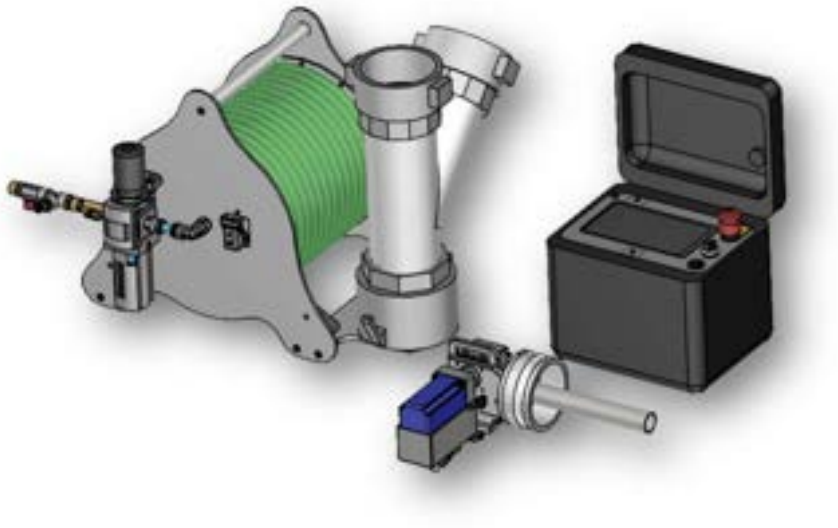
Original
operating manual

LED UV Curing System
"BRAWO® Pico"

Type:	BP-001
Year of manufacture:	from 2022



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Manufacturer:
BRAWO® SYSTEMS GmbH
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www.brawosystems.com
(Publisher of the Manual)

NOTE
This document is the English translation of the original German version of the operating manual.

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Writer of the operating manual.

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Table of contents

1 User information

The contents of the operating manual are directed to the operating company of the "BRAWO® Pico". The operating company is trusted with activities such as installation, operation, cleaning and maintenance.

These activities must only be carried out by authorized, trained or instructed persons.

Specialist has specialist education, experience and knowledge of the pertinent conditions. Thereby he is in a position to assess and execute the assigned work and to recognized and prevent possible hazards.

Trained personnel are trained in the tasks and possible hazards during improper use. They are trained as required and also in terms of required safety equipment and protective measures.

☞ The instructions in the section "Regulations for the operating company" must be observed and complied with.

➠ Section "Operator regulations"

The following signs and symbols are used in this operating manual:

Picture numbering

There are item numbers assigned in the pictures. In the text these item numbers are referred to in parentheses.

☑ Prerequisite 1

1. Step 1
2. Step 2

Handling pre-requisites

The prerequisites must be fulfilled in order to carry out the following handling instructions.

1. Step 1
2. Step 2

Handling request

Handling requests are manual actions that are numbered according to their sequence.

☞ These instructions contain important information about the corresponding topic, however are not warnings of dangers.

➠ The cross-reference refers to further documents or to sources of information in this operating manual.

➥ The sequential process starts automatically after a successful handling request.

2 Operator regulations

The operator must ensure, that:

- Seamless condition is guaranteed.
- NO safety equipment is removed or manipulated.
- If there are any defects found on the "BRAWO® Pico" (defective equipment, smoke, smells, etc.) is stopped immediately and the defect removed.
- The operating personnel has been instructed and trained.
- This operating manual is read and followed by the operating personnel.
- The operating manuals of the individual components are read and followed.
- The operating manuals are available in all operations.
- The service and maintenance instructions are followed.
- All activities are carried out only by the group previously instructed to do so.
- Operation is done according to its intended use.
- The work area is sufficiently illuminated.
- The disposal of the unit is only performed by authorized businesses.
- Prescribed tests are done on time and documented.

⚠ CAUTION

Personal protective equipment

Technically unavoidable residual risks can exist on the "BRAWO® Pico":

- The notes given in the operating manual for use of Personal Protective Equipment is to be provided as follows.

⚠ CAUTION

Revisions and modifications

Modifications or changes can impact safety:

- Modifications and changes must be assessed before they are implemented according to the legal safety specifications.

3 Product identification (rating plate)

Figure 1 Rating plate

Rating plate legend	
Mod.	Model
Ser.No.	Serial number
Year	Year of manufacture
U	Connection voltage
I	Connection current
MOP	Maximum Operating Pressure
m	Weight

The model plate is located on the side of the control unit.

Figure 2 Placement of rating plate

4 Safety instructions

The safety instructions given in the operating manual must absolutely be followed.

Furthermore, the pertinent federal work protection regulations, accident prevention regulations and safety regulations apply.

Explanation of different safety instructions:

⚠ DANGER

Keywords for hazards

Hazard information means that death or severe injuries **may result** if the hazards cannot be sufficiently prevented.

- Description of measures to prevent hazard

⚠ WARNING

Keywords for hazards

Warning instructions means that death or severe injuries **may result** if the hazards cannot be sufficiently prevented.

- Description of measures to prevent hazard

⚠ CAUTION

Keywords for hazards

Caution means that a slight injury **may occur**, if the hazard cannot be sufficiently prevented.

- Description of measures to prevent hazard

NOTE

This instruction describes measures for preventing property damage.

Generally applicable safety instructions:

Generally valid safety instructions apply for the total duration of use of the "BRAWO® Pico" and are basically to be observed in all phases of life from installation to disposal.

➠ Section "Generally applicable safety instructions".

Pre-fixed safety instructions:

Pre-fixed safety instructions only apply for individual sections and are listed at the start of the corresponding section.

Example:

⚠ DANGER

Accidental starting

Severe injuries are the result if the "BRAWO® Pico" starts up unexpectedly during repair or cleaning:

- Stop the "BRAWO® Pico" before maintenance or cleaning work and secure against unexpected start up, e.g. by disconnecting the power plug.

Integrated safety instructions:

Integrated warning instructions apply for individual actions and are listed before the risk-containing step within the handling request.

1. Step 1
2. Step 2

Hazard.
Measure.

3. Step 3 (with risk)
4. Step 4

4.1 Generally applicable safety instructions

DANGER

Electrical current

Severe injuries may result from electric current if the "BRAWO® Pico" is operated with defects on the powered components:

- Work on electrical components must only be carried out by qualified electricians.
- Before starting work turn off the electric supply (disconnect the power plug) and secure against restarting.

DANGER

Compressed air

Severe injuries from working with compressed air are the result if safety instructions are not followed:

- Do not put pressurized components into operation if they are damaged.
- Replace compressed air lines according to the manufacturer's specifications

WARNING

Tripping and falling

Improper routing of cables and wires can lead to tripping hazards and damage to the wires:

- When routing cables and wires make sure to avoid tripping hazards

4.2 Safety signs

☞ The following safety labels are attached to the "BRAWO® Pico".
☞ Damaged safety labels must be replaced immediately.

Icons	Meaning	Attachment locations
	Warning due to dangerous electrical voltage	Control unit
	Warning about opposing rollers	Retraction unit
	Warning of optical radiation	Control unit
	protect from wet	Control unit
	Protect from frost	Control unit
	Observe user manual	Control unit

5 Intended Use

The LED UV curing system "BRAWO® Pico" is used for domestic sewer refurbishing through UV irradiation of resin-soaked knitted hoses / hose liners.

