove the dressing rings and hand weights from the lapping disc.
- (2) If a pneumatic contact pressure device is present, establish the air connection via the maintenance unit

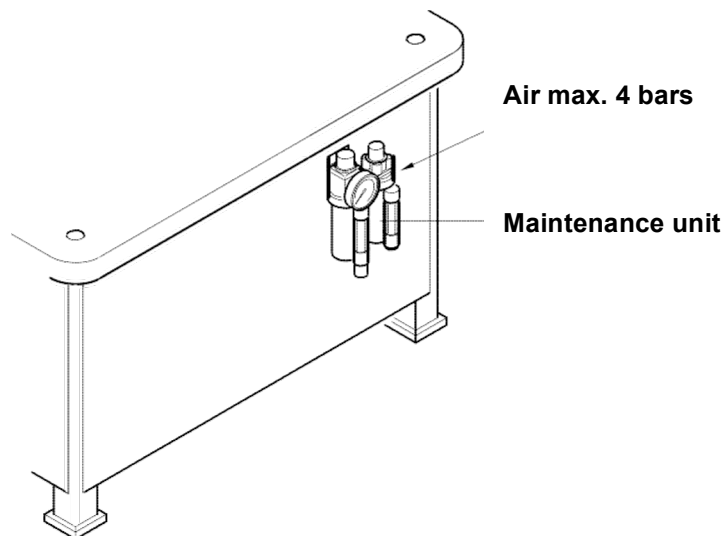


Figure 7.3

- (3) Move the contact pressure weights to the top end position by operating the control valves (see Fig. 7.7).
- (4) Plug the male connector on the machine connecting cable into a socket with the supply voltage specified in the tech. data.



Pay attention to correct earthing!

7 Operation / control

Check direction of rotation of the lapping disc

- (1) Set the main switch on the side of the control console to the on position.
- (2) Press the „START“ pushbutton (7.6/1).

CAUTION!

It is essential for the dressing rings to be removed from the lapping disc.

***The rings slip off the machine if the direction of rotation is incorrect!
Risk of injury!***

The lapping disc must rotate **anticlockwise**.

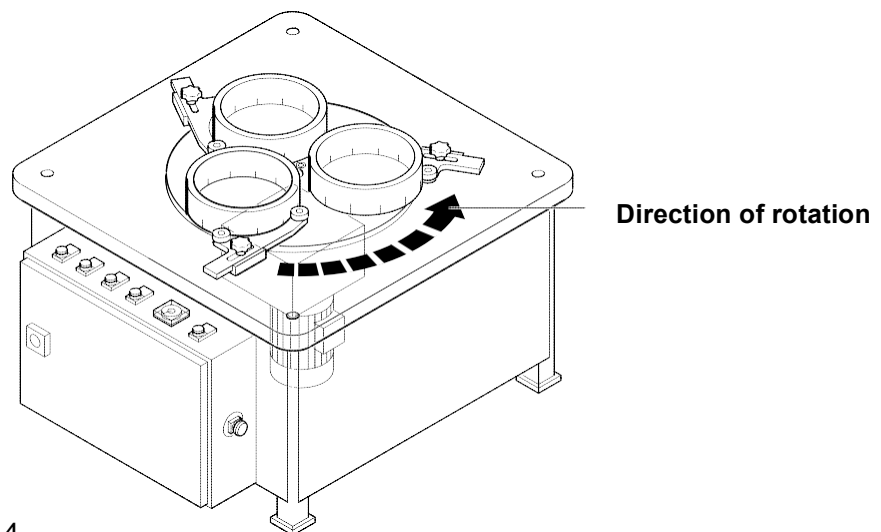


Bild 7.4

Figure 7.4

If the direction of rotation is incorrect, correction can be made by changing a phase of the electrical connection.

CAUTION! ***Only have this work performed by a skilled electrician!***

Further tasks for starting up

- (1) Degrease the dressing rings and lapping disc with a suitable medium.
- (2) Apply the dressing rings to the lapping disc in the "neutral" position.
- (3) Install the lapping medium tank with the pump and waste tank (see Fig. 7.5).

7 Operation / control

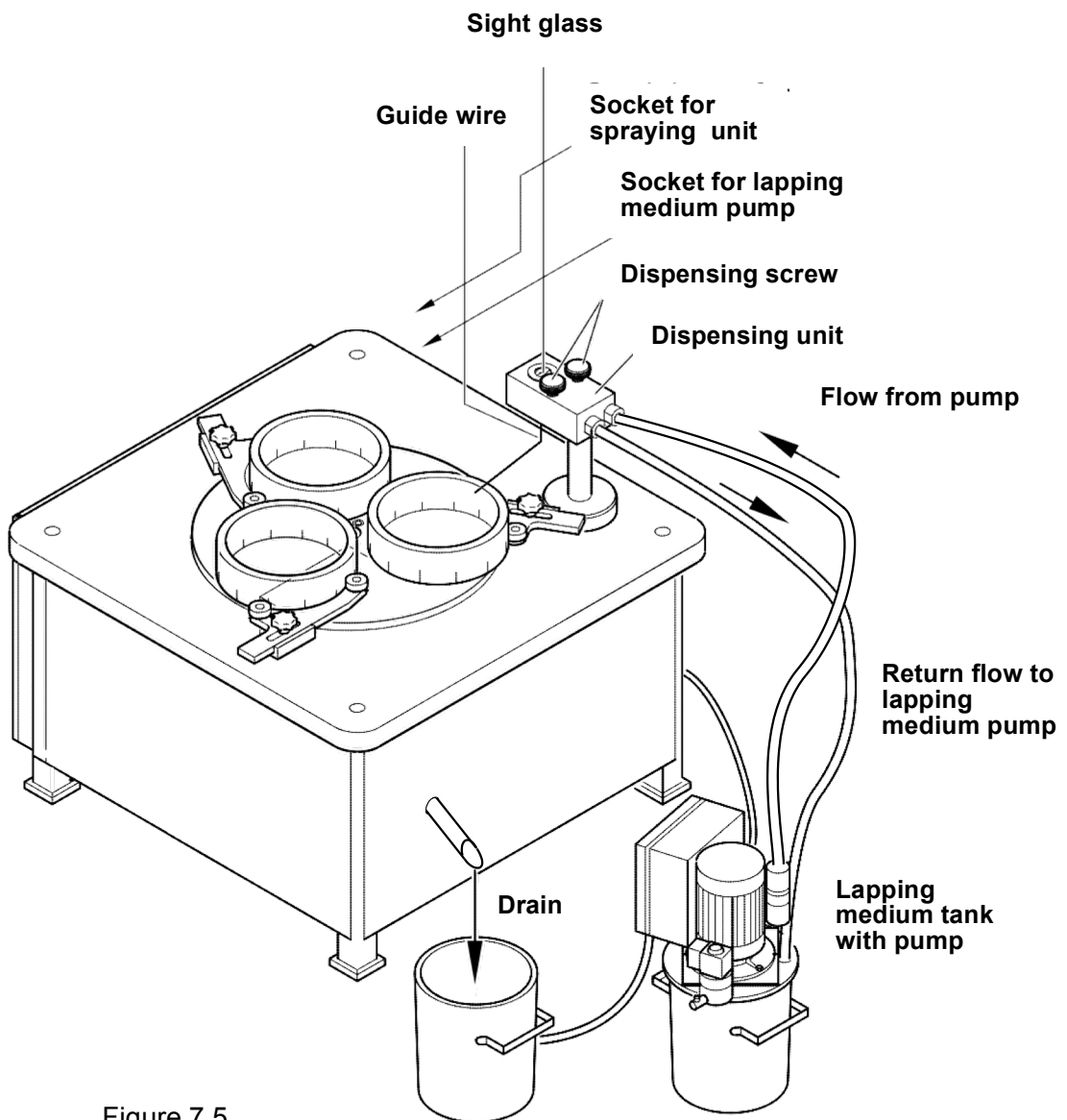


Figure 7.5

7 Operation / control

Control elements of lapping machine

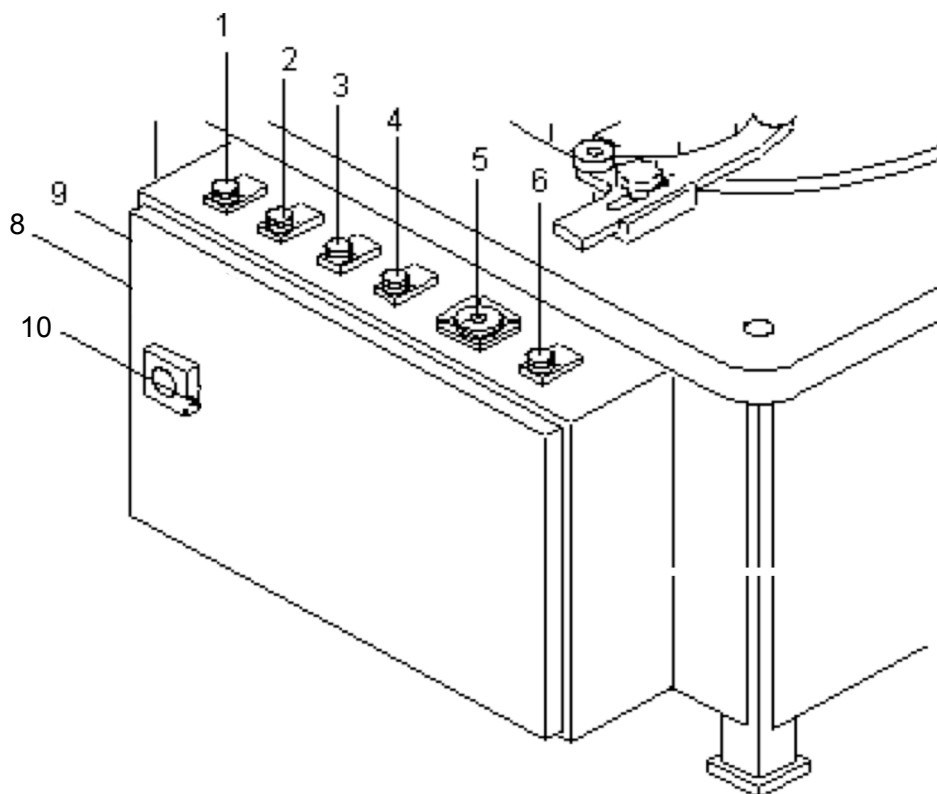


Figure 7.6

- 1 - Mains
- 2 - Machine ON
- 3 - Machine OFF
- 4 - Pump start
- 5 - Timer
- 6 - Indicator light: LAPPING TIME END
- 7 - 230 V socket for pendulum arm (permanent voltage in "ON" position of the main switch)
- 8 - 230 V socket for dispensing unit and pulse device activated via pump start (switched by means of "PUMP" start)
- 9 - Main switch

7 Operation / control

Contact pressure device (optional equipment)

The pneumatic contact pressure device is available for joke lapping machines of series „EL“ or as a retrofitting unit.

