Operating manual

for the pneumatically stationary honing machine

Engine	48/60	621-102-000
	28/33+32/40	621-105-000
	48/60	621-109-000

Revision 1.0 - 06 / 2012

GERUS Apparatebau GmbH & Co KG

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EG-Konformitätserklärung

Wir, die Firma

GERUS Apparatebau GmbH&CO.KG
Engelschalkstrasse 16
86316 Friedberg, Deutschland,

erklären hiermit, dass die nachfolgend bezeichnete Maschine aufgrund ihrer Konzipierung und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den einschlägigen Sicherheits-und Gesundheitsanforderungen den nachfolgenden angeführten EG-Richtlinien entspricht.

Maschinenrichtlinie 2006/42/EG
EMV-Richtlinie 2004/108/EG

Bezeichnung der Maschine:
Description of the machine:

Honvorrichtung
Honing device

Typ:
Type:

Serien-Nr.:
Serial No.:

HDS-

Angewandte harmonisierte Normen:
Applied harmonized standards:

EN 12100, EN 60204

Bevollmächtigter für techn.Dokumentation:
Authorized person for techn.documentation:

Dipl.Ing. H. Müschenborn

Ort und Datum:
Place and date:

Friedberg, 25.07.2011

Name und Position des Unterzeichners:
Name and position of signer:

Dipl.Ing. R. Schroll, Geschäftsführer
Dipl.Ing. R. Schroll, Business manager

Unterschrift des Unterzeichners
Signature of signer

EC-Declaration of Conformity

We, the company

GERUS Apparatebau GmbH&CO.KG
Engelschalkstrasse 16,
86316 Friedberg, Germany,

declare hereby that the following described machine in its conception, construction and form put by us into circulation is in accordance with all the relevant essential health and safety requirements of the following EC directives.

Machinery directive 2006/42/EC
EMC directive 2004/108/EC

REACH Erklärung

Wir, die Firma

GERUS Apparatebau GmbH&CO.KG
Engelschalkstrasse 16, 86316 Friedberg,
Deutschland,

erklären hiermit, dass wir als Hersteller von Maschinen und Werkzeugen zur Überholung und Instandsetzung von Großmotoren von der Verordnung nur als nachgeschalteter Anwender betroffen sind und daher nicht zur Registrierung und Vorregistrierung verpflichtet sind.

Beim Gebrauch unserer Maschinen werden Keine Schadstoffe im Rahmen von Artikel 7.1 und 7.2 der Verordnung freigesetzt

Ort und Datum:
Place and date:

Name und Position des Unterzeichners:
Name and position of signer:

REACH Declaration

We, the company

GERUS Apparatebau GmbH&CO.KG
Engelschalkstrasse 16, 86316 Friedberg,
Germany,

declare hereby that as a manufacturer of machines and tools for overhauling and maintenance of large bore engines we are only concerned by the regulation as downstream user and, therefore, we are not bound to register or pre-register.

Under normal use of our machines, no harmful substances within the scope of Article 7.1 and 7.2 of the regulation are released.

Friedberg, 03.11.2011

Dipl.Ing. R. Schroll, Geschäftsführer
Dipl.Ing. R. Schroll, Business manager

Unterschrift des Unterzeichners
Signature of signer

Safety measures

When using this machine, the following safety measures against general injury risks and fire hazards must be observed:

1. **Take environmental influences into account**
   Ensure adequate ventilation when using the machine in closed rooms. Also ensure adequate lighting.
2. **Wear suitable work clothing**
   Do not wear loose-fitting clothing. It can be caught by moving parts. Wear a hair net if you have long hair.
3. **Wear safety glasses**
   Honing fluids can cause eye injury.
4. **Wear hearing protection**
   Noise emissions at the workstation can exceed 85dB (A).
5. **Do not misuse the connection cables**
   Do not carry or pull the machine by the connection cables.
6. **Secure the connection cable**
   Pay careful attention to keeping the connection cables from protruding into the motion range of the circulating tool spindle. Protect the cables from heat and sharp corners.
7. **Prevent accidental start-up**
   Make certain that the main valve on the compressed air supply station is closed when connecting to the compressed air network.
8. **The honing machine has several moveable parts which were designed without protection against contact.**
   Maintain a minimal clearance of 1 meter from all moveable parts to securely exclude the risk of accidents.
9. **Interrupt the compressed air supply when not in use**
   The compressed air supply must be interrupted before any repair work is performed on the machine as well as during periods of non-usage and work interruptions.
10. **Maintain the machine with care**
    Routinely inspect the hoses, couplings and valves. Have damaged and defective components replaced by a professional.
11. **Intended usage of the machine**
    The machine is intended exclusively for the honing of cylinder liners. Improper usage of the machine as well as the usage of parts not recommended by the manufacturer can mean personal injury for you. Only use parts recommended by the manufacturer.

Information symbols

The following important information symbols are used in the operating manual:

Indicates a hazard which could lead to bodily injury or even death if not prevented.

Caution Indicates a warning against material damage

Note Additional information and tips

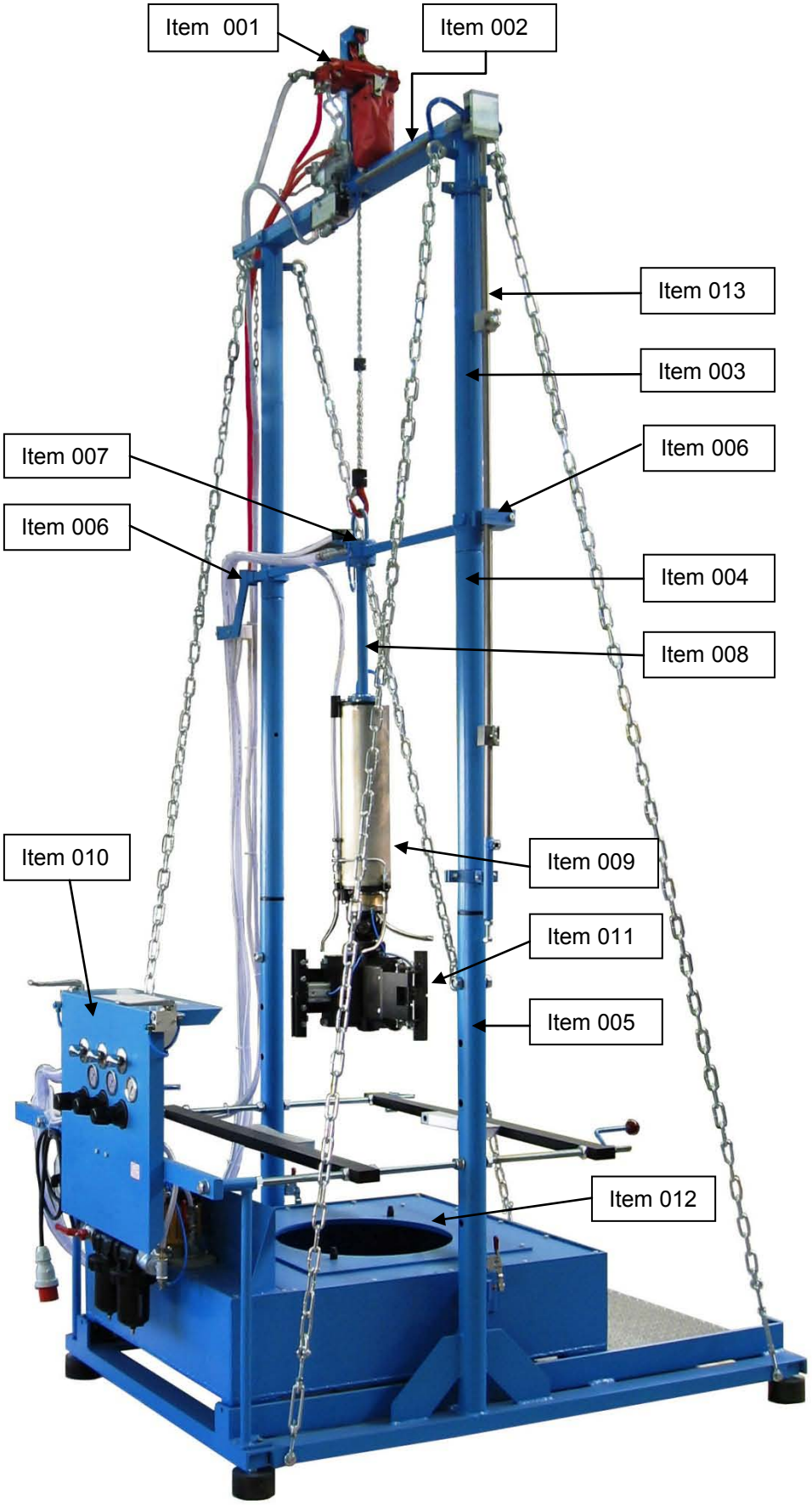


Fig 1 - General view

Table of contents

1 General safety information

1.1 Precautions for protecting the air you breath

The GERUS honing machine is operated pneumatically. A small amount of oil is added to the compressed air for the maintenance and lubrication of the moveable parts and valves within the ventilated system. An adequate fresh air supply must nevertheless be ensured during operation to rule out damage to health. If this cannot be ensured, then appropriate safety measures must be taken by the operator.

1.2 Requirement for stable foothold

A stable and secure foothold is mandatory during operation to ensure the physical integrity of the operators. The operator must have a secure foothold during the machining process. This is defined as a position which allows the operator to operate the valves on the control panel in any situation without manually securing his/her position and posture. Such a standing area must be ensured before work is started.

1.3 Safety clearance and occupied areas

The honing machine has several moveable parts which were designed without protection against contact. In order to safely exclude the risk of accidents, the honing machine can only be operated from the control panel with two hands. The sources of risk in detail:

Bushing edges (rotating honing stones)

Bushing (honing head work area)

Rotating honing head

Honing stein mounting bracket

Reversing control

Two-hand operation

Figure 2 - Pneumatic attachment

The results of the honing process may only be monitored when the main valve is closed. The risk of accidents caused by moving machine components can only be safely ruled out in this condition.

For reasons of safety, the machine may only be shut down in the following sequence:

Actuation of the two valves (left-right outside) must stop immediately after the turning point has been passed. Use a chain hoist to bring the honing head into the desired position for checking the work result. Close the main tap on the pneumatic connection.

2 Design of the honing machine

2.1 Work preparation

Ensure that the operator has a secure foothold and sufficient lighting before starting the work. The requirements for the operator's standing area must be even, firm and free of oil and grease and enable safe operation of the honing machine. The lighting must allow for visual inspection of the work result without additional lighting.

2.2 Description of the air supply

The air supply has the task of providing the working medium (compressed air) for the honing machine at defined pressures and quantities.

The pneumatic connection (Pos. 010) has a 1 ¼" connection on the access side which can be pressurised from 8 bars up to a maximum of 18 bars. An additional pressure reducing valve can be obtained for higher pressures, up to 30 bar. The pneumatic attachment has three connections on the output side for setting the working pressures.

Figure 3 - Pneumatic attachment

No.	Unit	Connection - description
1	Stroke	In the flow direction to the right (G 1/2”)
2	Rotation	Middle (G1”)
3	Contact pressure	In the flow direction to the left (G1/2”)

2.3 Design of the pylon

Place the two adapter pieces in the two receiver tubes and secure them with the M16 hexagon screw and locking nut.

Subsequently unscrew the two pylon tubes on both sides.

When both pylon tubes are unscrewed, insert the upper transverse yoke (Item 002), on the middle of which the hoist motor with the chain is mounted, into the pylon tubes. Then use the two eyebolts and the two spacers to screw each side in such a way that the two tension chains can be screwed in with the associated shackles.

2.4 Assembly of the honing device (one time)

The two pylons are inserted and screwed into the two receiver tubes together with the screwed-in spacers.

The upper yoke is subsequently inserted into both pylons and screwed together with the two chain holding devices.

The chains are now mounted, on top with a shackle and below with a shackle on the turnbuckle. The turnbuckle is screwed onto the lower frame with a screw. Subsequently, when all the chains have been mounted, the turnbuckle is manually tightened until both pylons are taut.

The drive unit which has been pre-assembled in this way is connected on the eyelet screw, as described in the drawing, to the chain hoist hook (Item 001) and lifted (caution: risk of swing-through). The slidable outer guides on the guide arm (Item 007) are released and displaced until the guide arm lies flat on the pylon tubes – the guides are then returned to the starting position and locked. A clearance of around 5mm should exist between the guide and the pylon.

Figure 4 – Guide

The guide arm (Item 007) with the honing head can be moved up and down with the manually operated lateral yellow control to enable the raising and lowering of the unit.