Also included in intended use

- Following the operating manual
- compliance with maintenance and service work

☞ Any use beyond and deviating from this is considered non-intended use.

5.1 Foreseeable misuse

DANGER

Misuse

Improper use can result in severe injuries and is therefore not permitted, such as for example:

- Use of the LED UV light source as a heat source
- Use of the LED UV light source for illumination
- Taking the safety equipment out of operation (control-related and/or mechanical)
- Operation without compliance with the operating manual

5.2 Specified knitted hoses / hose liners

☞ All BRAWOLINERs® made of light-curing resin can be cured (consider the nominal diameter!)

☞ Contact the manufacturer for knitted hoses / hose liners from third-party manufacturer.

6 Technical data

6.1 Dimensions and weight

6.1.1 Control unit

Height	270	mm	Depth	235	mm
Width	300	mm	Weight	5.27	kg

6.1.2 Reel

Height	440	mm	Depth	595	mm
Width	425	mm	Weight	21	kg

6.1.3 Lock

Height	160	mm	Depth	405	mm
Width	330	mm	Weight	4.7	kg

6.2 Connection values

Voltage	115/240	V AC	Operating pressure	max. 2	bar
Amperage	5.3/3.15	A			
Frequency	60/50	Hz			

☞ **The BRAWO® Pico must only be operated with the network connection line included from the manufacturer.**

☞ Compressed air can be regulated using the pressure reducer.

☞ Only "cool technical compressed air" (free of oil and water) is to be used.

6.3 Set up requirements

Allowable ambient temperature	+5 to +40 °C
Altitude	max. 2000 Hm
Relative humidity	20-95%
Overvoltage category	II
Damp room	No
Degree of contamination of the intended environment	Degree of contamination 2
Specification of the set up location	- Usable inside/outside - Level - Horizontal - Dry

☞ Degree of contamination 2 is a non-conductive contamination.

☞ The contamination can be caused by occasional condensate (condensation) or, for example, hand perspiration.

6.4 Noise emission

Emission noise level (A- assessment)	≤ 70	dB(A)

☞ Noise emission **85 dB(A) when compressed air turned on.**
Wear hearing protection during maintenance/servicing.

⚠ CAUTION

Increased noise emissions

Increased noise emissions on LED head with compressed air supply turned on:

- Use hearing protection during service/maintenance work on the LED head

6.5 Operating materials

Operating material	Quantity
Multi-purpose grease (retraction unit sliding guide)	2g
Heat resistant silicon spray	As needed

☞ **Only use heat-resistant silicone spray to lubricate the liner.**

⚠ WARNING

Operating materials

Danger to health due to incorrect use of the operating materials possible:

- Read and follow the safety data sheet and the operating instruction of the operating materials used
- Only use other operating materials after consultation with the manufacturer.

7 Description of the "BRAWO® Pico"

7.1 General Overview

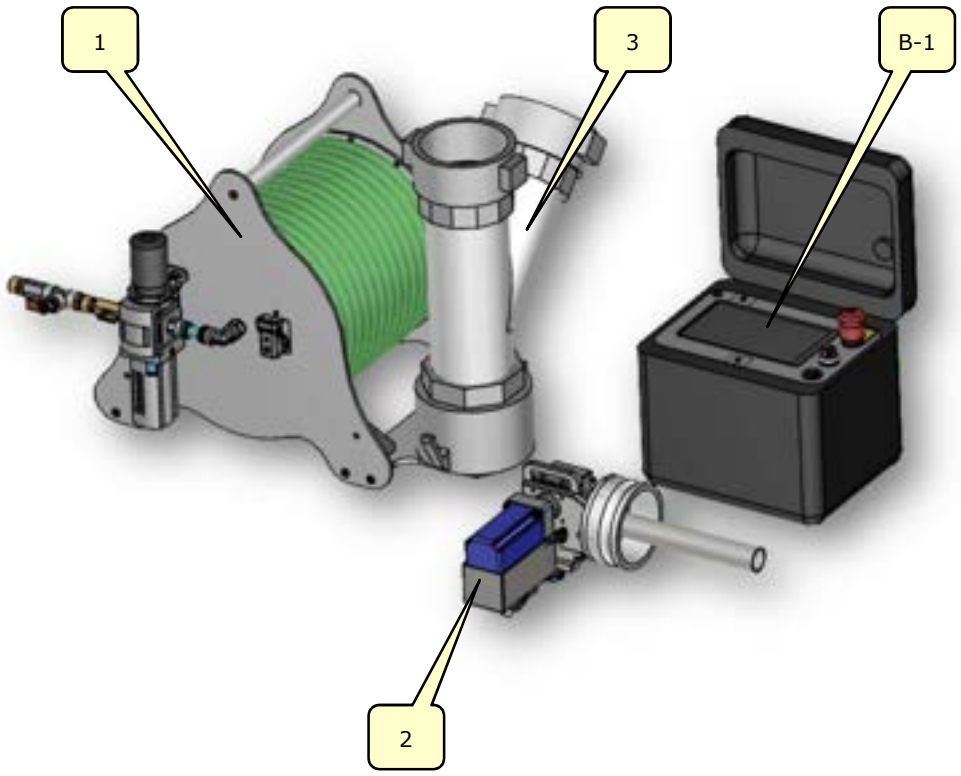


Figure 3 General Overview

No.	Designation	No.	Designation
B-1	Control unit with control panel.	2	Retraction unit
1	Cable drum with LED head	3	Airlock with coupling

7.2 Description of the "BRAWO® Pico"

The "BRAWO® Pico" is made up of the components:

- Control unit (B-1) with control panel
- Cable drum (1) with LED head
- Retraction unit (2)
- Airlock with coupling (3)

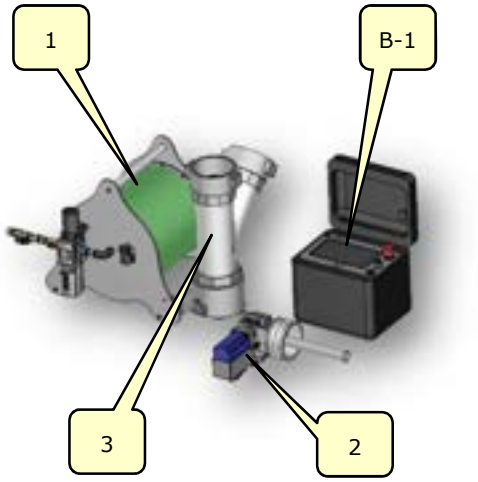


Figure 4 Structure of the "BRAWO® Pico"

7.2.1 Control unit with control panel.

The control unit (B-1) contains the entire power and control electronics of the "BRAWO® Pico".

The contact to the cable drum is made using a plug connection.
The control unit (B-1) is used "mobile" (connected by cable.

The "BRAWO® Pico" is parametrized using the touch screen (B-1.3) according to the specific conditions of the construction site.

➠ Section "Control unit"

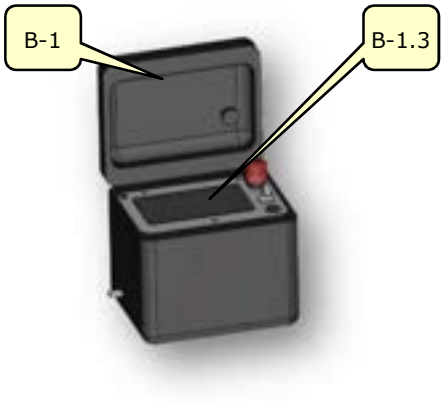


Figure 5 Control unit

7.2.2 Supply hose with LED head

Supply lines for all the electronic components of the LED head are routed in the supply hose (1-1).

