# Pendulum nozzle



## *45.125B/C*

**Operating instructions**
**English**
**October 26| Version 1.3**

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| 1.3 | Locknut mentioned, dimensions adjusted, spare parts updated | October 26 | aro |
| | | | |

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# Preface

**Dear customer**
Thank you for the trust you have placed in us by the choice of our product.
We would be more than pleased to receive any improvement suggestions and any constructive suggestions. We consider your cooperation as contribution to the optimum execution of our product and the corresponding documentation.

If you have any questions or suggestions, please contact our customer services directly:

***enz® technik ag***
*Tel. +41 41 676 77 66*
*info@enz.com*

**Feedback form**
www.enz.com/en/header/feedback

Person responsible for the documentation:
Bryan Bieri (Tech. Support / Head of QM)

Changes and further developments due to technical progress as well as print errors are reserved.

# Purpose of the document

These operating instructions serve to use our product in a comprehensive sense according to its intended use, correctly, effectively and safely. The users are informed about the risks, reasonably foreseeable misuse and residual risks.



**Important!**
Before using the product for the first time, read these original operating instructions, handle accordingly and keep them in a safe for future reference.

Carefully read through the operating instructions before working with the cleaning tool. Make sure that this has been understood by all persons working with the product.

The operating instructions should be made available to the operating personnel at all times. It must be stored at an easily accessible location.
If the operating instructions are lost or destroyed, a copy can be requested from your local dealer, or downloaded directly from the product page of ***enz® technik ag***. Use the QR code on the cover sheet for this purpose.

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# 1 Safety

## 1.1 Consequences when disregarding the safety instructions

Disregarding the safety instructions may lead to accidents with serious personal injury, property or environmental damage.
The manufacturer is not liable for damage that results from disregarding the safety instructions.

## 1.2 Target group

These operating instructions are intended for all persons that are involved in assembly, commissioning and operation of this pipe cleaning tool.

## 1.3 Requirements on the user

All persons that are involved in the assembly, commissioning
and operation of this tool must ...

- be familiar with channel cleaning work and have the required professional knowledge;
- be trained and instructed accordingly for the use of the product;
- have read and understood the operating instructions, in particular the chapter "**1 Safety**".

If the personnel do not have the necessary knowledge, this must be trained and instructed. If necessary, this can be carried out by the manufacturer of the pipe cleaning tool.

Only the maintenance and repair activities described in these operating instructions may be carried out by users who fulfil the requirements specified. All other maintenance and repair work may only be carried out by qualified personnel of the manufacturer.



Observe the instructions in the chapter "**7 Maintenance**"!

## 1.4 Meaning of the general safety instructions

The general safety instructions in this chapter inform you about potential residual risks which, despite correct use of the product, may be permanently present or occur unexpectedly.
To avoid personal injury, property or environmental damage, it is essential that all persons working with the product observe the safety instructions. For these persons, it is therefore mandatory that this chapter is read and understood.

## 1.5 Types of instructions in these operating instructions

| | |
|---|---|
|  | **DANGER!**<br>Designates dangers which, if disregarded, will result in **death** or severe injuries! |
|  | **WARNING!**<br>Designates dangers which, if disregarded, may result in **death**, severe injuries and / or invalidity! |
|  | **CAUTION!**<br>Designates dangers which, if disregarded, may result in injuries and significant property, financial or environmental damage! |
|  | Information for the technically correct and efficient use of the product. |


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## 1.6 Intended use

Due to the high pressures and temperatures, there is a risk of property damage as well as a risk of injury for the user and other persons. For the correct and intended use of the product, the following points must be observed:

- The pipe cleaning tool may be used exclusively in pipes or pipe-like channels. In doing so, the profile to be cleaned must be closed and surrounded by material.
- The product is suitable for operation in cast steel, concrete, stoneware and plastic pipes.
- Consult the manufacturer for use in pipes made of other materials.
- The product may only be operated with correct hose connections free of faults.
- During operation including setup - and clearing work, the cleaning area (shaft, feed, etc.) must be sufficiently secured.
- During operation, **no** persons may remain in the pipes or at the ends of the pipes.
- The max. pressure specified on the nozzle may **not** be exceeded.
- The dirty water may **not** be directed into streams or rivers.
- Before putting into operation each time, the correct state of the product must be checked.
- Defects must be rectified before putting into operation.
- Only proper tools may be used (e.g. use only matching open-end spanners for nuts).
- Secure high-pressure hoses in such a way that these cannot be damaged during operation.
- Only accessory parts provided and approved by ***enz® technik ag*** may be used.