Figure 5 – Setting the hoist limit

This manual control can be used to move the honing head with the drive motor – without function – up or down to achieve the desired hoisting position. If necessary, the adjustable rerouting position must be set on the lateral control rod (Item 013). If this manual control is used to move the honing head into the workpiece – cylinder liner, then this must be inserted slowly and carefully to prevent damage to both the honing stone and the top of the cylinder lining.

2.5 Attachment of the honing head

Two wooden supports, on which the honing head (Item 011) is positioned coaxially to the cylinder axis, are placed on the upper end of the cylinder lining (compare to assembly drawing). The pneumatic hoisting device (Item 001) is drained off until the upward-pointing honing head can be fastened to the pneumatic drive unit with the help of the three DIN 933-M8x25 screws. The air connection coupling must then be inserted.

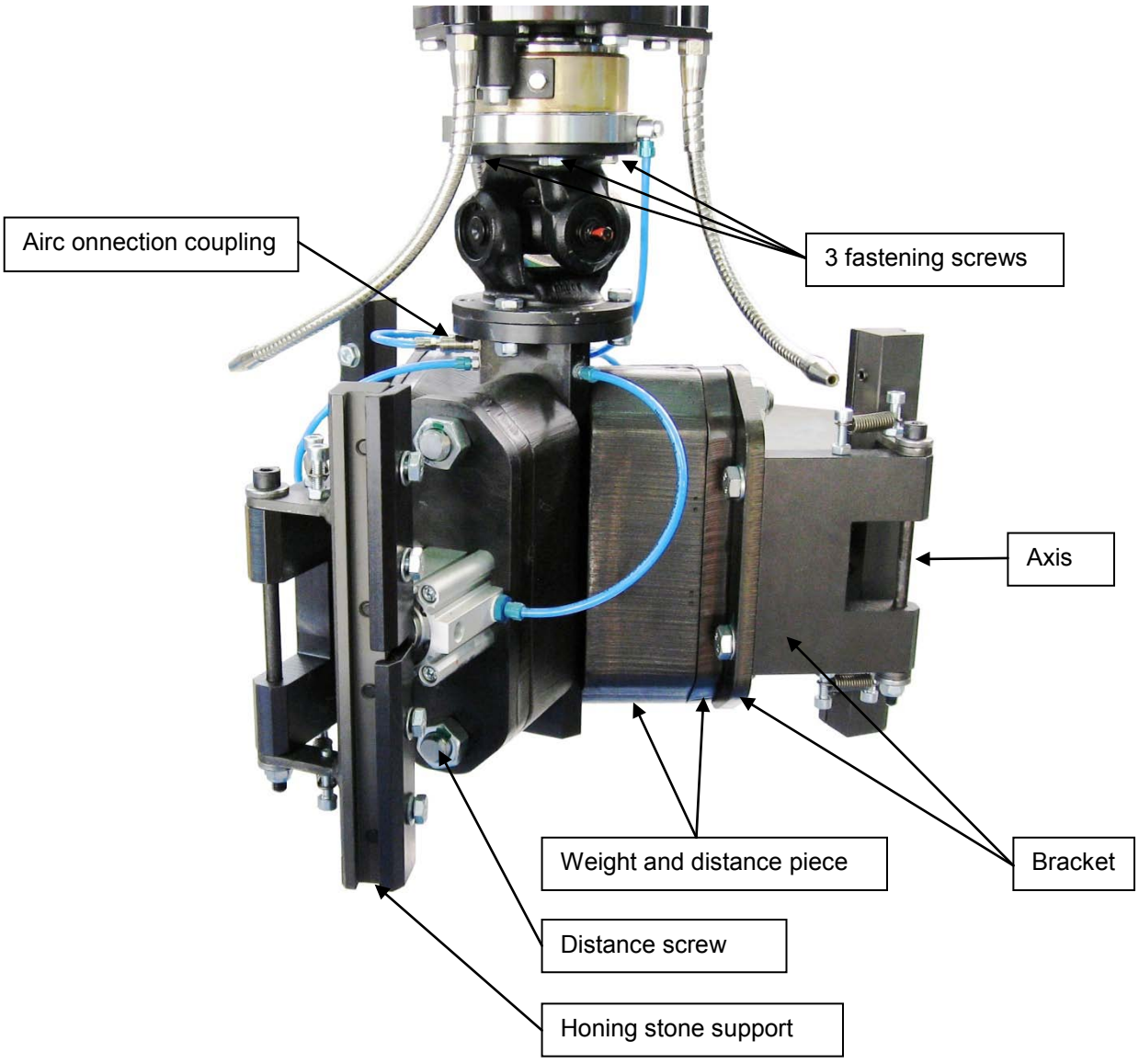


Figure 6 – Attachment of the honing head

2.6 Connection of the compressed air

Caution:

Make certain that the air supply station is closed when connecting the main tap lines!

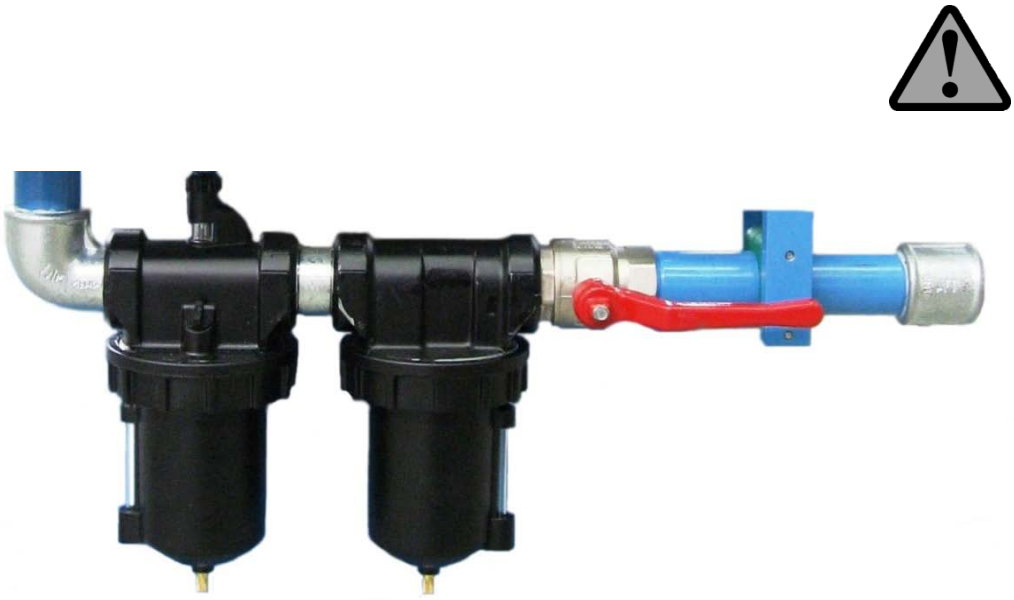


Figure 7 – Compressed air connection

An internal thread of 1 ¼“ is provided for this. A pressure of 8 to 10 bars (max. 18 bars) should be connected.

The pneumatic drive unit is pre-piped and fitted and is completely attached to the pylons.

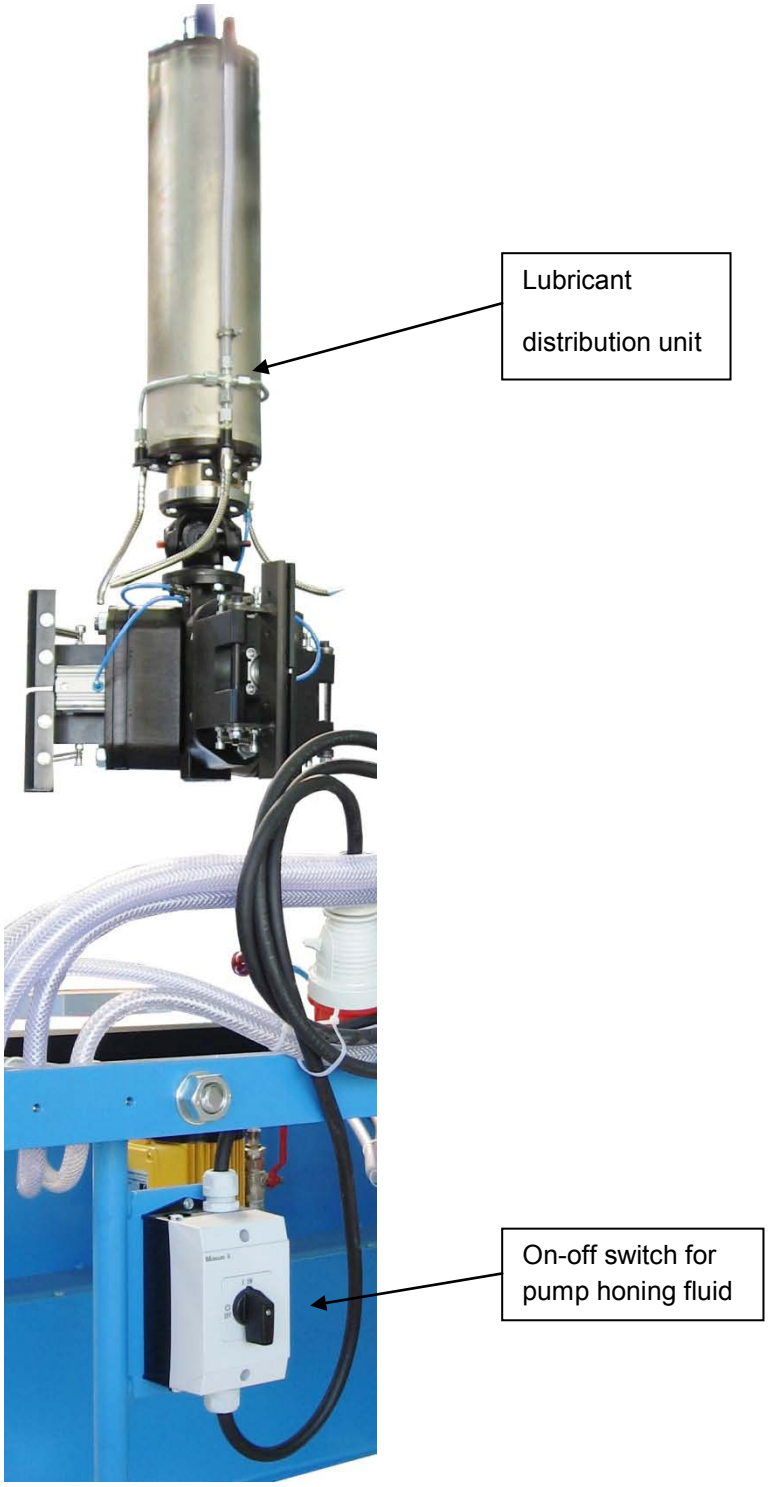


Figure 8 - Hose connection

2.7 Adjusting and changing the honing stones

As with the honing lubricant, the honing stones to be used are not supplied by GERUS. The stones and sizes are selected exclusively by the motor manufacturer.

Two honing stones (Item 2) are inserted smoothly and without gaps into each of the three contact pressure arms.

The tensioning screws (Item 4) are loosened for the insertion of new honing stones and the set screws (Item 5) are turned back so that the stones lie flatly on the honing stone support (Item 1). The tensioning screws are tightened (Item 4) for fixation. After the honing stones are inserted, a check is made as to whether the dimension h meets the minimum requirements of 1.5 mm. If this is not the case, the honing stone can be readjusted to the required dimension. Loosen the tensioning screws (Item 4) slightly for this purpose however.