Structural diagram

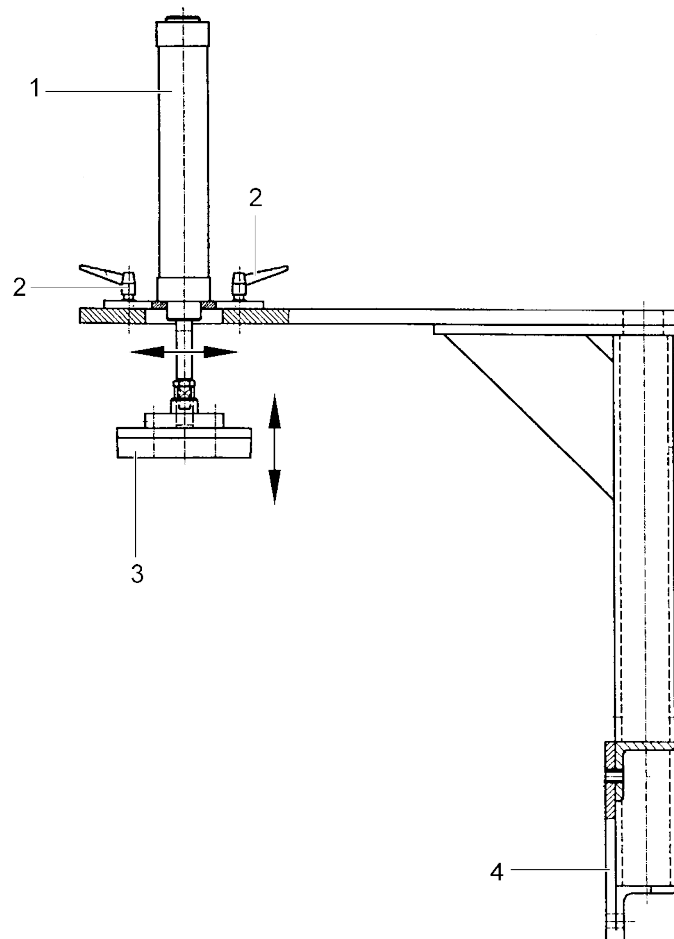


Figure 7.7

- 1 – Pneumatic cylinder
- 2 - Clamping screws for cylinder retaining plate
- 3 – Contact pressure plate
- 4 - Fixing flange for pneumatic contact pressure device

7 Operation / control

On the pneumatic contact pressure device, the three contact pressure cylinders (7.7/1) can be moved to their working and end position by operating the control valve.

After loosening two locking screws (7.7/2), the pneumatic contact pressure cylinders can be adjusted in position in relation to the position of the lapping machine dressing rings by means of a guide.

The necessary working pressure can be adjusted for all three contact pressure cylinders by means of a pressure relief valve.

The necessary contact pressure depends on the size of the surfaces to be processed and the type of machining process selected. It is generally determined empirically. (see chapter 12, annex 4.)

Reduce travel speed for safety reasons!



The cylinder travel speed is cut back to < 10cm/sec. for safety reasons.

7 Operation / control

General advice on lapping

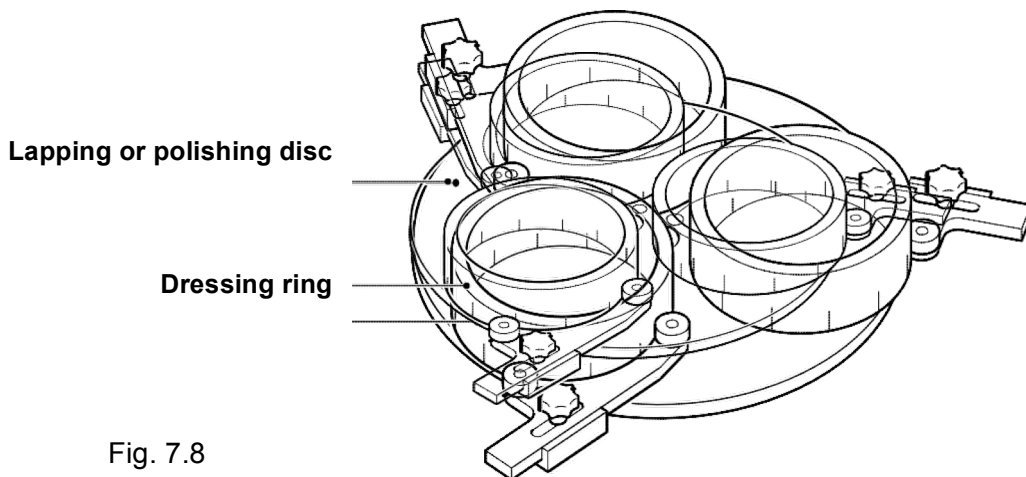


Fig. 7.8

The dressing rings serve to holding the lapping disc flat and guiding and receiving the workpieces in addition to distributing the lapping or polishing medium.

The dressing rings run at three positions against machine jokers which are capable of transferring shearing force.

The means of transmitting force to the workpiece is either the dressing ring itself (with the ring fully loaded) or a mask corresponding to the workpiece(s).

The mask is generally a hard paper disc with the internal dimension of the sealing ring and recesses for receiving the workpieces.

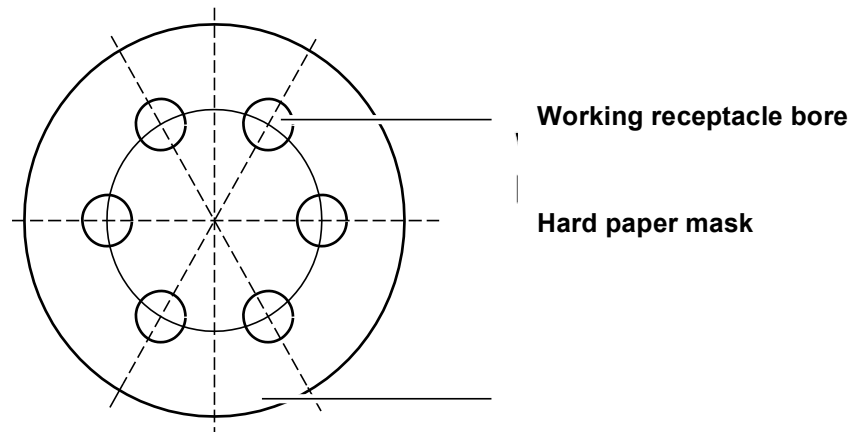


Fig. 7.9

7 Operation / control

This mask should have approx. 1 - 2 mm of play in relation to the dressing ring; the workpieces should have approximately the same play in the mask in order to ensure flat contact between the workpiece surface and the lapping disc.

The hard paper masks are to be provided with suitable spacers (e.g. commercially available U washers) in order to limit the lapping process to the workpieces and the dressing rings.

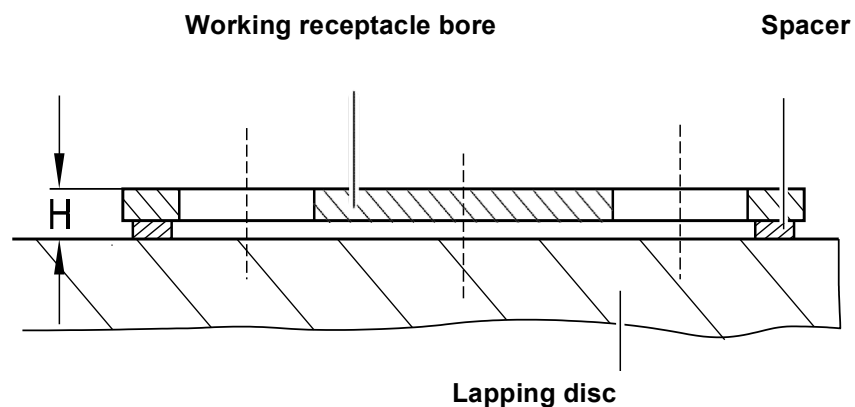


Fig. 7.10

The height "H" must be less than the height of the workpieces to be processed.

The dressing rings are fitted with workpieces after the lapping disc displays an adequate film of lapping medium.

This is achieved by a brief period of machining with the lapping machine running idle but with the lapping medium supply system activated.

When the dressing rings are equipped with workpieces, the contact pressure required for machining is created by applying the hand weights or, if the machine is equipped with a pneumatic system, by charging the contact pressure cylinder.

Compensation washers (soft rubber material) should be placed between the workpieces and the contact pressure weights to compensate for any differences in dimensions of the individual workpieces/ring.