## 1.7 Safety instructions for modifications

It is forbidden to carry out any conversions or modifications to the pipe cleaning tool. Only parts authorised by the manufacturer may be used. The manufacturer is not liable for damage that results in conjunction with conversions to the product made at your own authority.

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## 1.8 Protective equipment when working in shafts, pits and channels

The employer provides suitable protective equipment. They must ensure that their employees wear these during work.
The protective equipment prescribed by the SUVA (Switzerland) are described in the following.

See the leaflet for this purpose:
**Safe access and working in shafts, pits and channels**

**Order number: 44062.d**

Suva
Schweizerische Unfallversicherungsanstalt
Occupational safety
Postfach, 6002 Luzern, Switzerland
Information:
Tel. 041 419 51 11
Orders:
www.suva.ch/waswo
Fax 041 419 59 17
Tel. 041 419 58 51



**Isolation devices**

Isolation devices for self-rescue (self-contained open-circuit compressed air breathing apparatus and regenerative devices) for remaining in channels and for first supply of persons injured.



**Rescue harness**

Rescue harness or safety clothing with sewn-in neck eyelet. During the rescue operation, the rescue rope is attached to the neck eyelet. Lifting the injured person is carried out, e.g. By means of a rescue lifting device with automatic load backstop.



**Suitable work clothing**

Closed work clothing protects against contamination of skin and possible infections. Visually noticeable work clothing should make the employees more visible for road users.



**Suitable shoes**

The safety shoes should, in particular, offer good support as well as be anti-slip and leak proof (e.g. Rubber boots).


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**Gloves**

Suitable gloves protect against hand injuries and contact against substances hazardous to health and contaminated water.



**Hard hat**

The hat protects the persons head against falling objects as well as against knocking against fixed components and objects.



**Ear protection**

For noise which can damage hearing, e.g. ear protector capsules with integrated headset can be worn.



**Eye protection**

If there is a danger from splitters, splashing of hazardous substances, etc. eyes must be protected.



**Network-independent lighting**

For example, a splash-proof torch or a lamp fixed to a hard hat must be carried.

## 1.9 General safety instructions



**Danger! | High-pressure water jets**

Defective or incorrect operation of the product may generate dangers from splash water under pressure. Before operation, ensure the trouble-free state of the product. Powerful water jets may cause severe injuries or even sever limbs. Non-observance of the safety instructions may result in **death** or very serious injuries!



**Danger! | Poisonous vapours**

Poisonous vapours may accumulate in channels. Wear the prescribed protective equipment such as gas masks, gas alarms and rescue harnesses. Inhaling poisonous vapours or air contaminated with particles may result in **death** or very serious injuries from the particles penetrating into the lungs!



**Warning! | Parts falling down**

In the area of open shafts and objects may fall into the shaft and on top of persons working there. When inserting the product, never remain directly under the shaft opening. Secure the shaft access against parts that may fall down. Do not throw any tools or objects into the shaft. Never access shafts that are in danger of collapsing. Persons could be buried. Non-observance of safety instructions may result in **death** or serious injuries!



**Warning! | Chemical burns**

Channels may contain unknown, corrosive or other harmful substances. Wear the respective protective clothing. Use the prescribed protective equipment. Chemical burns to skin and eyes as well as infections with pathogens may be the consequence.



**Warning! | Risk of falling**

In the area where work is carried out using the product, open shafts are to be expected. Open shafts must be indicated. Take care where you step. Persons falling may result in **death** or serious injuries!



**Warning! | Hand injuries**

With a modification of the product, there is a risk of hand injuries from entrapment or abrasion. Wear gloves when working. Pay attention to where you hold the product. Carry heavy devices with the assistance of a second person. If disregarded, this may result in crushing, abrasion up to the severing of limbs.



**Caution! | Tipped objects**

With a modification of the product, there is a risk of hand injuries from sharp edges. Wear gloves when working. Pay attention to where you hold the product. If disregarded, this result in cut injuries to hands or other body parts.



