OPERATING/INSTALLATION INSTRUCTIONS

(Translation)

Container Cleaning Device
Jet Cleaner

TANKO®MX125
TANKO®MX150

TANKO®MX125...EX
TANKO®MX150...EX

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ID no.: 664BAMX0000ENX - 2024/10

NOTE

These instructions are an essential part of the device and must be available to operating and maintenance personnel at all times throughout its entire life cycle. The safety instructions contained therein must be observed.

If the device is resold, the instructions must always be transferred to the new owner.

Translation

The operating instructions must be written in an official European Union language acceptable to the manufacturer of the machinery in which the partly completed machinery will be assembled, or to his authorized representative. If any discrepancies arise in the translated text, the original operating instructions (German) must be consulted for clarification, or the manufacturer must be contacted.

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Abbreviations and Units

Abbreviations

ATEX	**AT**mosphère **EX**plosible; Synonym for the ATEX Directive of the European Union; comprises measures for explosion protection for potentially explosive atmospheres
AF	Width across flats [wrench size]
AG	Assembly group
Approx.	Approximately
ASSY	Assembly
ATO	According to order
AWH	Armaturenwerk Hötensleben GmbH
BetrSichV	Betriebssicherheitsverordnung (German Operational Safety Ordinance); ordinance concerning health and safety when using work equipment; German implementation of Directive 2009/104/EC of the European Parliament concerning the minimum safety and health requirements for the use of work equipment by workers at work
BS	British Standard
BSP	British Standard Pipe; British thread standard for pipe fittings
CIP	Cleaning in Place; a local (automated) cleaning process without dismantling plant parts. Denotes a procedure for cleaning processing plants, predominantly in sectors with particularly critical hygiene requirements, such as the pharmaceutical industry, food and beverage industry or biofuel plants.
C-PTFE	PTFE compounds; composite made from a mixture of PTFE or modified PTFE with special fillers and additives
DIN	Deutsches Institut für Normung e.V.; is a national standards organization in the Federal Republic of Germany; the standards of this organization are referred to as DIN standards.
DN	DIN nominal width
DP	Downpipe; in the context of these instructions, this colloquial term describes a line or connection in cleaning technology between a process connection and a cleaning head.
DPE	Downpipe extension; an extension to increase the usable installation length [LE] of the device.
EMC	Electromagnetic compatibility; synonym for the EMC directives of the European Union; includes measures for apparatus/equipment, a plant or a system intended to operate interference-free in an electromagnetic environment without causing electromagnetic interference itself.
EN	European Standard (Norm)
EPDM	Ethylene propylene diene monomer; synthetic rubber; group of elastomers made from ethylene (ethene), propylene (propene) and a diene. (Trademarks e.g. Buna®; Keltan®; Nordel® or Thomapren®)
EPL	Protection level of the device (Equipment Protection Level)

etc.	and so on
FDA	Food and Drug Administration (US food and medication monitoring regulation authority)
if nec.	if necessary
IP	Individual part
ISO	International Organization for Standardization
JC	Jet cleaner
Jet	Cleaning jet; in the context of these instructions, this colloquial term describes a cleaning jet from a jet cleaner [JC] used in cleaning technology.
LE	Usable installation length of the downpipe [DP]; the dimension corresponds to the distance from the lower edge of the process connection to the lower edge of the cleaning head.
$L_{EX,8h}$	Daily noise exposition level
LEXT	Length of the downpipe extension [DPE]
L_{PA}	Emission noise pressure level at workplace
max.	maximum
MC	Media Connection; in the context of these instructions, this colloquial term describes the interface used in cleaning technology for supplying cleaning medium from the supply line to the device.
MX	"MX" device series; Jet cleaners with external drive and internal gear unit.
min.	minimum
NPT	National Pipe Thread; USA thread standard for pipe fittings
PC	Process Connection; in the context of these instructions, this colloquial term describes the interface used in cleaning technology for the connection to the process from the device to the container.
PEEK	Polyetheretherketone; semi-crystalline, thermoplastic material (Trademarks e.g. Ketron® or Victrex®)
PTFE	Polytetrafluoroethylene; highly crystalline, thermoplastic material (Trademarks e.g. Hostaflon® or Teflon®)
RC	Rinsing Connection (optional); the rinsing connection is only used for removing or draining away the cleaning fluid (e.g. water) required for self-cleaning of the device in the area of the magnetic coupling, in the flow direction from the media connection [MC] to the rinsing connection [RC]. The connection is only recommended if the device is installed in a position that deviates from the standard.
SI	Système international d'unités; the most widely used international system of units for physical values
SN	Serial number
Stroke	Stroke; for the purposes of these instructions, this term describes the path of a linear movement from point A to point B in a straight line for a moving component (e.g. cleaning head).

T_a	Ambient temperature (e.g. inside the container)
T_p	Process temperature (e.g. working temperature of the cleaning medium)
TRBS	Technische Regeln für Betriebssicherheit (German Technical Rules for Operational Safety); these rules specify the details of the "Betriebssicherheitsverordnung" (BetrSichV = German Operational Safety Ordinance) with regard to the identification and assessment of hazards and the derivation of suitable measures.
TRGS	Technische Regel für Gefahrstoffe (German Technical Rules for Hazardous Substances); these rules reflect the state of the art, occupational medicine and occupational hygiene as well as other sound scientific knowledge for activities involving hazardous substances, including their classification and identification.
v_{eff}	Effective vibration velocity
WA	Welded assembly
WP	Wear part

Terms

Stationary device:
The device remains fitted on the container for a long period, even during the production process.
Mobile device:
The device is mounted on and removed from the container several times in a short period and can also be used for cleaning several containers.
Traversing device:
The device is moved manually or automatically by means of a driven linear unit (e.g. mechanical or pneumatic) within a defined stroke.

Units of Measure

The following indicated factors are intended for orientation and the conversion of the SI units to common units of measure for the American market.

bar	Unit of measure for pressure p [bar] All pressure [bar] specifications stand for overpressure [bar o] = positive pressure [bar g], unless expressly described otherwise (e.g. absolute pressure [bar a]). Conversion: 1 bar = 14.50376... psi [pound-force per square inch]
°C	Unit of measure for temperature T [degrees Celsius] Conversion from Celsius to Fahrenheit: °C × 1.8 + 32 = °F [degrees Fahrenheit]
h	Unit of measure for time t [hours]
K	Unit of measure for temperature T and temperature differences ΔT [Kelvin] Conversion: 273.15 K = 0 °C
kg	Unit of measure for mass m [kilograms] Conversion: 1 kg = 2.20462 ... lb [Latin: libra; pounds]
l/min	Unit of measure for volume flow rate V [liters per minute] Conversion: 1 l/min = 0.06 m^3/h [cubic meters per hour] 1 l/min = 0.26417 ... gpm (US) [gallons per minute (US)] 1 m^3/h = 4.40286 ... gpm (US) [gallons per minute (US)]
lx	Unit of measure for illuminance E_v [lux]
m	Unit of measure for length l [meters] Conversion: 1 m = 3.28083... ft [feet]
mm	Unit of measure for length l [millimeters] Conversion: 1 mm = 1/25.40005 in [inches] = 0.03937 in [inches]
Nm	Unit of measure for moment/torque M [newton meters] Conversion: 1 Nm = 0.737 lbft [pound-force feet]
rpm	Unit of measure for speed n [revolutions per minute] Conversion: 1 U/min = 1 rpm [revolutions per minute]
µm	Unit of measure for length l [micrometers]
MΩ	Unit of measure for electrical resistance R [Mega Ohm = 1 million ohms]
pS/m	Unit of measure for electrical conductivity of materials κ [picosiemens per meter]

1 Introduction

These operating/installation instructions (referred to hereinafter as the instructions) are a component of the device. They provide you with all the information required for smooth operation of the TANKO®MX jet cleaner (referred to hereinafter as the device).

The instructions must be read, understood, and applied by all persons employed to carry out installation and assembly, commissioning, maintenance, cleaning and troubleshooting on the device. This applies in particular to the listed safety instructions.

After studying the instructions, you will be able to

- install and operate the device safely,
- clean and service the device correctly and
- take the correct measures if a fault occurs.

In addition to these instructions, generally applicable, statutory and other binding regulations for the prevention of accidents and for environmental protection in the country of use must also be observed.

The instructions must be kept at the location of use of the device so that they are available in legible condition at all times. If the device is resold, the instructions must always be transferred to the new owner.

Download the instructions, if necessary, from the website http://www.awh.eu.

1.1 Means of Presentation

1.1.1 Explanation of Signal Words

The warnings are introduced with a signal word which describes the extent of the hazard. The meaning and their classification in case of hazardous situations are explained in the following overview.

Signal Word	Meaning	Consequences of Failure to Observe
⚠ DANGER	Hazard with a high level of risk	Death or severe physical injury
⚠ WARNING	Hazard with a medium level of risk	Death or severe physical injury
⚠ CAUTION	Hazard with a low level of risk	Minor or moderate physical injury
NOTE	Hazard with a low risk	Risk of material damage
NOTE ON EXPLOSION PROTECTION	Important note on explosion protection	Loss of explosion protection and resulting hazards

Table 1.1-1: Overview of Signal Words

1.1.2 Explanation of the Warnings

Section-related Warnings

The section-related warnings apply not only to one particular action, but rather to all actions within a section. In addition, the pictograms and symbols indicate a general or specific danger.

DANGER

This warning warns of a hazard with a high level of risk!

Failure to observe it can lead to death or severe physical injury.

- *Measure(s) to prevent the danger*

WARNING

This warning warns of a hazard with a medium level of risk!

Failure to observe it can lead to death or severe physical injury.

- *Measure(s) to prevent the danger*

CAUTION

This warning warns of a hazard with a low level of risk!

Failure to observe it can lead to minor or moderate injury.

- *Measure(s) to prevent the danger*

NOTE

This warning warns of a hazard with a minor level of risk!

Failure to observe it can lead to material damage.

- *Measure(s) to prevent the danger*

NOTE ON EXPLOSION PROTECTION

This note contains instructions regarding explosion protection.
Non-compliance can disable the explosion protection, thus resulting in hazards.

Embedded Warnings

The embedded warnings apply to specific actions and are integrated directly into the action before the specific action step.

The embedded warnings are structured as follows.

⚠ **SIGNAL WORD** Type and source of the danger

Possible consequences in case of failure to observe

- Measure(s) to prevent the danger

Further Means of Presentation

INSTRUCTION

> *This note contains specific safety-relevant instructions and/or work steps for operational procedures and switch-off processes that are to be strictly complied with.*
> *Non-compliance prevents operational safety, thus leading to hazards.*

The "Info" symbol provides useful information, additional tips and recommendations.

– Texts which follow this mark are bulleted lists.

• Texts which follow this mark describe measures for prevention of the danger.

1. Texts which follow this numbering describe the first step of a task, followed by further numbered steps which have to be performed in the specified order.

a) Texts which follow this lettering as a subitem of a numbering (e.g. 1) describe the first step of a task for a higher-level task, followed by further lettered steps which have to be performed in the specified order.

(1) Numbers in brackets reflect the item numbers in figures or parts lists.

" " Texts in quotation marks are (direct) quotes from documents (e.g. directives or standards) or words, word groups and parts of a text with a special meaning.

Important, significant information is shown with additional **bold type**, *in italics* or CAPITAL LETTERS for emphasis of individual words or phrases.

Arrows (e.g. in a figure or illustration) indicate the relevant position and/or direction of a described detail (e.g. step of an activity to be performed) for a better understanding.

1.1.3 Pictograms and Symbols

The following pictograms and symbols are used as a supplementary measure in these instructions to clarify the sources of dangers and measures. They can appear at all levels of danger.


Warning about electrical voltage

Warning about potentially explosive atmosphere


Warning about hand injuries


Warning about a hot surface


Warning about corrosive substances


Warning about substances which are a water hazard


Unauthorized access prohibited


Wear protective work clothing


Wear safety shoes


Wear protective gloves


Wear safety goggles


Wear a hard hat


Wear hearing protection


Wear a welding mask


Isolate from voltage before work


Obey instructions


Protective grounding required


Secure against power being switched back on


Return for recycling

Operating equipment for Ex zone

1.2 Warranty and Liability

The commitments agreed in the contract of supply and delivery, the general terms and conditions and the terms of delivery of Armaturenwerk Hötensleben GmbH (referred to hereinafter as AWH) and the statutory regulations valid at the time the contract was concluded shall apply.

Warranty and liability claims in case of personal injury and material damage shall be excluded, in particular if these can be attributed to one or more of the following causes:

- Improper or incorrect use of the device,
- Improper assembly and installation, commissioning, operation and maintenance of the device,
- Failure to observe the notes in the instructions regarding assembly and installation, commissioning, operation and maintenance of the device,
- Constructional modifications to the device (conversions or other modifications to the device must not be made without previous written approval from AWH. In case of infringement, the device will lose its EU conformity and the operating authorization.),
- Use of spare parts that do not comply with the specified technical requirements,
- Improperly performed repairs,
- Disasters, the effects of foreign objects and force majeure.

Disclaimer

AWH reserves the right to make alterations to this document at any time without prior notice. AWH provides no guarantee (neither expressed nor implied) with regard to all information in this document, including but not limited to the implied guarantee of merchantability and suitability for a particular purpose. Furthermore, AWH does not guarantee the correctness or completeness of information, text, graphics or other parts in this document.

1.3 Product Names and Trademarks

The product names and trademarks included in these instructions are brands or registered trademarks of the respective owners.

TANKO® and AWH® are registered trademarks of Armaturenwerk Hötensleben GmbH.

1.4 Related Documents

The following documents may contain supplementary information for these instructions:

- Manufacturer's declarations and/or certificates of conformity
- Certificates
- Additional documents for any attached or upstream components, e.g. drawings, technical data, information on accessories etc.
- Supplements to these instructions (e.g. special designs)
- AWH catalog, product data sheet

2 Safety

The device has been built in accordance with state-of-the-art technology and the recognized safety rules. Nevertheless, use of the device may pose a danger to the life and limb of the user and third parties or a risk of impairments to the device and other objects of material value as a result of its function.

The following basic safety instructions are intended to prevent injury to personnel and material damage. The operating company must ensure that the basic safety instructions are observed and adhered to.

These instructions contain basic notes on installation, operation, maintenance and servicing of the device which must be complied with.

Anyone involved in installation, operation, maintenance and servicing must have read and understood these instructions.

The safety systems and safety instructions described in these instructions must be adhered to.

WARNING

Failure to comply with these instructions, incorrectly performed installation and repair work or incorrect operation could lead to malfunctions on the device and to dangerous situations!

There is a risk of death or severe physical injury.

- *All work performed on the device must be carried out only by a specialist and in compliance with*
  - *the corresponding detailed operating and installation instructions,*
  - *the warnings and safety signs on the device,*
  - *the regulations and requirements specific to the plant and*
  - *the national/regional regulations for safety and the prevention of accidents.*
- *Never install damaged devices or components.*

The figures in these instructions are intended to provide basic understanding and are primarily representations of the principles involved. They may differ from the actual design of the device.

For maintenance and repair, we recommend a training course provided by the manufacturer or a person authorized by the manufacturer.

If you have questions or doubts about handling the cleaning device, please contact AWH.

Built-in Safety Systems

The built-in safety devices used by the higher-level plant in which the device is installed are to be tested at regular intervals.

WARNING

Dangerous situations arising from changing or disabling safety devices!

Only functional safety devices can ensure safe operation and prevent inadmissible operating conditions.

Changing or disabling safety devices can lead to unpredictable and dangerous situations.

There is a risk of death or severe physical injury.

- *Disabling the safety devices or changing the way they operate is strictly prohibited.*

2.1 Using the Device

The TANKO-MX is a rotating cleaning device and belongs to the group of jet cleaners. It is driven by the cleaning medium. The device is used for cleaning the interiors of containers with and without installed equipment.

For the purpose of these instructions the word "container" refers to **closed** tanks, silos, barrels, containers, pipes, and similar, that are provided with an outlet that ensures that the supplied cleaning medium can drain freely.

The device was developed, designed and built exclusively for industrial and commercial use and may only be used or operated by professional users. It must not be used for private use.

The device is constructed so that it can be operated safely within the specified technical parameters (see *Section 3.3 Technical Data*).

2.1.1 Intended Use

DANGER

Danger from fire/explosion when using the device in a explosive atmosphere!

The device must be suitable for use in hazardous areas (explosive atmosphere).

There is a risk of death or severe physical injury.

- *Observe the type plate of the device and the associated operating instructions.*
- *Only use devices with an Ex marking in the Ex area.*

WARNING

Risk of hazardous situations caused by use other than the intended use and/or other types of use of the device!

There is a risk of death or severe physical injury.

- *Only use the device for the intended use.*
  - *Only ever use the device in accordance with the specifications contained in these instructions and the specifications on the device's type plate.*
  - *All the specifications in these instructions must be adhered to at all times.*
  - *Always keep the operating instructions at the location where the device is used.*
  - *Keep all signs on the device in legible condition.*
  - *Only use original spare parts.*
- *Modifications or conversions of the device are NOT permitted.*

WARNING

Danger from incorrect use of materials/media!

The materials/media to be used for the intended operation of the device are procured and utilized by the operating company of the device.

If unsuitable materials/media are selected, strong chemical reactions could lead to fatal injury or severe physical injuries.

- *The proper selection and treatment of these materials/media is solely the responsibility of the operating company.*
- *When selecting the materials/media, make sure that the permitted technical parameters of the device are NOT exceeded.*
- *The cleaning media and agents must be approved for all of the materials of the device (e.g. washers, bushings) and for the substances in the container to be cleaned which come into contact with them.*
- *Adhere to the specified chemical limits for use in the material data sheets.*
- *Adhere to the safety data sheets provided by the manufacturers of the materials and media, in particular for hazardous substances:*
  - *Comply with the hazard and disposal instructions.*
  - *Set out protective measures and compile operating instructions for hazardous substances.*
  - *This also applies to hazardous substances that may develop during work processes.*

Refer to the order confirmation/parts list from AWH for the materials used in the device.

In all cases, the operating company must check whether the device is suitable for its application.

Locations for containers in which the device is to be installed are usually closed spaces. In different setups, the operating company must ensure the protection of the device from harmful weather and environmental influences while maintaining the specified application limitations/conditions (see *Section 3.3 Technical Data*).

In the process, the following must always be observed:

- Only operate the device when installed in a closed container.
- Never direct the cleaning jet or torrent from the device at persons.
- Protect the device from freezing (e.g. risk of frost from possible residual water).
- Use a suitable filter system in the supply line for the cleaning medium.
- Operate the device only within the approved parameters (see *Section 3.3 Technical Data*). If necessary, appropriate monitoring and limiting systems (e.g. for pressure and temperature) should be implemented.
- Only cleaning media that are compatible with the materials of the device may be used (see *Section 3.4 Cleaning Media*).
- The installation position of the device (see *Section 5.2.2 Installation Position*).
- The device may generate vibrations when cleaning the container. Any other vibrations must be avoided (see *Section 7.4.1 Maintenance Intervals*).
- The device is designed for fixed pipe installation only. Installation on a hose is PROHIBITED.

Cleaning Media

Only sprayable fluids that meet the requirements in *Section 3.4 Cleaning Media* may be used for cleaning.

The conditions and limit values given in these instructions for the cleaning process in ATEX applications (e.g. depending on the flash point or the conductivity of the cleaning media) are recommendations from Technical Specification IEC/TS 60079-32-1 or TRGS 727 based on the state of the art. Regardless of this, the owner must perform an analysis for the individual case, taking the relevant process values into account. The owner may specify other measures and/or limit values in an explosion protection document to prevent the generation of an electrostatic charge when spraying the cleaning medium, which could cause a potential discharge and ignite a potentially dangerous amount of explosive atmosphere.

Use in Ex Atmosphere (ATEX-Jet Cleaner type TANKO-MX...EX of the Equipment Group II)

The use of an ex-device is required if there may already be flammable gases, vapors, mists or combustible dust in the container, or they are only added by the intended cleaning process in the form of sprayed fluid (aerosol).

The device of device group II is suitable for use in explosive atmospheres in the area of zone 0 or zone 20.

Category	Zone	Ex-Atmosphere
1	Inside the container	
1G	0	Gas
1D	20	Duzt

Table 2.1-1: Application of TANKO-MX...EX (Equipment Group II) in Ex Atmosphere

For the intended use, also observe the additional information of the Ex marking on the type plate of the device (see *Section 2.5.3 Marking for Explosion Protection*).

NOTE ON EXPLOSION PROTECTION

The area of application of the device must always be adapted to the corresponding operating conditions and the materials in contact with the product. These materials must be selected so that there are no reactions between them and the cleaning medium or the substances in the container to be cleaned, which could impair explosion safety.

It must be ensured that no hybrid mixtures can occur either in the container or in the environment (a hybrid mixture is a mixture of air with flammable substances in different aggregate states, e.g. gas/vapor and dust).

If this is not observed, the explosion protection could be invalidated.

If there are hybrid mixtures in the container or they can develop during cleaning when spraying, then a change in the explosion parameters of the individual mixtures involved towards an increased explosion hazard with lower explosion limits is to be expected, as soon as charged particles arising by the cleaning process. The safety-related parameters of the present hybrid mixtures must be known, or an expert analysis must be provided under the responsibility of the operator.

The following "cleaning" and "idle state" operating states and their existing process conditions inside or outside atmospheric conditions are generally decisive for the use of the device.

Definition „atmospheric conditions“
Atmospheric conditions are usually understood (ATEX guidelines) as an ambient temperature of -20 °C to +60 °C and an absolute pressure of 0.8 bar a to 1.1 bar a.

Definition „explosive mixtures“ GefStoffV - German Ordinance on Hazardous Substances § 2 Para. 10)
“Potentially explosive mixtures consist of flammable gases, vapors, mists or stirred-up combustible dust and air or another oxidizing agent that reacts to a self-propagating flame when an ignition source becomes active, generally causing an abrupt increase in temperature and pressure.”

Definition „explosive atmosphere“ (ATEX)
Explosive atmosphere is an explosive mixture with air as an oxidizing agent (oxygen content of the air max. 21%) under atmospheric conditions. The explosive atmosphere is a subset of the explosive mixtures.

	Operating Status of the Device							
Process Conditions	**Cleaning**				**Rest State**			
Atmospheric Conditions	yes		no		yes		no	
Explosive Mixtures	no	yes (ATEX)	no	yes	no	yes (ATEX)	no	yes
Process State	**A**	**B**	**A**	**C**	**D**	**E**	**D**	**F**

Table 2.1-2: Operating States and Process Conditions

Operating State – Cleaning Process (cleaning > cleaning medium is sprayed and cleaning head rotates)

When spraying cleaning fluid, the following three process states must always be taken into account, as well as the conditions in the container, and also the type and temperature of the cleaning medium:

A) **During cleaning, no potentially explosive mixture is present, nor is it possible for one to develop from the cleaning medium.**

- Pressure in the container: 0 to 0.5 bar (0 to 7.25 psig)
- Temperature of the cleaning medium: +5 °C to +95 °C
- Ambient temperature in the container to be cleaned: +5 °C to +95 °C

B) **There is a potentially explosive atmosphere in the container during cleaning (ATEX conditions).**

Depending on the process conditions, flammable gases, vapors, mists or combustible dust may already be in the container before the device is used (EX zone) or also introduced in the form of sprayed liquid (aerosol) during the intended cleaning process.

- Pressure in the container: 0 to 0.1 bar (0 to 1.45 psig)
- There already is an explosive atmosphere in the container when cleaning is started:
  - Temperature of the NON-flammable cleaning medium: +5 °C to +60 °C
  - Temperature of the flammable cleaning medium: +5 °C to flash point $T_{\text{flash point}}$ -15 °C (max. +60 °C)
- There is NO explosive atmosphere in the container at the start of cleaning, and it is only created by spraying the flammable cleaning medium:
  - Temperature of the flammable cleaning medium: +5 °C to +60 °C

As soon as flammable liquids are sprayed according to *Section 3.4 Cleaning Media* the development of flammable vapors and mists must be expected, even if their flash point is 15 K above the cleaning medium temperature.

- Ambient temperature in the container to be cleaned: +5 °C to +60 °C

C) **A potentially explosive mixture is present during cleaning, but there is no potentially explosive atmosphere.**

This process state is not covered by the ATEX approval of the device.

In operating conditions resulting in explosive mixtures outside atmospheric conditions in the container to be cleaned, or in the presence of oxidizing agents other than air, the ATEX directive cannot be applied offhand. It can only be used as the basis for an assessment if there are no atmospheric conditions in an EX-zone.

For processes that are outside atmospheric conditions, the operating company must make a differentiated assessment of the effects. The necessary safety-related parameters must be determined and an additional risk assessment must be created for explosion hazards in order to separately verify the suitability of the device used.

NOTE ON EXPLOSION PROTECTION

The cleaning process with the devices is also prohibited in the presence of potentially explosive mixtures with ignitable substances such as hydrogen, ethylene, acetylene, carbon disulfide, carbon monoxide, ethylene oxide and trichlorosilane.

Operating State – Rest State (NO cleaning > cleaning medium is NOT sprayed and cleaning head is stationary)

For process states **D); E)** or **F)** in the rest state, the max. permissible parameters of the device according to *Section 3.3 Technical Data* (see *Table 3.3-1: Operating Parameters of the Device*) must be taken into account.

If the device is in the rest state or is NOT being operated, then the supply line of the cleaning medium must be closed off as close as possible to the media connection [MC] of the device by means of an appropriate shut-off device (e.g. slide valve, flap, tap or valve) so that the spread of gases and vapors or an unintentional supply of media is prevented. There may only be an open connection for the cleaning medium from the supply line (pump) to the medium connection [MC] during the cleaning process.

This device is intended exclusively for the purpose outlined above. Any other use beyond that described here or any conversion of the device without a written agreement with the manufacturer is considered IMPROPER use.

The manufacturer accepts NO liability for damage arising from such improper use. The operating company bears the sole risk.

2.1.2 Non-Intended Use

Operation of the device without cleaning medium is only permitted for a limited time for certain situations (see *Table 6.4-1: Time-limited Operation of the Device without Cleaning Medium*).

The device is **NOT suitable** for the following applications:

- A devices without an Ex marking is NOT suitable for use in the explosion-hazardous area.
- The device is NOT suitable for private use.
- The device is NOT suitable for use outside of containers.
- Holding the device with your hand during operation is PROHIBITED.
- The device must NOT be immersed in the product of the production process (NOT even partially). This could cause the product to enter into the device. The spray holes may become blocked. The free movement of the drive could be obstructed.
- The device must NOT by operated with gases (e.g. air) over a long period, as the cleaning medium is used for lubrication of the bearings.

NOTE ON EXPLOSION PROTECTION

The use of the device in the presence of dusts prone to spontaneous combustion is NOT permitted or the risk of spontaneous combustion must be eliminated by suitable protective measures (e.g. inerting).

The use of the device in the presence of substances prone to exothermic chemical reactions (e.g. pyrophoric substances with air, alkali metals with water, the decomposition of organic peroxides or polymerization reactions) must be excluded.

The device must not be put into operation until it has been assured that all the safety devices are fully functional and the plant in which the device is installed meets the safety requirements of all relevant European directives (e.g. the Machinery Directive).

2.2 Spare Parts, Replacement Parts and Accessories

WARNING

Risk of damage, malfunction or complete failure of the device!

Incorrect or faulty spare/replacement parts and accessories put the functional safety and reliability of the device at risk. This can result in failure of components or a device malfunction, as well as material damage and consequential damage.

There is a risk of death or severe physical injury.

- *Only use the manufacturer's original spare parts.*

We expressly draw attention to the fact that spare parts and accessories NOT supplied by AWH have NOT been checked or approved by AWH. The installation and/or use of such products could therefore, under certain circumstances, result in changes with negative results to the properties of the device specified by its design and the higher-level plant.

AWH is not liable for any damage arising from the use of non-original parts or non-original accessories. Standard parts can be obtained from specialist dealers.

A list of spare parts is provided in *Section 7.5 Spare Parts and Customer Service*.

2.3 Duties of the Operating Company

The device is used in the commercial sector. The operating company is thus subject to the legal obligations regarding occupational safety.

In the EEA (European Economic Area), the national implementation of the Framework Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work, as well as the associated individual directives shall be observed and complied with in their current valid versions.
Of particular importance in this connection is Directive 2009/104/EC concerning the minimum safety and health requirements for the use of work equipment by workers at work.

NOTE ON EXPLOSION PROTECTION

For applications in the presence of potentially explosive atmospheres, the Directive (1999/92/EC with Annexes I and II) on minimum requirements for improving the safety and health protection of workers potentially at risk from potentially explosive atmospheres also applies.

As a basic rule in Germany, the Operational Safety Ordinance (BetrSichV) must be observed.

In other countries, the respective national guidelines, statutes and country-specific regulations regarding occupational safety and accident prevention must be complied with.

At the same time, the following, non-exhaustive instructions apply in particular:

– The operating company must ensure that the device is used only as intended (see *Section 2.1 Using the* Device).

– The operating company must keep informed of the locally applicable occupational health and safety regulations and, in addition, use a risk assessment to determine the hazards resulting from the

specific working conditions at the location of use of the device. These must then be implemented in the form of operating instructions for the operation of the device.

- When using hazardous materials, protective measures must be specified in accordance with the safety data sheets and operating instructions shall be compiled for hazardous materials. Personnel must be instructed accordingly. This also applies to hazardous substances that may develop during work processes.
- A continuous risk assessment must be carried out for workplaces, including temperature conditions for the medium and the place of use (falling). The measures are to be defined in operating instructions. Personnel must be instructed accordingly.
- Supervisors must monitor compliance with the measures specified in the operating instructions.
- Throughout the entire operating period of the device, the operating company must check whether the operating instructions it has compiled reflect current legislation requirements and adapt them as necessary.
- The operating company must clearly regulate and specify the responsibilities of personnel (e.g. for operation, maintenance and cleaning).
- The operating company must allow only sufficiently qualified and authorized personnel to work on the device.
- The operating company must ensure that all employees handling the device have read and understood the instructions.
  Furthermore, it must provide personnel with training at regular intervals with certification and inform them of the hazards.
- The operating company must provide sufficient workplace lighting at the plant in accordance with the locally applicable regulations for occupational health and safety, in order to prevent hazards occurring as a result of poor lighting.
- The operating company must provide personnel with personal protective equipment and make sure that this is used (see *Section 2.4.1 Personal Protective Equipment*).
- The operating company must make sure that the danger area of the higher-level plant in which the device is installed is not accessible to unauthorized persons.
- The operating company must make sure that no one is permitted to work on the device whose ability to react is impaired by drugs, alcohol, medication or similar.
- The operating company must take appropriate measures to inform groups of persons who are not intended to come into direct contact with the device (e.g. visitor groups) about the potential dangers involved.
- The operating company is responsible for making sure that the device is only ever operated in perfect condition.
- Wherever high pneumatic pressures occur, there is a possibility of sudden failure of or damage to the lines and connections. This poses a hazard. The operating company must instruct operating and maintenance personnel at least once a year on the possible hazards.
- The constructor of the overall plant must install the switching and safety devices required for setting up, inspection, shutting down (including emergency shutdown), operation, maintenance, cleaning and repair.

- The operating company must design the disconnection of the energy sources on the higher-level plant technically in such a way that the *Switch-off Procedure* described in *Section 7.2* can be adhered to.
- The operating company must define and adhere to the intervals for inspections and control measures in accordance with the environment and media used.
- The operating company must provide fire safety devices, e.g. the appropriate quantity of suitable hand-held fire extinguishers of the appropriate size, in easily accessible places and provide employees with training in fire safety.
- Warnings in the documentation of externally supplied assembly groups must be adhered to and incorporated into the risk assessments for the specific workplace.
- For installation of the device in a plant, the operating company must guarantee safe access using steps, platforms and rails in accordance with EN ISO 14122-1-3.

Connections:

Before operating the machine with the device, the operating company must make sure that the local regulations are observed for assembly, installation and commissioning, if these tasks are performed by the operating company.

- Hydraulic connections must fulfill the requirements of EN ISO 4413.
- Pneumatic connections must fulfill the requirements of EN ISO 4414.
- Electrical connections must fulfill the requirements of EN 60204-1.

NOTE ON EXPLOSION PROTECTION

Any person working in a potentially explosive area must be regularly instructed with regard to the necessity of grounding measures and they should also be made aware of typical grounding faults (e.g. subsequent grounding of objects or devices that are already charged).

NOTE ON EXPLOSION PROTECTION

When operating the device on a container, the resulting ignition hazards "mechanically generated sparks", "static electricity", "exothermic reactions" and "hot surfaces" must be considered by the user within the framework of a hazard/risk assessment.

2.4 Requirements for Personnel

The device must only be operated, maintained and repaired by persons with the appropriate qualifications. These persons must be familiar with the instructions and act in accordance with them. The respective authorizations for personnel must be clearly defined.

The following qualifications are designated in the instructions for various fields of activity:

Expert/Specialist Personnel

An expert is a person whose professional training, knowledge, and experience and knowledge of the relevant standards and regulations enables them to carry out work on the device and identify and prevent potential risks independently.

Instructed Person

An instructed person has been instructed and, if necessary, trained by the operating company or an expert in a briefing on the assigned tasks and possible hazards in the event of improper actions, and instructed on the necessary safety devices and protective measures.

Only personnel with the following expertise are permitted to perform work on the device:

- **Assembly/disassembly:** Industrial mechanic or comparable vocational qualification, practical experience in the assembly/disassembly of devices
  The person must be familiar with the construction, mechanical installation, maintenance and troubleshooting of the device, and have the following qualifications:
  - Vocational training and final qualification in the field of mechanics (e.g. mechanic or mechatronics technician)
- **Welding work:** Welder qualification in pipeline engineering or similar apprenticeship
- **Electrical work:** Electrician; person with appropriate specialized apprenticeship, knowledge and experience, enabling them to identify and prevent risks which may be caused by electricity
  The person must be familiar with the electrical installation, commissioning, troubleshooting and repair of the device and have the following qualifications:
  - Vocational training and final qualification in electrical engineering (e.g. electrician, electronics engineer or mechatronics technician)
  - Several years of vocational experience in the field of electrical engineering
- **Cleaning:** Instructed person

Work performed in the other areas, i.e. **transportation, storage, operation and disposal,** must be performed exclusively by personnel who have received suitable instruction.

All of the personnel listed above must wear protective clothing in accordance with their respective activities.

2.4.1 Personal Protective Equipment

NOTE ON EXPLOSION PROTECTION

Persons working in potentially explosive atmospheres must not be dangerously charged. The personal protective equipment must meet the explosion protection requirements.

If this is not observed, the explosion protection could be invalidated.

- *Observe TRGS 727 "Prevention of ignition hazards due to electrostatic charge" Chapter 7 "Electrostatic charging of persons and personal protective equipment (PPE)".*
- *EN 1149-5 Protective clothing - Electrostatic properties - Part 5: Observe performance requirements relating to material and design.*

Personal protective equipment must be used in accordance with the respective task when working on the device in order to minimize health hazards.

Protective work clothing

Protective work clothing is tight-fitting work clothing with low resistance to tearing, with tight-fitting sleeves and without protruding parts. It is mainly used for protection against becoming entangled in moving components. Do not wear any rings, necklaces or other jewelry.

Safety shoes

Wear slip-resistant safety shoes for protection against heavy, falling objects or for protection against slipping on slippery surfaces.

Protective gloves

Wear protective gloves to protect your hands against friction, grazes, getting pricked or deep cuts and for protection against coming into contact with hot surfaces or chemical substances.

Protective goggles

Wear protective goggles for protection against media escaping at high pressure and against flying objects.

Hard hat

Wear a hard hat for protection against falling or flying objects.

Hearing protection

Wear hearing protection to protect yourself from an increased noise level (≥ 85 dB(A)).

Welding mask

Wear a welding mask to protect against damage to the eyes or skin caused by the welding arc and to protect against burns caused by flying particles during welding.

Personal protective equipment must be provided by the operating company in accordance with the valid requirements. Furthermore, both the national regulations and, if necessary, the internal instructions from the operating company must be observed.

2.5 Marking

2.5.1 Type Designation

Example: Jet cleaner

TANKO – MX125 – G14EX

1) Brand of the cleaning devices: **TANKO**
2) Type/Series: **M**edia drive **X**
3) Size: (125; 150) Installation opening ≈ **125** mm
4) Variant: **G** for “gleitgelagert” (with slide bearing)
5) Number of nozzle carriers: **1**
6) Number of nozzles: **4**
7) Execution: AT**EX**

2.5.2 Type Plate

The marking is applied to the device according to the following figure.

