



Manual
torbo M, torbo L
electrical

2015

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Code of practice

(extract from the instructions for Operation)

Valid rules and regulations for wet abrasive blasting must always be adhered to, as well as the rules and regulations for the prevention of accidents relevant to the respective field of application; special attention must be paid to the following:

- All recommendations and instructions, in particular the basic safety instructions included in the instructions for operation!
- The machine must be operated by regularly trained and skilled personnel only!
- The blasting lance should never be directed towards persons and/or animals!
- The magnetic clamp of the remote control must always be securely fixed at the wrist!
(only for machines with electrical control)
- Helmet, hearing- and breathing protection apparatus must always be worn!
- Protective clothing must always be worn!
- Before operating make sure the machine and all accessories are in perfect condition.
- The control cabinet of the machine must be opened only for adjustments, inspections or maintenance work.
- Regular maintenance of the machine is essential.
- The compressor must always be operated without tool lubricator.

This manual must be always with the machine!


Machine data



If your machine is an Atex-version or a part of a trailer or it is a torbomix installed:

- Consider additionally the appendix to the machine.
- The appendix has priority before the manual!

Identification plate information

 torbo ENGINEERING KEIZERS GmbH Einsteinstraße 11, D-46325 Borken Tel.: +49 (0) 28 61 / 9 42 9-0		
Maschinen-Typ / Type de la machine Typ of machine / Macchina tipo	torbo XX	①
Herstelldatum / Date de production Date of production / Data di produzione	JJJJ	②
Maschine-Nr. / No. de la machine Machine-No. / Macchina n.	BB AA BBB	③
Kessel-Nr. / No. du réservoir Tank-No. / Serbatoio n.	CCC D	④
Zul. Betriebsüberdruck / Surpression admissible Max. overpressure / Sovrappressione ammissibile	_____ bar (PSI)	⑤
Zul. Betriebstemp. / Surtempérature admissible Permissible operationg Temp. / Temperatura ammissibile	_____ °C (°F)	⑥
Nennspannung, -leistung / Tension et puissance nominales Rated voltage, -output / Tensione, -potenza nominale	_____ V DC / W	⑦
Zul. Gesamtgewicht / Poids total admissible Permissible total weight / Peso totale ammissibile	_____ kg (lbs.)	⑧

- ① XX: Data to the type of the machine
- ② JJJ: manufacture year (date does not give information for the date to the first application!)
- ③ AA: Further data to the type of machine; BBB BB: Production number of the machine
- ④ CCC D: Production number of the vessel
- ⑤ Data over the max. vessel pressure; the attached air pressure must be 2 bar (70 PSI) below the max. vessel pressure.
- ⑥ Data of the max. ambient temperature for the machine
- ⑦ Power connection data in volts and watts (only for machines with electrical control)
- ⑧ Admissible total weight = weight of the machine plus the weight of the filled vessel



To reduce our response time and your expenses, please always send/give us the type of machine (line 1) and machine number (line 3) with a parts orders or if you have questions.

Scope of supply

To the scope of supply contained:

- the torbo XX (designation see under "Machine data")
- a remote control for the machine
- a tool set
- the CE documationen
- this manual (incl. instruction and spare parts list)



- The specification refers to the standard. The specification can deviate with extra equipment. You find the information regarding the extra equipment under the point "Machine data".
- With torbocar units or machines with torbomix etc. you will get an appendix to this manual.
- With units with compressor you will get an extra documentation for the compressor.
- The safety notes and guidances are to be considered as constituent to this manual.



1. Basic instructions

Instructions for application of the manual

A fundamental prerequisite for the safe and troublefree operation of this machine is knowledge of the basic safety rules, regulations and instructions.

The manual includes essential instructions for safe operation of the machine.

The manual, and in particular, the safety instructions must be adhered to by all persons operating the machine.

Moreover, the instructions for the prevention of accidents during blasting as well as the rules and regulations for the prevention of accidents valid on site must be adhered to (e.g. within the Ex-area).

Duties of the operator and of the personnel

The operator is obliged to have operate the machine only by those persons, who

- are familiar with the basic regulations for safety at work and for the prevention of accidents and who have been adequately instructed and trained for the operation of the machine and
- have read, understood and confirmed by their signature the content of the chapter on safety and the respective caution notes.
- At regular intervals, it has to be checked whether the safety instructions are adhered to by the personnel.

Before starting to work, all persons authorized to operate the machine shall commit themselves to

- strictly adhere to the basic rules and regulations regarding safety at work and prevention of accidents;
- read the chapter on safety and the caution notes in this manual and to confirm by their signature to have understood same.

Dangers in operating the machine

The torbo wet abrasive blasting machine has been designed in accordance with the latest state of the technology and in conformity with approved safety requirements. In spite of that, the use of the machine may entail dangers to life and limb of the user or third parties resp. impairments for the machine or other material assets.

The machine must be operated only

- in a safe and perfect operating condition and
- for use for the intended purpose.

Any troubles which might impair the operational safety, must be eliminated immediately.

Usage for the intended purpose

The torbo wet abrasive blasting machine has been designed exclusively for surface treatment of natural and artificial stones, ferrous and non-ferrous metals, wood and similar materials by the wet abrasive blasting process using blasting media and water.

Any other or exceeding use is not regarded as in conformity with the intended purpose. Messrs. torbo Engineering Keizers GmbH shall not be liable for any damages arising from such inappropriate use.

The usage to the intended purpose also implies:

- the adherence to all instructions in the manual,
- the proper performance of all inspection and maintenance work,
- the observance to the technical data (chap. VI and identification plate) and the locally prescribed regulations (like noise protection, industrial safety etc.)
 - admissible max. compressed air temperature 45°C (113°F); max. water temperature 30°C (86°F),
 - admissible application temperature 5 to 45°C (40 to 113°F); admissible storage temperature -20 to 60°C (-4 to 140°F),
- the boundaries of the device/the machine are the spatial dimensions,
- the max. weight may be moved only in the emptied status,
- only regularly trained and experienced personnel may operate on/along the device/machine.

Please also take into consideration that a loss of material of the various types of surfaces as well as a deformation or breakage of objects by wet abrasive blasting cannot be excluded (in particular in case of wet abrasive blasting using hard and sharp-edged blasting media and a high jet pressure on thin sheet material and glass panes).

As blasting media all conventional and commercially available blasting media are suitable which are heavier than water and which, by the addition of water, do not lump or emit hazardous vapours or gases and which are approved for wet abrasive blasting on the surface to be treated.

Not permitted use

The torbo wet abrasive blasting machine is not to use if there is no responsible authority of the responsible person resp. competent authority. This particularly applies within endangered areas like

- areas, within which noise or dust leads to endangerments,
- within areas, where sandblasting can lead to endangerments (for example Ex-areas).

Warranty and liability

In principle, our “General Conditions for Sale and Delivery“ shall apply which will be at disposal upon conclusion of the contract at the latest.

Warranty and liability claims in case of personal injury and damage to property are excluded if they are due to one or several of the reasons mentioned hereunder:

- usage of the machine not in conformity with the intended purpose;
- improper putting into operation, operation, maintenance and assembly of the machine;
- operation of the machine with defective or not properly fitted and/or not operational safety devices and protective guards;
- non-adherence to the advice and instructions of the manual regarding transport, storage, assembly, putting into operation, operation, maintenance and setting of the machine;
- unauthorized and/or improper alterations to the machine design;
- inappropriate control of machine- and wearing parts;
- improper performance of maintenance or repair;
- accidents by the influence of foreign matter or Force Majeure.

Copyright

The copyright regarding this manual remains with Messrs. torbo ENGINEERING KEIZERS GmbH, D-46325 Borken. This manual is intended exclusively for use by torbo operators and their personnel.

It contains instructions and advice which - neither wholly nor partly - may be copied, divulged or otherwise disclosed. Any infringement may entail result in litigation prosecution.

2. Basic safety instructions

Definition of symbols and references

In this manual, the following symbols and definitions of dangers are used:



This symbol defines an **imminent danger** for life and health of persons.

The non-adherence to these instructions will entail severe effects detrimental to health and even serious threatening injuries.



This symbol defines a **possible danger** for life and health of persons.

The non-adherence to these instructions may entail severe effects detrimental to health and even serious threatening injuries.



This symbol defines a situation which **might become dangerous**.

The non-adherence to these instructions may entail slight injuries to persons or damage to property.



This symbol means essential instructions for proper handling of the machine. The non-adherence to these instructions may entail troubles with the machine or with the environment.



This symbol refers to hints and recommendations for use and in particular to useful information. They will help make optimal use of all functions of the machine.

Organizational measures

The operator is obliged to place at disposal the required personal protective outfit (e.g. hearing- and breathing apparatus and face guards). The available protective and safety equipment must be checked at regular intervals.

Safety devices

be properly installed and operable. Protective devices, guards etc. may be removed only at standstill of the depressurized machine which has been secured against re-start.

Informal safety measures

The manual (with appendix, if available) forms part of the machine and has always to be kept on site. Apart from the manual, the rules and regulations for the prevention of accidents during abrasive blasting as well as the locally valid rules (e.g. ATEX 94/9/EG) and regulations for the prevention of accidents and for environmental protection must always be at disposal and adhered to. It must be ensured that the safety instructions and warning boards at the machine are always legible.

Training of the personnel


The machine must be operated and put into operation only by regularly trained and experienced personnel. Untrained personnel or personnel to be trained and instructed may operate the machine only under the supervision of experienced and skilled persons (This applies in particular to the ex area: consider ATEX 94/9/EG or §14 chapter 1-3 and §15 BetrSichVero. in Germany).

The competence with regard to putting into operation, operating, maintenance, assembly, setting and repair must be clearly stipulated.

Safety measures under normal service conditions

In normal operation of the blasting machine, the following points must be observed:

The machine must be put into operation only if:

- all protective devices are fully operable,
 - all connections have been made and secured,
 - the magnetic clamp of the remote control has been fixed at the wrist of the operator and does not contact the remote control (only for remote controls with magnetic clamp) and, if the operator keeps a firm hold on the manual blasting nozzle/lance.
 - Before switching on or starting the machine it must be made sure that nobody can be jeopardized hereby.
 - At least once per shift, the machine and its equipment must be checked for external visible damage.
- 
 - The blasting lance must never be directed to persons and/or animals!
 - Never direct the blasting lance to objects which are not to be subject to surface treatment.
 - The inspection of the machine also include its equipment.
 - For Ex-areas: consider the guidance for ATEX!

Dangers due to electric energy (at machines with electrical control only)

- If works have to be performed at electric cable or supply system, this must be done by a skilled electrician only.
- The electric equipment of the machine must be checked at regular intervals. Loose connections and scorched cables must be eliminated immediately.
- The control cabinet must always be kept closed. Authorized personnel only shall have access to the control cabinet using a key or adequate tool.
- When working will live parts, a second person must assist who in case of need could actuate the main switch (at machines with an electrical remote control).

Dangers due to pneumatic energy

- Pneumatic equipment must be operated only by personnel having special knowledge and experience in the field of pneumatics.
- Before tackling any repair work, sections of the pneumatic system and delivery conduits to be opened must be depressurized.
- At reasonable intervals, pneumatic hose pipes are to be exchanged even if no deficiencies impairing safety are visible.

Special hazards

When operating the machine, special attention has to be paid to the following in order to avoid hazards:

- Never direct the blasting nozzle towards persons and/or animals !
- The blasting nozzle must not be directed towards objects which are not to be blasted!
- Keep a tight hold on the blasting lance during start (back kick of the blasting lance!)
- Unauthorized starting of the machine in case of interruptions (also short interruptions) must be avoided.
- Machine to be made inaccessible for unauthorized people. Blasting nozzle and remote control to be made inaccessible for unauthorized people.
- During interruptions, magnetic clamp of the remote control to be put into jacket- or trouser pocket (at machines with magnetic clamp security).
- When operating the machine, the control cabinet must be kept closed and made inaccessible for unauthorized people.

Dangers due to superfines as well as noxious gases and vapours

The concentration of fine dusts during operation of the machine is detrimental to health. The operators therefore have to be protected by an adequate protective outfit or protective measures against inhalation of superfines.

The addition of chemical or other agents must be clarified with the producer and/or supplier of the agents. If on account of these agents or by using these agents in combination with water and/or blasting media health risks could arise, adequate protective measures must be taken.

If by the use of these agents the functions of the machine might be impaired, a written confirmation must be obtained from torbo Engineering Keizers GmbH, D-46325 Borken, before using such agents.



- Adequate breathing protection is to be ensured when working on the machine.
- Adhere to the instructions of the producer when using other substances than water and/or commercially available blasting media.

Dangers due to the noise of the machine

During the operation of the machine, the continuous sound intensity level (depending on the setting) amounts to 105 dB(A) which might be higher on account of unfavourable local conditions.

The operating staff must be protected by an adequate outfit or protective measures against impairment of hearing.



- Adequate hearing protection is to be ensured when working on the machine.

Maintenance, repair, trouble-shooting

Regarding maintenance, repair and trouble-shooting the following requirements must be fulfilled:

- The specified maintenance and inspection work must be carried through according to schedule.
- The operating staff must be informed in time of any intended maintenance and/or repair.
- All plants, systems, machines, appliances upstream and downstream of the wet abrasive blasting machine, as well as all supply systems like current, compressed air and pressurized water are to be secured against accidental actuation.
- For all maintenance-, inspection- and repair works, the machine must be deenergized and depressurized and secured against re-start,
 - attach warning board to prevent from restarting the machine;
 - uncouple compressed-air- and pressurized-water hoses from the machine;
 - disconnect cable from power source (only at machines with electrical circuit).
- After completion of the works check loosened screws and connections for tight fitting.
- After completion of the works check all safety devices for correct functioning.

Alterations of the machine design

No alterations, attachments or conversions of the machine are allowed without the approval of the manufacturer.

All conversion measures are subject to the written approval of Messrs. torbo Engineering Keizers GmbH, D-46325 Borken.

Any machine parts which are not in a perfect state and condition, must be exchanged immediately.

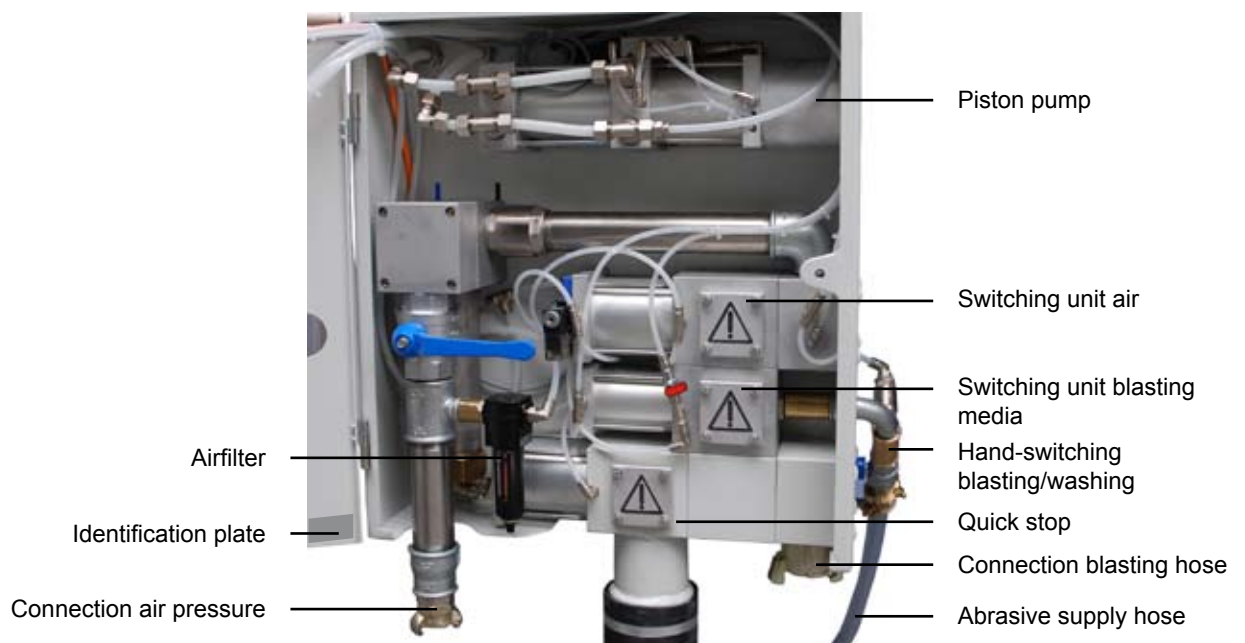
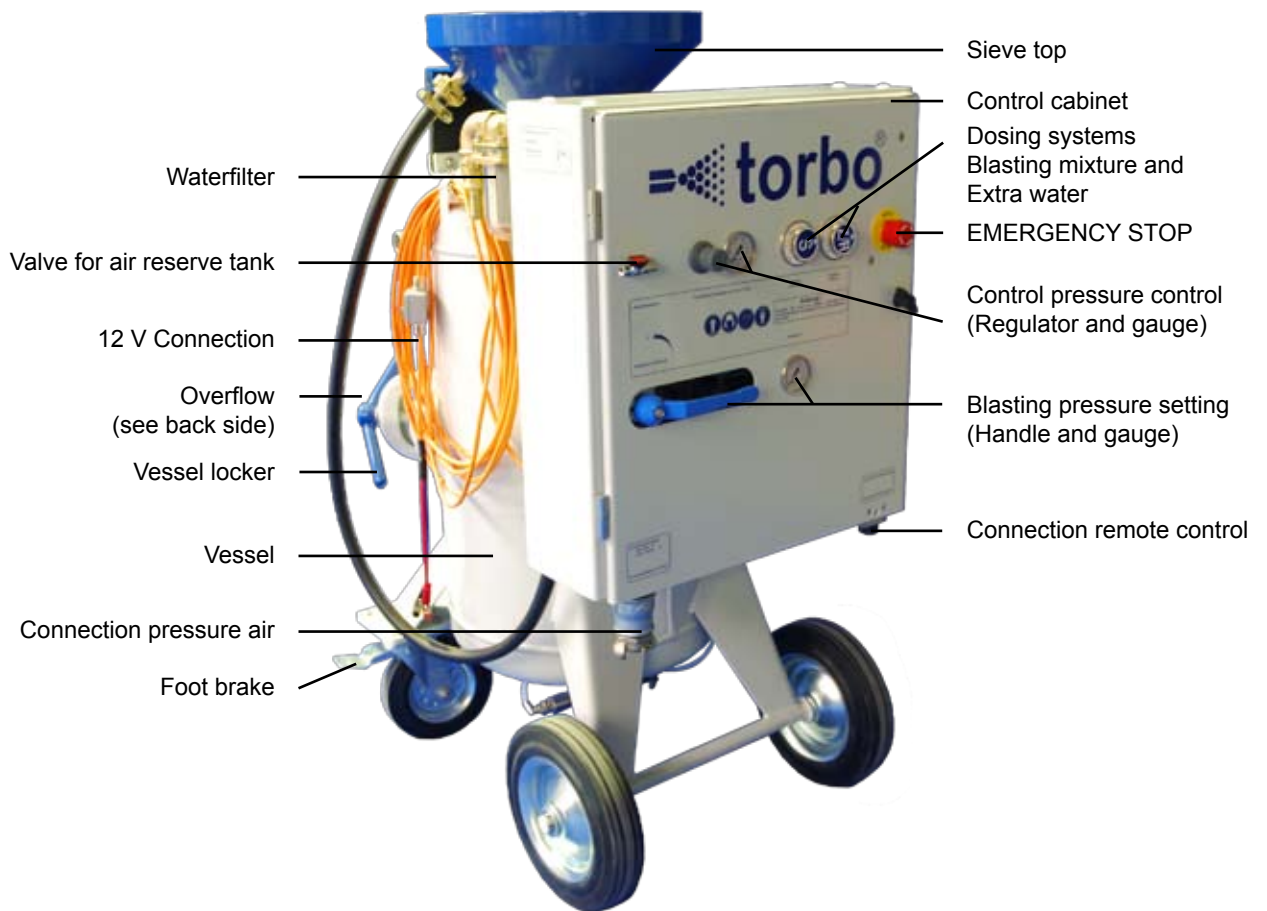
Only original spare- and wear parts are to be used. In the case of parts bought elsewhere it cannot be warranted that they have been designed and manufactured to fulfil the requirements regarding quality and safety.