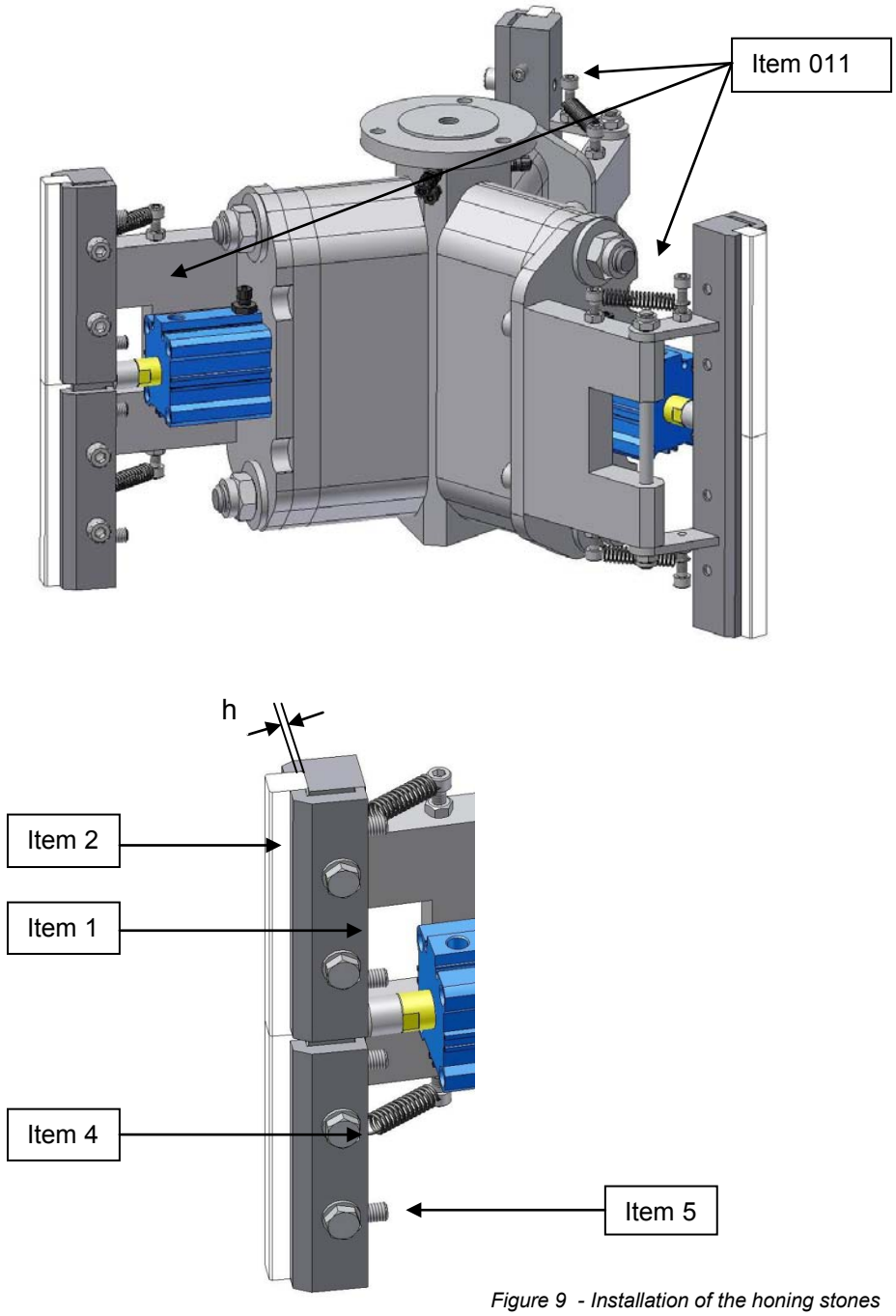


Figure 9 - Installation of the honing stones

For the adjustment of dimension h, the tensioning screws (Item 4) are loosened until the honing stones can be moved with the aid of the set screws (Item 5). Every revolution of the set screw raises the stone 1 mm. When advancing the set screw, ensure that it is tightened evenly to prevent breakage of the stone.

It is necessary to change the stone as soon as the dimension h falls below 1.5 mm and no further advancement can be made with the set screws.

The honing result does not depend on an identical dimension h on all contact pressure arms. The pneumatic contact pressure control ensures even contact pressure independent of dimension h. This ensures the achievement of a uniform honing result even when the height dimensions on the arms differ.

3 Operation of the honing machine

Before start-up, the honing angle required by the motor manufacturer must be set by determining the ratio of the rotation speed to the hoisting speed. The two pressure reducing valves on the control unit are set to the position required for this purpose. The control unit is calculated by

$$\alpha \quad \tan \quad = \quad \left(\frac{Vrot}{Vhub} \right)$$

The honing angle setting made by the manufacturer may not be changed by persons who have not been trained to do so.

Check the honing steins for flawless condition immediately before start-up. Replace damaged, worn (height of the honing stone above the stone receptacle <1.5mm) or heavily contaminated stones with suitable new stones. All of the stones must always be replaced for operational and performance-related reasons. Bring the stones into the idle position after any work steps to prevent unintentional contact of the stones with other objects.

The contact pressure, which presses the honing stones against the walls of the bushing, can vary between 2 and 6 bars. Please also observe the specifications of the motor manufacturer.

The honing fluid recommended by the manufacturer is poured in the quantity recommended by the manufacturer into the container (Item 012) provided for this purpose.

4 Special operation for lift control

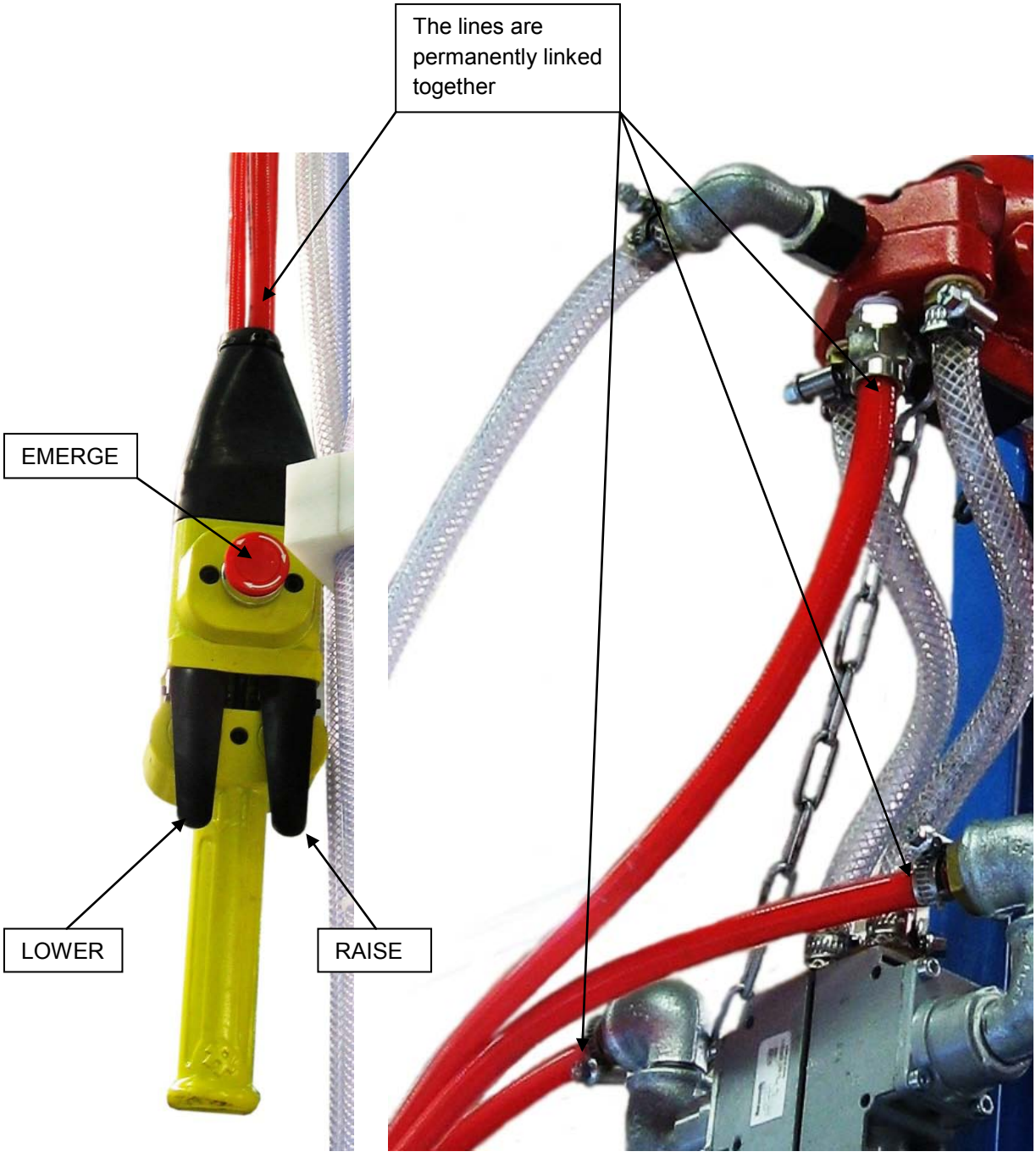


Figure 10 – Lift activation

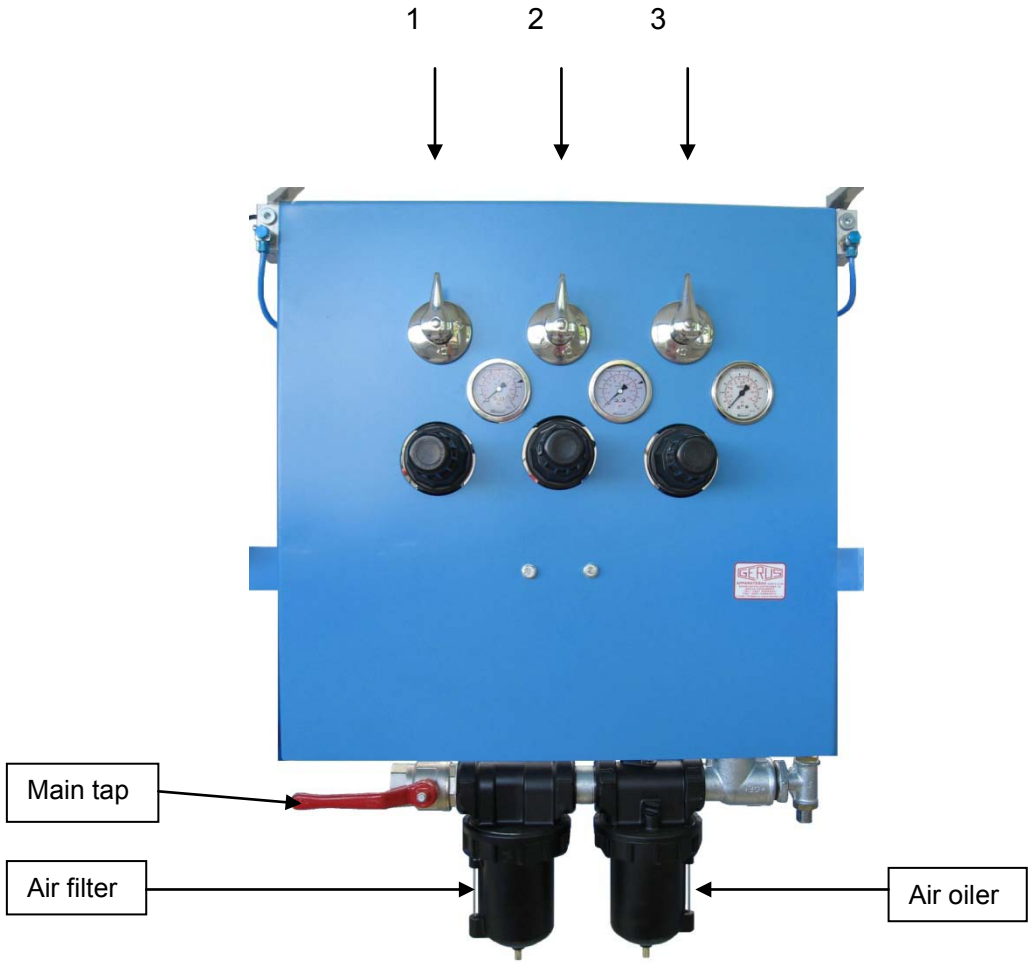


Figure 11 – main tap with filter and oiler

Now turn the main tap and actuate the following valves in the given order:

1. Actuate the ball valve for lifting and lowering
2. Actuate the ball valve for rotation of the honing head
3. Actuate the ball valve for honing stone contact pressure

5 Shutdown

The last lifting process is a LIFTING of the honing head. Immediately after the lower turning point is past, the shutdown routine must be carried out in the following sequence.

1. Release the two hand lever valves on item 010 shortly after the lower turning point. – Stop all processes – Rotation – Lift and contact pressure.
2. Loosen the two adjustable guide lugs on the guide arm and push them inwards.
3. Turn the guide arm away from the guide tubes and use the manual hoisting device to move the honing head with the turning device so far upwards that the honing head is completely outside of the cylinder lining.
4. Close the main tap on the air supply unit.