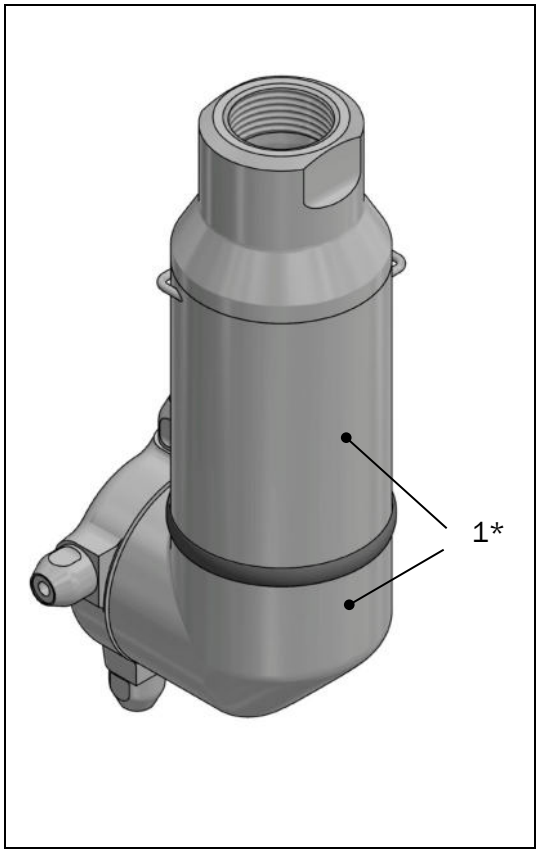


Figure 2.5-1: Type Plate Position

1 Device type plate
(*Position depends on the execution)

In case of inquiries, the data on the type plate of the device are important for proper and speedy processing:

A) Manufacturer address
B) Type designation
C) Year of manufacture

Serial no. [SN]
D) Article number
E) Internal plant number
F) Sequential counting number

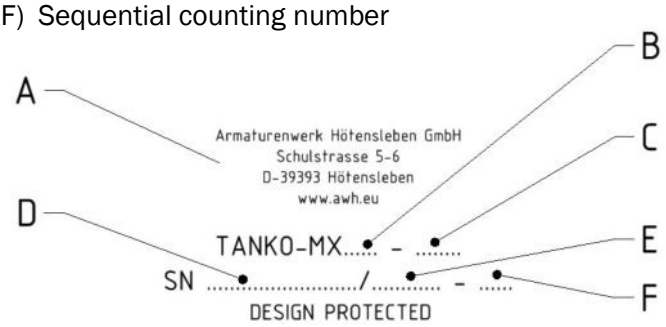
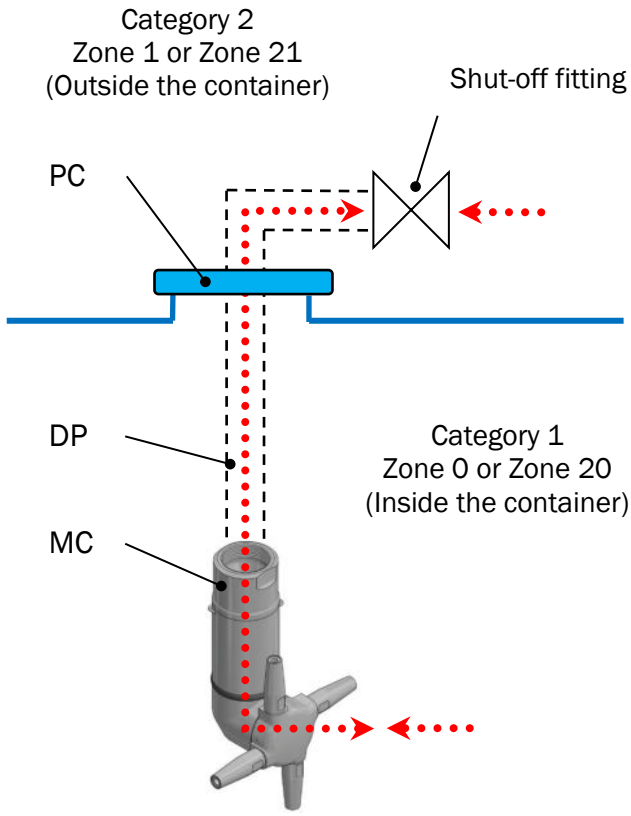


Figure 2.5-2: Example Type Plate

The labeling or writing on the type plate of the device must be permanently visible and legible so that the device can be unambiguously and fully identified throughout its entire life cycle.

2.5.3 Marking for Explosion Protection

Devices in explosion-proof design are marked by indicating the device group, category, ignition protection type, explosion group, temperature class and EPL on the type plate. A CE and Ex marking confirms compliance of the device with ATEX Directive 2014/34/EU.



Note on presentation:

The arrows of the dotted lines represent the possible directions of propagation of the zones inside and outside the container in the rest state of the device (NO cleaning). A shut-off device (e.g. shut-off fitting) for media supply is not included in the scope of delivery.

Figure 2.5-3: Example of Zone Separation

For the intended use of the devices in the respective zones, the devices must have an appropriate protection level.

The device protection levels specified in ISO 80079-36 are related to the corresponding device groups and device categories according to the following table.

IEC 60079-10-X		Directive 2014/34/EU				ISO 80079-36			
Zone		Device group	Device category			Group	EPL		
Gas Vapor Mist	0	II	1G	---	---	II	Ga	---	---
	1			2G	---			Gb	---
	2				3G				Gc
Dust	20	II	1D	---	---	III	Da	---	---
	21			2D	---			Db	---
	22				3D				Dc

Table 2.5-1: Relationship between Zones and Device Protection Levels (EPL)

The operating company is responsible for the division into zones.

When using the devices in potentially explosive atmospheres "gas" and/or "dust", the permissible explosion groups must be observed.

Explosion group II (gases, vapors and mists) is divided into subgroups IIA, IIB and IIC and explosion group III (dust) is divided into subgroups IIIA, IIIB and IIIC.

The hazardous nature of the subgroups increases from IIA to IIC or from IIIA to IIIC. The demands on the devices also increase accordingly.

- If the devices are approved for explosion group IIC, then they may also be used for IIB and IIA.
- If the devices are approved for explosion group IIIC, then they may also be used for IIIB and IIIA.

Explosion group II Ex atmosphere "Gas"	Explosion group marking on the device
IIA	IIA, IIB, IIC
IIB	IIB, IIC
IIC	IIC

Table 2.5-2: Classification of Explosion Groups II

Explosion group III Ex atmosphere "Dust"	Explosion group marking on the device
IIIA	IIIA, IIIB, IIIC
IIIB	IIIB, IIIC
IIIC	IIIC

Table 2.5-3: Classification of Explosion Groups III

The maximum surface temperature of the device is determined by the ambient temperature in the container to be cleaned and/or the temperature of the cleaning medium. The device assumes the higher temperature in each case and is therefore identified with a range of temperature classes for gas or a temperature range for dust. The permitted temperatures must be taken into account (see *Section 3.3 Technical Data*).

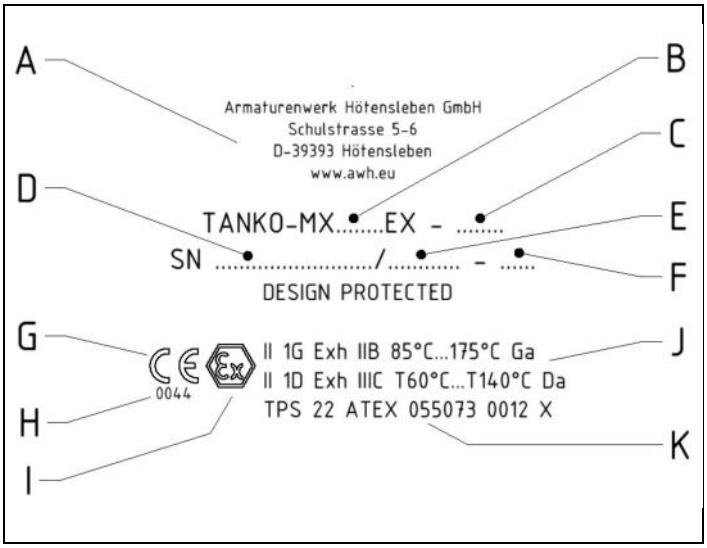
The following table (excerpt from EN ISO 80079-36 or IEC/EN 60079-0) lists the temperature classes for electrical/non-electrical devices in device group II G:

Temperature class	Max. surface temperature [°C]
T1	≤ 450
T2	≤ 300
T3	≤ 200
T4	≤ 135
T5	≤ 100
T6	≤ 85

Table 2.5-4: Temperature Division for Group II G Devices

Remark:
Devices corresponding to a higher temperature class, e.g. T5, are also permitted for applications where a lower temperature class is required, e.g. T3.

The type plate on the device also contains the information required for operation in a potentially explosive atmosphere according to the ATEX Directive 2014/34/EU and standards:



A) Manufacturer address
B) Type designation (size)
C) Year of manufacture
D) Article number
E) Internal plant number
F) Sequential counting number
G) CE mark of conformity
H) ID number of the designated body that audits the QA system
I) Explosion protection plate (Ex symbol)
J) Identification for use in a potentially explosive atmosphere
K) Number of the EU type examination certificate

Figure 2.5-4: Example of Type Plate (ATEX)

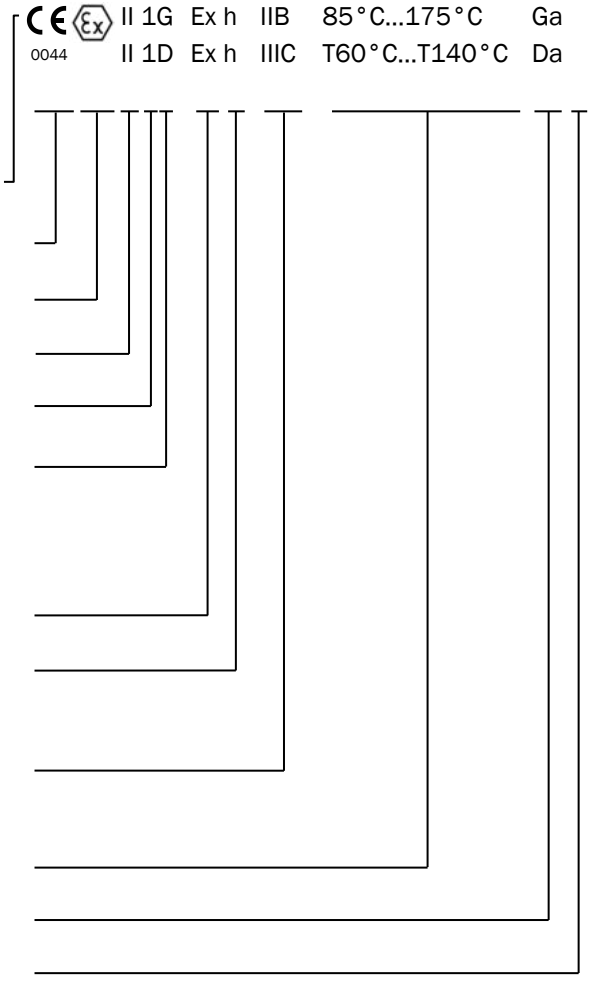
The device is marked as non-electrical equipment for use in potentially explosive atmospheres with the letter "h", and is designed in the standardized ignition protection type of design safety "c" according to EN ISO 80079-37. It has the following Ex marking.

Ex Marking of the Device (Category 1)

Device (Category 1)					
CE 0044 Ex	II 1G	Ex h	IIB	85°C...175°C	Ga
	II 1D	Ex h	IIIC	T60°C...T140°C	Da
	TPS 22 ATEX 055073 0012 X				

Explanation of Ex Marking:

Certificate number: TPS 21 ATEX 055073 0012 X [a)]



Marking according to Directive:

1) CE conformity marking
2) ID no. of the specified body
3) Explosion protection marking
4) Device group II
5) Device category
6) Explosive atmosphere
   G = „Gas“ D = „Dust“

Marking according to standard:

7) Ex symbol
8) Letter
   e.g. „h“ = non-electrical device
9) Explosion group
   II =„Gas“; III =„Dust“ (A; B; C)
10) Temperature class/range
11) EPL
12) Symbol „X“ [a)]

[a)] The symbol "X" means that the safe use of the device depends on specific operating conditions specified in the operating instructions. If the symbol "X" is included in the EU-type examination certificate on the device, it is not included in this marking.

The Ex markings of the device are explained in Table 2.5-5 and Table 2.5-6 depending on the possible operating conditions.

Explosion group II EPL Ga

According to the requirement for mechanical equipment with device protection level II EPL Ga, a safety factor is required. The maximum surface temperature must not exceed 80% of the marked temperature class. The resulting temperature class for the cleaning device thus originates from the higher temperature.

Operating status			Flammable gases or vapors inside the container to be cleaned			
			II1G Ex h IIB 85°C...175°C Ga			
	Temperature		Surface temperature of the device inside the container	Potentially explosive atmosphere in the container	Resulting temperature class	EPL
	Operating temperature of cleaning medium	Inside the container				
Cleaning process	+5 °C ≤ +60 °C	+5 °C ≤ +60 °C	The device assumes max. the temperature of the cleaning medium or that of the container. This results in a max. surface temperature of the device of +60 °C. (= 80% of +75 °C)	**Gases or vapors of explosion groups IIA or IIB** The cleaning process (spraying of fluids) in the presence of potentially explosive mixtures with ignition-sensitive substances in accordance with *Section 2.1* and *Section 3.4* is not permitted. Group IIC gases are NOT permitted during cleaning. (see *Section 2.1* process state „B“)	85 °C (T6)	Ga
	> +60 °C ≤ +68 °C	> +60 °C ≤ +68°C	max. +68 °C (= 80% of +85°C)	If potentially explosive mixtures outside atmospheric conditions are possible in the container, the cleaning process under these conditions requires a separate hazard assessment. (see *Section 2.1* process state „C“)		
	> +68 °C ≤ +80 °C	> +68 °C ≤ +80 °C	max. +80 °C (= 80% of +100 °C)		100 °C (T5)	Ga
	> +80 °C ≤ +95 °C	> +80 °C ≤ +95 °C	max. +95 °C (= 80% of +119 °C)		119 °C	Ga
Rest state (no cleaning)	n/a	max. +60 °C	The device assumes max. the temperature of the container. This results in a max. surface temperature of the device of +60 °C. (= 80% of +75 °C)	**Gases or vapors of explosion groups IIA or IIB** Group IIC gases are permitted in the container, but must be completely removed for cleaning and the container must be suitable for this. (see *Section 2.1* process state „E“)	85 °C (T6)	Ga
	n/a	> +60 °C ≤ +68 °C	max. +68 °C (= 80% of +85 °C)	If potentially explosive mixtures in the container outside atmospheric conditions are possible, the device has no potential ignition source other than the hot surface with the temperature of the surrounding container when used as intended in rest state. (see *Section 2.1* process state „F“)		
	n/a	> +68 °C ≤ +80 °C	max. +80°C (= 80% of +100 °C)		100 °C (T5)	Ga
	n/a	> +80 °C ≤ +108 °C	max. +108°C (= 80% of +135 °C)		135 °C (T4)	Ga
	n/a	> +108 °C ≤ +140 °C	max. +140°C (= 80% of +175 °C)		175 °C	Ga

Table 2.5-5: Explanation of Ex Marking - Gas

Example of the cleaning process:
The temperature of the cleaning medium is 67 °C and the ambient temperature is 78 °C.
Resulting temperature class for "Gas" = T5

Explosion group III EPL Da

Temperature data without consideration of a dust layer.

Operating status			Combustible dust inside the container to be cleaned			
			II 1D EX h IIIC T60°C...T140°C Da			
	Temperature					
	Operating temperature of cleaning medium	Inside the container	Surface temperature of the device inside the container	Potentially explosive atmosphere in the container	resulting max. surface temperature	EPL
Cleaning process	+5 °C ≤ +60 °C	+5 °C ≤ +60 °C	The device assumes max. the temperature of the cleaning medium or that of the container. The result is a max. surface temperature of +60 °C.	**Dusts of dust groups IIIA, IIIB or IIIC** (see *Section 2.1* process state „B“)	T60 °C	Da
	> +60 °C ≤ +95 °C	> +60 °C ≤ +95 °C	max. +95 °C	If potentially explosive mixtures outside atmospheric conditions are possible in the container, the cleaning process under these conditions requires a separate hazard risk assessment. (see *Section 2.1* process state „C“)	T95 °C	Da
Rest state (no cleaning)	n/a	max. +60 °C	The device assumes max. the temperature of the container. This results in a max. surface temperature of the device of +60 °C.	**Dusts of dust groups IIIA, IIIB or IIIC** (see *Section 2.1* process state „E“)	T60 °C	Da
	n/a	> +60 °C ≤ +140 °C	max. +140 °C	If potentially explosive mixtures in the container outside atmospheric conditions are possible, the device has no potential ignition source other than the hot surface with the temperature of the surrounding container when used as intended in rest state. (see *Section 2.1* process state „F“)	T140 °C	Da

Table 2.5-6: Explanation of Ex Marking - Dust

Example of the cleaning process:
The temperature of the cleaning medium is 67 °C and the ambient temperature is 78 °C.
Resulting temperature for "Dust" = T78°C

NOTE ON EXPLOSION PROTECTION

According to EN 1127-1:2019, 6.4.2, the max. surface temperature in the container must not exceed 80% of the ignition temperature of the explosive gas/air mixture or 2/3 of the ignition temperature of the dust/air mixture (determined in accordance with the latest version of EN 50281-2-1).
In addition, the smoldering temperature of the dust (ignition temperature of the dust layer (determined in accordance with the latest version of EN 50281-2-1) must be at least 75 K above the max. surface temperature. The thickness of the dust layer may reach a maximum of 5 mm.
Where dust layers of > 5 mm are formed, the safety distance between the smoldering temperature and the maximum surface temperature of the device must be increased. In this context, the requirements in accordance with the latest version of EN 60079-14 must be observed.

For processes that follow cleaning, the possibly increased surface temperature of the device must be taken into account. If necessary, the device must be left to cool down for a sufficient length of time until a safe temperature is reached.

Before starting processes in which potentially explosive mixtures may develop, the device and/or the ambient temperature in the container must cool down to a safe temperature that no longer poses an explosion hazard, see also the note on explosion protection above. Possible hazards when spraying fluids must also be taken into account and considered in a separate risk assessment by the operating company.

NOTE ON EXPLOSION PROTECTION

To maintain the required temperature class or the permissible temperature range, the corresponding process temperatures must be monitored.
If this is not observed, the explosion protection could be invalidated.

- *The system for monitoring and limiting the temperature must ensure that the specified limits are complied with. The limit value for switching off must never exceed the max. specified temperatures.*
- *All components of the monitoring equipment must have an Ex approval according to the existing zones, and be approved according to ATEX Directive 2014/34/EU for device group II in the required categories.*
- *To monitor the temperature, it is recommended to operate an intrinsically safe temperature sensor or temperature probe (e.g. resistance thermometer Pt 100) in combination with an Ex-barrier/switching amplifier.*

3 Construction and Function

For the development of the device, importance was attached to simple shape and functional design for the operating company. The outer appearance of the device is harmonious and compact.

To protect the innovation, the design of the devices was registered with the relevant authorities.

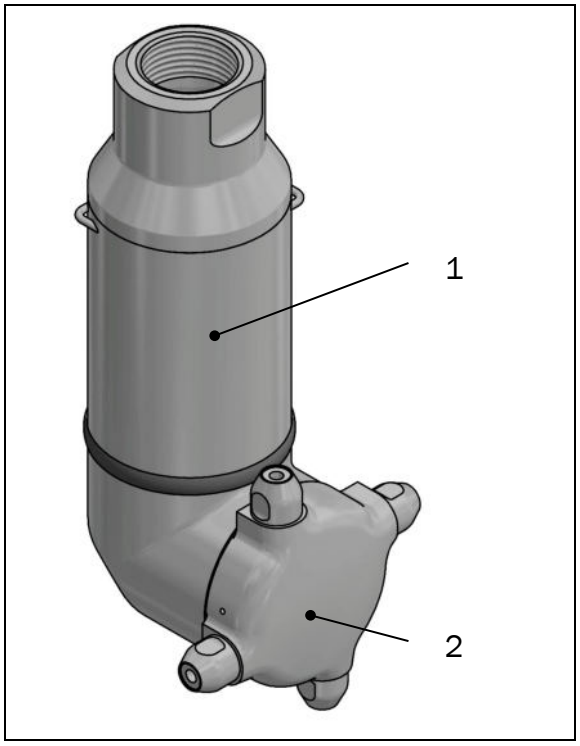
– European Union (EU)	Community Design No.	002772095-0001; 005879129-0001/-0002
– United Kingdom (UK)	Design No.	90058791290001; 90058791290002
– United States (US)	Design No.	D790,661 S; D897,494 S; D909,532 S
– India (IN)	Design No.	281376; 318537-001; 318538-001
– China (CN)	Design No.	303855808 S; 305505176 S; 305505177 S

3.1 Construction

The TANKO-MX series devices are essentially identical in construction. The design is primarily determined by the different connections and the number and sizes of the nozzles. This results in the differing construction sizes and performance parameters of the devices, e.g. volume flow rate and cleaning radius. The cleaning of differently sized containers is possible due to the differing ranges of the cleaning jet.

3.1.1 MX125 Construction

The Container Cleaning Device Comprises the following Main Components:



1 AG drive unit

2 AG cleaning head

Figure 3.1-1: Overview MX125-G14

3.1.2 MX150 Construction

The Container Cleaning Device Comprises the following Main Components:

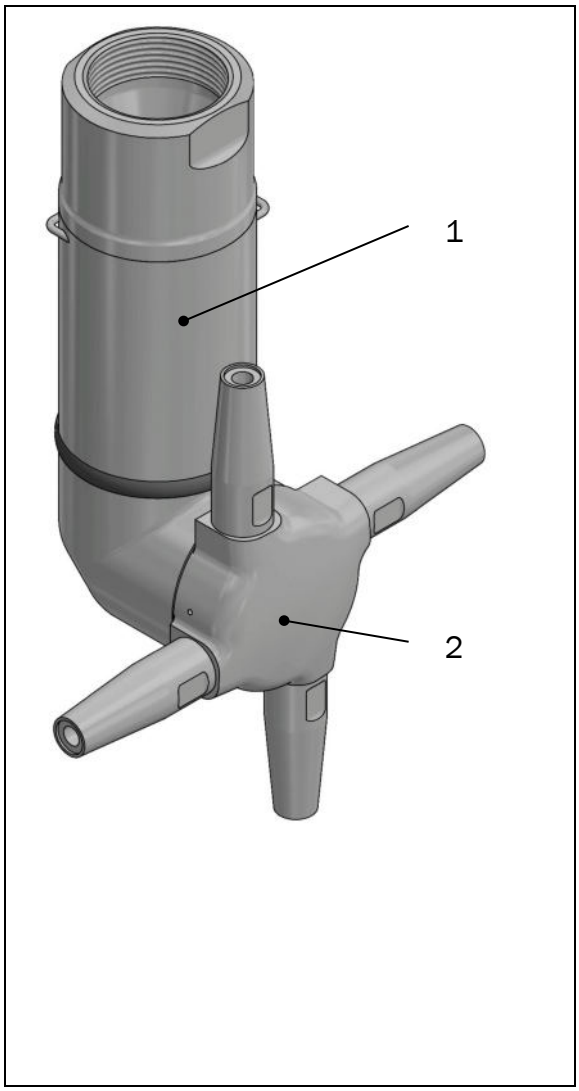


Figure 3.1-2: Overview MX150-G14

1 AG drive unit

2 AG cleaning head

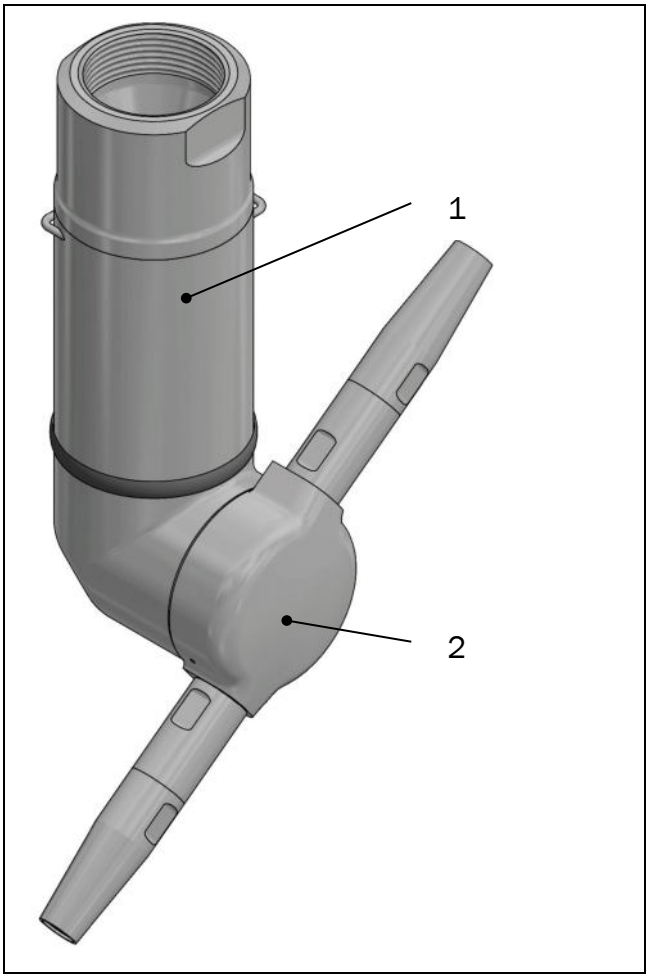


Figure 3.1-3: Overview MX150-G12

3.2 General Function Description

The jet cleaner of the TANKO-MX series is a cleaning device design with an internal drive. The materials of the device are stainless steel and plastic. The bearings do not require additional lubrication as they are flushed with cleaning medium during operation and thus simultaneously lubricated and cooled.

The drive unit is driven by the cleaning media which flows through it. According to the operating principle of an axial turbine, the cleaning medium flows through the media connection, through a flow-in disk and into the device and drives the impeller which is solidly connected to a rotor shaft.

The cleaning head is connected to the drive unit in such a way that the generated torque is transmitted directly onto the integrated bevel gear unit.

The gear unit comprises one fixed bevel gear wheel and one circulating bevel gear wheel. The circulating bevel gear wheel drives the nozzle carrier (with nozzles). The rotation of the circulating bevel

gear wheel around the axis of the fixed bevel gear wheel and the forced rotation around its own axis generates the orbital rotary movement of the nozzles around the cleaning head.

The different number of teeth on the bevel gears causes the nozzle position to shift with each revolution of the cleaning head. A cycle is complete when the nozzles are back in their initial starting position after a certain number of revolutions.

The orbital movement of the jet creates a closed cleaning pattern on the inner surface of the container, the mesh size of which depends on the number of teeth on the bevel gears, the number of nozzles and the distance from the container wall.

The jet-blast principle of the nozzles concentrates the cleaning medium, generating a high-energy jet. The mechanical cleaning effect depends on the outlet speed, the mass and the angle of impact of the cleaning medium. The intensive cleaning jets dislodge the deposits adhering to the container wall, rinse them off at high speed and discharge them. Very good cleaning results can be achieved using the jet cleaner for soluble substances and if the appropriate jet cleaner is selected for the respective container size.

Differently sized devices, variations of head sizes, nozzle quantity and the nozzle bore are available to suit the specific requirement and the size of the container.

The container outlet must be open during a cleaning process, i.e. no accumulation of cleaning medium should occur. When the device is not in operation, the supply line must be closed off as close as possible to the media connection [MC] using a permanently sealed shut-off fitting.

Note on the Use of Devices within the Effective Range of Internal Fittings

If the jet cleaner is used within the effective range of internal fittings, i.e. if there is a possibility of collision between the device (downpipe [DP] with cleaning head) and moving internal fittings in the container, safe operation of the device is only possible with additional protection measures.

The operating company should also conduct a hazard or risk assessment to identify and implement the functional requirements for the device controller, and, if necessary, additional monitoring equipment on the container to prevent collisions between the device (downpipe [DP] with cleaning head) and any internal fittings. The following functions and associated monitoring must be ensured:

- The rest position of moving internal fittings must be defined and monitored.
- Cleaning may only be started if the device is attached securely to the container and all connections are technically leakproof.
- The process may only be restarted after a completed cleaning process if the downpipe [DP] with the cleaning head is no longer located in the effective range of the internal fitting or the device was removed from the container.

It must be ensured that the cleaning process can be started only if moving installations in the plant that could collide with the effective range of the device (downpipe [DP] with cleaning head), are in their rest position outside the effective range of the device and are secured against being turned on again. This system must guarantee a high level of safety.

Application Examples for Jet Cleaners

Tanks, silos, barrels, containers, pipes, dryers, centrifuges, agitators, vacuum tanks, spray towers, container washing plants, fermenters, filters, mixing containers and horizontal dryers.

Comment on the Cleaning Process

The result of a cleaning process with the device, like all other cleaning processes, depends on multiple parameters. According to the "Sinner's Circle", the four most important parameters for cleaning are:

- Chemicals (cleaning medium, plus the product and its concentration)
- Mechanical power (removal of dirt, establishment of contact with the cleaning medium)
- Temperature
- Time (reaction time of the cleaning medium and duration of the cleaning process)

All four factors are interdependent and variable in relation to each other in terms of their magnitudes. The desired cleaning result can only be achieved with a well-balanced combination of pressure, flow, reaction time, temperature and cleaning medium.

Cycle (device-specific)

Depending on the drive characteristics of the cleaning device, the orbital movement of the cleaning jet results in the application of an increasingly dense cleaning pattern on the inner wall of the container. After a certain number of revolutions of the cleaning head, a completely closed cleaning pattern has been created, and the device-specific cycle [Z] has been run through. The nozzles are back in their start position and the cycle [Z] starts again.

The speed [n] of the cleaning head varies for devices driven with cleaning medium depending on the volume flow rate which is determined in particular by the number of nozzles, the size of the bores in the nozzles and by the pressure of the cleaning medium.

Cleaning Times

According to these instructions, the cleaning time [$t_{cleaning}$] is the time required for a completed cleaning process with the following influencing values:

cleaning times [$t_{cleaning}$] = number of cycles [N_{cycle}] x time for a cycle [t_{cycle}]

In practice, the cleaning time is used as the basis for planning the cleaning process. The number of cycles or even partial-cycles can be adapted according to the cleaning requirements.

3.2.1 MX Function

The item numbers shown in brackets refer to Figure 7.5-1: Internal structure (example MX125).

The cleaning fluid enters through the connection cover (01) of the device and flows through the bores of the inflow disk (14) and into the drive unit at a certain angle. In the process, the fluid meets the rotor impeller (15) which is connected fixedly to the shaft of the spur gear (18). The parts are set in rotation and the spur gear (18) drives the planetary gear.

The spur gear with internal gearing (22) of the planetary gear is screwed fixedly to the shaft-axle connection (24) so that the generated torque is transmitted directly from the drive unit in the direction of the cleaning head. Simultaneously, the cleaning agent flows further through the planetary gear via the bores in the ring gear (22), through the bevel gear for the nozzle carrier (26), and into the shaft-axle connection (24) of the cleaning head.

In the cleaning head there is a bevel gear unit which comprises a fixed bevel gear for the housing (23) and a circulating bevel gear for the nozzle carrier (26). The fixed bevel gear for the housing (23) is screwed fixedly to the housing (02).

The rotation of the shaft-axle connection (24) and the gearing of the bevel gears force the bevel gear for the nozzle carrier (26) to rotate.

The circulating bevel gear for the nozzle carrier (26) is bearing mounted on the driver shaft for the nozzle carrier (25) and connected to the driver shaft by a pin (35). The nozzle carrier (27) is screwed fixedly to the driver shaft for the nozzle carrier (25). The nozzle carrier (27) is therefore driven.

The simultaneous rotation of the bevel gear wheel for the nozzle carrier (26) around the axis of the fixed bevel gear wheel for the housing (23) and the forced rotation around its own axis generates the orbital rotary movement of the nozzles (12) around the cleaning head.

The fluid flows past the bevel gear wheel for the nozzle carrier (26) and into the nozzle carrier (26) and is distributed to the side bores for the nozzles (12). From there, the fluid passes through the openings of the nozzles (12) and back out again.

Any leakages from the cleaning device are used for the device's self-cleaning.

Time for a cycle [t_{cycle}] MX125/MX150

- If the entry pressure is 3 – 8 bar (44 – 116 psig), the speed of the cleaning head [n] is 5 – 14 rpm. Fluctuations of up to 20% are to be expected due to the design.
- A cycle [Z] is completed after 43 revolutions.
- To calculate the time for a cycle [t_{cycle}], divide the cycle [Z] by the speed [n] of the cleaning head.

Examples [$t_{cycle} = Z : n$]:

$t_{cycle\ (max.)}$ = 43 revolutions : 05 rpm = 8,60 min x 60 s/min ≈ 516 s (max.)

$t_{cycle\ (min.)}$ = 43 revolutions : 14 rpm = 3,07 min x 60 s/min ≈ 184 s (min.)

3.3 Technical Data

The estimated safe service life of the device is 10 years with single-shift operation and the use of drinking water.

The prerequisites for this are that the device must be maintained properly at the intervals specified in *Section 7.4 Maintenance* and the wear parts must be replaced regularly.

All media other than tap water can reduce the service life of the device.

Using a suitable monitoring and limiting system, the owner must ensure that the operating parameters such as temperature, pressure and flow rate are complied with. The settings must be made in such a way that the maximum permissible values are not exceeded and the minimum permissible values are not fallen short of. If this should occur, then a safety device must bring the device and/or the system to a safe state.

NOTE ON EXPLOSION PROTECTION

Restriction of the operating parameters of the device!

The maximum permitted operating parameters such as container size, operating pressure and volume flow rate must be taken into account due to electrostatic charge when handling fluids.

If this is not observed, the explosion protection could be invalidated.

- *Comply with the notes in Section 3.4 Cleaning Media before commissioning or recommissioning the device.*

Designation	TANKO-MX125-G14	TANKO-MX150-G14	TANKO-MX150-G12
Cleaning process			
Range – Cleaning radius (max.) – Wetting radius (max.)	 4 m (13,12 ft) 5 m (16,40 ft)	 7,5 m (24,60 ft) 10,5 m (34,44 ft)	 9 m (29,52 ft) 10,2 m (33,46 ft)
Volume flow rate/flow	*see diagram Figure 3.3-1*	*see diagram Figure 3.3-2*	*see diagram Figure 3.3-3*
Operating pressure – Cleaning medium	3 to 8 bar (43.5 to 116 psig)		
Pressure in the container	Depending on the process conditions see *Section 2.1* 0 to 0,1 bar (0 bis 1,45 psig) with Ex-atmosphere 0 to 0.5 bar (0 to 7.25 psig) without Ex-atmosphere		
Operating temperature T_p – Cleaning medium	Depending on the process conditions see *Section 2.1* +5 °C to +60 °C (+41 °F bis +140 °F) with Ex-atmosphere +5 °C to +95 °C (+41 °F to +203 °F) without Ex-atmosphere		
Ambient temperature T_a – inside the container	Depending on the process conditions see *Section 2.1* +5 °C to +60 °C (+41 °F bis +140 °F) with Ex-atmosphere +5 °C to +95 °C (+41 °F to +203 °F) without Ex-atmosphere		
Cleaning time	see *Section 3.2*	see *Section 3.2*	see *Section 3.2*
Rest state			
Pressure in the container	Depending on the process conditions see *Section 2.1* 0 bis 0,1 bar (0 bis 1,45 psig) with Ex-atmosphere without Ex-atmosphere **Note on the pressure in the container at rest* see *side 32*		
Ambient temperature T_a - inside the container	Depending on the process conditions see *Section 2.1* -20 °C to +60 °C (-4 °F bis +140 °F) with Ex-atmosphere -20 °C to +140 °C (-4 °F to +284 °F) without Ex-atmosphere		
NOTE Risk of frost!	Empty the device at temperatures below freezing.		
Installation Dimensions			
Process connection [PC]	not specified (operator side)		
Media connection [MC]	1" BSP or NPT Inner thread	1 ½" BSP or NPT Inner thread	1 ½" BSP or NPT Inner thread
Installation opening – Stationary device – Mobile device	see *Section 5.2.1* Ø 125 mm (Ø 5 in) > Ø 160 mm (Ø 6 ¼ in)	see *Section 5.2.1* Ø 220 mm (Ø 8 ½ in) > Ø 235 mm (Ø 9 ¼ in)	see *Section 5.2.1* Ø 150 mm (Ø 6 in) > Ø 310 mm (Ø 12 ¼ in)
No. of nozzles – optional	4 (1x4) ---	4 (1x4) ---	2 (1x2) ---
Nozzle bore	Ø 4.5 / 5.0 / 6.0 mm	Ø 7.0 / 8.0 mm	Ø 7.0 / 8.0 / 11,0 mm
Nozzle movement (orbital)	Ball Ø 150 mm (6 in)	Ball Ø 225 mm (8 ⅞ in)	Ball Ø 300 mm (11 ⅞ in)
Jet movement	360° orbital	360° orbital	360° orbital

Drive			
Drive type – hydraulic	Hydraulic gear turbine		
Translation – Drive: Cleaning head	≈ 274 : 1	≈ 274 : 1	≈ 274 : 1
Cleaning head speed	≈ 5 – 14 rpm	≈ 5 – 14 rpm	≈ 5 – 14 rpm
Emission noise pressure level – Outside the container	Depending on the condition of the container! The noise pressure level can exceed the maximum permissible exposition value of $L_{EX, 8h}$ = 85 dB(A).		
Miscellaneous			
Materials – in contact with media – other	see *Section 7.5.1* 1.4404/08 (AISI 316L) 1.4571 (AISI 316Ti) C-PTFE; PEEK+PTFE; 1.4401 (AISI 316)	see *Section 7.5.1* 1.4404/08 (AISI 316L) 1.4571 (AISI 316Ti) C-PTFE; PEEK+PTFE; 1.4401 (AISI 316)	see *Section 7.5.1* 1.4404/08 (AISI 316L) 1.4571 (AISI 316Ti) C-PTFE; PEEK+PTFE; 1.4401 (AISI 316)
Weight (standard)	≈ 3.2 kg	≈ 3.6 kg	≈ 3.5 kg / ≈ 3.8 kg

Table 3.3-1: Operating Parameters of the Device

The permissible parameters for the rest state depend on the design of the device (e.g. material of the parts) and must be observed during production or manufacturing processes before or after cleaning.

*Note on the pressure in the container at rest:

Depending on the max. permissible pressure of the container and attached equipment parts as well as the supply line and the shut-off fitting used for the cleaning medium. The requirements of the Pressure Equipment Directive PED 2014/68/EU must be taken into account.

Operating pressure of the cleaning medium

This information refers to the flow pressure in the supply line of the cleaning medium directly upstream of the device and not at the pump.

Installation opening

The specified dimensions of the installation opening are recommended minimum dimensions for installing the device with the cleaning head in the container in an assembled state. The required size of the opening varies depending on the number and size of the nozzles and depends on the type of use as a "stationary or mobile device". Smaller installation openings using the device are possible (e.g. by using shorter nozzles). The instructions in Section 5.2.3 Installing the Device must be observed.

