

Water-jet pump

Operating manual

Series SP 820



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Subject to technical modifications.
Read carefully before use.
Save for future use.



Table of contents

1	About this document	3
1.1	Target groups	3
1.2	Other applicable documents	3
1.3	Warnings and symbols	3
2	Safety instructions	4
2.1	Intended use	4
2.2	General safety instructions	4
2.2.1	Obligations of the operating company	4
2.2.2	Obligations of personnel	4
2.3	Hazardous media	4
3	Layout and Function	5
3.1	Marking	5
3.1.1	Name plate	5
3.2	Description	5
3.2.1	Features	5
3.2.2	Function	5
3.3	Assembly	5
4	Transport, Storage and Disposal	6
4.1	Unpacking and inspection on delivery	6
4.2	Transportation	6
4.3	Storage	6
4.4	Disposal	6
5	Installation and connection	7
5.1	Preparations for installation	7
5.2	Planning pipelines	7
5.3	Design the layout of the fitting	7
5.4	Install the fitting	7
5.4.1	Connection with flange	7
5.4.2	Connection with sockets, nozzles or female threads	8
5.5	Performing the hydrostatic test	8
6	Operation	8
6.1	Commissioning	8
7	Maintenance	9
7.1	Servicing	9
7.2	Maintenance	9
7.2.1	Removing fitting	9
7.2.2	Disassemble and reassemble the nozzle	9
7.3	Replacement parts and return	9
8	Troubleshooting	10
9	Appendix	11
9.1	Technical specifications	11
9.2	Replacement parts	11
9.3	Flange installation	11

List of figures

Fig. 1	Name plate (example)	5
Fig. 2	Function	5
Fig. 3	Assembly	5
Fig. 4	Attach lifting gear (example)	6
Fig. 5	Tightening torques	11

List of tables

Tab. 1	Other application documents, purpose and where found	3
Tab. 2	Warnings and symbols	3
Tab. 3	Troubleshooting	10
Tab. 4	Tightening torques	11

1 About this document

This manual

- is part of the fitting
- applies to all series referred to
- it describes safe and proper operation during all operating phases

1.1 Target groups




Operating company

- Responsibilities:
 - Keep this manual available at the place of operation, also for future use.
 - Ensure that employees read and observe this manual and other applicable documents, especially the safety instructions and warnings.
 - Observe any additional country-specific rules and regulations that relate to the system.

Qualified personnel, fitter








- Mechanics qualification:
 - Qualified employees with additional training for fitting the respective pipework
- Electrical qualification:
 - Qualified electrician
- Responsibility:
 - Read, observe and follow this manual and the other applicable documents, especially all safety instructions and warnings.

1.2 Other applicable documents

<p>Resistance lists Resistance of materials used to chemicals</p> <p>www.stuebbe.com/pdf/300051.pdf</p>	
<p>Data sheet Technical specifications, conditions of operation</p> <p>www.stuebbe.com/pdf/302541.pdf</p>	
<p>CE declaration of conformity Conformity with standards</p> <p>www.stuebbe.com/pdf/300168.pdf</p>	


Tab. 1 Other application documents, purpose and where found

1.3 Warnings and symbols

Symbol	Meaning
	<ul style="list-style-type: none"> • Immediate acute risk • Death, serious bodily harm
	<ul style="list-style-type: none"> • Potentially acute risk • Death, serious bodily harm
	<ul style="list-style-type: none"> • Potentially hazardous situation • Minor injury
	<ul style="list-style-type: none"> • Potentially hazardous situation • Material damage
	<p>Safety warning sign</p> <ul style="list-style-type: none"> ▶ Take note of all information highlighted by the safety warning sign and follow the instructions to avoid injury or death.
	Instruction
1., 2., ...	Multiple-step instructions
✓	Precondition
→	Cross reference
	Information, notes

Tab. 2 Warnings and symbols


2 Safety instructions

 The manufacturer accepts no liability for damages caused by disregarding any of the documentation.

2.1 Intended use

- The fitting is intended for the following applications:
 - Mixing, dosing and conveying liquid and solids-free media
 - Evacuating air from pipes and immersion tanks
 - Pumping out immersion tanks and pits
- Only use the fitting with suitable media (→ Resistance lists).
- Adhere to the operational limits (→ Data sheet).