7 Operation / control

Lapping

The following components are necessary for the machining process of "lapping".

- (1) Lapping disc made of fine-grained die-cast material.
- (2) Lapping medium pump with tank and waste tank (optionally with pulse device).
- (3) Lapping medium (abrasive), e.g. Al_2O_3 , Sic or B_4C .
- (4) Lapping fluid.

Setting up the lapping machine

- (1) Mix abrasive and lapping fluid (oil or H_2O with corrosion protection) in the lapping medium container at a ratio of approx. 1:7 (standard).

The mixing ratio must be varied depending on machining parameters.



Observe max. lapping medium height.

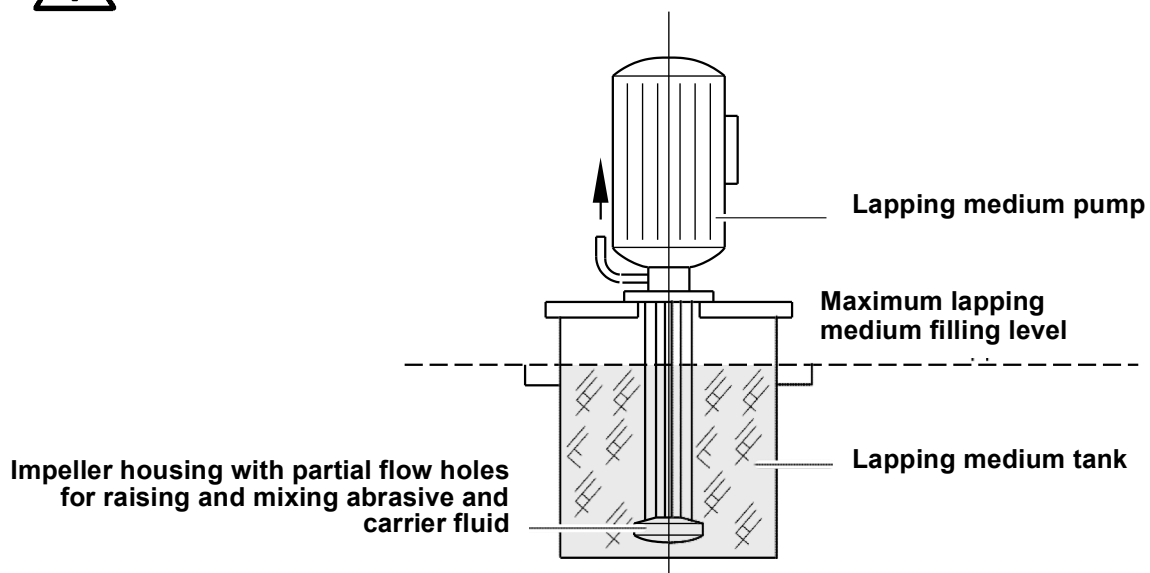


Figure 7.11

7 Operation / control

- (2) Position the lapping medium and waste tank on the machine. Install the lapping medium pump (Fig. 7.5).
Connect the pump to the socket (7.6/8).
Connect the pulse device to the socket (7.6/9)
- (3) Press the "PUMP" ON button (7.6/3). The lapping disc does not rotate yet, but is however wetted with lapping medium.
- (4) Both the machine and the lapping medium flow rate can be halted by pressing the machine "OFF" button (7.6/2).
- (5) Furthermore, the pump starts automatically on pressing the "ON" button (7.6/1).
- (6) Load the lapping machine with workpieces (see "General advice").
- (7) Adjust the lapping time on the timer (7.6/6). The normal time range of the timer is 30 minutes.
Other time ranges 30 sec. - 3 min. - 30 min. - 3 hrs. may be set.

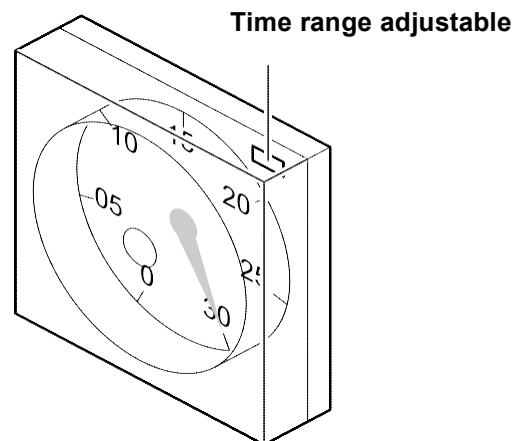


Figure 7.12

Set the timer indicator to the desired lapping time.

The indicator runs back to "0" and the machine switches off automatically.

7 Operation / control



The machine cannot be started if the time indicator is set to "0".

- (8) Start the lapping machine by pressing the machine "ON" pushbutton (7.6/1).

The machine is equipped with soft start and only achieves the preset speed after a few seconds.

This is necessary in order to avoid damaging the workpieces during machine start-up!

Once the preconfigured lapping time (7.6/5) has elapsed, the machine switches off automatically.

- (9) Both the machine and the lapping medium flow rate can be halted by pressing the machine "STOP" button (7.6/2).

The start-up time is set at the factory on the speed control unit. (See annex Control unit).

The necessary processing parameters for the process can be requested and determined in the application technology department at tel. no. 002204/839-77.



Polishing and lapping

The following components are required for polishing and lapping:

- (1) Polishing and lapping disc
- (2) Dispensing device and spray arm.

Selection of the appropriate polishing and lapping disc in conjunction with the diamond suspension (grit size) is made based on the desired process results.

Our application technology department, tel. 02204/ 839 - 77 is at your disposal for recommendations concerning processing.

7 Operation / control

Setting up the machine for the polishing and lapping process

- (1) Screw the glass vessel under the dispensing device.

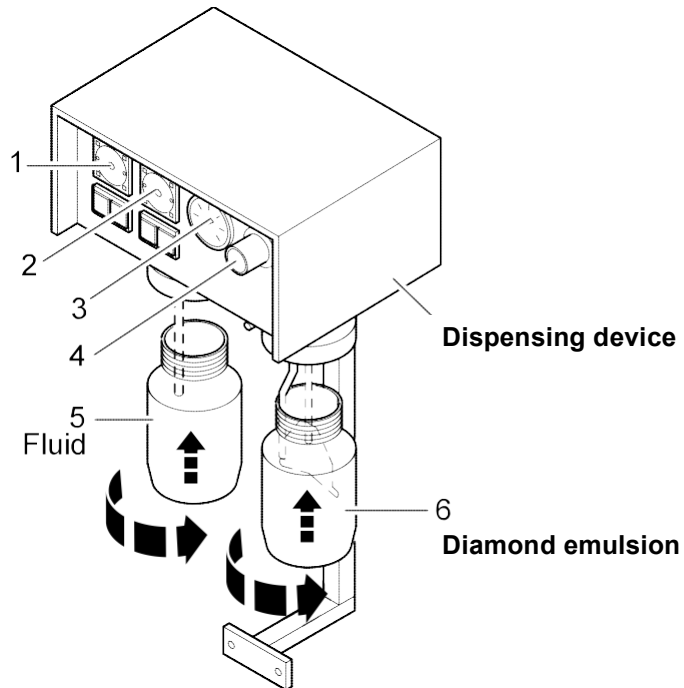


Figure 7.13

- (1) Connect the dispensing device to air and electric power.

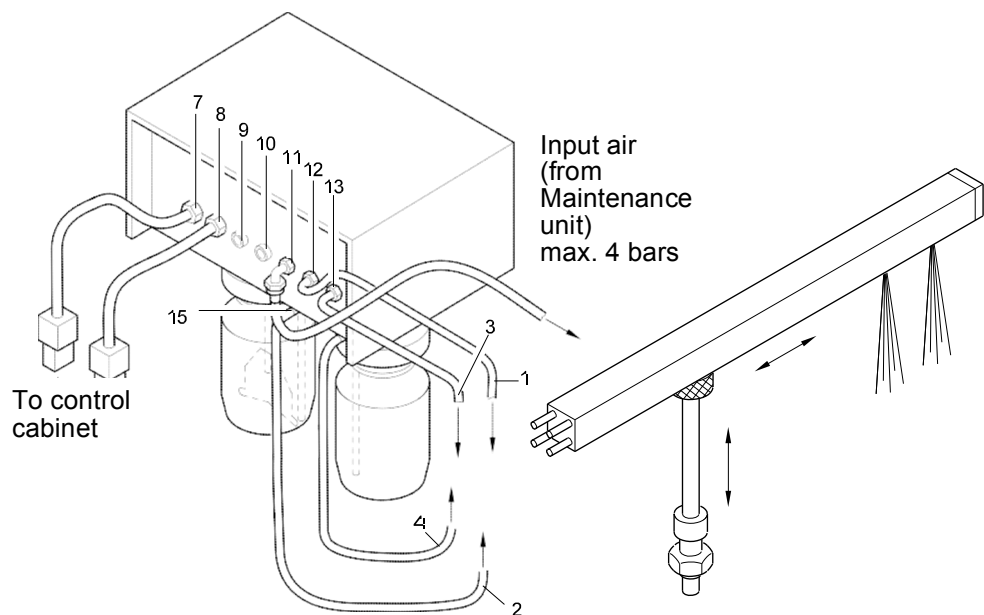


Figure 7.14

7 Operation / control

Establishing connection between the dispensing device - spray arm

Dispensing device outlet (7.14/12) to spray arm inlet (7.14/1).

Dispensing device outlet (7.14/13) to spray arm inlet (7.14/3).

Diamond emulsion outlet (7.14/14) to spray arm inlet (7.14/2). Fluid outlet (7.14/15) to spray arm inlet (7.14/4).

Dispensing device inlet (7.14/11) to maintenance unit outlet (max. 4 bars).

Establishing connection between the control cabinet (lapping machine) - dispensing device

Connect the male connector (7.16/7) of the dispensing device to the socket (7.6/11) of the control cabinet.