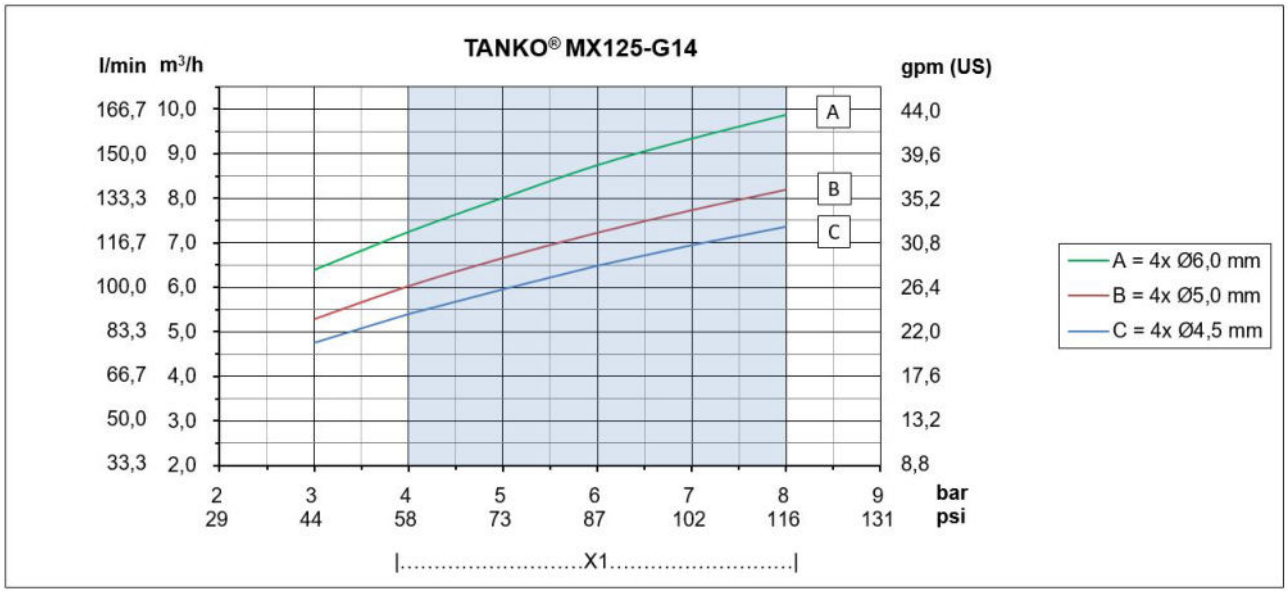
Consumption Data and Operating Pressure for the Cleaning Process:

The specified values for consumption are average values, and may deviate by approx. ± 10% during normal operation. They apply to operation with clean water as the cleaning fluid at a temperature of +25 °C / +77 °F. The values may differ if a different cleaning fluid and a different medium temperature are used.

The consumption of cleaning fluid of the devices depends on multiple factors, e.g. the pressure of the cleaning fluid and the size of the nozzle openings. An increase in pressure leads to increased consumption (throughput). The permitted range for the operating pressure of the cleaning medium must be adhered to.

MX125-G14 Variants / 3 – 8 bar (43.5 – 116 psig)

- TANKO-MX125-G14 1 x 4 nozzles-Ø 4.5 mm
- TANKO-MX125-G14 1 x 4 nozzles-Ø 5.0 mm
- TANKO-MX125-G14 1 x 4 nozzles-Ø 6.0 mm

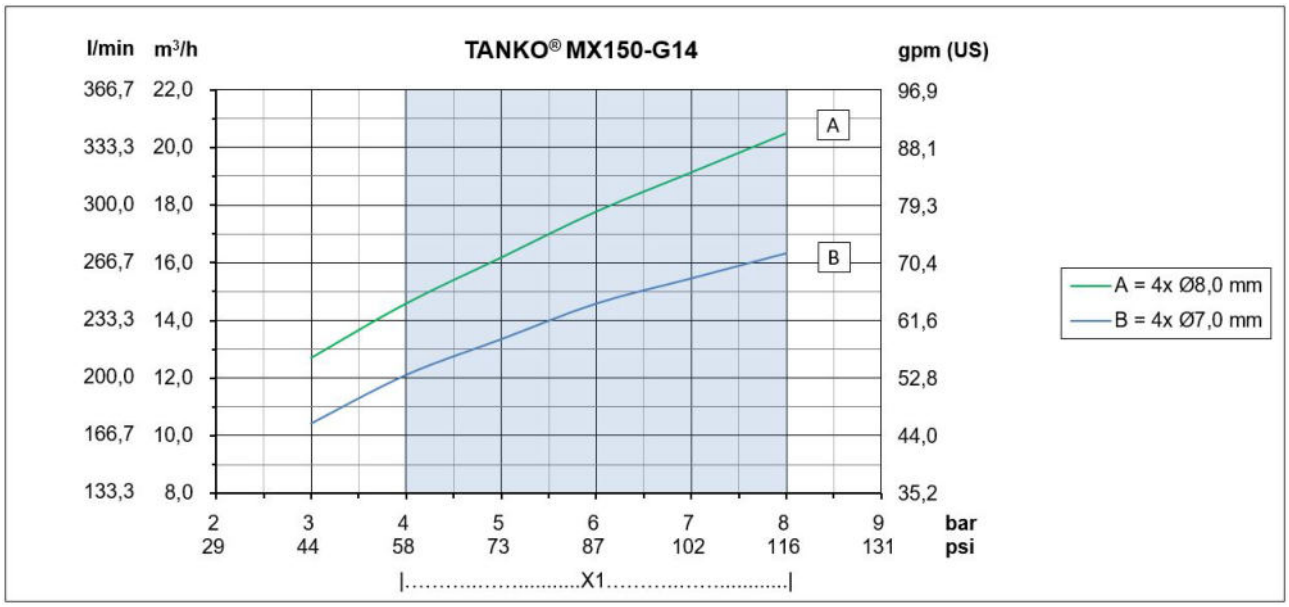


X1 – optimal pressure range

Figure 3.3-1: Chart - MX125-G14 flow (article no. 66MA4...)

MX150-G14 Variants / 3 – 8 bar (43.5 – 116 psig)

- TANKO-MX150-G14 1 x 4 nozzles-Ø 7.0 mm
- TANKO-MX150-G14 1 x 4 nozzles-Ø 8.0 mm

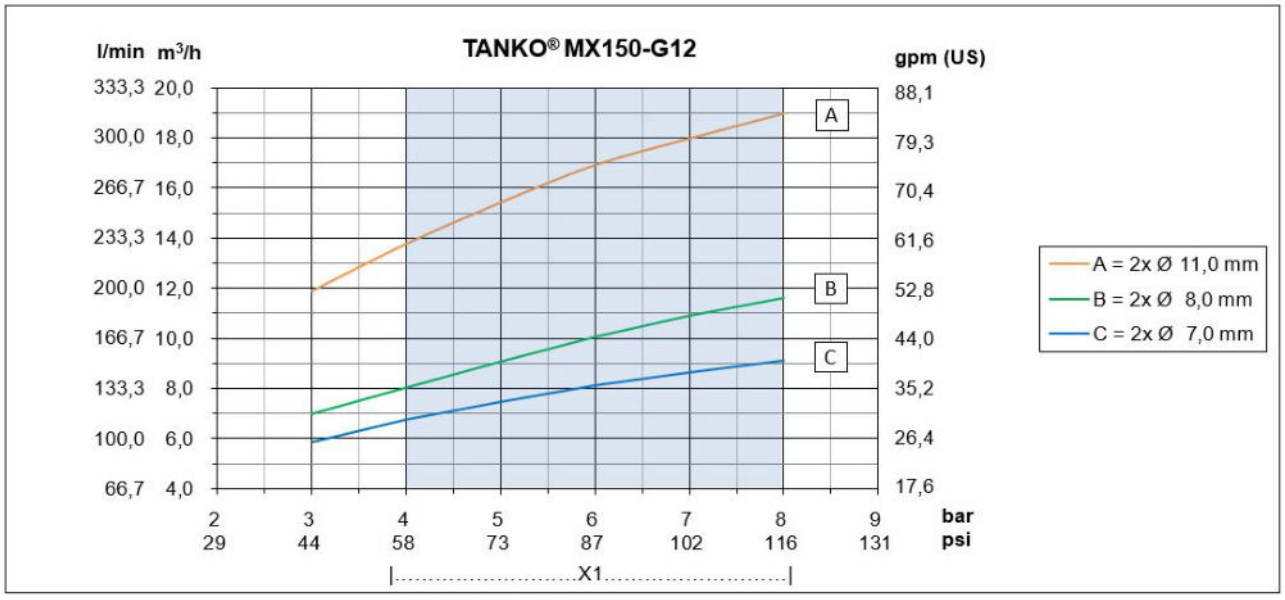


X1 – optimal pressure range

Figure 3.3-2: Chart - MX150-G14 flow (article no. 66MB4...)

MX150-G12 Variants / 3 – 8 bar (43.5 – 116 psig)

- TANKO-MX150-G12 1 x 2 nozzles-Ø 7.0 mm
- TANKO-MX150-G12 1 x 2 nozzles-Ø 8.0 mm
- TANKO-MX150-G12 1 x 2 nozzles-Ø 11,0 mm



X1 – optimal pressure range

Figure 3.3-3: Chart - MX150-G12 flow (article no. 66MB2.../66MC2...)

3.4 Cleaning Media

Due to the wide variety of practical cases of application and use for the cleaning device, it is NOT possible for AWH to recommend specific cleaning media for the operating company. The operating company bears the sole responsibility for the type of cleaning media, their use and handling.

For this reason, AWH can provide the operating company with **a few reference points and notes** (for a device in a container) **but only as a precautionary measure**, which must be observed and integrated into the operating company's hazard and risk assessments.

WARNING

Danger due to corrosive and irritant cleaning medium!

When handling the cleaning medium, it is IMPOSSIBLE TO EXCLUDE the risk of inhalation, swallowing, contact with the skin, eyes and mucous membranes.

There is a risk of death or severe physical injury.

- *Adhere to the regulations and specifications in the safety data sheets for the cleaning media (e.g. vapors or hazardous substances).*

CAUTION

Danger as a result of using incorrect cleaning media!

Due to their material resistance, the materials used in the device impose certain limitations on the cleaning media used.

Failure to observe these restrictions can result in the failure of components or a device malfunction, causing material damage and consequential damages.

- *The cleaning media must be approved for all of the materials of the device (e.g. gaskets, bushings) and for the substances to be cleaned in the container that come into contact with it.*
- *Cleaning media containing the following (corrosive) substances may NOT be used:*
  - *chlorine and chlorine ions*
  - *substances containing salt (no resistance to seawater)*
  - *medium-concentrated to highly concentrated organic acids*
  - *strong acids, in particular nitric acid and sulfuric acid (with acid content > 65%)*
  - *aliphatic, aromatic and chlorinated hydrocarbons*
  - *phenols*
  - *fluorine compounds*
- *Cleaning media containing solids or liquids with solid particles or solid content (e.g. abrasives) which can lead to increased wear and/or blockages of the spray holes may NOT be used.*

When choosing cleaning media, not only the compatibility of the materials used in the device should be checked, but also of the system. For example:

- PEEK is not resistant to concentrated sulfuric or nitric acid.
- EPDM is only resistant to a limited extent to grease and mineral and synthetic oils. The possible applications depend to a large degree on the concentration of the greases and the applicable temperatures. When in contact with very fatty materials, EPDM can expand or swell significantly, even at low temperatures.

NOTE

Risk of damage to the device from the cleaning medium!

Dirt or foreign objects in the cleaning medium can have a negative effect on the function of the device.

There is a risk of material damage and consequential damages.

- *Use a suitable filter system in the cleaning medium supply line. The use of a filter with a filtration effect corresponding to a mesh width of 50 µm is recommended.*
- *Adhere to the instructions on supply and return lines in Section 5.2 Installation.*

Only clean, sprayable fluids may be used.

For NON-ATEX applications, the Following Media are Permitted for Cleaning the Container:

- Water
- Water-based solutions (e.g. water with alkaline cleaning additives and similar)

For proper use in food or pharmaceutical applications, the cleaning media must meet the hygienic requirements for this or be suitable or approved. If possible, only environmentally compatible media should be used for cleaning.

NOTE Applications with fully demineralized water:
Ultra pure water, ultra pure water vapor and ultra pure water vapor condensate can have extremely corrosive effects under certain conditions. Particularly with elevated operating temperatures (e.g. 80 °C to 120 °C) and with increasing operating time, corrosion reactions are possible including where stainless steel is used.
The appearance of corrosion on supposedly stainless steels occurs in various classes or types and depends on countless influencing parameters such as temperature, pressure, degree of mineralization of the media (pH value and electrical conductivity) and operating time.

In practice, the special types of corrosion of stainless steels cannot always be prevented, but can be significantly minimized and delayed.

If you have any questions or uncertainties about this, please consult AWH!

3.4.1 Cleaning Media for ATEX Applications

With the process of spraying, ignition sources (such as hot surfaces, static electricity and exothermic reaction) may occur. Since the process of spraying is the responsibility of the owner, this person must take appropriate measures to prevent these ignition sources from becoming active. The process of spraying and jet-cleaning with fluids always requires an individual analysis of the owner.

Here AWH refers to the relevant standards and technical rules.

NOTE ON EXPLOSION PROTECTION

Before using the device in an Ex zone, the technical rules for avoiding the dangers of potentially explosive atmospheres must be observed.

If this is not observed, the explosion protection could be invalidated.

- *TRGS 720 "Hazardous, potentially explosive mixtures - General -"*
- *TRGS 721 "Hazardous explosive mixtures - Assessment of the explosion hazard -"*
- *TRGS 722 "Avoidance or restriction of hazardous potentially explosive mixtures"*
- *TRGS 723 "Hazardous potentially explosive mixtures - Avoidance of ignition of hazardous potentially explosive mixtures"*
- *TRGS 727 "Avoidance of ignition hazards due to electrostatic charge", Chapter 4.12 "Cleaning containers"*
- *IEC/TS 60079-32-1, Explosive atmospheres – Part 32-1: Electrostatic hazards, guidance, Chapter "Spraying liquids and tank cleaning"*

Excerpts from **TRGS 727** "Prevention of ignition hazards due to electrostatic charge"

Chapter 4 Electrostatic Charges when Handling Fluids

When filling and emptying containers with fluids, when recirculating, stirring, mixing and spraying fluids and also when measuring, sampling and cleaning, the fluids themselves or the interior of the container could be charged in a dangerous manner. The size and intensity of the resulting charge depend on the properties of the fluid, its flow rate, the procedure, the size and geometry of the container as well as the container material."

Section 4.12 Cleaning Containers

(1) When cleaning containers, particularly during jet cleaning, high electrostatic charges can occur.

(2) The resulting amount of charge is influenced by various factors, including:

- the properties of the jet cleaning material,
- further additives to the jet cleaning material,
- the phase condition of the jet cleaning material,
- the phase condition of the contaminated jet cleaning material,
- the flow rate during fluid jet cleaning,
- the shape and number of jet nozzles,
- the operating pressure,
- the size and geometry of the container,
- the fluid properties in the container,
- the residual fluid and
- the fluid level.

(3) Ignitable mixtures (e.g. carbon disulfide/air mixtures) require additional measures.

(4) Impacting cleaning jets form droplets or mists when they disintegrate that are normally charged and generate electrical charges in the container. Existing turbulence distributes the charged mist throughout the container, thus generating a high space charge density with high field strengths.

Note 1: The electrical potential generated by the mist has its maximum value in the middle of the container and depends on the type of cleaning fluid, e.g. water, oil or the use of auxiliary substance, and the parameters of the jet cleaner used, e.g. fluid pressure, flow rate and nozzle diameter.

Note 2: Furthermore, isolated conductors can develop when cleaning with a water jet. Falling water clusters can be charged by impact on the potential in the center of the tank. Ignitable discharges can occur when the water clusters approach grounded conductive objects or the ground.

Section 4.12.1 Cleaning with Water Jets of Pressures up to 12 Bar

When cleaning with water jets up to 12 bar and with up to 20 nozzles, dangerous charges are not to be expected as long as the fluid flow rate does not exceed 7 l/s and the container volume does not exceed 10 m^3.
Remark AWH: For the number of nozzles, all spray nozzles per jet cleaner including the nozzles of other devices in one container must be considered in total!

Section 4.12.2 Cleaning with Water jets of Pressures up to 12 Bar

Remark AWH: This section does not apply to the intended use of the device (see max. operating pressure off the cleaning medium)!

Section 4.12.3 Cleaning with Low and Medium Conductivity Solvents from Pressures up to 12 Bar

(1) If fluids of low and medium conductivity, e.g. organic solvents, are used as cleaning agents, the proportion of a second phase, e.g. water or solid, must not exceed 1%.

(2) Cleaning agents may only be applied in a closed circuit if the level of contamination is kept below 1%.

Note 1: The accumulation of fluid in the container during cleaning is to be avoided.

Note 2: Fluids of low conductivity, such as hydrocarbons, charge less than water during spraying because they contain only a low concentration of dissociated ions.

Remark AWH: Here recommends the Technical Specification IEC/TS 60079-32-1 Section 7.10.3 a foreign body content of max. 0.5%.

Section 4.12.4 Cleaning with Solvents of Medium Conductivity from Pressures above 12 Bar

Remark AWH: This section does not apply to the intended use of the device (see max. operating pressure off the cleaning medium)!

Section 4.12.5 Cleaning with Steam Jets

For steam jet cleaning of metallic containers coated with hydrocarbons with a capacity V < 100 m^3, hazardous charges are not to be expected. No isolating metal parts may be present in the container to be cleaned.

NOTE ON EXPLOSION PROTECTION

Avoiding the formation of a hazardous explosive atmosphere and the effectiveness of ignition sources should be the primary focus of explosion protection. Explosions with dangerous effects may occur if the following four conditions are met simultaneously:

- *High level of dispersion of flammable substances,*
- *Concentration of flammable substances in the air within the explosive limits,*
- *Hazardous quantity of potentially explosive atmosphere,*
- *Effective ignition source*

To prevent hazardous charges, appropriate measures must be taken in terms of the construction and equipment to guarantee with a very high level of reliability corresponding to category 1 that the relevant process variables

- Type of cleaning medium
- Conductivity of cleaning medium
- Operating pressure of cleaning medium
- Volume flow rate of cleaning medium
- Proportion of a second phase in cleaning medium
- Container size
- Maximum number of spray nozzles per container
- Temperature in the container to be cleaned and temperature of the cleaning medium

are complied with in accordance with the Technical Specification IEC/TS 60079-32-1 and TRGS 727 in the valid version and as described in the operating instructions.

DANGER

Explosion hazard due to ignition source!

Splashing or spraying of fluids to clean the container can create potentially effective ignition sources (such as exothermic chemical reaction or static discharge due to potential differences). The existing potentially explosive atmosphere can be ignited.

There is a risk of death or severe physical injury.

- *Adhere to the regulations and specifications in the safety data sheets for the cleaning media (e.g. ignition temperature; flash point; explosive limits).*
- *The cleaning medium and the material to be cleaned must not cause a chemical reaction that might cause an ignition.*
- *Corrosive or explosive fluids, fluids with solid content (e.g. abrasives) and substances that can undergo exothermic reactions with the material of the container or the plant (e.g. chlorine, substances containing chlorine ions or salt) must not be used for cleaning purposes.*
- *Observe electrostatic charges when handling fluids.*
- *The cleaning medium must not contain any foreign bodies (e.g. rust particles).*

For ATEX applications, the Following Media are Permitted for Cleaning the Container:

When selecting the cleaning media, the conditions for the process state **B)** according to *Section 2.1* are decisive. Solvents with low and medium conductivity (k ≤ 10,000 pS/m) and water are permitted as cleaning media under the following conditions:

– When spraying or misting aqueous solutions (e.g. water with alkaline cleaning additives and similar), they must not generate electrostatic charges that are stronger than those that would be generated when using water without additives (see TRGS 727 Annex A 1.3.)

Normally, dangerous electrostatic charges only occur with fluids of low electrical conductivity. When spraying or atomizing, however, other physical conditions apply.

Extract from TRGS 727 Annex A 1.3 Spraying and jet-cleaning with fluids
"The atomization of a fluid jet into small droplets can produce highly charged fluid jets or mists regardless of the conductivity of the fluid. As a general rule: the more conductive the fluid, the stronger the charge generation. Thus, a water jet generates more charges than an oil jet. Even stronger charges are caused by multiphase mixtures, e.g. of oil and water."

NOTE ON EXPLOSION PROTECTION

Conductive solvents (hydrocarbons) which, despite high conductivity (κ > 10,000 pS/m), can become dangerously charged when sprayed, such as some organic acetates, ethers and higher ketones, glycols, glycol ethers, ethyl acetate and isopropyl acetate, are not permitted as cleaning media within the scope of ATEX approval. Their use requires further expert consideration under the responsibility of the operator.

4 Transportation and Storage

AWH products are checked carefully before they are dispatched and are packaged in accordance with the respective transportation and storage conditions. However, it is NOT possible to rule out the possibility of damage during transportation completely.

NOTE ON EXPLOSION PROTECTION

Transportation and storage of the device in a potentially explosive atmosphere are PROHIBITED!

If this is not observed, the explosion protection could be invalidated.

- *Exclude Ex atmospheres by suitable measures and/or free measurement.*

CAUTION

Risk from protruding sharp edges on the device!

Depending on the design, the device may have protruding sharp edges which can be dangerous when handling it.

There is a risk of minor cuts.

- *Wear protective gloves when working on the device.*
- *When handling, e.g. unpacking, transportation without packaging, assembly/ disassembly and maintenance work, beware of protruding sharp edges.*

In the event of damage (including cases involving spare and wear parts) please contact AWH immediately with a damage report.

Scope of Delivery

- Container cleaning device
- Operating and installation instructions
- Technical documents in accordance with the order (e.g. certificates and reports)

The scope of delivery ends at the interfaces of the device (see *Section 5.2.1 Interfaces*).

NOT included in the scope of delivery:

- Fasteners required for fastening the device to the container (e.g. screws, nuts, clamps)
- Gaskets
- Equipment parts, such as filter, shut-off fitting or flow meter for the cleaning medium.
- Energy supply lines (e.g. cables, hoses; adapters)

Refer to the delivery note and the order confirmation for full details of the scope of delivery.

Inspection on Receipt of Goods:

- Immediately check the delivery against the delivery note and the order confirmation on receipt to make sure that it is complete.
- Check the delivery for any transport damage (visual inspection).

Claims:

- Register claims for damaged and/or incomplete deliveries with the transport company immediately.
- Keep the packaging for a possible inspection by the transport company or for return delivery.

Return Delivery:

In the event of a possible return delivery, pack the device parts so that they cannot become damaged during transportation. If possible, use the original packaging and the original packaging material. If neither is available anymore, request a packaging company with specialist personnel.

- Consult AWH if you have any questions regarding packaging and transport safety.

4.1 Packaging

The device is supplied fully assembled. The packaging is selected to suit the conditions of transportation. Required accessories, spare parts, operating or installation instructions and technical documents are packaged separately and enclosed with the delivery.

The packaging should protect the device up until the time of installation against transport damage, corrosion and other damage. Therefore, do not remove the packaging until shortly before installation.

NOTE

Danger due to improper disposal!

Packaging materials are valuable raw materials and can often be re-used or usefully processed and recycled.

Improper disposal can cause environmental damage.

- *Dispose of packaging materials in an environmentally friendly manner and recycle them.*
- *Adhere to the locally valid disposal regulations.*

4.2 Transportation

NOTE ON EXPLOSION PROTECTION

Transport damage can result in the loss of the explosion protection.

- *In the event of signs of transport damage, do NOT commission the device!*
- *Contact the manufacturer of the device.*

NOTE Improper transportation can cause damage to the device.

The functional safety and reliability of the device may be compromised.

- Observe the symbols and instructions on the packaging.
- Always transport the device in dry condition.
- Protect the device from impact.
- If possible, use the original packaging for transportation.
- Proceed with care when unloading the device and when transporting it on your premises.
- Do not remove the packaging until shortly before installation.

4.3 Storage

NOTE ON EXPLOSION PROTECTION

Incorrect storage can result in the loss of the explosion protection.

- *In the event of signs of storage damage, do NOT commission the device!*
- *Contact the manufacturer of the device.*

The packaging used for the device, the components and the replacement/wear parts is designed to be stored for 3 months.

NOTE Risk of damage to the device as a result of incorrect storage!

Incorrect storage can cause damage to the device and its components and lead to premature aging (e.g. plastic parts).

The failure of components or a device malfunction can cause material damage and consequential damages.

- Adhere to the following storage conditions:
  - Store the device in the original packaging wherever possible.
  - Store the device in a clean and dry place (e.g. closed, dust-free room).
  - Store the device in stable environmental conditions.
  - Prevent major temperature fluctuations so that condensation does not form.
  - Prevent dirt and moisture from entering into the device.
  - Protect the device from the elements (e.g. formation of condensation in the device, sunlight).
  - Protect unpacked devices or components with dustproof covers. Condensation must not be allowed to form beneath the cover.

Parameters for Storage (Recommended):

– Room temperature	+10 °C – +45 °C (+50 °F – +113 °F)
– Relative humidity	max. 60% (non-condensing)
– Temperature fluctuations	max. 10 °C (18 °F) per day
– Occurrence of vibrations	v_{eff} < 0.2 mm/s

5 Installation

5.1 Safety Instructions for Installation

NOTE ON EXPLOSION PROTECTION

Work on the device in a potentially explosive atmosphere is PROHIBITED!

If this is not observed, the explosion protection could be invalidated.

- *Exclude Ex atmospheres by suitable measures and/or free measurement.*
- *Only allow instructed personnel to work in potentially explosive atmospheres.*
- *The personal protective equipment must meet the explosion protection requirements.*
- *Do not use a tool that could create sparks.*

DANGER

Danger of ignition in potentially explosive atmosphere due to potential differences!

When filling and emptying containers with fluids, when recirculating, stirring, mixing and spraying fluids and also when measuring, sampling and cleaning, the fluids themselves or the interior of the container could be charged in a dangerous manner.

Differences in potential (e.g. electrostatic charge) can cause igniting sparks or heat, which can act as an ignition source.

There is a risk of death or severe physical injury.

- *Only clean adequately grounded containers made of electrically conductive material without insulating internal coatings.*
- *Make sure that any electrostatic charge is prevented. Also make sure that all electrically conductive parts on the device and the container are grounded for potential equalization to the same potential using grounding cables with a sufficient diameter.*
- *Grounding must always be carried out before commissioning the device.*
  Avoid grounding faults (e.g. subsequent grounding of already charged objects or equipment).
- *Do not secure or seal mechanical connections with electrically insulating materials (such as sealing tape, sealant, adhesive, etc.), if it impairs the grounding of the device on the container.*
- *Wear antistatic shoes and protective clothing in accordance with the requirements for electrically conductive work clothing.*

Within potentially explosive areas, potential equalization is required. "All conductive parts of the device (and the container) must be arranged so that the occurrence of a dangerous potential difference between these parts is unlikely. Where there is a possibility that insulated metal parts may become charged and thereby act as a source of ignition, grounding connections must be provided" *(Excerpt from EN ISO 80079-36 "Non-electrical equipment for explosive atmospheres - Part 1 Basic principles and requirements" Section 6.7.2 Grounding connections for conductive parts).*

WARNING

Risk of falling when working at heights!

When carrying out assembly/disassembly work on parts of the plant at heights, there is a risk of falling.

There is a risk of death or severe physical injury.

- *Do not perform any work at heights except with a safety platform with cage or suitable fall protection (e.g. safety rope and safety harness).*
- *If you are using a harness as fall protection, it is imperative that the rescue concept for a person in the harness is observed.*
- *A person must not remain suspended in the harness for longer than 15 min as there is otherwise a risk of shock or even death.*
- *Wear protective work clothing, safety shoes, protective gloves and a hard hat for work at heights.*

CAUTION

Risk of accidents as a result of improper installation!

Incorrect installation, falling components or failure to comply with the indicated safety notes can result in accidents or damage to property.

There is a risk of minor or moderate injuries.

- *Only allow experts to perform work on the device.*
- *Before starting work, observe the **working steps of the switch-off procedure** (see Section 7.2 Switch-off Procedure).*
- *Wear protective work clothing, protective gloves and safety shoes when performing work.*
- *Do not work on the device unless it is depressurized and in a cool state.*
- *Maintain a safe distance when working on the device. We recommend that you provide 1 m of space for free movement around the device and container.*

CAUTION

Risk from protruding sharp edges on the device!

Depending on the design, the device may have protruding sharp edges which can be dangerous when handling it.

There is a risk of minor cuts.

- *Wear protective gloves when working on the device.*
- *When handling, e.g. unpacking, transportation without packaging, assembly/disassembly and maintenance work, beware of protruding sharp edges.*

CAUTION

Insufficient lighting in the work environment!

The device is NOT equipped with any lighting. Insufficient lighting when working on the device can cause accidents.

There is a risk of minor or moderate injuries.

- *Make sure that there is sufficient and even lighting in all areas of the plant in which the device is used when work is performed on the device.*
- *In Germany, the technical rules for workplaces apply – ASR A3.4. Illuminance of **300 lx (lux)** is recommended (maintenance value).*

Connection to the Energy Supply

Connection to the energy supply should only be established once the device is securely attached mechanically to the container. The connections must be established in such a way that a permanent, secure connection is maintained.

- Hydraulic connections must fulfill the requirements of EN ISO 4413.
- Pneumatic connections must fulfill the requirements of EN ISO 4414.
- Electrical connections must fulfill the requirements of EN 60204-1.

The use of electrically insulating materials for sealing (e.g. Teflon sealing tape) or for bonding (e.g. Loctite adhesive) to secure threaded connections against self-loosening is NOT permitted if this impairs the grounding of the device on the container.

Operation of the device without cleaning medium is only permitted for a limited time for certain situations (see *Table 6.4-1: Time-limited Operation of the Device without Cleaning Medium*). Therefore, it is necessary to continuously monitor the supply of the cleaning medium during cleaning. A malfunction must be detected, registered and evaluated at an early stage in order to immediately transfer the device to a safe operating state.

A disruption to the supply of the cleaning medium can be caused by the following, for example:

– Pump failure (e.g. pump defective, power failure, cable break or loose contact, etc.).
– Deterioration of the filter performance of the installed filter (e.g. filter clogged).
– Shut-off fitting closed.
– Leaks (leakage) at sealing points of the connections and/or line connections.

For detection and monitoring of the fluid flow, a flow meter/monitor is recommended by the manufacturer as the measuring device.

A flow meter consists of two main components, the measuring sensor, which serves as the flow sensor, and an evaluation and supply part, the transmitter.

When selecting the measuring device, attention must be paid to the measuring ranges for pressure and temperature, the fluid to be measured, the type of connection, the nominal width, and the degree of protection, depending on the process and environmental conditions.

NOTE ON EXPLOSION PROTECTION

Danger due to interruption of the supply of the cleaning medium!

In Ex applications, the supply of the cleaning medium must be monitored continuously during cleaning.

If this is not observed, the explosion protection could be invalidated.

- *For applications in the Ex zone, use intrinsically safe measuring devices.*
- *The measuring devices must have an Ex approval according to the existing zones and be approved according to ATEX Directive 2014/34/EU for device group II in the required categories.*

The flow meter should be installed in the immediate vicinity of the media connection [MC] upstream of the device. The manufacturer's instructions for the measuring device for installation must be observed.

NOTE ON EXPLOSION PROTECTION

Zone carry-over

If the device is in the rest state and no cleaning medium is flowing, then it is to be expected that the potentially explosive atmosphere present in the container will spread via the cleaning head inside the downpipe of the device and zone carryover is possible via the media connection [MC].

If this is not observed, the explosion protection could be invalidated.

- *Connect all parts of the device conductively to the grounded container to be cleaned.*
- *Ensure that the media connection [MC] and the supply line for the cleaning medium are technically leakproof.*
- *There may only be an open connection for the cleaning medium from the supply line (pump) to the medium connection [MC] during the cleaning process.*
- *To limit the spread of potentially explosive atmospheres beyond the media connection [MC], provide an appropriate shut-off fitting upstream of the device (use permanently sealed shut-off fittings, such as slide valves, butterfly valves, taps or valves).*
- *Keep the shut-off device closed when the device is not in operation.*
- *In order to exclude gaseous media (e.g. air) even when starting up the pump, the volume of the line between the shut-off device and the media connection [MC] must be kept as low as possible. All lines must be vented.*

NOTE ON EXPLOSION PROTECTION

Flame arrester

When installing the device in potentially explosive atmospheres, it must be taken into account that the device does not have a flame arrester (see EN ISO 16852), and therefore the connection between the inside of the container and the supply line is not flame arresting.

WARNING

Danger due to swinging hydraulic equipment!

In certain operating states, screw and clamp connections may unforeseeably loosen due to significant swinging motions and/or vibrations. This means it is possible for leaks to form at the sealed points of the connections and line connections, from which hot and/or corrosive fluid may spray out at high pressure.

There is a risk of death or severe physical injury.

- *All connections and line connections should be securely attached without mechanical tension and permanently technically leakproof.*
- *During initial commissioning, the swinging and vibrations of the device must always be observed and insofar as is possible, tested under various operating conditions.*
- *In the event of swinging and/or vibrations, avoid releasing the connections by additional measures, such as spot welding or bonding (e.g. Loctite).*

Connection to the Disposal System

NOTE

Danger due to improper disposal!

The medium used for cleaning may contain chemical additives and may additionally become contaminated with residues (e.g. sludge particles) from the previous production process during cleaning. Waste may contain various harmful substances and may NOT be disposed of in ground water, in water courses or in the sewage system.

Improper disposal can cause environmental damage.

- *Please note the safety data sheets for the cleaning media:*
  - *Comply with the hazard and disposal instructions.*
  - *Set out protective measures and compile operating instructions for hazardous substances.*
- *Following cleaning, dispose of the contaminated cleaning medium in an environmentally friendly manner in accordance with the locally applicable regulations, or ecologically recycle it.*

The cleaning media used for the cleaning process may NOT present a danger to the safety and the health of persons even after cleaning. Risk due to filling, use, recovery and disposal is to be avoided.

Depending on the application and properties of the system/container, appropriate measures should be taken to ensure after cleaning that the used/draining medium is properly fed to a preparation or disposal system.

5.2 Installation

The safety instructions in *Section 5.1 Safety Instructions for Installation* must be adhered to before installation of the device in the container.

CAUTION

Fault due to incorrect installation position/location of the device!

Any installation of the device NOT performed correctly can cause damage to the device which puts the functional safety and reliability at risk during commissioning.

That can result in hazards.

There is a risk of minor or moderate injuries.

- *When selecting the installation position of the device, make sure that*
  - *a safe distance is maintained from the internal wall of the container and from nearby components, in order to prevent scraping or impact during operation and*
  - *It is imperative to prevent collisions while the cleaning head and surrounding components (e.g. agitators) are moving simultaneously.*
- *Only fixed pipe installation is permitted. Installation with a hose can cause the installed cleaning device to thump/whip.*
- *Install the device free of mechanical tension.*
- *Refer to the installation dimensions in Table 3.3-1: Operating Parameters of the Device or from the figures in the Section 5.2.1 Interfaces.*

CAUTION

Fault as a result of dirt, foreign objects or damage to the device!

Foreign objects such as scale, burrs, chips, etc. can restrict flow or get into the piping system and cause malfunctions or damage to components, including gaskets. This can result in hazards that endanger the functional safety of the device.

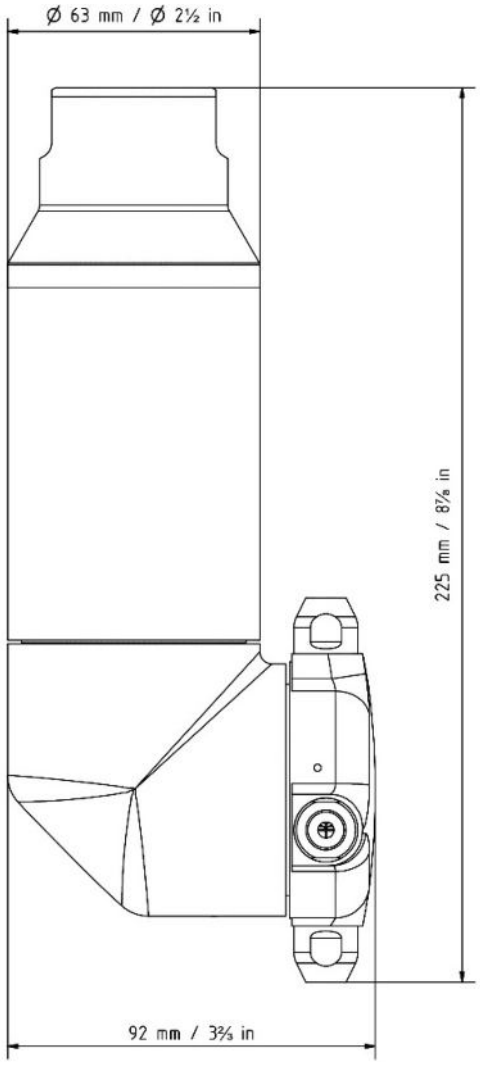
There is a risk of minor or moderate injuries.

Before the device is installed for the first time and for assembly after conversion work on the system in which the device is installed, the following measures must be taken.

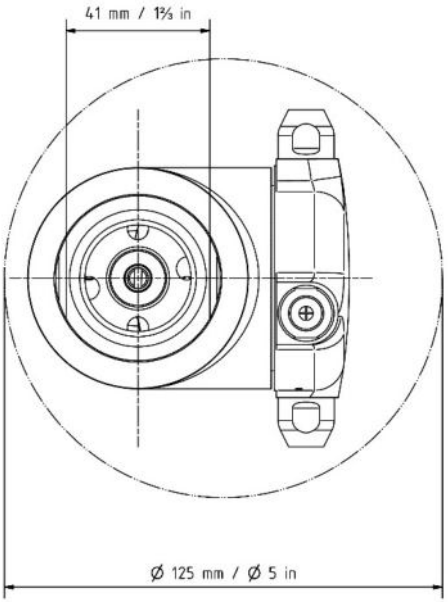
- *All supply and return lines for the cleaning medium must be rinsed with clear water in order to remove any contamination, foreign objects or residue in the supply line (e.g. scale, chippings, welding particles etc.).*
- *Take suitable measures to prevent dirt and foreign objects from entering via the interfaces of the device. Install a filter upstream of the media connection [MC] in the supply line for the cleaning medium (see Section 3.4 Cleaning Media).*
- *Paint must not be applied to the surface of the device.*

5.2.1 Interfaces

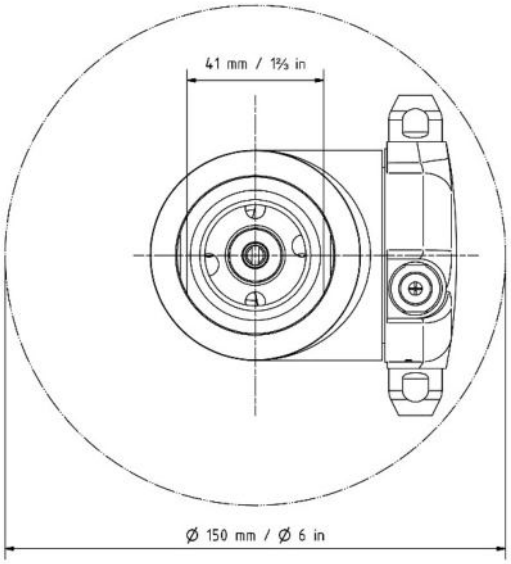
5.2.1.1 Installation Dimensions and Interfaces of the MX125-G14



Front view



Top view (min. Ø of the installation opening)



Top view

Figure 5.2-1: Installation dimensions of the Device - MX125-G14 (article no. 66MA4...)