6 Disassembly of the honing head

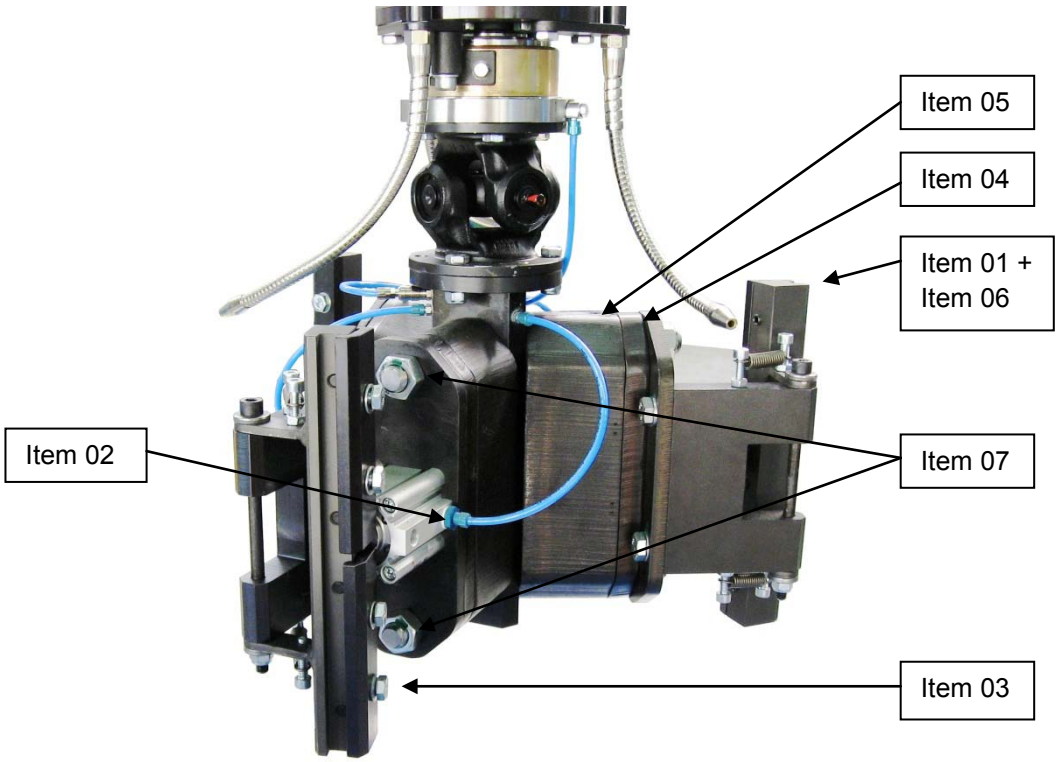


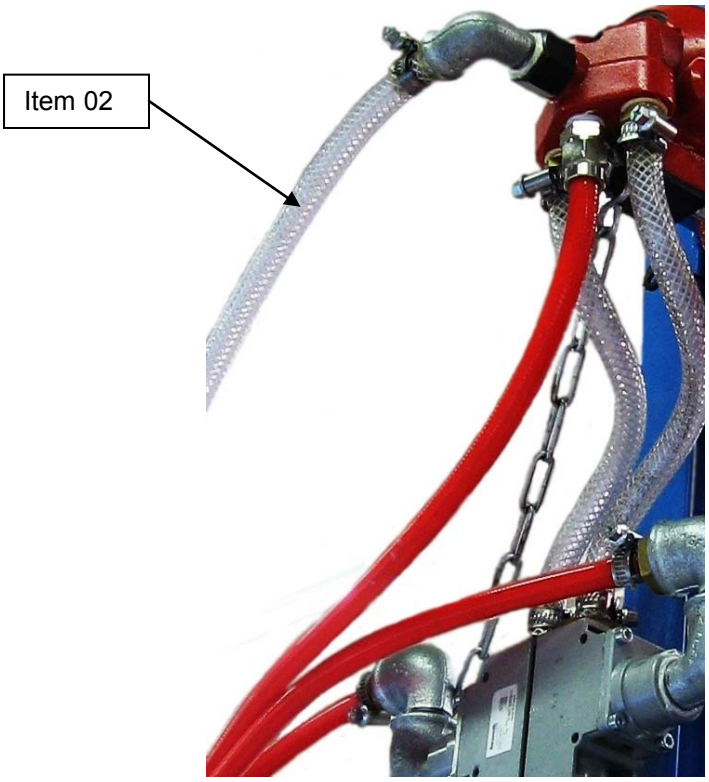
Fig 13 – honing head

The honing head must be lifted out of the cylinder lining for disassembly. Mounting can now be done on the honing head. The procedure is explained as follows:

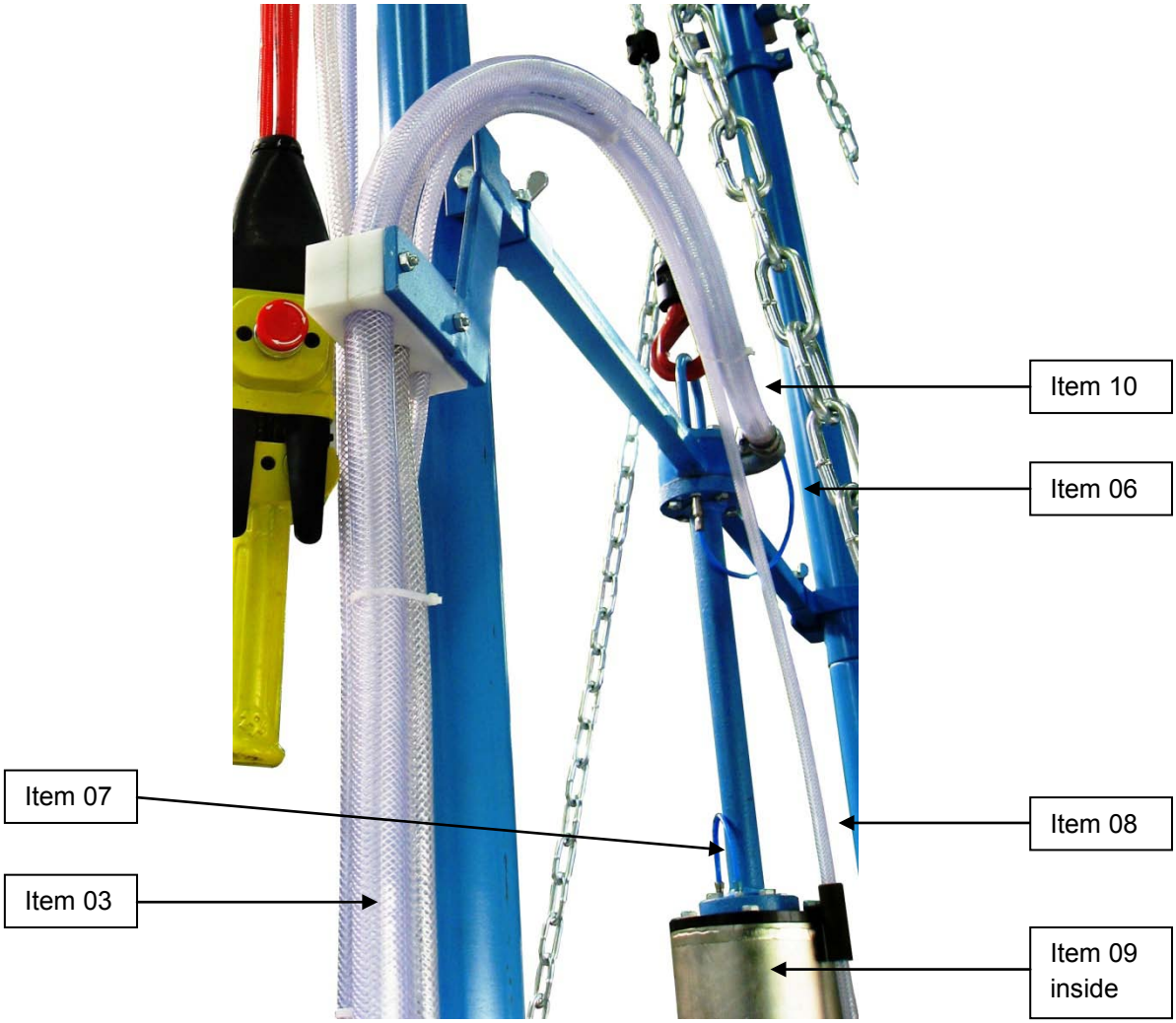
1. Close the main tap of the air supply and run the system until it is empty.
2. The honing stone bracket can be completely disassembled by unscrewing the two nuts (Item 07). The hose to the pneumatic cylinder (Item 02) must be pulled out for this purpose.
3. The honing stone bracket must not be disassembled for changing the honing stones (Item 06). It is only necessary to slightly loosen the hexagon screws on the clamping bar (Item 03) and then only until the used honing stone can be removed.
4. Instead of the honing stone, the brush attachment can be clamped in the bracket in the same manner.
5. The shim stocks (Items 04 and 05) define which cylinder lining diameters can be honed. These must have the same thickness and number on all 3 honing head arms.
6. When work is performed on the honing head, it can swing freely or be placed on the supplied wooden supports.
7. After completion of assembly, re-open the main air tap and, if necessary, use the separate emergency activation of the hoisting device to re-lower the honing head into the cylinder lining.
8. When performing maintenance work, check whether all moveable components of the honing stone bracket (Item 01) function smoothly.

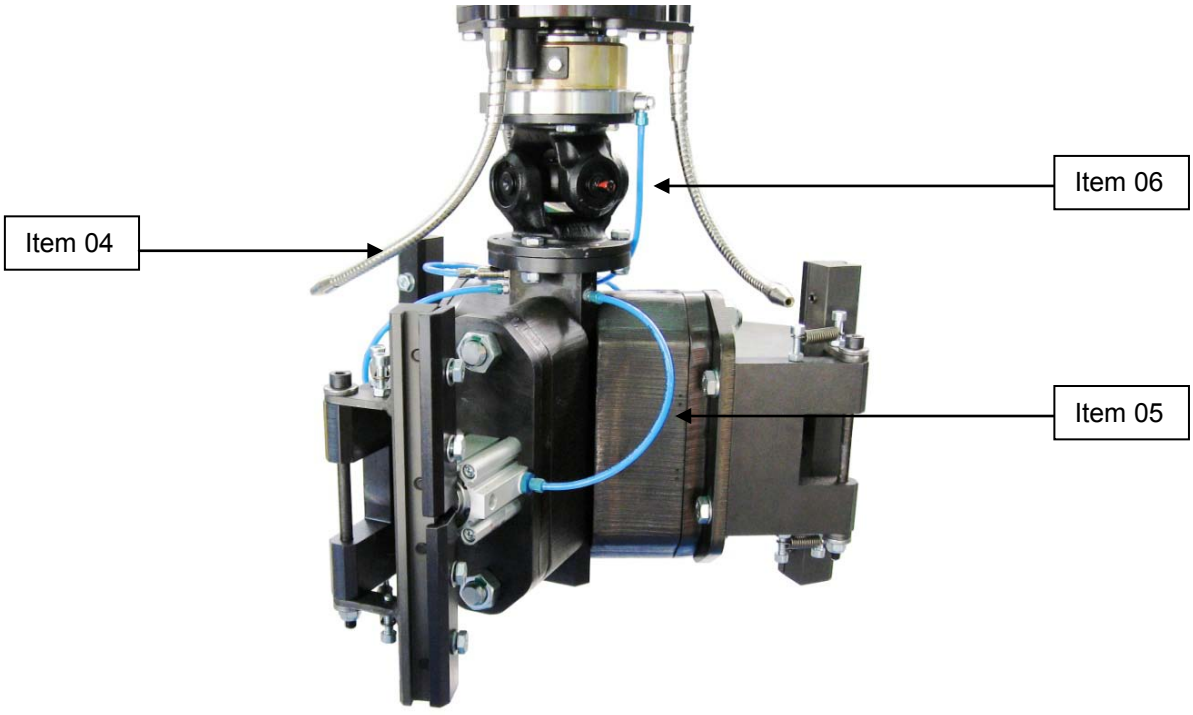
7 Spare parts catalogue for the honing machine