Disposal of substances/materials and cleaning of machine

All substances and materials used have to be properly handled and disposed of. In particular, this applies to:

- Blasting media and water used in the performance of any works and jobs,
- Additives used, like rust retarding agents, solvents for cleaning the machine etc.

II. Operating instructions





For machines with ATEX permission and a working place in an Ex-area:

- The machine have to be checked (permission for the Ex-area, status of the machine) by the responsible person for the Ex-area.
- The service personnel needs permission from the responsible person for the Ex-area to work within this area.
- The specification in the appendix “ATEX” must consider, this description has priority.

1. Transport and set up

A. Transport of single units

Before moving the machine, the footbrakes have to be released (see pic. 2). Afterwards the machine can be displaced by towing at the provided tow bar.

To move the machine with a crane, use the crane eyes on top of the vessel only.



- For transporting it must be ensured that the pressure vessel is empty.
- if you use aids for the raising, you are sure that the aids are admissible in a good status and for the weight.
- The machine must be placed on a plane surface and the footbrakes (see pic. 2) have to be applied in order to avoid tilting or slippage;
- During transport, the machine must be secured in conformity with the rules and regulations for the prevention of accidents applicable to the transport of piece goods.



Pic. II.1.01



Pic. II.1.02

1. Place the machine on a flat and fixed surface.
2. Protect the machine from tilting or sliding. Press the footbrakes at the rear wheels down (with torbo S120 and M120 only).



Pic. II.1.03



Pic. II.1.04

3. Close hand bar “P” for blasting pressure (turn right - lever is horizontally)
4. Close valve for air reserve tank (Lever shows upward)



- Check the location the machine against slippage and stability.

B. Transport of torbocars

A torbocar means a trailer with torbo machine with or without additional mountings like compressor, hose reel, water tank, toolbox, high pressure unit or similar and to move with a towing vehicle.

For this type of systems you have an additional appendix to this operating instruction. In the appendix you have further important notes for transportation of trailer units.



- Consider the statements in the appendix for torbocars.

2. Connecting the machine



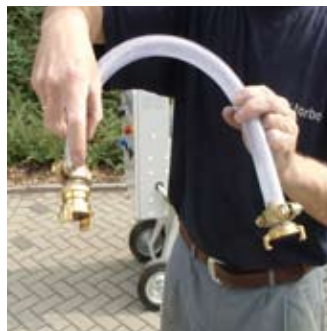
- Connections must always be secured against loosening.
- Use only suitable hoses and cables.
- Hoses and cables have to be checked regularly for wear and damage and replaced if necessary.
- Place the machine only on suitable locations (see chapter 1 “Transport and set up”).



- Use always clean water and clean regularly the water filter. This increases the life time of the piston pump.
- Disconnect/close the oiler at the compressor!
- Use only clean hoses, this reduce the service work and cost.
- With a torbocar some connections are fixed installed, skip you accordingly this.



Pic. II.2.01



Pic. II.2.01, Info

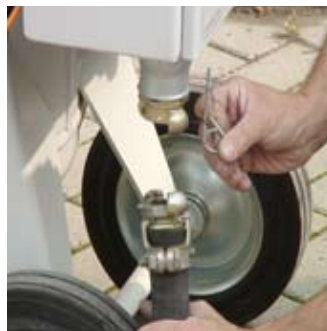
1. Connect the abrasive-supply-hose at the under page of the vessel and on the right site at the control cabinet.



The coupling with locking collar must be at the under page of the vessel.



Pic. II.2.02



Pic. II.2.02, Info

2. Connect air pressure hose at the machine.



Secure the coupling against loosening.



Not applicable at units with a compressor.



Pic. II.2.03

3. Connect water hose at the machine.



At units with water tank: connect the water hose at the water tank and check the connection to the machine.



Pic. II.2.04



Pic. II.2.04, Info

4. Connect pole tongs (black and red) at a 12 Volt DC power source. (e.g. battery of the compressor or towing vehicle)



Connect the red pole tongs on “+” and the black one on “-“. The LED lights up green.



Is not necessary at systems with a compressor.

3. Filling the machine

3.1 First filling at location



- Make sure before filling the machine that the machine is correctly attached. See chapter 2 “Connecting the machine“.



Pic. II.3.01



Pic. II.3.02

1. Open venting valve at the overflow. (Lever is toward the line.)
2. With wet and/or damp blasting media: Open the valve for the water supply at the sieve top. (Handle is toward the line - extra equipment).



Pic. II.3.03



Pic. II.3.04

3. Open the venting valve at the hand-switching for blasting/washing. (Lever is toward the line – extra equipment).
4. Turn handwheel “S” to position “D” or on maximum value respectively. Turn handwheel “Z/R” to position “D” or on maximum value respectively (extra equipment)

Now open the air-pressure and water to the machine.



Pic. II.3.05



Pic. II.3.06

5. Start filling the blasting media through the sieve top into the vessel.
6. Fill maximum as much as blasting media penetrates out of the overflow.



Pic. II.3.07



Pic. II.3.08

7. Close venting valve at the overflow (Lever is transverse to the line)
8. With wet or damp blasting media: close additionally the valve for the water supply at the sieve top. (Lever is transverse to the line - extra equipment).



Pic. II.3.09



Pic. II.3.09, Info

9. Uncouple the water hose from the sieve top and rinse the remaining blasting media from the sieve top into the vessel (extra equipment).

Open the water supply to the sieve top. (Handle is toward the line - extra equipment).



Pic. II.3.10



Pic. II.3.11

10. Close the water supply at the sieve top. (Handle is transverse to the line - extra equipment).

11. Tip over the sieve top.



Pic. II.3.12



Pic. II.3.13

12. Wait until water penetrates on the top of the vessel.



Filling of the vessel can be accelerated by the addition of water at the upper opening of the vessel and/or pushing the handwheel "S".

13. Turn the ring at the vessel locker back and forth, until no more blasting media is situated on the locking-plate.



Pic. II.3.14



Pic. II.3.15

14. Pull up the locking-plate, and hold this briefly, so that in the vessel can build up the pressure.



Place sieve top back on the top of the vessel.

15. Pull the black adjustment wheel and set the vessel pressure on 11 to 12 bar (160 to 175 PSI). (See gauge on the right side of the wheel).

Push the adjustment wheel back.



turn to the left -> less pressure
turn to the right -> more pressure



If you place the pressure over 12 bar (160 to 175 PSI), the relief valve will be open. In this case you must repeat the steps 1 to 15.



Pic. II.3.16

16. Turn the lever for blasting pressure somewhat upward.

Check the machine for tightness:

- a) Hearing (hisses air or water from the machine?)
- b) View (is any water leaking from the machine?)



If a leakage is present, then recover these, or contact your agent/ dealer.

3.2 Repeating the filling

For repeated filling of the vessel at the location: repeat the steps 1 to 14.



Steps 15 and 16 are only necessary for the first filling.

4. Adjustment



Wear always suitable work clothes, breath and ear protection when working with the machine.



Pic. II.4.01



Pic. II.4.02

1. Set the amount of blasting media at hand-wheel “S” and for extra water at hand-wheel “Z/R” on the right position for the job. (See also chapter III. “Practice information”)

2. Wear the necessary and prescribed work clothes.

3. Start the machine and adjust the blasting pressure to the desired pressure at the lever. (see also chapter III. “Practice information”)



Pic. II.4.03



First read chapter 5 “Start blasting” and chapter 6 “Switching off the machine”



- Consider the admissible maximum past-flow at the blasting nozzle. (German, national regulation: past-flow less than 1 second at the nozzle).



- The blasting pressure is displayed during blasting at the gauge on the right side of the lever for blasting pressure.
- You will find information for correct adjusting of the machine for the job in chapter III. “Information for practice”.
- If the blasting hose and/or the extension cable are not long enough, connect more blasting hose and cable and set/control the blasting pressure again.

5. Start blasting



- Always consider the safety regulations in this operating instruction!
- The blasting lance should never be directed towards persons and/or animals!
- Be sure that the machine is correctly filled and adjusted. See also chapter 3. "Filling the machine" and chapter 4. "Adjustment".
- The magnetic clamp of the remote control must be securely fixed at the wrist!
- The higher the blasting pressure is, the higher is the recoil at the nozzle!



Pic. II.2.05



Pic. II.2.06

5. Connect blasting nozzle on the blasting hose.
(connection with union nut or with coupling - see picture)

6. Connect remote control on the extension cable.



Take off the magnet of the remote control; the magnet of the remote control must always be securely fixed at the wrist!



Pic. II.2.07



Pic. II.2.08

7. Fix remote control approx. 30 cm (12 Inch) behind the nozzle holder at the blasting lance.
Protect the cable with an additional belt at the blasting hose.

8. Connect the loose end of the extension cable to the machine.



Pic. II.2.09



Pic. II.2.09, Info

9. Connect the loose end of the blasting hose to the machine.



Protect the connection with a split pin.



- When more than 20 m (60 ft.) blasting hose are connected, check if the past-flow time is more than 1 second. If so, additionally the switch-off device QE99 has to be installed approx. 10 to 20 m (30 to 60 ft.) behind the blasting nozzle to reduce the past-flow time to less than 1 second.

5.1 Starting after setting



- First read chapter 6.1. "Interrupt blasting"



Pic. II.5.01



Pic. II.5.02

1. Fix the magnetic clamp of the remote control on your wrist!
2. For starting:
Have a tight hold on the blasting lance (blasting hose with nozzle and remote control) and put the magnetic clamp on the designated place at the remote control.



At machines with hand switching (extra equipment) see also chapter 5.4 "Hand switching blasting/washing".

5.2 Starting after stopping (e.g. for a break)



- First read chapter 6.2 "Stopping blasting (e.g. for a break)"



Pic. II.5.03



Pic. II.5.04

Connect water and air pressure to the machine.

3. Close the overflow at the machine (lever is transverse to the line).
4. Wait until water flows out of the top of the vessel



Filling of the vessel can be accelerated by the addition of water at the upper opening of the vessel and/or pushing the handwheel "S".

5. Turn the ring at the vessel locking back and forth, until no more blasting media is situated on the sealing disk.
6. Pull up the vessel locking by the ring until the pressure has built up.



Place sieve top back on the top of the vessel.



Pic. II.5.05



Pic. II.5.06



Pic. II.5.07



Pic. II.5.08

7. Fix the magnetic clamp of the remote control on your wrist!
8. For starting:
Have a tight hold on the blasting lance (blasting hose with nozzle and remote control) and put the magnetic clamp on the designated place at the remote control.



At machines with hand switching (extra equipment) see also chapter 5.4 "Hand switching blasting/washing".

5.3 Starting after leaving the machine (e.g. over night)



- First read chapter 6.3 "Leaving the machine (e.g. over night)"

- Fill the machine (see also chapter 3. "Filling the machine" and/or chapter 3.2 "Repeating the filling").
- Check and correct if necessary the adjustments on the machine (see also chapter 4. "Adjustment")
- afterwards, you can start the machine (see also chapter 5.1 "Starting after setting").

5.4 Hand switching blasting/washing (Extra equipment)



Pic. II.5.09



Pic. II.5.10

Machines with hand switching blasting/washing are switch-selectable at the machine from blasting to washing (blasting with air and water).

9. Starting blasting: open lever (Lever is toward the line).
10. Starting washing: close lever (Lever is transverse to the line).

6. Switching off the machine



- The magnetic clamp is to be protected always in such a way that the machine cannot be started by unauthorized persons.
- In an emergency the machine can also be switched off by pressing the EMERGENCY-OFF switch.

6.1 Interrupt blasting



Pic. II.6.01



Pic. II.6.01, Info

1. For interrupting blasting pull off the magnetic clamp from the remote control.



In an emergency the machine can be switched off by pressing the EMERGENCY-OFF switch.

6.2 Stopping blasting (e.g. for a break)



Pic. II.6.02



Pic. II.6.02, Info

2. For interrupting blasting pull off the magnetic clamp from the remote control.



In an emergency the machine can be switched off by pressing the EMERGENCY-OFF switch.

3. Open the overflow at the vessel.

Interrupt the compressed air supply to the machine.

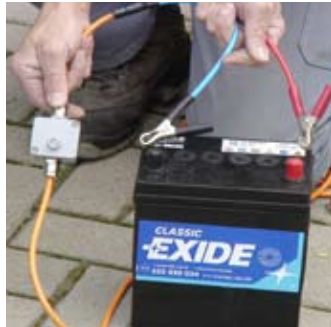
Interrupt the water supply to the machine.



Pic. II.6.03

6.3 Leaving the machine (e.g. over night)

Switch off the machine, make the vessel pressure-free - open the overflow - see also chapter 6.2 "Stopping blasting (e.g. for a break)" - and follow following steps.



Pic. II.6.04



Pic. II.6.05



Pic. II.6.06



Pic. II.6.07



Pic. II.6.08



Pic. II.6.09

4. Uncouple the Pole Tongs from 12 V connection.
5. Uncouple and protect Remote control and extension cable.
6. Uncouple and protect the blasting hose.
7. Uncouple and protect air pressure hose.
8. Uncouple and protect water hose.
9. The vessel is to be emptied in the following cases:
 - a) A soluble blasting media was used.
 - b) A blasting media was used, which hardens in connection with water (e.g. Soda).
 - c) Another blasting media will be used.
 - d) The location is to be changed.



If the blasting media hardens in connection with water, if a softer blasting media is to be filled in, order or if the location (building site) is to be changed, so the vessel is after emptying additionally too clean from the inside. (see also chapter IV. "Maintenance" / 3. "vessel cleaning")

III. Practice information

This chapter will assist you to use the machine at optimum levels in diverse applications.

1. Blasting result – optimization of the parameter

The setting of the machine depends on the result which is needed. The following settings influence the blasting result and have to be conformed to the result:

- blasting pressure;
- blasting hose;
- blasting nozzle;
- blasting media;
- quantity of blasting media and water;
- additional water.

There is no general solution for settings because of always varying working conditions. But there are some rules to exclude typical mistakes at the setting and to find a close optimized solution for the setting.

1.1. Soft blasting

The target for soft blasting is to have an equable and clean result without respectively with low damage of the surface.

The most unnecessary mistakes during soft blasting are:

- Selection of the blasting media (hardness, grain),
- setting blasting mixture consumption,
- setting blasting pressure,
- combination of blasting hose and blasting nozzle and
- handling of the blasting nozzle.



See table at chapter 3.2. for the best initial values.

Information for the best handling of the blasting nozzle, look at chapter 3.

1.2. Power blasting

The target for power blasting is to have a maximum on abrasion power.

This means not only that it is enough to have plenty of air volume and the right blasting media and setting for blasting mixture, but also to have low power losses.

Needless power losses arise when:

- The cross-section of the air hose between air-compressor and machine or the cross-section of the blasting hose is too small;
- The hoses are too long or have too many arcs;
- The nozzle has a wrong cross-section or shape;
- The blasting mixture or the setting of blasting mixture is wrong.



Examples for the initial setting, see table at chapter 2.

2. Adjustments and settings

In the first column of the first table „Material of object to be blasted“ the work to be done is to be stipulated. Following this, the approximate values for the selection of the blasting mixture, the required volume of blasting mixture, the pressure at the machine, the diameter of the blasting nozzle and of the blasting hose may be taken from the respective line.

After selecting the settings and the blasting nozzle by means of the first table you have to select the right air-compressor size, air hose between compressor and machine and the blasting hose size for the blasting nozzle by using the information shown in the second table.

The data in the tables are approx. values only and may differ from case to case.

Table 1: Directional data for settings

	Type of blasting media	Volume of blasting mixture in l/min	Blasting pressure in bar	Blasting nozzle in mm
Softest cleaning	a)	0,4 / 0,6 / 0,8 / 1,0	0,5 bis 1,5	6 bis 8
Soft cleaning	a)	0,6 / 0,8 / 1,0 / 1,5	0,5 bis 2,0	8 bis 10
Cleaning	a) b)	0,6 / 0,8 / 1,0 / 2,0	1,0 bis 5,0	10 bis 12
Blasting up to 5 m ³ /min	b) c)	2,0 / 3,0	bis 10	10 bis 12
Blasting up to 7 m ³ /min	b) c)	3,0 / 4,0	bis 10	12 bis 14
	b) c)	4,0 / 5,0	bis 10	14 bis 16
Blasting up to 15 m ³ /min	b) c)	4,0 / 5,0 / 6,0	bis 10	14 bis 16

Information to the table 1

Column 2 „Type of blasting media

- a) Stone dust, calcite powder, basalt, finical and soft blasting media without sharp edges and soft media upto 0,4 mm and with a hardness upto 4 Mohs.
- b) Stone dust, glas powder and other fine blasting media upto 0,8 mm and a hardness upto 8 Mohs.
- c) Slag, granite powder, garnet and other blasting media upto 1,5 (2,0) mm and with hardness upto 8 (9) Mohs.
- d) Sodium bicarbonate, lime (suitable for the removal of paint coat without damaging the metallic surface) and other fine and soft blasting media of a very low hardness.



- In order to ensure a good flow of the blasting mixture it is recommended to use a blasting mixture containing superfines (disadvantageous e.g. a grainage from 1 to 2 mm; better: e.g. 0,4 to 2,0 mm).
- To get more soft cleaning, you may have to use extra water (handwheel „Z“ – equipment 507).

