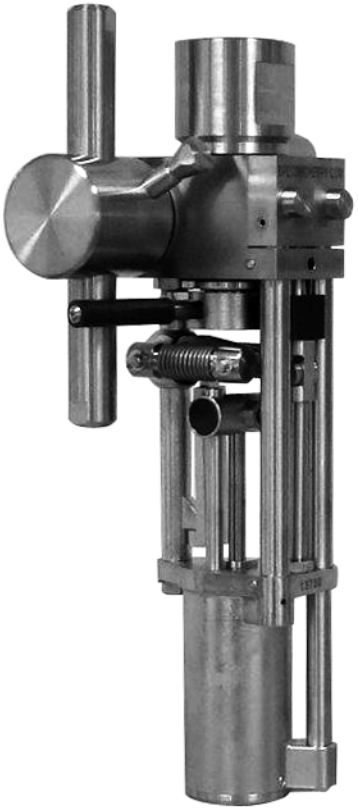

Operating Instructions

GEA Index Cleaner Fury 602

Edition 01/08/2016
English

Product Fury 602

Document Operating Instructions

Edition 01/08/2016
English

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Table of Contents

Notes for the Reader

The present Operating Instructions are part of the user information for the cleaner. The Operating Instructions contain all the information you need to transport, install, commission, operate and carry out maintenance for the cleaner.

Binding Character of These Operating Instructions

These Operating Instructions contain the manufacturer's instructions to the operator of the cleaner and to all persons who work on or use the cleaner regarding the procedures to follow.

Carefully read these Operating Instructions before starting any work on or using the cleaner. Your personal safety and the safety of the cleaner can only be ensured if you act as described in the Operating Instructions.

Store the Operating Instructions in such a way that they are accessible to the operator and the operating staff during the entire life cycle of the cleaner. When the location is changed or the cleaner is sold make sure you also provide the Operating Instructions.

Notes on the Illustrations

The illustrations in these Operating Instructions show the cleaner in a simplified form. The actual design of the cleaner can differ from the illustration. For detailed views and dimensions of the cleaner please refer to the design documents.

Symbols and Highlighting

In these Operating Instructions, important information is highlighted by symbols or special formatting. The following examples illustrate the most important types of highlighting.

DANGER

Warning: Fatal Injuries.
Failure to observe the warning can result in serious damage to health, or even death.
➔ The arrow identifies a precautionary measure you have to take to avoid the hazard.

EXPLOSION HAZARD

Warning: Explosions.
Failure to observe the warning can result in a severe explosion.
➔ The arrow identifies a precautionary measure you have to take to avoid the hazard.

WARNING

Warning: Serious Injuries.
Failure to observe the warning can result in serious damage to health.
➔ The arrow identifies a precautionary measure you have to take to avoid the hazard.

CAUTION

Warning: Injuries.
Failure to observe the warning can result in minor or moderate damage to health.
➔ The arrow identifies a precautionary measure you have to take to avoid the hazard.

IMPORTANT NOTE

Warning: Damage to Property.
Non-observance of the warning note can cause serious damage to the cleaner or in the vicinity of the cleaner.
➔ The arrow identifies a precautionary measure you have to take to avoid the hazard.

Carry out the following steps: = Start of a set of instructions.

1. First step in a sequence of operations.
2. Second step in a sequence of operations.
   ➥ Result of the previous operation.

✓ The operation is complete, the goal has been achieved.

NOTE
Further useful information.

Abbreviations and Terms

Abbreviation	Explanation
ATEX	ATEX is a widely used synonym for the European Union ATEX directives. The designation ATEX is derived from the abbreviation of the French ATmosphère EXplosive.
BS	British Standard
bar	Unit of measurement of pressure [bar] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [bar_g/psi_g] unless explicitly specified otherwise.
BSP	British Standard Pipe Thread
approx.	approximately
°C	Unit of measurement of temperature [degree Celsius]
DN	DIN nominal width
DIN	German standard issued by DIN (Deutsches Institut für Normung e.V., German Institute for Standardization)
EN	European Standard
°F	Unit of measurement of temperature [degree Fahrenheit]
h	Unit of measurement of time [hour]
ISO	International standard issued by the International Organization for Standardization
kg	Unit of measurement of weight [kilogram]
l	Unit of measurement of volume [litre]
min.	minimum
max.	maximum
mm	Unit of measurement of length [millimetre]
µm	Unit of measurement of length [micrometre]
M	Metric
NPT	National Pipe Thread

Abbreviation	Explanation
Nm	Unit of measurement of work [newton metre] UNIT OF TORQUE 1 Nm = 0.737 lbft Pound-Force (lb) + Feet (ft)
PA	Polyamide
PEEK	Polyether ether ketone
C-PEEK	Polyether ether ketone containing carbon
PTFE	Polytetrafluoroethylene
psi	British and American unit of measurement [Pound force per square inch] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [barg/psig] unless explicitly specified otherwise.
a/f	Indicates the size of spanners width across flats
Inch	Unit of measurement of length In the Anglo-American language area
Inch OD	Pipe dimension acc. to British standard (BS), Outside Diameter
Inch IPS	US pipe dimension Iron Pipe Size

Safety

Safety Note

The cleaner is operationally reliable. It was built according to state-of-the-art standards.

Nevertheless, the cleaner can pose dangers, especially if

- the cleaner is not used in accordance with its intended use,
- the cleaner is not used correctly,
- the cleaner is operated under impermissible operating conditions.

Operator's Duties

In your capacity as operator of the facility you bear a particular responsibility for the proper and safe handling of the cleaner in your facility. Only use the cleaner when it is in perfect condition to prevent danger to persons and property.

These Operating Instructions contain the information you and your staff need for the safe and reliable operation during the entire service life of the cleaner. Be sure to read these Operating Instructions carefully and ensure that the measures described here are observed.

The operator's duty of care includes planning the necessary safety measures and monitoring that these measures are observed. The following principles apply:

- Only allow qualified staff to work on the cleaner.
- The operator must authorize the staff to carry out the relevant tasks.
- Working areas and the entire environment of the cleaner must be neat and clean.
- The staff must wear suitable work clothing and personal protective equipment. As the operator of the facility make sure that work clothing and personal protective equipment are used.
- Instruct the staff with regard to any properties of the product which might pose a health risk and the preventative measures to be taken.
- Have a qualified first-aider on call during the operation, who can initiate the necessary first-aid measures in case of an emergency.
- Clearly define processes, lines of authority and responsibilities associated with the cleaner. Everybody must know what to do in case of an emergency. Instruct the staff in this respect at regular intervals.
- The signs relating to the cleaner must always be complete and legible. Check, clean and replace the signs as necessary at regular intervals.

NOTE
Carry out regular checks. This way you can ensure that these measures are actually observed.

Qualification of Staff

This section contains information about the qualifications that staff working on the cleaner must have.

Operating and maintenance staff must

- have the necessary qualification to carry out their tasks,
- be instructed with regard to possible dangers,
- know and observe the safety instructions given in the documentation.

Only allow qualified electricians to carry out work on the electrical equipment or have a qualified electrician supervise the work.

Only allow specially trained staff to carry out any work on explosion-protected equipment. When working on explosion-protected equipment observe the standards DIN EN 60079-14 for gases and DIN EN 50281-1-2 for dusts.

The following minimum qualifications are required:

- Vocational training as a skilled worker who can work on the cleaner independently.
- Sufficient instruction to work on the cleaner under the supervision and direction of a qualified specialist.

Each member of staff must meet the following requirements to be allowed to work on the cleaner:

- Personal qualification for the relevant task.
- Sufficient professional qualification for the relevant task.
- Instructed with regard to the function of the cleaner.
- Instructed with regard to the operating sequences of the cleaner.
- Familiar with the safety devices and their function.
- Familiar with these Operating Instructions, especially with the safety instructions and the information which is relevant for the task on hand.
- Familiar with the basic regulations with regard to occupational health and safety and accident prevention.