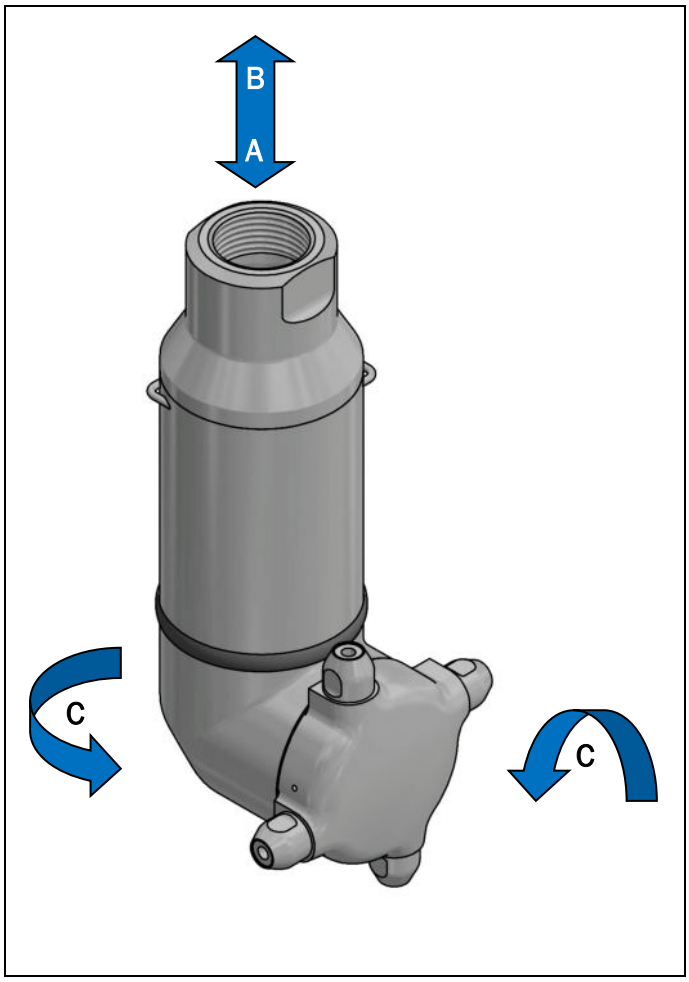


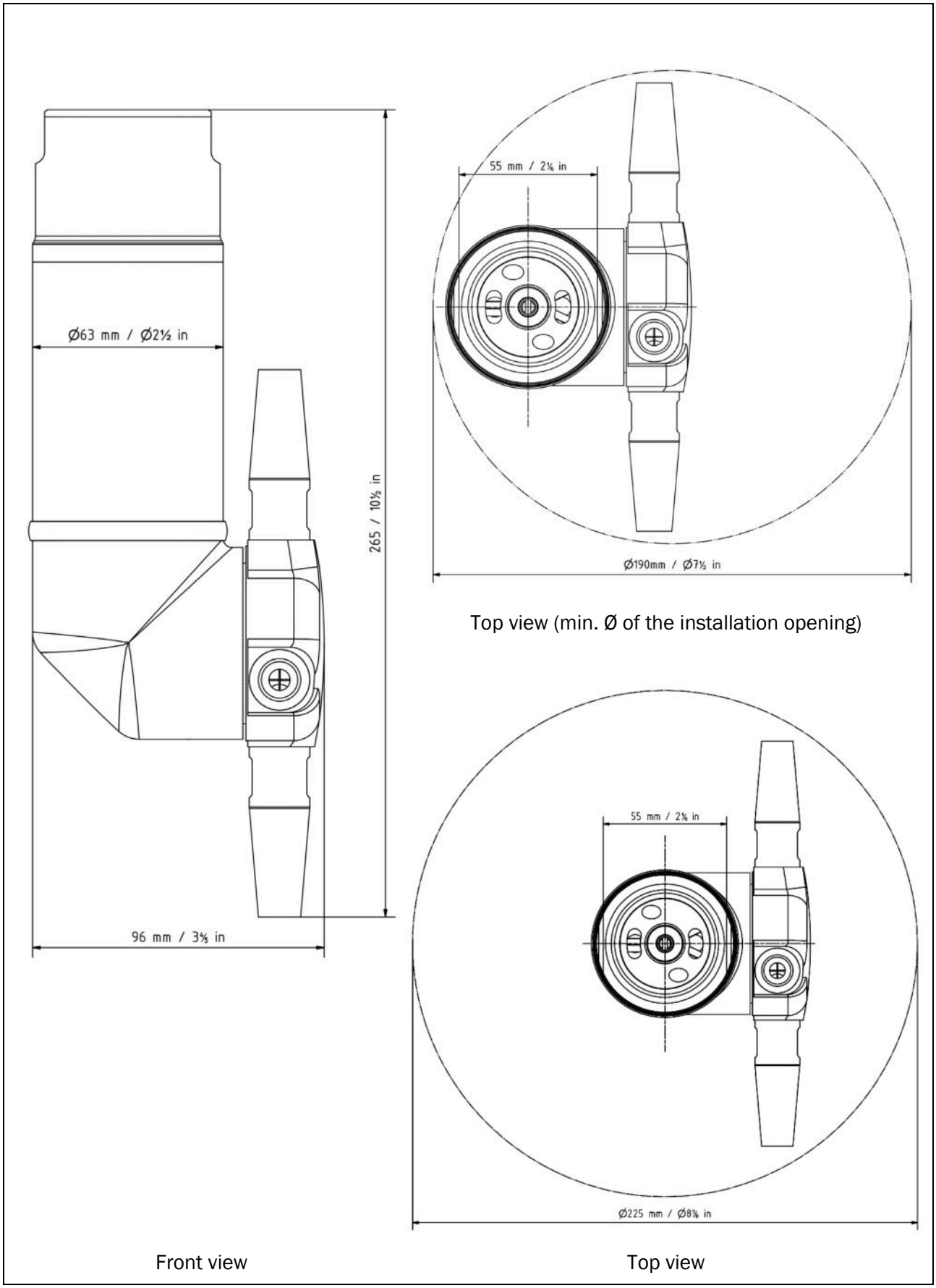
Figure 5.2-2: Interfaces of the Device - MX125-G14

A Drive / Energy Supply
Media connection [MC]
(connection of the downpipe [DP] to the device)

B Device / Container
Process connection [PC]
(connection of the downpipe [DP] to the container)

C Space for Movement / Installation Space
Cleaning head with nozzles
(space for orbital nozzle movement and outlet of cleaning agent)

5.2.1.2 Installation Dimensions and Interfaces of the MX150-G14



Top view (min. Ø of the installation opening)

Front view

Top view

Figure 5.2-3: Installation dimensions of the Device - MX150-G14 (article no. 66MB4...)

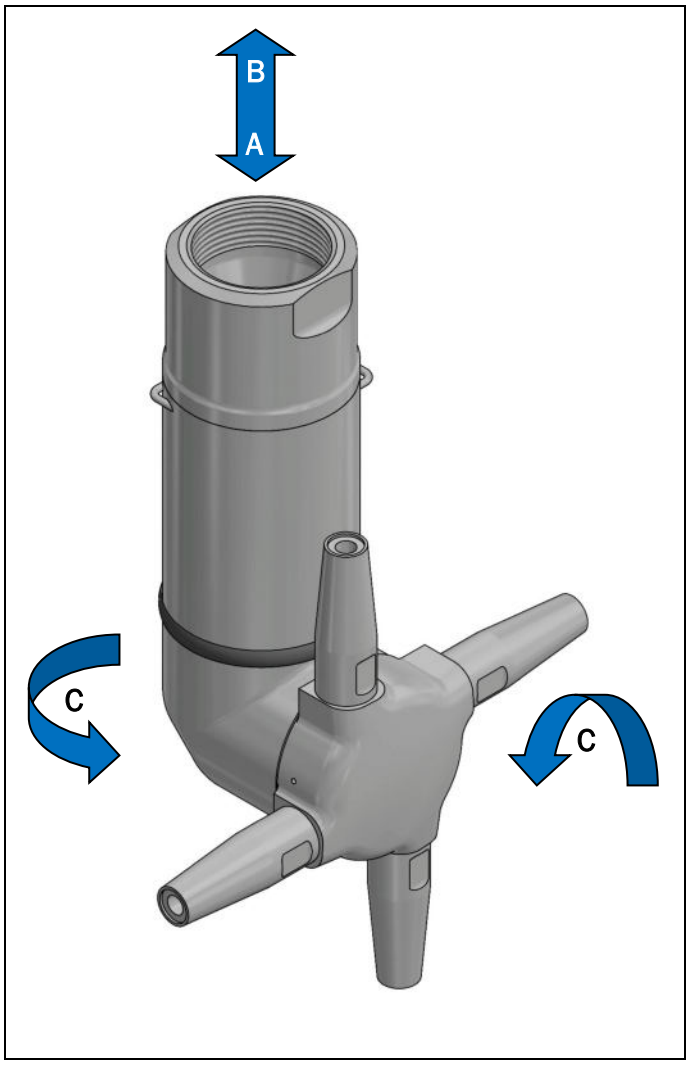


Figure 5.2-4: Interfaces of the Device - MX150-G14

A Drive / Energy Supply
Media connection [MC]
(connection of the downpipe [DP] to the device)

B Device / Container
Process connection [PC]]
(connection of the downpipe [DP] to the container)

C Space for Movement / Installation Space
Cleaning head with nozzles
(space for orbital nozzle movement and outlet of cleaning agent)

5.2.1.3 Installation Dimensions and Interfaces of the MX150-G12

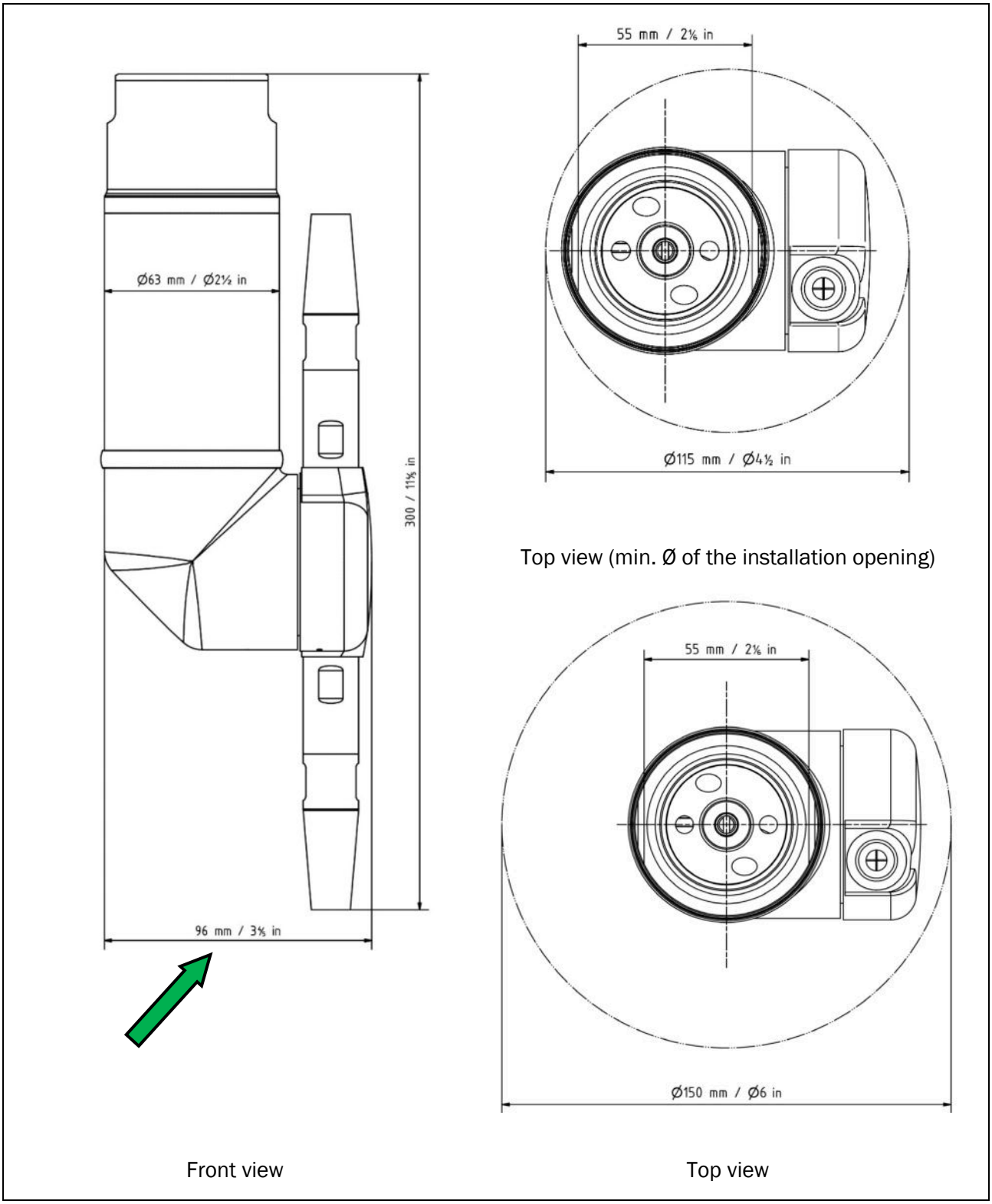


Figure 5.2-5: Installation dimensions of the Device - MX150-G12 (article no. 66MB2...)

For devices with a starting article no. 66MB..., the installation dimension for the distance from housing<>nozzle holder is the installation dimension = 96 mm (see arrow Figure 5.2-5).
For devices with a starting article no. 66MC..., the nozzle holder is approx. 2.5 mm wider.
The installation dimension for these devices is therefore 98,5 (= 96 + 2,5) mm.

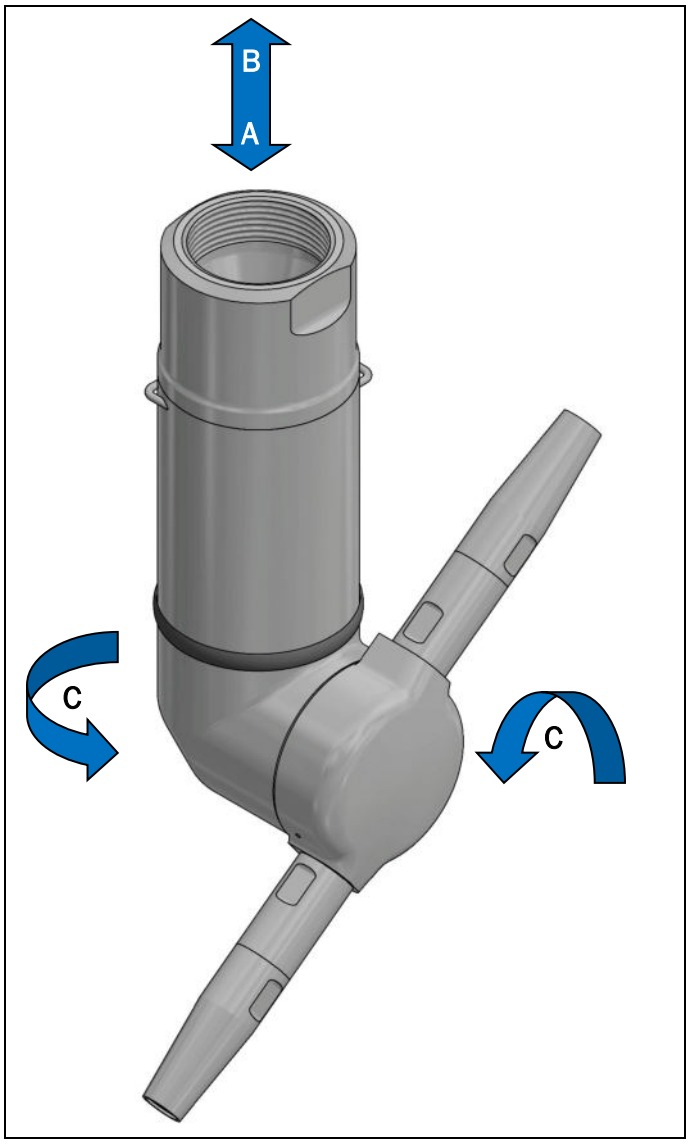


Figure 5.2-6: Interfaces of the Device - MX150-G12

A Drive / Energy Supply
Media connection [MC]
(connection of the downpipe [DP] to the device)

B Device / Container
Process connection [PC]
(connection of the downpipe [DP] to the container)

C Space for Movement / Installation Space
Cleaning head with nozzles
(space for orbital nozzle movement and outlet of cleaning agent)

5.2.2 Installation Position

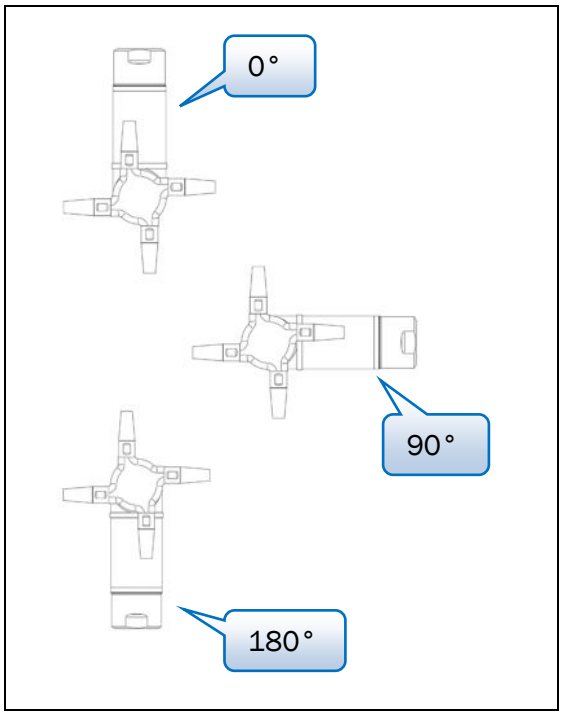
Vertical Installation Position - Cleaning Head Pointing Downwards (Standard)

In this installation position, the device achieves its optimum operating levels and self-drainage of the device is ensured.

Different Installation Position from the Standard

In the event of an installation position that differs from the standard, observe the following:

- The running performance may be compromised.
- The service life of the bearing elements may be shortened as a result of the increased strain.
- Maintenance intervals should be shortened, (see *Section 7.4.1 Maintenance Intervals*).
- Self-drainage of the device is NOT always guaranteed.



Installation position (vertical) = 0°
Cleaning head down (standard)

Installation position (horizontal) = 90°
Cleaning head horizontal

NOTE Depending on the version, increased stress on one side of the gasket must be expected at the process connection [PC] in this installation position.

This can result in leaks.

- Define shortened intervals for process connection [PC] at maintenance point.

Installation position (vertical) = 180°
Cleaning head up

Remark: Installation positions within the specified angles are permissible.

Figure 5.2-7: Installation Positions of the Device

⚠ **CAUTION** Fault due to simultaneous operation of several devices!
If several devices are used simultaneously to clean a container, then the devices can negatively influence each other during cleaning.

Various faults (e.g. poor cleaning results) or impermissible operating states can occur.

- Maintain a minimum distance between the devices depending on their maximum cleaning power. This also applies to simultaneous operation with other devices.

5.2.3 Installing the Device

Installation Opening of the Container

The intended use of the device (mobile or stationary) is the decisive factor for the required size of the installation opening. The specified installation dimensions in *Table 3.3-1: Operating Parameters of the Device* are recommended minimum dimensions for the installation opening and for installing the device in the container and removing it from the container in assembled condition.

⚠ **WARNING** Connections that are NOT screwed, such as separable connections with a clamp or grid design can be unexpectedly loosened or mistakenly removed!
Fluids may penetrate or spray out and be carried over between zones.

There is a risk of severe physical injury.

- Fluid and process connections in clamped or detent configuration must:
  - be self-locking (e.g. mechanical locking of a lever arm coupling with safety lock),
  - be provided with an additional securing mechanism to prevent them from coming loose accidentally or
  - a tool or key is required for loosening (e.g. replacing a winged nut with a hexagonal nut).

For clamp connections (e.g. according to DIN 11853-3, DIN 11864-3 or DIN 32676), depending on the strength and nominal width, double-joint clamps or clamps consisting of 2 individual shells are recommended. To ensure that the clamp does NOT have to be operated directly by hand, but exclusively with a tool (e.g. open-end wrench), the clamps must be designed with a locking screw and hexagonal nut.

Installation Opening - Manhole

If a manhole is selected as the installation opening and a cover or the lid of the manhole opening is used as the process connection [PC], then the relevant contact surfaces must be positive-fitting and tightly and technically sealed. The instructions given for fastening and securing separable connections in clamp or snap-in design must also be taken into account for this application.

⚠ **WARNING** Risk of the device falling accidentally!
The device may strike personnel when falling.

There is a risk of severe physical injury.

- Hold the device firmly when installing/removing it.
- There must be nobody beneath the device when installing/removing it.

NOTE Risk of dirt and foreign objects in the device!

Functional safety and reliability may be compromised.

- During installation, make sure and check that there is no dirt or foreign objects in the device (e.g. small particles, sealing material).

NOTE No torque may be initiated into the device via the nozzles while the device is being installed/removed! Lever action can cause a torque to be transferred via the nozzle carrier to the bevel gear wheels.

The threaded connections of the bevel gear wheels could become loose.

- When setting the device down with the downpipe [DP] fastened in place, make sure that the nozzles ARE NOT under pressure due to the weight and length of the downpipe [DP].
- Clamp the downpipe [DP] in a vise so that the device can be fastened to or loosened from the downpipe [DP].

Interface A

The supply line connection must be configured to be compatible with the media connection [MC] of the device. The supply line for the cleaning agent must be fastened permanently and leak-tight to the media connection [MC].

Threaded Connection

A cylindrical thread on the pipe of the media supply should have a length of min. 16 to max. 20 mm and be completely screwed into the connection cover (01) of the device for a tight fit. A longer thread can have a negative influence on the supply of the cleaning medium.

For devices with threaded connection, AWH recommends the use of the weld-on nipples for cleaning devices from the "TANKO®AN" series for adaptation to the pipe of the media supply. These weld-on nipples are available for various pipe dimensions.

NOTE Risk of damage to the device during assembly!
For fastening or loosening the device to the pipe of the media supply, the application of a belt pipe wrench/ strap wrench or an open-end wrench or adjustable pliers wrench at the housing is NOT suitable.

The threaded connection between the connection cover (01) and housing (02) may damaged as a result of excessive tightening torque or become loose.

- Only use the wrench flat on the connection cover (01) for screwing on and unscrewing the device at the pipe for the media supply (see *Figure 5.2-8: Threaded connection (example MX125)*).

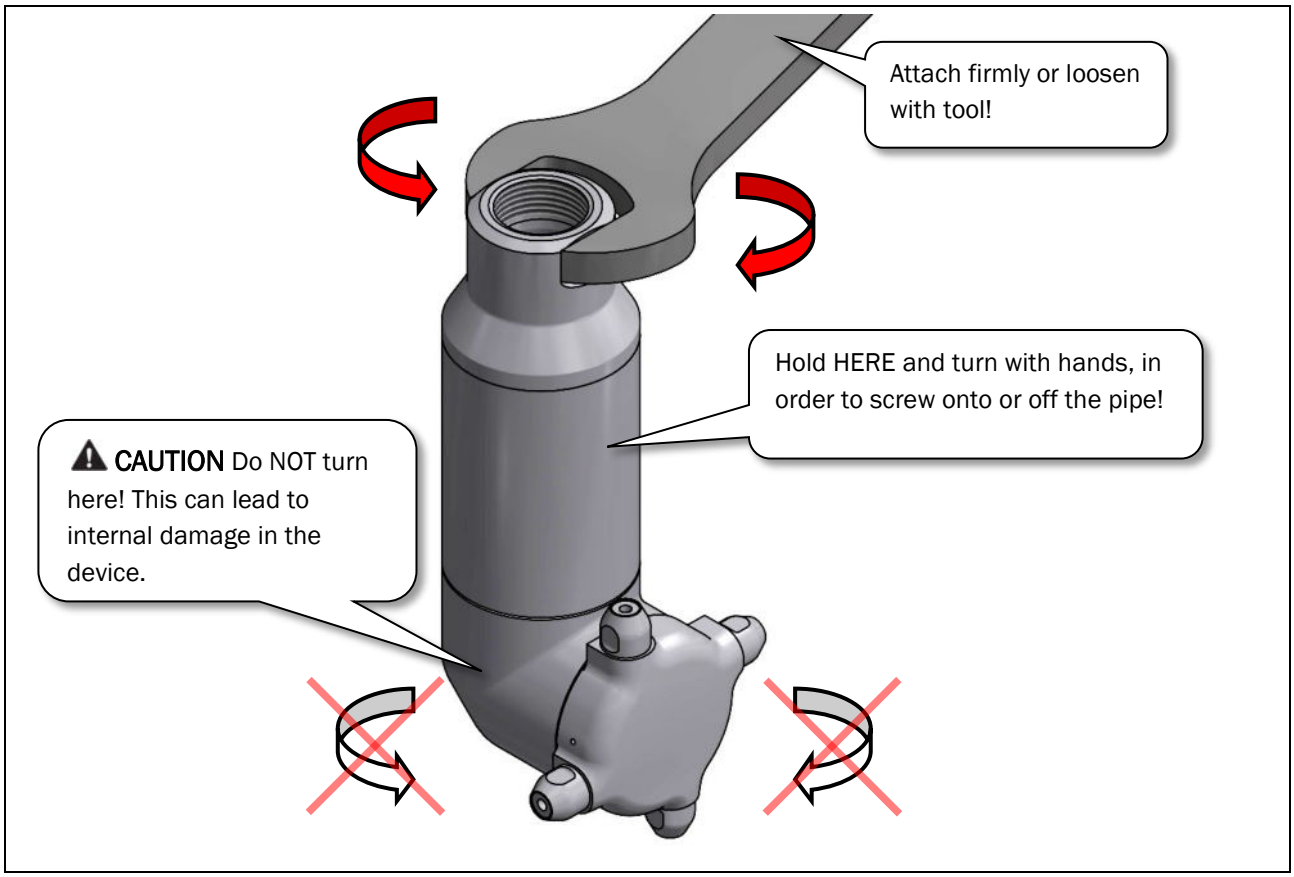


Figure 5.2-8: Threaded connection (example MX125)

1. Remove the screw cap/sealing plug from the media connection [MC].
2. Hold the device firmly with your hands against the cylindrical housing (02) and screw the external thread at the media supply line into the internal thread in the connection cover (01).

   NOTE There is a risk of damage to the thread if the tightening torque applied for the threaded connection between the connection cover and the pipe is excessive!

   - The tightening torque value for the threaded connections between the connection cover (01) / pipe depends on the material of the pipe for the media supply.
3. Tighten the threaded connection between the connection cover (01) / pipe using an open-ended wrench or adjustable pliers wrench, as shown in *Figure 5.2-8*.
4. Depending on operating conditions and requirements (e.g. use in explosive areas), additionally secure the threaded connection between the connection cover (01) and pipe against self-loosening (e.g. spot welds, locking pin or other suitable measures).

Interface B

The connection to the container must be designed so that it is compatible with the process connection [PC] for the downpipe [DP]. The process connection [PC] has to be fastened permanently and in a technically leakproof manner to the connection on the container (e.g. screwed or clamped) and secured to prevent it from coming loose.

Interface C

The lower parts of the device, the shaft-axle connection (24) as well as the nozzle carrier (27) with the nozzles (12), must NOT be turned by hand, as this can generate excessive torque which could damage the gear unit or loosen threaded connections. Depending on the design of the device, the nozzle carrier (27) is installed in either a rigid or moving manner. Depending on the design of the device, the nozzle carrier (27) is rigidly or movably mounted. If the nozzle carrier (27) is mounted movably, then the nozzles can rotate to an angle of 180° between two impact points.

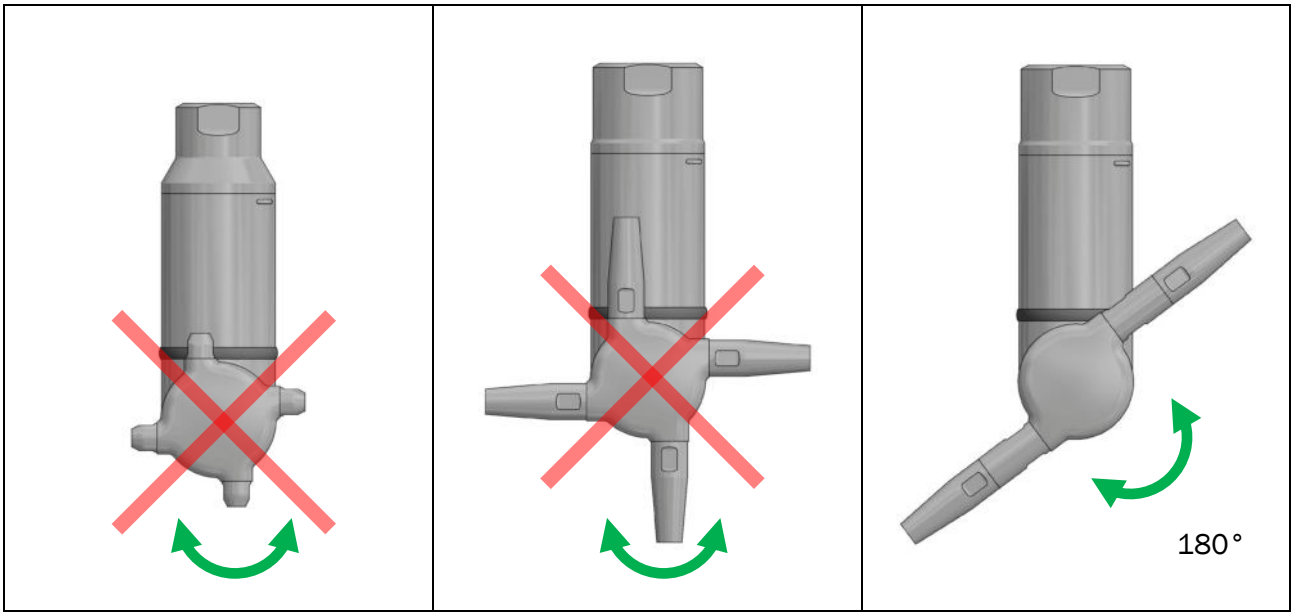


Figure 5.2-9: Mobility of the nozzle carriers

NOTE An excessively strong cleaning jet can subject the container, the surrounding components in the container or the device itself to strong forces and cause damage!

This can result in material damage.

- Maintain sufficient distance from surrounding components during operation so the force of the cleaning jet:
  - does not cause vibrations in the surrounding components,
  - does NOT influence the rotary movement of the cleaning head due to recoil and
  - does not provoke vibrations in the device itself (see *Section 7.4.1 Maintenance Intervals*).

The same applies when installing more than one device in one container!

⚠ **CAUTION** Excessively small installation opening for the container or components (e.g. agitators) in the container! Nozzles collide during installation.
The nozzle carrier may come loose or damage to the device may result.

- The nozzles must NOT collide!

1. Check the following before inserting the device into the container:
   - The minimum dimension for the installation opening (see *Section 3.3 Technical Data*),
   - Presence of interfering contours on surrounding components in the container and
   - The nozzle carrier with nozzles is firmly in place on the cleaning head.
2. Lift the device (downpipe [DP] with cleaning head) out of the container through the installation opening with the utmost care.

Installing the Stationary Device

A "stationary device" can be installed in different ways depending on the properties of the container and the size and accessibility of the installation opening:

– The cleaning head, together with the downpipe [DP] of the device, is inserted into the container from the outside through the installation opening.
– The cleaning head is detached from the downpipe [DP] of the device and the downpipe [DP] of the device is inserted into the container from the outside through the installation opening without the cleaning head. After that, from inside the container, the cleaning head is reattached to the downpipe [DP] of the device.

NOTE The following must be noted regarding the installation opening.

Depending on the design of the device, the nozzle carrier is rigidly or movably mounted.

- Do NOT turn rigidly installed nozzle carriers with your hand!
- Position the nozzles by turning the movable nozzle carrier.
- Fasten the alternative cleaning head/device inside the container.
  – Provided that proper installation and assembly/removal of the cleaning head/device inside the container is assured.

Installing the Mobile Device

⚠ CAUTION If the device (downpipe [DP] with cleaning head) is used within the effective range of internal fittings, there is a possibility of collision with moving internal fittings (e.g. agitators) in the container! Various faults or impermissible operating states can occur.

Material damage and consequential damages may occur.

- Before the device (downpipe [DP] with cleaning head) is inserted into the container through the installation opening, fix the resting positions of movable internal fittings, monitor them, and secure them against restarting.

NOTE The following must be noted regarding the installation opening.

- Smaller installation openings on the container for mobile use of the device as in *Section 3.3 Technical Data* are only permitted:
  – If the cleaning head fits through the installation opening with the nozzles in any position during installation and removal of the device (e.g. by using shorter nozzles) and
  – If a safety clearance of at least 5 mm is ensured between the device and the installation opening.

Installing the Traversing Device

These devices must generally NOT be operated as intended without a professional connection of the downpipe [DP] to the installation opening of the container. These devices are used for applications with special technical requirements for connecting the devices to the container or where the automation of cleaning processes is planned. Owners take direct responsibility for the design of the necessary components for connection and for automation.

One possible application is, for example, the retraction and extension of the devices with a linear unit (see *Example of an application – Traversing Device* from *Page 63*).

NOTE ON EXPLOSION PROTECTION

If the device is not permanently installed on the container, but is moved in and out of the container manually or automatically, then there is a risk of mechanically generated sparks in the event of a collision.

If this is not observed, the explosion protection could be invalidated.

- *In order that no sparks are created:*
  - *select the speed of the device not higher than 1 m/s*
  - *the impact energy must not exceed 500 J*
  - *the device must not come into contact with aluminum or other light metals*

In the ignition hazard analysis of the cleaning system, the risk of collision must be considered for a moving device in order to rule out the possible generation of potentially dangerous ignition sparks by individual impacts. The requirements of the standard EN ISO 80079-36:2016 "Non-electrical equipment for explosive atmospheres – Part 1 Basic method and requirements" Section 6.4.2 Assessment of sparks generated by single impacts must be complied with.

NOTE ON EXPLOSION PROTECTION

In the environment of Ex application, the device and all components used by the operating company must comply with the special requirements regarding explosion protection.

If this is not observed, the explosion protection could be invalidated.

- *For applications in the Ex zone, all components must have an Ex approval according to the existing zones and must be approved for device group II in the required categories according to ATEX Directive 2014/34/EU.*

When using these devices, the process connection must ensure the required separation of the areas "container inside"/"container outside". The connection must be solid and technically leakproof. Uncontrolled lowering of the device into the container must be prevented. Additional measures must be taken to ensure that the cleaning process can only be started when the cleaning head is in the container.

Example of an application – Traversing Device:

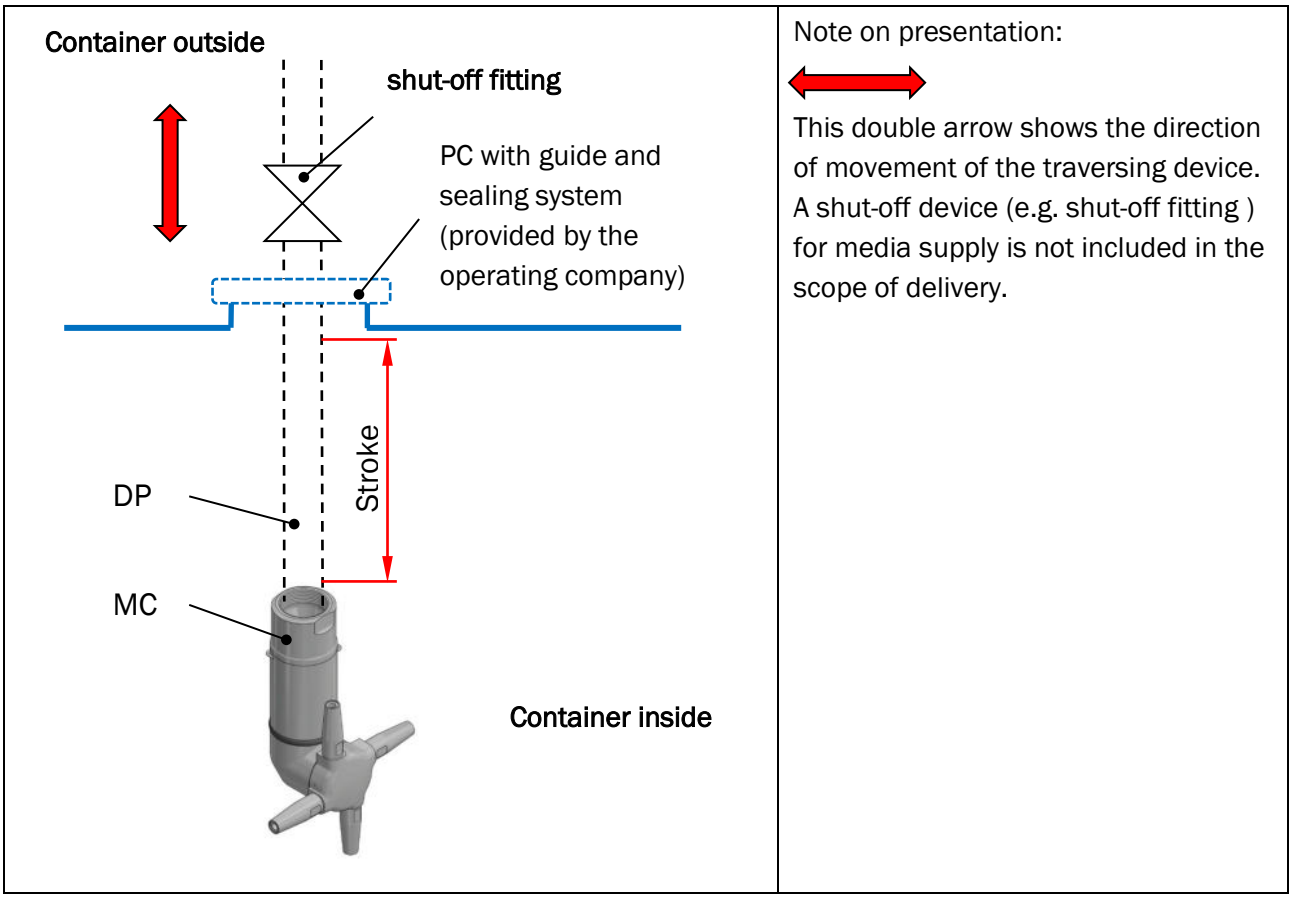


Figure 5.2-10: Example traversing device

As a rule, a completely actuated unit consists of a guide system, an drive unit (e.g. servo motor) and a control system. The linear unit can be actuated mechanically, pneumatically, hydraulically or electrically.