Connect the male connector (7.14/8) of the dispensing device to the socket (7.6/10) of the control cabinet.

The dispensing device is equipped with two separate circuits to allow spraying of the diamond suspension or the fluid on to the polishing and lapping disc at different spraying times and intervals.

Solenoid valves are activated via timers and the compressed air initiates the spraying process by means of the spray arm equipped with 2 jets.

7 Operation / control

Adjusting the timeswitches

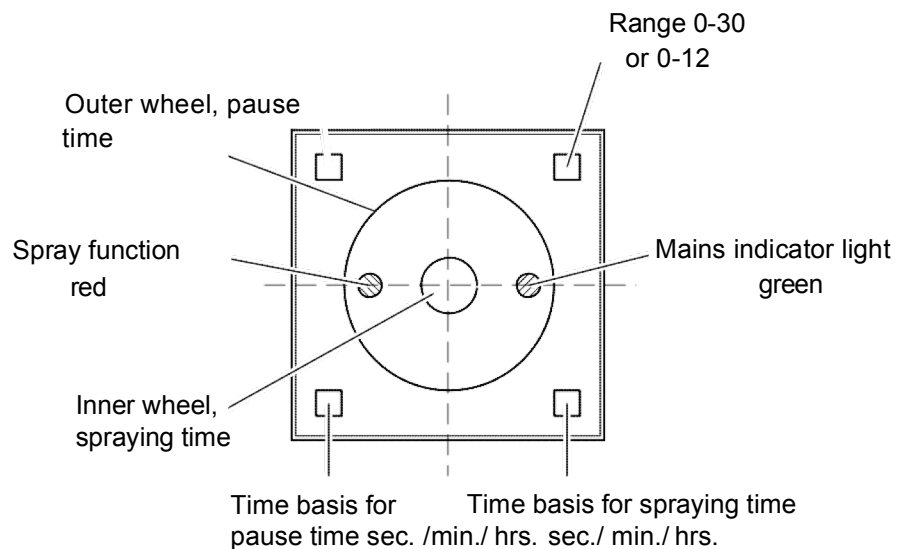


Fig 7.15

The spraying times and intervals must be selected in each case for the process parameters.



The polishing and lapping disc must not be excessively wet during polishing and lapping, as the workpieces only glide in this case without the desired stock removal!

The spraying process is started taking account of the times configured on the spraying unit by pressing the "PUMP" pushbutton (7.6/3) or "START" pushbutton (7.6/1) on the control cabinet of the lapping machine.

The spraying process stops automatically when the machine is switched off.

Switching off by pressing the "STOP" pushbutton (7.6/2) or after expiry of the set time on the lapping machine timer (7.6/5).



Polishing and lapping discs consist of metal powders and a synthetic resin compound. Since the geometry of the polishing and lapping disc has a decisive influence on workpiece accuracy, careful treatment of the polishing and lapping disc is required.

Projecting burrs on the workpiece result in corresponding grooves in the polishing and lapping disc coating.

Ensure burr-free workpieces

7 Operation / control

Preparation of the multi-metal discs for use on flat lapping machines

If a polishing and lapping system is to be installed on an existing lapping machine, the latter machine must be thoroughly cleaned first.

Particular attention is to be paid in doing so to the conventional grinding medium container and the supply pipes. After cleaning the container must be filled with Al_2O_3 (13 μm) - article no.: 3638031- mixed with lapping oil.

The mixing ratio is:

1/2 kg grinding medium per 5 l of oil or water.

Once the dressing rings have been cleaned and checked for damage, they are applied to the polishing and lapping disc and are rotated by hand in order to ensure that no damage is present.

The machine should subsequently run for approx. 10 minutes using the above grinding medium. (No other grinding medium type and no other grit size may be used for this purpose).

The polishing and lapping disc must be checked for flatness (smoothness) and the machine is to run with the dressing rings in position until the desired flatness has been achieved.

The polishing and lapping disc, dressing rings and the surrounding area must subsequently be cleaned in order to remove all traces of the grinding medium used.

After selection of the appropriate diamond emulsion, the dressing rings must run in a neutral position for approx. 10 minutes while diamond suspension is used in the recommended quantities.

The polishing and lapping disc and machine are now ready for operation.

The polishing and lapping disc should be just moist during operation; it must not be as wet as is the case during conventional lapping.



All traces of the previous grinding medium must be removed when changing the polishing and lapping discs and the diamond suspension.

Polishing and lapping discs must be stored flat (level).

7 Operation / control

Changing the diamond suspension grit size

The discs must initially be dressed with Al_2O_3 (13 μm) when changing the diamond emulsion grit size.

This removes all remains of the previously used grit size.

Clean the disc, machine and dressing rings thoroughly afterwards.

Subsequently use the new grit size on the disc in the recommended quantities for approximately 10 minutes.

Installing the spraying unit on an existing lapping machine

The screw attachment position for the spraying unit depends on the position of the polishing and lapping disc, i.e. the level of the disc top edge in relation to the supply containers, as indicated in figure 12.1, must be observed.

The height of the spraying arm must be above the level of the fluids of the spraying unit.

The connecting hoses between the spraying device and spray arm should be kept as short as possible in order to avoid deposition of the diamond emulsion in the hose.

The operating pressure for the spraying unit is 0.5 - 1.0 bars.

Tip: **Flush the diamond suspension line with fluid in case of more prolonged stoppage!**

7 Operation / control

Control and correction possibilities for keeping the lapping disc flat

The grinding, lapping and polishing disc is equally exposed to attack by the abrasive during the machining process as the workpieces to be processed.

Consequently, stock removal also occurs on the lapping disc, of a shape-changing nature under certain circumstances. In order to be able to detect at an early stage and counteract this unwanted change in shape, the flatness of the disc should be checked daily at predetermined time intervals.

Three methods are indicated for this purpose:

- **Flatness testing by means of a flatness measuring gauge:**

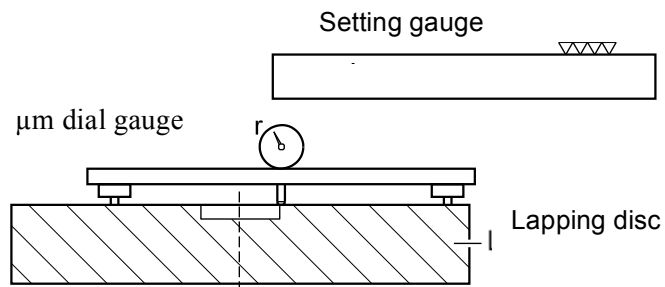


Figure 7.16

In this case, after setting the diameter to be tested and zeroing the dial gauge to the setting gauge (granite block), the deviation of the flatness is measured and can be recorded in magnitude as a numerical value.

- **Flatness testing by means of a workshop flat ruler and thin paper (e.g. cigarette paper):**

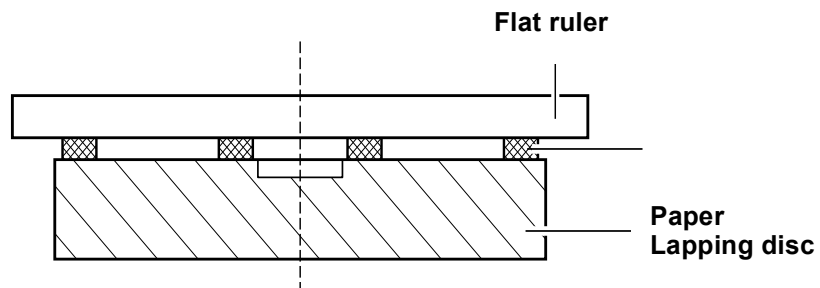


Figure 7.17

7 Operation / control

In this method, the lapping disc is tested for flatness by a tensile test on the paper strips.

- **Test block and interference measurement**

For this purpose, a flat workpiece (test block) is included in machining at a processing interval. After machining, the flatness of the test piece is checked with the aid of interference measurement.

The first method is the most practicable test method, as it is on the one hand easy and quick to perform and on the other hand, the flatness errors can be read directly on the dial gauge.

Scheme for interference testing

In order to control flatness of the lapping disc, the test block must be lapped on the latter and subsequently polished with paper.

The plane glass is subsequently applied and lightly pressed on the edge with a finger.

Light bands curved
around the finger mean:

convex test block
concave lapping disc

Light bands curved away from the
finger mean:

concave test block
convex lapping disc

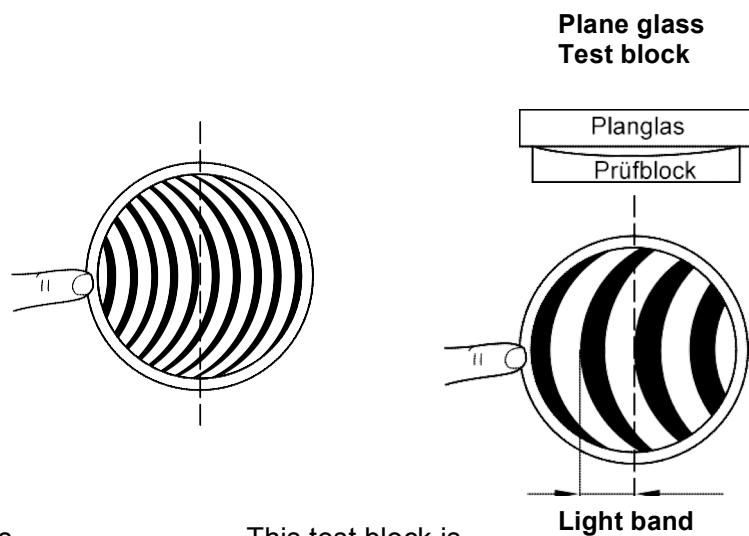


Figure 7.18

This test block is
3 light bands, convex.