Air is continually blown into the supply hose (1-1) to cool the UV LEDs.

There is a plug connector on one end of the supply hose including the LED head (1-1), so that the entire hose package, including LED head, can be replaced without tools.

☞ The supply hose (1-1) is 25 m long and thus enables the refurbishing of sections approx. 20 m.

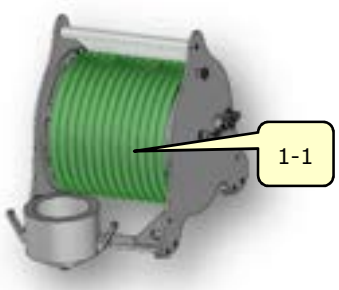


Figure 6 Supply hose

The LED head (1-2) has high-performance UV LEDs for curing the hose liner. The entire LED system can be pulled in directly with the hose liner.

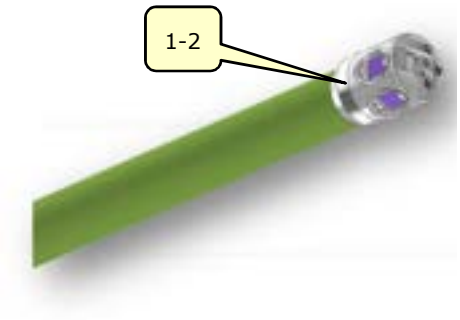


Figure 7 LED head

There is a pneumatic lock (see arrow) on the LED head to pull the LED system to the hose liner.

☞ To pull it in there is an eyelet suspended in the pneumatic lock.

Figure 8 LED head lock

There is a 3/2-way proportional valve (1-3) on the cable drum (1) to control the pneumatic lock.

The 3/2-way proportional valve (1-3) is connected via a pneumatic hose with a mini-cylinder in the LED head.

☞ The 3/2-way proportional valve (1-3) is manually switched to lock/unlock.

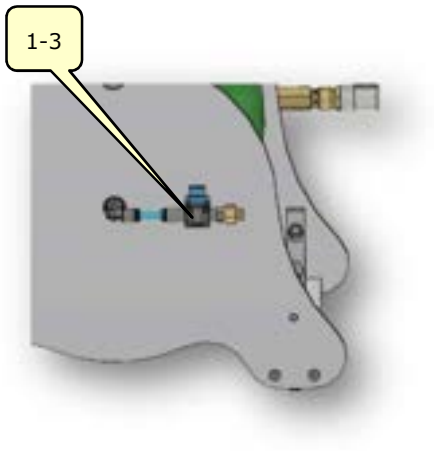


Figure 9 LED head lock

7.2.3 Hose cart

The supply hose (1) is located on the reel (1-4) of the cable drum (1).

The holder (1-5) is intended for the retraction unit.

The cable drum has two rotary feedthroughs for air and power.

The hose length is therefore independent of the rehabilitation length. Supply hose lengths that are not required remain on the reel during rehabilitation.

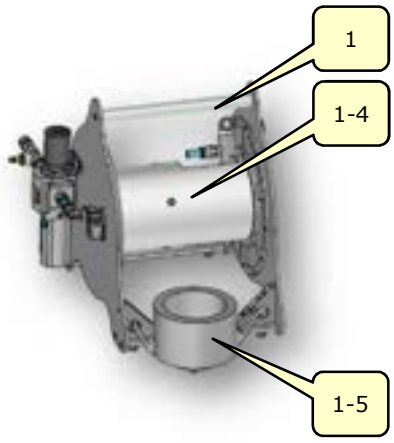


Figure 10 Reel

7.2.4 Retraction unit

After the inversion the retraction unit (3-1) pulls the LED head out of the pipe with a defined speed.

During the retraction process the UV LEDs are turned on and cure the hose liner. The retraction unit consists of a motor and two retraction rollers, which are connected by two gears.

The surfaces of the retraction rollers are surface coated and are rough. The rough surface provides high static friction on the supply hose.

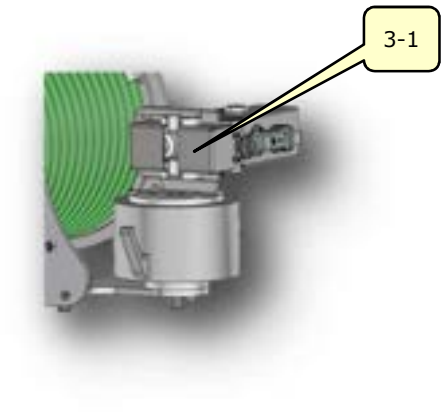


Figure 11 Retraction unit

7.3 Description of the Y-lock

7.3.1 Branch pipe connection

The LED head is already in the branch pipe (5-1) during the inversion process. After the liner is completely inversed, the LED head can be pushed in up to the end of the holder.

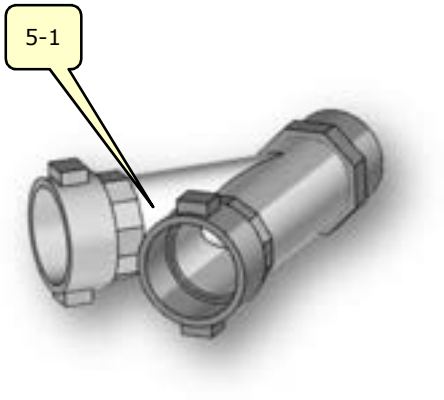


Figure 12 Y-hose
(branch pipe connection)

7.4 Control unit (B-1)

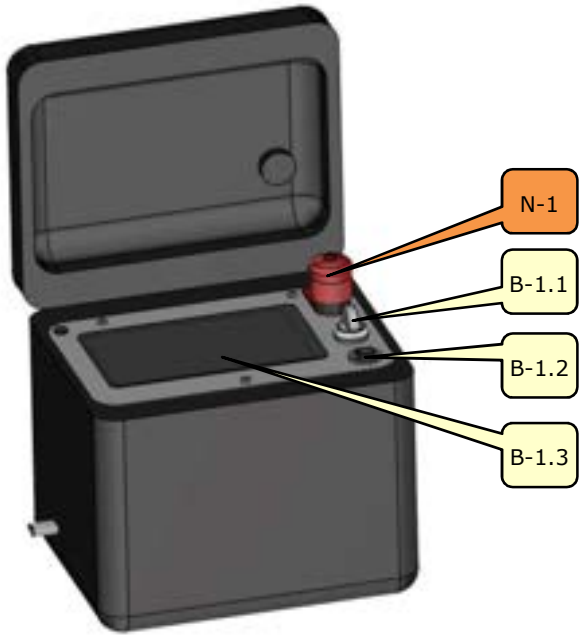


Figure 13 Control unit

No.	Control / display element	Function
B-1.1	Selector switch "Supply voltage"	Switch 230 V supply voltage on/off
B-1.2	USB interface	Data transfer
B-1.3	Touch panel	Display, control and parametrization of the "BRAWO® Pico"
N-1	EMERGENCY STOP button	Shuts down the "BRAWO® Pico" securely in hazardous situations

☞ When the EMERGENCY STOP button is pressed the power supply to the LED head and the retraction unit are cut off.