2.2 General safety instructions

 Read and observe the following regulations before carrying out any work.

2.2.1 Obligations of the operating company

Safety-conscious working

- Only operate the fitting if it is in perfect technical condition and only use it as intended, remaining aware of safety and risks, and adhering to the instructions in this manual.
- Ensure that the following safety aspects are observed and monitored:
 - Intended use
 - Statutory or other safety and accident-prevention regulations
 - Safety regulations governing the handling of hazardous substances
 - Applicable standards and guidelines in the country where the pump is operated
 - Applicable guidelines of the operator
- Make personal protective equipment available.

Qualified personnel

- Ensure all personnel tasked with work on the fitting have read and understood this manual and all other applicable documents, especially the safety, maintenance and repair information, before they start any work.
- Organize responsibilities, areas of competence and the supervision of personnel.
- The following work should be carried out by specialist technicians only:
 - Installation, repair and maintenance work
 - Work on the electrical system
- Make sure that personnel to be trained only work on the fitting under the supervision of specialist technicians.

2.2.2 Obligations of personnel

- Observe the instructions on the fitting and keep them legible, e.g. name plate and identification marking for fluid connections.
- Only carry out work on the fitting if the following requirements are met:
 - System is empty
 - System has been flushed
 - System is depressurized
 - System has cooled down
 - System is secured against being switched back on again
- Do not modify the fitting in any way.

2.3 Hazardous media

- When handling hazardous media (e.g. hot, flammable, explosive, toxic, hazardous to health or the environment), observe the safety regulations for the handling of hazardous substances.
- Use personal protective equipment when carrying out any work on the fitting.
- Collect leaking pumped liquid and residues in a safe manner and dispose of them in accordance with environmental regulations.

3 Layout and Function

3.1 Marking

3.1.1 Name plate

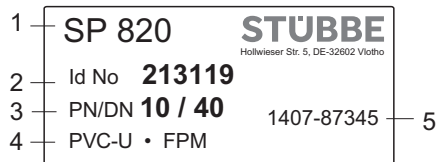


Fig. 1 Name plate (example)

- 1 Type
- 2 ID number
- 3 Nominal pressure [bar] / Nominal diameter [mm]
- 4 Materials (body, seals)
- 5 Date of manufacture - Series number

3.2 Description

3.2.1 Features

- The fitting is intended for the following applications:
 - Mixing, dosing and conveying liquid and solids-free media
 - Evacuating air from pipes and immersion tanks
 - Pumping out immersion tanks and pits
- The direction of flow and the installation position must match the directional arrow on the fitting
- The flow rate is adjustable by means of the pressure of the propellant and the bore in the nozzle
- Connection variants available
 - The screw connections are to DIN 8063 and the inserts are to DIN/ISO
 - The flange is to DIN EN 1092 (DIN 2501)

3.2.2 Function

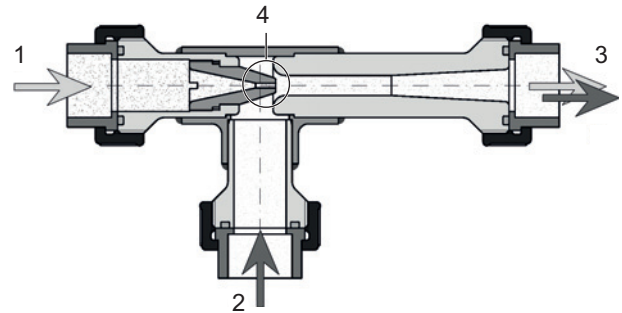


Fig. 2 Function

The propellant medium (1) flows in the main direction of flow through the nozzle installed in the water-jet pump. The cross-sectional constriction caused by the nozzle bore (4) results in an acceleration of the propellant medium, thus creating a vacuum in the area of the suction port (2), which sucks in any pumped media (liquid or gaseous) present. The media leave the water-jet pump together at discharge nozzle (3).

The suction quantity depends on the pressure of the propellant medium and the size of the nozzle bore.