To move the device dynamically with a linear unit within a stroke, the downpipe [DP] of the device is mechanically attached to the guide carriage of the linear guide by means of a fastening unit. To avoid a high load on the linear drive, the supply lines of the energy supply (e.g. for the electrical and media connection), should be kept as short as possible and, if necessary, supported (e.g. energy chain).

Avoid jerky movements when moving the device and during cleaning. It must be ensured that there are no foreign objects in the moving area of the device and the linear guide and that no persons are present and/or able to reach into this area during movement.

An automatically controlled linear movement of the cleaning head makes it possible to optimize the cleaning process and reduces cleaning times. Different sequences for the cleaning process can be implemented with one control system.

During cleaning, the cleaning head can move within the possible stroke and

– moves to various specified positions and/or
– moves slowly over a specified area (back and forth).

In the rest state, the cleaning head is

– Outside the container
  The installation opening of the container is sealed and locked via a separate fitting (e.g. slide valve) or
– Inside the container
  The container is sealed and locked directly via a special sealing system between the downpipe [DP] of the device and the installation opening of the container.

⚠ **WARNING** If a moving device is not completely moved out of the container or is not in its defined position for the idle state, then there is a risk of collision when the production process is started and moving installations in the container (e.g. agitators) are moved at the same time.

Damage to the device, installations and resulting hazards can be the consequence.

- The production process may only be started if:
  – the downpipe [DP] with cleaning head is outside the effective range of installations in a defined rest position,
  – regardless of the installation position, the moving device cannot move in an uncontrolled manner in the container (e.g. lowering due to gravity) and is secured.

Further instructions must be observed on use of the devices within the effective range of internal fittings in *Section 3.2* and on installation on interfaces in *Section 5.2.3.*

For use and safe operation as a traversing device are:
– *the system for sealing or closing the installation opening of the container,*
– *the structural design for fastening (e.g. for a linear unit),*
– *the functional requirements of the control system (e.g. manual or automatic) and*
– *all other conditions for integrating the device into the cleaning system*

in the context of an additional hazard or risk assessment. The operating company is responsible for implementing the resulting measures.

6 Commissioning

Before commissioning the device in Germany, the operating company of the plant must observe the German Operational Safety Ordinance (BetrSichV).

In other countries, the respective national guidelines, statutes and country-specific regulations regarding occupational safety and accident prevention must be complied with.

WARNING

Hazardous situations as a result of incorrect installation of the device!

If the device is not installed properly, unpredictable situations may arise during commissioning or operation.

There is a risk of death or severe physical injury.

- *As a basic rule, commissioning of the device (with cleaning medium) must not be performed until the following has been checked:*
  - *Correct mechanical installation of the device on/in the container*
  - *Correct hydraulic, electrical and/or pneumatic connection*
  - *Safe and reliable functioning of the device*
  - *Setup conditions*

6.1 Safety Instructions for Commissioning

Before operating the device, the operating company must ensure that local regulations are observed during commissioning.

We recommend that you document commissioning and the corresponding operating conditions in a report.

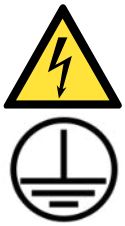
NOTE ON EXPLOSION PROTECTION

Work on the device in a potentially explosive atmosphere is PROHIBITED!

If this is not observed, the explosion protection could be invalidated.

- *Exclude Ex atmospheres by suitable measures and/or free measurement.*
- *Only allow instructed personnel to work in potentially explosive atmospheres.*
- *The personal protective equipment must meet the explosion protection requirements.*
- *Do not use a tool that could create sparks.*

DANGER



Danger to life due to dangerous contact voltage!

As the result of faulty parts, electrically conductive parts of the device that are NOT part of the operating electricity circuit, may be carrying voltage. In the event of a fault, electric shock may occur when touched.

There is a risk of death or severe physical injury.

- *The device must have an electrically conductive connection with the grounding conductor system of the plant via a PE lead so that in the event of a fault, high contact voltages are prevented via the ground potential and/or the power supply is switched off automatically (e.g. overcurrent protective devices).*
- *The grounding must always be checked before the commissioning of the device.*
- *Note the correct connection of the grounding conductor.*

DANGER

Danger of ignition in potentially explosive atmosphere due to potential differences!

When filling and emptying containers with fluids, when recirculating, stirring, mixing and spraying fluids and also when measuring, sampling and cleaning, the fluids themselves or the interior of the container could be charged in a dangerous manner.

Differences in potential (e.g. electrostatic charge) can cause igniting sparks or heat, which can act as an ignition source.

There is a risk of death or severe physical injury.

- *Only clean adequately grounded containers made of electrically conductive material without insulating internal coatings.*
- *Make sure that any electrostatic charge is prevented. Also make sure that all electrically conductive parts on the device and the container are grounded for potential equalization to the same potential using grounding cables with a sufficient diameter.*
- *Grounding must always be carried out before commissioning the device.*
  Avoid grounding faults (e.g. subsequent grounding of already charged objects or equipment).
- *Do not secure or seal mechanical connections with electrically insulating materials (such as sealing tape, sealant, adhesive, etc.), if it impairs the grounding of the device on the container.*
- *Wear antistatic shoes and protective clothing in accordance with the requirements for electrically conductive work clothing.*

DANGER

Explosion hazard due to ignition source!

Splashing or spraying of fluids to clean the container can create potentially effective ignition sources (such as exothermic chemical reaction or static discharge due to potential differences). An existing potentially explosive atmosphere could be ignited.

There is a risk of death or severe physical injury.

- *Adhere to the regulations and specifications in the safety data sheets for the cleaning media (e.g. ignition temperature; flash point; explosive limits).*
- *The cleaning medium and the material to be cleaned must not cause a chemical reaction that might cause an ignition.*
- *Corrosive or explosive fluids, fluids with solid content (e.g. abrasives) and substances that can undergo exothermic reactions with the material of the container or the plant (e.g. chlorine, substances containing chlorine ions or salt) must not be used for cleaning purposes.*
- *Observe electrostatic charges when handling fluids.*
- *The cleaning medium must not contain any foreign bodies (e.g. rust particles).*

WARNING

Danger due to hot surfaces!

The device is delivered without additional protective measures against hot surfaces and may NOT be equipped with thermal insulation.

The device may heat up significantly as a result of the cleaning medium or the heat transfer from the container. Depending on the duration of contact, touching the device can cause skin burns.

There is a risk of burns from the cleaning medium at temperatures above +60 °C (+140 °F).

- *Safeguard hot surfaces with a guard or barriers.*
- *Put up warning signs in the direct vicinity of the hot surfaces.*
- *Wear protective work clothing and protective gloves when working.*

WARNING

Danger resulting from negative pressure/vacuum in the container!

A cold cleaning process in hot, closed containers can generate negative pressure, which may lead to damage to the container.

There is a risk of death or severe physical injury.

- *Take precautions to allow gases or vapors to escape during operation (e.g. install devices for ventilation and exhaust or pressure equalization).*

As a result of the variety of practical applications and uses for the cleaning device, AWH CANNOT specify a noise level for the device under load, i.e. installed in the container and operating with cleaning fluid.

It is for this reason that AWH can offer the operating company, **solely as a precautionary measure, a few points of reference and notes** to be observed and to be integrated into the operating company's hazard and risk assessments.

CAUTION

Risk of hearing damage as a result of an increased noise level!

The device emits a noise pressure level of L_{pA} < 70 dB(A).

When the device is operated in a container, the noise level may exceed the maximum permitted exposure value of $L_{EX,\ 8h}$ = 85 dB(A) and varies depending on the properties of the container in the plant and the existing operating conditions of the device.

Hearing damage could be incurred as a result.

- *The plant noise level must always be measured and documented by the operating company.*
- *Keep the plant noise level within the legal range:*
  - *Perform noise reduction measures (e.g. sound insulation).*
  - *Delimit and mark the noise area (e.g. with mandatory sign "Wear hearing protection").*
  - *Use effective hearing protection (e.g. ear muffs or ear plugs).*

Comply with the technical health and safety rules relating to noise and vibration protection (called TRLV Lärm in Germany). State-of-the-art technology must be used to implement the measures to provide protection from exposure to noise based on the risk assessment. In this case, noise emissions must be prevented at source, or reduced as far as possible.

CAUTION

Insufficient lighting in the work environment!

The device is NOT equipped with any lighting. Insufficient lighting when working on the device can cause accidents.

There is a risk of minor or moderate injuries.

- *Make sure that there is sufficient and even lighting in all areas of the plant in which the device is used when work is performed on the device.*
- *In Germany, the technical rules for workplaces apply – ASR A3.4. Illuminance of **300 lx (lux)** is recommended (maintenance value).*

The following conditions must be met before the device can be commissioned in an Ex zone:

- The details on the type plate of the device must comply with the requirements of the local explosion area on-site (device group, Ex category, Ex zone, temperature class)!
- The ambient temperature during later use is within the permitted range!
- The device and the container are correctly grounded and have potential equalization.
- The distances from the device to the on-site plant components have been checked and comply with the explosion protection requirements.
- All connections at the interfaces of the device are securely fastened and tightly sealed (zone carryover).

– All required protective devices are installed.

6.2 Functional Check/Trial Run

All the screw connections on the device are firmly tightened in the factory. Nevertheless, a trial run should be carried out to check that the device functions safely and reliably, and that it is leak-tight once installed.

Do not operate the device unless it is in perfect condition.
The container to be cleaned must be emptied and depressurized.

⚠ **WARNING** Persons in the container. Persons may be struck by the jets from the cleaning head!

There is a risk of death or severe physical injury.

- Do NOT start the cleaning process while there are persons in the container.

Functional Check

1. Close all of the openings on the container (e.g. inspection openings).
2. Switch off all moving inner fittings in the container (e.g. agitators) and secure them to prevent them from being inadvertently switched back on or set in motion.
3. Check to ensure that there is a safe distance around the container and to the surrounding components.
4. Switch on the device (see *Section 6.3 Switch-on Procedure*).
5. Check the interfaces on the device for impermeability.
6. ***NOTE*** Risk of collision with moving parts!
   Observe the following steps if inner fittings in the container need to rotate during the cleaning process:
   - Start up the surrounding inner fittings (e.g. agitators) step by step.
   - Carefully check that the cleaning head and surrounding components (e.g. agitators) do NOT collide while moving simultaneously.
7. Make sure that there are no unusual vibrations.
8. Check the device to make sure that it is running smoothly.
9. Switch off the device (see *Section 7.2 Switch-off Procedure*).

6.3 Switch-on Procedure

In accordance with the type of device activation and how it is integrated (e.g. manual or automatic) on the cleaning plant, the switch-on procedure has to be integrated and the following instructions have to be observed when switching on.

WARNING

Danger from sudden, unforeseeable or unauthorized switching-on of the device!

For example, a start command can be triggered by incorrect operation of a start control device. For a safe cleaning process it is absolutely necessary to consistently follow the sequence of safety-relevant switching processes. Non-compliance prevents operational safety, thus leading to hazards.

- *When commissioning the device, the **work steps for the switch-on procedure** must be followed in the given order.*

SWITCH-ON PROCEDURE

Work steps

1. *Securely close all of the openings on the container (e.g. inspection openings).*
2. *Empty and depressurize the container.*
3. *Switch off all moving inner fittings in the container (e.g. agitators) and secure them to prevent them from being inadvertently switched back on or set in motion.*
4. *Open the outlet of the container for the cleaning medium.*
   - *Check whether the cleaning medium fed into the container can drain freely during cleaning and does NOT collect together.*
5. *Switch on the cleaning medium supply.*
   - *Open the shut-off fitting (e.g. valve or ball cock) and start the pump slowly.*
   - *Check that the supply of cleaning medium is NOT interrupted (e.g. flow meter) and the media pressure on the device is established.*
6. *Take suitable measures to secure the supply of cleaning medium to prevent it from being switched off suddenly, unexpectedly or without authorization.*

NOTE

Risk of breakage due to material overload!

Pressure surges when switching the cleaning medium on or off, in particular pressure surges which exceed the operating pressure, and gas components in the cleaning medium may cause hammering in the cleaning device.

There is a risk of material damage or destruction of plant parts, (e.g. leakage in the pipe system or on connected devices).

- *Prevent pressure surges ("water hammers") and gas components in the cleaning medium, e.g. caused by:*
  - *installing a water hammer arrester or pressure relief valve in the supply line,*
  - *starting/stopping the pump slowly (e.g. frequency controlled) and*
  - *opening/closing the shut-off fitting slowly (e.g. valve or ball cock).*

The term "water hammer" denotes a pressure surge in a fluid line which is generated by opening/closing a shut-off fitting (e.g. valve or ball cock) quickly at the end of a pipeline.

Pressure hammers/pressure surges can also be provoked by quick changes in the flow rate (pressure increase or pressure drop), or by sudden changes in the direction of the flow of fluids. This effect is particularly common in pump systems with long pipelines when starting up, stopping or changing the speed of pumps.

6.4 Operation

Once it has been commissioned and inspected, the device can be put into operation, observing the following instructions.

WARNING

Risk when used outdoors!

The devices are usually operated in a closed factory hall and are thus protected from the risk of lightning. If the device is used outdoors, there is a risk of lightning in the case of a storm.

There is a risk of death or severe physical injury.

- *Protect the plant in which the device is installed with suitable lightning protection measures.*
- *In case of use outdoors and in case of storms or the risk of lightning, stop work immediately.*

WARNING

Risk if the operating/working area is accessed by unauthorized persons!

Unauthorized persons are NOT familiar with the hazards in the working area as described in these instructions.

There is a risk of death or severe physical injury.

- *Permit only authorized specialist personnel who are qualified and trained for the operation to operate the cleaning device.*
- *Keep unauthorized persons away from the working area of the plant/machine in which the device is installed.*
  If in doubt, address these persons and order them to exit the working area.
- *Stop the work for as long as there are unauthorized persons in the working area.*

WARNING




Risk of chemical burns and heat burns when opening the container!

The supply line is pressurized. The person may be struck by cleaning jets or come into contact with residual fluid from the supply line and device. There may also be hot vapors in the container.

There is a risk of death or severe physical injury.

- ***Do NOT open the container*** *during the cleaning process.*

  Before starting work, adhere to the ***work steps of the switch-off procedure*** *(See Section 7.2 Switch-off Procedure).*
- *Before opening the container, observe the* ***cooling and draining time****.*
- *Use personal protective equipment (e.g. protective gloves, safety shoes, safety goggles).*

WARNING


Danger due to hot surfaces!

The device may heat up significantly as a result of the cleaning medium or the heat transfer from the container. Depending on the duration of contact, touching the device can cause skin burns.

There is a risk of burns from the cleaning medium at temperatures above +60 °C (+140 °F).

- *Comply with the warning signs and do NOT touch the marked areas.*
- *Do NOT remove insulation from protected hot surfaces.*
- *Maintain a safety distance from existing protective equipment or barriers.*
- *Use protective equipment (e.g. protective gloves; cloths) to provide protection from the hot surface.*
- *Do not touch the device until after a sufficient cooling time.*

WARNING

Danger caused by ejection of the cleaning medium!

If the cleaning medium is unexpectedly ejected after a system failure (e.g. pressure drop due to interruption of the pressure supply) there is a risk of accident.

There is a risk of death or severe physical injury.

- *Do NOT remove the device if the cleaning medium has failed.*
- *Always follow the* ***work steps of the switch-off procedure*** *(see Section 7.2 Switch-off Procedure).*

Operation is performed from the control room of the higher-level facility or from the local control point. The safety systems and safety instructions in the operating instructions for the higher-level plant/machine must be adhered to.

The area around the plant/machine and the operator work stations at the plant/machine must be keep free of objects during operation so that unobstructed access is possible at all times.

Impermissible operating conditions

If there are impermissible operating conditions, then operational safety of the device is not guaranteed.

The device must NOT be put into operation if

- Safety devices are not working,
- There are persons or objects in the danger area,
- Faults or damage to the device are visible,
- Maintenance intervals have been exceeded,
- Malfunctions are visible on the device.

When operating the device, adhere to the following additional instructions:

Operation of the device without cleaning medium is only permitted for a limited time for certain situations.

Dry blowing of the device with non-flammable gaseous medium (e.g. air or nitrogen):	
A) There is no potentially explosive atmosphere (Ex zone) or no potentially explosive mixture outside atmospheric conditions. Remark: If the device is blown dry or emptied with compressed air, for example, the air pressure must not result in the cleaning head rotating at a higher speed than 5 rpm (revolutions per minute) or 12 seconds per revolution	**max. 0,5 minutes**
B) In the presence of a potentially explosive atmosphere (Ex zone) or C) potentially explosive mixture outside atmospheric conditions. 	**PROHIBITED!**
Sterilize the device with steam at 121.1 °C (250 °F) when at rest:	
A) There is no potentially explosive atmosphere (Ex zone) or no potentially explosive mixture outside atmospheric conditions. Remark: When steam cleaning the device, the steam pressure must not result in the cleaning head rotating at a higher speed than 10 rpm (revolutions per minute) or 6 seconds per revolution.	**max. 20 minutes**
B) In the presence of a potentially explosive atmosphere (Ex zone) or C) potentially explosive mixture outside atmospheric conditions. 	**PROHIBITED!**

Table 6.4-1: Time-limited Operation of the Device without Cleaning Medium

⚠ **WARNING** Persons in the container. Persons may be struck by the jets from the cleaning head!

There is a risk of death or severe physical injury.

- Do NOT start the cleaning process while there are persons in the container.
- NEVER direct the cleaning jet or torrent at persons.

⚠ **WARNING** Incorrect operation of the device!

There is a risk of death or severe physical injury.

- Only operate the device when it is in perfect condition.
- Do not operate the device unless it is installed inside a closed container.
- Drain and depressurize the container that needs to be cleaned.
- Securely close all of the openings on the container (e.g. inspection openings).
- When operating the device, **adhere to the switch-on and switch-off procedures** (see *Sections 6.3 Switch-on Procedure* and *7.2 Switch-off Procedure*).
- There is no need for the device to be run in.
- The following operating states of the device are NOT permitted:
  - Operation of the device without cleaning medium.
  - Immersing the device in the product of the production process.
  - Operation of the device outside the permitted parameters (see *Section 3.3 Technical Data*).
- Immediately stop operation in the event of leaks outside the container.
- Refrain from any type of work which compromises the safe and reliable function of the device.
- Immediately inform the operating company of any changes to the device or the plant that may impair its safety.

If you notice vibrations on the plant that are NOT generated by the device while commissioning the device, these must be prevented with suitable measures so that the vibrations CANNOT be transmitted to the device.

If this is NOT possible, the maintenance intervals must be shortened in accordance with *Section 7.4.1 Maintenance Intervals*.

During normal operation of the device, you must make sure that the mixture of supplied cleaning medium and dislodged substances can flow freely from the container.

NOTE Clogging in the drain of the container is to be eliminated at once so that:

- No large quantities of dirt can accumulate in the container,
- There is NO impermissible filling of the container with cleaning medium,
- The device does NOT become immersed as the fluid level rises.

For cleaning media in circulation:
Run the final cleaning step with clean water to remove any suspended matter which may have been introduced.

NOTE ON EXPLOSION PROTECTION

The information on the permissible impurities for cleaning media in a closed circuit must be observed in accordance with Section 3.4 Cleaning Media!

7 Maintenance

The following safety instructions apply to all work on the device that is listed and described in this chapter and must be observed at all times.

Only use **original spare parts** when replacing parts of the device. A **functional check** must be performed after all maintenance work (see *Section 6.2 Functional Check/Trial Run*).

If you have questions or doubts about handling the cleaning device, please contact AWH.

7.1 Safety Instructions for Maintenance

NOTE ON EXPLOSION PROTECTION

Work on the device in a potentially explosive atmosphere is PROHIBITED!

If this is not observed, the explosion protection could be invalidated.

- *Exclude Ex atmospheres by suitable measures and/or free measurement.*
- *Only allow instructed personnel to work in potentially explosive atmospheres.*
- *The personal protective equipment must meet the explosion protection requirements.*
- *Do not use a tool that could create sparks.*

Disconnection from the Energy Supply

Only after the safe disconnection from the connected energy supply (electrical, pneumatic, hydraulic) and precautions have been taken to ensure that no hazards can be caused by the energy supply, should the device be mechanically disconnected from the container and removed.

DANGER

Danger to life due to live components!

Activated electrical components are live with dangerous electrical voltage and may perform uncontrolled movements. An electric shock may occur from coming into contact with these components.

There is a risk of death or severe physical injury.

- *Allow only **qualified electricians** to perform work on the electrical system.*
- *Before starting work, observe the **work steps of the switch-off procedure** (see Section 7.2 Switch-off Procedure).*
- *Cover adjacent live parts to prevent contact.*
- *Beware of the hazards caused by electrical current (e.g. warnings).*

DANGER

Danger of ignition in potentially explosive atmosphere due to potential differences!

When filling and emptying containers with fluids, when recirculating, stirring, mixing and spraying fluids and also when measuring, sampling and cleaning, the fluids themselves or the interior of the container could be charged in a dangerous manner.

Differences in potential (e.g. electrostatic charge) can cause igniting sparks or heat, which can act as an ignition source.

There is a risk of death or severe physical injury.

- *Only clean adequately grounded containers made of electrically conductive material without insulating internal coatings.*
- *Make sure that any electrostatic charge is prevented. Also make sure that all electrically conductive parts on the device and the container are grounded for potential equalization to the same potential using grounding cables with a sufficient diameter.*
- *Grounding must always be carried out before commissioning the device. Avoid grounding faults (e.g. subsequent grounding of already charged objects or equipment).*
- *Do not secure or seal mechanical connections with electrically insulating materials (such as sealing tape, sealant, adhesive, etc.), if it impairs the grounding of the device on the container.*
- *Wear antistatic shoes and protective clothing in accordance with the requirements for electrically conductive work clothing.*

WARNING

Risk of falling when working at heights!

When carrying out assembly/disassembly work on parts of the plant at heights, there is a risk of falling.

There is a risk of death or severe physical injury.

- *Do not perform any work at heights except with a safety platform with cage or suitable fall protection (e.g. safety rope and safety harness).*
- *If you are using a harness as fall protection, it is imperative that the rescue concept for a person in the harness is observed.*
- *A person must not remain suspended in the harness for longer than 15 min as there is otherwise a risk of shock or even death.*
- *Wear protective work clothing, safety shoes, protective gloves and a hard hat for work at heights.*

WARNING

Risk of accident caused by incorrectly performed maintenance and repair work!

Improper maintenance, falling components or failure to adhere to the listed safety instructions can lead to accidents.

There is a risk of death or severe physical injury.

- *Only allow experts to perform work on the device.*
- *Do not work on the device unless it is disconnected from the power supply, depressurized and in a cool state.*
- *Maintain a safe distance when working on the device. We recommend that you provide 1 m of space for free movement around the device and container.*

WARNING

Risk of chemical burns and heat burns when opening the container!

The supply line is pressurized. The person may be struck by cleaning jets or come into contact with residual fluid from the supply line and device. There may also be hot vapors in the container.

There is a risk of death or severe physical injury.

- ***Do NOT open the container** during the cleaning process.*
- *Before starting work, observe the **work steps of the switch-off procedure** (see Section 7.2 Switch-off Procedure).*
- *Before opening the container, observe the **cooling and draining time**.*
- *Use personal protective equipment (e.g. protective gloves, safety shoes, safety goggles).*

WARNING

Danger due to hot surfaces!

The device may heat up significantly as a result of the cleaning medium or the heat transfer from the container. Depending on the duration of contact, touching the device can cause skin burns.

There is a risk of burns from the cleaning medium at temperatures above +60 °C (+140 °F).

- *Do not remove the devices unless they are in a cool state.*
- *Allow the device to cool down before starting work.*
- *Beware of hot surfaces (e.g. warning signs).*
- *Use safety clothing and equipment (e.g. protective gloves, cloths) to provide protection against the hot surface.*

WARNING

Risk of crushing when carrying out maintenance, cleaning and repair work!

The container and the interfaces of the device (e.g. media connections) may be pressurized.

There is a risk of death or severe physical injury.

- *Before starting work, depressurize the container and all lines.*
- *Switch off all moving parts in the container and secure them to prevent them from being inadvertently switched back on or set in motion.*
- *Do not remove the device unless it has been depressurized.*
- *Wear protective gloves.*

CAUTION

Insufficient lighting in the work environment!

The device is NOT equipped with any lighting. Insufficient lighting when working on the device can cause accidents.

There is a risk of minor or moderate injuries.

- *Make sure that there is sufficient and even lighting in all areas of the plant in which the device is used when work is performed on the device.*
- *In Germany, the technical rules for workplaces apply - ASR A3.4. Illuminance of **300 lx (lux)** is recommended (maintenance value).*

7.2 Switch-off Procedure

In accordance with the type of device activation and how it is integrated (e.g. manual or automatic) on the cleaning plant, the switch-off procedure must be integrated and the following instructions must be observed when switching off.

WARNING

Danger due to sudden, unexpected or unauthorized reactivation of the device!

For example, a start command can be triggered by incorrect operation of a start control device. For a safe cleaning process it is absolutely necessary to consistently follow the sequence of safety-relevant switching processes. Non-compliance prevents operational safety, thus leading to hazards.

- *Before performing any disassembly, maintenance, repair or cleaning work on the device, it is imperative to carry out the following **work steps of the switch-off prozedure** in the specified order.*

SWITCH-OFF PROCEDURE

Work Steps

1. *Shut off the supply of the cleaning medium.*
   - *Slowly stop the pump and close the shut-off fitting (e.g. valve or ball cock).*
   - *Check that the supply of cleaning medium is stopped (e.g. flow meter) and there is no media pressure on the device.*
2. *Safeguard the supply of cleaning medium to prevent sudden, unforeseeable or unauthorized reactivation (e.g. lockable switch/shut-off elements).*
   - *Check that any supply of media is reliably prevented and insert dummy disks if necessary. Observe a cooling-down phase for media temperatures above 80 °C.*
   - *Make sure that the cleaning device and supply line for cleaning medium have been completely drained (e.g. by waiting time).*
3. *Depressurize the container against the ambient pressure.*
   - *Safeguard the supply of steam or other media that affect the pressure to prevent sudden, unforeseen or unauthorized reactivation (e.g. lockable switches/shut-off elements).*
   - *Make sure that the pressure inside the container matches the ambient pressure.*

NOTE

Risk of breakage due to material overload!

Pressure surges when switching the cleaning medium on or off, in particular pressure surges that exceed the operating pressure, and gas components in the cleaning medium can cause hammering in the cleaning device.

There is a risk of material damage, e.g. leakage in the pipe system or on connected devices.

- *Prevent pressure surges ("water hammers") and gas components in the cleaning medium, e.g. caused by:*
  - *installing a water hammer arrester or pressure relief valve in the supply line,*
  - *starting/stopping the pump slowly and*
  - *opening/closing the shut-off fitting slowly (e.g. valve or ball cock).*

7.3 Removal

The safety instructions in *Section 7.1 Safety Instructions for Maintenance* must be observed before removing the device from the container.

CAUTION

Risk from protruding sharp edges on the device!

Depending on the design, the device may have protruding sharp edges which can be dangerous when handling it.

There is a risk of minor cuts.

- *Wear protective gloves when working on the device.*
- *When handling, e.g. unpacking, transportation without packaging, assembly/disassembly and maintenance work, beware of protruding sharp edges.*

CAUTION

Fault as a result of dirt, foreign objects or damage to the device!

Foreign objects such as scale, burrs, chips, etc. can restrict flow or get into the piping system and cause malfunctions or damage to components, including gaskets. This can result in hazards that endanger the functional safety of the device.

There is a risk of minor or moderate injuries.

- *Implement suitable measures to prevent dirt and foreign objects from entering via the interfaces of the device.*
- *Before starting work, make sure that all necessary tools, auxiliary materials and information are available and observe the instructions for the interfaces.*
- *When lifting the device out of the container, maintain a distance from the inner wall of the container and surrounding components (e.g. agitators), to avoid scraping or knocking.*
- *Set the device down on a stable surface after removing it.*

7.3.1 Removing the Device

Installation Opening of the Container

The intended use of the device (mobile or stationary) is the decisive factor for the required size of the installation opening. The specified installation dimensions in *Table 3.3-1: Operating Parameters of the Device* are recommended minimum dimensions for the installation opening and for installing the device in the container and removing it from the container in assembled condition.

WARNING Risk of the device falling accidentally! The device may strike personnel when falling.

There is a risk of severe physical injury.

- Hold the device firmly when installing/removing it.
- There must be nobody beneath the device when installing/removing it.

NOTE No torque may be initiated into the device via the nozzles while the device is being installed/removed! Lever action can cause a torque to be transferred via the nozzle carrier to the bevel gear wheels.

The threaded connections of the bevel gear wheels could become loose.

- When setting the device down with the downpipe fastened in place, make sure that the nozzles ARE NOT under pressure due to the weight and length of the downpipe [DP].
- Clamp the downpipe [DP] in a vise so that the device can be fastened to or loosened from the downpipe [DP].

Interface A

The supply line for the cleaning medium has to be disconnected at the media connection [MC]. The media connection [MC] has to be sealed with a sealing cap.

For Threaded Connection (see *Figure 5.2-8: Threaded connection (example MX125)*).

1. *NOTE* Connection between connection cover (01) and media supply pipe can be additionally secured.
   - Before loosening, remove the securing device (e.g. spot welds or securing pins).
2. Unfasten the connection cover threaded connection (01) / media supply pipe with an open-end wrench or an adjustable pliers wrench.
3. Hold the device against the cylindrical housing (02) firmly with your hands and rotate away from the media feed pipe.
4. Place the media connection [MC] with a suitable screw cap/sealing plug.

Interface B

NOTE Excessively small installation opening on the container!
Damage to the device or its surroundings may result.

- Before unfastening interface B, check whether the device can be lifted out through the installation opening of the container with the cleaning head (see *Section 3.3 Technical Data*).
- The instructions for interface "C" must be observed if the installation opening is too small.

Interface C

The lower parts of the device, the shaft-axle connection (24) as well as the nozzle carrier (27) with the nozzles (12), must NOT be turned by hand, as this can generate excessive torque which could damage the gear unit or loosen threaded connections.

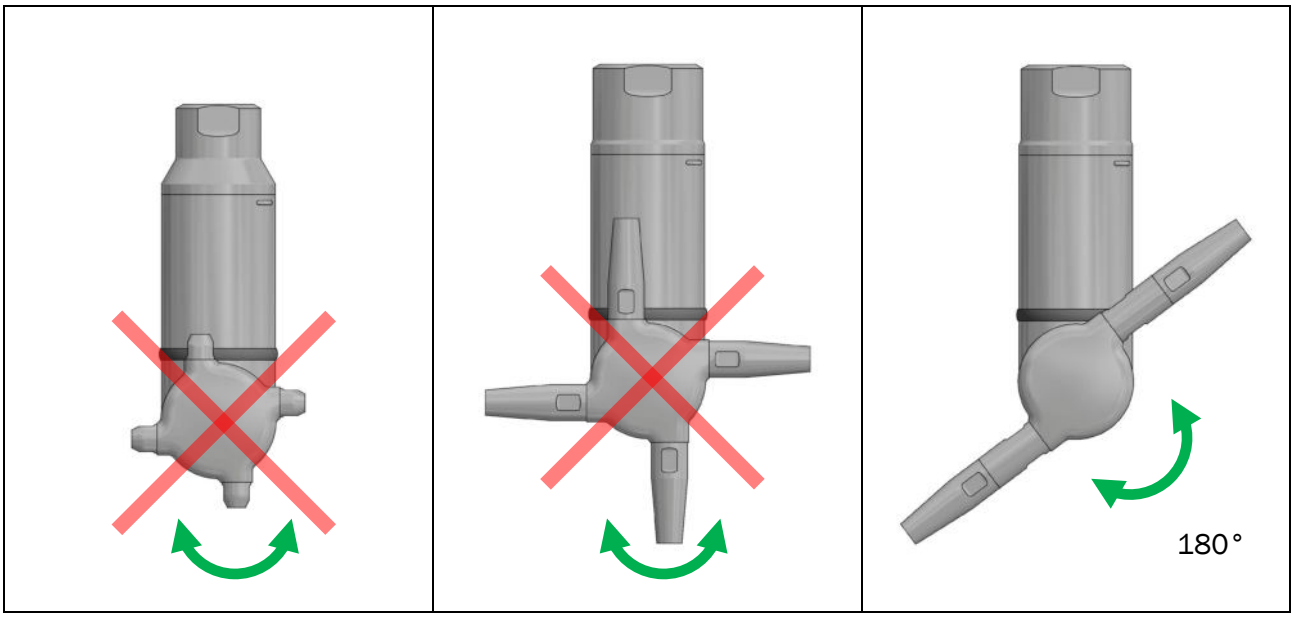


Figure 7.3-1: Mobility of the nozzle carriers

⚠ **CAUTION** Excessively small installation opening for the container or components (e.g. agitators) in the container! Nozzles collide during removal.

The nozzle carrier may come loose or damage to the device may result.

- The nozzles must NOT collide!

1. Check the following before pulling the device out of the container:
   - The minimum dimension for the installation opening (see *Section 3.3 Technical Data*),
   - Check for interfering contours on surrounding components in the container.
2. Lift the device (downpipe [DP] with cleaning head) out of the container through the installation opening with the utmost care.

Removing the Stationary Device

A “stationary device” can be removed in different ways depending on the properties of the container and the size and accessibility of the installation opening:

- Before removal, the downpipe [DP] is disconnected from the process connection [PC] and lifted out of the container through the installation opening from the outside, together with the device. The device is then disconnected from the downpipe [DP] at the media connection [MC].
- The device is disconnected from the downpipe [DP] at the media connection [MC] inside the container.

NOTE The following must be noted regarding the installation opening.

Depending on the design of the device, the nozzle carrier must be installed in either a rigid or movable way. If the nozzle carrier is installed in a movable way, then the nozzles can rotate to an angle of 180° between two impact points.

- Do NOT turn rigidly installed nozzle carriers with your hand!
- Position the nozzles by turning the movable nozzle carrier.
- Unfasten the alternative cleaning head/device from the downpipe [DP] inside the container.
  - Provided that proper installation and assembly/removal of the cleaning head/device inside the container is assured.

Removing the Mobile Device

⚠ **CAUTION** If the device (downpipe [DP] with cleaning head) is used within the effective range of internal fittings, there is a possibility of collision with moving internal fittings (e.g. agitators) in the container! Various faults or impermissible operating states can occur.

Material damage and consequential damages may occur.

- Monitor the defined resting positions of movable internal fittings and secure them against restarting until the device (downpipe [DP] with cleaning head) is no longer within the effective range of internal fittings or has been removed from the container. Only then may the process be restarted after the cleaning process has been completed.

Removing the Traversing Device

The method of integrating a moving device into the cleaning system is carried out by the system manufacturer. Thus, for the respective installation situation, the additional specifications for removal must also be followed according to the documents of the system manufacturer, and the necessary work steps must be carried out in the correct sequence. Uncontrolled lowering of the device into the container must always be prevented.

7.4 Maintenance

To ensure the trouble-free operation, high operational safety and long service life of the cleaning device, it is imperative to have it cleaned and maintained at regular intervals. The safety instructions in *Section 7.1 Safety Instructions for Maintenance* must be adhered to when carrying out cleaning, maintenance and repair work.

Repairs

In the case of repairs, the country-specific regulations must be taken into account. In Germany, the Operational Safety Ordinance (BetrSichV) and the Product Safety Act (ProdSG) apply.

NOTE ON EXPLOSION PROTECTION

***Repairs** to Ex devices must be carried out in accordance with the requirements of EN IEC 60079-19 and may only be carried out by certified specialist workshops.*

All maintenance, repair and assembly/disassembly work for individual components and assembly groups should only be carried out when the device is in its disassembled state.

Maintenance work must be documented in a protocol.

NOTE

Risk of damage to the device due to improper assembly/disassembly work!

Assembly/disassembly of the device that is NOT performed properly could cause damage to the device and put its functional safety and reliability at risk during recommissioning.

The failure of components or a device malfunction can cause material damage and consequential damages.

- *Use a vise with protective jaws, e.g. plastic or light metal, for clamping.*
- *Only use suitable tools that do not damage the surface.*
- *For assembly work, adhere to the specified tightening torques (see Section 7.5 Spare Parts and Customer Service).*

NOTE

Risk of dirt and foreign objects in the device!

Dirt or foreign objects can impair the functional safety and reliability of the device.

- *During assembly, make sure and check that there is no dirt or foreign objects in the device (e.g. small particles, sealing material).*

NOTE

Damage to the threaded connections!

Stainless steel threaded connections may tend to seize up during assembly as a result of friction caused by high preload forces and high friction values, and can cause problems when tightening and releasing.

- *Lubricate the threaded connections before assembly.*
- *Define the choice of lubricant very precisely for the application and the requirements (e.g. Klüberpaste UH1 96-402 or UH1 84-201).*
- *Adhere to the information on the safety data sheets provided by the lubricant manufacturer.*

NOTE

Edge compression in the area of the wrench flats!

If workpieces are NOT grasped without play and in a protective manner by the flats during assembly/disassembly, then they are at risk of damage.

- *For gentle, protective assembly/disassembly work, use an adjustable or pliers wrench with parallel, smooth clamping jaws.*
- *Apply the clamping jaws of the adjustable wrench or pliers wrench to the flats without play so that they rest evenly across the surface and loosen or tighten the screwed part.*

Maintenance of the Control System and Equipment Parts

A control system and equipment parts (e.g. filter, shut-off fitting or flow meter for the cleaning medium), are NOT supplied by the manufacturer!

The intervals as well as methods for their maintenance work are to be determined by the operating company according to the specifications of the respective manufacturer and in accordance with the safety requirements.

7.4.1 Maintenance Intervals

NOTE

Component failure due to vibration damage!

During operation, vibration can cause screw and clamp connections to become loose or the device to be subjected to severe strain, thus possibly leading to component failure.

The failure of components or a device malfunction can cause material damage and consequential damages.

- *Check the installed device for loose connections at regular intervals.*
- *Pay attention to vibration damage during maintenance and inspection.*
- *Adapt the maintenance intervals according to the operating conditions of the plant.*

  After commissioning, start with short maintenance intervals at first.

  If no damage occurs, the maintenance intervals can be adapted incrementally until the intervals specified in the instructions are reached.