Column 3 „Volume of blasting mixt.“



- For cleaning, always test soft blasting media first.
- The blasting mixture is already mixed with 20% water. If you need more water for soft cleaning, you may have to use extra water (handwheel „Z“ – equipment 507).
- For cleaning, the percentage of water may be increased in the case of machines with dosing facility for extra water (with dosing equipment ZW (506) resp. with handwheel „Z“ (507)) to achieve an optimum result in a still more gentle way.

Column 4 „Blasting pressure“



- For cleaning, always test with a low blasting pressure first.
- The blasting pressure at the machine and at the blasting nozzle may differ because of different length and different diameter of the blasting hoses.

Table 2: Max. compressor size required as a function of the blasting nozzle

Diameter blasting nozzle	mm	6	8	10	12	14	16
Compressor output	m3/min	1,8	3,2	5,0	7,2	9,8	12,8
Blasting hose and compressed-air hose	mm	13/7, 19/7	19/7, 25/7	25/7, 32/8	32/8	32/8, 49/8	32/8, 49/8
	zoll	1/2, 3/4	3/4, 1	1, 5/4	5/4	5/4, 1 1/2	5/4, 1 1/2



- The shorter the hose and the bigger the diameter of the hose, the lower is the loss of blasting power. (This concerns the air hose between the compressor and the machine and the blasting hose).

3. Blasting nozzle and operation

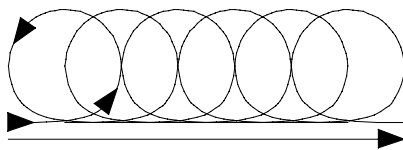
The nozzle: Standard nozzles are Cylinder- and Venturi-nozzles, but the Venturi-nozzle produces a higher speed of the blasting mixture at the nozzle. The result of the higher blasting mixture speed is a higher production efficiency of blasting power (up to 30%).

Also long blasting nozzles have up to 20% more blasting power in comparison to short nozzles.

B. Handling of the blasting nozzle: This is not a question of the machine or the equipment, but of the training of the operator. A well trained operator with experience can get up to 50% more production efficiency than an operator without training.

The first step to get the maximum blasting performance is to have a good planning, the right blasting mixture and the right setting of the machine.

After planning, the operator has to know what result is required, so that the operator knows how to handle the nozzle.



Pic. III.3.01: movement of the nozzle

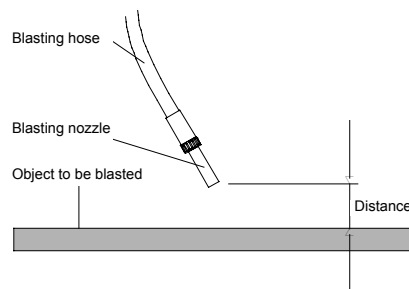
Movement of the nozzle

The best way to move the blasting nozzle on large objects is to circulate and side lunge the nozzle at the same time.

If you don't circular the nozzle, the surface will look unintegrated.



- The faster the circulating and the side motion, the lower the wear on the surface.



Pic. III.3.02: distance of the nozzle

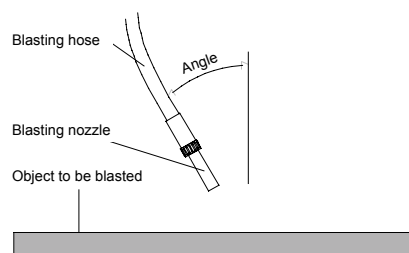
Distance of the nozzle

The normal distance between object to be blasted and blasting nozzle is approx. 20 to 25 cm.

One possibility to influence the aggressiveness of the blasting process, is to increase the distance between object and blasting nozzle.



- The nearer the blasting nozzle to the object, the stronger the aggressiveness of the nozzle and the smaller the surface simultaneously treated.



Pic. III.3.02: angle of the nozzle

Angle of the nozzle

The normal angle between object and blasting nozzle is 20 to 45°.

One possibility to influence the aggressiveness of the blasting process, is to increase the angle between object and blasting nozzle.



- The smaller the specified angle to the object, the stronger the aggressiveness of the nozzle and the smaller the surface simultaneously treated.

IV. Maintenance

In order to ensure correct maintenance of the machine it is compulsory that maintenance is performed only after having read these instructions and by trained personnel.



Ex-area

For machines with Atex permission and a working place in an Ex-area:

- The specification in the appendix „ATEX“ must consider, this description has priority.
- Maintenance work have to be done only outside of the Ex-area.
- The responsible person for the Ex-area must check the maintenance work before the machine comes into the Ex-area.

1. Maintenance work

Daily before connecting the machine

- cleaning of compressed-air connections
- cleaning of water connections
- cleaning of 12 Volt connection (pol tongs)

After 20 working hours

- cleaning unit from outside
- cleaning airfilter and waterfilter
- if necessary, clean vessel from inside
- check hoses (particularly blasting hoses) for wear, if necessary exchange the hoses
- check gaskets from the couplings, if necessary exchange the gasket

Inspection I

Inspection II

The inspections I and II have to be done by regularly trained and experienced personnel.

For further information please contact you sales partner. They will be glad to help you.

In one-shift-operations the inspection I and II are to be carried through at intervals of 3 to 6 months.

Any occurring troubles, faults etc. are to be eliminated immediately by adequately trained personnel; before starting the machine again, any defective parts are to be replaced by new original parts.



- Before beginning any maintenance work, the power, compressed-air and water connections are to be detached and the machine is to be depressurized.
- The machine must be protected from re-start.
- Repairs and the inspection I and II may be carried out by adequately trained personnel only, being at disposal via the torbo-trading partners.
- For mobile units with compressors the inspections of the respective manufacturer must be adhered to for maintenance at the compressor or chassis respectively.



- For a safe operation and a long service life of the machine and its accessories, it must be adhered to the cleaning and maintenance advises shown in the instructions for operation. The servicing instructions in the manual are to be considered.
- Obvious neglect can reduce the manufacturer product liability or warranty claims.

2. Information to the weekly maintenance

2.1 Cleaning water filter



Pic. IV.2.01



Pic. IV.2.02

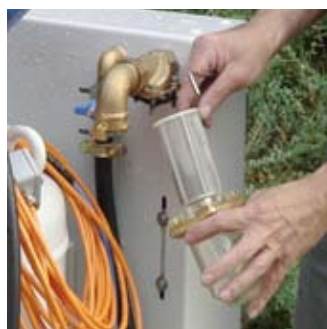
1. Depressurize the machine (disconnect the air and water hose from the machine)
open the air outlet
2. disconnect the machine from the power connection



Protect the machine against re-start.



Pic. IV.2.03



Pic. IV.2.04

3. Unscrew the filter (4 screws) at the upper side of the filter.
4. Remove filter element from container .

Clean the filter with compressed air or water or replace the filter element.



Pic. IV.2.05



Pic. IV.2.06

5. Insert filter element in the container and screw these on again.



Look at the right position of the gasket at the upper side.

6. Tighten the 4 screws over cross.

2.2 Cleaning air filter



2.2.1 Air filter



Pic. IV.2.07



Pic. IV.2.08

7. Depressurize the machine (disconnect the air and water hose from the machine); open the air outlet.
8. disconnect the machine from the power connection.



Protect the machine against re-start.



Pic. IV.2.09



Pic. IV.2.10

9. Screw of the container (press it upward and turn it left) and take off the container.
10. Unscrew the filter element and clean it with compressed air, supersede if necessary.



Pic. IV.2.11



Pic. IV.2.12

11. Screw in filter element again.
12. Clean container with compressed air and screw on the container again. (invert container over the filter element, press in slightly and turn it right.)



Look for the right position of the O-ring on the top of the container.

2.2.2 Oil removal filter (Package 517)

Is the machine equipped with an oil removal (Package 517), so also this filter has to be controlled or replaced.



Pic. IV.2.13



Pic. IV.2.14

13. Depressurize the machine (disconnect the air- and water hose from the machine); open the air outlet.

14. disconnect the machine from the power connection.



Protect the machine against re-start.



Pic. IV.2.15



Pic. IV.2.16

15. The oil removal filter is installed on the right side of the air filter.

16. If the display on top of the filter is green, that means that the filter is correct. Changes the display to red, then the filter has to be replaced.



Pic. IV.2.17



Pic. IV.2.18

17. If the display is red:

Screw off the container (press it upward and turn it left) and take off the container.

18. Unscrew the filter element supersede it and dispose the filter correctly.



Pic. IV.2.19



Pic. IV.2.20

19. Screw in a new filter element.

20. Clean container with compressed air and screw on the container again. (invert container over the filter element, press in slightly and turn it right.)



Look for the right position of the O-ring on the top of the container.

3. Vessel cleaning (inside)

If the vessel is empty and has to be cleaned from inside, please follow the next steps:



Pic. IV.3.01



Pic. IV.3.02

1. Depressurize the machine (disconnect the air and water hose from the machine); open the air outlet.
2. Disconnect the machine from the power connection.



Protect the machine against re-start.



Pic. IV.3.03



Pic. IV.3.04

3. Disconnect the abrasive supply hose from the vessel lower surface and the control cabinet.
4. Open the vessel closure laterally at the vessel.



Pic. IV.3.05



Pic. IV.3.06

5. Rinse remaining blast media out of the vessel with a water hose.
6. Remove if necessary blast media residues by hand from the vessel.



Pic. IV.3.07



Pic. IV.3.08

7. Insert the vessel closure into the opening, hold with the one hand and screw the blue handle with the other hand on.



Pay attention with the reinsertion of the vessel closure to the correct fit of the seal.

8. Tighten the handle firmly.



- When there is danger of frost: Store the machine drying and frost-protected (look also chapter 4, paragraph 4 „Frost precaution“).

4. Frost precaution

When there is danger of frost for the machine, the machine has to be water-free. For this the following steps are necessary:



Pic. IV.4.01



Pic. IV.4.02



Pic. IV.4.03



Pic. IV.4.04



Pic. IV.4.05



Pic. IV.4.06



Pic. IV.4.07



Pic. IV.4.08

1. Depressurize the machine (disconnect the air and water hose from the machine); open the air outlet.
2. Disconnect the machine from the power connection.



Protect the machine against re-start.

3. Clean the water filter (look also chapter 4, paragraph 2.1 „Cleaning water filter“)
4. Clean the air filter (look also chapter 4, paragraph 2.2.1 „air filter“)
5. Clean the oil removal filter (look also chapter 4, paragraph 2.2.2 „Oil removal filter“)
6. Clean the vessel from inside (look also chapter 4, paragraph 3 „Vessel cleaning (inside)“)
7. Turn the arrow at the dosing valve(s) „S“ and „Z“ (extra equipment) on position „D“.
8. Open the valve for the water supply at the sieve top. (Handle is toward the line - extra equipment)



Pic. IV.4.09



Pic. IV.4.10

9. Open the valve for hand switching. (Lever is toward the line).
10. Connect the compressed air hose at the water connection of the machine.



An adapter for frost protection is available.



The water hose for the sieve top (extra equipment) must be surely coupled at the sieve top!

- Compressed air to the machine slightly open (max. 1 m³/min / max. 4 bar).
- Let the compressed air flow till no more water leaks out from the machine.
- Close compressed air to the machine.
- Uncouple the compressed air hose from the machine.

Protect the machine and the accessories of the machine subsequently.

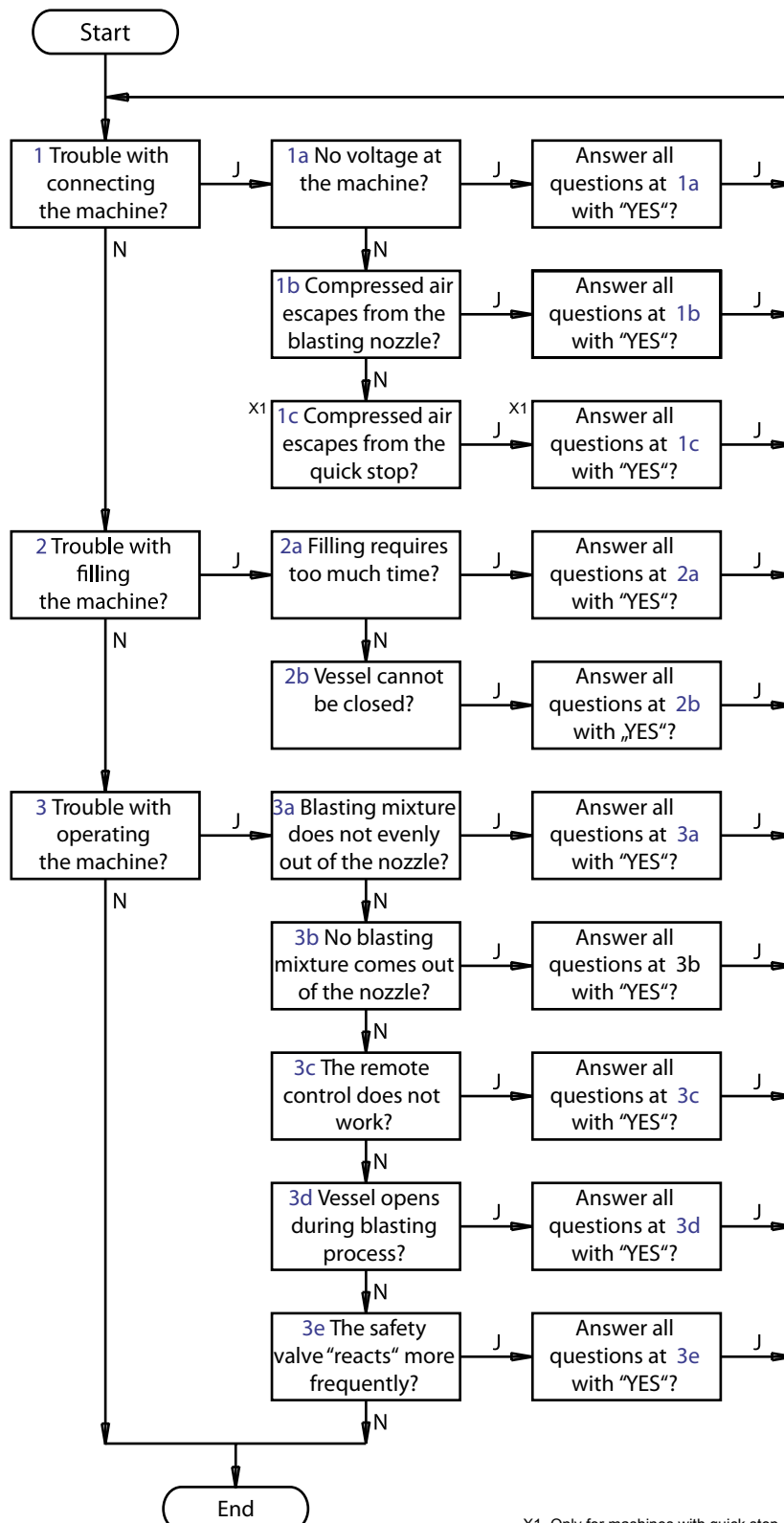


Do not attach the abrasive mixture hose at the machine, so that no water can remain in the vessel.

V. Trouble-shooting

To find the reason for a possible trouble please proceed as follows:

1. Begin at "Start" in the diagram and answer one question after the other.
2. If a possible source of trouble is found the corresponding questions under this item has to be checked at the machine.
3. If the answer to the first question is "Yes", the next item has to be checked as long as one item has to be answered with "No".
4. This reason for the trouble has to be repaired



X1 Only for mashines with quick stop

Questions 1a

- Are the pole tongs at the connecting cable clean?
- Does LED at the socket-outlet show a green light?
- Is the emergency-off-switch unlocked?

Questions 1b

- Is the hand lever "P" for the compressed air closed?

Questions 1c

- Is the hand lever "P" for the compressed air closed?
- Are the locking stopper in the switching units quick-stop and compressed air o. k.?

Questions 2a

- Is the overflow closed?
- Is the blasting media dry? (only for machines without water connection at the sieve top)
- Is the water flow into the sieve top open? (is water spraying out of the rinsing-nozzle?)
- Is the granulation of the blasting media correct?

Questions 2b

- Is the overflow closed?
- Is the hand lever "P" for blasting pressure regulation closed?
- Is the vessel sealing disc free from blasting media?
- Is the rubber seal on the vessel sealing disc o.k.?
- Has the handwheel "S" been set on "D" resp. on maximum value?
- Is the pressure control open?
- Has the machine the right setting?
- Is the pump working? (Hearing sample)?
- Is the locking stopper in the switching unit blasting media o.k.?

Questions 3a

- Has the blasting media consumption (hand-wheel "S") the right setting (position)?
- Has the blasting mixture got a sufficient percentage of superfines?
- Has the cross-section of the blasting hose and the nozzle diameter been chosen correctly?
- Is the interior of the blasting hoses and blasting nozzle free?
- Are the non-return valves inside/outside the pressure vessel o.k.?

Questions 3b

- Has the machine been set for blasting?
- Is the blasting mixture fine enough?
- Does blasting mixture penetrate from the vessel, when the blasting mixture hose has been uncoupled?
- Does the switching unit blasting mixture open?
- Have the pneumatic hoses of the switching unit been checked?
- Is the vessel closed (leakproof)?
- Is the interior of the blasting hoses and blasting nozzle free?

Questions 3c

- Does the LED at the power box light green?
- Is the emergency-off-switch unlocked?
- Are the extension cables of the remote control checked?
- Are the plugs at the port valves from the switching units are checked?
- Are the coils at the port valves from the switching units are checked?
- Is the remote control checked?

Questions 3d

- Does the air pressure connected at the machine exceed 2 bar ?
- Is the venting valve at the overflow closed and leakproof?
- Is the cross-section of the blasting hose small enough?
- Is the filter element in the air filter controller checked and clean?
- Is the vessel sealing disc o.k.?
- Are the locking stopper of the switching units o.k.?
- Are the non-return valves inside/outside the pressure vessel o.k.?

Questions 3e

- Is the connected water pressure (see manometer) less than 12 bar and the air pressure less than 10 bar?
- Has the control pressure (see manometer) been set correctly (between 11 and 12 bar)?



Ex-area

For machines with Atex permission and a working place in an Ex-area:

- The specification in the appendix „ATEX“ must consider, this description has priority.
- Maintenance work have to be done only outside of the Ex-area.