8 Transport

NOTE

Improper transport

Improper transport can damage the "BRAWO® Pico" and/or its components:

- Transport may only be done by suitable experts.
- Pay attention to the dimensions, weight and location of the center of gravity

➠ Section "Technical Data"; dimensions and weight

8.1 Procedure in case of transport damage

NOTE

Transport damage

Even slight damage can lead to malfunctions during operation and/or to a breakdown:

- Check the "BRAWO® Pico" and its unit components for damage immediately after transport.
- If transport damage has been determined. do not put the "BRAWO® Pico" into operation.
- Inform the manufacturer

If damage is found, inform the manufacturer by contacting the following:

BRAWO® SYSTEMS GmbH
Blechhammerweg 13 - 17
D-67659 Kaiserslautern
Tel.: +49 631 20561-100
email: info@brawosystems.com

8.2 Transport with packaging

⚠ Warning

Transport with packaging

Improper transport can lead to dangerous situations:

- The following transport instructions can be attached to the "BRAWO® Pico" packaging and must be followed

Symbol	Meaning
	This side up
	Fragile packaged goods
	Protect from wet
	Protect from frost
	Attach here
	Place forklift here
	Center of gravity

8.3 Transport of the "BRAWO® Pico"

8.3.1 Transport

☑ Voltage and compressed air supply disconnected

☞ The "BRAWO® Pico" is transported in individual units.
☞ To do this, grasp the "BRAWO® Pico" on the handle of the hose package and transport the control unit with the carrying strap.

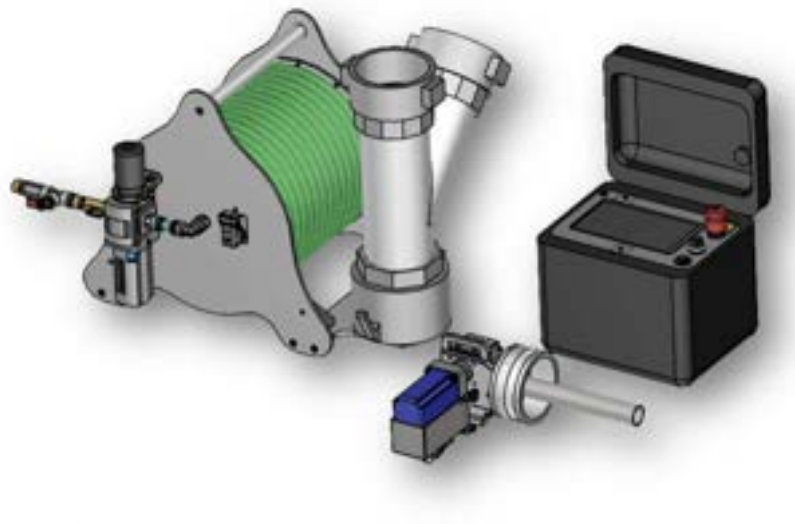


Figure 14 Transport

8.3.2 Transport with pallet

⚠ WARNING

Transport by forklift

The "BRAWO® Pico" can tip if positioned incorrectly on the forklift and cause personal injury:

- Consider center of mass
- Use a pallet with adequate load carrying capacity
- Do not use damaged palettes

☑ Suitable hoisting means with sufficient load bearing capacity must be available.

☑ Transport means (e.g. forklift) with sufficient load bearing capacity is available (min. 100 kg).

☑ Voltage and compressed air supply disconnected.

1. Lift the "BRAWO® Pico" and set it on a pallet.

2. Secure against slipping with suitable and approved straps.

☞ Place the strap around the individual components.

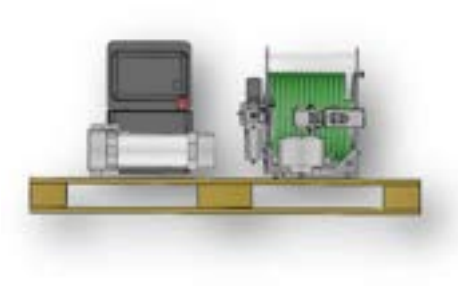


Figure 15 "BRAWO® Pico" on a pallet

3. Move the "BRAWO® Pico" to the installation location as close as possible to the floor.

Figure 16 Transport view with pallet

9 Assembly and Installation

9.1 Preparation

☞ Do not remove the transport securing devices until the "BRAWO® Pico" is in a secure position.

☞ Only remove transport and protective packaging just before installation, since they protect the components from damage and corrosion.

☞ Transport and protective packaging must be disposed of according to the local regulations.

9.2 Preparing for operation

☞ The "BRAWO® Pico" is delivered completely pre-assembled.