For work to be carried out on the cleaner the following user groups are distinguished:

User groups

Staff	Qualifications
Operating staff	Adequate instruction and sound knowledge in the following areas: • Function of the cleaner • Operating sequences of the cleaner • What to do in case of an emergency • Lines of authority and responsibilities with respect to the task
Maintenance staff	Adequate instruction as well as sound knowledge of the design and function of the cleaner. Sound knowledge in the following areas: • Mechanical equipment • Electrical equipment • Pneumatic system Authorization with regard to safety engineering standards to carry out the following tasks: • Setting devices into operation • Earthing of devices • Marking of devices The relevant certificates of qualification must be submitted before work can be carried out on ATEX certified machines.

Supplementary Regulations

In addition to the instructions in this documentation the following also has to be observed:

- pertinent accident prevention regulations,
- generally accepted safety rules,
- national regulations applicable in the country of use,
- work and safety instructions applicable in the facility,
- installation and operating regulations for use in potentially explosive areas.

Instructions for the Safe Operation

Dangerous situations during the operation can be avoided by safety-conscious and proactive behaviour of the staff.

General Principles

To ensure the safe operation of the cleaner the following principles apply:

- The Operating Instructions must be kept ready to hand and accessible for everyone at the cleaner's place of use. They must be complete and in clearly legible form.
- Only use the cleaner for its intended use.
- The cleaner must be functional and in good working order. Check the condition of the cleaner before starting work and at regular intervals.
- Wear tight-fitting work clothing for all work on the cleaner.
- Ensure that nobody can get hurt on the parts of the cleaner.
- Immediately report any faults or noticeable changes on the cleaner to the person responsible.
- Observe the accident prevention regulations and all local regulations.

Installation

For installation, the following principles apply:

- Only properly qualified staff is allowed to install, assemble and set the cleaner into operation.
- Ensure that adequate working and traffic areas are available at the place of installation.
- Observe the maximum load-bearing capacity of the installation surface.
- Observe the transport instructions and markings on the part(s) to be transported.
- Remove any nails protruding from transport crates immediately after opening the crate.
- Under no circumstances should anyone stand under a suspended load.
- During assembly, the cleaner's safety devices might not be working effectively.
- Reliably secure machine parts which have already been connected against inadvertently being switched on.

Commissioning/Setup Mode

For commissioning, the following principles apply:

- The cleaner must be completely assembled and correctly adjusted. All screw connections must be securely tightened.
- Reliably secure machine parts which have already been connected against inadvertently being switched on.
- After conversion of the cleaner, residual risks must be reassessed.

Setting into Operation

For setting into operation, the following principles apply:

- Only allow properly qualified staff to set the cleaner into operation.
- Establish all connections correctly.
- When the cleaner is switched on, the danger zones must be free.
- Remove any liquids that have escaped without leaving residues.

Operation

For operation, the following principles apply:

- Monitor the cleaner during the operation.
- Safety devices must not be changed, removed or taken out of service. Check all safety devices at regular intervals.
- All guards and hoods must be fitted as intended.
- Structural alterations of the cleaner are not permitted. Immediately report any changes on the cleaner to the person responsible.
- Always keep danger zones clear. Do not leave any objects in the danger zone. Only allow persons to enter the danger zone when the machine is de-energized.
- Regularly check that all emergency stop devices are working correctly.
- The cleaner contains a threadlocker/sealant (Loctite 243) with NSF P1 approval.

Shutting Down

For shutting down, the following principles apply:

For longer periods of standstill, observe the storage conditions, see “Storage“ (page 19).

Maintenance and Repair

For maintenance and repair, the following principles apply:

- Observe the intervals specified in the maintenance schedule.
- Only allow qualified staff to carry out maintenance or repair work on the cleaner.
- Before starting any maintenance or repair work, the cleaner must be switched off and secured against being switched back on. Work may only be started once any residual energy has been discharged.
- Block access for unauthorized persons. Put up notice signs which draw attention to the maintenance or repair work going on.
- Do not climb on the cleaner. Use suitable access aids and working platforms.
- Wear suitable protective clothing.
- Only use suitable and undamaged tools to carry out maintenance work.
- When replacing parts only use approved, fully functional load lifting devices and lifting accessories which are suitable for the intended purpose.
- Before setting the unit back into operation refit all safety devices as originally provided in the factory. Then check that all safety devices are working correctly.
- Check pipes are firmly secured, also check for leaks and damage.
- Check that all emergency stop devices are working correctly.

Disassembly

For disassembly, the following principles apply:

- Only allow qualified staff to disassemble the cleaner.
- Before starting disassembly, the cleaner must be switched off and secured against being switched back on. Work may only be started once any residual energy has been discharged.
- Disconnect all power and utility lines.
- Markings, e.g. on lines, must not be removed.
- Do not climb on the cleaner. Use suitable access aids and working platforms.
- Mark the lines (if unmarked) prior to disassembly to ensure they are not confused when re-assembling.
- Protect open line ends with blind plugs against ingress of dirt.
- Pack sensitive parts separately.

Environmental Protection

Harm to the environment can be avoided by safety-conscious and proactive behaviour of the staff.

For environmental protection the following principles apply:

- Substances harmful to the environment must not be discharged into the ground or the sewage system.
- Always observe the pertinent regulations relating to waste avoidance, disposal and utilization.
- Substances harmful to the environment must be collected and stored in suitable containers. Clearly mark the containers.
- Dispose of lubricants as hazardous waste.

Signage

Dangerous points on the cleaner are indicated by warning signs, prohibition signs and mandatory signs.

The signs and notes on the cleaner must always be legible. Any illegible signs must be replaced immediately.

Signs on the cleaner

Sign	Meaning
	General hazard warning
	Warning Crushing
	Explosive atmosphere hazard warning

Residual Risk

Hazard Areas

Transport, Installation

Do not set the cleaner down on the lower body. Store the cleaner in horizontal position and secure it against rolling away to the side.

Setting into Operation

Observe the following notes

- When installing the cleaner, secure it against tipping and twisting and secure all fixing points correctly.
- Only set the cleaner into operation in closed vessels.

Operation

Observe the following notes

- Provide suitable protective measures to ensure that the cleaner cannot be set into operation outside of the vessel.
- In the event of faults, stop all media supplies immediately.
- Check the installation situation to ensure that the cleaner is not in contact with other parts and that rotation cannot be obstructed.
- Do not allow the maximum cleaning pressure and the maximum cleaning temperature to be exceeded.
- Vessels, tanks and road tankers etc. must be grounded by suitable means.

Maintenance

Observe the following notes

- Close all media supply lines and ensure that no hot or aggressive media are applied to or are in the cleaner.
- Never set the cleaner down on the lower body.
- Do not attempt to turn the nozzles by hand.
- Do not use the lower body as a tool contact point for installation or removal.

Residual Dangers

Dangerous situations can be avoided by safety-conscious and proactive behaviour of the staff and by wearing personal protective equipment.

Residual dangers on the cleaner and measures

Danger	Cause	Measure
Danger to life	Inadvertent switch-on of the cleaner	Effectively disconnect all components, effectively prevent switch-on.
Danger of injury	Danger presented by moving or sharp-edged parts	The operator must exercise caution and prudence. For all work: • Wear suitable work clothing. • Never operate the machine if the cover panels are not correctly fitted. • Never open the cover panels during the operation. • Never reach into openings. As a precautionary measure, wear personal protective equipment in the vicinity of the cleaner: • Protective gloves • Safety shoes

Declaration of Incorporation

Declaration of Incorporation

in accordance with the EC Machinery Directive 2006/42/EC

We herewith declare that this consignment contains the subsequently identified – but incomplete – machine and that putting into service is not permitted until it has been established that the machinery into which this machine is to be incorporated is in conformity with the provisions of the EC Machinery Directive.

We declare that the incomplete machine identified here complies with the "Essential Health and Safety Requirements" defined in Annex I, section 1 and section 2.1. The technical documentation is compiled in accordance with Annex VII, part B. In response to a reasoned request the relevant information will be transmitted to the appropriate national authorities.