VI. Technical data

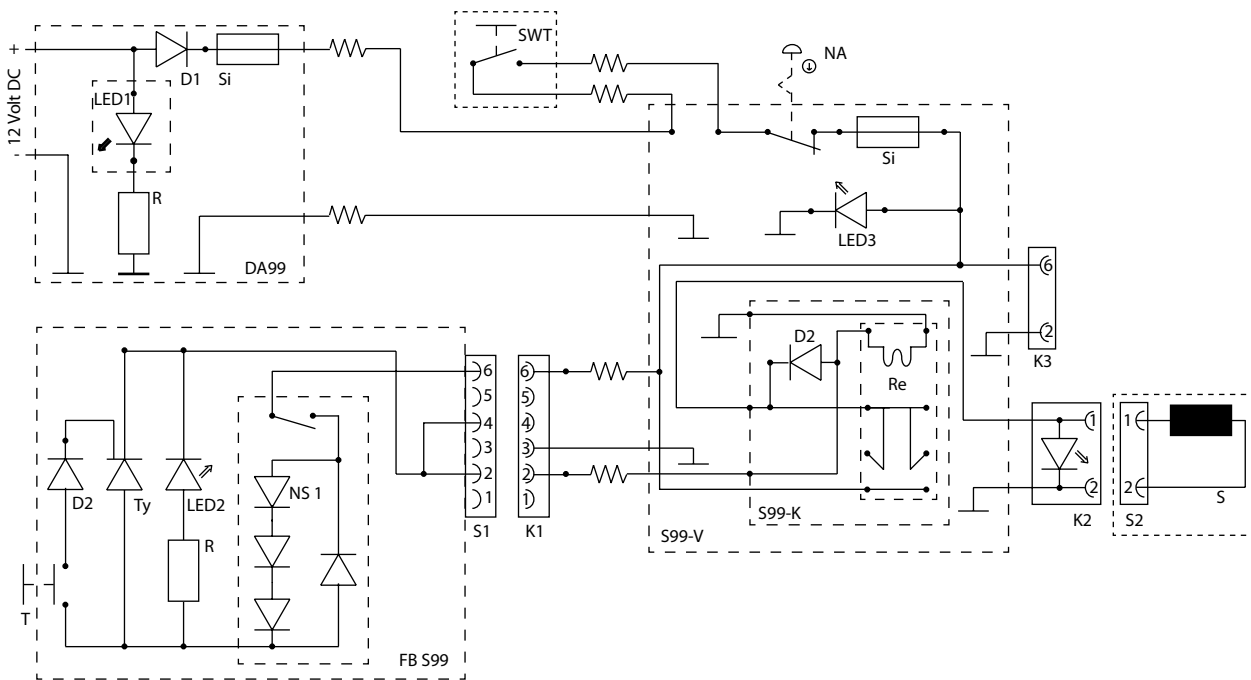
1. General data

		torbo M	torbo L
Capacity of vessel	l (dm ³) / Cu. ft.	120 / 4,2 (Option 200, 320 l.)	
Control pressure (max.)	bar / PSI	12 / 170	
Weight (empty)	kg lbs.	145 - 180 / 320 - 395 (bei 200 l: bis 280 kg; bei 320 l. bis 320 kg)	
Dimensions (height x width x depth), approx.	mm inch	1.220 x 830 x 660 / 49 x 33 x 26 (bei 200 l.: 1.360 x 1.050 x 750 mm bei 320 l.: 1.490 x 1.200 x 750 mm)	
Size Air connection	mm / inch	25 / 1	39 / 11/2
Air connection (min. - max.)	m ³ /min	2,0 - 5,0	2,0 - 10,0
	Cu. ft. per min.	70 - 175	70 - 350
	bar	4,0 - 10,0	4,0 - 10,0
	PSI	56 - 140	56 - 140
Connected power	Volt / Watt	12 / 4	
Water connection (min. - max.)	bar / PSI	über 0 - 12,0 / über 0 - 170	
Blasting hose connection	mm / inch	32 / 11/4	
Consumption of blasting media	l/min	0,24 - 6,40	
	Cu. ft. per min.	0,01 - 0,23	
Blasting time (100% period of use)	Std. / h	3,8 - 0,4 (bei 200 l.: 6,5 - 0,6; bei 320 l.: 10,4 - 1,1)	
Average blasting time per filling	Std. / h	0,9 (bei 200 l.: 2,0; bei 320 l.: 3,1)	
Standard blasting mixture	Blasting media / water	80% / 20%	
Water consumption during blasting	l/min gals. per min.	0,12 - 1,20 / 0,03 - 0,30	
Sieve top for:			
Dry blasting media			standard
Wet blasting media			obtained
Fast filling device			obtained (with 200 and 320 l.)
At the remote control:			
Safety magnetic-switch			standard
Function "blasting"			standard
Function "cleaning"			N / A
Function "drying"			obtained
At the machine:			
Dosing for blasting mixture			standard
Function "extra water"			obtained
Setting for extra water			obtained
Setting for cleaning water			obtained
Switching blasting to cleaning			obtained
Setting blasting pressure			standard
Setting control pressure			standard
On/Off-switch and Emergency-off-switch			standard
Quick-stop (0 bar at the nozzle)	3 sec. per 100 m blasting hose		obtained
Safety air reserve tank			standard
Filter for water and switching-air			standard

		torbo M080	torbo M120
Capacity of vessel	l (dm ³) / Cu. ft.	80 / 2,8	120 / 4,2
Control pressure (max.)	bar / PSI	12 / 170	12 / 170
Weight (empty)	kg	125 - 165	145 - 180
	lbs.	275 - 365	320 - 395
Dimensions (height x width x depth), approx.	mm	1.130 x 720 x 660	1.220 x 830 x 660
	inch	45 x 29 x 26	49 x 33 x 26
Size Air connection	mm / inch	39 / 1 1/2	39 / 1 1/2
Air connection (min. - max.)	m ³ /min	2,0 - 10,0	2,0 - 10,0
	Cu. ft. per min.	70 - 350	70 - 350
	bar	4,0 - 10,0	4,0 - 10,0
	PSI	56 - 140	56 - 140
Connected power	Volt / Watt	12 / 4	12 / 4
Water connection (min. - max.)	bar	0,0 - 12,0	0,0 - 12,0
	PSI	0 - 170	0 - 170
Blasting hose connection	mm / inch	32 / 1 1/4	32 / 1 1/4
Consumption of blasting media	l/min	0,48 - 4,80	0,48 - 4,80
	Cu. ft. per min.	0,02 - 0,17	0,02 - 0,17
Blasting time (100% period of use)	Std. / h	2,6 - 0,3	3,8 - 0,4
Average blasting time per filling	Std. / h	0,6	0,9
Standard blasting mixture	Blasting media / water	80% / 20%	80% / 20%
Water consumption during blasting	l/min	0,12 - 1,20	0,12 - 1,20
	gals. per min.	0,03 - 0,30	0,03 - 0,30
Sieve top for:			
Dry blasting media		standard	standard
Wet blasting media		N / A	obtained
Fast filling device		N / A	N / A
At the remote control:			
Safety magnetic-switch		standard	standard
Function "blasting"		standard	standard
Function "cleaning"		N / A	N / A
Function "drying"		N / A	N / A
At the machine:			
Dosing for blasting mixture		standard	standard
Function "extra water"		obtained	obtained
Setting for extra water		obtained	obtained
Setting for cleaning water		obtained	obtained
Switching blasting to cleaning		obtained	obtained
Setting blasting pressure		standard	standard
Setting control pressure		standard	standard
On/Off-switch and Emergency-off-switch		standard	standard
Quick-stop (0 bar at the nozzle)	3 sec. per 100 m blasting hose	obtained	obtained
Safety air reserve tank		standard	standard
Filter for water and switching-air		standard	standard

2. Diagram(s)

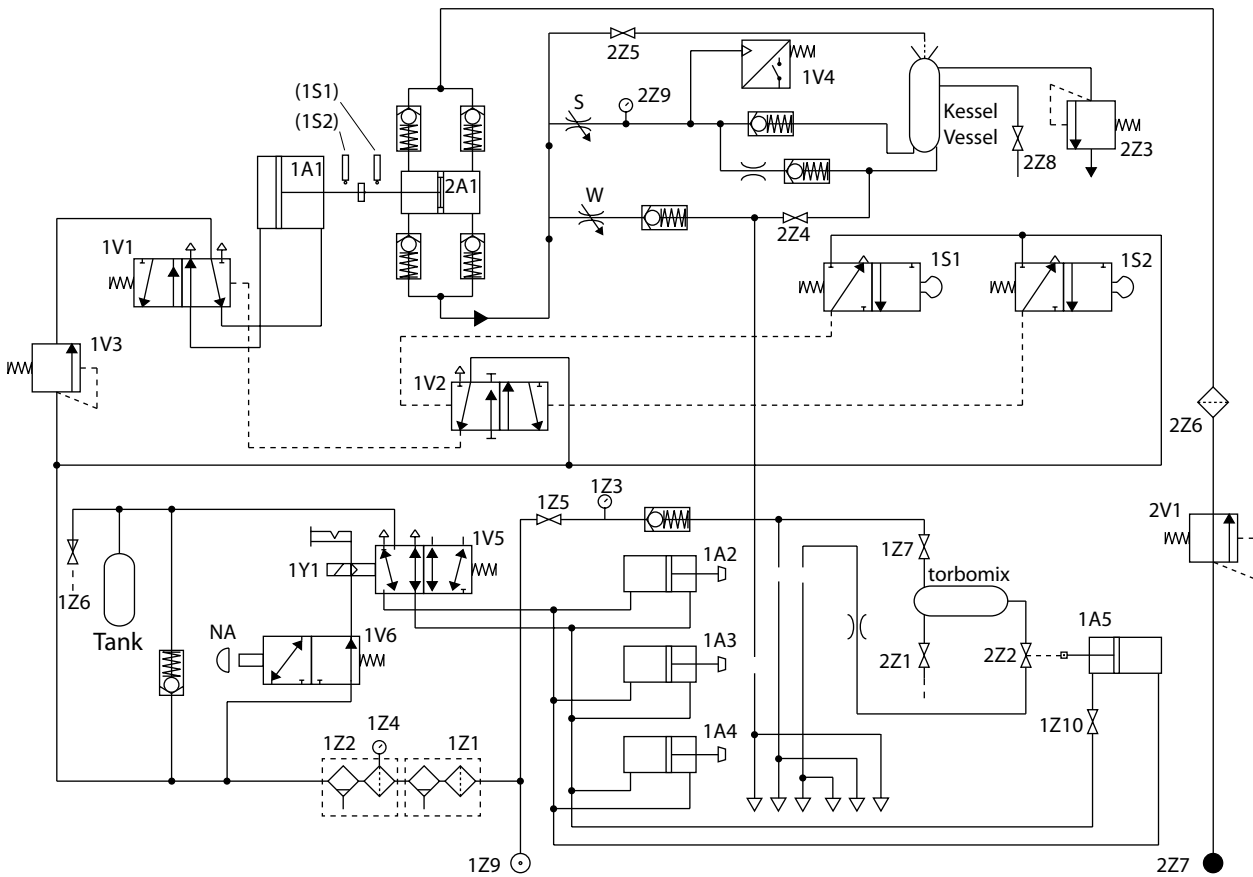
Wiring diagram for remote control FB S99 (S-XL)



Legend

D1	Diode 1N5400
D2	Diode 1N4007
DA99	Socket 12 Volt
FB S99	Electrical remote control Type S99
K1	Coupling remote control, IP65 (in closed state acc. to DIN 40050)
K2	Coupling solenoid, IP65 (in closed state acc. to DIN 40050)
K3	Coupling, 12 Volt, IP65 (in closed state acc. to DIN 40050)
LED1	LED (red/green), 4,5 V, 11 mA
LED2,3	LED (green), 12 V, 11 mA
NA	Emergency stop EN IEC 60947-3, VDE 0660 Part 107 -30 up to 85°C, IP65, 24 V DC/10A
NS1	Proximity switch, remote control, up to 240 V DC/AC, max. 1 A - 50 W / 50 VA
R	Resistor 560 Ohm, 1/4 W
Re	Relay, 2xUM, 150 V DC/AC, 1,25 A, 30 W / 50 VA
S	Magnetic coil, solenoid MV 12 V / 2,5 W
S99-K	Controlboard S99
S99-V	Powerbox S07
S1	Plug remote control, IP65 (in closed state acc. to DIN 40050)
S2	Plug, solenoid, IP65 (in closed state acc. to DIN 40050)
Si	Fuse, Poly-Switch, 50 V, $I_H = 1,6$ A (=nominal current), $I_S = 2,4$ A
SWT	Float gauge, inside water tank
T	Push-button 42 V, 100 mA (max. 3 VA), IEC 529
Ty	Tyristor C106

Pneumatic- and hydraulic diagram (ML2015)



Legend pneumatic scheme

- 1A1 Cylinder pump air side
- 1A2 Cylinder switching unit compressed air
- 1A3 Cylinder switching unit blasting media
- 1A4 Cylinder switching unit quick stop
- 1A5 Cylinder torbomix on/off actively
- 1S1 Limit switch left
- 1S2 Limit switch right
- 1V1 Solenoid pump actively
- 1V2 Solenoid pump passively
- 1V3 Pressure limiter
- 1V4 Pressure switch ≥ 8 bar
- 1V5 Solenoid switching units
- 1V6 Solenoid Emergency stop
- 1Y1 Magentic coil 12 Volt FBS
- 1Z1 Main filter
- 1Z2 Fine filter
- 1Z3 Gauge blasting pressure „P“
- 1Z4 Display fine filter
- 1Z5 Venting valve blasting pressure
- 1Z6 Venting valve air storage tank
- 1Z7 Venting valve torbomix, air connection
- 1Z9 Compressed air connection
- 1Z10 Venting valve torbomix, on/off passively
- NA Emergency stop

air outlet

- 2A1 Cylinder pump water side
- 2V1 Pressure limiter
- 2Z1 Venting valve torbomix, air outlet
- 2Z2 Venting valve torbomix, on/off actively
- 2Z3 Pressure relief valve
- 2Z4 Venting valve hand-switching
- 2Z5 Venting valve Sieve top
- 2Z6 Water filter
- 2Z7 Water connection
- 2Z8 Venting valve overflow
- 2Z9 Gauge vessel pressure
- S Dosing valve blasting media
- W Dosing valve addition water

VII. Spare-parts list

The perfect functioning of your machine is guaranteed only by the use of original torbo spare parts. If you do not use genuine spare parts any claim with regard to warranty becomes invalid.

The warranty is subject to our conditions of sale and delivery (please send in for a copy). Claims made for spare parts under warranty will be settled as follows:

- The parts will first be invoiced on delivery.
- After you send back the defective parts to our company (freight-free for us) we will check the parts.
- If the parts with claims which conforms with our warranty conditions, you will get a credit note for these parts.
- If no request for the parts return is made within 30 days from the customer being notified, damaged parts will be scrapped.

The pictures and texts in this spare-parts list are not binding. We reserve the right to make technical amendments.

Operation, maintenance and repairs are only to be carried out by trained persons entrusted with this work. Clearly define the individual responsibilities of your personnel.

Observe the service manual.

Order of spare parts

When ordering spare parts please quote:

- Orderer, customer No., address for invoice
- Address for the shipment, if not identical with the address for the invoice
- Machine-Typ and machine-No.
- Article-No., quantity and denomination
- Urgency and method of forwarding (e.g. by TNT, DHL, airmail).



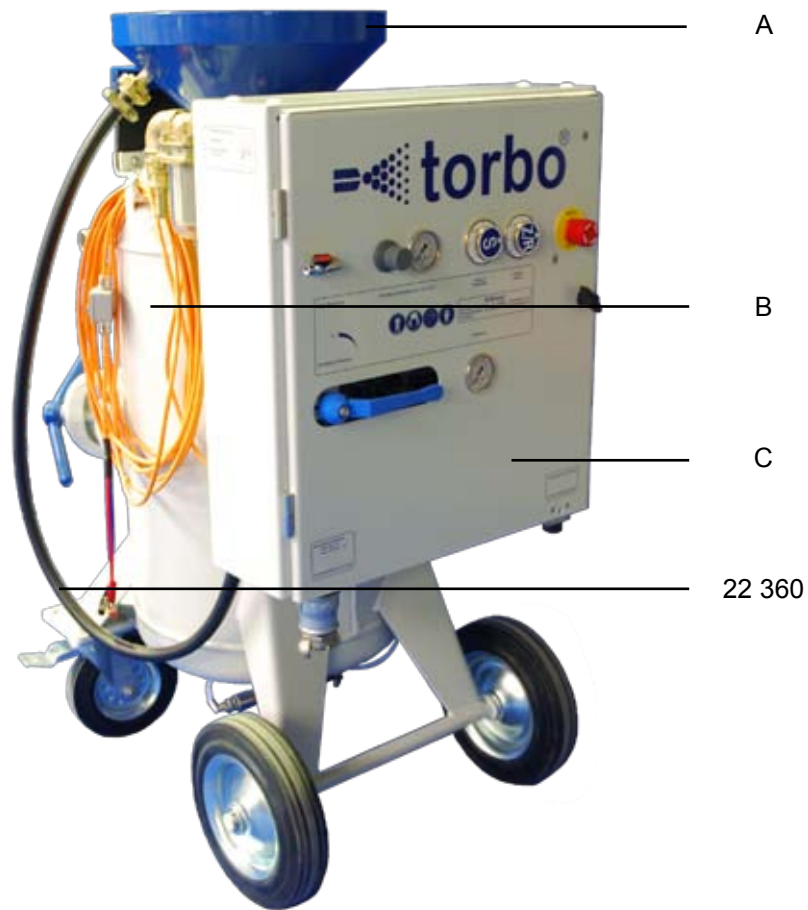
- Without this data we cannot deliver out or only with delay your spare-parts order.
- Spare-parts orders given verbally must be confirmed in writing. If there is no confirmation in writing, the customer has to bear the costs for incorrect deliveries.