9.2.1 Connections of the control unit

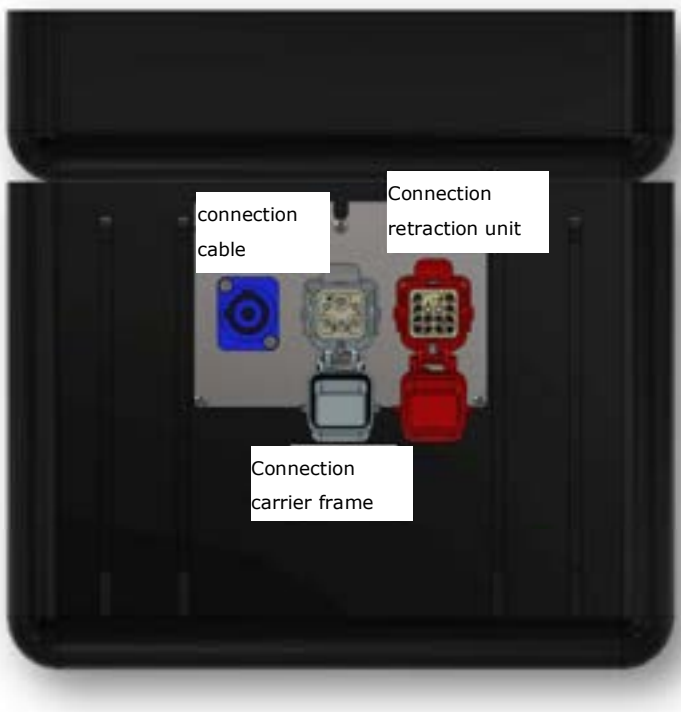


Figure 17 Control unit connections

9.2.2 Connect/disconnect Powercon plug

1. Plug the Powercon plug of the connection line in the socket provided for it.

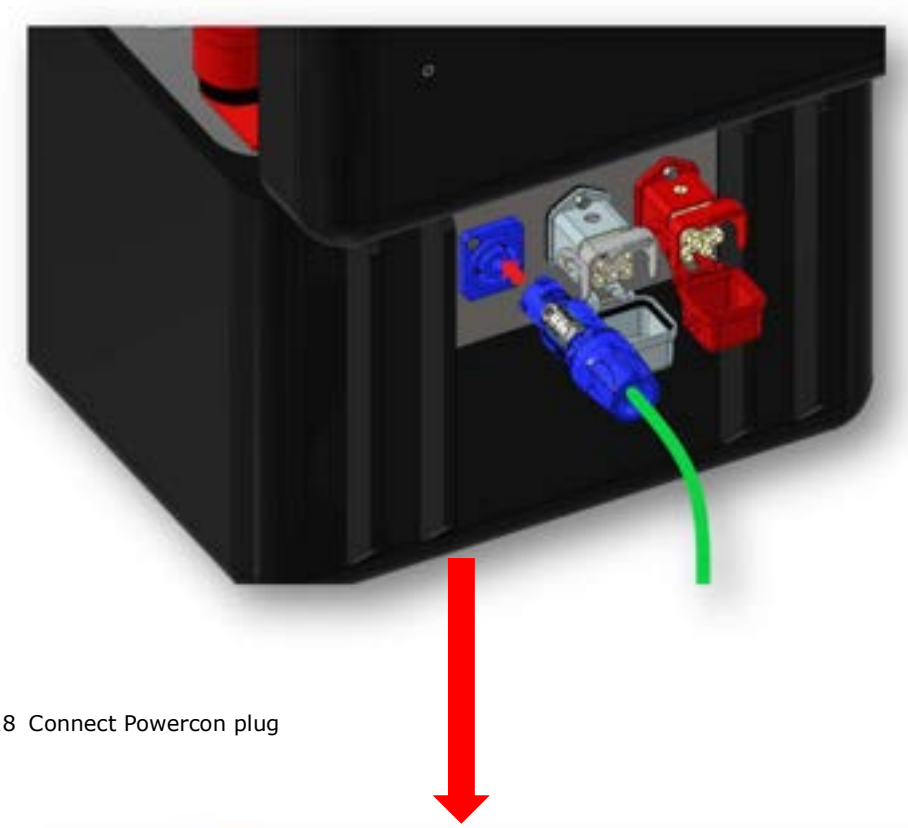


Figure 18 Connect Powercon plug

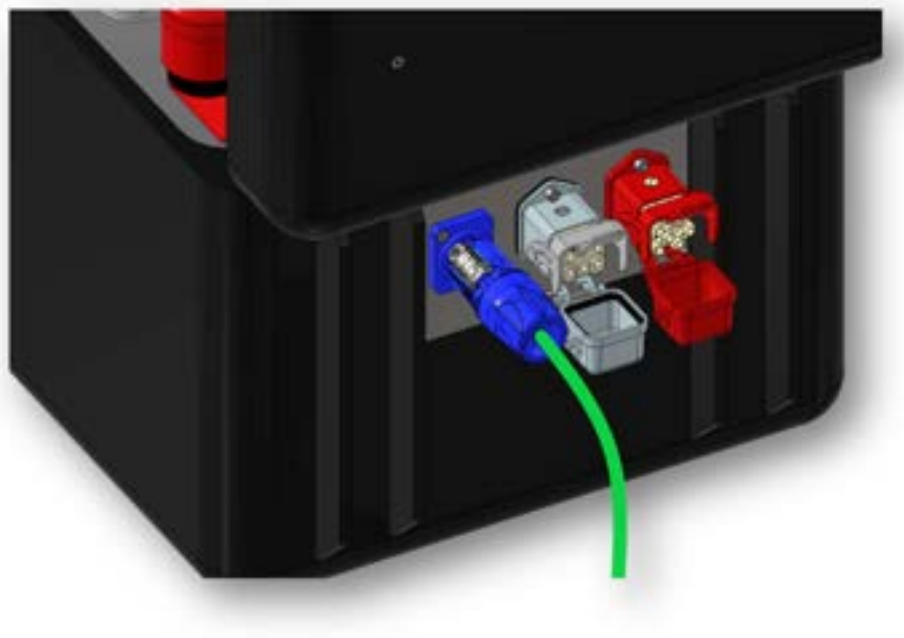


Figure 19 Powercon plug plugged in

2. After plugging in, rotate the plug 45° clockwise, until the lock audibly engages.

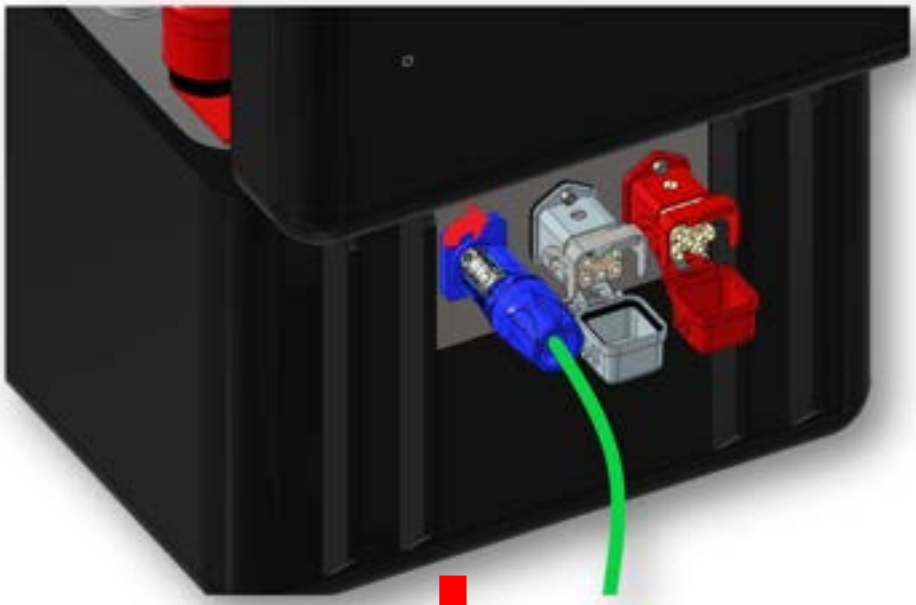


Figure 20 Lock Powercon plug

Figure 21 Powercon plug locked

3. To disconnect the lock. pull back and rotate the plug counterclockwise 45°.

Figure 22 Disconnect Powercon plug

4. Pull the plug out of the socket.