This declaration will become invalid if any alterations are made to the machine which have not been agreed with us.

Designation of the machine:	Fury 602
Machine type:	GEA Index Cleaner
Relevant EC directives:	2006/42/EC
Applicable harmonized standards:	DIN EN ISO 12100

Büchen, 18/04/2016

Franz Bürmann	Matthias Südel
Managing Director	Senior Director Product Development Flow Components

Transport and Storage

Scope of Supply

On receipt of the cleaner check whether

- the details on the type plate correspond to the data in the order and delivery documents,
- the equipment is complete and all components are in good order.

Transport

For transport, the following principles apply:

- Only use suitable lifting gear and slings for transporting package units/cleaners.
- Observe the pictograms on the package.
- Handle the cleaner with care to avoid damage caused by impact or careless loading and unloading. The outside synthetic materials are susceptible to breaking.
- Only allow qualified staff to transport the cleaner.
- Movable parts must be properly secured.
- Only use approved, fully functional load lifting devices and lifting accessories which are suitable for the intended purpose. Observe the maximum load-bearing capacities.
- Under no circumstances should anyone stand under a suspended load.
- Take care when transporting the cleaner. Do not grip sensitive parts of the unit to lift or push the unit or to support yourself. Avoid putting the unit down with a jerk.
- Do not set the cleaner down on the lower body. Store the cleaner in horizontal position and secure the cleaner against rolling away to the side.

Storage

Store the cleaner in a dry place and ensure it is not subjected to vibration and is protected from external influence.

Storage temperature +5...+40 °C

Intended Purpose

Designated Use

The Index Cleaner Fury is intended for the cleaning of tanks and vessels. This cleaner has been designed for installation vertically up or vertically down.

NOTE

The manufacturer will not accept any liability for damage resulting from any use of the cleaner which is not in accordance with its designated use. The risk of such misuse lies entirely with the operator of the facility.

Requirements for the Operation

The prerequisite for the reliable and safe operation of the cleaner is proper transportation and storage as well as professional installation and assembly. Operating the cleaner within the limits of its designated use also involves adhering to the operating, inspection and maintenance instructions.

Improper Operating Conditions

The operational reliability of the cleaner cannot be ensured under improper operating conditions. Therefore avoid improper operating conditions.

Operating the cleaner is not permitted if

- Persons or objects are in the danger zone.
- Safety devices are not working or were removed.
- Malfunctions have been detected on the cleaner.
- Damage has been detected on the cleaner.
- Maintenance intervals have been exceeded, see “Maintenance Intervals“ (page 32).

Conversion Work

You should never make any technical modifications to the cleaner. Otherwise you will have to undergo a new conformity process in accordance with the EC Machinery Directive on your own.

In general, only original GEA Tuchenhagen GmbH spare parts should be fitted. This ensures the reliable and economical operation of the cleaner. Using spare parts from third-party suppliers will invalidate any and all warranty claims.

Installation and Commissioning

Operating Conditions

The cleaner is driven by the cleaning liquid flowing through it at a suitable pressure and flow rate. It is essential that the cleaner is supplied with cleaning liquid at the correct pressure and flow rate for effective operation. The requirements are specified in the tables below.
The specified pressure is the pressure required at the cleaning head and not at the pump.

Operating flow rate and pressure requirements for cleaner Fury 602 – 8 mm nozzles

Required flow rate [l/min]	200	225	250	280
Required flow rate [IMPgpm]	44	51	55	62
Required flow rate [USgpm]	53	60	66	74
Required pressure [bar]	4	6	8	10
Required pressure [psi]	56	84	112	140
Throw length [m]	8	11	12	13
Throw length [ft]	26	36	39	42

Operating flow rate and pressure requirements for cleaner Fury 602 – 10 mm nozzles

Required flow rate [l/min]	295	330	380	415
Required flow rate [IMPgpm]	65	73	84	91
Required flow rate [USgpm]	78	87	100	110
Required pressure [bar]	4	6	8	10
Required pressure [psi]	56	84	112	140
Throw length [m]	8	11	12	13
Throw length [ft]	26	36	39	42

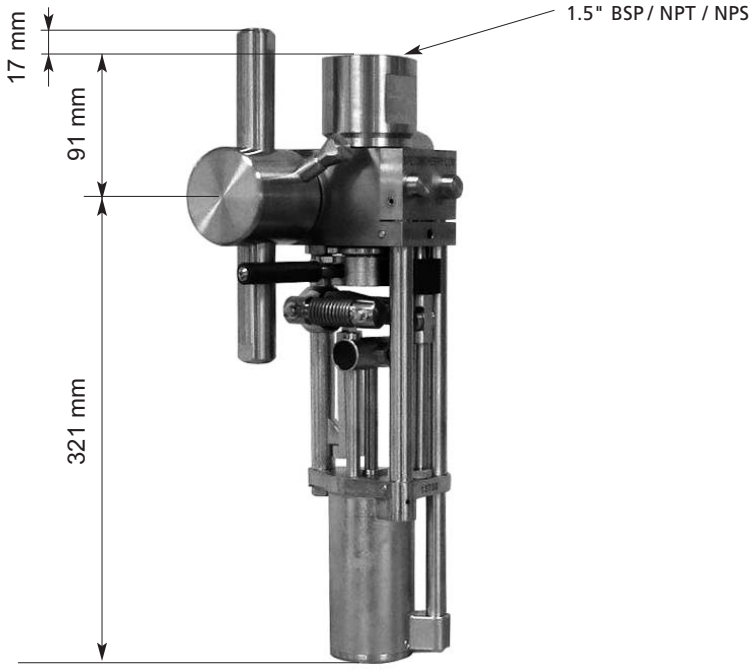
NOTE
The cleaner may only be operated at a maximum pressure of 12 bar. Higher pressures can destroy the cleaner.

Notes on Installation

Observe the following points before installing the cleaner:

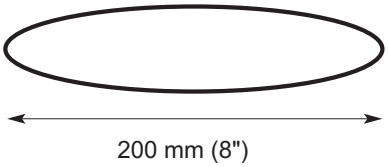
- Switch off the power circuit and protect it from unauthorized switch-on.
- Protect the supply pump for CIP medium against unauthorized switch-on.
- Shut off the cleaning medium supply line and secure the line against being opened. There must not be any chemical cleaning medium in the supply line.
- Make sure that there are no foreign objects in the system.
- Clean (rinse) the cleaning medium supply line before connecting the cleaner.
- The electrical installation must be in accordance with the requirements of EN 60079-14 in areas with explosive gas atmosphere and in accordance with the requirements of EN 61241-4 in areas with explosive dust atmosphere.

Installation Dimensions



Installation dimensions

The smallest manhole diameter recommended for normal operation is 200mm (8"). The nozzles must be vertically aligned. Take care to avoid damaging the cleaner.



Dimensions of manhole with vertically aligned nozzles

Installation

Voraussetzung

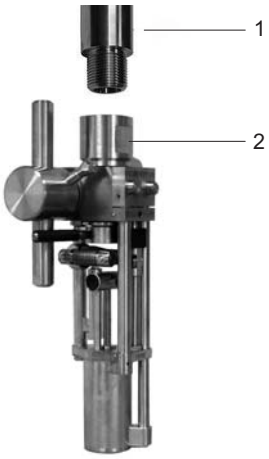
- We generally recommend that a 500 µm filter/strainer should be installed in the CIP supply line at the tank cleaner to prevent blockage or damage resulting from foreign particles. It is the customer‘s responsibility to ensure the suitability of the strainer/filter retention rating for this particular application.
- The cleaner must have a suitable pipe connection for this.

IMPORTANT NOTE

Danger when screwing the cleaner to the fixed pipe via the lower body
Doing so will cause damage to the gears inside the cleaner or jamming of the mechanism
➔ Screw the cylindrical upper body (2) to the pipe (1).