3.3 Assembly

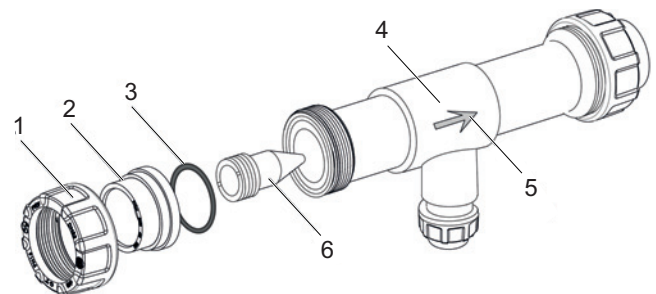


Fig. 3 Assembly

- 1 Union nut
 - 2 Insert
 - 3 O-ring*
 - 4 Housing
 - 5 Direction of flow
 - 6 Nozzle*
- * Replacement parts

4 Transport, Storage and Disposal

4.1 Unpacking and inspection on delivery

1. Unpack the fitting when received and inspect it for transportation damage.
2. Report any transportation damage to the manufacturer immediately.
3. Ensure that the information on the name plate agrees with the order/design data.
4. For immediate installation, damage packaging material according to local regulations.
 - For later installation, leave the fitting in the original packaging.

4.2 Transportation

⚠ DANGER

Death or limbs crushed as a result transported items falling over or tilting.

- ▶ Do not stand under suspended loads.
- ▶ Use lifting gear appropriate for the total weight to be transported. Weight specification (→ data sheet).
- ▶ Attach lifting gear in accordance with the following diagram.

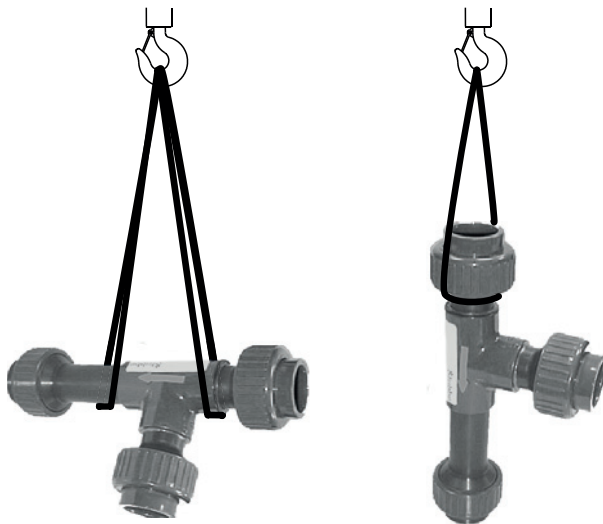


Fig. 4 Attach lifting gear (example)

- ▶ Lift the fitting with properly installed lifting gear and position it at the place of installation.

4.3 Storage

NOTE

Material damage due to inappropriate storage!

- ▶ Store the fitting properly.

1. Make sure the storage room meets the following conditions:
 - Dry
 - Frost-free
 - Vibration-free
 - Not in direct sunlight
 - Storage temperature +10 °C to +60 °C
2. As far as possible, store the valve in its original packaging.

4.4 Disposal

i Plastic parts can be contaminated by poisonous or radioactive media to such an extent that cleaning will not be sufficient.

⚠ WARNING

Risk of poisoning and environmental damage from medium!


- ▶ Use personal protective equipment when carrying out any work on the fitting.
 - ▶ Before disposing of the fitting:
 - Collect escaping medium and dispose separately according to local regulations.
 - Neutralize residues of medium in the fitting.
 - ▶ Remove plastic parts and damage them in accordance with local regulations.
-
- ▶ Dispose of the fitting in accordance with local regulations.

5 Installation and connection

5.1 Preparations for installation

1. Ensure the design of the fitting is consistent with the purpose intended:
 - Materials used (→ Type plate).
 - Medium (→ Order and design data).
2. Ensure the required operating conditions are met:
 - Resistance of body and seal material to the medium (→ resistance lists).
 - Media temperature (→ Data sheet).
 - Operating pressure (→ Data sheet).
3. Consult with the manufacturer regarding any other use of the device.