Figure 23 Plug disconnected

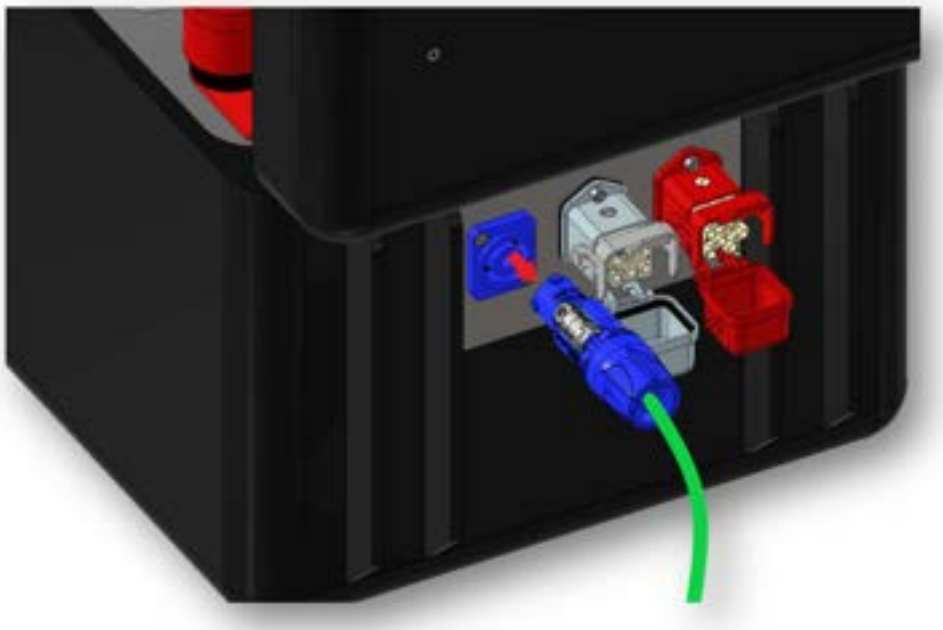


Figure 24 Plug removed

9.2.3 Connecting/disconnecting the carrier frame and retraction unit

1. Pull down the safety bar and then open the caps.

Figure 25 Pull down the safety bar

2. Hold the caps down and insert the plugs into the sockets (pay attention to color and direction).

Figure 26 Insert plug

3. Fold down the safety bar until it audibly engages.
   The plug connection is then secured.

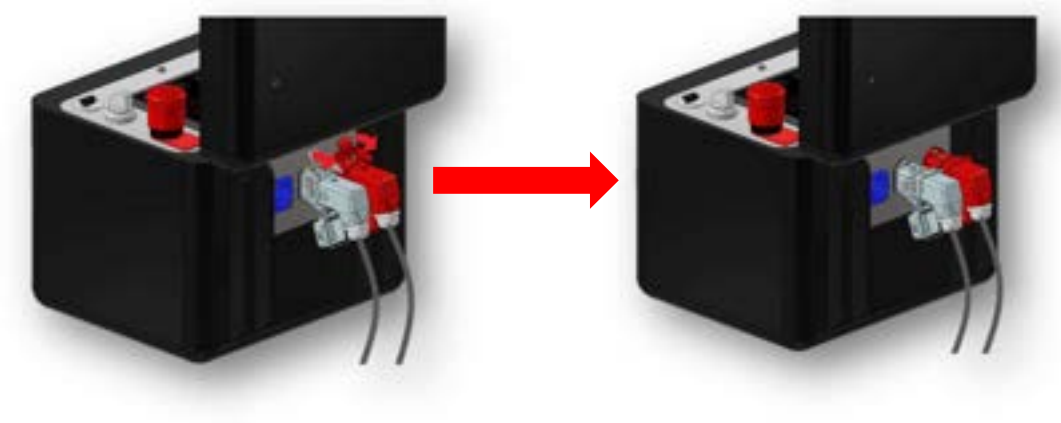


Figure 27 Engage safety bar

4. To disconnect the connection, push up the safety bar.

Figure 28 Push up the safety bar

5. Pull the plug out of the socket.

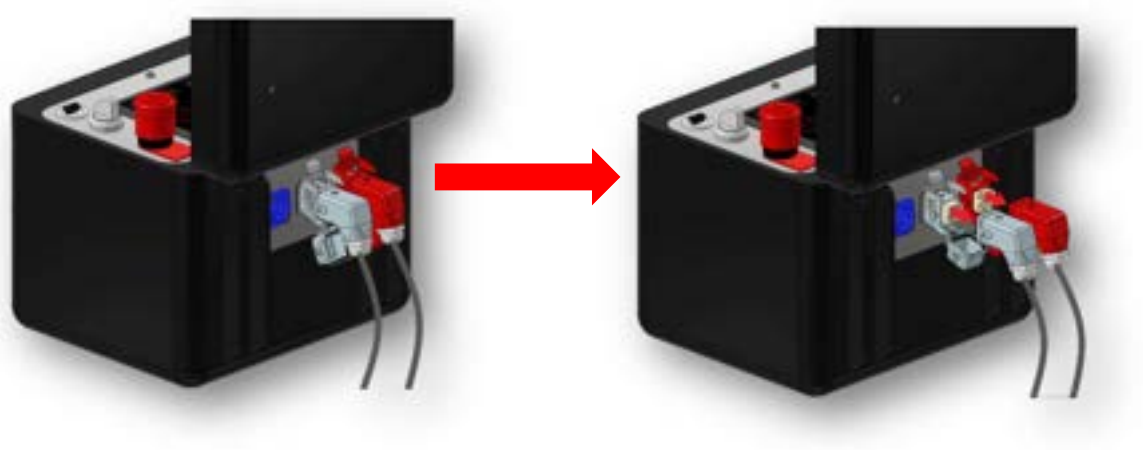