This test block is
1 light band, concave.

7 Operation / control

Concave lapping disc
correct by adjusting
rings outwards.

Convex lapping disc
correct by adjusting the
rings inwards.

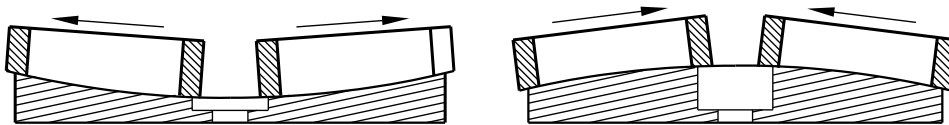


Fig. 7.19

For detailed information concerning testing of flat surfaces with interference testing devices and plan glasses, see special information on "Interference testing devices".

Dressing the polishing and lapping disc using the diamond dressing block

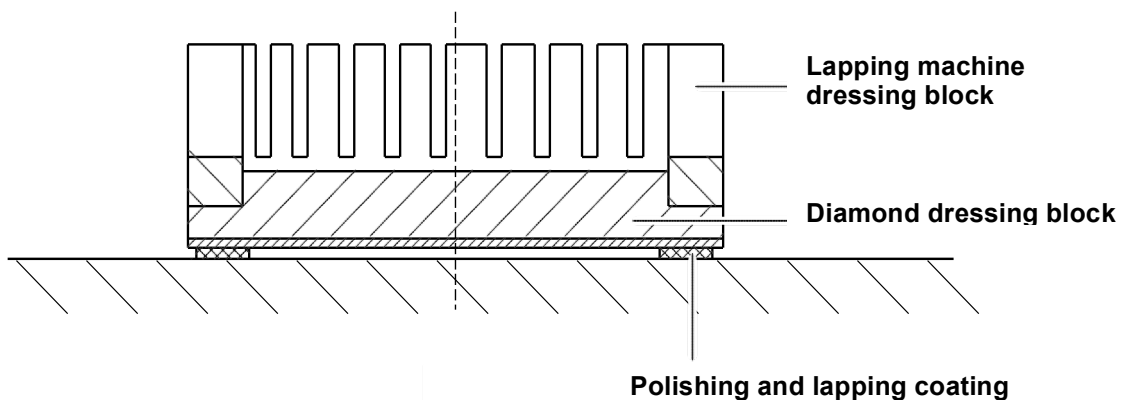


Figure 7.20

7 Operation / control

The most convenient and economical method for correcting polishing and lapping coatings is using the diamond dressing block.

Structure of the diamond block (art. no. 3645710):

- Aluminium carrier disc with eyebolt
- Self-adhesive diamond pellets
- Pellets have different grit sizes for the respective disc type (fine and coarse).

In order to perform dressing the DIA block is placed on the polishing and lapping disc at one of the three dressing ring positions.

The DIA block is guided in the lapping machine yoke by the inversely applied dressing ring.

The weight applied by the dressing ring is adequate for the dressing process.

Water-soluble fluid is used as the cooling lubricant for the dressing process when dressing the disc.

The following points must be observed during dressing:

- Weight applied: dressing and DIA block.

The weight may be further increased after a little dressing time.

max. 50%



- It must be ensured that the entire surface of the pellets does not project over the edge of the lapping disc during dressing.

If this is not observed, the pellets may become detached or a recess may occur on the polishing and lapping disc!



7 Operation / control

Advantages with the dressing process versus the dressing method using Al₂O₃:

- Shorter dressing time.
- Cleaning lapping medium (Al₂O₃) from the machine (disc and dressing rings) is dispensed with.
- Only water-soluble fluid is to be added during the dressing process (article no.: 3645645).

Replacement pellets:

Article no.: 3645755 - Fine (12 x required)

Article no.: 3645756 - Coarse (12 x required)

Flatness testing (workpieces)

The lapped parts have a dull matt surface. The surface of the parts needs to be polished so that it reflects in order to test the lapped parts for flatness using monochromatic light.

- After cleaning the lapped part on fine polishing paper, dress until the surface reflects.
(Not required when machining using the polishing and lapping system.)
- Place the lapped and polished component under a monochromatic light source. The surface to be tested must face upwards in this case. The plane glass is subsequently placed on the lapped and polished surface.



Scrupulous cleanliness is required.

- The monochromatic light is reflected from the surface of the surface to be tested by means of the plane glass, with a series of dark bands appearing.

When the surface of the part to be tested is absolutely flat, the bands are straight and parallel. If the bands are curved, the surface is uneven.

- Details: see brochure.

For detailed information, see special information on "Interference testing devices".

8 Troubleshooting

See annex:

Observe manufacturer's instructions for geared motor and control unit.

9 Care and maintenance



Disconnect the mains voltage cable from the socket before beginning work.

Care

- The lapping machine is properly lubricated before leaving the factory.
- The roller yoke bearings are lubricated for life.
- A gear oil change is necessary after 16,000 operating hours or after 3 years at the latest.
- See the annex Gears for detailed instructions.
- Machines with pneumatic contact pressure device; cylinders can be operated without OIL.

Handle the dressing rings with care and avoid damage!



- Rub dry and lightly grease the rings afterwards.
- Lapping disc and dressing rings: once the working time is over, take the dressing rings off the machine and clean with water or oil-soluble cleaner depending on the lapping fluid used.
- Also clean the lapping disc.
- After dismantling the lapping disc and carrier, the lapping disc trough can be lifted out for thorough cleaning.
- During machine stoppage, it is expedient to cover the lapping plate (e.g. with film) in order to avoid contamination.
- Do not cover polishing cloths with film.



Contamination on the lapping disc results in scratches on the lapped surface.

10 Consumables

Detailed documents concerning

- Lapping and polishing media,
- Lapping and polishing discs,
- Dressing rings and similar

refer to joke polishing and lapping system brochure.

11 Spare parts



The position of the expendable parts and spare parts is dealt with in the following figure!

Spare parts for EL 380

Pos. no.	Item no.	Designation	Qty.
1	3637003	Lapping disc, grooved D = 380 mm	1
	3637103	Lapping disc D = 380 mm	1
2	3637303	Dressing ring, grooved 140/178x45	1
	3637403	Dressing ring 140/178x45	1
3	3635108	Hand weight 517-016-4	1
4	3635107	Compensation felt	1
5	3635103	Workpiece holder	1
6	32010446	Wiper 517-035-3	1
7	32003188	Hose, transparent PVC-NW35x5	1
8	32004443	Ribbed belt PJ/762-4	1
9	32004442	Three-phase motor 0.55 KW, 1500 l/min	1
10	32003670	Worm gear ZAE-E63/30:1	1
11	32004223	Immersion pump KTA 25/220	1
12	3635113	Pump mounting 517-205-3	1
13	3635114	Lapping medium tank 517-204-2	1
14	3635114	Waste tank 517-204-2	1
15	3635116	Castor, cpl. 517-032-4	1
16	31730955	O-ring OR28.00-3.00	1

11 Spare parts

Spare parts for EL 380

#

17	32003622	Pneum. Andruckvorrichtung	1
18	31730206	Flanschlager FLCTE 17	1
19	32003623	Pneumatikgewicht 517-103-4	1
20	31730009	Rillenkugellager 6000 2RS	1
23	32004218 32004219	Einschraubstutzen G 1/8-NW 6 Einschraubstutzen G 1/8-NW 8	1 1
24	32003647	Dosierblock 517-202-2	1
25	3635132	Dosierschraube, kompl. 517-206-4	1
26	31730950	O-Ring, Dosierschraube OR 5.00-1,20	1
27	32002825 31722531	Schlauch, klar PVC-NW8x2 Schlauch, schwarz PU-6	1 1
28	31722201	Dichtscheibe G-1/8	1
29	3635133	Tropfgeber 527-063-4	1
30	32003651	Führungsdraht 527-064-4	1
33	3635130	Dosierblock, kompl. 517-201-2	1
34	31733366	Klemmhebel 42-M6-20	1
35	31720235	Pneum. Zylinder DW-40-H250	1
36	32004611	Kreuzgriffschraube 40-M8-15	1
40	32003182	Joch 600-284-3	1
41	32003628 32005173	Jochhalter, Standard 517-015-4 Jochhalter, Pneumatik 517-115-4	1 1

Pneum. contact pressure device
Flange bearing
Weight of pneumatics
Grooved ball bearing
Hex spud Hex spud
Dispensing block, cpl.
Dispensing screw
O-ring, dispensing screw
Hose, transparent Hose, black
Sealing washer
Dripper
Guide wire
Dispensing block, cpl.
Clamping lever
Pneum. cylinder
Star handle screw
Yoke
Yoke holder, standard Yoke holder, pneumatic