7.1 Crossbeam with chain hoist


Item 02

7.2 Compressed air lines and lapping agent flow

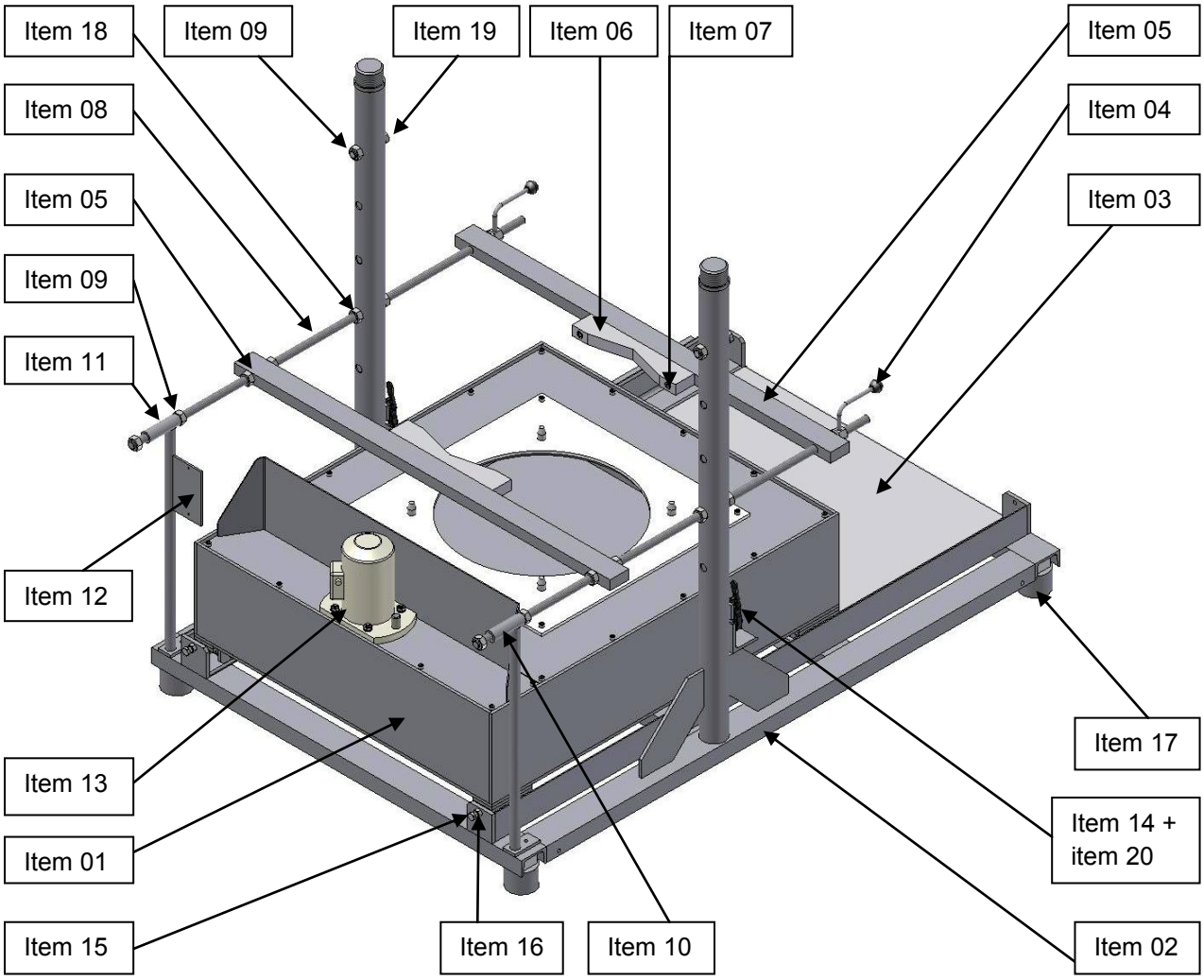




7.3 Parts lists: Crossbeam and hoist

Item	Order no.	Designation	Type / unit quantity	
			621-102-000	621-105-000
01	621-200-001	Pneumatic chain hoist	1	1
02	621-020-019-1	Air hose for hoist	1	1
03	621-020-019-3	Air hose for drive unit	1	1
04	621-020-518	Spray nozzles	3	3
05	001-001-011	Air hose, 230mm	3	3
06	001-000-007	Air hose, 250mm	2	2
07	001-000-009	Air hose, 100mm	1	1
08	621-102-070	Lapping agent hose	1	1
09	001-000-010	Air hose, 540mm	1	1
10	621-020-019-2	Air hose for honing head	1	1

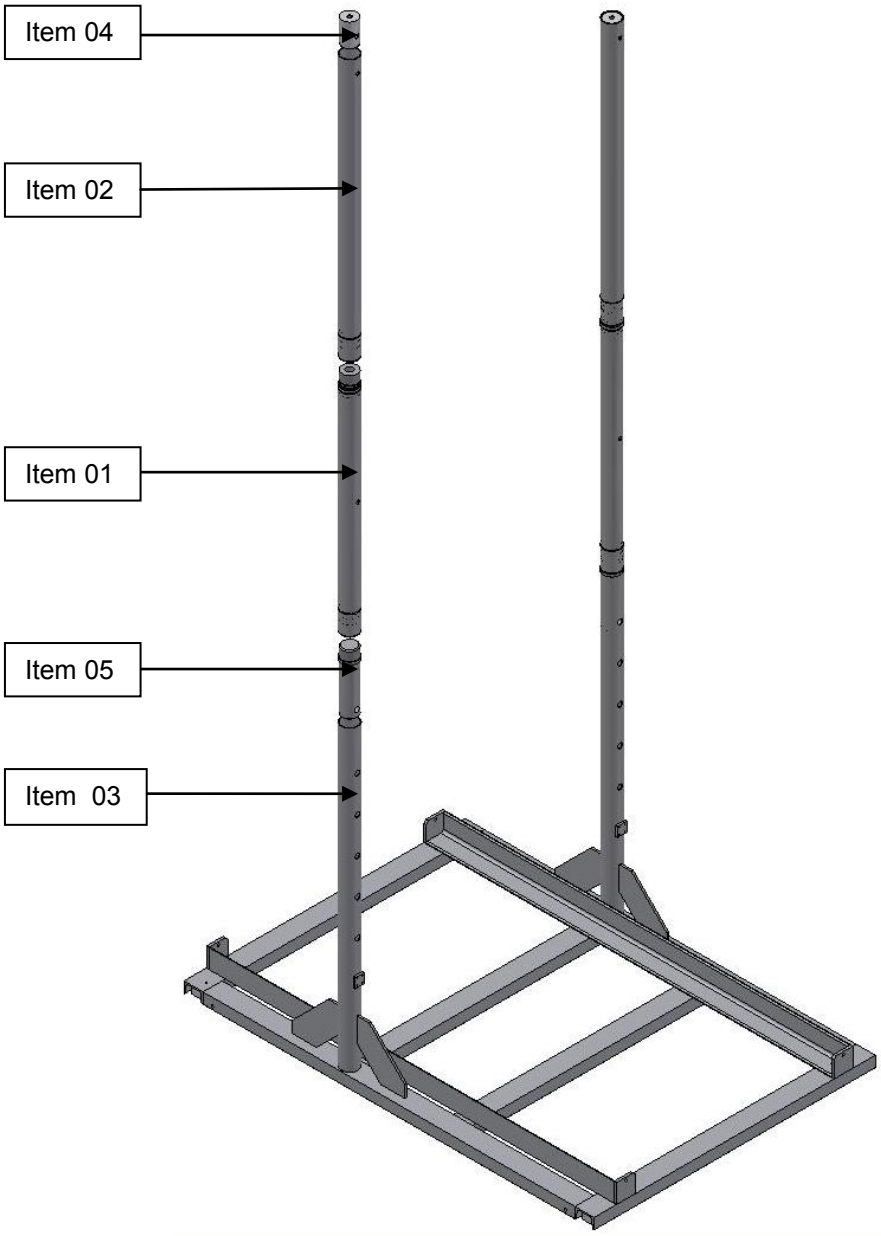
7.4 Honing system base



Item	Order no.	Designation	Type / unit quantity	
			621-102-000	621-105-000
ZSB	621-102-001 621-105-001	Honing system base	1 -	- 1
01	621-102-002 621-105-002	ZSB Tank	1 -	- 1
02	621-102-011 621-105-011	Frame	1 -	- 1
03	621-102-013 621-105-013	Corrugated plate	1 -	- 1

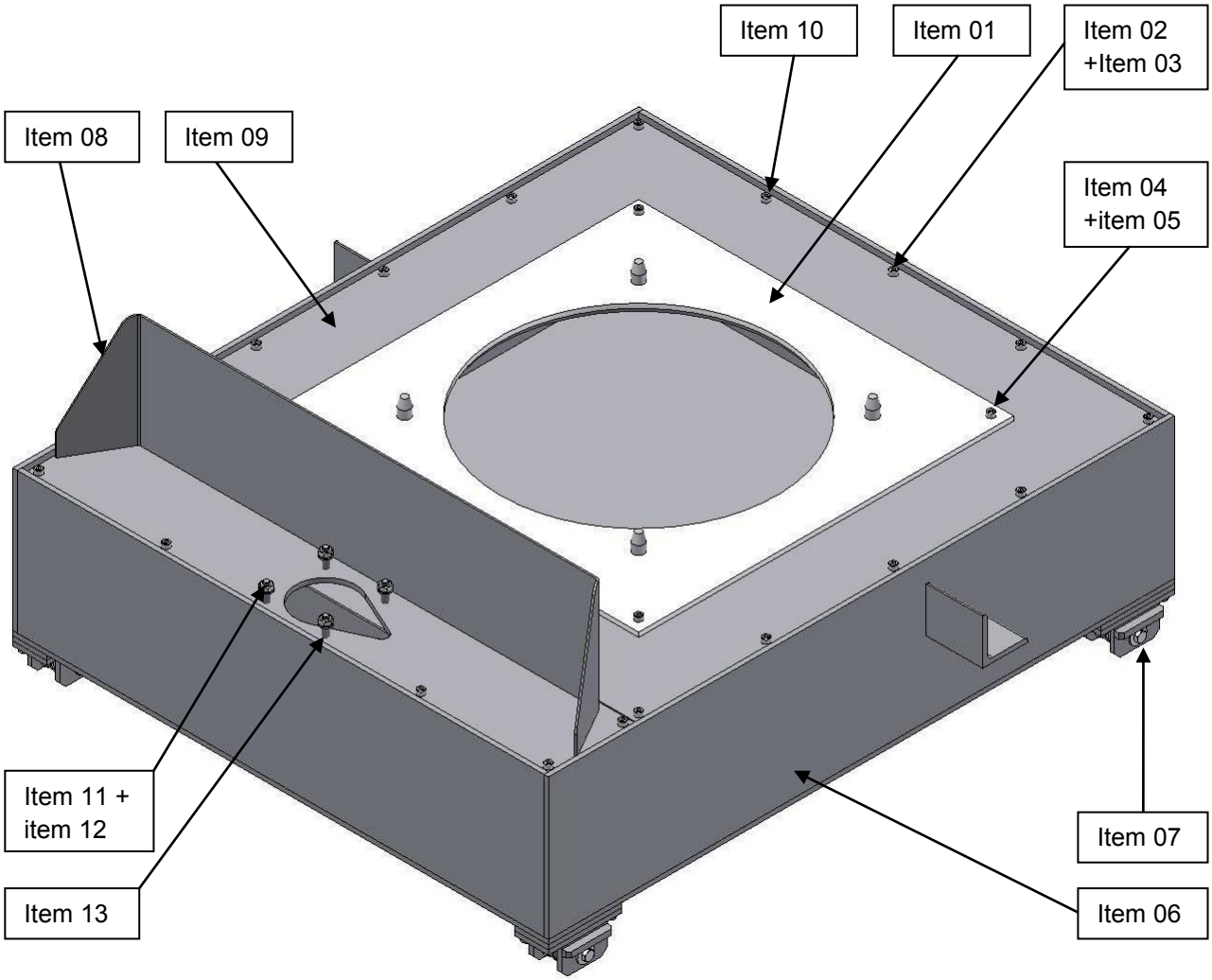
04	621-102-015	Handle with M20 nuts	2	2
05	621-102-017 621-300-035	Clamping bar	2 -	- 2
06	621-300-036	Take-up plate	2	2
07	DIN912-M10x80	Cylinder screw with inner hexagon	4	4
08	DIN976-AM20x900	Threaded rod	2	2
09	DIN934-M20	Hexagon nuts	16	14
10	621-102-020	Support	1	1
11	621-105-006	Support	1	1
12	621-105-005	Aluminium plate for switches	1	1
13	621-300-039	Immersion pump	1	1
14	629-001-009	Horizontal clamp	2	2
15	DIN933-M12x40	Hexagon screw	2	2
16	DIN934-M12	Hexagon nuts	2	2
17	645-010-038	M16 rubber-metal buffer	6	6
18	DIN125-A20,5	Disk	4	4
19	DIN931-M20x90	Hexagon screw	2	-
20	DIN912-M5x12	Cylinder screw with inner hexagon	8	8