Figure 29 Remove plug

6. Close the caps and then pull down the safety bar until it engages audibly.

Figure 30 Close caps

7. The caps are now closed securely.

Figure 31 Caps closed

9.2.4 Connecting the carrier frame and unit (Harting plug)

1. Pull down the safety bar.

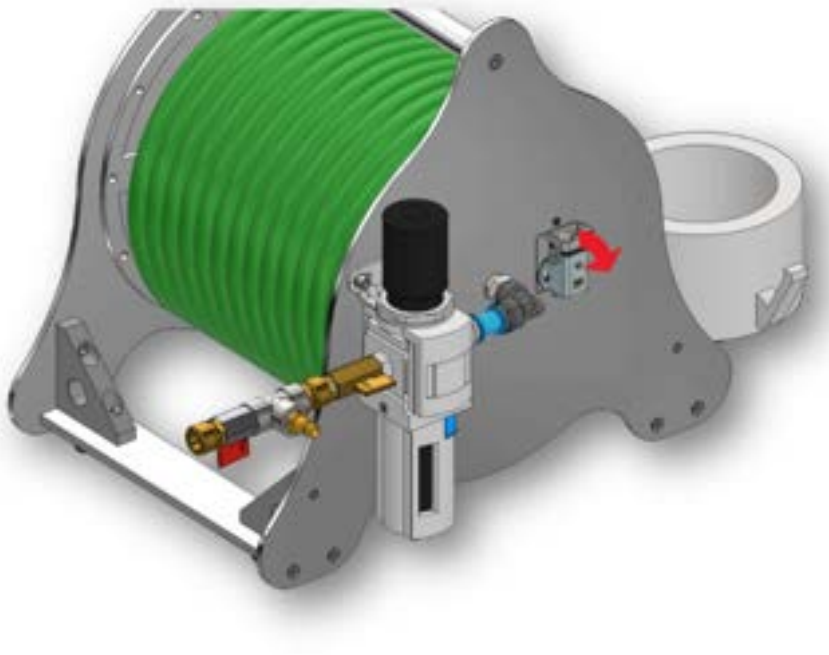


Figure 32 Pull down the safety bar

2. Insert the plug into the socket (pay attention to direction).

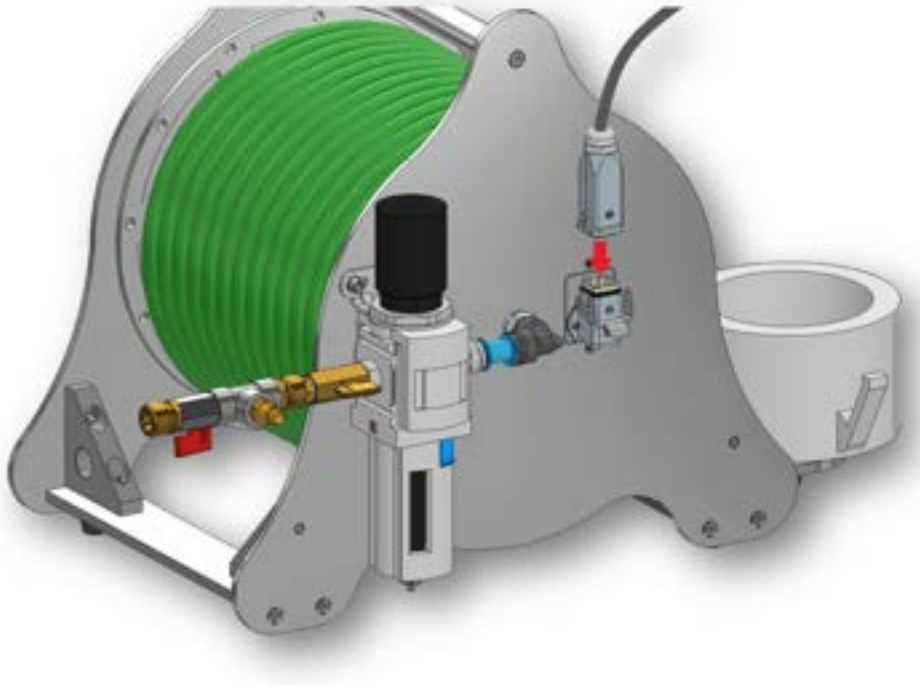


Figure 33 Connect plug

3. Push the safety bar up until it audibly engages.

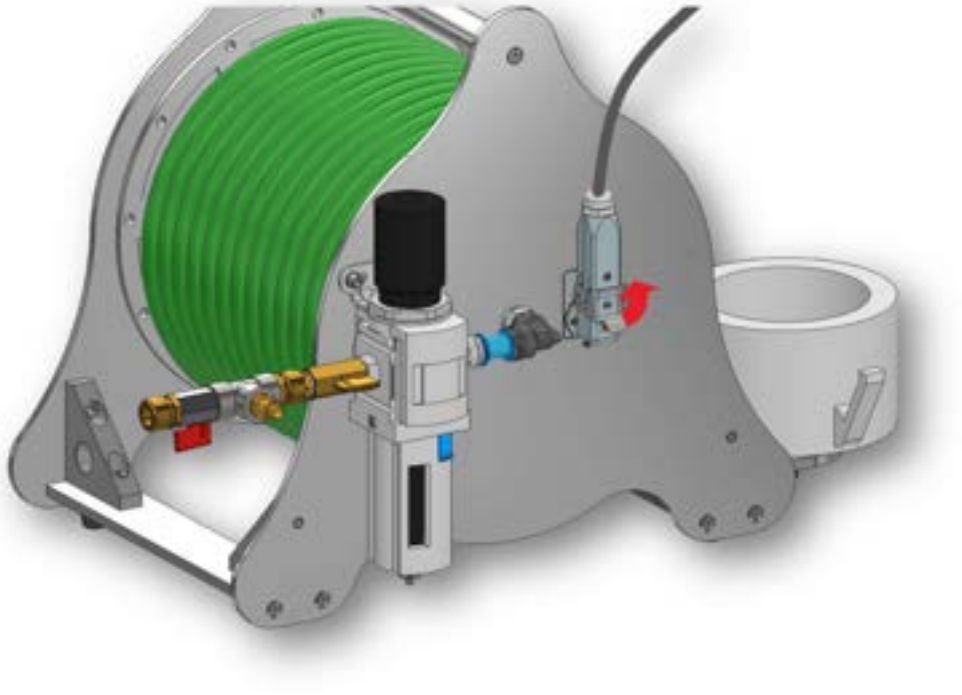


Figure 34 Engage safety bar

4. The plug connection is now secured.

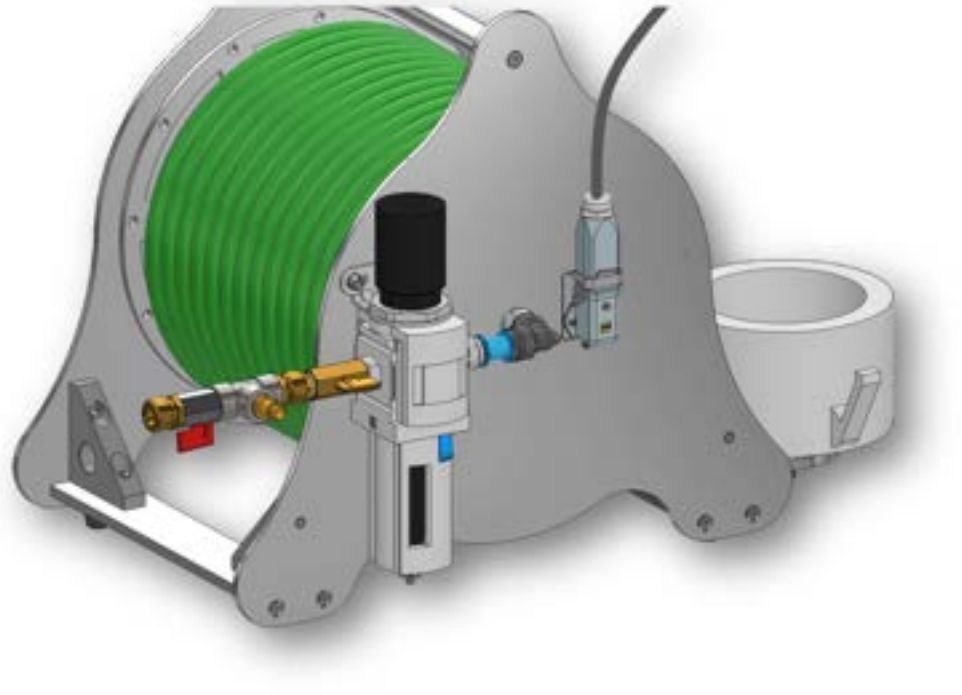


Figure 35 Safety bar secured