Maintenance Intervals and Methods

Shorten the maintenance intervals by 30% in the event of:

- *Deviation from the preferred installation position of the device (see Section 5.2.2 Installation Position).*
- *Vibrations that occur in the plant which are NOT caused by the device and CANNOT be prevented.*

If the device is NOT operated for a longer period, we recommend that you check the device completely before recommissioning to make sure that it is fully functional
(see *Section 6.2 Functional Check/Trial Run*).

A regular inspection must be carried out after 200 h_O (operating hours) of the appliance or after a period of 24 months (2 years), depending on which event occurs first.

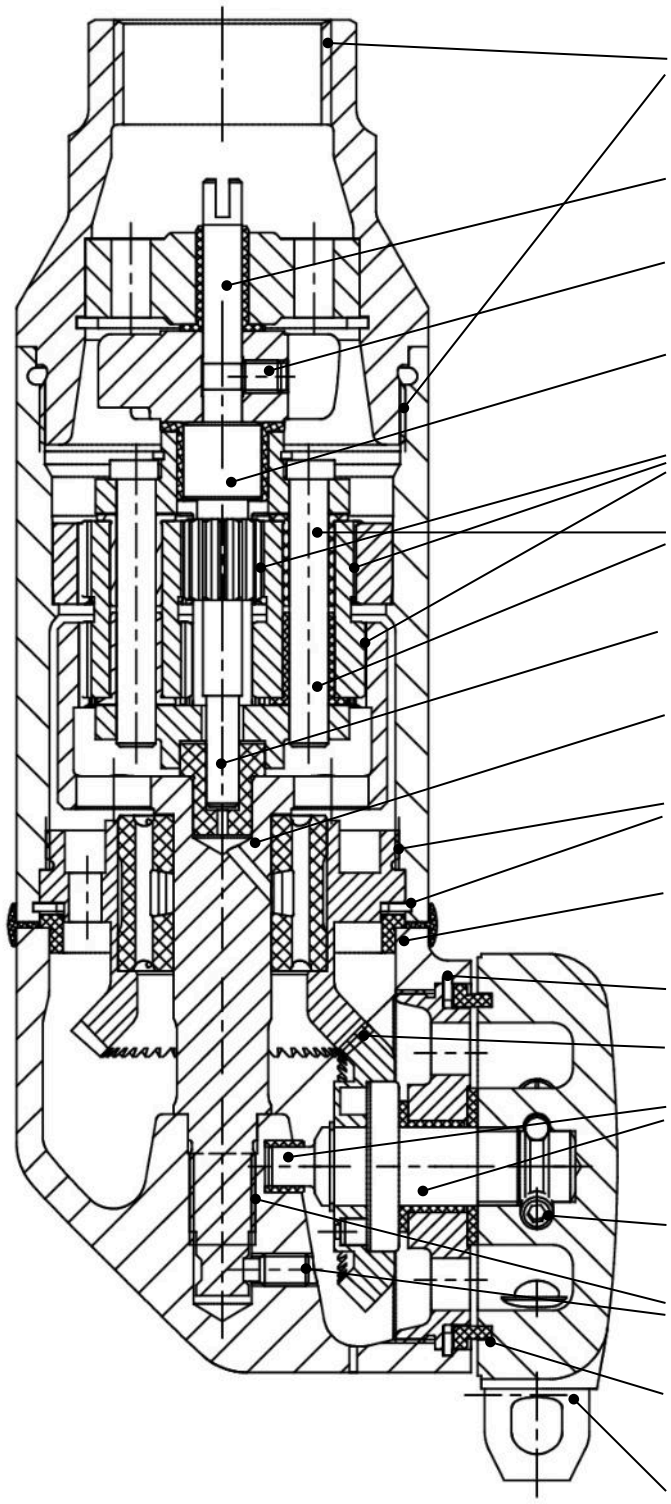
The specified times of the maintenance intervals are based on single-shift operation (8 hours per working day, 12 months per year) of the device and operation with

Cleaning medium:	*Water*
Media pressure:	*8 bar (116 psig)*
Media temperature:	*25 °C (77 °F)*

Interval:	h_O	= operating hours of the device	**Method:**	V	= visual inspection
	d	= daily		F	= functional check
	w	= weekly		M	= measurement
	m	= monthly		C	= cleaning*
	¼ y	= quarterly			
	½ y	= every six months			
	y	= yearly			

*The cleaning intervals are to be defined by the operating company in accordance with operating conditions.

Overview of Maintenance Points



Maintenance Points

A Connection
Media connection [MC] / Process connection [PC]
Connection cover / Housing
B Plain bearings
Spur gear SR with shaft / flow-in disk

C Connection
Spur gear SR with shaft / impeller

D Plain bearings
Spur gear SR with shaft / planetary carrier

E Gearing
Spur gear SR / spur gear PR / spur gear HR

F Plain bearings
Axle for planetary carrier / spur gear PR

G Plain bearing
Spur gear SR with shaft / spur gear HR

H Plain bearings
Spur gear HR / bevel gear wheel for housing

I Connection
Housing / bevel gear wheel for housing

J Plain bearings
Housing / shaft-axle connection

K Connection
Shaft-axle connect. / bearing plate
L Gearing
Bevel gear unit
M Plain bearings
Driver shaft / bearing plate
Driver shaft / shaft-axle connection

N Connection
Driver shaft / nozzle carrier

O Connection
Spur gear HR / shaft-axle connection

P Plain bearings
Shaft-axle connection / nozzle carrier

Q Connection
Nozzle carrier / nozzles

Figure 7.4-1: Maintenance points TANKO-MX (example MX125)

The tightening torques of the threaded connections required for maintenance are listed in Section 7.5.1 MX125 and MX150.

Point	Inspection and Maintenance Work	Interval	Method
A	Check that the media connection [MC] / process connection [PA] and the connection cover/housing connection for tightness, wear and contamination as well as a firm fit. • Replace parts in the event of wear or damage. • Properly reattach loosened threaded connections. Depending on the version of the device, the threaded connection between the connection cover and the housing is secured by a securing mechanism with two locking pins. • Check that the locking pins are firmly in place. • After each disassembly of the threaded connection, replace the used locking pins with new genuine parts during assembly. Check upstream equipment parts for function and contamination. • Clean or replace the filter. • Ensure technical tightness (e.g. shut-off fitting).	m	V F
B	Check the plain bearings to make sure they are fully functional and for wear. • Clean or replace the collar bushings as necessary. • The spiral circlip must be fully engaged in the groove.	200 h_O	V F C
C	Check the threaded connection to make sure that it is firmly in place. • Properly reattach loosened threaded connections.	m	V F
D	Check the plain bearings to make sure they are fully functional and for wear. • Clean or replace the collar bushings as necessary.	200 h_O	V F C
E	Check that the gear unit is fully functional and wear on the teeth. • Check the bearing movement. • Replace parts in the event of wear or damage.	200 h_O	V F C
F	Check the plain bearings to make sure they are fully functional and for wear. • Clean or replace the collar bushings as necessary.	200 h_O	V F C
G	Check the plain bearings to make sure they are fully functional and for wear. • Clean or replace the collar bushings as necessary.	200 h_O	V F C
H	Check the plain bearings to make sure they are fully functional and for wear. • Clean or replace the collar bushings as necessary.	200 h_O	V F C
I	Check the threaded connection to make sure that it is firmly in place. • Properly reattach loosened threaded connections. • The spiral circlip must be fully engaged in the groove.	m	V F

J	Check the plain bearings to make sure they are fully functional and for wear. • Clean or replace the collar bushings as necessary.	200 h_o	V F C
K	Check the threaded connection to make sure that it is firmly in place. • Properly reattach loosened threaded connections. • The spiral circlip must be fully engaged in the groove.	m	V F
L	Check that the gear unit is fully functional and wear on the teeth. • Check the bearing movement. • Replace parts in the event of wear or damage.	200 h_o	V F C
M	Check the plain bearings to make sure they are fully functional and for wear. • Clean or replace the collar bushings as necessary.	200 h_o	V F C
N	Check the threaded connection to make sure that it is firmly in place. • Properly reattach loosened threaded connections.	m	V F
O	Check the threaded connection to make sure that it is firmly in place. • Properly reattach loosened threaded connections.	m	V F
P	Check the plain bearings to make sure they are fully functional and for wear. • Clean or replace the collar bushings as necessary.	200 h_o	V F C
Q	Check the threaded connection to make sure that it is firmly in place. • Properly reattach loosened threaded connections.	m	V F

Table 7.4-1: Inspection and Maintenance Work MX125 and MX150

Heavily worn bushings can cause increased wear on the spur gears in the area of the teeth.

7.4.2 Tools and Tightening Torques

Use only proper tools which are required for performing the required work and approved for use.

NOTE ON EXPLOSION PROTECTION

When working in areas where flammable or easily ignitable vapors, fluids or dusts are present, where sparks could result in a potential fire or explosion hazard, tools that are unlikely to create sparks should be used.

If this is not observed, the explosion protection could be invalidated.

- *Do not use a tool that could create sparks (see EN 1127-1 Annex A Information on the use of tools in hazardous areas).*

When working in a potentially explosive atmosphere, it is important to remember that possible sparking is influenced can be caused by factors other than the tool. E.g.:

- The material to be processed,
- The hardness of the material to be processed compared to the hardness of the tool,
- The impact or friction energy applied
- Additional, existing deposits that could cause spark formation, such as rust, aluminum, combustible dusts and the oxygen level.

Tools for the device

NOTE ON EXPLOSION PROTECTION

All maintenance, repair and assembly/disassembly work for individual components and assembly groups should only be carried out when the device is in its removed state and in an "Ex-free area". The tools and assembly aids required for this therefore do not have to be certified for use in an Ex zone.

The following tools are required for mechanical work on the device:

Tools	MX	
	125	150
– Screwdriver set (slot head)	X	X
– Hexagon socket wrench (size 2.5 x 100 mm)	X	X
– Open-end wrench AF 14 mm	X	X
– Open-end wrench AF 18 mm	---	X
– Pliers wrench or adjustable wrench/crescent wrench with smooth parallel gripping jaws	X	X
– Torque wrench 100 Nm (adjustable and positionable) with insertion shaft ☐ 9 x 12 mm	X	X
○ AF 14 mm open-end wrench or AF 1-27 mm adjustable insertion tool ☐ 9 x 12 mm	X	---
○ AF 18 mm open-end wrench or AF 1-27 mm adjustable insertion tool ☐ 9 x 12 mm	---	X
– Torque wrench 130 Nm (adjustable and positionable) with insertion shaft ☐ 14 x 18 mm	X	X
○ AF 41 mm open-end wrench or AF 2-41 mm adjustable insertion tool ☐ 14 x 18 mm	X	---
○ AF 55 mm mm open-end wrench ☐ 24,5 x 28 mm	---	X
○ Plug-in/transition adapter for arbor-mounted tool ☐ 14 x 18|24,5 x 28 mm	---	X
– Torque wrench 100 Nm (adjustable) with reversible ratchet or reversible square socket ☐ 1/2"	X	X
– Torque screwdriver (adjustable 2,0-7,0 Nm) with inserts and accessories (interchangeable blade 6 edge)	X	X
– Joint face wrench (Adjustable pin spacing; pin diameter Ø 3 mm)	X	X
– Needle nose pliers	X	X
– Pick and hook set for sealing rings/O-rings	X	X
– Strap wrench/belt pipe wrench (e.g. Ø 140 mm) with woven belt (optional)	X	X

Table 7.4-2: Tools

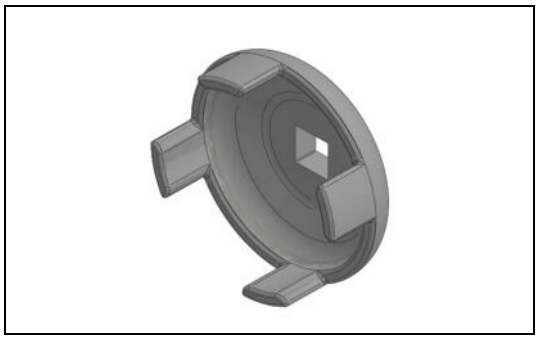
Figure 7.4-2: Tools for TANKO-MX

All the screw connections on the device are firmly tightened in the factory with a corresponding tightening torque. This ensures that the required clamping force between the components to be joined is also present during the time of maximum application of operating forces.

Only use regularly serviced/calibrated torque tools to install the device. In addition, observe the dimension of the insertion tools and compare them with those of the adjustment tool (see operating instructions/test report of the respective torque tool). In case of deviation, carry out a dimension correction!

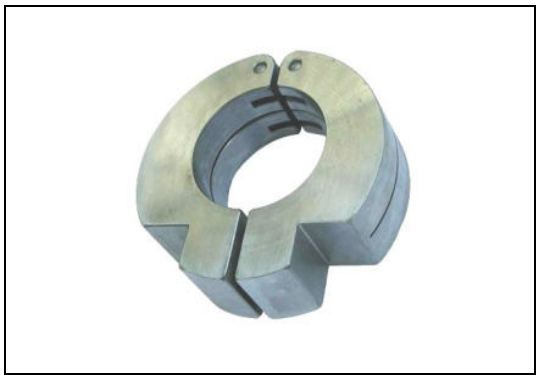
All relevant tightening torques of the threaded connections are listed in Section 7.5 Spare Parts and Customer Service.

MX125 / MX150 Special Tool



Mounting bell for nozzle carrier MX with socket for torque wrench
Drive AF: ☐ 1/2" inside
Article No. 664MWMA444A20

This mounting bell means that the nozzle carrier (27) can be comfortably loosened without causing damage and can be properly re-tightened with a torque wrench.



Assembly aid DN 2.1/2" for pipe Ø 63,5-60,6
Article No. 7003800021294

The device can be clamped in a vise in the middle of the edge of the housing (02) without protective jaws with this tool. Due to the even strain when clamping, the housing (02) cannot deform and the holding power is stronger for loosening or proper tightening of individual screwable parts e.g. the connection cover (01).

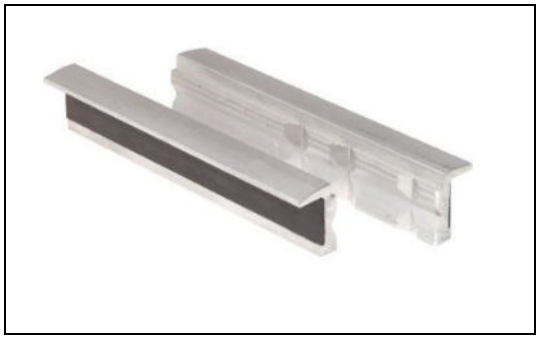
Articulated face wrench with mount for torque wrench (without pin)
Drive AF: inside ☐ 1/2"
Article No. 7607

Loose pin with nut
Pin: Ø 3 mm (M4)
Article No. 7608

This tool, with exchangeable pin and drive square for a torque wrench, is suitable for loosening or professional tightening of the bevel gear for the housing (23) and the bearing shield (28).

Mounting driver for safety pin
Article No. 664MWMA021A00

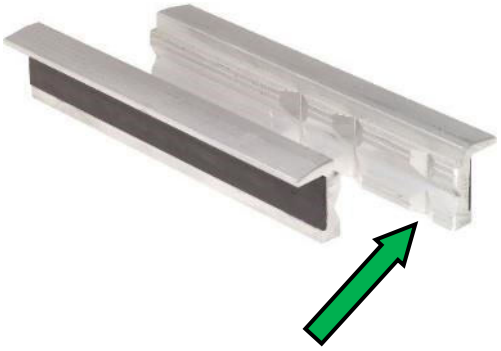
This tool has a special guide slot so that the locking pin (02.1) can be easily aligned and professionally mounted.

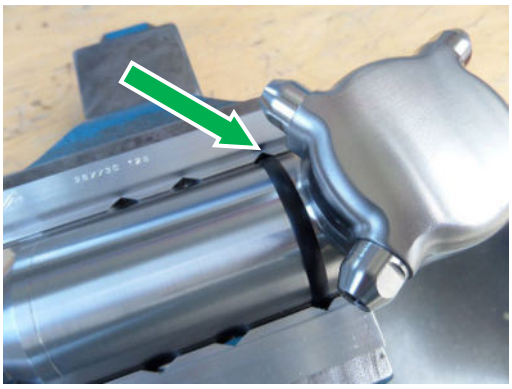


Magnet vise jaw pair aluminum, prism
Jaw width: 125 mm
Article No. 7260

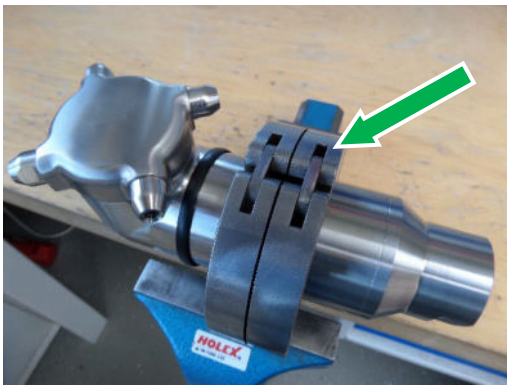
These protective jaws prevent surface damage and, due to the notched prisms on the profile surface, generate a good holding force when fastening components in the vise.

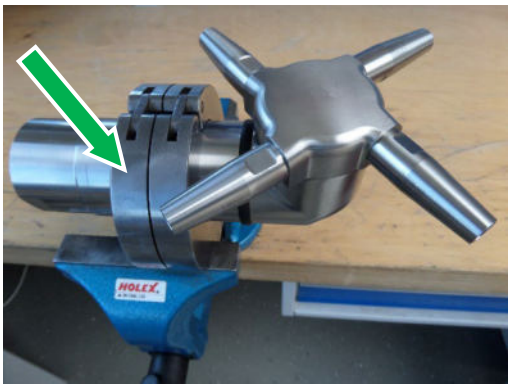
If the device is fitted with a rinsing ring (07.1), protective jaws with prisms for clamping the device in the vise are recommended. The rinsing ring (07.1) can be positioned freely within the prisms and is thus NOT crushed.





It is also possible to attach the device in the vise with the mounting aid for clamping for the pipe. This clamping also has the advantage that, with high tightening torques during disassembly/assembly, the device is secured with a high holding power.





7.4.3 Disassembling the Device

The tools required for assembly/disassembly work are listed in Section 7.4.2 Tools and Tightening Torques.

7.4.3.1 Disassembling the MX125 and MX150 Device

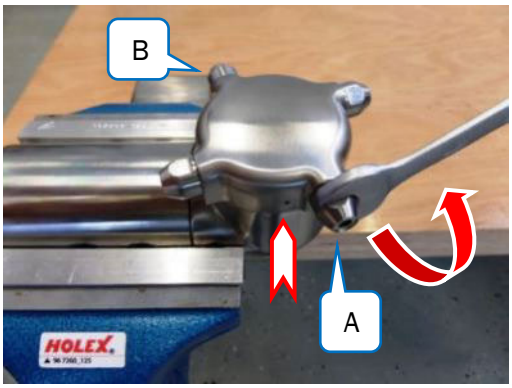
The item numbers shown in brackets refer to Figure 7.5-1: Internal structure (example MX125) and Table 7.5-2: MX125 and MX150 parts list (standard).

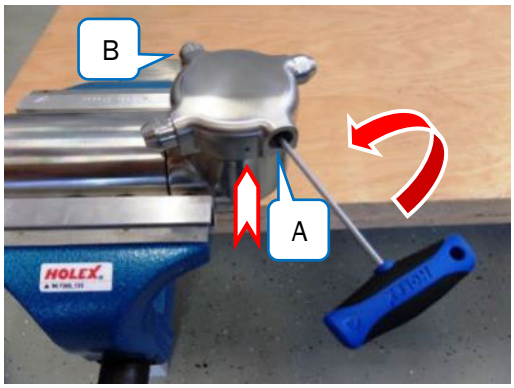
1) Disassembly - Cleaning Head Assembly Group

On the cleaning head, there is a “bore for self-cleaning” of the device on the face of the nozzle carrier. This bore is also used for orientation when disassembly/assembly of the device.

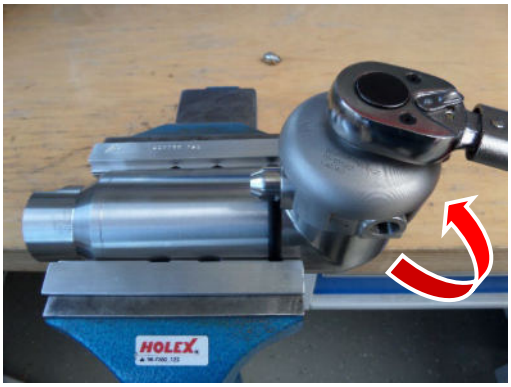
The position of the “bore for self-cleaning” is denoted by the  *symbol in the illustrations.*

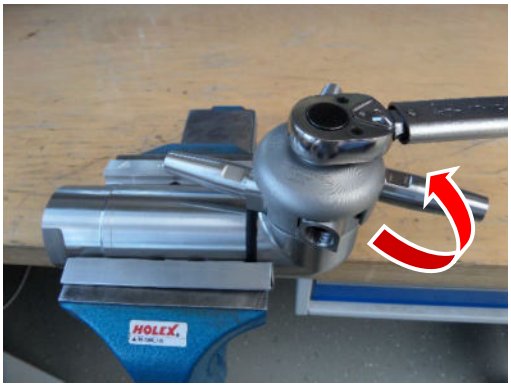
1. Fasten the device in the vise with the nozzle carrier (27) facing upwards, horizontally on the housing (02) and the shaft-axle connection (24).
2. Unfasten the nozzle (12) or nozzle extension (12.1) directly at the “bore for self-cleaning” with an open-end wrench or pliers wrench and unscrew with the jet concentrator (13).
3. ***NOTE*** The set screw (34) may fall into the device when being unscrewed!
   - Insert a hexagon socket wrench, size 2.5 mm, through the threaded hole on the face of the nozzle carrier (27) and into the set screw (34).
   - Unfasten the set screw (34) and carefully unscrew it from the nozzle carrier (27).
4. ***NOTE*** The nozzle carrier (27) is secured by 2x set screws (34)!
   - Repeat steps 2 and 3 at position "B".





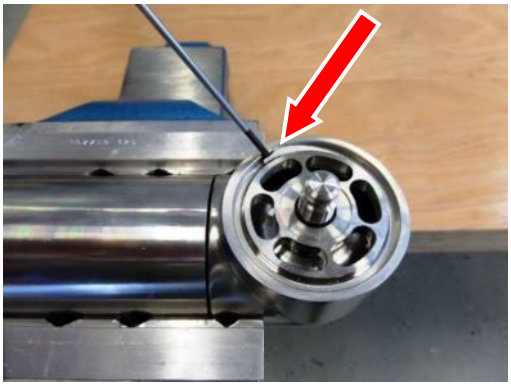
5. Loosen the nozzle carrier (27) with the help of the mounting bell for the MX nozzle carrier and a ☐ 1/2” ratchet and unscrew from the driver shaft (25).

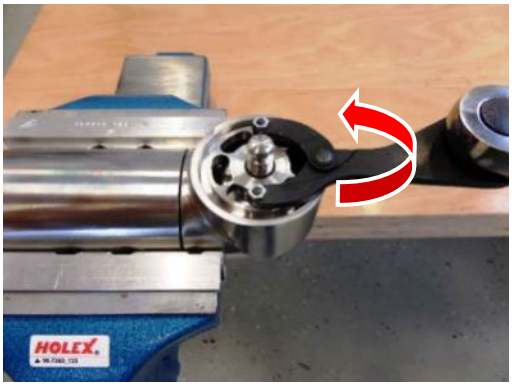




6. Remove the collar bushing (07) from the nozzle carrier (27).
7. Slide the sliding disk (11) from the driver shaft (25).

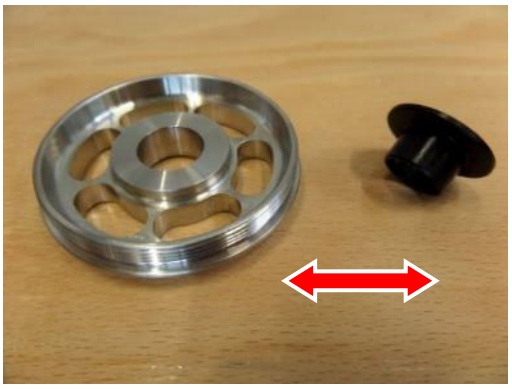
8. Lever the spiral circlip (30) in front of the bearing plate (28) out of the internal groove on the shaft-axle connection (24), by inserting the flat tip of a small screwdriver on the removal notch, and screw it out in a spiral pattern.
9. Unfasten the bearing plate (28) with an adjustable face wrench (pin Ø 3mm) and unscrew it from the shaft-axle connection (24).



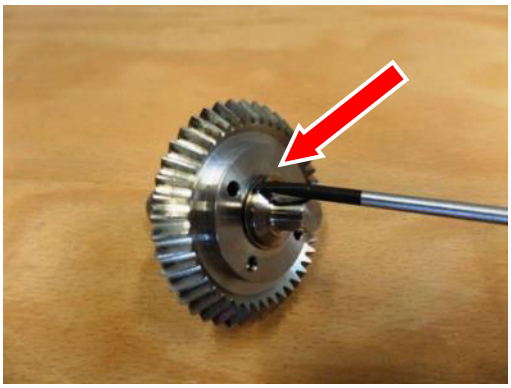


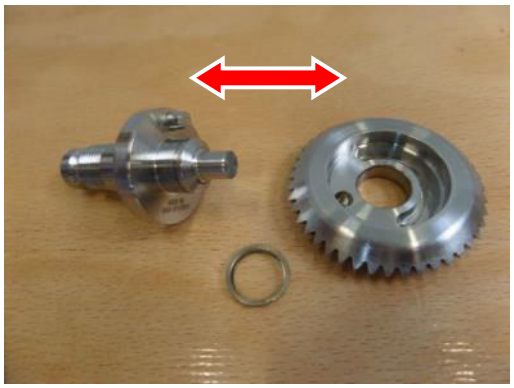
10. Remove the driver shaft (25) from the shaft-axle connection (24) together with the bearing plate (28); collar bushing (08); cylindrical pin (35), bevel gear wheel for the nozzle carrier (26) and spiral circlip (31).

11. Slide the bearing plate (28) with the collar bushing (08) from the driver shaft (25).
12. Push the collar bushing (08) out of the bearing plate (28) with an auxiliary tool (e.g. drift).



13. Lever the spiral circlip (31) out of the internal groove on the driver shaft (25), by inserting the flat tip of a small screwdriver on the removal notch, and screw it out in a spiral pattern.
14. Pull the bevel gear wheel for the nozzle carrier (26) from the driver shaft (25).
15. The cylindrical pin (35) is pressed into the driver shaft (25) and should not be removed.



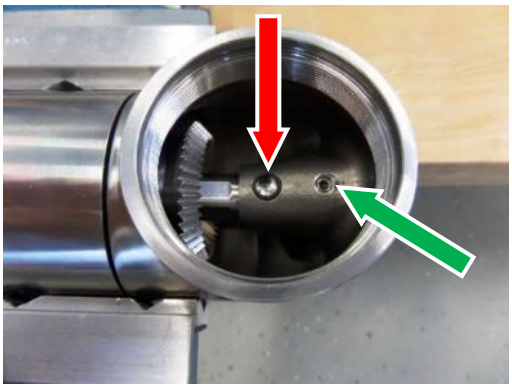


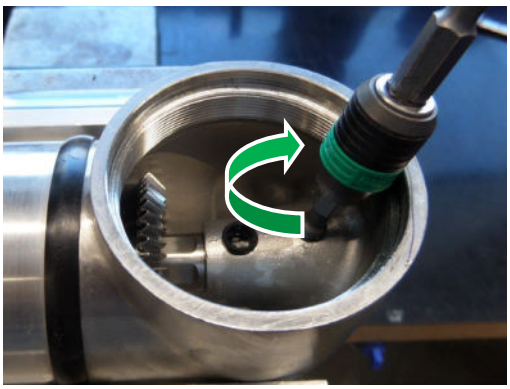
16. Pull the bushing (09) from the shaft-axle connection (24) with a set of pliers or lever it out with the flat tip of a small screwdriver.

17. ***NOTE*** Loss protection!

    The set screw (34) is secured against loss by a slight punch mark in the area of the front thread on the dome of the shaft-axle connection (24). It is possible that the set screw (34) cannot be unscrewed easily.

    - If necessary, remove the punch mark before unscrewing (e.g. taper countersink).
    - Unfasten the set screw (34) on the drift of the shaft-axle connection (24) with a hexagon socket wrench size 2.5 mm and unscrew it.





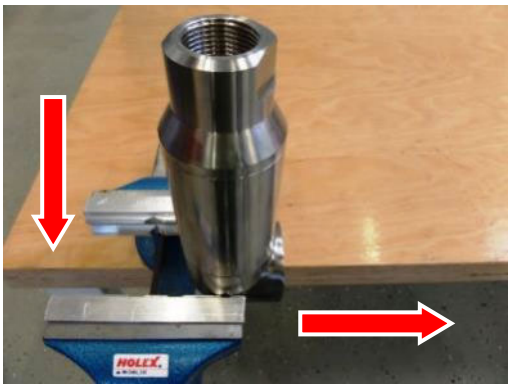
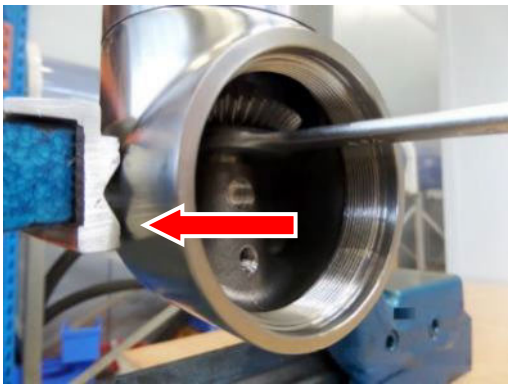
18. Hold the device firmly with one hand and unfasten the vise.

19. Fasten the device vertically in the lower area of the shaft-axle connection (24) so that the connection cover (01) faces upwards and the thread for the bearing plate (28) of the shaft-axle connection (24) faces to the side.

20. *NOTE* Left-hand thread of the connection!

    Turning the incorrect direction can damage the threaded connection.

    - Make **sure that** the threaded connection is turned in the correct direction “LH” (left-hand).
    - Unfasten the AG drive unit using an open-end wrench on the flats AF 14 of the shaft of the spur gear (22).
    - Unscrew AG drive unit from the dome of the shaft-axle connection (24).

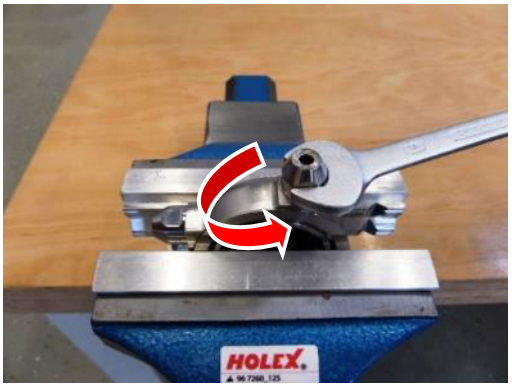



21. Depending on the equipment of the device, remove the collar bushing (07) and the flushing ring (07.1) or only the alternative flushing ring with integrated collar bushing (07.1) from the shaft-axle connection (24).

22. Remove the shaft-axle connection (24) from the vise.

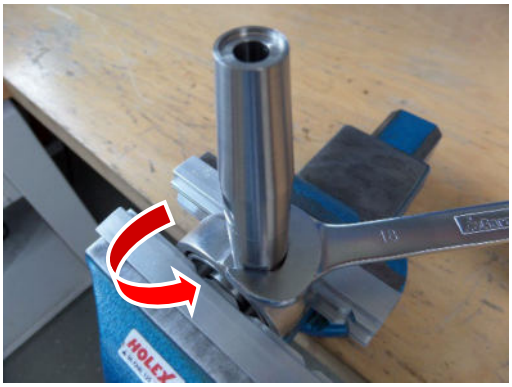

23. Repeat the following steps depending on the number of nozzles (12).

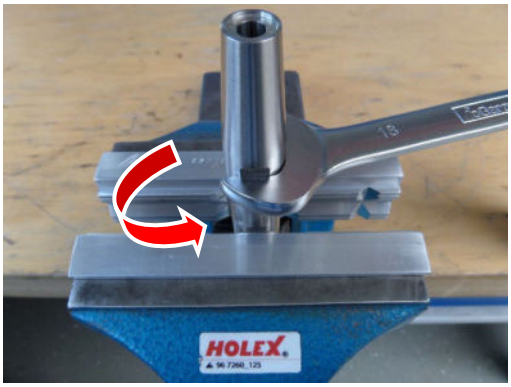
    - Fasten the nozzle carrier (27) in the vise. The nozzle (12) being unfastened faces upwards.
    - Unfasten the nozzle (12) or nozzle extension (12.1) and unscrew it from the nozzle carrier (27).
    - Remove the nozzle carrier (27) from the vise.



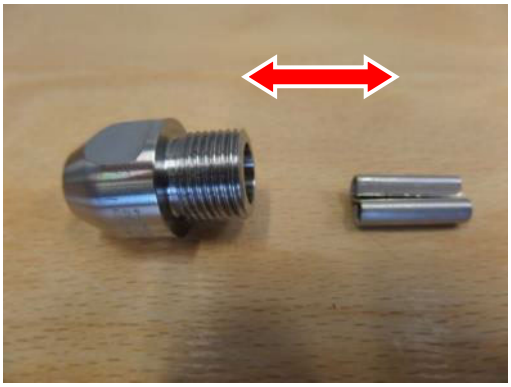

Note regarding Devices with Nozzle Extension (12.1):

- Unfasten nozzle extension (12.1) with the nozzle (12) and unscrew it from the nozzle carrier (27).
- Clamp the nozzle extension (12.1) with the nozzle (12) in the vise.
- Unfasten the nozzle (12) and unscrew it from the nozzle extension (12.1).
- Remove the nozzle extension (12.1) from the vise.

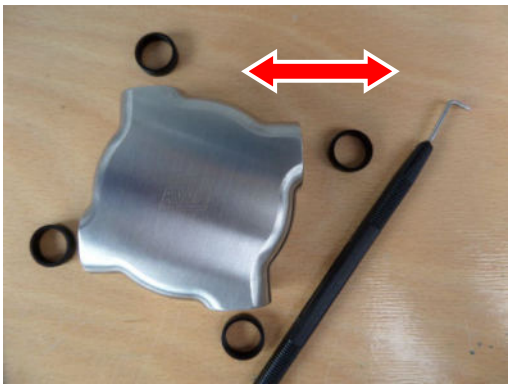




24. Pull the jet concentrator (13) from the nozzle (12), e.g. with a set of pliers.



25. Remove the seal ring (13.3) from the threaded bore of the nozzle carrier (27) or from the nozzle extension (12.1) (e.g. with O-ring pick).



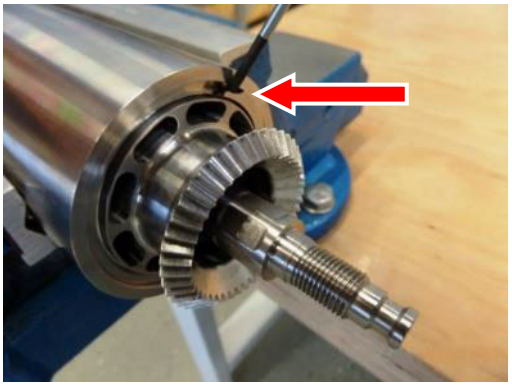
2) Disassembly - Drive Unit Assembly

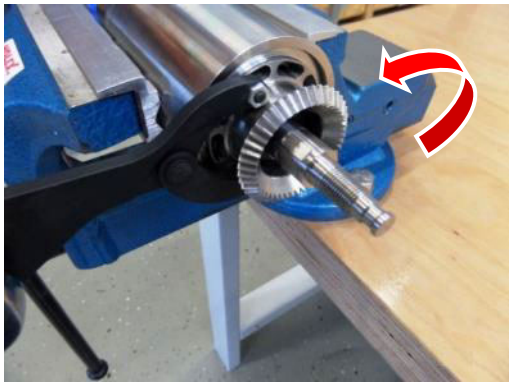
Before you can start with disassembly of the drive unit assembly, the cleaning head assembly unit first has to be removed!

1. ***NOTE*** Incorrect clamping in the vise can cause threaded connections to become jammed and deformed unintentionally!

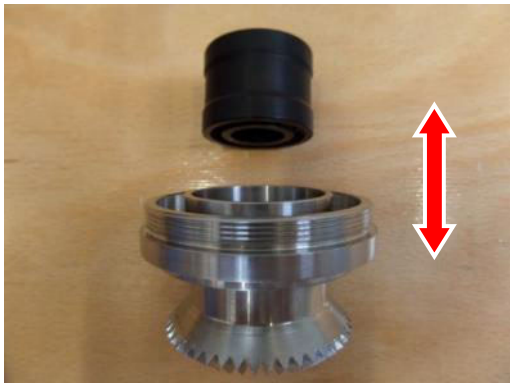
   The threaded connection cannot be screwed and may become damaged.

   - The jaws of the vise must not clamp too firmly and not directly in the area of the threaded connection.
   - Fasten the AG drive unit in the vise in a horizontal position on the housing (02) so that the threaded connection for the bevel gear wheel for the housing (23) is NOT clamped.
2. Lever the spiral circlip (30) out of the internal groove on the housing (02), by inserting the flat tip of a small screwdriver on the removal notch, and screw it out in a spiral pattern.
3. Unfasten the bevel gear wheel for the housing (23) with an adjustable face wrench (pin Ø 3 mm) and unscrew it from the housing (02).

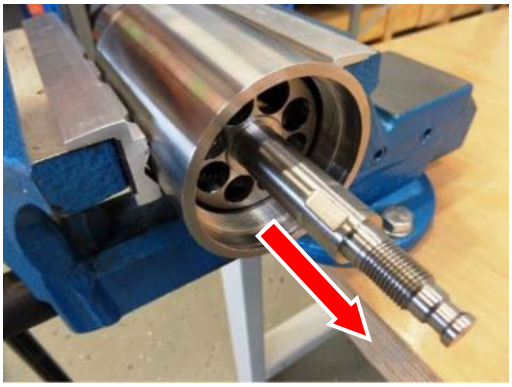


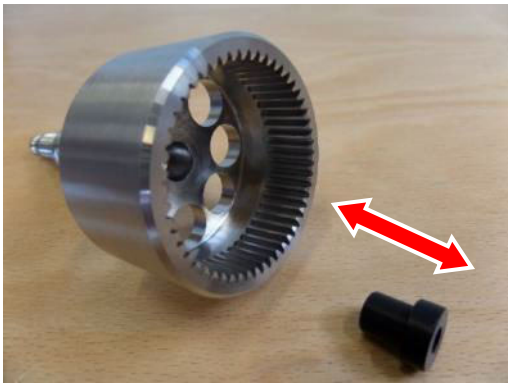


4. Push the bevel gear wheel for the housing (23) with the plain bearing (10) from the spur gear (22).
5. Support the bevel gear wheel for the housing (23) on a surface so that the plain bearing (10) is exposed.
6. Use an auxiliary tool (e.g. drift) to drive the plain bearing (10) from the bevel gear wheel for the housing (23).