5.2 Planning pipelines

 When mixing or dosing, suitable throttle valves, flow meters or diaphragm seals in the pipeline are recommended.

WARNING


Risk of poisoning and environmental damage from medium!

Leaks due to impermissible pipework forces.

- ▶ Ensure that the fitting is not subject to any pulling or thrusting forces or bending moments.

1. Plan pipes safely:
 - No tensile or compressive forces
 - No bending moments
 - Adjust for changes in length due to temperature changes (compensators, expansion shanks)
 - Direction of flow according to the direction of the arrow on the fitting
 - Calming section min. 5 x DN before and after the valve
2. Dimensions (→ Data sheet).

5.3 Design the layout of the fitting

 For reference when designing the layout of the valve for the specific application, guide values/characteristic curves are described in the data sheet (→ Data sheet). The characteristic curves represent the relationships for propellant medium and suction medium water at a suction height of 100 cm.

With other media (density/viscosity) the ratio may change. STÜBBE recommends adapting the nozzle bore to the desired operating point.

If no nozzle bore diameter is specified when ordering, a 1 mm bore will be delivered.

1. Check the characteristic curves and determine the required diameter for the nozzle bore (→ data sheet).
2. Remove the nozzle (→ [7.2.2 Disassemble and reassemble the nozzle, Page 9](#)).
3. Drill a hole in the nozzle tip with the required diameter.
4. Fit the nozzle.

5.4 Install the fitting

WARNING

Risk of poisoning and environmental damage from medium!


Leak due to faulty installation.

- ▶ Installation work on the pipes should only be performed by technicians who have been specially trained for the pipework in question.

NOTE

Material damage due to contamination of the fitting!

- ▶ Make sure no contamination reaches the fitting.
- ▶ Flush the pipe with a neutral medium.

 The fitting is installed according to the connection type of the pipes.


5.4.1 Connection with flange

1. Prepare pipe ends according to connection type.
2. Radially position the fitting and flat seal between the flange ends.
3. Screw fitting (flange screws, nuts and washers).
 - Observe tightening torques (→ [9.3 Flange installation, Page 11](#)).

5.4.2 Connection with sockets, nozzles or female threads

1. Prepare pipe ends according to connection type.
2. Loosen the union nuts on the inserts and push same over the pipeline end.
3. Connect inserts with pipe ends.
4. Radially push the valve between the pipeline ends and tighten by hand using the union nuts.

5.5 Performing the hydrostatic test

 Pressure test using neutral medium, e.g. water.

1. Pressurize the fitting, ensuring:
 - Test pressure < permissible system pressure
 - Test pressure < 1.5 PN
 - Test pressure < PN + 5 bar
2. Check the fitting for leaks.

6 Operation

6.1 Commissioning

- ✓ Fitting correctly installed and connected

WARNING

Risk of injury and poisoning due to medium spraying out!

- ▶ Use personal protective equipment when carrying out any work on the fitting.

1. Open the supply for the propellant medium and the pumped medium.
2. Check the desired suction quantity of the pumped medium. If necessary, rearrange layout of the fitting ([→ 5.3 Design the layout of the fitting, Page 7](#)).
3. After the initial stresses due to pressure and operating temperature, check if the fitting is sealed.

7 Maintenance

7.1 Servicing

⚠ WARNING

Risk of injury and poisoning due to hazardous media liquids!

- ▶ Use personal protective equipment when carrying out any work on the fitting.

1. Visual and function check (every three months):
 - Normal operating conditions unchanged
 - No leaks
 - No unusual operating noises or vibrations
2. Ensure that the fitting is functioning properly.
3. Clean the fitting with a moist cloth if necessary.

7.2 Maintenance

⚠ WARNING


Risk of injury and poisoning due to hazardous or hot media!

- ▶ Use personal protective equipment when carrying out any work on the fitting.
- ▶ Safely collect the media and dispose of it in accordance with environmental regulations.

7.2.1 Removing fitting

1. Ensure that:
 - System is empty
 - System has been flushed
 - System is depressurized
 - System has cooled down
 - System is secured against being switched back on again
2. Depending on the variant, loosen the union nuts or the flange connection.
3. Remove fitting from the pipe.
4. Decontaminate fitting if required.
 - Dead space in the fitting may still contain medium.