Carry out the following steps:

1. Hold the cylindrical upper body (2) and carefully screw it onto the pipe (1) until it is hand-tight.



2. Use a strap wrench/adjustable spanner on the cylindrical upper body (2) or a suitably sized spanner on the spanner flats (2) provided to screw the cleaner to the pipe (1).

✓ Done

Removing

Remove in reverse sequence of installation.

CAUTION

Hot surface of the cleaner
Danger of burns.
➔ Allow the cleaner to cool before removing it.

CAUTION

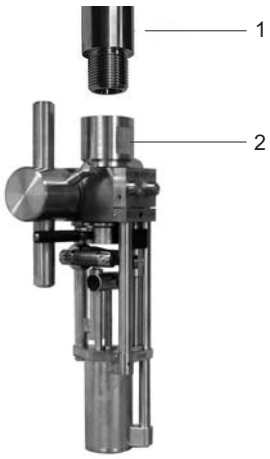
Hot and aggressive liquids can be discharged from the cleaner.
Danger of injury.
➔ Completely drain the cleaner before removing it.

IMPORTANT NOTE

Danger when unscrewing the cleaner via the lower body
Doing so will cause damage to the gears inside the cleaner or jamming of the mechanism
➔ Use the cylindrical upper body as contact point for the tool.

Carry out the following steps:

1. Use a strap wrench/adjustable spanner on the cylindrical upper body (2) or a suitably sized spanner on the spanner flats provided to unscrew the cleaner from the pipe (1).
2. Support the lower body and carefully unscrew the cylindrical upper body (2) by hand until the cleaner comes free from the inlet pipe (1).



✓ Done

Setting into Operation

Voraussetzung

- Avoid water hammers in the supply pipe.

CAUTION

Hot and aggressive liquids are discharged from the cleaner!
Danger of injury
➔ Make sure nobody stands in the area of action of the nozzles.
➔ The cleaner may only be operated in a vessel intended for this purpose.

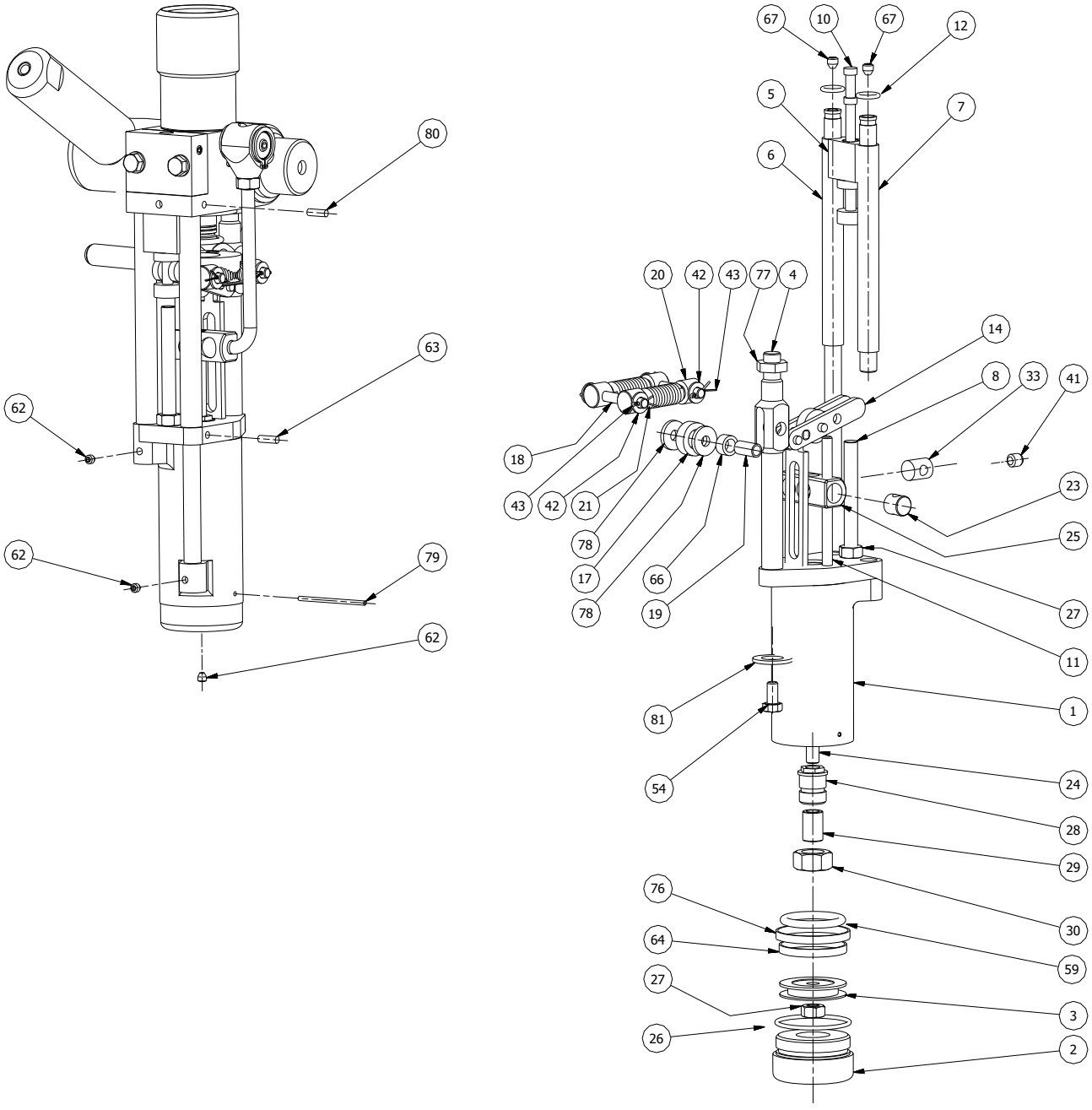
Carry out the following steps:

➔ Connect the cleaner and set it into operation.