Please take the address to the next torbo agency out of the Internet or contact us directly.

torbo ENGINEERING KEIZERS GmbH, Einsteinstr. 11, 46325 Borken, Germany

Tel.: +49 (0) 28 61 / 942 90; Fax: +49 (0) 28 61 / 942 999; www.torbo.de; info@torbo.de

torbo M, torbo L



Article	Denomination	Quantity
	torbo M-electrical torbo L-electrical	
A	Sieve top	s. Para. 1
B	Vessel	s. Para. 2
C	Control cabinet	s. Para. 3
22 360	Pressure water hose 1/2 - 1,8 m, compl. (for sieve top)	1

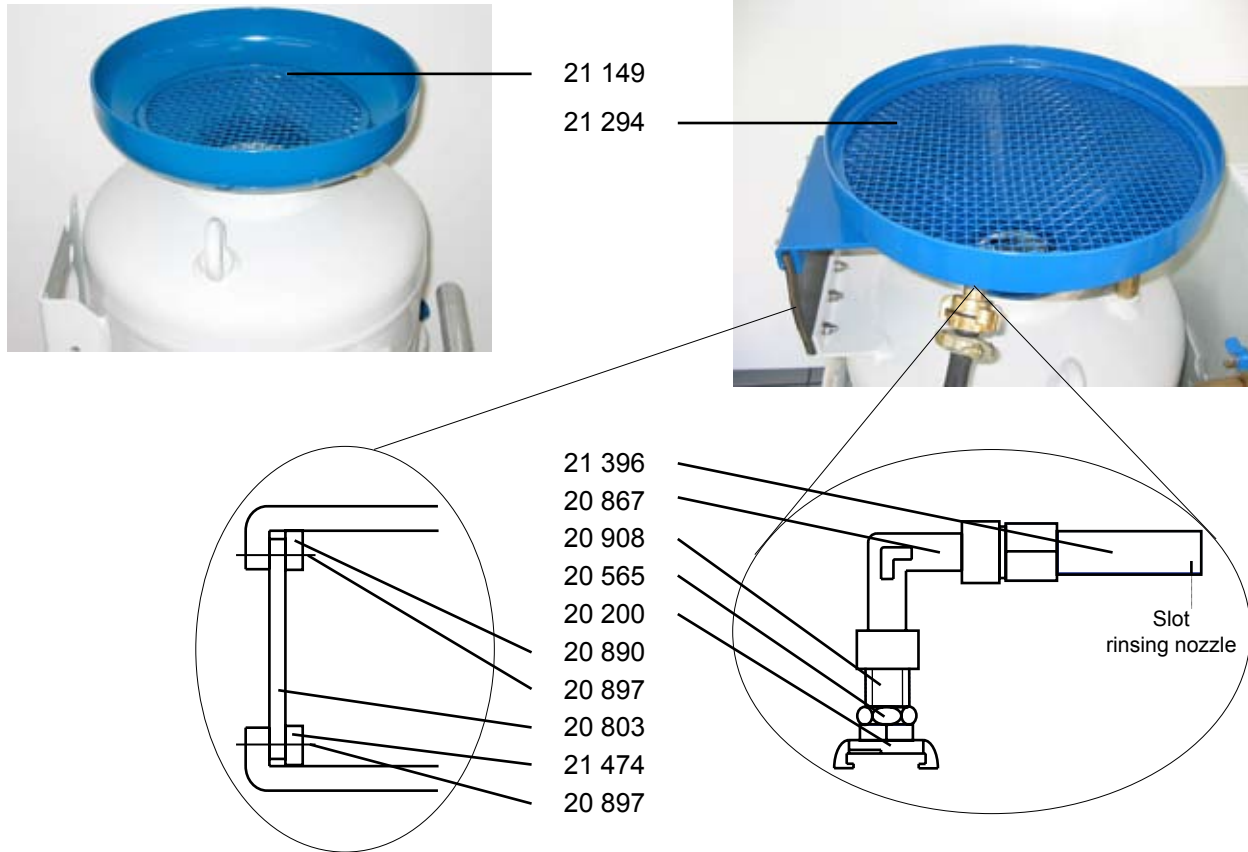


Ex-area

For machines with Atex permission:

- The specification in the appendix „ATEX“ must consider, this description has priority.
- Maintenance work have to be done only outside of the Ex-area.

1. Sieve top



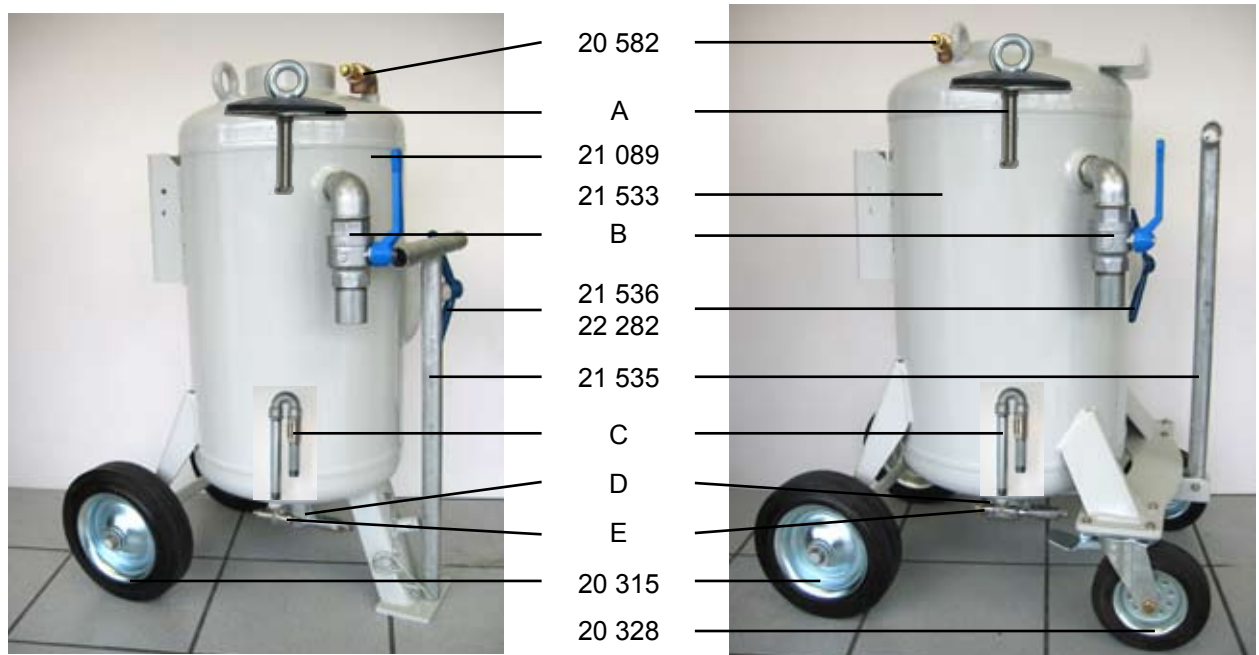
Article	Denomination	Quantity
21 149	<i>For torbo S080 and M080</i> Sieve top T95, compl.	1
21 294	<i>For torbo S120 and M120</i> Sieve top S95, compl. (without water connection)	1
21 295	<i>For torbo S120 and M120 with package (203)</i> Sieve top S95, compl. (with rinsing nozzle - extra equipment (203))	1
21 296	Water connection, Sieve top S95, compl.	1
20 200	Pressure water coupling (NW 40 mm) 3/8, F-thread	1
20 684	Gasket, pressure water coupling (NW 40 mm)	1
20 565	Reducing nipple 1/4-3/8, F/M-thread	1
20 803	Rubber plate (4-4-hole), sieve top S95	1
20 867	Elbow 1/4, F-thread	1
20 890	Gripping jaw (4-hole-blue), sieve top S95	1
20 897	Fastening element 08-005	8
20 908	Nipple 1/4, M-thread, brass	1
21 396	Rinsing nozzle 95	1
21 474	Gripping jaw (4-hole-gray), sieve top S95	1



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2. Pressure vessel (Tank)



Article	Denomination	Quantity
21 089	<i>For torbo S080 and M080</i> Pressure vessel 080 95, compl.	1
21 090	Pressure vessel 080 95, galvanized, powder-coat	1
21 533	<i>For torbo S120 and M120</i> Pressure vessel 120 98, compl.	1
21 534	Pressure vessel 120 98, galvanized, powder-coat	1
A	Vessel sealing 99, compl.	s. Para. 2.1
B	Overflow	s. Para. 2.2
C	Internal water 99, compl. (inside vessel)	s. Para. 2.3
D	Abrasive outlet 99, compl.	s. Para. 2.4
E	Water feeding pipe 02	s. Para. 2.5
20 315	Wheel d=280 mm (with fastening elements)	2
20 328	Wheel with brake (with fastening elements)	2
20 582	Pressure relief valve, vessel, compl.	1
20 180	Pressure relief valve 3/4 – 12 bar, F-thread	1
21 395	Fastening element 08-007	1
21 535	Tow bar 98, vessel, compl.	1
21 536	Vessel closure (lock), vessel	1
20 280	Gasket, vessel closure (lock)	1
22 282	Handle, vessel closure, blue (lock)	1

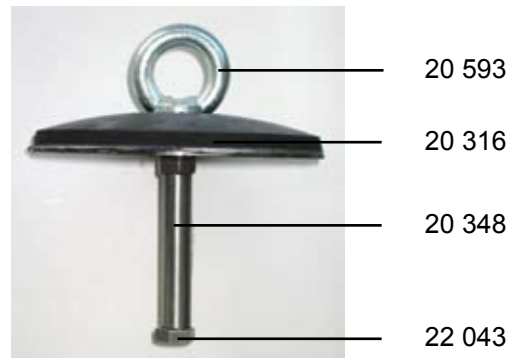


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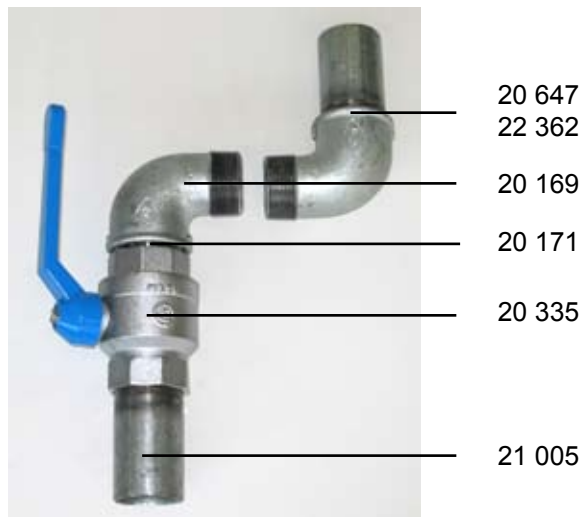
- The specification in the appendix „ATEX“ must consider, this description has priority.
- Maintenance work have to be done only outside of the Ex-area.

2.1 Vessel sealing



Article	Denomination	Quantity
20 636	Vessel sealing 98, compl.	1
20 316	Vessel sealing disc 98	1
20 348	Distance-holders 16/13x80 mm, vessel sealing, stainless steel	1
20 593	Ring screw M12, galvanized	1
22 043	Hex. head screw M12x90 mm, stainless steel	1

2.2 Overflow



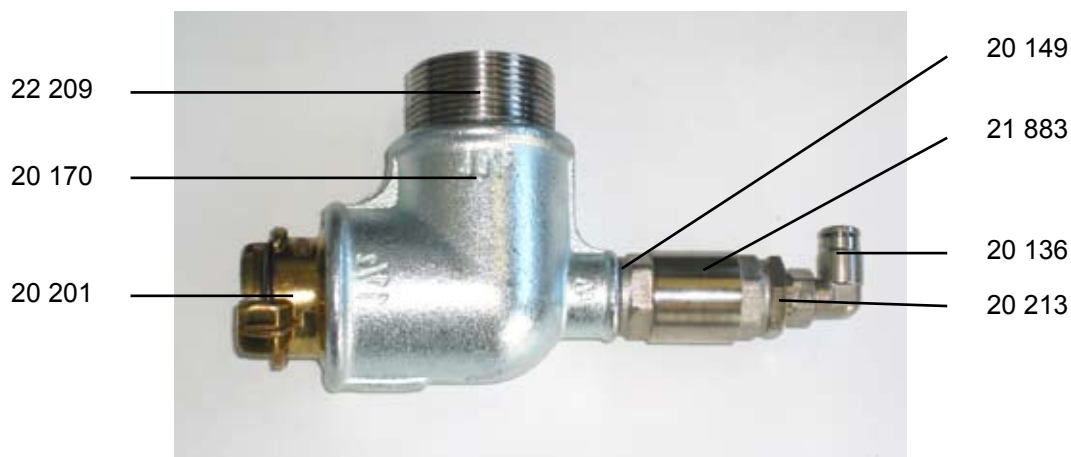
Article	Denomination	Quantity
	Overflow	
21 057	Overflow 98 (outside vessel), compl.	1
22 362	Overflow 95 (inside vessel), compl. (for torbo S080 and M080)	1
20 647	Overflow 95 (inside vessel), compl. (for torbo S120 and M120)	1
20 169	Elbow 11/2, F/M-thread	2
22 209	Nipple 11/2-40 mm, stainless steel	1
20 335	Venting valve 11/2, F-thread	1
20 623	Handle, venting valve 11/2+2 (blue)	1
21 005	Nipple 11/2-180 mm, galvanized, M-thread	0,5

2.3 Internal water (inside vessel)



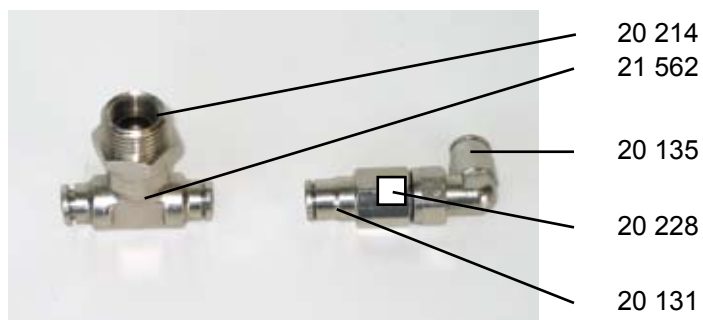
Article	Denomination	Quantity
21 889	Internal water 99, compl. (inside vessel)	1
20 149	Nipple 1/2, M-thread, brass	1
20 164	Nipple 1/2-180 mm, galvanized	1
20 167	Elbow 1/2-180°, F-thread	1
21 883	Non-return valve 1/2, Form G-F-thread	1
21 884	Nipple 1/2-80 mm, galvanized	1

2.4 Abrasive outlet



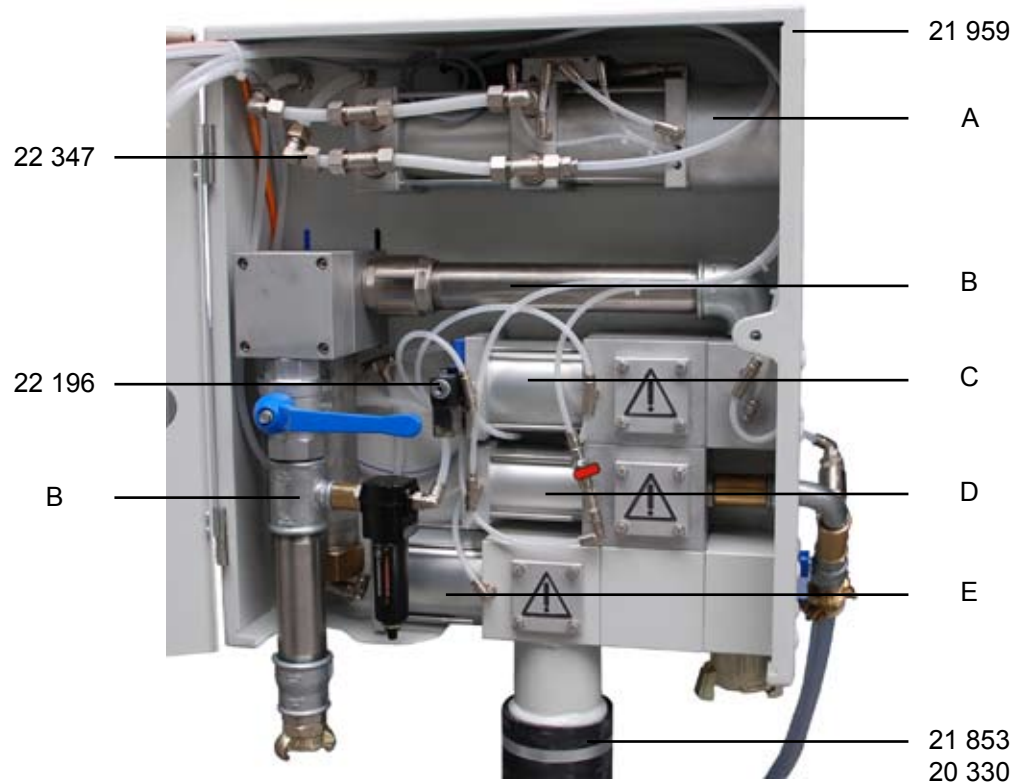
Article	Denomination	Quantity
21 741	Abrasive outlet 99, compl.	1
20 136	Push-in 1/4-08, Form WA	1
20 149	Nipple 1/2, M-thread, brass	1
20 170	T-fitting 1 1/2-1 1/2-1/2, F-thread	1
20 201	Pressure water coupling (NW 40 mm) 1 1/2, M-thread	1
20 684	Gasket, Pressure water coupling (NW 40 mm)	1
20 213	Reducing nipple 1/4-1/2, F/M-thread	1
21 883	Non-return valve 1/2, straight, F-thread	1
22 209	Nipple 1 1/2-40 mm, stainless steel	1

2.5 Water feeding pipe



Article	Denomination	Quantity
22 388	Water feeding pipe 02, compl.	1
20 131	Push-in 1/4-08, Form GI	1
20 135	Push-in 1/8-08, Form WA	1
20 214	Reducing nipple 3/8-1/2, F/M-thread	1
20 228	Nozzle 1/8-0,7	1
21 562	Push-in 3/8-08, Form TA	1

3. Control cabinet



Article	Denomination	Quantity
A	Piston pump	s. Para. 3.1
B	Compressed air connection and distribution	s. Para. 3.2
C	Switching unit D8002	s. Para. 3.3
D	Switching unit S6302	s. Para. 3.3
E	Quick stop QS8002 (package 411)	s. Para. 3.3
	<i>For machines without quick stop:</i>	
22 549	Plate QS8007 instead of Quick stop QS8099	1
21 634	Blasting coupling 1 1/2, F-thread	1
20 607	Gasket, Blasting coupling (NW 42 mm), 11 mm	1
21 594	Gasket, Blasting coupling (NW 42 mm), 20 mm	1
22 209	Nipple 1 1/2-40 mm, stainless steel	1
F	Connections for switching units	s. Para. 3.4
G	Dosing valve(s)	s. Para. 3.5
H	Connections Sieve top	s. Para. 3.6
I	Water connection	s. Para. 3.7
J	Emergency-off switch and powerbox	s. Para. 3.8
20 143	Push-in 1/4-06, Form WI	1
20 330	Clamp 80-120	1
21 055	Abrasive supply hose 19-660, compl. ¹	1
21 559	Push-in 1/4-08, Form WI	1
21 799	Gauge 99 (for installs)	1
21 847	Hinge 99, compl.	2
21 853	Outlet hose QS8099, compl.	1
21 959	Frame, control cabinet SM99, powder-coat	1
21 965	Door, control cabinet SM99, powder-coat	1
21 966	Air-control-element S/M99, compl. (Control pressure)	1
20 136	Push-in 1/4-08, Form WA	1
20 873	Push-in 1/4-06, Form GA	1
22 359	Nut for Panel montages, air-control-element S/M99	1
22 175	Socket remote control cable 06, compl.	1
22 196	Port valve 01 DWS, compl., electrically	1
22 190	Port valve 01-1/8-1, electrically	1
22 347	Compression fitting 12 mm, Form W	1
22 346	Tubing sleeve, compression fitting 12 mm	1
22 415	Fastener 03, control cabinet	1
22 799	Sticker-kit torbo S/M 99 ²	1
22 872	Compressed air empty 05, compl.	1