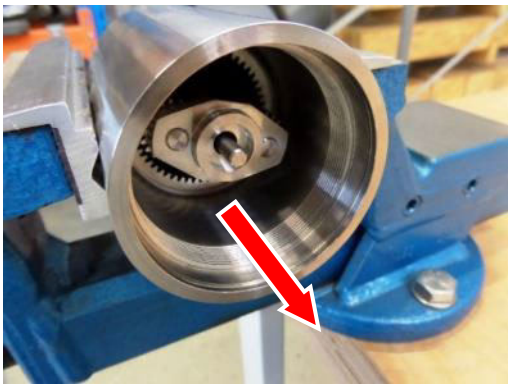


7. Remove the spur gear (22) together with the collar bushing (05) from the housing (02).
8. Pull the collar bushing (05) from the spur gear (22) with a set of pliers.

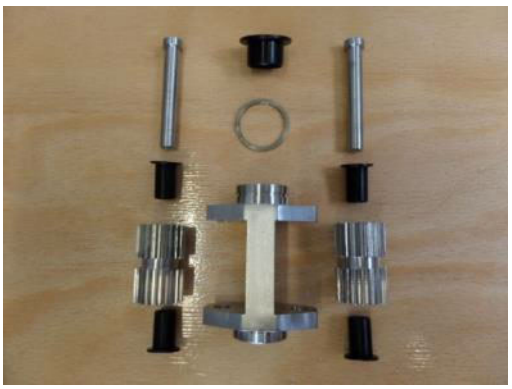




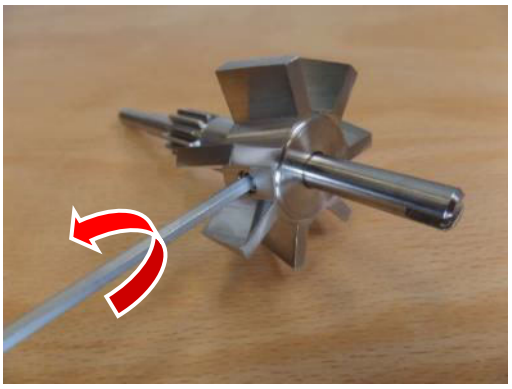
9. Remove the planetary carrier (16) assembly with spur gear (19; 20); axle for the planetary wheel (17); spiral circlip (32) and collar bushing (03 and 04) from the housing (02).
10. Push the collar bushing (03) out of the planetary carrier (16) with an auxiliary tool (e.g. drift).



11. Lever the spiral circlip (32) out of the internal groove on the planetary carrier (16), by inserting the flat tip of a small screwdriver on the outer notch, and screw it off in a spiral pattern.
12. Pull the axle for the planetary wheel (17) from the planetary carrier (16) and the spur gears (19; 20).
13. Push the collar bushings (04) from the spurs (19; 20) with an auxiliary tool (e.g. drift).



14. Remove the spur gear (18), together with the impeller (15) and the set screw (33) from the housing (02).
15. Unfasten the set screw (33) with a hexagon socket wrench size 2.5 mm and unscrew it from the impeller (15).
16. Push the impeller (15) from the shaft of the spur gear (18).



17. ***NOTE*** Incorrect clamping in the vise can cause threaded connections to become jammed and deformed unintentionally!

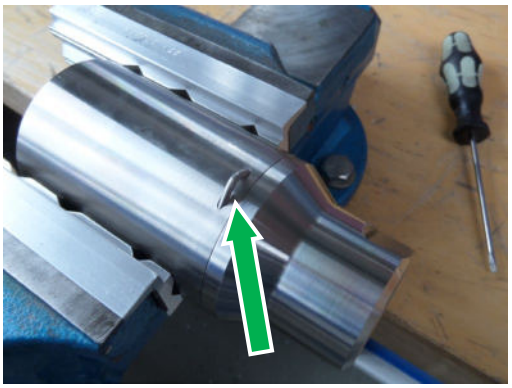
    The threaded connection cannot be screwed and may become damaged.

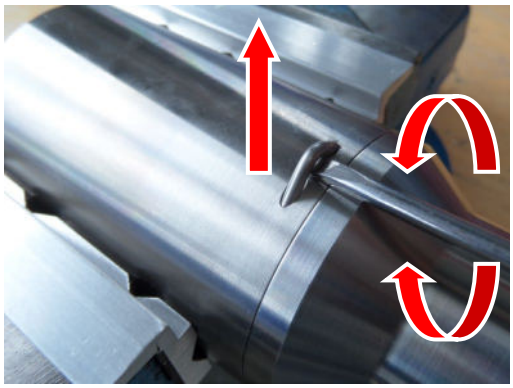
    - The jaws of the vise must not clamp too firmly and not directly in the area of the threaded connection.
    - Hold the housing (02) firmly with one hand and unfasten the vise.
    - Fasten the housing (02) in a horizontal position in the vise so that the thread on the connection cover (01) is NOT clamped.

18. ***NOTE*** Depending on the version of the device, the threaded connection between the connection cover (01) and housing (02) is secured by a securing mechanism with two locking pins (02.1).

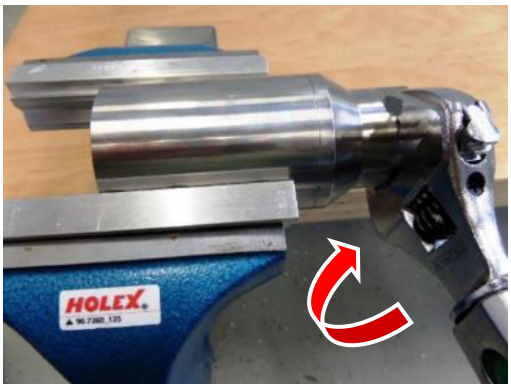
    Remove the locking pins (02.1) before loosening the threaded connection.

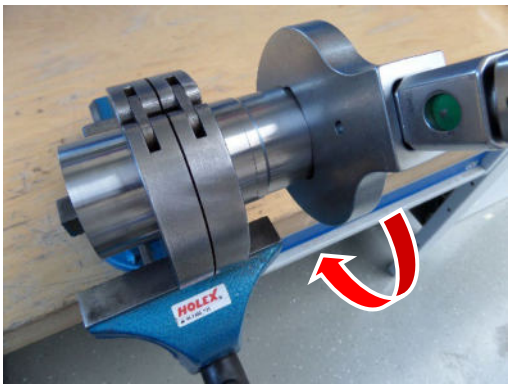
    - Lever the short leg of each locking pin (02.1) out of the housing (02), e.g. with the flat tip of a small screwdriver, and pull out the long leg.
    - Do not reuse the locking pins (02.1) because of the safety requirement. Dispose of them.





19. Place an open-end wrench/adjustable wrench on the flats of the connection cover (01), unfasten the connection cover (01) and unscrew it from the housing (02).

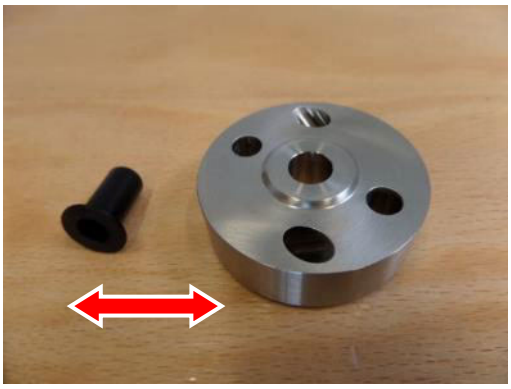




20. Lever the spiral circlip (29) out of the internal groove on the connection cover (01), by inserting the flat tip of a small screwdriver on the removal notch.

21. Remove the flow-in disk (14) from the connection cover (01).

22. Push the collar bushing (03) out of the flow-in disk (14) with an auxiliary tool (e.g. drift).



23. *NOTE* The spur gear (21) is pressed into the housing (02)!

    The spur gear (21) cannot be removed.

    - Remove the housing (02) together with the spur gear (21) from the vise.

The device is now completely disassembled. The individual parts can now be checked for soiling or damage and cleaned as necessary (e.g. in an ultrasound bath). Damaged parts and wear parts with signs of wear must be replaced.

7.4.4 Assembling the Device

The tools required for assembly/disassembly work are listed in Section 7.4.2 Tools and Tightening Torques.

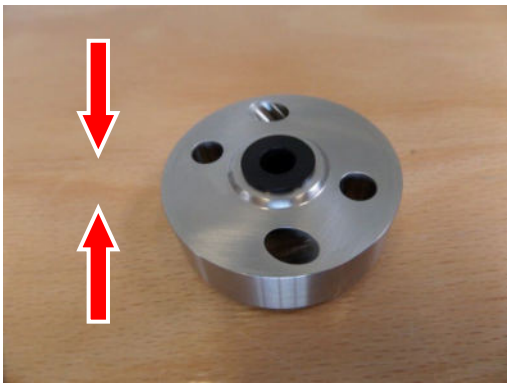
7.4.4.1 Assembling the MX125 and MX150 Device

The item numbers shown in brackets refer to Figure 7.5-1: Internal structure (example MX125) and Table 7.5-2: MX125 and MX150 parts list (standard).

The tightening torques for the threaded connections required for assembly are listed in the Table 7.5-1: MX125 and MX150 Tightening torques.

1) Assembly - Drive Unit Group

1. Press the collar bushing (06) into the flow-in disk (14) as far as it will go.



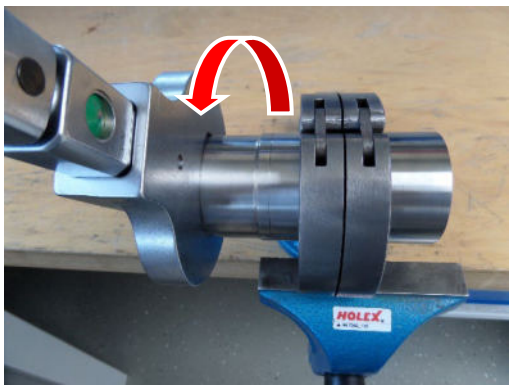
2. Push the flow-in disk (14) into the connection cover (01) so that the liner of the collar bushing (06) faces the inside of the device.
3. Insert the circlip (29) into the internal groove on the connection cover (01) and allow it to engage in place.

4. ***NOTE*** Incorrect clamping in the vise can cause threaded connections to become jammed and deformed unintentionally!

   The threaded connection cannot be screwed and may become damaged.

   - The jaws of the vise must not clamp too firmly and not directly in the area of the threaded connection.
   - Fasten the housing (02), with the spur gear (21) pressed in, in the vise in a horizontal position.

5. Screw the connection cover (01), together with the collar bushing (06), flow-in disk (14) and circlip (29) in the housing (02), and tighten it.

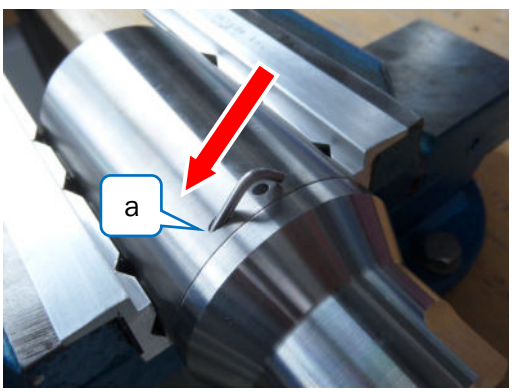


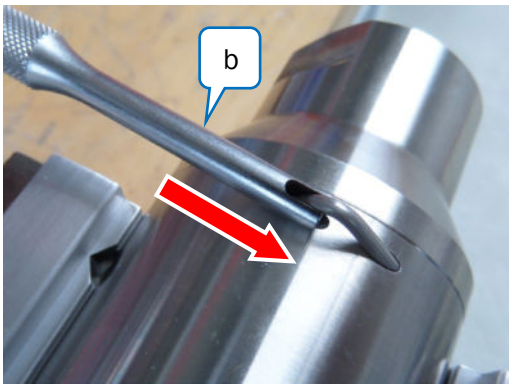
6. ***NOTE*** Depending on the version of the device, the threaded connection between the connection cover (01) and housing (02) is secured by a securing mechanism with two locking pins (02.1). If a locking pin (02.1) is bent several times, the material will fatigue and lose its strength.

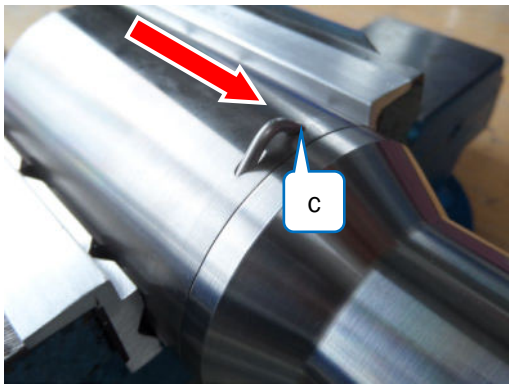
   The locking pins (02.1) may come loose and fall into the container.

   - Do not reuse bent locking pins (02.1). Replace them with new genuine locking pins (02.1).
   - Secure the threaded connection between the connection cover (01) and housing (02) against loss twice.
     a) Push the long leg of the locking pin (02.1) laterally into the long hole Ø 2.6 mm of the housing (02).
     b) Align the short leg of the locking pin (02.1) and apply a light hammer blow to it using the assembly driver in tangential contact with the housing (02) so that it engages in the short Ø 2.6 mm hole.
     c) Reposition the locking pin (02.1) in the direction of the short leg (e.g. by hammer blow or between the vise jaws) and check for tight fit.

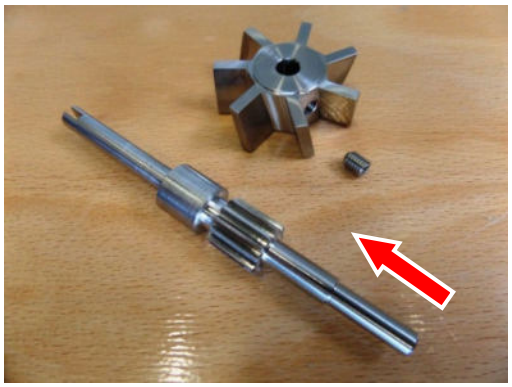
     Remark:
     To mount the 2nd Locking pin (02.1), repeat work steps a), b) and c).







7. Hold the screwed parts firmly with one hand and unfasten the vise.
8. Fasten the screwed parts on the outer diameter of the housing (02) in the thread area of the connection cover (01) in the vise in a vertical position so that the opening is facing upwards.
9. Push the impeller (15) onto the shaft of the spur gear (18).

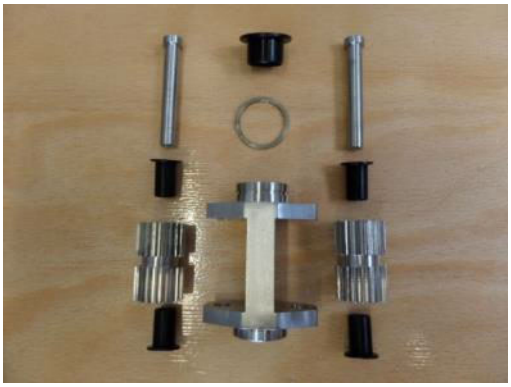


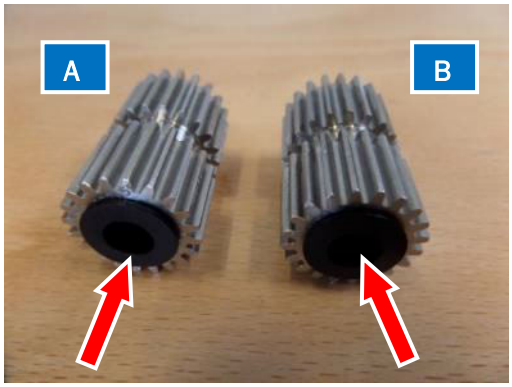
10. Screw the set screw (33) into the impeller (15) and tighten it with a hexagon socket wrench size 2.5 mm.
11. Insert the spur gear (18), together with the impeller (15) and the set screw (33), through the opening in the housing (02) and push the shaft end with the slot into the collar bushing (06).

12. ***NOTE*** The spur gears (19; 20) have different gearing!

    Two different spur gears, type A and type B, must always be used.

    - Press two collar bushings (04) into each of the spur gears (19; 20) as far as it will go.





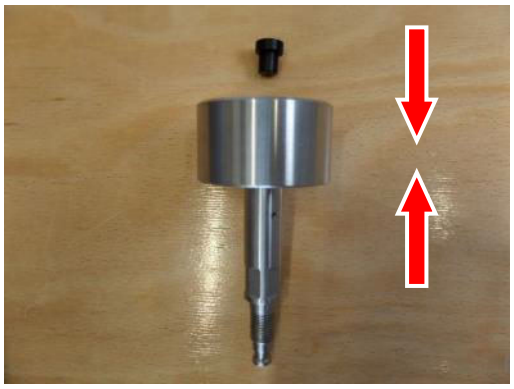
13. Push the axle for the planetary wheel (17) into the planetary carrier (16) and through the collar bushings (04) on the spur gears (19; 20). The head of the axle for the planetary gear (17) must be flush with the planetary carrier (16) and face inwards with the flat side.
14. Insert the spiral circlip (32) into the external groove on the planetary carrier (16) in a spiral pattern and allow it to engage in place. The axles for the planetary gear (17) are thus secured against displacement.
15. Press the collar bushing (03) into the planetary carrier (16) as far as it will go.

16. ***NOTE*** Assembling the planetary gear incorrectly can cause the gear wheels to jam!

    The gear wheels may become damaged and the cleaning head will not rotate.

    - It must be possible to push the teeth of the spur gears (19; 20) and of spur gear (21) together easily so that they mesh and they must not jam.
    - Push the planetary carrier (16), fully assembled with the axle for the planetary gear (17); collar bushing (04); spur gear (19; 20) and spiral circlip (32), with the collar bushing (03) onto the shaft of the spur gear (18).
    - You must be able to rotate the planetary carrier (16) by hand without any noticeable resistance.

17. Press the collar bushing (05) into the spur gear (22) as far as it will go.

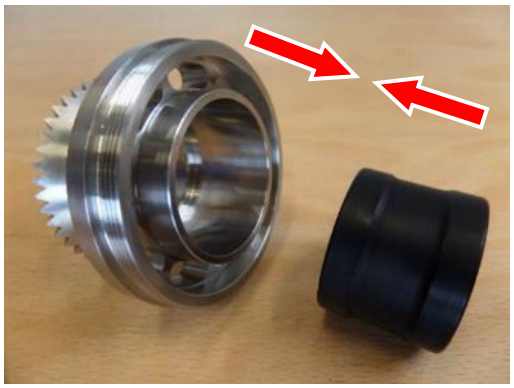


18. ***NOTE*** Assembling the planetary gear incorrectly can cause the gear wheels to jam!

    The gear wheels may become damaged and the cleaning head will not rotate.

    - It must be possible to push the teeth of the spur gear (22) and of spur gears (19; 20) together easily so that they mesh and they must not jam.
    - Push the spur gear (22), together with the collar bushing (05), onto the shaft of the spur gear (18) and into the planetary carrier (16).

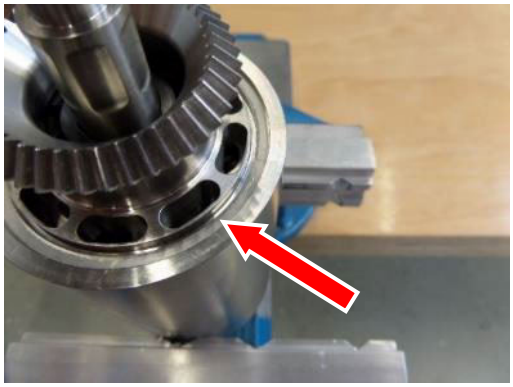
19. Press the plain bearing (10) into the bevel gear wheel for the housing (23) as far as it will go.



20. Push the bevel gear wheel for the housing (23) with the plain bearing (10) onto the shaft of the spur gear (22).

21. Screw the bevel gear wheel for the housing (23) into the housing (02) and tighten it with an adjustable face wrench (pin Ø 3 mm).

22. Insert the spiral circlip (30) into the internal groove on the housing (02) in a spiral pattern and allow it to engage in place.



2) Assembly - Cleaning Head Assembly Group

Before you can start with assembly of the cleaning head assembly group, the drive unit assembly first has to be assembled!

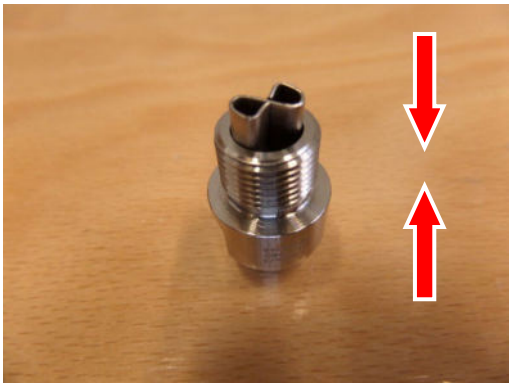
On the cleaning head, there is a “bore for self-cleaning” of the device on the face of the nozzle carrier. This bore is also used for orientation when disassembly/assembly of the device.

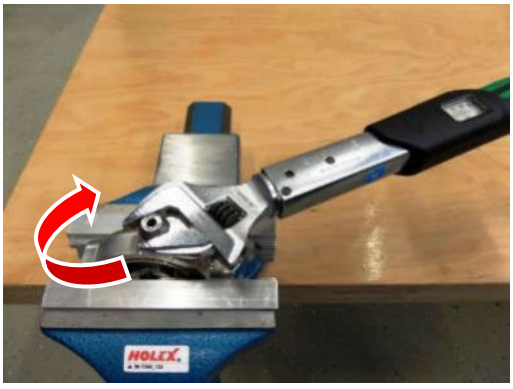
The position of the “bore for self-cleaning” is denoted by the ⇨ *symbol in the illustrations.*

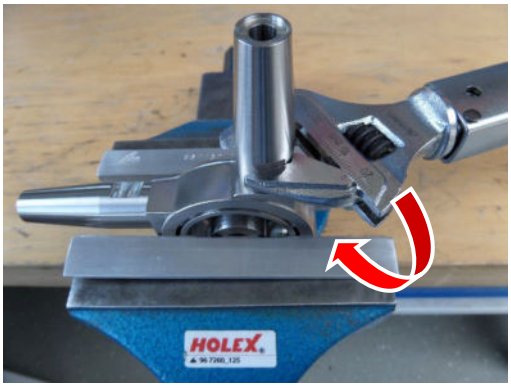
1. ***NOTE*** The nozzle carrier (27) is additionally secured by 2x set screws (34). Therefore, only screw in and tighten the nozzle (12) at position "A" directly next to the "hole for self-cleaning" and the nozzle (12) of position "B" after mounting the nozzle carrier (27) on the driver shaft (25) on the device!

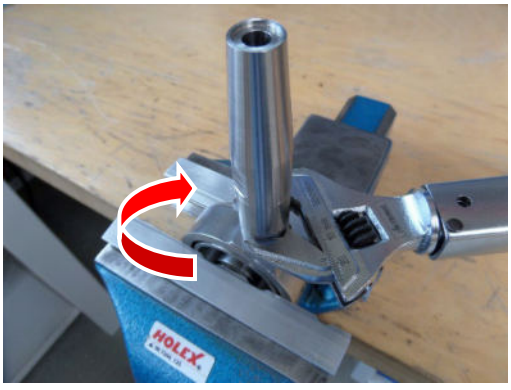
   Repeat the following steps in accordance with the number of nozzles (12) on the device:

   - Fasten the nozzle carrier (27) in the vise.
   - Push the seal ring (13.3) into the threaded bore of the nozzle carrier (27) as far as it will go.
   - Push the jet concentrator (13) into the nozzle (12).
   - Screw the nozzle (12), together with the jet concentrator (13), into the nozzle carrier (27) and tighten it.
   - Remove the nozzle carrier (27) from the vise.









Note regarding Devices with Nozzle Extension (12.1):

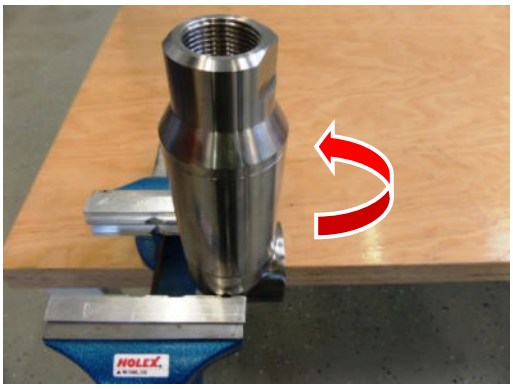
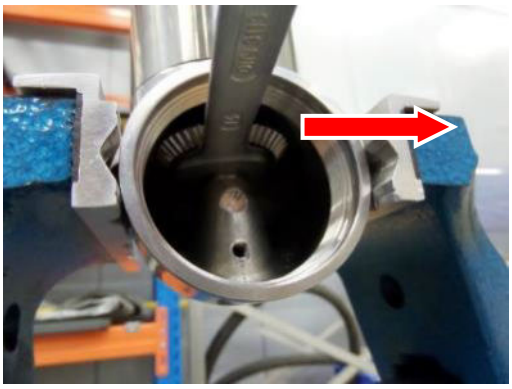
- Push the jet concentrator (13) into the nozzle (12).
- Push the seal ring (13.3) into the threaded bore of nozzle extension (12.1) as far as it will go.
- Fasten the nozzle extension (12.1) in the vise.
- Screw the nozzle (12), together with the jet concentrator (13), into the nozzle extension (12.1) and tighten it.
- Remove the nozzle extension (12.1) together with the nozzle (12) from the vise.

2. Fasten the shaft-axle connection (24) in the vise so that the dome faces upwards and the thread for the bearing plate (28) faces to the side.
3. Depending on the equipment of the device, place the collar bushing (07) and the flushing ring (07.1) or only the alternative flushing ring with integrated collar bushing (07.1) in the shaft-axle connection (24).

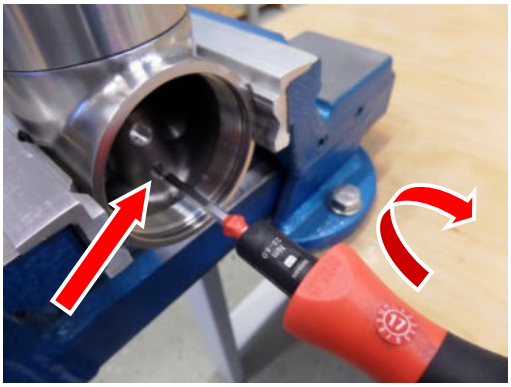
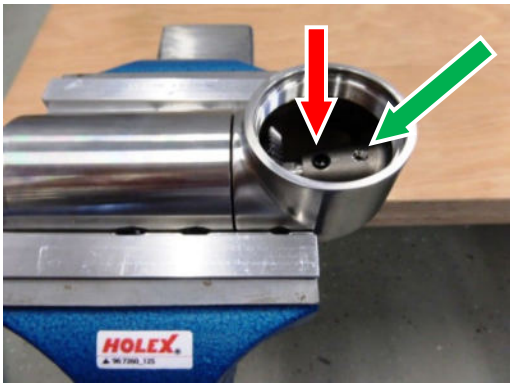
4. *NOTE* Left-hand thread of the connection!

   Turning the incorrect direction can damage the threaded connection.

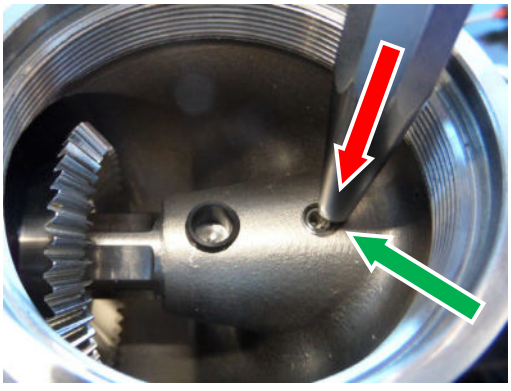
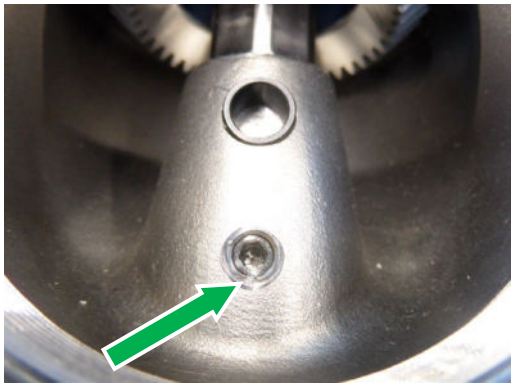
   - Make sure that the threaded connection is turned in the correct direction “LH” (left-hand).
   - Screw the drive unit assembly with the shaft-axle connection (22) into the dome of the shaft-axle connection (24).
   - Tighten the shaft of the spur gear (22) using the flats (AF 14) with an open-end wrench.

5. Screw the set screw (34) into the dome of the shaft-axle connection (24) and tighten it with a hexagon socket wrench, size 2.5 mm.
6. Hold the screwed parts firmly with one hand and unfasten the vise.
7. Fasten the screwed parts again so that the housing (02) is in a horizontal position between the jaws and the thread for the bearing plate (28) faces upwards.
8. Press the bushing (09) into the dome of the shaft-axle connection (24) as far as it will go.

9. Secure the set screw (34) against being lost by applying a slight punch mark in the area of the front thread on the dome of the shaft-axle-connection (24).

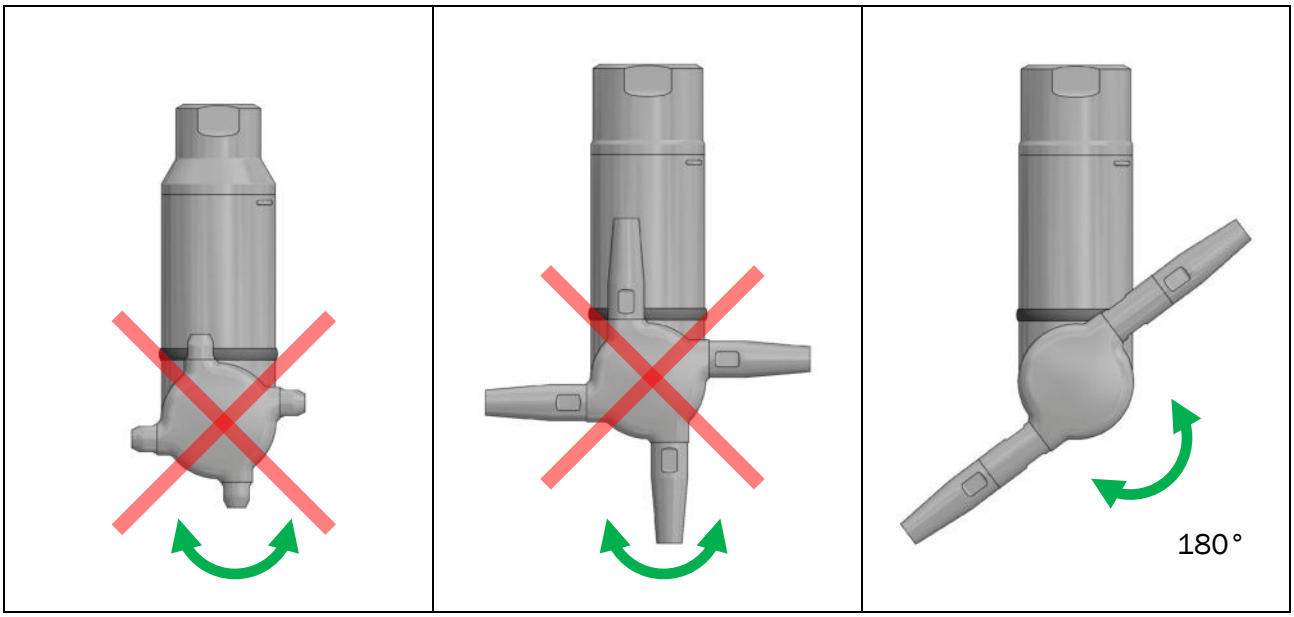


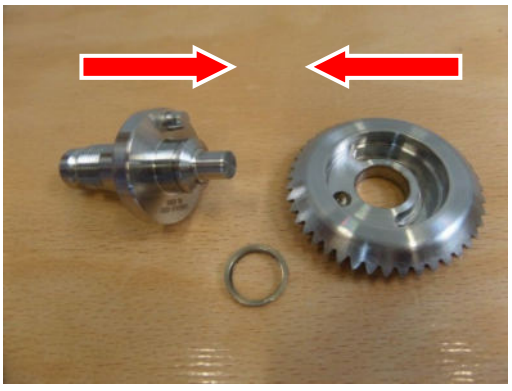
Figure 7.4-3: Mobility of the nozzle carriers

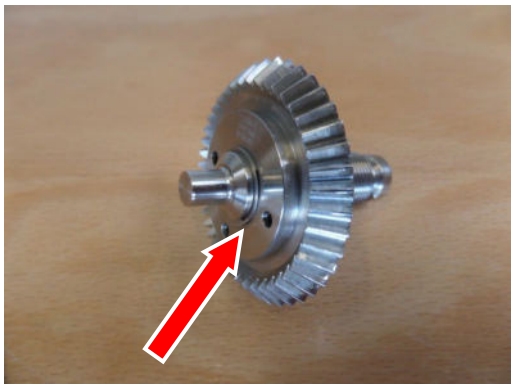
10. ***NOTE*** Incorrect assembly of the device! In order for a device with two long nozzles to also fit through a small installation opening of the container, the nozzle carrier (27) can be mounted movably. The nozzles can then be aligned with the installation opening.

    Depending on the device type, please note the following assembly steps:

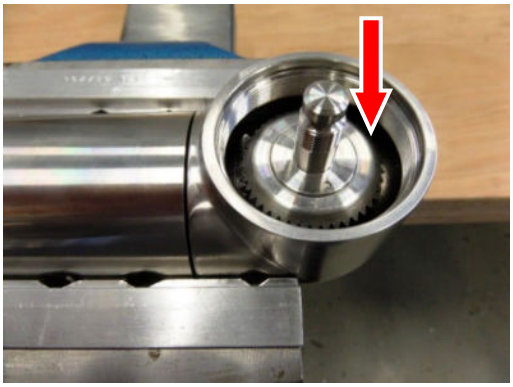
    - Nozzle carrier/nozzles NOT freely movable.
      Push the driver shaft (25) into the 'boring' of the bevel gear for the nozzle carrier (26) with the cylindrical pin (35).
    - Nozzle carrier/nozzles freely movable within 180°.
      Push the driver shaft (25) into the 'bent nut' of the bevel gear for the nozzle carrier (26) with the cylindrical pin (35).

11. Insert the spiral circlip (31) into the external groove on the driver shaft (25) in a spiral pattern and allow it to engage in place.

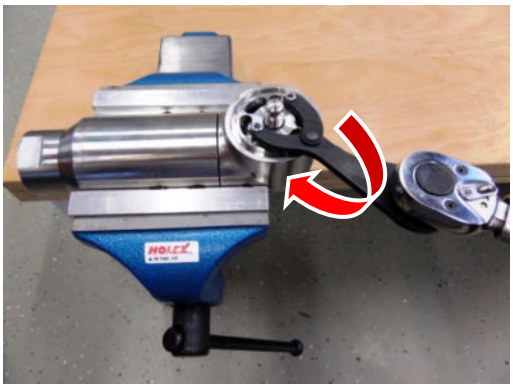


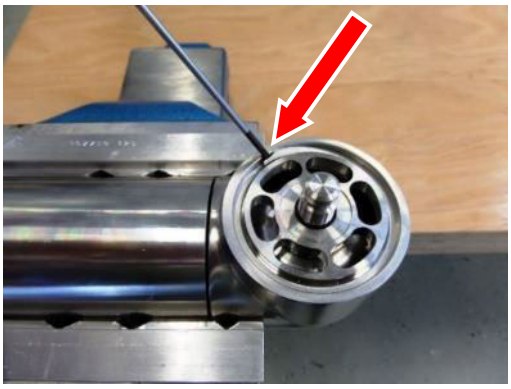


12. Push the journal of the driver shaft (25), together with the cylindrical pin (35); bevel gear wheel for the nozzle carrier (26) and spiral circlip (31), into the bushing (09) of the shaft-axle connection (24).
13. Press the collar bushing (08) into the bearing plate (28) as far as it will go.

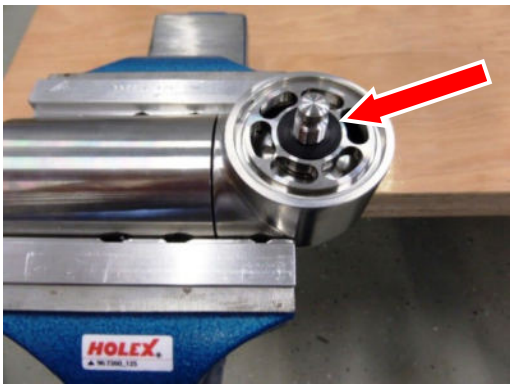


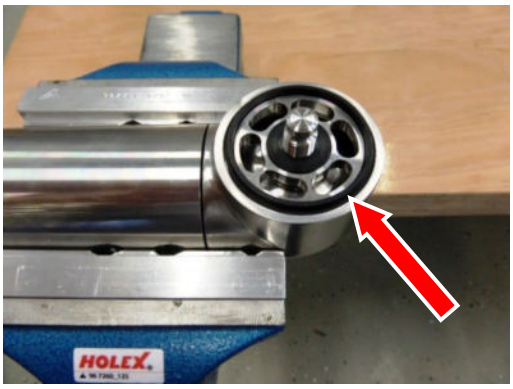
14. Push the bearing plate (28), together with the collar bushing (08), onto the driver shaft (25).
15. Screw the bearing plate (28) into the shaft-axle connection (24) and tighten it with an adjustable face wrench (pin Ø 3 mm).
16. Insert the spiral circlip (30) into the internal groove on the shaft-axle connection (24) in a spiral pattern and allow it to engage in place.