**Caution! | Risk of falling**

In the area where work is carried out with the product, lines and objects are to be expected on the ground. Take care where you step. Keep the operating area clean and tidy. Falling caused by tripping may result in injury.


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# 2 Rights

## 2.1 Copyright

This manual may not be partially or completely copied, photocopied, reproduced, translated or converted in an electronically of machine-readable form without the prior written consent of **enz® technik ag**.

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## 2.2 Disclaimer

The manufacturer is not liable for damage that:

- has resulted in conjunction with modifications to the product carried out at your own authority.
- have resulted from disregarding the safety instructions.

## 2.3 Guarantee conditions

In line with our terms of sales and delivery, we issue a guarantee. However, the guarantee is omitted:

- When used under conditions stipulated otherwise by us.
- When using replacement or accessory parts that are not original from **enz® technik ag**.
- In event of damage caused by:
  - Incorrect handling
  - Non-observance of the operating instructions
  - Unsuitable operating material
  - Routing of the hose or pipelines incorrectly or inappropriately
  - Changes, modifications or conversions to the product at your own authority

# 3 Environment

## 3.1 Disposal

Old devices have valuable recyclable materials that should be recycled. Therefore, please dispose of old devices via enz® technik ag or suitable collecting points.

## 3.2 Environmental protection

Please observe that surfaces can only be cleaned where the composition is known. Chemicals or other poisonous substances must never be released to the environment. Take care to avoid excessive use or water. In this way, you help to protect natural resources.


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# 4 Technical data

## 4.1 Introduction

The enz® pendulum nozzle is designed for the targeted cleaning of oval profiles. Thanks to the ingenious weight distribution and a connecting thread that is not positioned in the middle, the nozzle always oscillates outwards and thus remains constantly in the same position. The power of the water is diverted downwards thus enabling an optimum cleaning on the ground without losing water. A very good ground adhesion is guaranteed by the high weight of the pendulum nozzle. With the water jet on the front head, the enz® pendulum nozzle can loosen dirt and remove even larger deposits without much effort.

## 4.2 Area of application

- Removal of loose debris, gravel, seal skins and soft deposits
- Cleaning of the bottom in large channels, including oval profiles
- Cleaning of loose deposits on the ground
- Pipe diameter: 400 - 1200 mm (16“ - 48“)

## 4.3 Designation of the parts

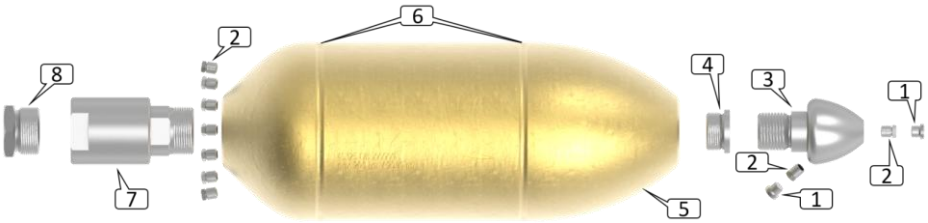


*Figure 1: Designation of the parts*

1: M10x1 screw plug
2: M10 nozzle insert
3: Nozzle head with locknut
4: Screw plug (for operation without head)
5: Nozzle body
6: 2x wear markers
7: Rotary union
8: Reduction 1 ¼“ to 1“

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## 4.4 Pendulum nozzle 45.125B/C



*Figure 2: Pendulum nozzle 45.125B/C*

### 4.4.1 Specifications

| | | | 45.125B | 45.125C |
|---|---|---|---|---|
| Connecting thread | | | BSPP 1″ | BSPP 1 1/4″ |
| Screw inserts | | | 7x M10 | |
| Circumferential inserts | | | 2x M10 | |
| Centre inserts | | | 1x M10 | |
| Mass | | kg | 30 | |
| | | lbs | 66 | |
| Temperature range | | °C | 0 - 60 | |
| | | °F | 32 - 140 | |
| Area of application | | mm | from 400 | |
| | | inch | from 16 | |
| Dimensions | ØxL | mm | 160x591 | 160x581 |
| | | inch | 6.3x23.3 | 6.3x22.9 |
| min. flow rate at 100 bar | | l/min | 150 | |
| | | US gpm | 40 | |
| max work pressure | max | bar | 200 | |
| | | psi | 2,900 | |
| Recycling | | | ok | |