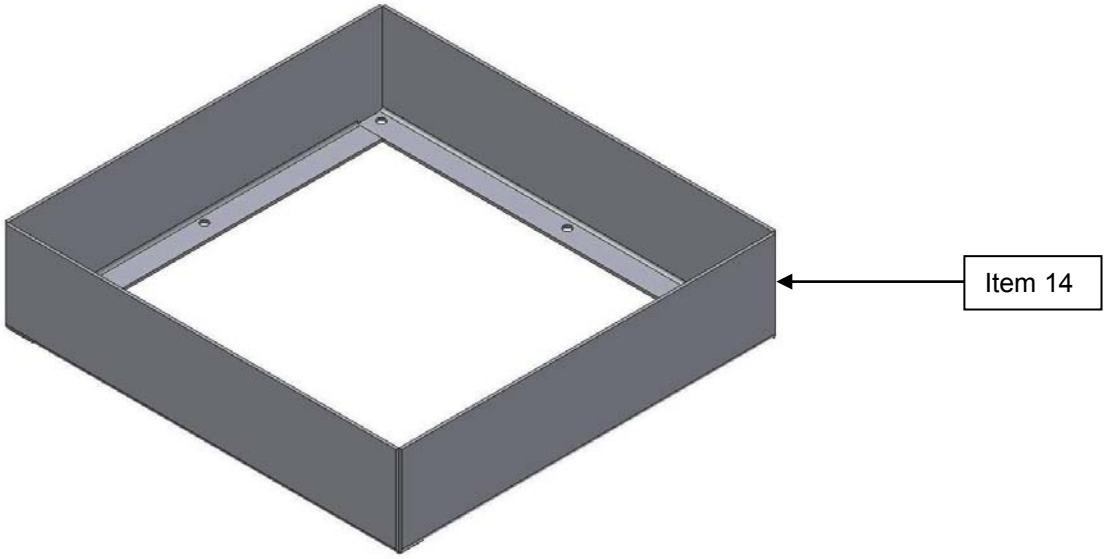
7.5 Support for crossbeam



Item	Order no.	Designation	Type / unit quantity	
			621-102-000	621-105-000
01	621-102-029	Extension tube L=950	2	2
02	621-102-028 621-105-039	Extension tube L=1100 Extension tube L=900	2 -	- 2
03	621-102-011 621-105-011	Frame	1 -	- 1
04	621-020-024	Taps	2	2
05	621-102-012	Threaded bolts	2	2

7.6 Tank with support

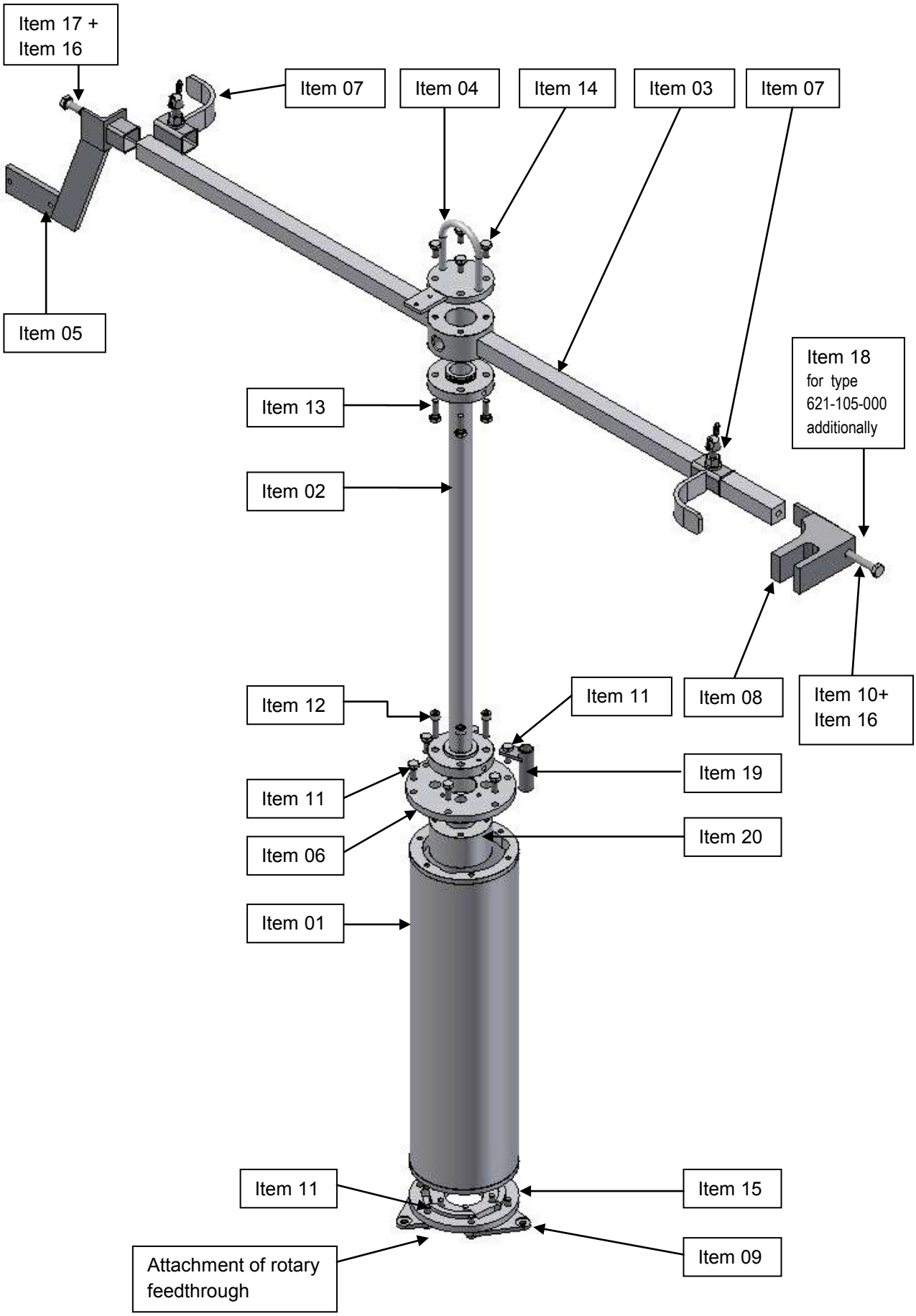




7.7 Parts lists: Tank with support

Item	Order no.	Designation	Type / unit quantity	
			621-102-000	621-105-000
ZSB	621-102-002 621-105-002	Tank	1 -	- 1
01	621-102-016 621-105-015	Support Pole plate	1 -	- 2
02	621-102-014	Centring bolts	4	-
03	DIN7991-M8x25	Countersunk screw	4	-
04	DIN912-M8x25	Cylinder screw with inner hexagon	4	-
05	DIN934-M8	Hexagon nuts	4	-
06	621-102-010 621-105-010	Tank-welded part	1 -	- 1
07	621-102-006	ZSB support roller	4	4
08	621-102-004 621-105-004	ZSB pump cover	1 -	- 1
09	621-102-003 621-105-003	Cover	1 -	- 1
10	DIN912-M8x16	Cylinder screw with inner hexagon	22	16
11	DIN934-M10	Hexagon nuts	4	4
12	DIN125-A10,5	Disk	4	4
13	M10x40	Threaded bolts	4	4
14	621-105-012	Support frame for tank	-	1

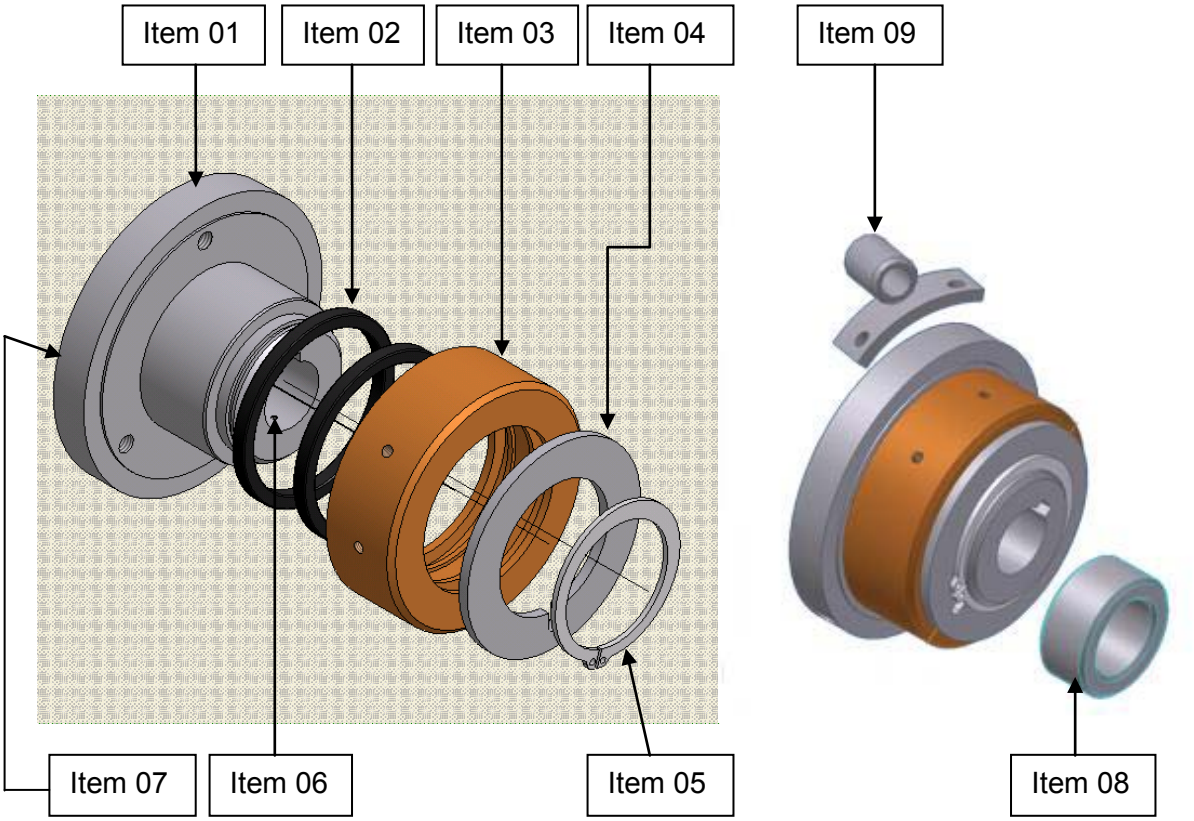
7.8 Guide arm with drive unit



7.9 Parts lists: Guide arm with drive unit

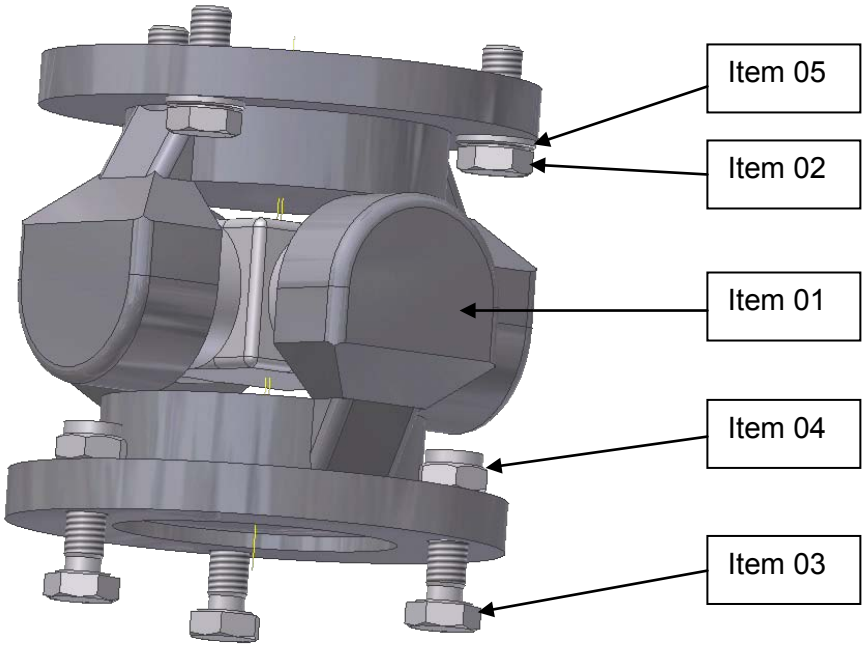
Item	Order no.	Designation	Type / unit quantity	
			621-102-000	621-105-000
01	621-020-111	Assembly housing	1	1
02	621-020-105 621-020-104	Extension - 600 mm Extension - 100mm	1 -	- 1
03	621-036-011 621-036-016	Guide arm - long Guide arm - short	1 -	- 1
04	621-020-086	Suspension	1	1
05	621-102-060	Hose mount	1	1
06	621-020-034	Cover	1	1
07	621-036-010	Bracket for fixation	2	2
08	621-102-062	Bracket	1	1
09	621-020-040	Plate	3	3
10	DIN931-M10x90 DIN931-M10x140	Hexagon screw	1 -	- 1
11	DIN933-M8X20	Hexagon screw	12	12
12	DIN912-M8x30	Cylinder screw with inner hexagon	4	4
13	DIN933-M8x25	Hexagon screw	4	4
14	DIN933-M8x16	Hexagon screw	4	4
15	621-020-033	Flange	1	1
16	DIN125-A10,5	Disk	2	2
17	DIN931-M10x25	Hexagon screw	1	1
18	621-036-020	Weight	-	1
19	621-020-509	Bracket for lapping agent hose	1	1
20	621-020-321	Connections	1	1