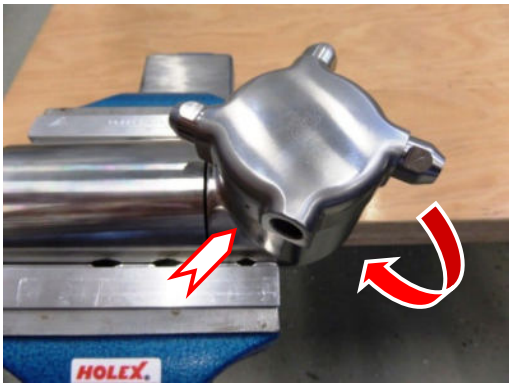


17. Slide the sliding disk (11) onto the driver shaft (25).
18. Insert the collar bushing (07) with the liner into the shaft-axle connection (24).





19. Screw the nozzle carrier (27) with the nozzles (12) and jet concentrator (13) onto the driver shaft (25) and tighten with the help of the mounting aid for nozzle carriers MX and a ☐ 1/2” ratchet or belt pipe.



20. ***NOTE*** The set screw (34) may fall into the device when being screwed in!

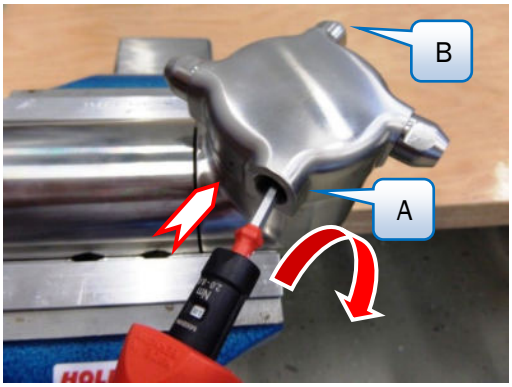
    Risk of damage in the device from foreign bodies.

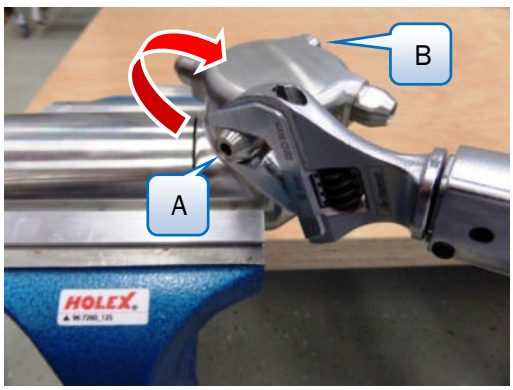
    - If a set screw (34) falls into the device during assembly, it must be removed.
    - Place the set screw (34) on the hexagon socket wrench, size 2.5 mm.
    - At position "A", directly next to the “bore for self-cleaning”, insert the hexagon socket wrench with the set screw (34) through the threaded bore on the face of the nozzle carrier (27).
    - Screw the set screw (34) into the nozzle carrier (27) crossways to the driver shaft (25) and tighten it.

21. Screw the nozzle (12), together with the jet concentrator (13), into the nozzle carrier (27) and tighten it.

22. ***NOTE*** The nozzle carrier (27) is secured by 2x set screw (34)!

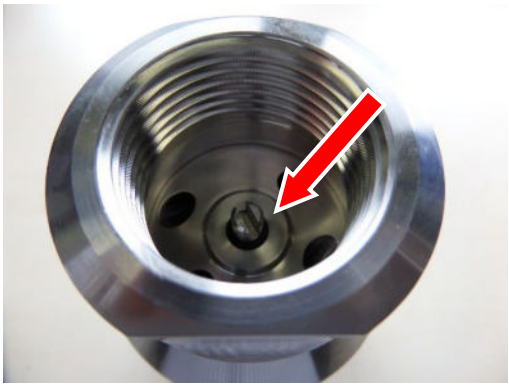
    - Repeat the work steps 20 and 21 at position "B".





23. Remove the device from the vise.

3) Inspecting the Assembly



1) Hold the device firmly with one hand and turn the spur gear (18) at the shaft end with a slotted screwdriver.
   - The drive shaft can be rotated but only with noticeable resistance. There is an error in the assembly. Disassemble the device and correct the error. The spur gears of the gear unit probably have not been joined correctly during assembly.
   - The drive shaft rotates smoothly without resistance.

The device is fully assembled and ready for installation (see *Section 5.2 Installation*) in the plant.

7.4.5 Notes on Cleaning

NOTE ON EXPLOSION PROTECTION

Cleaning work on the device is PROHIBITED in a potentially explosive atmosphere!

If this is not observed, the explosion protection could be invalidated.

- *Exclude Ex atmospheres by suitable measures and/or free measurement.*
- *Only allow instructed personnel to work in potentially explosive atmospheres.*
- *The personal protective equipment must meet the explosion protection requirements.*
- *Do not use a tool that could create sparks.*

It is recommended for the device to be cleaned during maintenance. Comply with the following safety instructions prior to cleaning.

WARNING

Hazard from corrosive or irritant cleaning agents!

Contact with the cleaning agent can generally NOT be ruled out during cleaning of the device.

There is a risk of death or severe physical injury.

- *Adhere to the regulations and specifications in the safety data sheets for the cleaning agents (e.g. vapors or hazardous substances).*
- *Use personal protective equipment (e.g. protective gloves, safety shoes, safety goggles).*
- *Avoid excessively strong concentration of the cleaning agent.*
- *Only use clean and chlorine-free water as a diluting agent.*
- *Rinse the device with plenty of clean water after cleaning.*
- *Store cleaning agent in accordance with the applicable safety guidelines.*

NOTE

Risk of damage to the device during cleaning!

The use of an incorrect cleaning agent or sharp objects can damage the device.

The functional safety and reliability of the device may be compromised.

- *The cleaning agents must be approved for all materials on the device (e.g. gaskets, bushings).*
- *Do not use sharp objects (e.g. knives) or tools.*

Cleaning in Assembled State:

As a basic rule, cleaning of the device parts that are located **inside the container** is NOT necessary. Self-cleaning takes place during the cleaning process.

Cleaning is carried out by simply rinsing the surfaces that come into contact with media (CIP cleaning).

Cleaning media:	3% nitric acid	max. +60 °C (+140 °F)
	3% caustic soda	max. +80 °C (+176 °F)

Cleaning in Disassembled State:

Prior to cleaning, the device must have been removed from the container by an **expert** and disassembled into its individual parts. The safety instructions in *Section 7.1 Safety Instructions for Maintenance* must be observed.

Cleaning of the device in a disassembled state can be carried out by **instructed persons**. After cleaning, the device must be assembled, checked and reinstalled in the container by an **expert** (see *Section 5.2 Installation*).

NOTE

Danger due to improper disposal!

Cleaning agents, consumables and lubricants must NOT be allowed to get into the groundwater, waterways or sewer system.

Improper disposal can cause environmental damage.

- *Dispose of any cleaning agents, lubricants and consumables (e.g. brushes and cloths) which have been used for cleaning in accordance with the local regulations and in accordance with the information in the manufacturer's safety data sheets.*
- *Dispose of packaging materials in an environmentally friendly manner and recycle them.*

7.5 Spare Parts and Customer Service

Spare Parts and Wear Parts

Subject to technical modifications in the interest of further development and improvement of the properties of the device. The Article No., dimensions or materials may differ from those of the supplied device.

NOTE

Removed spare/replacement parts should be recycled.

- *For disposal information, refer to Section 9.1 Disposal.*

The following data is important when requesting spare parts and for all inquiries:

Device

– Type
– Serial number

This information is located on the device as according *Figure 2.5-1: Type Plate* (see *Page 18*).

Spare part

– Designation
– Article No.

The individual parts of the device are given an item number in the *Figure 7.5-1 (Page 118)*. This number can be used in the parts lists of the *Table 7.5-2 (Page 120)* to *Table 7.5-5 (Page 123)* to identify the article-no. and designation for the spare part.

If spare parts are ordered for devices that were originally supplied with certificates (e.g. certificate according to EN 10204-3.1), then it is important that the type and serial number of the device are stated with the order in order that traceability can be ensured.

Customer Service

For technical questions or spare part requests, you can contact the Customer Service department as follows:

Armaturenwerk Hötensleben GmbH

Schulstr. 5 – 6
39393 Hötensleben/Germany

Telephone: *+49 39405 92-0*
Fax: *+49 39405 92-111*
E-mail: *info@awh.eu*
Internet: *http://www.awh.eu*

7.5.1 MX125 and MX150 Spare Parts

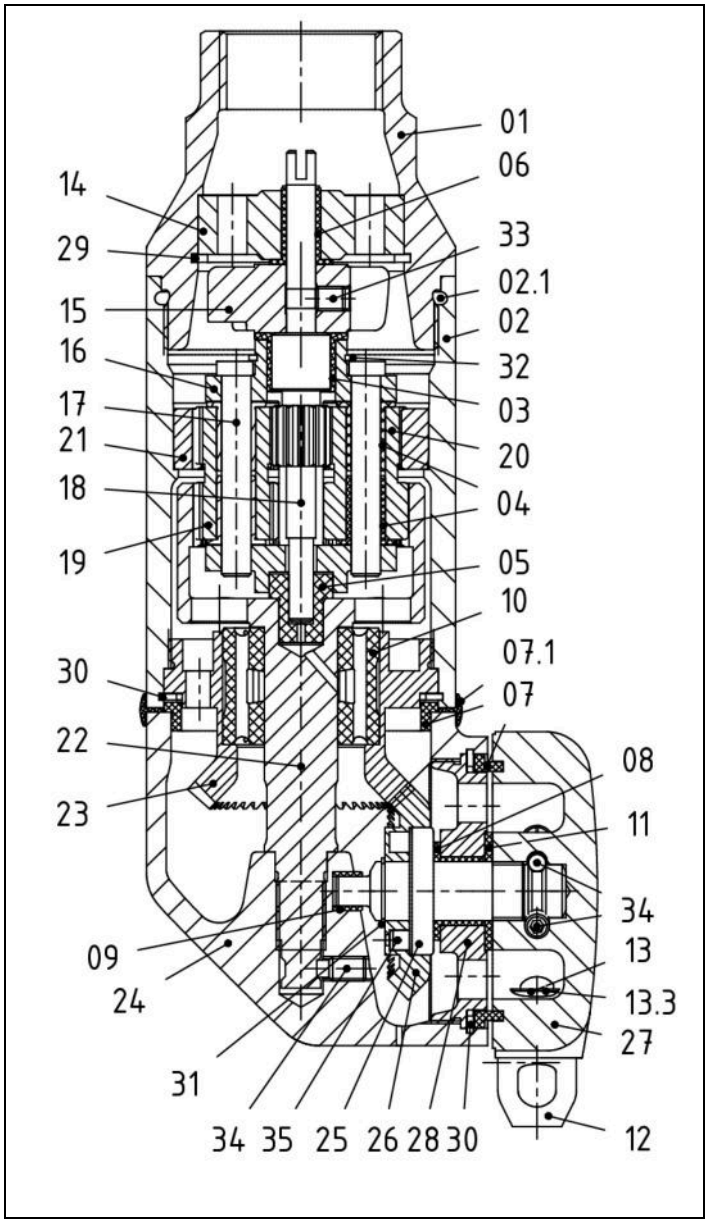


Figure 7.5-1: Internal structure (example MX125)

Tightening torque values for threaded connections

Item/Item	Item/Item	Item/Item	Thread	Tightening Torque	
				[Nm]	[lbft]
01 / 02	-----	-----	M56 x 1,5	110 - 120	81.1 – 88.5
15 / 33	24 / 34	27 / 34	M 5	2,9 - 3,1	2.1 – 2.3
02 / 23	24 / 28	-----	M54 x 1,0	54 - 58	39.8 – 42.7
22 / 24	-----	-----	M10 x 1,0 LH	26 - 28	19.2 – 20.6
25 / 27	12 / 27 (MX125)		M12 x 1,0	30 - 32	22.1 – 23.6
-----	12 / 27 (MX150)		M16 x 1,0	36 - 38	26.5 – 28.0

Table 7.5-1: MX125 and MX150 Tightening torques

Remark: The items marked "X" or "■" are included in the wear parts package and can be ordered. The items marked "■" are required for replacing wear parts [WP].

Item	Qty.	Designation	Remark	Article No.	Material	[WP]
01	---	Connection cover	MX125-G14 MX150-G14 MX150-G12	*Table 7.5-3* *Table 7.5-4* *Table 7.5-5* *Table 7.5-6*	1.4404 (AISI 316L)	---
02	1	Housing		66MA000020A20	1.4404 (AISI 316L)	---
		Housing (ATEX)		66MA000020A21		
02.1	2	Safety pin (ATEX)	Ø 2,5 x 8,0-25,0	66MA00051G050	1.4571 (AISI 316Ti)	X
03	1	B bushing	12,0x14,0/19,0-12,0	66MA000040AL0	C-PTFE	X
04	4	B bushing	6,0x 8,0/12,0-14,0	66MA000050AL0	C-PTFE	X
05	1	B bushing	5,0x 9,0/13,0-14,0	66MA000060AL0	C-PTFE	X
06	1	B bushing	6,0x 8,0/13,0-16,0	66MA000070AL0	C-PTFE	X
07	2 (1)	B bushing (alternative see 07.1)	48,8x52,8/55,8- 5,8	66MA000080AL0	C-PTFE	X
07.1	1	Rinsing ring	56,0x63,6/65,6- 6,4	66MA000250AL0	C-PTFE	---
	(1)	Rinsing ring with B bushing (alternative)	48,8x52,8/65,6- 6,4	66MA000250AL1	C-PTFE	(X)
08	1	B bushing	12,0x14,0/20,0-10,0	66MA000090AN0	PEEK+PTFE	X
		B bushing (ATEX)		66MA000090AJ0	C-PTFE	X
09	1	Bushing	6,0x 8,0- 6,0	66MA000100AL0	C-PTFE	X
10	1	Plain bearing type „A“	15,0x32,0-23,8	66MA000110AJ0	C-PTFE	X
11	1	Sliding disk	12,0x24,0- 1,5	66MA000140AL0	C-PTFE	X
12	---	Nozzle	MX125-G14 MX150-G14 MX150-G12	*Table 7.5-3* *Table 7.5-4* *Table 7.5-5* *Table 7.5-6*	1.4404 (AISI 316L)	---
12.1	---	Nozzle extension	MX150-G12	*Table 7.5-5* *Table 7.5-6*	1.4404 (AISI 316L)	---
13	---	Jet concentrator	MX125-G14 MX150-G14 MX150-G12	*Table 7.5-3* *Table 7.5-4* *Table 7.5-5* *Table 7.5-6*	1.4404 (AISI 316L)	---
13.3	---	Seal ring	MX125-G14 MX150-G14 MX150-G12	*Table 7.5-3* *Table 7.5-4* *Table 7.5-5* *Table 7.5-6*	C-PTFE	---
14	---	Flow-in disk	MX125-G14 MX150-G14 MX150-G12	*Table 7.5-3* *Table 7.5-4* *Table 7.5-5* *Table 7.5-6*	1.4404 (AISI 316L)	---
15	1	Rotor impeller	7x15° Typ A”	66MA07032A120	1.4404 (AISI 316L)	---
16	1	Planetary carrier		66MA000350A20	1.4404 (AISI 316L)	---
17	2	Axle for planetary wheel		66MA000360A20	1.4404 (AISI 316L)	---
18	1	Spur gear S11-SR	Sun wheel	66MA000371A20	1.4404 (AISI 316L)	---

19	1	Spur gear S22-PR-A	Planetary wheel A	66MA000382A20	1.4404 (AISI 316L)	---
20	1	Spur gear S22-PR-B	Planetary wheel B	66MA000382B20	1.4404 (AISI 316L)	---
21	1	Spur gear S12-HR	Ring gear	66MA000391A20	1.4404 (AISI 316L)	---
22	1	Spur gear S22-HR	Ring gear with shaft	66MA000392A20	1.4404 (AISI 316L)	---
23	1	Bevel gear wheel for housing		66MA000400A20	1.4404 (AISI 316L)	---
24	1	Shaft-axle connection		66MA000410A20	1.4408 (AISI 316L)	---
25	1	Driver shaft for nozzle carrier		66MA000420A20	1.4404 (AISI 316L)	---
26	1	Bevel gear wheel for nozzle carrier		66MA000430A20	1.4404 (AISI 316L)	---
27	---	Nozzle carrier	MX125-G14 MX150-G14 MX150-G12	*Table 7.5-3* *Table 7.5-4* *Table 7.5-5* *Table 7.5-6*	1.4404 (AISI 316L)	---
28	1	Bearing plate		66MA000470A20	1.4404 (AISI 316L)	---
29	1	Spiral circlip	B Ø 42,0 x 1,57	450605	1.4401 (AISI 316)	---
30	2	Spiral circlip	B Ø 56,0 x 1,25	450602	1.4401 (AISI 316)	---
31	1	Spiral circlip	W Ø 12,0 x 0,60	450603	1.4401 (AISI 316)	---
32	1	Spiral circlip	W Ø 19,0 x 1,07	450604	1.4401 (AISI 316)	---
33	1	Set screw ISO 4029	M5x 6	430159	1.4404 (AISI 316L)	---
34	3	Set screw ISO 4028	M5x10	430187	1.4404 (AISI 316L)	■
35	1	Cylindrical pin ISO 2338	4x 8 m6	440046	1.4404 (AISI 316L)	---

---	---	Wear parts package	Standard	66MA000VG0000	---	X
---	---	Wear parts package	ATEX	66MA000VG0001X	---	X

Table 7.5-2: MX125 and MX150 parts list (standard)

Assignment to the Variants of the MX125

The specified assignment of individual items reflects the standard configuration of the devices.
In individual cases there may be order-related discrepancies.

Item	Designation	Article No.	MX125-G14 Article No. 66MA4...						MX125-G14EX Article No. 66MA4...X					
			66MA403NGQA20	66MA403NGRA20	66MA403NGSA20	66MA404NGQA20	66MA404NGRA20	66MA404NGSA20	66MA403NGQA21X	66MA403NGRA21X	66MA403NGSA21X	66MA404NGQA21X	66MA404NGRA21X	66MA404NGSA21X
			Quantity						Quantity					
01	Connection cover													
	BSP-1“	66MA003014A20	1	1	1	---	---	---	---	---	---	---	---	---
	NPT-1“	66MA004014A20	---	---	---	1	1	1	---	---	---	---	---	---
	BSP-1“ (ATEX)	66MA003014A21	---	---	---	---	---	---	1	1	1	---	---	---
	NPT-1“ (ATEX)	66MA004014A21	---	---	---	---	---	---	---	---	---	1	1	1
12	Nozzle [mm] Connection: M12x1.0													
	DB = 4,5	66MA00020QA20	4	---	---	4	---	---	4	---	---	4	---	---
	DB = 5,0	66MA00020RA20	---	4	---	---	4	---	---	4	---	---	4	---
	DB = 6,0	66MA00020SA20	---	---	4	---	---	4	---	---	4	---	---	4
13	Jet concentrator													
	8,0 x 0,4-15,0	66MA000210A20	4	4	4	4	4	4	4	4	4	4	4	4
13.3	Seal ring													
	8,0 x 10,8- 4,5	66MA000213AL0	4	4	4	4	4	4	4	4	4	4	4	4
14	Flow-in disk													
	2x 45° DB = 6,0 A4	66MAN2A30S520	1	---	---	1	---	---	1	---	---	1	---	---
	2x 45° DB = 6,0 A5	66MAR2A30S520	---	1	---	---	1	---	---	1	---	---	1	---
	2x 45° DB = 6,0 A6	66MA02A30S520	---	---	1	---	---	1	---	---	1	---	---	1
27	Nozzle carrier Nozzle connection: M12x1.													
	4-slot type B	66MA040440B20	1	1	1	1	1	1	1	1	1	1	1	1

Table 7.5-3: MX125-G14 Standard configuration (article no. 66MA4...)

Assignment to the Variants of the MX150

The specified assignment of individual items reflects the standard configuration of the devices.
In individual cases there may be order-related discrepancies.

Item	Designation	Article No.	MX150-G14 Article No. 66MB4...				MX150-G14EX Article No. 66MB4...X			
			66MB403NGTB20	66MB403NGUB20	66MB404NGTB20	66MB404NGUB20	66MB403NGTB21X	66MB403NGUB21X	66MB404NGTB21X	66MB404NGUB21X
			Quantity				Quantity			
01	Connection cover									
	BSP-1½“	66MA003016A20	1	1	---	---	---	---	---	---
	NPT-1½“	66MA004016A20	---	---	1	1	---	---	---	---
	BSP-1½“ (ATEX)	66MA003016A21	---	---	---	---	1	1	---	---
	NPT-1½“ (ATEX)	66MA004016A21	---	---	---	---	---	---	1	1
12	Nozzle [mm] Connection: M16x1									
	DB = 7,0	66MB00020TB20	4	---	4	---	4	---	4	---
	DB = 8,0	66MB00020UB20	---	4	---	4	---	4	---	4
13	Jet concentrator									
	12,0 x 0,4-15,0	66MB000210A20	4	4	4	4	4	4	4	4
13.3	Seal ring									
	12,0 x 14,8- 4,5	66MB000213AL0	4	4	4	4	4	4	4	4
14	Flow-in disk									
	2x 45° DB = 6,0 G6	66MA02G30S520	1	---	1	---	1	---	1	---
	2x 45° DB = 6,0 L6	66MA02L30S520	---	1	---	1	---	1	---	1
27	Nozzle carrier Nozzle connection: M16x1									
	4-slot type B	66MB040440B20	1	1	1	1	1	1	1	1

Table 7.5-4: MX150-G14 Standard configuration (article no. 66MB4...)

Item	Designation	Article No.	MX150-G12 Article No. 66MB2...				MX150-G12EX Article No. 66MB2...X			
			66MB203NGTB20	66MB203NGUB20	66MB204NGTB20	66MB204NGUB20	66MB203NGTB21X	66MB203NGUB21X	66MB204NGTB21X	66MB204NGUB21X
			Quantity				Quantity			
01	Connection cover									
	BSP-1½“	66MA003016A20	1	1	---	---	---	---	---	---
	NPT-1½“	66MA004016A20	---	---	1	1	---	---	---	---
	BSP-1½“ (ATEX)	66MA003016A21	---	---	---	---	1	1	---	---
	NPT-1½“ (ATEX)	66MA004016A21	---	---	---	---	---	---	1	1
12	Nozzle [mm] Connection: M16x1									
	DB = 7,0	66MB00020TB20	2	---	2	---	2	---	2	---
	DB = 8,0	66MB00020UB20	---	2	---	2	---	2	---	2
12.1	Nozzle extension [mm] Connection: M16x1									
	LV = 35	66MB000220A20	2	2	2	2	2	2	2	2
13	Jet concentrator									
	12,0 x 0,4-15,0	66MB000210A20	2	2	2	2	2	2	2	2
13.3	Seal ring									
	12,0 x14,8- 4,5	66MB000213AL0	4	4	4	4	4	4	4	4
14	Flow-in disk									
	2x 45° DB = 6,0 A6	66MA02A30S520	1	---	1	---	1	---	1	---
	2x 45° DB = 6,0 A7	66MAT2A30S520		1	---	1		1	---	1
27	Nozzle carrier Nozzle connection: M16x1									
	2-slot type B	66MB020440B20	1	1	1	1	1	1	1	1

Table 7.5-5: MX150-G12 Standard configuration (article no. 66MB2...)

Item	Designation	Article No.	MX150-G12 Article No. 66MC2...				MX150-G12EX Article No. 66MC2...X			
				66MC203NGYB21		66MC204NGYB21		66MC203NGYB21X		66MC204NGYB21X
			Quantity				Quantity			
01	Connection cover									
	BSP-1½“	66MA003016A20	---	1	---	---	---	---	---	---
	NPT-1½“	66MA004016A20	---	---	---	1	---	---	---	---
	BSP-1½“ (ATEX)	66MA003016A21	---	---	---	---	---	1	---	---
	NPT-1½“ (ATEX)	66MA004016A21	---	---	---	---	---	---	---	1
12	Nozzle [mm] Connection: M18x1									
	DB =11,0	66MC00020YB20	---	2	---	2	---	2	---	2
12.1	Nozzle extension Connection: M18x1									
	LV = 35	66MC000220A20	---	2	---	2	---	2	---	2
13	Jet concentrator									
	14,0 x 0,5-15,0	66MC000210A20	---	2	---	2	---	2	---	2
13.3	Seal ring									
	14,0 x16,8- 4,5	66MC000213AL0	---	4	---	4	---	4	---	4
14	Flow-in disk									
	2x45° DB = 6,0 L6	66MA02L30S520	---	1	---	1	---	1	---	1
27	Nozzle carrier Nozzle connection: M18x1									
	2-slot type B	66MC020440B20	---	1	---	1	---	1	---	1

Table 7.5-6: MX150-G12 Standard configuration (article no. 66MC2...)

8 Faults

8.1 Safety Instructions for Troubleshooting

Before rectifying a fault, the following safety instructions must always be adhered to:

NOTE ON EXPLOSION PROTECTION

Work on the device in a potentially explosive atmosphere is PROHIBITED!

If this is not observed, the explosion protection could be invalidated.

- *Exclude Ex atmospheres by suitable measures and/or free measurement.*
- *Only allow instructed personnel to work in potentially explosive atmospheres.*
- *The personal protective equipment must meet the explosion protection requirements.*
- *Do not use a tool that could create sparks.*

DANGER

Danger of ignition in potentially explosive atmosphere due to potential differences!

When filling and emptying containers with fluids, when recirculating, stirring, mixing and spraying fluids and also when measuring, sampling and cleaning, the fluids themselves or the interior of the container could be charged in a dangerous manner.

Differences in potential (e.g. electrostatic charge) can cause igniting sparks or heat, which can act as an ignition source.

There is a risk of death or severe physical injury.

- *Only clean adequately grounded containers made of electrically conductive material without insulating internal coatings.*
- *Make sure that any electrostatic charge is prevented. Also make sure that all electrically conductive parts on the device and the container are grounded for potential equalization to the same potential using grounding cables with a sufficient diameter.*
- *Grounding must always be carried out before commissioning the device.*

  Avoid grounding faults (e.g. subsequent grounding of already charged objects or equipment).
- *Do not secure or seal mechanical connections with electrically insulating materials (such as sealing tape, sealant, adhesive, etc.), if it impairs the grounding of the device on the container.*
- *Wear antistatic shoes and protective clothing in accordance with the requirements for electrically conductive work clothing.*

WARNING




Risk of chemical burns and heat burns when opening the container!

The supply line is pressurized. The person may be struck by cleaning jets or come into contact with residual fluid from the supply line and device. There may also be hot vapors in the container.

There is a risk of death or severe physical injury.

- ***Do NOT open the container*** *during the cleaning process.*
- *Before starting work, observe the* ***work steps of the switch-off procedure*** *(see Section 7.2 Switch-off Procedure).*
- *Before opening the container, observe the* ***cooling and draining time****.*
- *Use personal protective equipment (e.g. protective gloves, safety shoes, safety goggles).*

WARNING

Hazardous situations caused by performing work on the device incorrectly!

There is a risk of death or severe physical injury.

- *Repairs and troubleshooting work must be performed only by qualified experts who have knowledge of the German Technical Rules for Operational Safety.*
- *Before starting work, observe the* ***work steps of the switch-off procedure*** *(see Section 7.2 Switch-off Procedure).*
- *Before rectifying any fault, observe the safety instructions in Chapter 7 Maintenance.*
- *In case of any uncertainty or doubt, contact AWH.*

WARNING

Danger caused by ejection of the cleaning medium!

If the cleaning medium is unexpectedly ejected after a system failure (e.g. pressure drop due to interruption of the pressure supply) there is a risk of accident.

There is a risk of death or severe physical injury.

- *Do NOT remove the device if the cleaning medium has failed.*
- *Always follow the* ***work steps of the switch-off procedure*** *(see Section 7.2 Switch-off Procedure).*

8.2 Faults and Remedial Action

Fault	Cause	Remedy
Cleaning head and/or nozzle carrier not rotating or rotating unevenly.	- There is no media pressure on the device.	- Open the shut-off valve for the medium.
	- Pressure of the cleaning medium too low.	- Increase the pressure (adhere to the max. permitted pressure).
	- Pressure of the cleaning medium too high.	- Reduce the pressure.
	- Excessive friction due to wear on the bushings and/or bearings.	- Check the bushings and/or bearings for wear, clean or replace them.
	- Drive unit in the device damaged or contaminated with deposits or foreign bodies. The teeth of the spur gears jam.	- Clean the inside of the device and remove any foreign bodies. Replace the spur gears.
	- The cleaning head collides with installed components.	- Eradicate the interfering contours.
	- Nozzles are blocked mechanically by interfering contours.	- Check the position in the container.
	- Nozzle jet too close to surrounding components. Due to high media pressure (recoil).	- Increase the distance to surrounding components.
	- Filter or nozzles blocked.	- Clean the filter or nozzles.
Effectiveness of cleaning is inadequate.	- Nozzles soiled or blocked.	- Clean or replace the nozzles.
	- Pressure of the cleaning medium too low.	- Increase the pressure (adhere to the max. permitted pressure).
	- Volume flow rate too low.	- Increase the volume flow rate
	- Filter blocked.	- Clean or replace the filter.
Jet pattern not ideal.	- No jet concentrators in the nozzles.	- Retrofit jet concentrators.
	- Nozzles soiled.	- Clean the nozzles.
	- Nozzles damaged.	- Replace the nozzles.
Process or media connection leaking.	- Gasket faulty.	- Replace the gasket.
	- Connections have come loose.	- Check the tightening torque values of the threaded connections.
Volume flow rate too high.	- Increased leakage due to heavily worn bushings or bearings.	- Replace the bushings or bearings.

Table 8.2-1: Operating Faults – Cause and Remedy

If the specified measures are NOT successful, please contact AWH.

In the event of return shipment (e.g. repair/servicing/return), a hazardous substance declaration must be enclosed with the device in accordance with the German Ordinance on Hazardous Substances (GefStoffV).

Request the form for the hazardous substance declaration from AWH.

8.3 What to do in Case of an Emergency

NOTE ON EXPLOSION PROTECTION

The measures for protecting the health and safety of workers from potentially explosive atmospheres specified for the emergency in the operating company's explosion protection document must be observed.

If a hazardous situation occurs, or if you need to avert a potential danger, quickly set the device to a safe state.

The type of EMERGENCY STOP circuit used for the device is to be determined depending on the hazards and operating conditions and is the sole responsibility of the operating company.

It is for this reason that AWH can offer the operating company, **solely as a precautionary measure, a few points of reference and notes** to be observed and to be integrated into the operating company's hazard and risk assessments.

- The work steps for switching off the device listed in *Section 7.2 Switch-off Procedure* must be adhered to.
- The EMERGENCY STOP circuit must be designed in such a way that the machine or system operator can actuate it immediately in the event of an emergency.
- Switching off with the "EMERGENCY STOP" in case of emergency is intended to disconnect the entire machine from the supply voltage without delay in order to eradicate the risks caused by electrical voltage immediately.
- Switching off with the "EMERGENCY STOP" in case of emergency is intended to prevent risks which cause hazardous movements as soon as possible.
- The EMERGENCY STOP must have priority over all other functions and actuations in all operating modes.
- Resetting must not cause the plant/machine to start up again.

Source:

- *EN 60204-1 / VDE 0113-1 "Safety of machinery – Electrical equipment of machines – Part 1: General requirements"*
- *EN ISO 13850: "Safety of machinery - Emergency stop function - Principles for design"*

In Case of an Emergency:

Trigger the EMERGENCY STOP function on the higher-level plant/machine.

- Actuate the **EMERGENCY STOP** switch
- Interrupt the drive energy supply
  - Interrupt electricity supply (e.g. electrical drive)
  - Switch off higher-level main switch
  - Pull out power plug
  - Close the compressed air shut-off valve (e.g. pneumatic drive)
- Interrupt the supply of cleaning medium (drive energy)
  - Close the shut-off valve (e.g. stopcock, butterfly valve or gate valve).

9 Decommissioning

Once the device has reached the end of its service life, it must be removed from the container, dismantled and disposed of in an environmentally friendly manner. Disposal must be performed in accordance with the respective valid local, national and international regulations.

NOTE ON EXPLOSION PROTECTION

Work on the device in a potentially explosive atmosphere is PROHIBITED!

If this is not observed, the explosion protection could be invalidated.

- *Exclude Ex atmospheres by suitable measures and/or free measurement.*
- *Only allow instructed personnel to work in potentially explosive atmospheres.*
- *The personal protective equipment must meet the explosion protection requirements.*
- *Do not use a tool that could create sparks.*

WARNING

Danger due to improper decommissioning/disposal!

There is a risk of intoxication or chemical burns when using harmful or toxic media, or media which is hazardous in any other way.

There is a risk of death or severe physical injury.

- *Only an expert should perform the work.*
- *Before starting work, observe the **work steps of the switch-off procedure** (see Section 7.2 Switch-off Procedure).*
- *Use protective work clothing, protective gloves and safety goggles when carrying out the work.*
- *In case of any uncertainty or doubt, contact AWH.*

Removal

Only **experts** are permitted to perform the removal from the container and the disassembly of the device for disposal. *Section 7.3 Removal* contains information on the removal of the devices and its interfaces. The safety instructions in *Section 7.1 Safety Instructions for Maintenance* must be observed.

9.1 Disposal

CAUTION


Danger from harmful fluids which are a health hazard!

During disposal, there is a risk of injury from contact with harmful fluids.

There is a risk of minor or moderate injuries.

- *Use personal protective equipment (e.g. protective gloves, safety shoes, safety goggles).*

NOTE

The cleaning device is made predominantly of stainless steel. Stainless steel is a valuable raw material and can easily be recycled.

After removal, the entire device must be properly:

– Cleaned (see *Section 7.4.5 Notes on Cleaning*) and
– Disassembled into its assembly groups and individual parts (see *Section 7.4.3 Disassembling the Device*)

Unless other arrangements have been made for return or disposal, disassembled components should be recycled:

– Scrap any parts made of metal
– Recycle any parts made of plastic
– other parts to be sorted according to material properties and disposed of

If necessary, contact a specialist company to arrange for disposal.

Comply with locally applicable health, safety, disposal and environmental protection regulations.

NOTE

Danger due to improper disposal!

Cleaning agents, consumables and lubricants must NOT be allowed to get into the groundwater, waterways or sewer system.

Improper disposal can cause environmental damage.

- *Dispose of any cleaning agents, lubricants and consumables (e.g. brushes and cloths) which have been used for cleaning in accordance with the local regulations and in accordance with the information in the manufacturer's safety data sheets.*
- *Dispose of packaging materials in an environmentally friendly manner and recycle them.*

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Annex 1: Declaration (Translation)

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Declaration of incorporation in accordance with
- **EC Machinery Directive 2006/42/EC, Annex II B**

We hereby declare that the container cleaning device

Designation:	**Jet cleaner**
Type/series:	**TANKO-MX125; TANKO-MX150**
Year of manufacture:	See type plate on the device
Serial number:	See type plate on the device

complies with the following basic health and safety requirements of Directive 2006/42/EC, Annex I: 1.1.2 – 1.1.7, 1.3, 1.5.2 – 1.5.9, 1.5.15, 1.5.16, 1.6, 1.7.1 – 1.7.3, 1.7.4, 1.7.4.1, 1.7.4.2, 1.7.4.3.

The specific technical documents have been compiled in accordance with Directive 2006/42/EC, Annex VII, Part B.

The supplied version of the device corresponds to the following directives and standards:

Directive/standard	Title	Version	Remarks
2006/42/EC	**EC Machinery Directive**	**2006**	
DIN EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction	2011-03	Harmonized standard
	DIN EN ISO 12100 Corrigendum 1	2013-08	
DIN EN ISO 4413	Hydraulic fluid power - General rules and safety requirements for systems and their components	2011-04	Harmonized standard

If any modifications are made to the device without our consent, this declaration shall lose its validity.

Commissioning is prohibited until it is certain that the overall system fulfills the applicable provisions of the directives to be applied.

Hötensleben, November 5, 2024

Thomas Erhorn (CEO) [a)] [b)]

[a)] Authorised representative to issue this declaration on behalf of the manufacturer
[b)] Authorised representative to compile the technical documentation with identical address of the manufacturer

Annex 2: Declaration - Ex version (Translation)

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Internet: http://www.awh.eu

Declaration of incorporation in accordance with

– **EC Machinery Directive 2006/42/EC, Annex II B**

EU declaration of conformity in accordance with

- **EU Directive 2014/34/EU relating to equipment and protective systems intended for use in potentially explosive atmospheres**

We hereby declare that the container cleaning device

Designation:	**Jet cleaner**
Type/series:	**TANKO-MX125...EX; TANKO-MX150...EX**
Year of manufacture:	See type plate on the device
Serial number:	See type plate on the device
Ex Marking:	See type plate on the device

complies with the following basic health and safety requirements of Directive 2006/42/EC, Annex I: 1.1.2 – 1.1.7, 1.3, 1.5.2 – 1.5.9, 1.5.15, 1.5.16, 1.6, 1.7.1 – 1.7.3, 1.7.4, 1.7.4.1, 1.7.4.2, 1.7.4.3.

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DIN EN ISO 4413	Hydraulic fluid power - General rules and safety requirements for systems and their components	2011-04	Harmonized standard
2014/34/EU	**EU Directive - Equipment and protective systems intended for use in potentially explosive atmospheres**	**2014**	
DIN EN 1127-1	Explosive atmospheres - Explosion prevention and protection – Part 1: Basic concepts and methodology	2011-10	Harmonized standard
DIN EN ISO 80079-36	Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements	2016-12	Harmonized standard
DIN EN ISO 80079-37	Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - Non-electrical type of protection constructional safety "c", control of ignition sources "b", liquid immersion "k"	2016-12	Harmonized standard

Marking according to ATEX Directive 2014/34/EU and applied standards:

EC-type examination certificate TPS 21 ATEX 055073 0012 X of the designated body TÜV SÜD Product Service GmbH, certification body, identification number 0123, Riedlerstrasse 65, 80339 Munich, Germany
Quality assurance system according to DIN EN ISO/IEC 80079-34, certified by the notified body TÜV NORD CERT GmbH, identification number 0044, Langemarckstraße 20, 45141 Essen, Germany.

CE 0044 Ex

II 1G	Ex h	IIB	85°C...175°C	Ga
II 1D	Ex h	IIIC	T60°C...T140°C	Da

TPS 22 ATEX 055073 0012 X

If any modifications are made to the device without our consent, this declaration shall lose its validity.

Commissioning is prohibited until it is certain that the overall system fulfills the applicable provisions of the directives to be applied.

Hötensleben, November 5, 2024

Thomas Erhorn (CEO) [a)b)]

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Notes

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