Ex-area

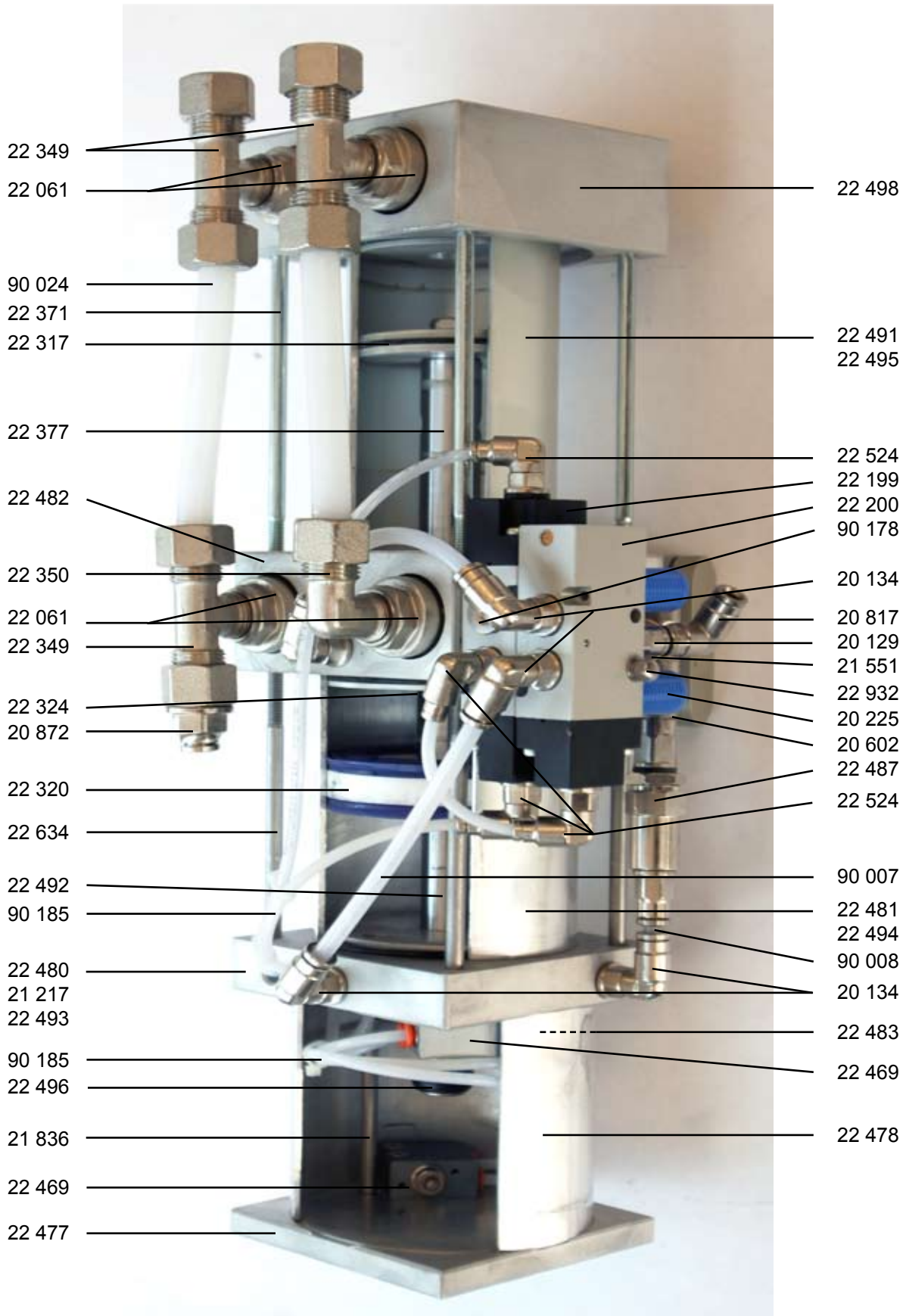
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¹ Please declare length ² Please declare language

3.1 Piston pump

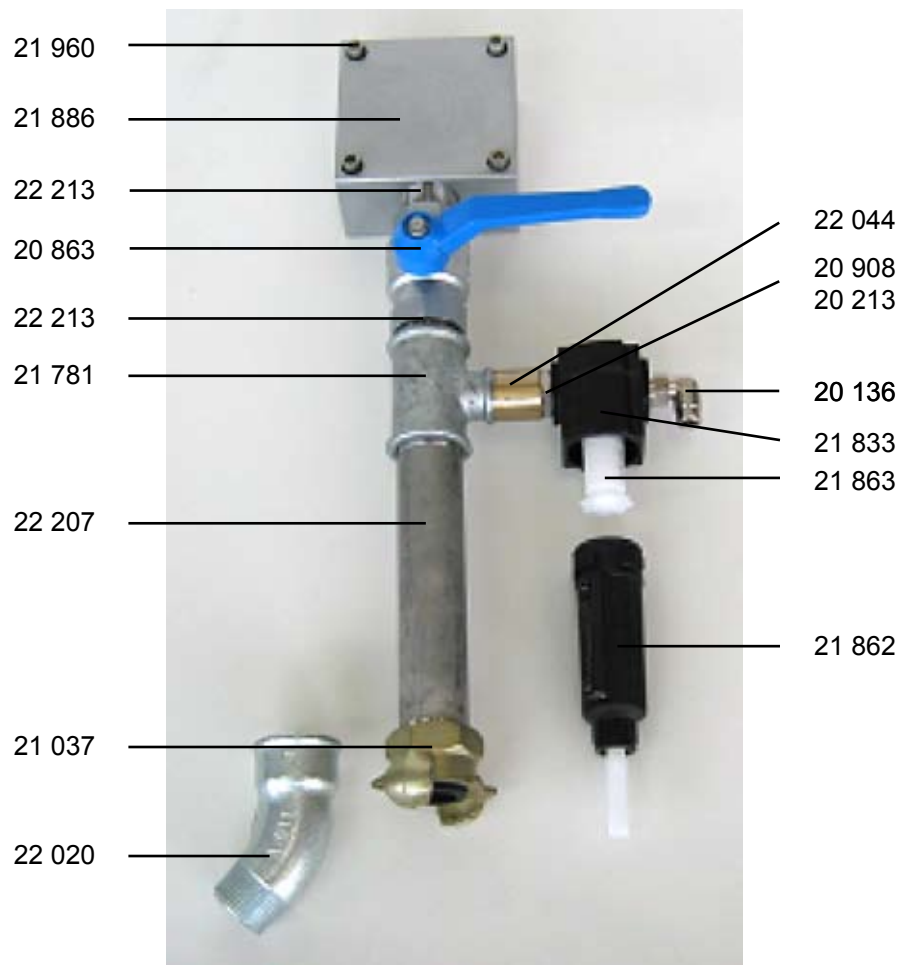
Piston pump 2K/080-063/07-P



Article	Denomination	Quantity
22 475	Piston pump 2K/080-063/07-P	1
22 476	Exchange Piston pump 2K/080-063/07-P	
20 129	Push-In 1/8-06, form GA	1
20 134	Push-In 1/8-06, form WA	5
20 225	Filter, noise surpression 1/8	3
20 602	Push-In 08, form T	1
20 817	Push-In 06, form W	1
20 872	Push-In 3/8-08, form GA	1
21 217	Guiding band 04x1,5 - 1.000 mm	0,05
21 551	Push-In 1/8-08, form GA	1
21 836	Fastening element 06-011	2
22 061	Non-return valve 3/8, form G-F-thread	4
20 999	Nipple 3/8-25 mm, brass	4
22 199	Port valve 01-1/8-2, pneumatic	1
22 200	Port valve 01-1/8-1, pneumatic	1
22 317	Piston 063-02 G, compl.	1
22 320	Piston 080-02 M, compl.	1
22 324	Guidance socket 2K-02, compl. (with gaskets)	1
20 238	Gasket 20x28x5,5	2
22 049	O-Ring 32x3	1
22 329	Wiper 20x25x3,6/4,6	1
22 330	Locking ring J44	1
22 376	O-Ring 38x3	1
22 349	Compression fitting 3/8-12, form TA	3
22 346	Tubing sleeve, compression fitting 12 mm	1
22 350	Compression fitting 3/8-12, form WA	1
22 346	Tubing sleeve, compression fitting 12 mm	1
22 371	Fastening element 06-026	4
22 377	Piston-rod 2K/080-063/02	1
22 337	Fastening element 08-029	2
22 469	Port valve 3/2-4 mm/06-P	2
22 289	Screw M4x20, stainless steel	4
22 477	Plate 2K-Port pump 06-P	1
22 478	Cylinder 100-06	1
22 480	Plate 2K/080-06/P-L	1
22 481	Cylinder 080/06-P	1
22 482	Plate 2K/080-063 LW	1
22 483	Push-In M5-04, form WA	2
22 487	Dirt-arrester 1/4, form GA, compl.	1
20 128	Push-In 1/4-08, form GA	1
20 873	Push-In 1/4-06, form GA	1
22 491	Cylinder 2K/063 W	1
22 492	Piston-rod 2K-Port pump 06-P	1
22 471	Screw M8x35, stainless steel	1
22 493	Wiper 16x20,5x3,2	1
22 494	O-Ring 72x2,5	2
22 495	O-Ring 57x2,5	2
22 496	Contact-giver 06-P	1
22 490	Screw M8x16, stainless steel	1
22 498	Plate 2K/063 W	1
22 524	Push-In 1/8-04, form WA	4
22 634	Fastening element 06-028	4
22 932	Hex. Head Screw M4x55 mm, stainless steel	2
90 007	Tube 06x1,0, PA-natural	0,30
90 008	Tube 08x1,0, PA-natural	1,00
90 024	Tube 12x1,50, PA-natural	0,50
90 178	Blind-nipple 1/8 (with edge)	2
90 185	Tube 04x0,75, PA-natural	1,35

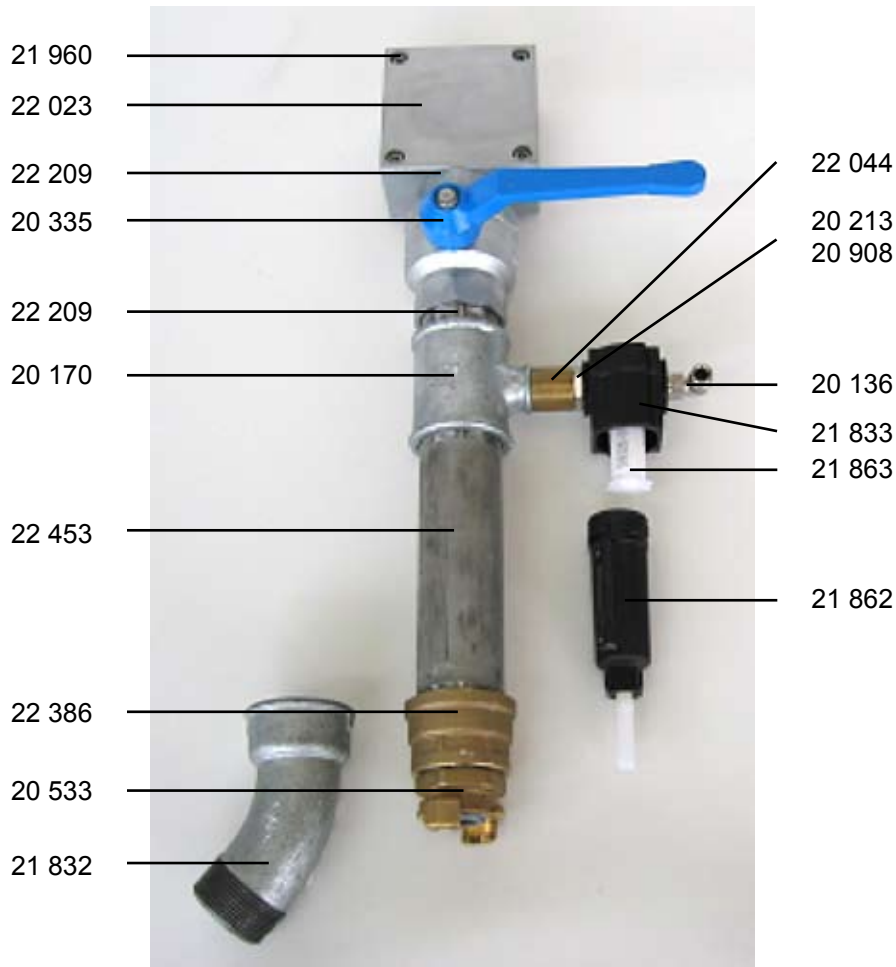
3.2 Compressed air connection and distribution

3.2.1 Compressed air connection 99-I-S100



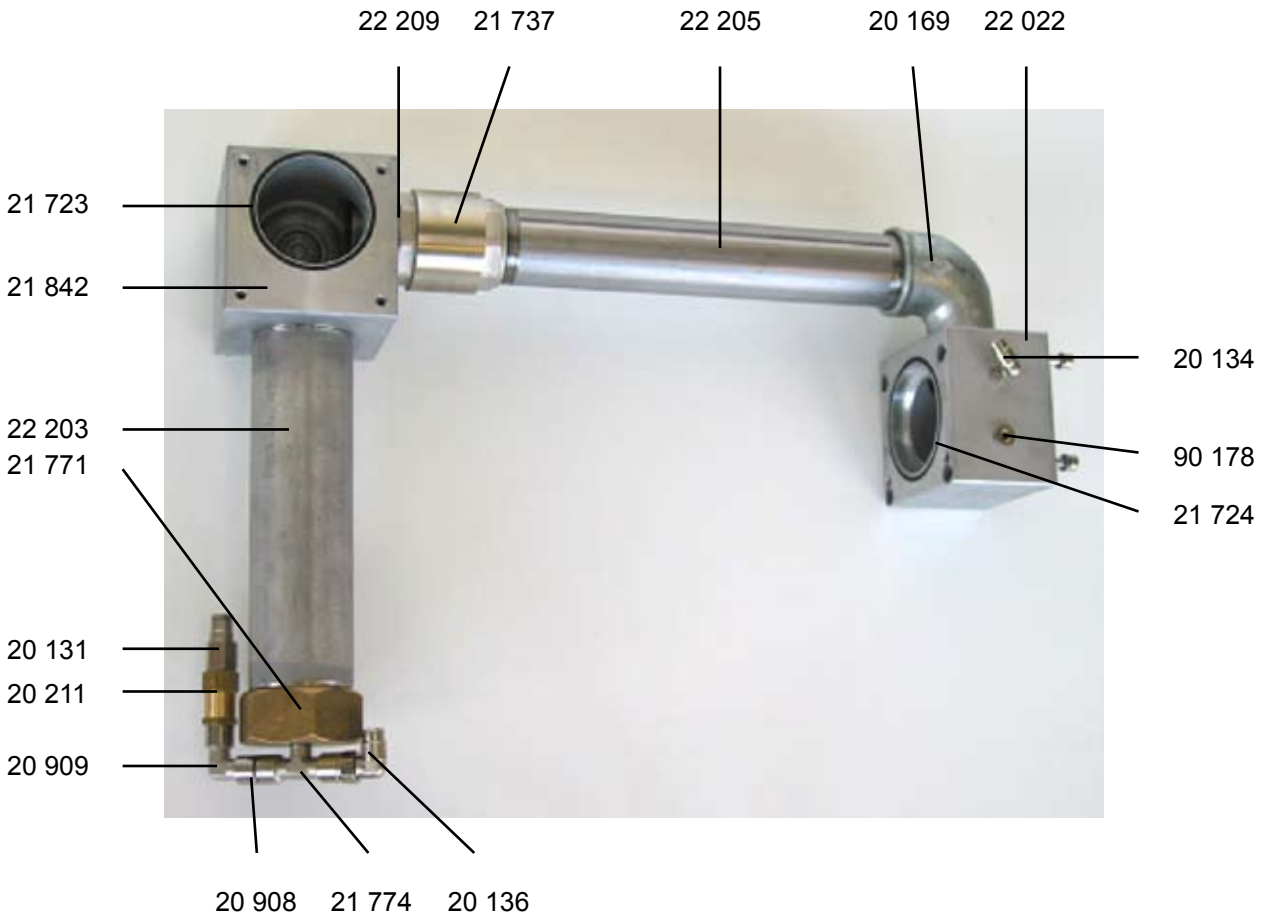
Article	Denomination	Qunatitiy
21 785	Compressed air connection 99-I-S100 (for torbo S080 / S120), compl.	
20 136	Push-in 1/4-08, Form WA	1
20 213	Reduce nipple 1/4-1/2, F/M-thread	1
20 863	Venting valve 1, F-thread	1
21 231	Handle, Venting valve 1 (blue)	1
20 908	Nipple 1/4, M-thread, brass	1
21 037	Air-pressure coupling (NW 42 mm), 1, F-thread	1
20 794	Gasket, air-pressure coupling (NW 42 mm)	1
21 781	T-fitting 1-1/2-1, F-thread, galvanized	1
21 833	Airfilter 1499	1
21 862	Container, Airfilter 1499, compl.	1
22 306	O-ring (for container 1499)	1
21 863	Filter insert 20 µm, Airfilter 1499	1
22 301	Centre-bolt, Airfilter 1499	1
22 302	Screw, Airfilter 1499	1
21 886	Block DL99-4-S100	1
21 960	Fastening element 06-020	4
22 020	Arc 1-45°, F/M-thread	1
22 044	Tape-lengthening 1/2-25, F/M-thread	1
22 207	Nipple 1-180 mm, stainless, steel	1
22 213	Nipple 1-35 mm, stainless steel	2

3.2.2 Compressed air connection 99-I-M150



Article	Denomination	Quantity
21 786	Compressed air connection 99-I-M150 (for torbo M080 / M120), compl.	
20 136	Push-in 1/4-08, Form WA	1
20 170	T-fitting 11/2-11/2-1/2, F-thread	1
20 213	Reduce nipple 1/4-1/2, F/M-thread	1
20 335	Venting valve 11/2, F-thread	1
20 623	Handle, venting valve 11/2+2 (blue)	1
20 533	Air-pressure coupling (NW 42 mm) 11/4, M-thread	1
22 387	Gasket, Air-pressure coupling 1 1/4	1
20 908	Nipple 1/4, M-thread-brass	1
21 832	Arc 11/2-45°, F/M-thread, galvanized	1
21 833	Airfilter 1499	1
21 862	Container, Airfilter 1499, compl.	1
22 306	O-ring (for container 1499)	1
21 863	Filter insert 20 µm, Airfilter 1499	1
22 301	Centre-bolt, Airfilter 1499	1
22 302	Screw, Airfilter 1499	1
21 960	Fastening element 06-020	4
22 023	Block DL99-4-M150	1
22 044	Tape-lengthening 1/2-25, F/M-thread	1
22 209	Nipple 11/2-40 mm, stainless steel	1
22 386	Reducing nipple 11/2-11/4, F-thread, brass	1
22 453	Nipple 11/2-160 mm, stainless steel	1