*Table 1: Specifications*

# 5 Installation

## 5.1 Equipping

To match the tool optimally to the flushing vehicle, enz® technik ag needs the following parameters for each order:

| | | |
|---|---|---|
| • Pumping capacity: | l/min | US gpm |
| • Pump pressure: | bar | psi |
| • Hose ø: | mm | inch |
| • Hose length: | m | feet |
| • Hose material: | plastic or rubber | |



If changes are made to the parameters, the tool must be re-calibrated

## 5.2 Assembly of the tools

The tool is supplied ready for operation and matched to your vehicle. After unpacking, check that the delivery is complete. Then the tool can be screwed onto the high-pressure hose.



**CAUTION!**

When installing the high-pressure hose, take care that the connecting thread is clean and intact. This may result in water escaping and to uncontrolled movements of the pressure hose.



When installing the high-pressure hose, make sure that no contamination can enter in the tool. This can result in the inserts clogging.


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## 5.3 Preparation work

Before you start with cleaning, the following points must be known:

- Pipe run
- Internal diameter of the channel to be processed
- Material quality of the channel to be processed
- Type of contamination in the pipe
- Intended flushing direction → We recommend working against the direction of flow
- Any possible inclines of the channel to be processed
- Access possibilities to the channel

## 5.4 Setting up the workplace

Before working with the pendulum nozzle, the following measures must be taken:

⚠ Install any barriers and protective equipment (Triopan warning sign, fencing ropes, etc.).

⚠ Obtain the necessary information about the waste water introduced to the shaft (chemical substances, gases, vapours, etc.)..

⚠ Measuring devices such as explosimeter, oxygen meter, gas alarm, etc. must be ready for use.

⚠ The working area must be cordoned off such that there is no risk of falling and no danger from road traffic.

⚠ Make sure that the suitable nozzles are present for the pipe cleaning. The area of application of each nozzle is apparent in chapter “Technical data”, from page **14.**

⚠ The pipe run must be known before starting work in order to prevent the nozzle from exiting at the end of the line. Possible exit location must be monitored by support staff.

⚠ In doing so, an exclusion of liability signed by the customer helps to safeguard against possible damage.

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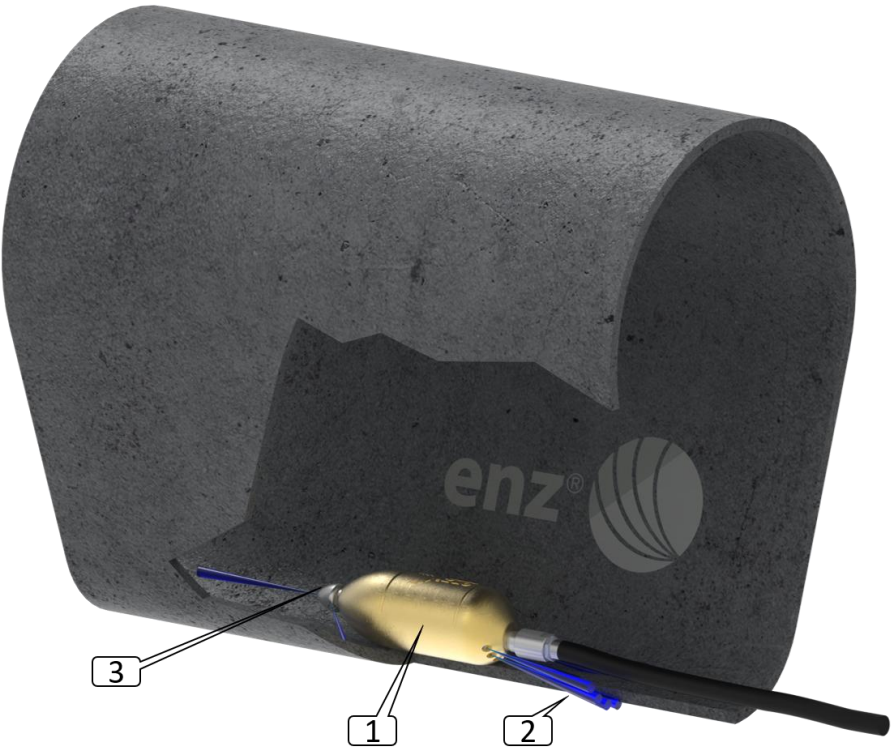
# 6 Operation