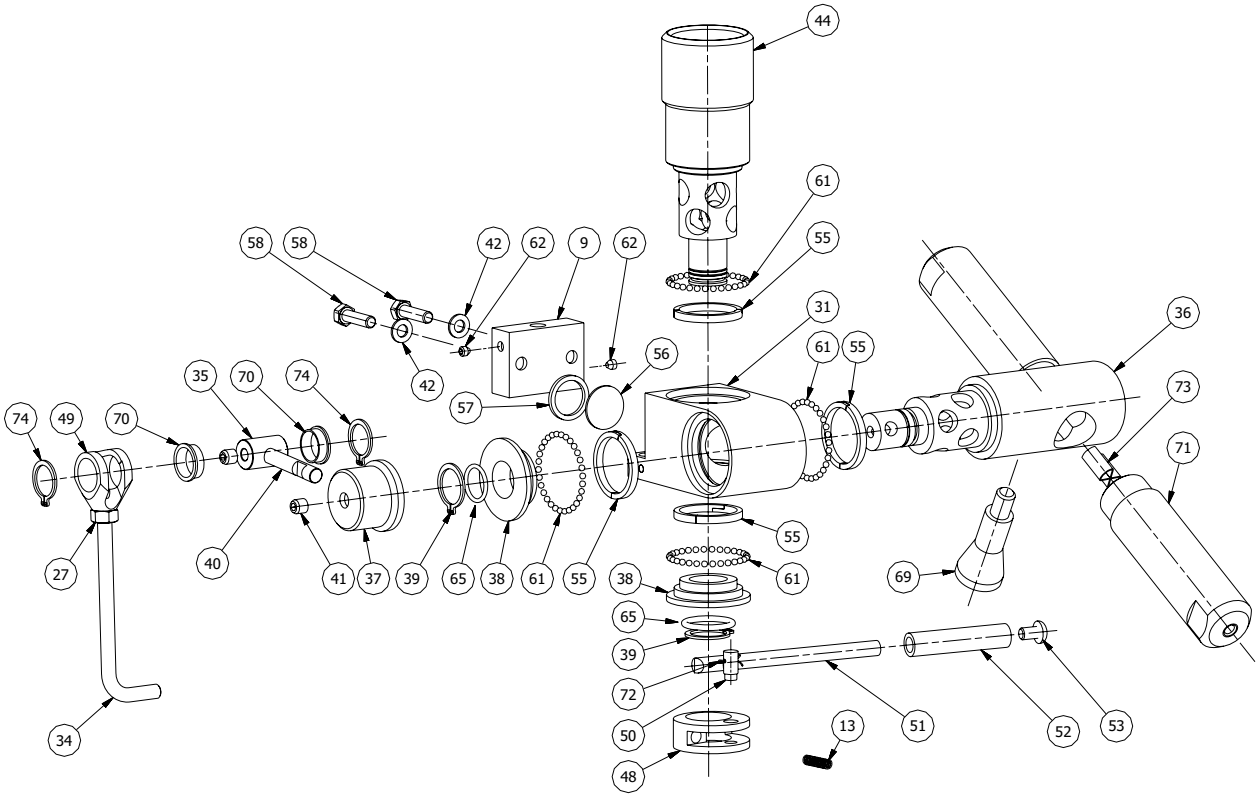
✓ Done

NOTE
Noise generated when the cleaning jets hit the tank wall can cause discomfort and stress in the immediate vicinity.

Disassembly



Left: Fury 602 unit
Right: Cylinder, flyover and water tube assembly



Main block, nozzle, inlet and indexing unit

Requirement:

- The cleaner must have been removed and completely drained and must have cooled down.

Carry out the following steps:

1. Unscrew the nozzles (71) and check if they are clear of blockage.
2. Remove the stream straightener (73) by pushing it out with a steel rod (Ø 6.0 mm).
3. Use a hex key (a/f 1/8") to remove the set screws (62), then use a pin punch (Ø 3/16") to drift out the cylinder cap pin (79).
4. Slide the end cap (2) off.

   ! The O-ring (26) should be left in place unless damaged.
5. Undo the sealing screws (58) and O-rings (42) using a spanner (a/f 14.0 mm).
6. Slide the valve block (9) off the valve spindle (10).

   ➥ Filter (56) and filter ring (57) are now visible.
7. Remove filter (56) and filter ring (57) and check for obstructions; clear if necessary.
8. Remove two control screws (67) using a hex key (a/f 3/16") and check for blockage.
9. Slide off two O-rings (12), use pliers to remove the split pins (43).

10. Dismantle the following parts: straight pin (18), sleeve (19), spring end (20), washer (42), flyover spring (21), bearing bush (66) and roller (17).

    ! Unless damaged, do not attempt to separate the spring end (20) from the straight pin (18).

11. Remove two set screws (41) using a hex key (a/f 3/16").

12. Dismantle the following parts: cap (37), connecting rod (40), flyover (14), rod end (49), rod end plug (35), conrod (34), conrod plug (33), crosshead (25), guide plug (23) and locknut (27).

13. Grip the locknut (27) with pliers and remove the piston (3) by pulling and rotating at the same time.

    ! Piston seal (64), O-ring (59) and bearing tape (76) should be left in place unless worn.

    ! The piston rod (24) should not be removed from the piston (3) unless it is to be replaced.

14. Grip the inlet tube (44) in a soft-jawed vice.

15. Remove the circlip (39) using circlip pliers.

16. Remove from the vice and, holding the tank cleaner in your hand, gently tap the inlet tube (44) with a nylon headed hammer.

    ! Hold the cleaner over a tray to catch loose parts.

17. Dismantle the following parts: inlet tube (44), bearing flange (38), ball set (61), seals (26/55), index block (48), index lever unit, guide pin (50), index spring (13) and split pin (72).

    ! The O-ring (65) should be left in place unless worn.

18. Remove the circlip (39) using circlip pliers.

19. Hold the tank cleaner in your hand. Gently tap the nozzle carrier (36) with a nylon headed hammer.

    ! Hold the cleaner over a tray to catch loose parts.

20. Dismantle the following parts: nozzle carrier (36), bearing flange (38), ball set (61), seals (26/55), circlip (39), ball set (61) and O-ring (65).

NOTE

The main body assembly should not be dismantled unless any of its components are damaged. It is strongly recommended that the main body assembly should be returned to the manufacturer in this case. If this is not possible, carry out the following steps:

21. Use a pin punch (Ø 3/16") to drift out two pins (63/80).

22. Undo the hex screw (54) using a spanner (a/f 16.0 mm).

    ↪ The main block (31) can now be separated from the cylinder (1) by tapping them apart using a nylon headed hammer.

23. Remove the valve slider (5) and the valve spindle (10).

24. Grip the long water tube (6) in a soft-jawed vice. Holding the cylinder (1) by hand, rotate and pull the water tube to release it.

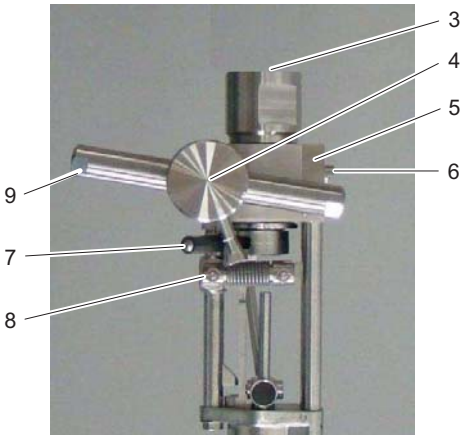
25. Repeat this for the short water tube (7).

✓ The cleaner is now dismantled.

Malfunctions

In the event of malfunctions immediately deactivate the cleaner and secure it against inadvertent reactivation. Malfunctions may only be remedied by qualified staff, who must observe the safety instructions.

Go through the check list below in numerical order.



No	Remedying Faults
1	Check the cleaning liquid pressure and flow rate. Check the pressure at the cleaning head and not at the pump. For pressure and flow rate requirements refer to chapter “Betriebsbedingungen“ (page 23). Increase the pressure/flow rate if necessary.
2	Take the Fury cleaner out of the tank. Blank off the nozzles and supply water through a hose at 2 bar (30 psi). Blanks for the nozzles can be supplied but a simple plug fitting inside the nozzles will do.
3	Check the inlet tube. Make sure the inlet tube is free from blockage, is not jammed and is not bent.
4	Rotate the nozzle tube forward and back 1/4 turn. Check the valve action is positive when it clicks over. The valve should be free and not bent.
5	Ensure that the valve spindle snaps up and down positively without delay.
6	Undo the bolts, remove the valve block and unscrew the control screw. Check that filter and control screw are free of blockage. Blow the water passages out with compressed air.
7	Move the index lever forwards and backwards by hand. Check that the inlet tube moves round in steps. • Check that this area is free of oil or grease. Remove with de-greaser if necessary. • Ensure the spring is intact and operates correctly.
8	Springs should be tensioned. If necessary, tighten by screwing the spring ends half a turn.
9	Check that all nozzles are free of blockage and the vanes are not damaged.

Maintenance

Maintenance Intervals

The actual maintenance intervals can only be determined by the user since they depend on the operating conditions, for instance:

- type and temperature of the cleaning solution,
- ambient conditions.