11 Spare parts

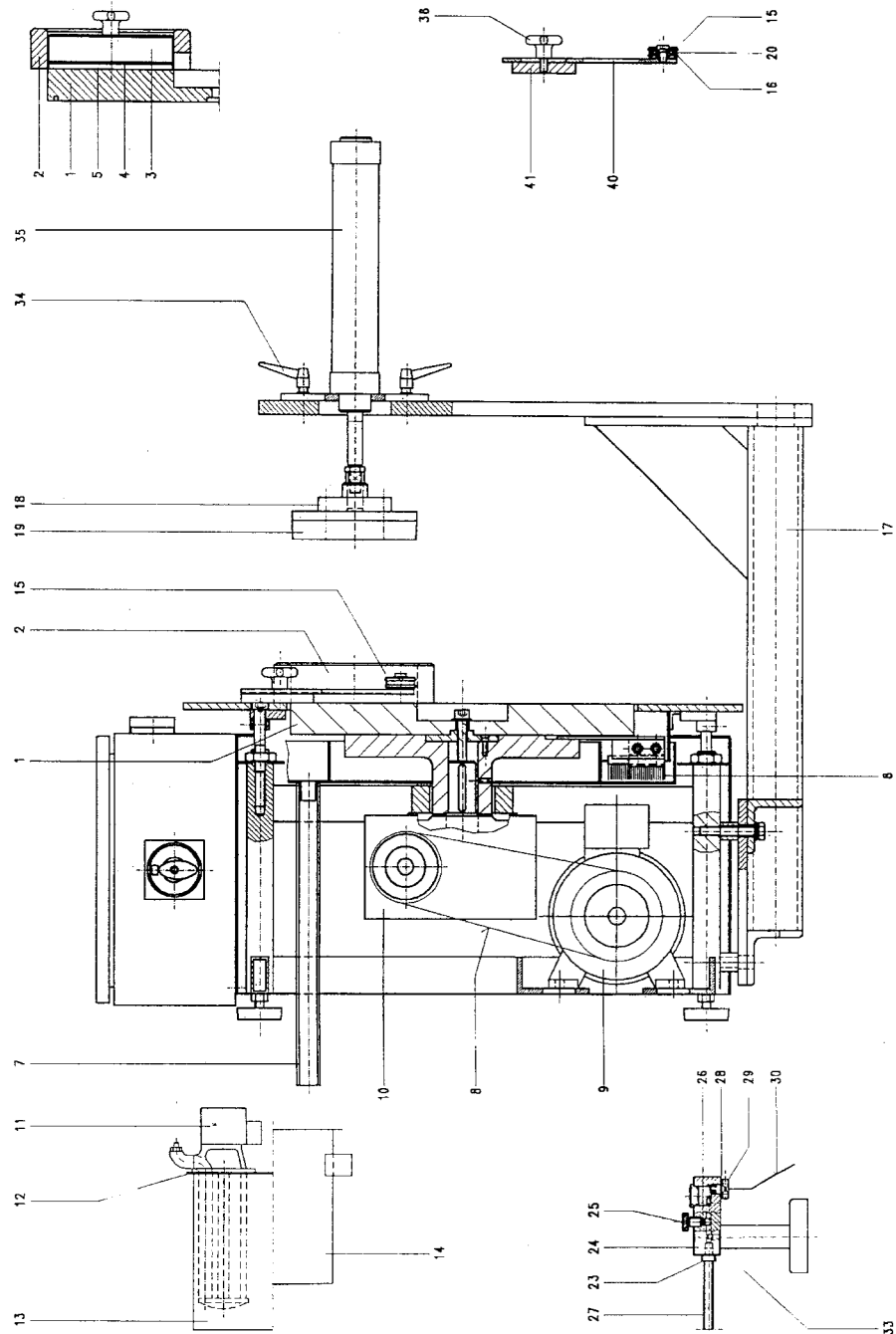


Figure 11.1

12 Annex

- 1 Dispensing device (option)
 - 1a - Spraying unit old version 809-B
 - 1b Spraying unit new version S1-08
- 2 Control unit (Lenze)
- 3 Gear ZAE
- 4 Lapping pressure EL 380 with contact pressure device

12 Annex

Enclosure 1

Dispensing device

1. Fluid circuit
 - 1.1 Spraying process triggering by hand
 - 1.2 Spraying process triggering by automatic time control
2. Diamond emulsion circuit
 - 2.1 Spraying process triggering by hand
 - 2.2 Spraying process triggering by automatic time control
3. Pressure gauge
4. Pressure control
5. Container for lubricant
6. Container for diamond emulsion
7. Connecting cable for stirrer
8. Mains connection 220V
9. Fuse holder - stirrer motor
10. Fuse holder - control circuit
11. Compressed-air connection, 3 bars
12. Compressed-air hose connection for diamond emulsion
13. Compressed-air hose connection for fluid
14. Connecting hose to spray arm
15. Connecting hose to spray arm

12 Annex

Enclosure 1

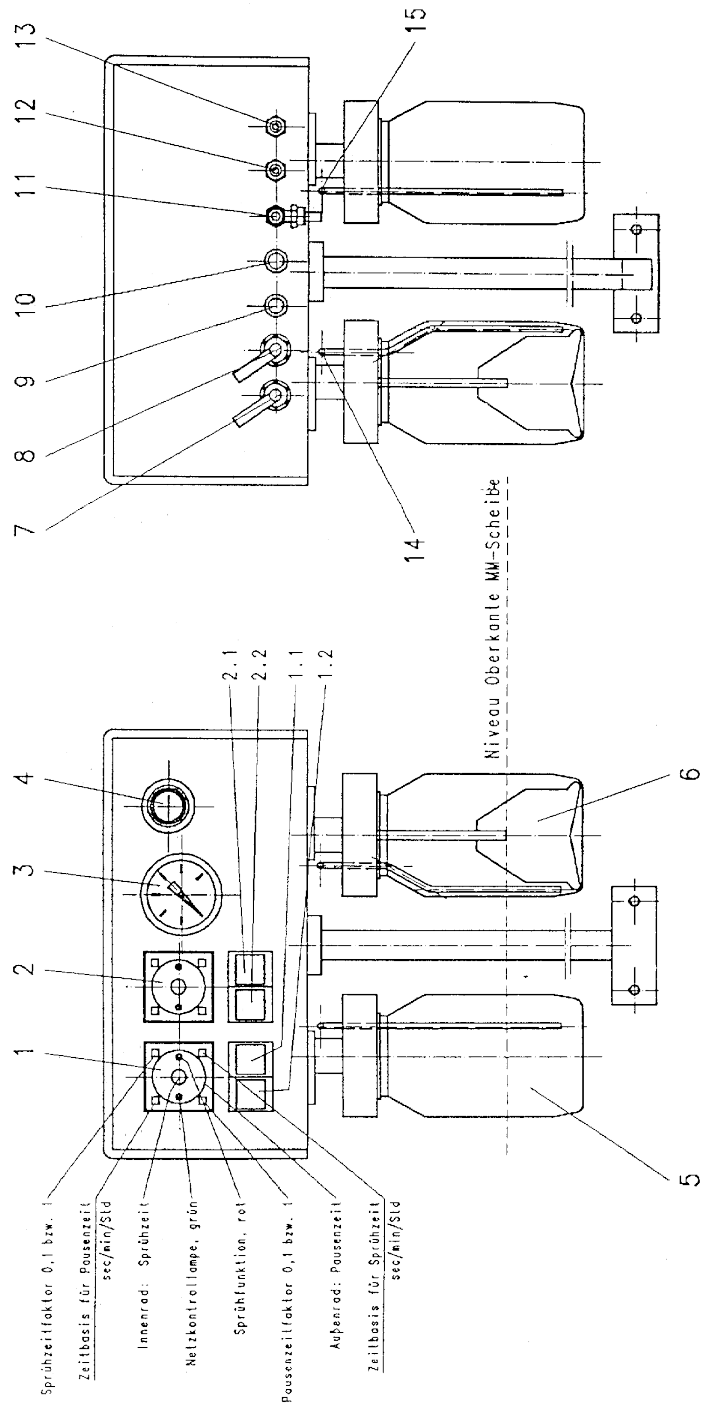


Figure 12.1

12 Annex

Enclosure 1a

Electrical parts list for circuit diagram no. S6350394 „Spraying unit 809-B“

Dispensing unit

Pos.	Order no.	Designation	Function
S1	3645830	Pushbutton red series 02	Automatic spraying Fluid
S2	3645831	Pushbutton white series 02	Manual spraying Fluid
S3	3645830	Pushbutton red series 02	Automatic spraying Diamond emulsion
S4	3645831	Pushbutton white series 02	Manual spraying Diamond emulsion
F1	3625120-1	Fuse 809B 250V/5x20 mm	Control
F2	2013688	Fuse holder	Control
M1	3645834	Drive motor replacement Type 826620	Stirrer
Y1	3645835-1	Solenoid valve Sirai Z 723 A	Air for spraying unit Fluid
Y2	3645835-1	Solenoid valve Sirai Z 723 A	Air for spraying unit Diamond emulsion
K1	3645836-1	Timer Syrelec JDR	Time for spraying process Fluid
K2	3645836-1	Timer Syrelec JDR	Time for spraying process Diamond emulsion
X1	31710844 32005358	Circular plug, old Square plug, new	Voltage supply permanently
X2	31710844 32005358	Circular plug, old Square plug, new	Voltage supply activated via Machine