## 6.1 Operating principle of the pendulum nozzle

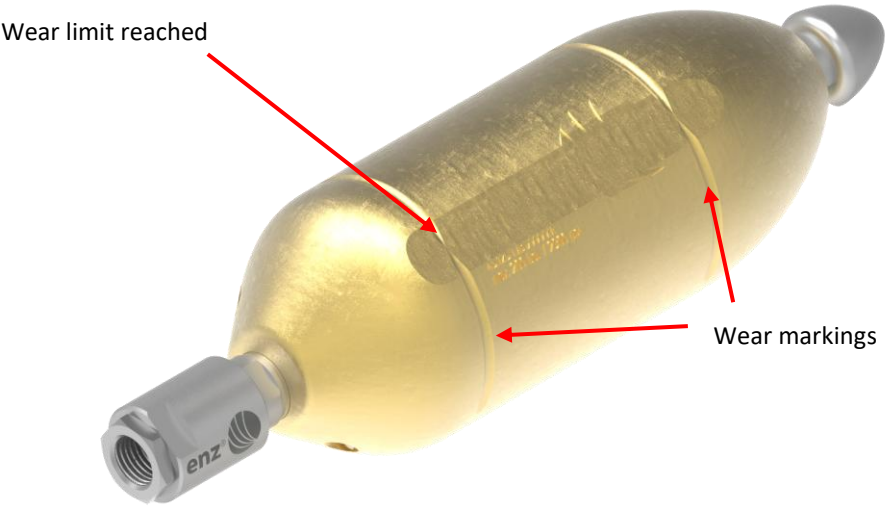
The pendulum nozzle is equipped with a nozzle body (**1**) that has a low centre of gravity. Thanks to this, the pendulum nozzle always oscillates outwards optimally. In this way, the thrust jets (**2**) are always directed against the bottom. The head (**3**) loosens the deposits with its front jet which are then rinsed out of the shaft by the thrust jets (**2**).



## 6.2 Wear markings

The wear markings serve the optical monitoring of the nozzle body.

To enable the nozzle to oscillate outwards, there is a hollow space directly underneath the wear markings. If material removal should occur in the upper half of the nozzle body, this can easily be recognised by the wear markings. If the material removal has reached the lower edge of the groove, the wear limit has been reached and the nozzle body must be replaced.




**CAUTION!**

If the wear limit of the pendulum nozzle has been reached, this must be replaced immediately. The nozzle may rupture if not observed. This may result in injuries due to broken parts flying around.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## 6.3 Operating the pendulum nozzle

1. Ensure that no persons are in the channel.
2. Insert the tool into the pipe to be cleaned.
3. Slowly increase the pressure on the nozzle to 100 bar.
4. Run the tool carefully to the end of the location to be cleaned.
5. Slowly pull the tool back in order to clean the pipe and flush loosened contamination out of the shaft.
6. After completing the cleaning work, close all shaft covers again.



**DANGER!**

In larger pipes, the tool may turn. Use a safety pipe for this reason. This may result in death or very serious injuries.



**WARNING!**

The maximum working pressure of 200 bar (2,900 psi) must never be exceeded. If the nozzle ruptures, walls of the pipe may be broken through and parts thrown away at high speed. If ignored, there is danger of severe injuries (see "Technical data" from page 14.



**WARNING!**

The nozzle body has two wear markings. If the material removal has reached the lower edge of the groove, the wear limit has been reached and the nozzle body must be replaced. If there is insufficient wall thickness, the nozzle may rupture. This may result in injuries due to broken parts flying around.



**WARNING!**

The tool may only be operated in closed pipes surrounded by material. Operating in open air may result in death or severe injuries.



**CAUTION!**

The tool may only be operated by trained persons. This may result in injuries and property damage.



**CAUTION!**

Only undamaged nozzle bodies may be used. This may result in injuries due to broken parts flying around.

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**CAUTION!**

The cleaning tool is equipped with a pressure chamber. After switching off the pressure, the tool is still under pressure for a short time. Wait a moment before taking the tool out of the pipe.