Maintenance Intervals

Job to be Performed	Maintenance Intervals (Guideline Values)
Inspection	175 hours of operation
Maintenance	500 hours of operation

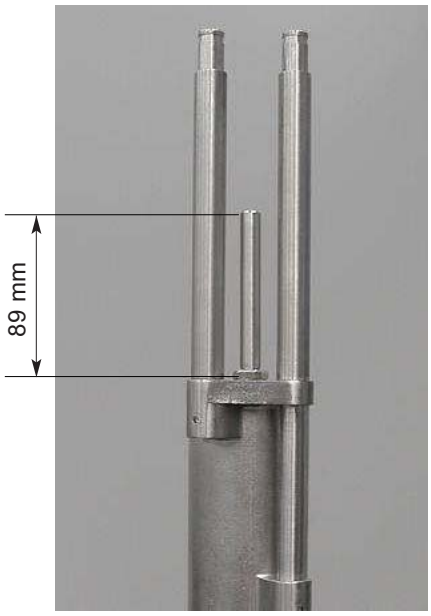
Disposal

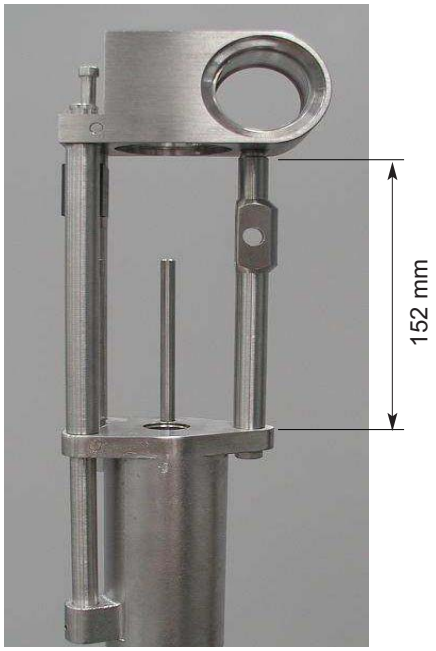
Dispose of the cleaner in an environmentally friendly manner. Observe the statutory waste disposal regulations applicable at the place of installation.

Separate the different materials and dispose of them correctly sorted. Also observe the instructions regarding disposal in the operating instructions for the individual components.

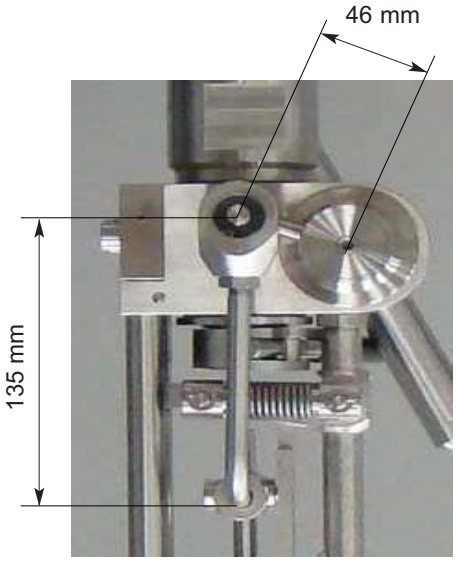
Installation

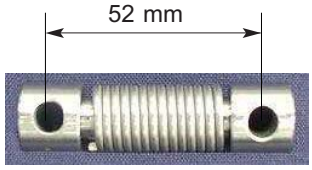
Setting Dimensions





Setting dimensions - stop spindle assembly





Setting dimensions - rod end and conrod, spring section

Assembling the Cleaner

Assemble the cleaner in the reverse order of disassembly. If the cleaner has been completely dismantled then the main body assembly must be reassembled first.

Requirement:

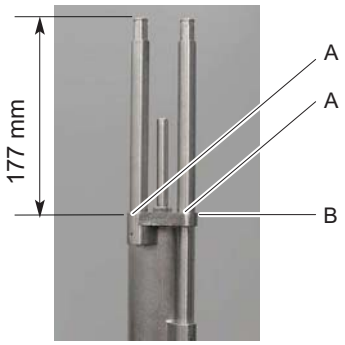
- All parts are clean and degreased.
- All water passages have been cleared out with compressed air.

Tools required:

- Threadlocker/sealant, Loctite 243 with NSF P1 approval is recommended

Carry out the following steps:

1. Apply Loctite to the threads of the stop spindle (8) and the guide spindle (11). Screw both spindles into place on the cylinder (1) by gripping them in a soft-jawed vice and turning until tight.
2. Screw two set screws (62) into the cylinder (1) and secure with Loctite.
3. Insert the long water tube (6) and the short water tube (7) into the cylinder (1) and apply Loctite to the points shown at (A) (see illustration).

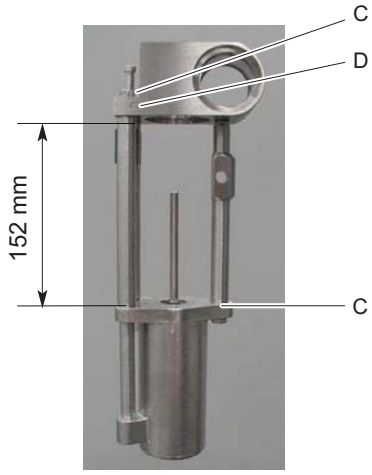


4. Adjust the water tubes to give a dimension of 177 mm (see illustration).

   ! Allow Loctite 30 minutes to dry.
5. At point (B), drill through Ø 3/16" into the existing hole in the cylinder (1).
6. Clear all drill swarf from the hole by blowing through with compressed air.
7. Insert the pin (63) and press it into place.
8. Apply Loctite to the thread of the pillar (4) and screw it into the main block (31).

9. Check whether the assembly is square and adjust the pillar (4) in the screwed position to give a dimension of 152 mm (see illustration).

   ! Allow Loctite 30 minutes to dry.



10. Fit valve stem (10) and valve slider (5). Bring block and cylinder assembly together and apply Loctite at (C) (see illustration).

11. At point (D), drill through Ø 3/16" into the existing hole in the main block (31).

12. Clear all drill swarf from the hole by blowing through with compressed air.

13. Insert the pin (80) and press it into place. Apply a small amount of Loctite to the machine screw (54) and tighten with a spanner (a/f 15.0 mm).

14. Fit eight O-rings (26) and four seals (55) into the main block (31).

15. Position two ball sets (61) into each of the two tracks.

16. Stand the inlet tube (44) on a flat surface with the large thread facing downwards and carefully lower the main body into place. Fit the bearing flange (38) in place on the inlet tube (44) and secure with a circlip (39).

17. Assemble the following parts: index block (48), index lever (51/52), guide pin (50), index spring (13) and split pin (72).

18. Position the index block (48) so that the large end of the guide pin (50) faces upwards.

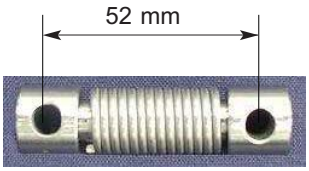
19. Position two ball sets (61) into each of the two tracks. Fit an O-ring (65) into the groove on the nozzle carrier (36). Fit the nozzle carrier (36) into the main block (31). The bearing flange (38) can now be pushed into position and secured with a circlip (39). The bearing housing (28), complete with sleeve (29), can then be secured in place with the bush nut (30).

20. Assemble the following parts: piston (3), piston rod (24), locknut (27), seal (64), O-ring (59) and bearing tape (76).

21. Carefully expand the seal (63) over the piston (3) by hand and fit it into the groove (it will quickly return to its original shape). Insert the whole assembly into the hole in the cylinder (1). Fit the O-ring (26) into the end cap (2), insert into place and secure.

22. Assemble the following parts: insert the circlip (74) into the rod end (49). Place the end sleeve (70) in position, then the rod end plug (35) and the end sleeve (70); screw the connecting rod (40) in position.

23. Screw the spring ends (20) into the springs (21) and adjust to give a dimension of 52 mm (see illustration).



24. Assemble the following parts into position on the pillar (3004): straight pin (18), sleeve (19), four spring ends (20), two washers (42), two split pins (43), bearing bush (66), roller (17) and two springs (21).

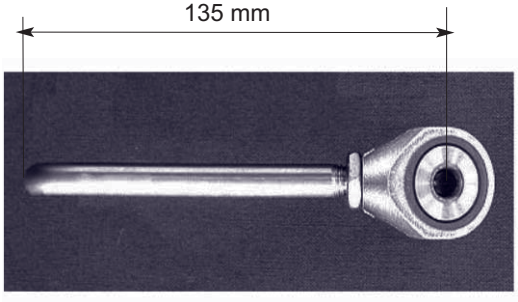
25. Expand the split pins (43) to secure the assembly.