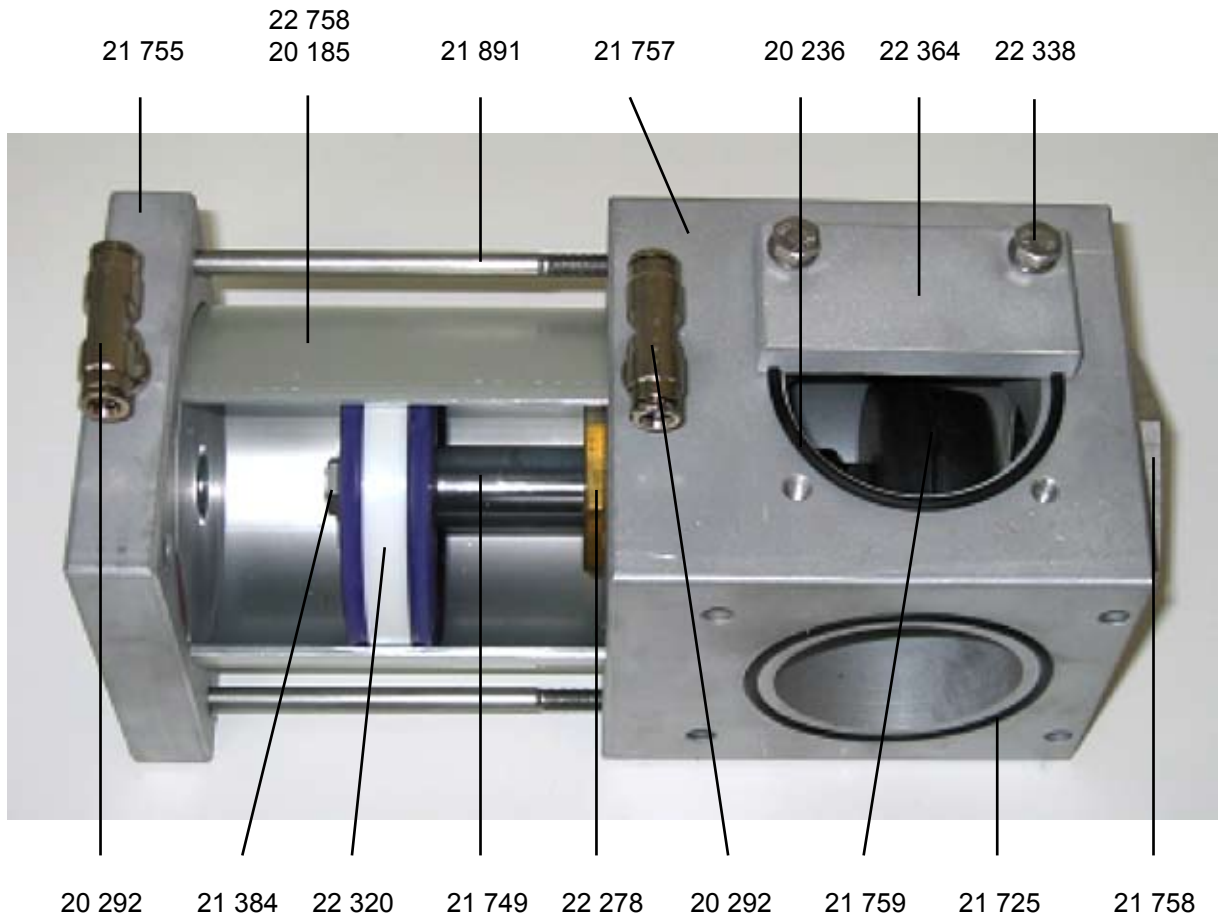
3.2.3 Compressed air connection 99-II-M150



Article	Denomination	Quantity
21 780	Compressed air connection 99-II-M150, compl.	1
20 131	Push-in 1/4-08, Form GI	1
20 134	Push-in 1/8-06, Form WA	1
20 136	Push-in 1/4-08, Form WA	1
20 169	Elbow 1 1/2, F/M-thread	1
20 211	Non-return valve 1/4, M-thread	1
20 908	Nipple 1/4, M-thread, brass	1
20 909	Elbow 1/4, F-thread (R)	1
21 723	O-ring 67x3 mm	1
21 724	O-ring 75x3 mm	1
21 737	Non-return valve 150, straight Form, F-thread	1
21 771	Cap 2, heavy design	1
21 774	T-fitting 1/4, F/M-thread	1
21 842	Block DL99-3-ML150	1
22 378	Fastening element 06-024	4
22 022	Block DL99-1-M150	1
21 845	Fastening element 06-013	4
22 203	Nipple 2-250 mm, stainless steel	1
22 205	Nipple 1 1/2-290 mm, stainless steel	1
22 209	Nipple 1 1/2-40 mm, stainless steel	1
90 178	Blind-nipple 1/8 (with edge)	1

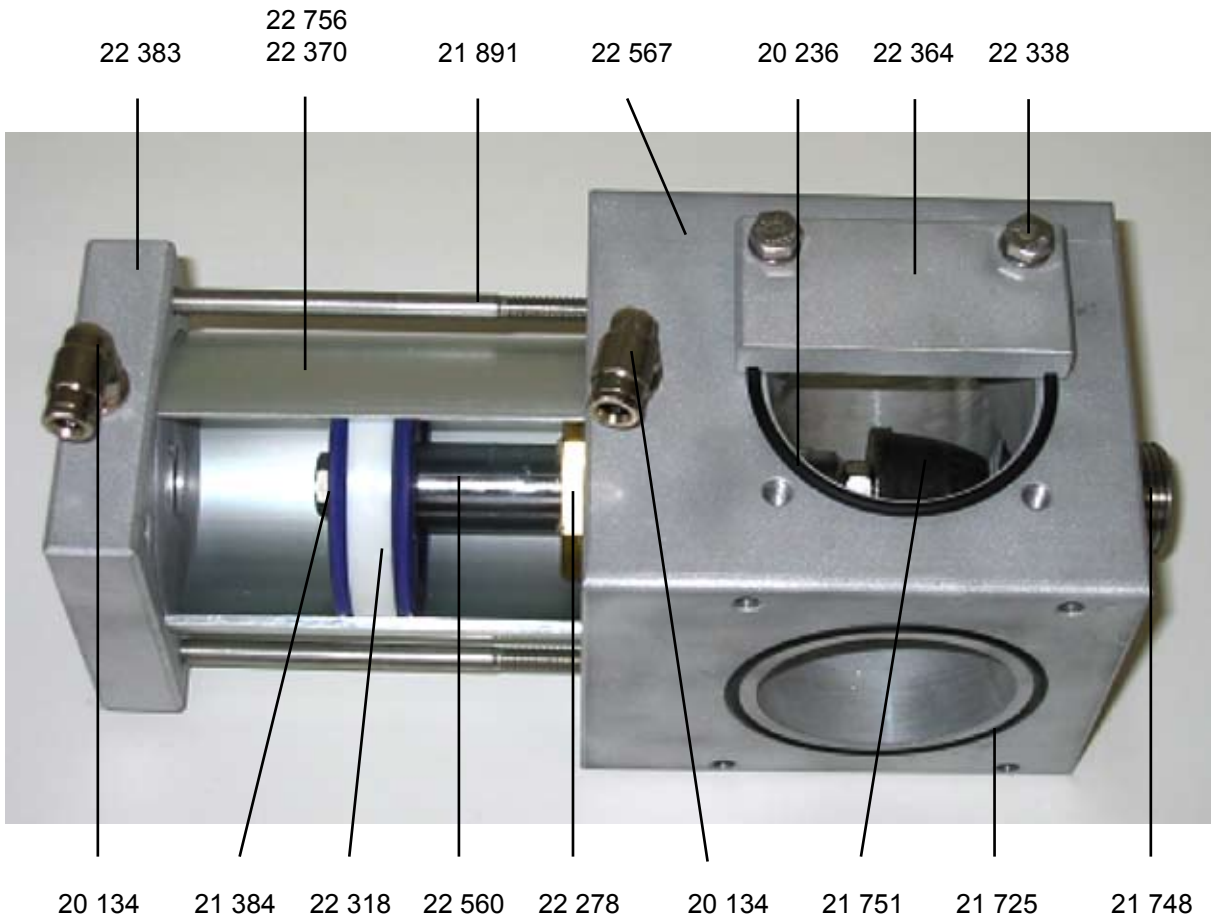
3.3 Switching units

Switching unit D8002 (compressed air)



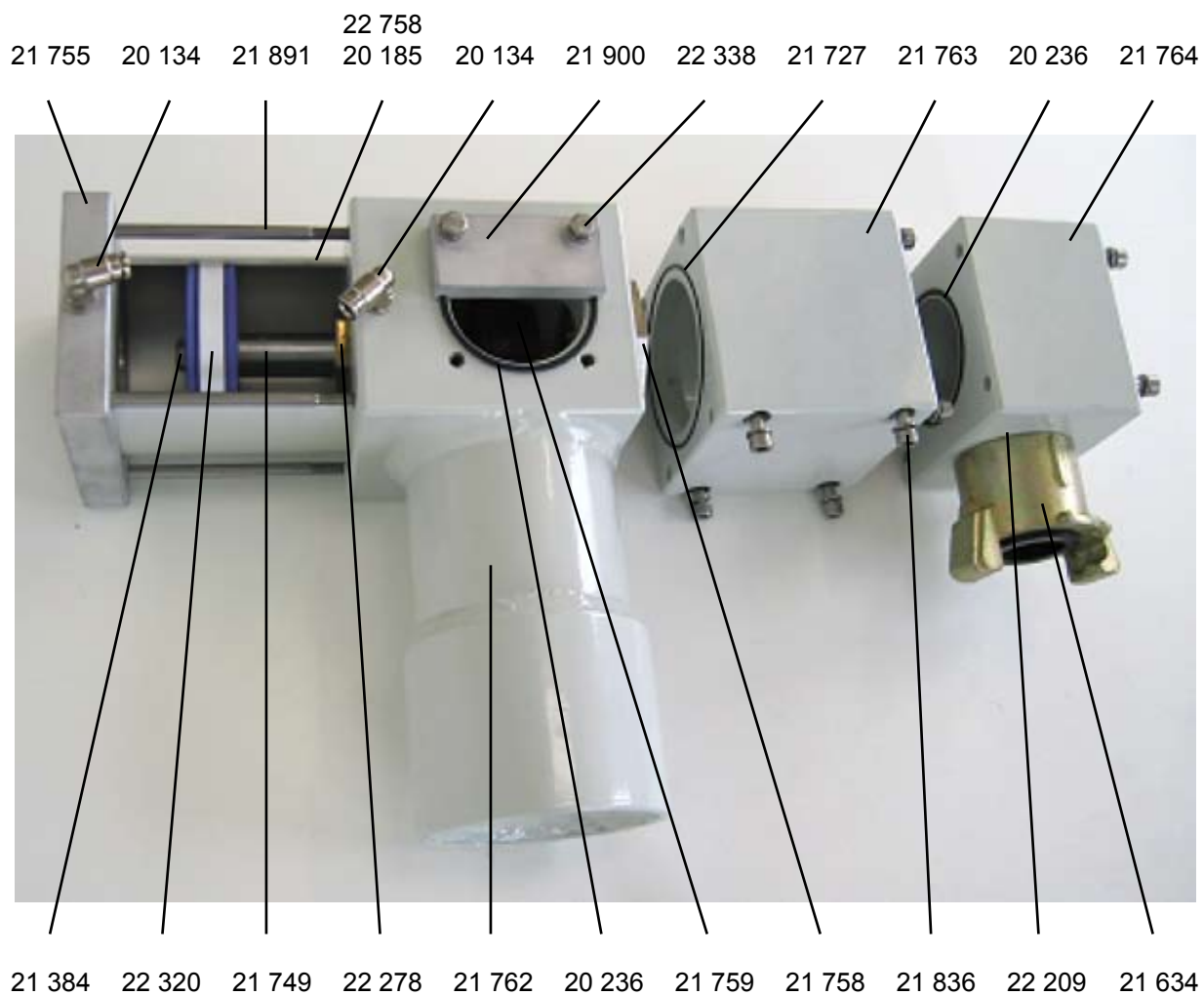
Article	Denomination	Quantity
22 379	Switching unit D8002, compl.	1
20 185	Gasket TEK 080-95	2
20 292	Push-In 1/8-06, form TA	2
20 236	O-Ring 60x3 mm	1
21 384	Fastening element 08-001	1
21 725	O-Ring 65x3 mm	1
21 749	Piston-rod 50/8099 and 080-02	1
22 278	Guidance socket 50/8099, compl. (with gaskets)	1
21 729	Gasket set 20x22x4,3	1
21 730	Wiper 20x8	1
21 750	Guidance socket 50/8099	1
21 755	Plate, switching unit 8099	1
21 757	Block D8099	1
21 836	Fastening element 06-011	4
21 758	Counterpart 8099	1
21 759	Locking stopper 8099, compl.	1
21 891	Fastening element 06-014	4
22 320	Piston 080-02 M, compl.	1
22 338	Fastening element 06-023	4
22 364	Locking plate 02	1
22 758	Cylinder 080-02	1

Switching unit S6302 (blasting mixture)



Article	Denomination	Quantity
22 381	Switching unit S6302, compl.	
20 134	Push-In 1/8-06, form WA	2
20 236	O-Ring 60x3 mm	1
21 384	Fastening element 08-001	1
21 725	O-Ring 65x3 mm	1
21 748	Counterpart 5099	1
21 751	Locking stopper 5099, compl.	1
21 891	Fastening element 06-014	4
22 278	Guidance socket 50/8099, compl. (with gaskets)	1
21 750	Guidance socket 50/8099	1
21 729	Gasket set 20x22x4,3	1
21 730	Wiper 20x8	1
22 318	Piston 063-02 M, compl.	1
22 338	Fastening element 06-023	4
22 364	Locking plate 02	1
22 370	Gasket TEK 063-02	2
22 383	Plate, Switching unit 063-02	1
22 560	Piston-rod 063-02	1
22 567	Block S6302	1
21 836	Fastening element 06-011	4
22 756	Cylinder 063-02	1

Switching unit QS8002 (quick stop)



Article	Denomination	Quantity
22 384	Switching unit QS8002, compl.	1
20 185	Gasket TEK 080-95	2
20 134	Push-In 1/8-06, form WA	2
20 236	O-Ring 60x3 mm	2
21 384	Fastening element 08-001	1
21 634	Blasting coupling 1 1/2, F-thread	1
20 607	Gasket, Blasting coupling (NW 42 mm), 11 mm	1
21 594	Gasket, Blasting coupling (NW 42 mm), 20 mm	1
21 727	O-Ring 80,5x2 mm	1
21 749	Piston-rod 50/8099 and 080-02	1
22 278	Guidance socket 50/8099, compl. (with gaskets)	1
21 750	Guidance socket 50/8099	1
21 729	Gasket set 20x22x4,3	1
21 730	Wiper 20x8	1
21 755	Plate, Switching unit 8099	1
21 758	Counterpart 8099	1
21 759	Locking stopper 8099, compl.	1
21 762	Block III QS8099	1
21 763	Block II QS8099	1
21 836	Fastening element 06-011	4
21 764	Block I QS8099	1
21 845	Fastening element 06-13	4
21 836	Fastening element 06-011	4
21 891	Fastening element 06-014	4
21 900	Locking plate 99 QS, powdercoated	1
22 209	Nipple 1 1/2-40 mm, stainless steel	1
22 320	Piston 080-02 M, compl.	1
22 338	Fastening element 06-023	4
22 758	Cylinder 080-02	1

3.4 Connections switching units

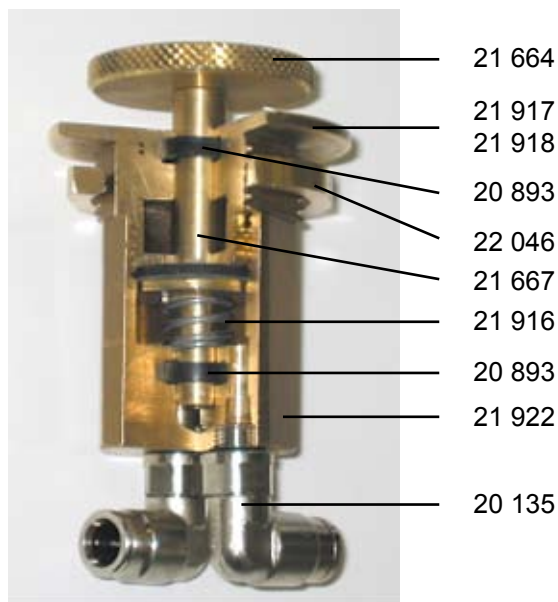
Connections switching unit S6302



Article	Denomination	Quantity
21 796	Connection S5099, compl. (without package 511)	
20 425	Pressure water coupling (NW 40 mm) 3/4, F-thread	1
20 684	Gasket, pressure water coupling (NW 40 mm)	1
20 789	Elbow 90°-3/4, F/M-thread	1
21 815	Tape-lengthening 3/4-65 mm, F/M-thread	1

Article	Denomination	Quantity
21 968	Connection S5099/Hand-switching (with package 511)	
20 136	Push-In 1/4-08, Form WA	1
20 150	Nipple 3/4, M-thread, brass	1
20 198	Pressure water coupling (NW 40 mm) 3/4, M-thread	1
20 684	Gasket, pressure water coupling (NW 40 mm)	1
20 204	Venting valve 3/4, F-thread	1
21 130	Handle, venting valve 3/4 (blue)	1
20 213	Reduce nipple 1/4-1/2, F/M-thread	1
20 409	T-Fitting 3/4, F-thread	1
20 789	Elbow 90°-3/4, F/M-thread	1
21 815	Tape-lengthening 3/4-65 mm, F/M-thread	1
21 883	Non-return valve 1/2, straight, F-thread	1
22 082	Reduce-nipple 3/4-1/2, M-thread	1