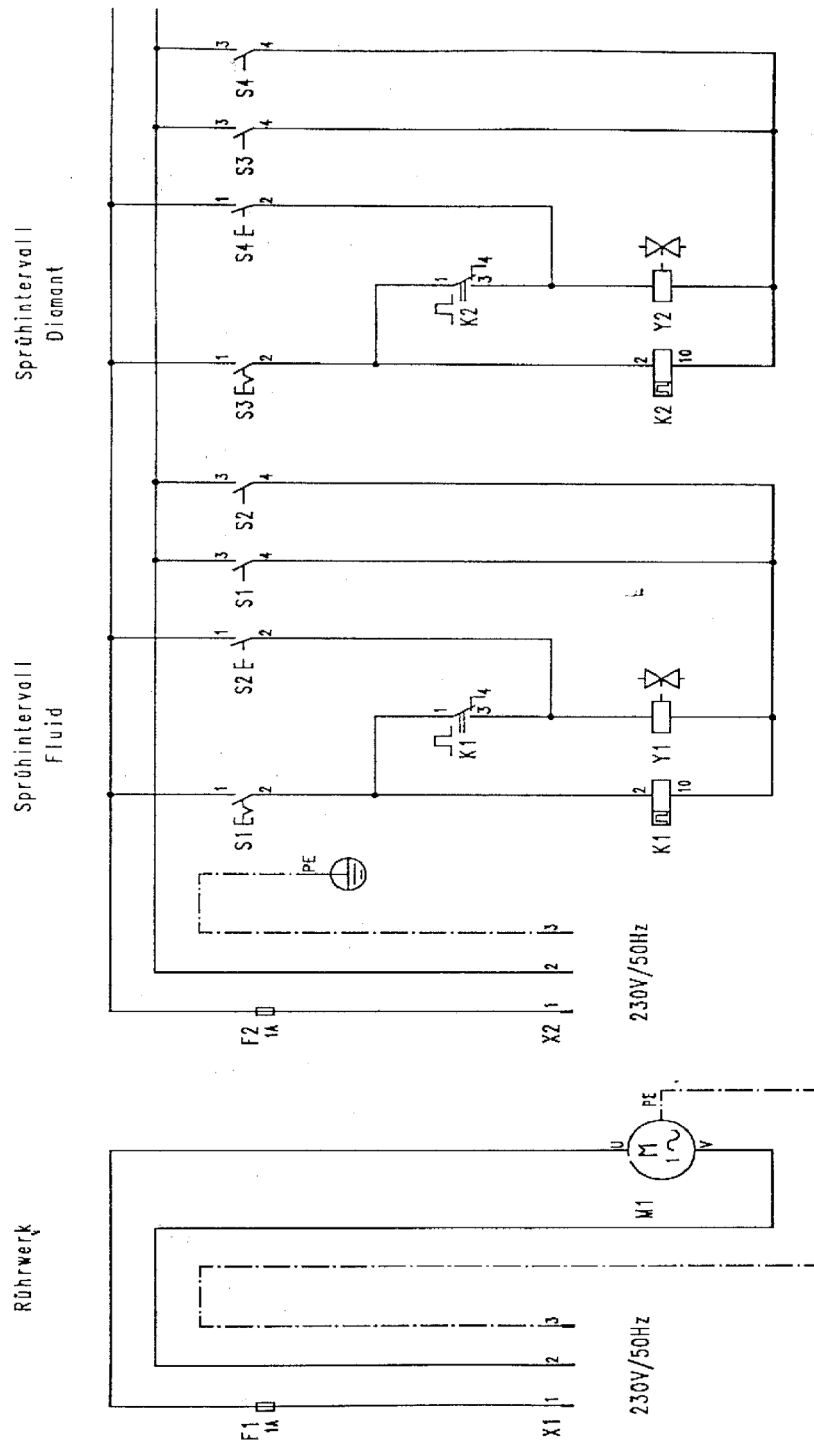
12 Annex

Enclosure 1b Electrical parts list, spraying unit S1-08

Pos.	Order no.	Designation
F1	3625120	Fuse 1A slow-blow, 250 V / 5 x 20 mm
F2	3625120	Fuse 1A slow-blow, 250 V / 5 x 20 mm
K1	3645836 3645837 3645838	Timer Cover Connection base
K2	3645836 3645837 3645838	Timer Cover Connection base
L1	.	
M1	3645834	Drive motor type 826620
N	.	
PE	.	
S1	3645829	Illuminated pushbutton, yellow
S2	3645828	Illuminated pushbutton, red with scale
S3	3645829	Illuminated pushbutton, yellow
S4	3645828	Illuminated pushbutton, red with scale
X1	32005358	Plug connector 250 V, 10A
X2	32005358	Plug connector 250 V, 10A
Y1	3645835	Solenoid valve for spraying unit
F2	3645835	Solenoid valve for spraying unit

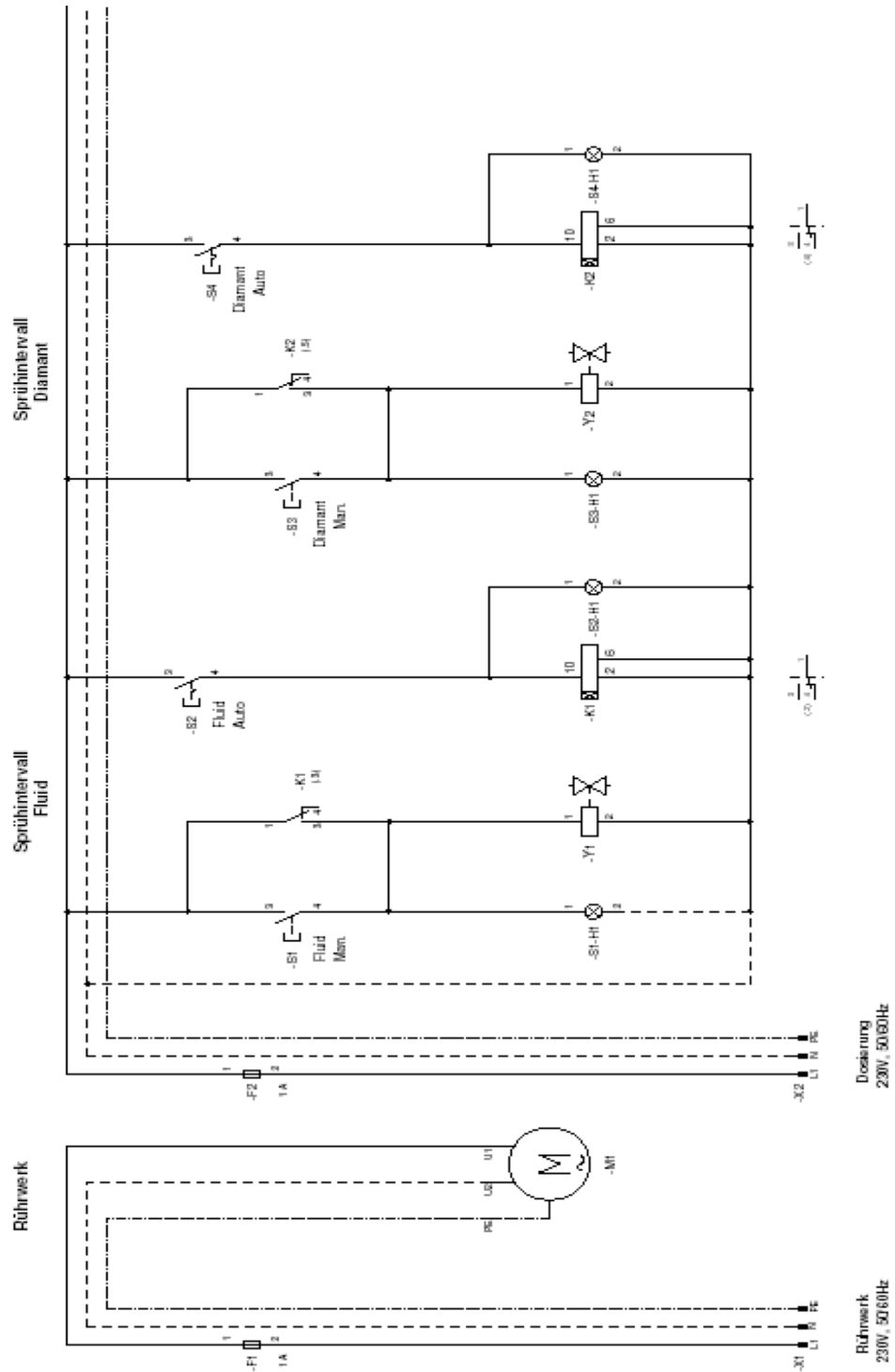
12 Annex

Enclosure 1a – Spraying unit 809B



12 Annex

Enclosure 1b – Spraying unit S1-08

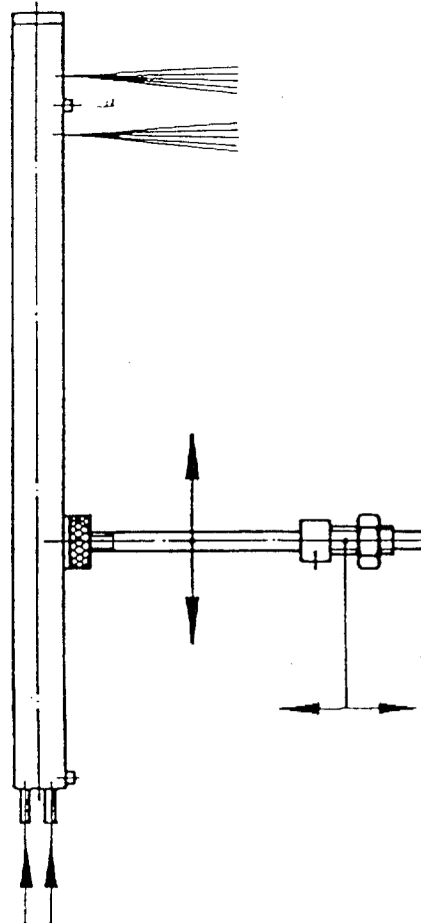
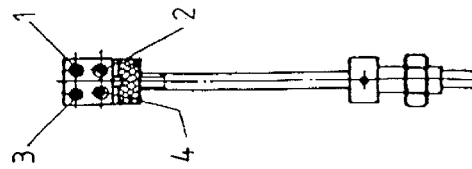
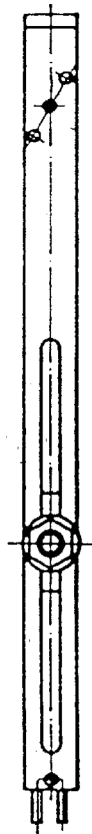


12 Annex

Enclosure 1

Schlauchanschlüsse

- 1 Druckluft, Diamant
- 2 Behälter Diamantsuspension
- 3 Druckluft Fluid
- 4 Behälter Fluid



Control unit (Lenze)

The speed of the drive motor is infinitely adjustable in conjunction with a frequency converter.