7.10 Rotary feedthrough



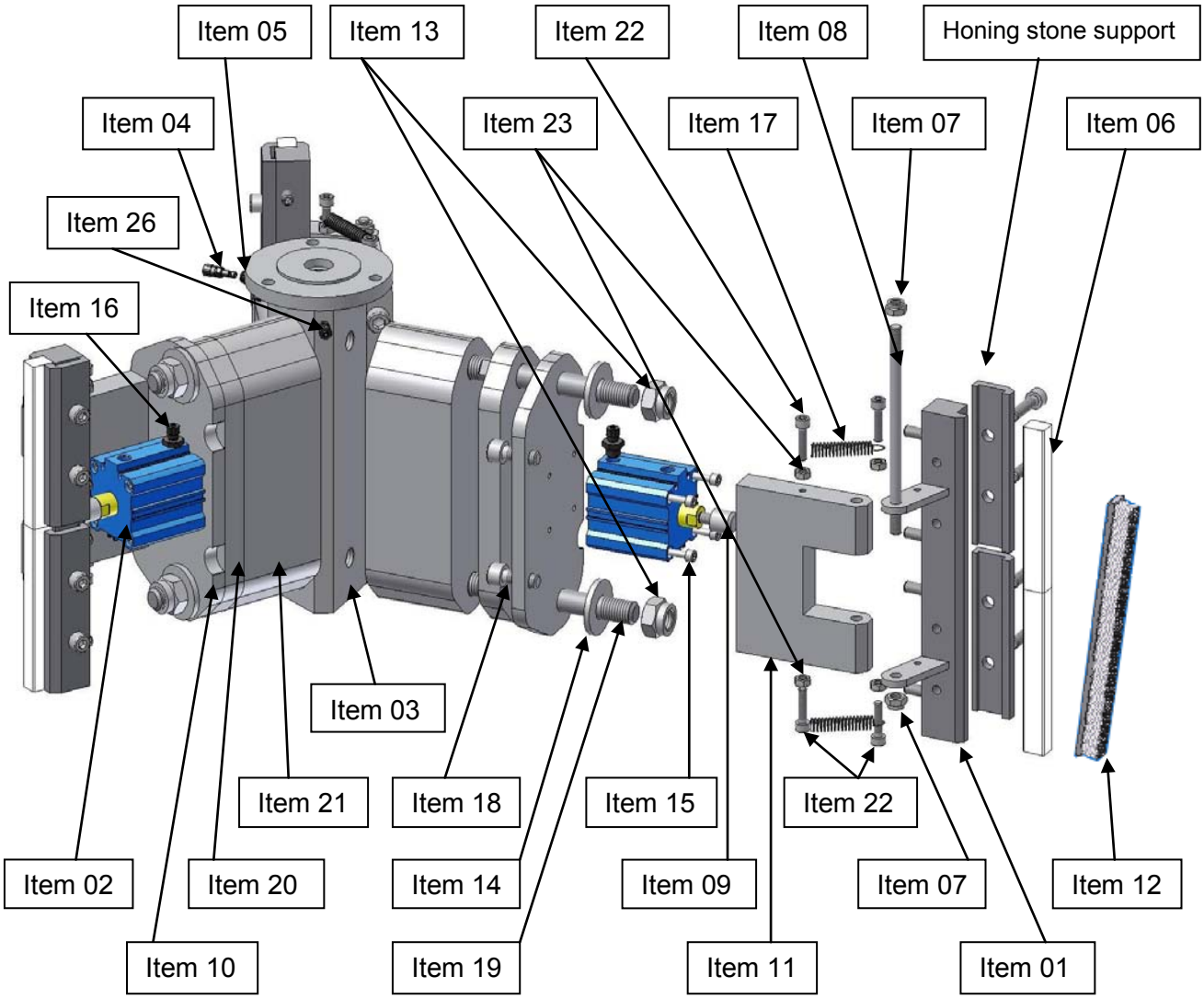
Item	Order no.	Designation	Type / unit quantity	
			621-102-000	621-105-000
ZSB	621-020-067	Rotary feedthrough	1	1
01	621-020-068	Drive flange	1	1
02	QRAR04333-N7004	Quad ring seal NBR, 70 Shore	2	2
03	621-020-070	Ring	1	1
04	621-020-069	Driving plate	1	1
05	DIN 471-50X2	Locking ring	1	1
06	DIN 1481-2X20	Coiled spring pin	1	1
07	DIN 553-M5X8	Grub screw	1	1
08	621-020-515	Ring	1	1
09	621-020-513	Bracket for air line	1	1

7.11 Cardan joint



Item	Order no.	Designation	Type / unit quantity	
			621-102-000	621-105-000
01	621-020-042	Cardan joint	1	1
02	DIN 933-M8X20	Hexagon screw	3	3
03	DIN 933-M8X25	Hexagon screw	3	3
04	DIN 985-M8	Stop nut	3	3
05	DIN 125-8,4	Disk	3	3

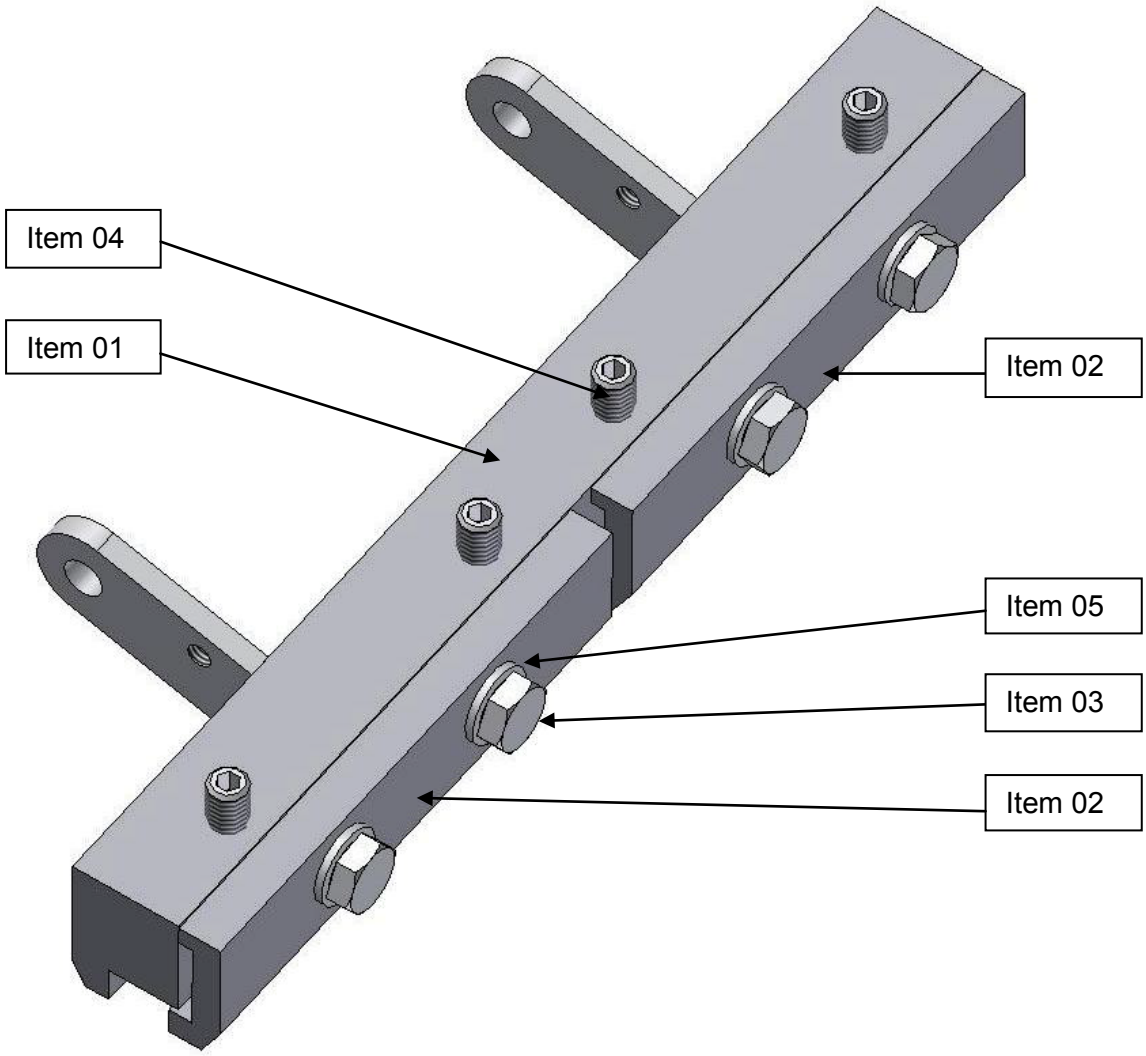
7.12 Honing head - complete assembly



Item	Order no.	Designation	Type / unit quantity	
			621-102-000	621-105-000
1	621-035-011 621-034-011	ZSB grinding stone bracket	3 -	- 3
2	CQ2B40TF-30DZ CQ2B40TF-10DZ	Pneumatic cylinder	3 -	- 3
3	621-035-001	Support	1	1
4	KS2-CK-3	Connection plug	1	1
5	KD2-M5-A	Connection socket	1	1

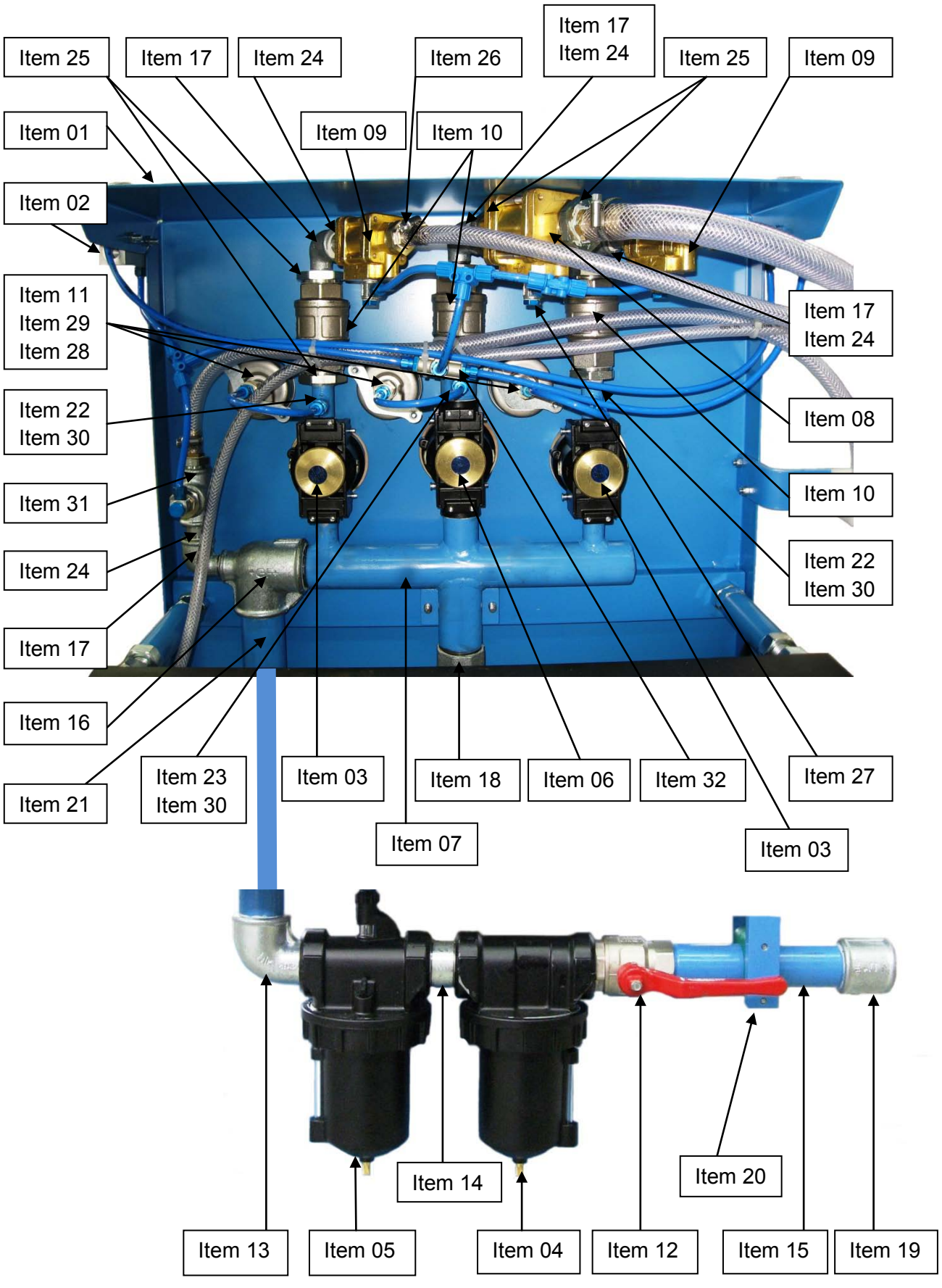
6	621-020-521 621-020-523 621-020-522	Honing stone pre-honing 13x16x120mm Honing stone honing OT-range 13x16x20mm Honing stone plateau honing 13x16x120mm	6 6 6	3 3 3
7	DIN 985-M8	Hexagon nuts	6	6
8	621-034-009	Threaded rod	3	3
9	621-035-010	Extension	3	3
10	621-034-005	Plate	3	3
11	621-035-006 621-034-006	Support	3 -	- 3
12	621-020-023	Cleaning brush	3	3
13	DIN 985 - M16	Hexagon nuts	6	6
14	DIN 6796 - 16	Tension disk	6	6
15	DIN912-M5 x 60 DIN912-M5 x 40	Cylinder screw with inner hexagon	12 -	- 12
16	CK-1/8-PK-3	Quick screw connection	3	3
17	621-020-151	Tension spring	6	6
18	DIN912-M10x25	Cylinder screw with inner hexagon	6	6
19	621-038-001 621-034-013	Grub screw	6 -	- 6
20	621-035-116	Distance plate L=16	3	-
21	621-035-164	Distance plate L=64	3	-
22	DIN912-M6 x 25 DIN912-M8 x 25	Cylinder screw with inner hexagon	12 -	- 6
23	DIN934 - M6 DIN934-M8	Hexagon nuts	12 -	- 6
24	CK-M5-PK-3	Quick screw connection	4	4