7.2.2 Disassemble and reassemble the nozzle

 Refer to the drawing (→ 3.3 Assembly, Page 5).

- ✓ Fitting disassembled
1. Using a suitable tool, unscrew the nozzle counterclockwise from the housing.
 2. Depending on the activity, proceed as follows:

Action	Action
Check the status	▶ Check the nozzle for damage and replace it if necessary (→ 7.3 Replacement parts and return, Page 9).
Clean the nozzle	▶ If the nozzle is dirty, clean it so that the nozzle bore is clear.
Check the nozzle bore and adjust it	▶ Determine the layout of the fitting (→ 5.3 Design the layout of the fitting, Page 7).

3. Screw the nozzle clockwise into the housing.
4. Check the O-ring and clean or replace it depending on its condition.
5. Install fitting (→ 5.4 Install the fitting, Page 7).

7.3 Replacement parts and return

1. Have the following information ready to hand when ordering spare parts (→ Type plate).
 - Fitting type
 - ID number
 - Nominal pressure and diameter
 - Body and seal material
2. Please complete and enclose the document of compliance for returns (→ www.stuebbe.com/en/service/download).



3. Use only spare parts from STÜBBE.

8 Troubleshooting

⚠ WARNING

Risk of injury and poisoning due to hazardous or hot media!

- ▶ Use personal protective equipment when carrying out any work on the fitting.
- ▶ Safely collect the media and dispose of it in accordance with environmental regulations.


Consult with the manufacturer regarding faults which are not identified in the following table, or which cannot be traced to the indicated causes.

Error	Possible cause	Corrective action
Fitting not creating suction	Nozzle not drilled	▶ Remove the nozzle and drill it out according to the design layout (→ 5.3 Design the layout of the fitting, Page 7).
	Nozzle clogged	▶ Disassemble and clean the nozzle (→ 7.2.2 Disassemble and reassemble the nozzle, Page 9).
	Fitting incorrectly installed	▶ Install the fitting in accordance with direction of flow indicated by the arrow.
Intake quantity too low	Nozzle bore too small	▶ Check the design of the nozzle bore according to the available parameters (e.g. pressure and quantity of the propellant medium, suction height, back pressure of the system). If necessary, select a larger nozzle bore (→ 5.3 Design the layout of the fitting, Page 7).
Suction quantity too great	Nozzle bore too large	▶ Check the design of the nozzle bore according to the available parameters (e.g. pressure and quantity of the propellant medium, suction height, back pressure of the system). If necessary, select a smaller nozzle bore (→ 5.3 Design the layout of the fitting, Page 7).
		▶ For better metering, install a suitable fitting (such as a diaphragm valve or metering ball valve) in the suction line.


Tab. 3 Troubleshooting

9 Appendix

9.1 Technical specifications

 Technical data (→ Data sheet).

9.2 Replacement parts

 Replacement parts (→ 3.3 Assembly, Page 5).

9.3 Flange installation

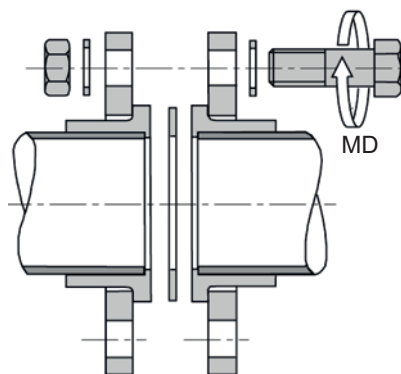


Fig. 5 Tightening torques

d [mm]	ND [mm]	Tightening ^{*1)} MD [Nm] for the variants		
		Flat sealing ring max. 10 bar	Profile seal max. 16 bar	O-ring max. 16 bar
20	15	10	10	10
25	20	12	12	12
32	25	15	12	12
40	32	20	15	15
50	40	25	15	15
63	50	30	20	20
75	65	35	20	20
90	80	35	20	20

Tab. 4 Tightening torques

1) Use a torque wrench