12 Annex

Enclosure 2

The frequency converter used:

Lapping machine, model	Speed controller – frequency converter, series, type	Order no.
EL 380	Series 8200; type 8202E.V002	2005318

The frequency converters are optimally configured by JOKE and are maintenance-free.

Speed control is performed by a potentiometer incorporated in the control cabinet.

The operating module of the frequency converter displays an error message in case of a failure. Please refer to our customer service department with the appropriate error code.

12 Annex

Enclosure 2

8.3 Error messages

Display	Malfunction	Cause	Remedy
----	No malfunction	-	-
EEr	External malfunction (TRIP set)	A digital input occupied by the TRIP set function has been activated	Check external generator
H05	Internal malfunction		Consultation with Lenze required
LU	Undervoltage	Intermediate circuit voltage lower than the value determined by C0173	Check mains voltage Check supply module
OC1	Short circuit	Short circuit present excessively high capacitive charging current of the motor lead	Seek cause of short circuit; check lead use a shorter or lower capacity motor lead
OC2	Earth fault	One of the motor phases has earth contact excessively high capacitive charging current of the motor lead	Check motor; check lead use a shorter or lower capacity motor lead
OC3	Drive controller overload during run-up or short circuit	- preset run-up time too short (C012) - faulty motor lead - winding short circuit in motor	Increase run-up time - check wiring - check drive design
OC4	Drive controller overload during run-down	- preset run-down time too short (C013)	- increase run-down - check design of the brake resistor and connect brake chopper
OC5	I x t – overload	Frequent and excessively long acceleration sequences with overcurrent Constant overload with $I_{Motor} > .05 \times I_{Nk}$	Check drive design
OC6	Motor overload	Motor is thermally overloaded by e.g. - impermissible constant current - frequent or excessive acceleration sequences	- Check drive design - Check setting of C120
OH	Heat sink temperature is above the fixed preselected value in the drive controller	Ambient temperature $T_u > 40^\circ\text{C}$ or 50°C Heat sink heavily soiled Installation position incorrect	Allow drive controller to cool down and ensure improved ventilation Check the ambient temperature in the control cabinet Clean the heat sink Change installation position
OH3	PTC monitoring	Motor too hot as a result of impermissibly high currents or frequent and excessively long acceleration sequences no PTC connected	Check drive design Connect PTC or deactivate monitoring
OH4	Device overtemperature	Interior of device too hot	- Reduce burden on the drive controller - Improve cooling - Check fan in the drive controller
OU	Overvoltage	Mains voltage too high Feedback mode Brake mode Creeping earth fault on the motor side	Check supply voltage Increase run-down times. In case of operation with a brake chopper: check dimensioning and connection of the brake resistor; increase run-down times. Check motor supply lead and motor for earth fault (disconnect motor from rectifier)
OUE	Overvoltage	Mains voltage lasts longer than 5 seconds	Check mains voltage
rSt	Error during auto TRIP reset	More than 8 error messages within 10 minutes	According to the error message displayed

12 Annex

Enclosure 1

Display	Malfunction	Cause	Remedy
Pr	Incorrect parameter transmission	Incorrect data transfer with the operating module PAR1 and PAR2 are faulty	Make sure to repeat data transfer or load factory setting before controller release
Pr1	PAR1 incorrectly transmitted	Incorrect data transfer with the operating module PAR1 is faulty	Make sure to repeat data transfer or load factory setting before controller release
Pr2	PAR2 incorrectly transmitted	Incorrect data transfer with the operating module PAR2 is faulty	Make sure to repeat data transfer or load factory setting before controller release

8.4 Resetting error messages

TRIP

- Once the malfunction has been eliminated, the pulse inhibit is only lifted by acknowledging the TRIP.

Hint!

If a TRIP source is still active, the pending TRIP cannot be reset.

Code	Description	Adjustment possibilities			IMPORTANT
		Lenze	Selection	Info	
C170↵	Error reset selection		-0- TRIP reset by STP key or LOW edge on RFR -1- Auto TRIP reset		
C171	Delay for auto TRIP reset	0	0 (1 sec.) 60		

Function It is possible to select whether errors arising are reset manually or automatically. Auto TRIP reset does not automatically reset all errors.

Activation

C170 = -0-:

- * TRIP manual reset
- * STP key
- * LOW signal at terminal 28

C170 = -1-:

Auto TRIP reset resets the following error messages after the time configured in C171:

- OC3 (overload during run-up)
- OC4 (overload during run-down)
- OC5 (overload)
- OC6 (I . t deactivation)
- OH (overtemperature)
- OUE (overvoltage in intermediate circuit)

Important

Mains switching always performs a TRIP reset.

In case of more than 8 auto TRIP resets within 10 minutes, the drive controller sets TRIP with the message rST (timer exceeded).

12 Annex

Enclosure 3

Gear ZAE

Lapping machine	Drive unit	Manufacturer	Order no.
EL 380	0.55 KW; 230/230V;50HZ; B3, 1500 1/min	Lenze	2004442

General

Electric motors have hazardous, voltage-carrying and rotating parts in addition to possibly hot surfaces. All tasks for transport, connection, starting up and regular maintenance are to be performed by qualified, responsible specialists (observe VDE 0105: IEC 364). Improper behaviour may cause severe **personal injury** and **material damage**. The respectively applicable **domestic**, **local** and **system-specific provisions** and requirements are to be observed.

Use as intended

These motors are designed for commercial systems. They comply with the harmonised standards of series **EN 60034 (DE0530)**. Use in the explosion-risk area is prohibited, unless otherwise expressly intended for this purpose (observe additional guidelines). If increased requirements are imposed in special cases - in case of use in non-commercial systems (e.g. contact protection for children's fingers), these conditions are to be ensured on the system side during setup.

The motors are dimensioned for ambient temperatures of between -20°C and +40°C in addition to installation heights <1000 m over sea level. It is essential to observe any indications to the contrary on the rating plate. The conditions at the site of use must correspond to all the data on the rating plate.

Low-voltage motors are components for installation in machinery in the sense of the Machinery Directive 89/392/EEC. Commissioning is forbidden until compliance of the final product with this directive has been established (observe EN 60204-1).

Enclosure 3

Operation

Vibration levels of $v_{\text{eff}} < 3.5$ mm/s ($P_N < 15\text{kW}$) and $v_{\text{eff}} < 4.5$ mm/sec. ($P_N > 15\text{kW}$) are harmless during coupled operation.

In case of deviations from normal operation - e.g. **increased temperatures, noises and vibrations**, the motor is to be switched off if **in doubt**. Determine the cause and consult the manufacturer if necessary. Do not deactivate protective devices even in trial operation.

Regularly clean the airways in case of high dirt levels. Open any blocked **condensation drain holes** from time to time!

In case of motors without a **relubrication system**, a bearing and grease change must be performed according to the manufacturer's indications; however after 3 years at the latest. Regrease the bearing by means of the **relubrication system** with the motor running. Observe the lubrication plate!

For motors with separate ventilation, the separate fan must be activated during operation.

Electrical connection

All work may only be carried out by **qualified specialists** with the machine out of operation, disconnected and previously secured against restarting. This also applies to auxiliary circuits (e.g. anti-condensation heating)

Check freedom from voltage!

Exceeding the tolerances in EN 60034 -I / IEC 34-1

- Voltage $\pm 5\%$, frequency $\pm 2\%$, curve form, symmetry - increases heating and affects electromagnetic compatibility. Observe rating plate data in addition to the connection diagram in the terminal box.

The connection must ensure a continuous and safe electrical connection (no protruding wire ends); use appropriate cable terminals. Establish a safe protective earth connection.

12 Annex

Enclosure 3

Tightening torques for terminal board connections

Thread Ø	M4	M5	M6	M8	M10
Tightening torque	08...1.2	1.8..2.5	2.7...4	5.5...8	9...13

Clearances of exposed, voltage-carrying components in relation to one another and against earth > 5.5 mm (UN< 690 V)

No foreign bodies, contamination or moisture must be present in the terminal box. Any unused cable entry openings and the box itself must be **closed so as to be dustproof and waterproof**.

Secure the **fitting key** for trial operation without drive elements.

In case of motors with a brake, check perfect function of the brake before starting up.

- Perform regular controls during operation.

Pay particular attention in this case to:

- unusual noises or temperatures
 - loss of seal
 - loose attachment elements
 - the condition of the electrical leads.
-
- If the fault cannot be remedied, please inform the JOKE customer service department.



Lapping pressure EL 380 with contact pressure device

Calculation example:

Workpiece to be polished 85x85mm: area 8.5x8.5cm
theor. contact pressure: 200g/cm²
1 part per dressing ring

Example: calculation of the contact pressure required:

8.5cm x 8.5cm x 200 g/cm² x 1 workpiece = 14450g/1000 =14.45Kg= 144.5N

Calculate the pressure to be set:

Calculation:

Total theoretical contact pressure = pressure in bars x (125.6N + 30N)
Value from cylinder force + contact pressure weight, see below)

Convert equation to pressure in bars

(Total theor. contact pressure – 30N)/ 125.6N = pressure in bars

(144.5N – 30N) / 125.6N=0.91bars

i.e. in order to place a load of 1445N or 14.45 Kg on my component, I must set a pressure of 0.91 bars at the pneumatic cylinder.

Cylinder force calculation: pneumatic cylinders have a diameter of 40mm

1 bar = 0.1N/mm²

1Kg=10Newton

Contact pressure plate weight=3Kg(30N)

Cylinder force calculation at 1 bar:

40mmx40mmx0.785= 1256mm²x0.1= 125.6Newton

Total force placed on the workpiece:

at a pressure of 1bar: 125.6N + 30N(contact pressure plate) =155.6N=15.56Kg

or at 2.5 bars: 2.5x125.6N + (30N)=344N=34.4Kg

p.p. Stefan Spiegel

-Product Manager-