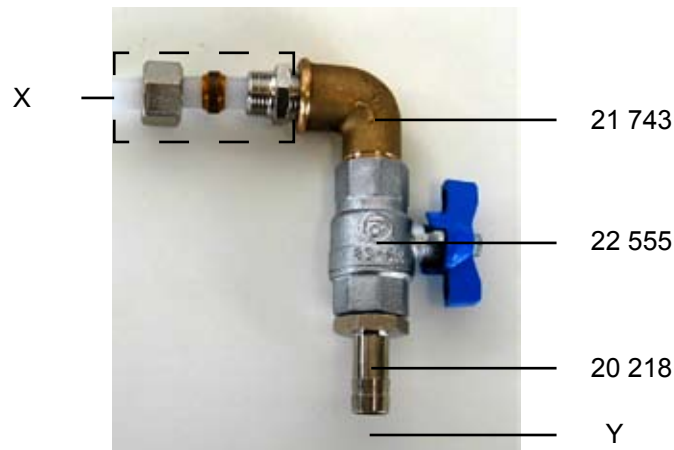
3.5 Dosing valves



Article	Denomination	Quantity
21 849	Dosing valve 99-03, compl. ¹	
21 850	Dosing valve 99-06, compl. ¹	
20 135	Push-In 1/8-08, Form WA	2
20 893	Gasket 11x17x4	2
21 664	Handwheel DV99 ¹	1
21 857	Decal „S“	1
21 858	Decal „Z“	1
21 921	Screw thread-pen M4x10, stainless steel	1
22 106	Decal, protection foil, handwheel 99	1
22 342	Decal „Z/R“	1
21 667	Pestle, dosing valve 99, compl.	1
21 916	Compression spring DV99	1
21 922	Base element DV99	1
21 917	Insert, dosing valve 99-03	1
21 918	Insert, dosing valve 99-06	1
22 033	Decal scale 99-03	1
22 034	Decal scale 99-06	1
22 233	Decal, mylar, protection foil, scale 99	1
22 046	Check nut 11/4	1

¹ indicate please „S“, „Z“, „R“ or „Z/R“

3.6 Connections sieve top



Article	Denomination	Quantity
21 798	Connection sieve top 99, compl. (without connections „X“ and „Y“)	
20 218	Fitting (NW 40 mm) 1/2-13 mm, M-thread	1
21 743	Elbow 1/2, F/M-thread, brass	1
22 555	Venting valve 1/2, F-thread, leaf-handle	1
21 794	Leaf-handle, venting valve 1/2 and 3/4	1
X	<u>Connection pieces</u>	
	<i>With piston pump 2K/080-063:</i>	
22 348	Compression fitting 1/2-12, form GA	1
22 346	Tubing sleeve, compression fitting 12 mm	1
	<i>With piston pump 2K/100-080:</i>	
22 355	Compression fitting 1/2-14, form GA	1
22 346	Tubing sleeve, compression fitting 12 mm	
	<i>With sieve top FS95:</i>	
21 943	Push-In 1/2-12, form WA	1
Y	<u>Hose (without picture)</u>	
20 324	Hose clamp big 1/2 (without picture)	1
90 020	Compressed-air hose 1/2, black (without picture) ¹	

¹ Please declare length

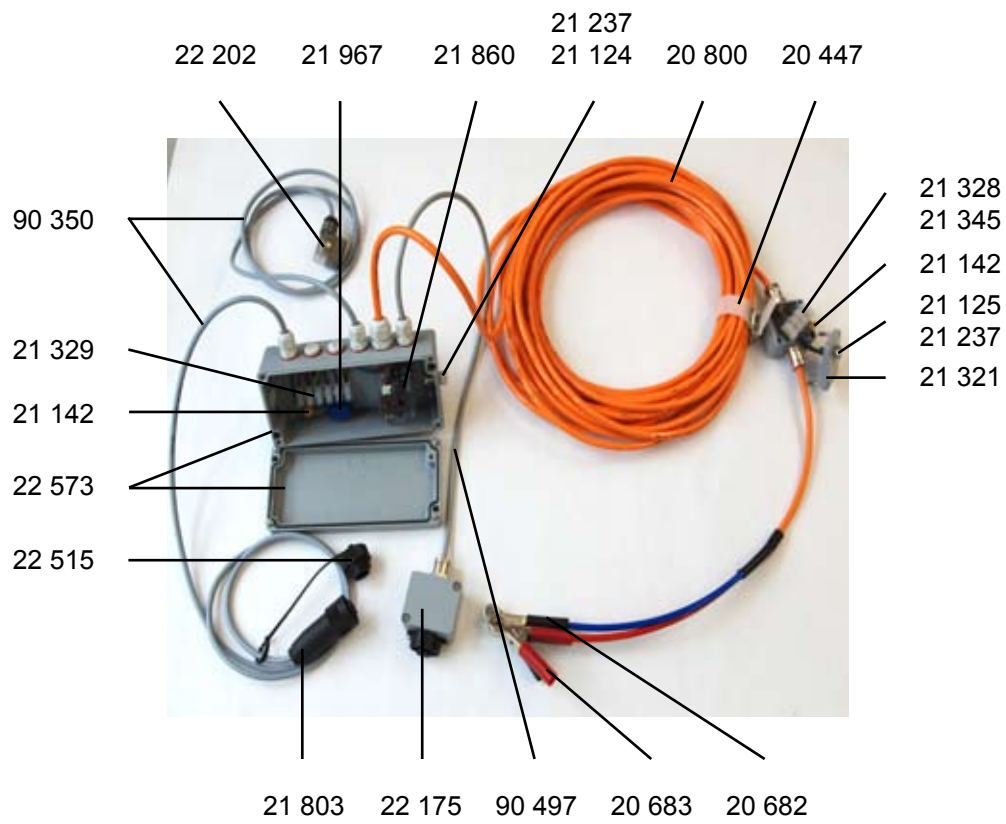
3.7 Connection pump



Article	Denomination	Quantity
21 792	Water connection 99, compl.	
20 158	Elbow 1, F/M-thread	1
20 187	Waterfilter 1	1
20 603	Filter insert, waterfilter 1	1
20 627	Container, waterfilter 1	1
20 629	Gasket, waterfilter 1	1
20 839	Pressure water coupling (NW 40 mm) 1, M-thread	1
20 684	Gasket, pressure water coupling (NW 40 mm)	1
21 598	Suction water coupling (NW 40 mm) 19 mm	1
22 344	Gasket, suction water coupling (NW 40 mm)	1
21 739	Reduce nipple 1/2-1, F/M-thread	1
X	<i>Connection to the piston pump</i>	
	<i>With piston pump 2K/080-063:</i>	
22 348	Compression fitting 1/2-12, Form GA	1
22 346	Tubing sleeve, compression fitting 12 mm	1
90 024	Tube 12x1,50, PA-natural	1
	<i>With piston pump 2K/100-080:</i>	
22 355	Compression fitting 1/2-14, Form GA	1
22 328	Tubing sleeve, compression fitting 14 mm	1
22 885	High-pressure hose blue 285-23/06 compl.	1

3.8 Emergency off-switch and powerbox

Powerbox S07



Article	Denomination	Quantity
22 530	Powerbox S07, compl. (without socket)	
20 511	Socket with cable and pole tongs, compl.	
20 447	Belt with buckle	2
20 682	Pole tong, black	1
20 683	Pole tong, red	1
20 800	Cable 2x1 mm ² , Flexipur (in mtr.)	12,50
21 124	LED 95 (green)	1
21 125	LED 95 (red/green)	1
21 142	Fuse (Poly-Switch) 50 Volt/1,6 A	2
21 237	Casing, LED 95	2
21 321	Casing, socket	1
21 402	Screwing with strain relief PG9, brass	1
21 328	Terminal block (4 outlets)	1
21 329	Terminal block (6 outlets)	1
21 345	Diode 1N5400	1
21 803	Coupling, cable FB S99	1
21 860	Emergency-off switch 99 (for installs), compl.	1
21 967	Controlboard S99 (inside), compl.	1
22 175	Socket for remote control cable 06, compl.	1
20 383	Cylinder screw M3x10 mm, stainless steel	2
21 402	Screwing with strain relief PG 9-brass	1
22 069	Coupling, cable remote control FB 99	1
22 176	Casing, socket remote control cable 06	1
22 455	Screw M4x8 mm, stainless steel	2
22 202	Coupling with LED, port valve 01	1
22 515	Protective hood for cable socket	1
22 573	Casing, powerbox S02 and U02	1
20 450	Blind nipple PG7	2
20 451	Screwing with strain relief PG7	3
21 136	Screwing with strain relief PG9	1
21 323	Gasket PG7 / PG9	6
21 325	Gasket PG11	1
21 930	Blind nipple PG11	1
90 350	Cable 2x0,75 mm ² (grey)	2,50
90 497	Cable 3x0,75 mm ² (in m)	1,00

4. Standard accessories

4.1 Safety equipment



Article	Denomination	Quantity
21 178	Safety equipment (601)	
20 278	Helmet with double face-protection	
20 178	Bracket, face-protection, helmet	1
20 179	Windshield with wire-tissues, helmet	1
20 188	Hearing-protection	1
20 189	Helmet	1
20 247	Windshield without wire-tissues, helmet	1
20 347	Fine dust mask	1

4.2 Rotation nozzle TS98

Article	Denomination	Quantity
22 100	Rotation nozzle TS98, compl.	
22 601	Fastener M6x20, stainless steel	3
22 936	Pipe for TS98	1
22 937	Hose for TS98	1

4.3 Nozzle, hoses, cable...

Diameter of the hoses: the first value indicates the inside diameter and the second value the wall thickness in mm. Example 19/7, the inside diameter is 19 mm, the outside diameter is 33 mm (19 + 2x7 mm).

Article for blasting hoses 13/7 (1/2")

Article	Denomination	Quantity
A	Blasting hoses with nozzle holder and blasting hose coupling	
22 933	Handheld lance 13/7 - 10 (1/2" hoses - 10 m long)	
22 094	Handheld lance 13/7 - 20 (1/2" hoses - 20 m long)	
B	Blasting hoses with 2 blasting coupling	
20 918	Blasting hose 13/7 - 20 m long with couplings	
21 034	Blasting hose 13/7 - 40 m long with couplings	
1	Nozzle holders	
20 827	Nozzle holder for soft-nozzle and hose 13/7 (1/2")	
2	Blasting nozzles	
21 983	torbo-blasting nozzle Soft 06 (6 mm)	
3	Blasting hose couplings	
21 127	Blasting hose coupling (NW 42 mm) 13/7 (1/2")	

Article for blasting hoses 19/7 (3/4")

Article	Denomination	Quantity
A	Blasting hoses with nozzle holder and blasting hose coupling	
22 617	Handheld lance 19/7 - 10 (3/4" hoses - 10 m long)	
20 539	Handheld lance 19/7 - 20 (3/4" hoses - 20 m long)	
B	Blasting hoses with 2 blasting coupling	
20 479	Blasting hose 19/7 - 20 m long with couplings	
20 485	Blasting hose 19/7 - 20 m long with couplings	
1	Nozzle holders	
20 612	Nozzle holder for Cylinder-nozzle and hose 19/7 (3/4")	
20 680	Nozzle holder for Laval-nozzle and hose 19/7 (3/4")	
2	Blasting nozzles	
21 984	torbo-blasting nozzle Cylinder 06 (6 mm)	
21 985	torbo-blasting nozzle Cylinder 08 (8 mm)	
21 113	torbo-blasting nozzle Laval with Supplementary nozzle 6 mm	
21 114	torbo-blasting nozzle Laval with Supplementary nozzle 8 mm	
21 115	torbo-blasting nozzle Laval with Supplementary nozzle 10 mm	
21 116	torbo-blasting nozzle Laval with Supplementary nozzle 12 mm	
21 117	torbo-blasting nozzle Laval with Supplementary nozzle 14 mm	
20 528	torbo-blasting nozzle Laval with Supplementary nozzle 16 mm	
3	Blasting couplings	
20 681	Blasting coupling (NW 42 mm) 19/7 (3/4")	

Article for blasting hoses 25/7 (1")

Article	Denomination	Quantity
A	Blasting hoses with nozzle holder and blasting hose coupling	
21 186	Handheld lance 25/7 - 2,5 (1" hose - 2,5 m long)	
B	Blasting hoses with 2 couplings	
20 478	Blasting hose 25/7 - 20 m long with couplings	
20 483	Blasting hose 25/7 - 40 m long with couplings	
1	Nozzle holders	
20 429	Nozzle holder for Laval-nozzle and hose 25/7 (1")	
20 830	Nozzle holder for Venturi-nozzle and hose 25/7 (1")	
22 293	Nozzle holder for Venturi-nozzle and blasting hose coupling, 50 mm	

Continuation: Article for blasting hoses 25/7 (1“)

Article	Denomination	Quantity
2	Blasting nozzles	
21 113	torbo-blasting nozzle Laval with Supplementary nozzle 6 mm	
21 114	torbo-blasting nozzle Laval with Supplementary nozzle 8 mm	
21 115	torbo-blasting nozzle Laval with Supplementary nozzle 10 mm	
21 116	torbo-blasting nozzle Laval with Supplementary nozzle 12 mm	
21 117	torbo-blasting nozzle Laval with Supplementary nozzle 14 mm	
20 528	torbo-blasting nozzle Laval with Supplementary nozzle 16 mm	
21 570	torbo-blasting nozzle Venturi No. 5 (8 mm)	
21 571	torbo-blasting nozzle Venturi No. 6 (9,5 mm)	
21 572	torbo-blasting nozzle Venturi No. 8 (12,5 mm)	
3	Blasting hose couplings	
20 435	Blasting hose coupling (NW 42 mm) 25/7 (1“)	

Article for blasting hose 32/8 (1 1/4“)

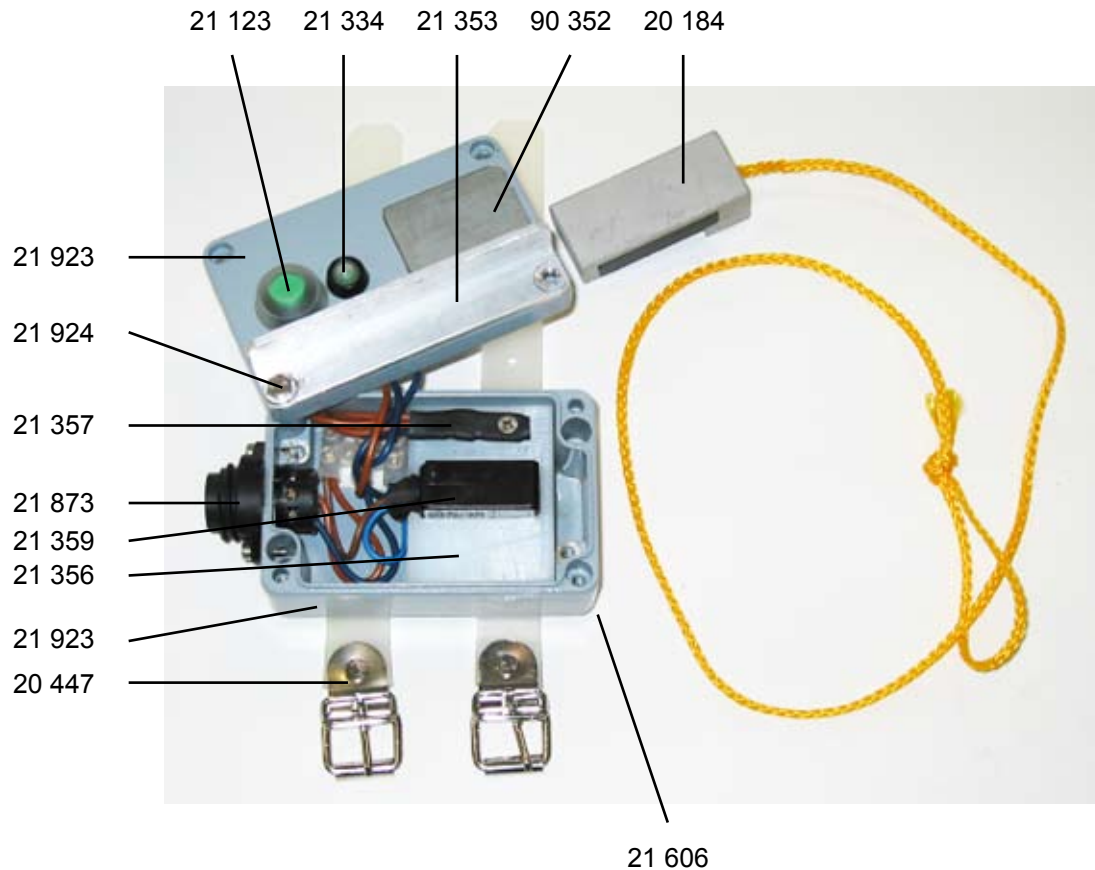
Article	Denomination	Quantity
A	Blasting hoses with nozzle holder and blasting coupling	
21 187	Handheld lance 32/8 - 2,5 (1 1/4“ hose - 2,5 m long)	
B	Blasting hoses with 2 couplings	
20 477	Blasting hose 32/8 - 20 m long with couplings	
20 486	Blasting hose 32/8 - 40 m long with couplings	
1	Nozzle holders	
20 610	Nozzle holder for Laval-nozzle and hose 32/8 (1 1/4“)	
20 611	Nozzle holder for Laval-nozzle and hose 32/8 (1 1/4“)	
22 293	Nozzle holder for Laval-nozzle and blasting hose coupling	
2	Blasting nozzles	
21 113	torbo-blasting nozzle Laval with Supplementary nozzle 6 mm	
21 114	torbo-blasting nozzle Laval with Supplementary nozzle 8 mm	
21 115	torbo-blasting nozzle Laval with Supplementary nozzle 10 mm	
21 116	torbo-blasting nozzle Laval with Supplementary nozzle 12 mm	
21 117	torbo-blasting nozzle Laval with Supplementary nozzle 14 mm	
20 528	torbo-blasting nozzle Laval with Supplementary nozzle 16 mm	
21 570	torbo-blasting nozzle Venturi No. 5 (8 mm)	
21 571	torbo-blasting nozzle Venturi No. 6 (9,5 mm)	
21 572	torbo-blasting nozzle Venturi No. 8 (12,5 mm)	
3	Blasting hose couplings	
20 583	Blasting hose coupling (NW 42 mm) 32/8 (1 1/4“)	

Cable, plug, clutches

Article	Denomination	Quantity
C	Extension cable	
21 801	Cable for FB S99 - 25 m long	
22 304	Cable for FB S99 - 50 m long	
21 802	Cable for FB U99 - 25 m long	
22 583	Cable for FB U99 - 50 m long	
4	Electrical plugs and clutches	
21 803	Clutches, Cable FB S99	
21 805	Plug, Cable FB S99	
21 804	Clutches, Cable FB U99	
21 806	Plug, Cable FB U99	

4.4 Remote control(s)

Remote control FB S99



Article	Denomination	Quantity
21 807	Remote control FB S99, compl.	1
20 184	Magnet with lanyard	1
20 447	Belt with buckle	2
21 123	Switch for FB 95 with protective hood, compl.	1
21 299	Protective hood, switch FB95	1
21 355	Switch FB95	1
21 334	LED 95 (green) with casing, compl.	1
21 353	Protective cover FB S95, alumium (above)	2
21 356	Holder, micro switch FB 95	1
21 357	Thyristor, compl.	1
21 359	Micro switch FB 95 (inside, with cable)	1
21 873	Plug FB 99 (installation)	1
20 138	Cylinder-screw M4x10, stainless steel	2
21 923	Casing, Powerbox FB S99	1
21 924	Cylinder-screw M4x25, stainless steel	4
21 606	Rail bar FB S95, alumium (down)	2
90 352	Plate, remote control FB 95	1

VIII. Glossary

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