With strongly contaminated pipes, we recommend that the tool is pulled back at regular distances. In this way you avoid blockages that may form behind the pendulum nozzle.

## 6.4 Cleaning slightly damaged pipes

Slightly damaged pipes generally have cracks in the pipe wall. These must be reported to the customer or the respective authority before starting the cleaning work. Take great care when working in slightly damaged pipes. The application always takes place at your own responsibility. enz® technik ag accepts no liability whatsoever.



**CAUTION!**

By washing out the cracks, pipe fragments may break away and the area around the pipe flushed out. In case of doubt, do not use the tool. Collapsing channels may result in injuries!



**CAUTION!**

If the pressure is too high the cleaning jet may damage or break through the pipe wall. This may result in work interruptions and property damage.

## 6.5 After use

After finishing the cleaning work, the following points must be observed:

1. Disassemble the cleaning tool from the high-pressure hose.
2. Rinse the cleaning tool with fresh water.
3. Check the nozzle inserts. These must not be clogged.
4. Dry the cleaning tool and preserve it with Oil Spray Bio (C191).


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# 7 Maintenance

The maintenance and repair activities described in these operating instructions may only be carried out by users who have the necessary knowledge.

## 7.1 Care

Allow the cleaning tool to dry after being used time and then spray it with Oil Spray Bio (C191) to protected it against corrosion.



If not used for a longer period, also spray the nozzle holes and the connecting thread with Spray Bio (C191).

## 7.2 Storage

Store the tool in a dry location protected against corrosion.

## 7.3 Changing the nozzle inserts

To ensure for an optimum cleaning performance, the nozzle inserts must be check at regular intervals. The wear depends on the degree of contamination of the water used.



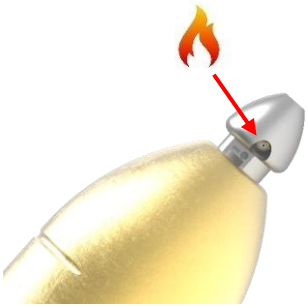
**CAUTION!**

Worn nozzle inserts impair the cleaning performance. These must be replaced. If disregarded, this may result in damage to the cleaning tool.

If the pendulum nozzle is operated on another heavy goods vehicle or with other hoses, the nozzle inserts must be replaced. To be able to determine the matching nozzle inserts, you need the JetCalc calculation program.
Follow the next steps to replace the nozzle inserts:

1. Clean the nozzle insert. During the approx. 10 seconds, heat it with the gas torch (C158).

Heat only locally.

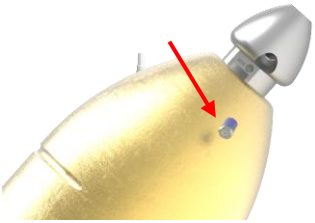


2. Disassemble the nozzle insert using a socket spanner (C131).



3. Clean the threaded hole and the new nozzle insert, e.g. with acetone.

4. Coat the thread of the nozzle insert with Loctite 243 (C192).



5. Screw the nozzle inserts in using the socket spanner (C131) and tighten them hand tight. The adhesive must harden for 24 hours at room temperature (approx. 22°C).

*Figure 3: Changing the nozzle inserts*



**CAUTION!**

Nozzle inserts may only be replaced by identical nozzle inserts or nozzle inserts calculated in JetCalc. If the tool is equipped incorrectly, this may significant damage to the tool and the pipe to be cleaned.



**CAUTION!**

Only spare parts provided by enz® technik ag may be used. This may result in injuries and property damage.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## 7.4 Mounting the head

1. Clean the screw plug. During the approx. 10 seconds, heat this with the gas torch (C158).

Heat only locally.

2. Remove the screw plug using a socket spanner (WAF 17).

3. Clean the threaded hole and the thread on the head, e.g. with acetone. Then coat both threads with Loctite 243 (C192).

4. Tighten the head with an open-ended spanner (WAF41) and secure it with the locknut (0024.1007). Take care that both nozzle inserts point downwards as shown. The adhesive must harden for 24 hours at room temperature (approx. 22°C).



*Figure 4: Mounting the head*


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## 7.5 Disassemble the head

1. Clean the head. Heat at the connecting thread with the gas torch (C158) for approx. 10 seconds.

Heat only locally.