26. Assemble the crosshead (25) with the following parts: plug (33), conrod (34), guide plug (23), set screw (41).

27. Slide the assembly into place over the spindle (11), but not at this stage over the piston rod (24). Fit the bearing flange (38) into place.

28. Slide the crosshead (25) onto the piston rod (24) and secure. Secure the set screw (41) using a hex key (a/f 3/16"). Fit the second straight pin (18) with two washers (42). Secure with two split pins (43).

29. Screw the locknut (27) onto the conrod (34). Screw the rod end (49) onto the conrod (34) and adjust to give a dimension of 135 mm (see illustration).



30. Fit O-rings (12) onto the ends of the long water tube (6) and the short water tube (7).

31. Apply Loctite to the threads of the two control screws (67) and screw into place. Position filter (56) and filter sealing ring (57). Slide the valve block (9) into place and secure.

! When rotating the nozzles forwards and backwards, the valve spindle (10) should click over with a sharp, snappy action. If this action is sluggish check that the pillar (4) is square. If it is not, undo the screw (54) and turn the pillar (4) either way fractionally so that the ends of the bearing flange (38) sit evenly on the valve spindle (10) without sideways bias.

✓ Done

Technical Data

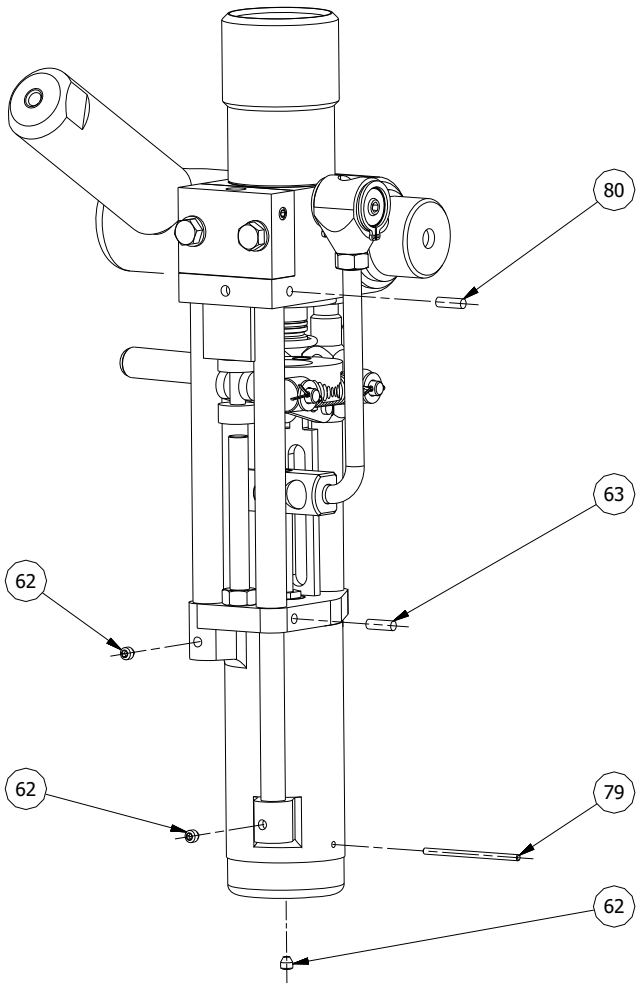
Technical data – Fury 602

Designation	Description
Standard materials	Stainless steel AISI 316/316L, C. PEEK, P.PTFE C.PTFE, Nitrile O-rings (Viton also available)
Standard connection	Female thread, 1.5" BSP/NPT
Operating temperature	max. 120 °C (248 °F)
Ambient temperature	max. 140 °C (284 °F), max. 30 min
Operating pressure range	5...10 bar (72.5...145 psi)
Tank opening	min. Ø 200 mm (7.8 inch)
Nozzle characteristics	360° wash pattern, 2 nozzles
Weight	10 kg (22 lb)
Nozzle sizes	8 mm and 10 mm Other sizes on request

Spare Parts Lists

Index Cleaner Fury 602

Fury 602 unit



Spare parts drawing - Fury 602 unit

Fury 602 unit

Item no.	Designation / material	Quantity	Part no.
62	1/4"BSFx1/4" set screw	3	4660-8219-010
63	Grooved pin	1	4660-4411-010
79	Cylinder cap pin	1	4660-4435-010
80	Main block pin	1	4660-4480-010

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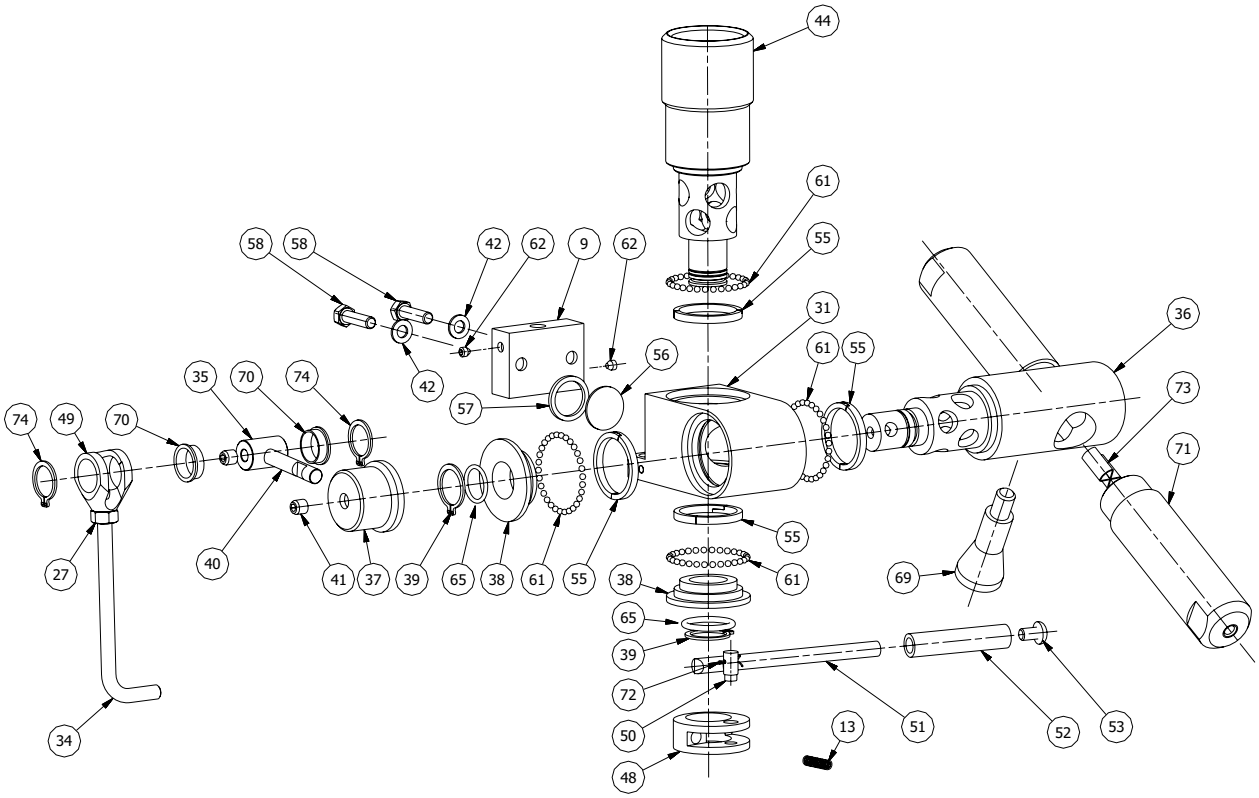
Main block, nozzle, inlet and indexing unit



Spare parts drawing - main block, nozzle, inlet and indexing unit

Main block, nozzle, inlet and indexing unit

Item no.	Designation / material	Quantity	Part no.
9	Valve block	1	4660-4442-010
13	Index spring	1	4660-4422-010
27	Locknut	1	4660-4439-010
31	Main block	1	4660-4357-010
34	Conrod	1	4660-4434-010
35	Rod end plug	1	4660-4426-010
36	Nozzle carrier	1	4660-4336-010
37	Cap	1	4660-4327-010
38	Bearing flange	2	4660-4475-010
	Connecting pin	2	4660-4337-010
39	Circlip NA3110-125	2	4660-4471-010
40	Connecting rod	1	4660-4416-010
41	Set screw BSF 3/8"	1	4660-4429-010
42	O-ring 011	2	4660-8210-000

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Spare Parts List

Index Cleaner Fury 602

Main block, nozzle, inlet and indexing unit (Cont.)