7.13 Honing stone support



Item	Order no.	Designation	Type / unit quantity	
			621-102-000	621-105-000
01	621-035-011 621-034-011	Grinding stone bracket	3 -	- 3
02	621-020-424	Clamping bar for honing stone	6	3
03	DIN 933-M8X25	Hexagon screw	12	6
04	DIN 913-M8X25	Grub screw	12	6
05	DIN 125A-8,4	Disk	12	6

7.14 Pneumatic attachment

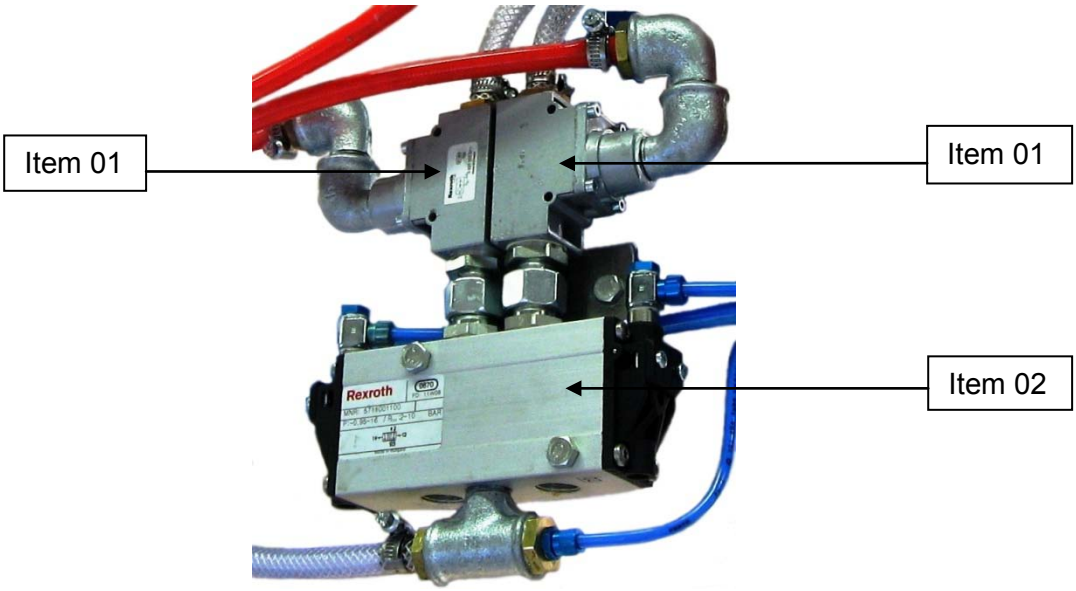


7.15 Parts lists: Pneumatic attachment

Item	Order no.	Designation	Type / unit quantity	
			621-102-000	621-105-000
ZSB	621-105-030 621-102-037	Pneumatic attachment	- 1	1 -
01	621-105-036 621-102-036	Sheet-operating unit of the pneumatic attachment	- 1	1 -
02	0820400004	Directional valve VVAP-3/2NC-PUS	2	2
03	R20-04C	Maxi pressure regulator G1/2	2	2
04	F602	Filter G 1 1/4"	2	2
05	L606-10W	Oiler G 1 1/4"	1	1
06	R20-08C	Maxi pressure regulator G1	1	1
07	621-105-040	Tube distributor	1	1
08	614221	2/2 directional valve PGV-131-B76-1BP	1	1
09	614201	2/2 directional valve PGV-131-B76-1/2BP	2	2
10	LKH-341-1	2-way ball valve	3	3
11	001-007-013	Manometer 0-10bar	3	3
12	621-020-507	Ball valve 1 1/4" i,a	1	1
13	GF92-1 1/4"	Bracket A/1 malleable iron fitting	1	1
14	621-105-049	Double nipple DIN2982-1 1/4"x45	1	1
15	621-105-050	Double nipple tube DIN2982-1 1/4"x160	1	1
16	GF130-1 1/4"- 1 1/4"-1/2"	T-piece i/i/i malleable iron fitting	1	1
17	GF92-1/2"	Bracket I_A malleable iron fitting	4	4
18	GF300-1 1/4"	Malleable iron fitting cap	1	1
19	GF270-1 1/4"	Malleable iron fitting sleeve I/I	1	1
20	621-105-007	Bracket for tube	1	1
21	621-105-048	Double nipple tube DIN29821_1/4"x250	1	1
22	621-105-045	Double nipple with sleeve DIN29821/2"x80&1/8"	2	2
23	621-105-046	Double nipple with sleeve DIN2982-1"x60 &1/8"	1	1
24	621-105-047	Double nipple DIN2982-1/2"x40	4	4

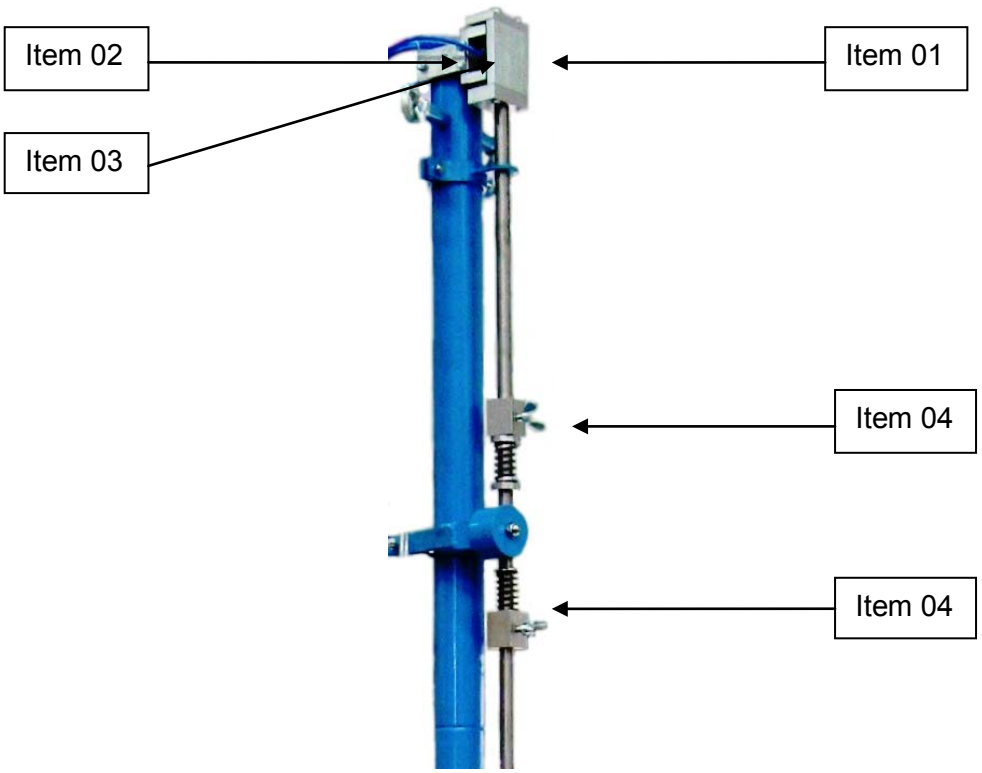
25	RI1X1/2CFX	Reducing expansion nozzle A/I with internal threads	7	7
26	RI1/2X1/4CFX	Reducing expansion nozzle A/I with internal threads	4	4
27	LCK-1/8-PK-4	L-quick connector	3	3
28	CK-1/4-PK-4	Quick screw connection	3	3
29	254M-1/4	Hexagon sleeve ¼“ IG	3	3
30	CK-1/8-PK-4	Quick screw connection	3	3
31	GF130-1/2“-1/2“-1/2“	T-piece I/I/I malleable iron fitting	1	1
32	EVR1210-F01	Or valve 1/8“	1	1

7.16 Lift control



Item	Order no.	Designation	Type / unit quantity	
			621-102-000	621-105-000
01	621-102-068	Double check valve	2	2
02	621-102-069	5/2 directional valve	1	1

7.17 Reversing



Item	Order no.	Designation	Type / unit quantity	
			621-102-000	621-105-000
01	621-102-047	Switching flag	1	1
02	621-102-046	Valve support for lift direction change	1	1
03	FV-5D-MG	Stem actuated valve G1/8	1	1
04	621-102-058	Switch damping	2	2

8 Maintenance notes

The function of the air supply unit is guaranteed when

- the air filter has been cleaned in a way that enables it to always be used.
- the oiler is always correctly adjusted before usage.
- oil is added for the oiler in the honing device.

All parts belonging to the honing device must be handled and stored in a way which enables them to be used at all times.

Only those honing stones should be used which have been recommended and supplied by the motor manufacturer. Honing stones with other properties can decisively influence the honing process and the honing results. There should always be enough honing stones in stock to allow for honing processes at all times.

The pneumatic cylinders in the honing head are to be checked for mobility and cleaned if necessary.

9 Disturbances – malfunctions and their correction

Disturbances can occur in the drives

- if the provided air-oiler is not set correctly,
- if this is operated without oil or with the wrong oil.

Correction:

- Check the settings – so that oil is only marginally conveyed.
- Compare the oil viscosity with the supplied oil

Disturbances can occur

- if the air pressure cannot be kept constant,
- The supply air cross section is too small.

Correction:

- Check for air leaks in the supply lines,
- unexpected removal from the compressed air network,
- and the air supply cross section.
- Check the air filter in the air supply unit and clean if necessary.

Disturbances can occur

- if the operating pressure is set to low
- or the air supply unit of one of the pressure reducing valves is defective.

Correction: Check the set pressures of the air supply unit.

The honing angle is not as desired. The speed of the honing head does not fit with the lifting speed.

Correction:

- Calibrate the speed of the honing head by changing the pressure of the centre pressure reducing valve
  (see figure 3 – air supply unit). Lower pressure corresponds to a lower
  speed, resulting in a steeper honing angle. Higher pressure corresponds to a higher speed, resulting in a flatter honing angle.
- The lifting speed can also be changed. This is achieved with the left pressure
  reducing valve (see figure 3 – air supply unit). Lower pressure corresponds to a lower lifting speed, resulting in a flatter honing angle. Higher pressure corresponds to higher lifting speed, resulting in a steeper honing angle.

Surface roughness is not achieved.

Correction:

- Check the contact pressure. The contact pressure is set with the right pressure reducing valve (see Figure 3 – air supply unit). Increase the pressure if necessary.
- The rings (item 002) on the rotary feedthrough (see group 7.7 rotary feedthrough)
  are worn and blow through – replace the rings. (included in the wear parts set).
  The wear parts set is included with the honing device.