2. Disassemble the head with an open-ended spanner (WAF41).

3. Clean the threaded hole and the thread on the screw plug, e.g. with acetone. Then coat both threads with Loctite 243 (C192).

4. Tighten the screw plug using an Allen key (WAF17) tight to the stop. The adhesive must harden for 24 hours at room temperature (approx. 22°C).



*Figure 5: Disassemble the head*


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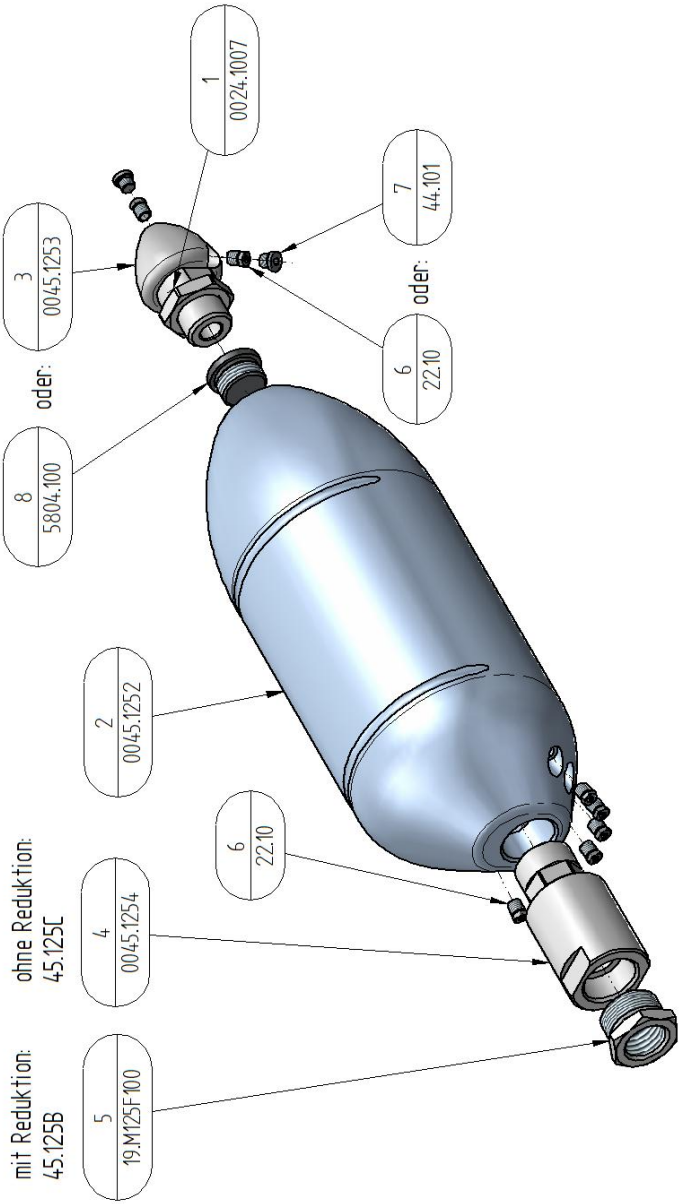
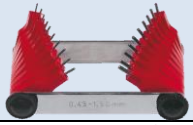
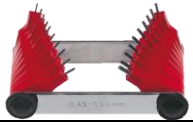
# 8 Spare parts / Accessories

## 8.1 Spare parts




*Drawing 1: Pendulum nozzle 45.125B/C*

## 8.2 Accessories

| | | |
|---|---|---|
|  | Head without nozzle inserts | 0045.1253 |
|  | Screw plug<br>BSPP 1” | 5804.100 |
|  | Screw plug<br>M10x1 | 44.101 |
|  | Nozzle insert M10 | 22.10 |
|  | Swivel joint | 0045.1254 |
|  | Reduction bushing M 1 1/4” F 1” | 19.M125F100 |
|  | Gas burner | C158 |
|  | Oil Spray Bio | C191 |
|  | Loctite 243 50 ml | C192 |
|  | Nozzle gauge with 20 pins<br>0.45-1.50 mm | C200 |
|  | Nozzle gauge with 16 pins<br>1.50-3.00 mm | C201 |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# 9 Directory

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