Item no.	Designation / material	Quantity	Part no.
44	Inlet Fu6 1.5"BSP	1	4660-4230-110
	Inlet Fu6 1.5"NPT	1	4660-4230-210
	Inlet Fu6 1.5"NPS	1	4660-4240-210
48	Index block	1	4660-4385-610
49	Rod end	1	4660-4485-010
50	Guide pin	1	4660-4451-010
51	Index lever	1	4660-4334-010
52	Index lever sleeve	1	4660-4344-010
53	Button head screw M5x10	1	4660-4287-010
55	Sealing ring C-PTFE	4	4660-4376-010
	O-ring 032	8	4660-4366-010
56	Filter	1	4660-4452-010
57	Filter sealing ring	1	4660-4462-010
58	Sealing screw	2	4660-4465-010
61	Ball set 4mm	1	4660-4461-010
62	Set screw/hex 1/4"BSFx1/4"	2	4660-8219-010
65	O-ring 24	2	4660-8260-000
69	Stop screw	1	4660-4315-010
70	End sleeve C-PTFE	2	4660-4253-010
71	Nozzle 8 mm	2	4660-4713-030
	Nozzle 10 mm	2	4660-4713-020
72	3/32" split pin	1	4660-4412-010
73	Stream straightener	2	4660-4752-010
74	Circlip NA3000-087	2	4660-4436-010

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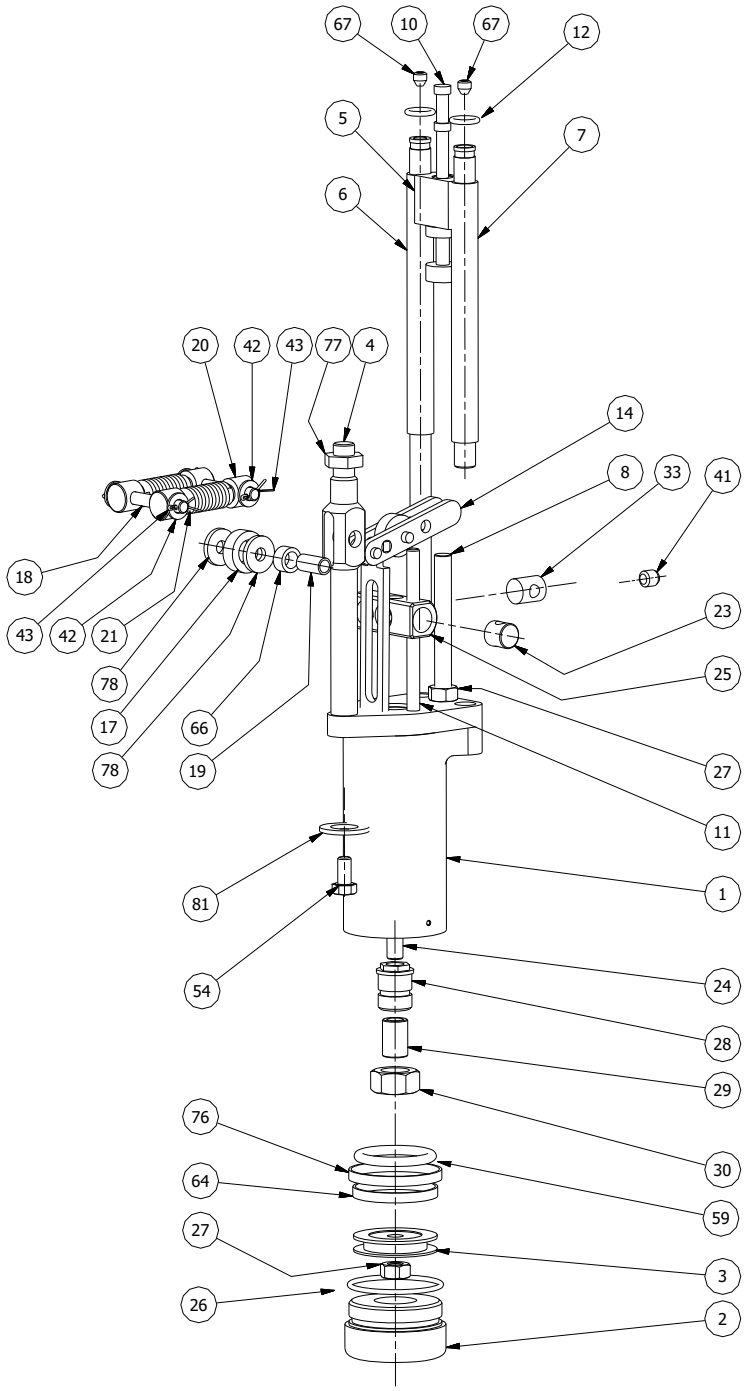
Cylinder, flyover and water tube assembly



Spare parts drawing - cylinder, flyover and water tube assembly

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Spare Parts List

Index Cleaner Fury 602

Cylinder, flyover and water tube assembly

Item no.	Designation / material	Quantity	Part no.
1	Cylinder	1	4660-4377-610
2	End cap	1	4660-4386-010
3	Piston	1	4660-4425-010
4	Pillar	1	4660-4440-610
5	Slider C-PTFE	1	4660-4460-010
6	Water tube, long	1	4660-4410-010
7	Water tube, short	1	4660-4420-010
8	Limit stop	1	4660-4430-010
10	Valve spindle	1	4660-4326-010
11	Spindle	1	4660-4470-010
12	O-ring 806	2	4660-4441-010
14	Flyover	1	4660-4423-610
17	Roller	1	4660-4273-010
18	Straight pin	2	4660-4482-010
19	Sleeve	1	4660-4433-010
20	Spring end	4	4660-4413-010
21	Flyover spring	2	4660-4473-010
23	Guide plug C-PTFE	1	4660-4474-010
24	Piston rod	1	4660-4484-010
25	Crosshead	1	4660-4464-610
26	O-ring 032	1	4660-4366-010
27	Locknut 3/8"BSF	2	4660-4439-010
28	Bearing housing	1	4660-4365-010
29	Sleeve C-PTFE	1	4660-4345-010
30	Bush nut	1	4660-4355-010
33	Plug	1	4660-4444-010
41	Set screw BSF 3/8"	1	4660-4429-010
42	1/4" washer	4	4660-4443-010
43	1/16" split pin	4	4660-8350-010
54	Hex screw 3/8"BSF	1	4660-4419-010
59	O-ring 325	1	4660-4455-010
64	Piston seal C-PTFE	1	4660-4445-010
66	Bearing bush C-PEEK	1	4660-4263-010
67	3/8"BSF control screw 1.6mm	2	4660-4472-010
76	Bearing tape C-PTFE	1	4660-4415-010

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Cylinder, flyover and water tube assembly (Cont.)

Item no.	Designation / material	Quantity	Part no.
77	Nut	1	4660-4367-010
78	Disk C-PTFE	2	4660-4463-010
81	3/8" washer	1	4660-4431-010

Tools

Table of required tools

Tools
Adjustable spanner
Bevel gear tool (10035)
Flat-bladed screwdriver
Pliers
Pin punch (Ø 3/16")
Scriber with hooked end (10036)
Strap wrench (10037)
Bush insertion tool (10041)
Hex key (a/f 1/8")
Hex key (a/f 3/16")
Spanner (a/f 14.0 mm)
Spanner (a/f 15.0 mm)
Spanner (a/f 16.0 mm)

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