5. To loosen the connection, push up the safety bar.

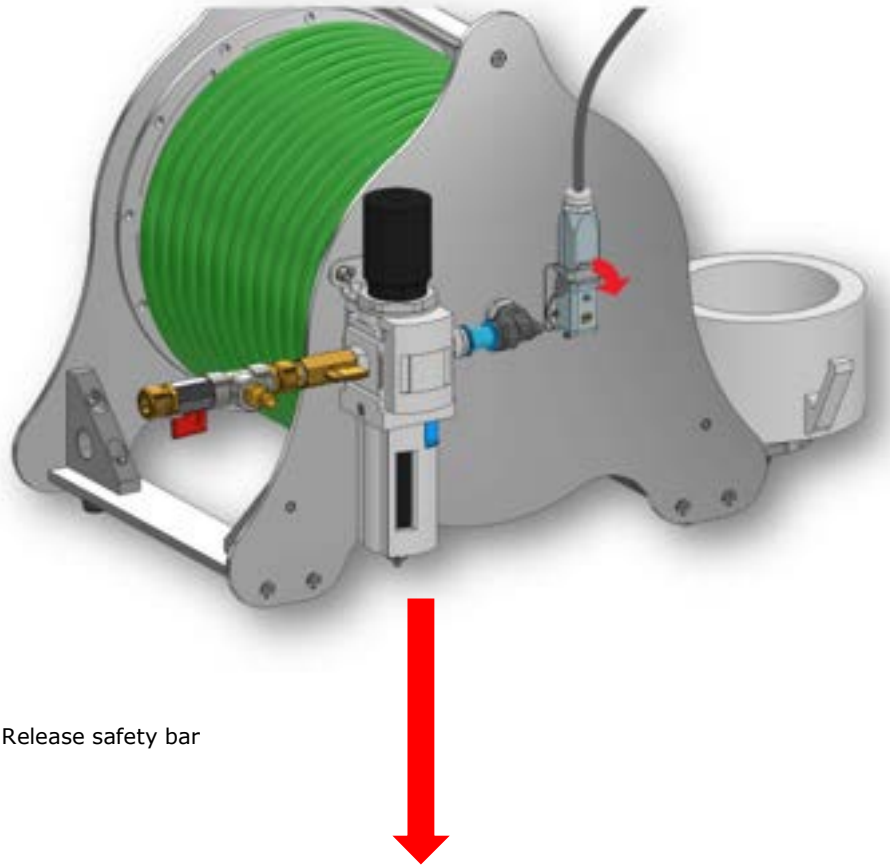


Figure 36 Release safety bar

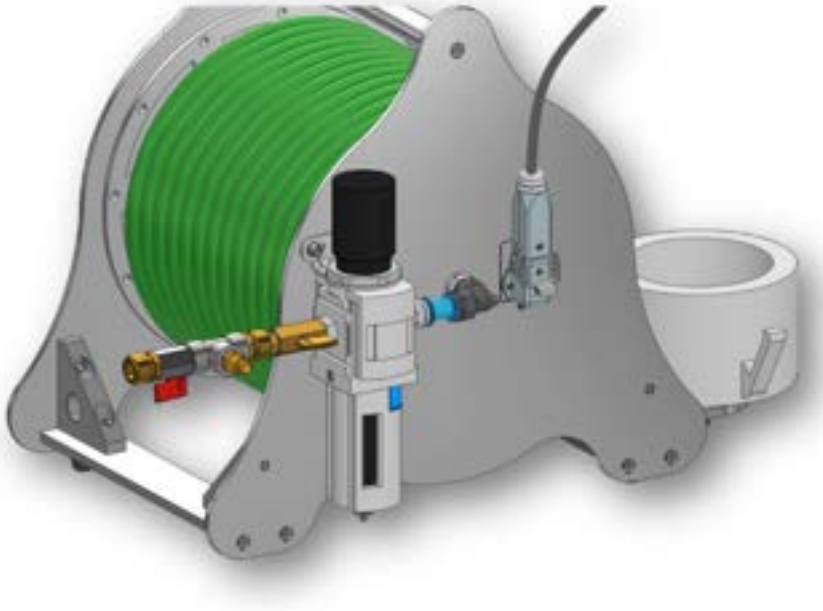


Figure 37 Safety bar released

6. Afterwards pull out the plug.

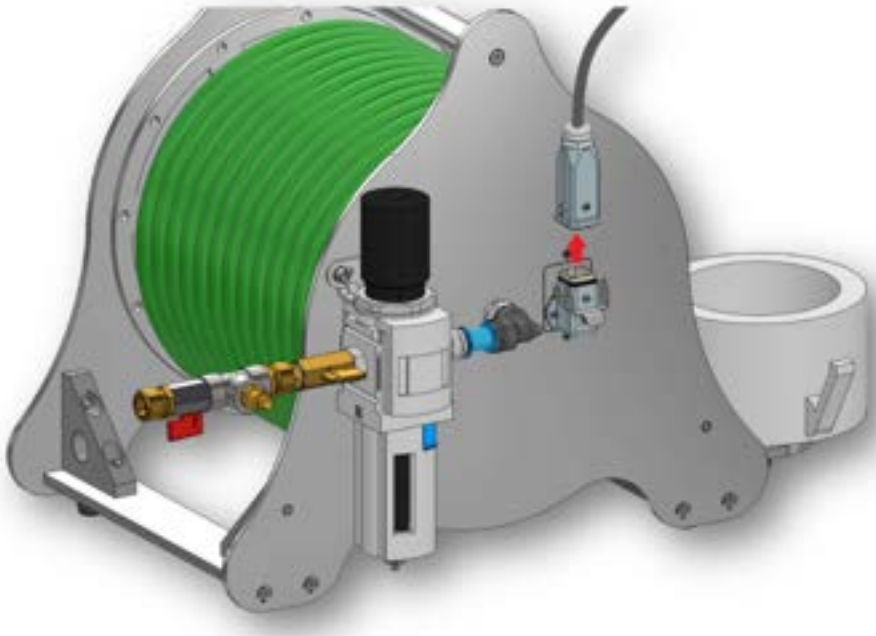


Figure 38 Remove plug

9.2.5 Connect compressed air

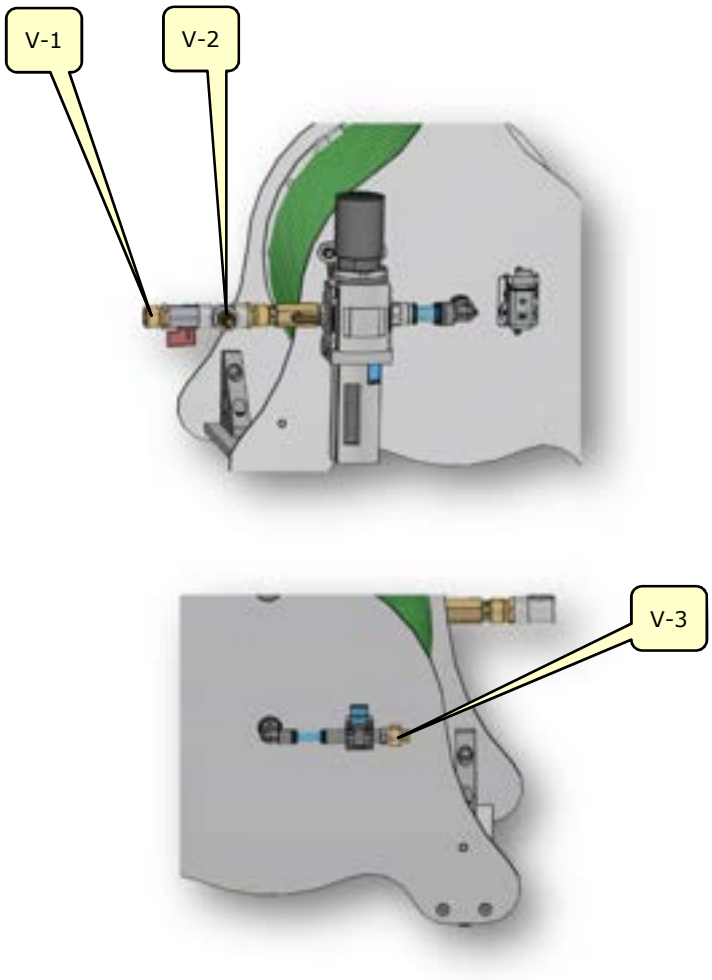


Figure 39 Connect the compressed air/compressed air distributor

No.	Description	Connection
V-1	Lock	Quick-connect
V-2	Compressed air supply (supply hose)	Plug-in nipple
V-3	Compressed air supply (lock LED head)	Plug-in nipple

☞ Inlet pressure (V-2) → max. 2 bars
☞ Inlet pressure (V-3) → 3 to 7 bar

9.2.6 Connect/disconnect retraction unit

1. Push up the safety bar.

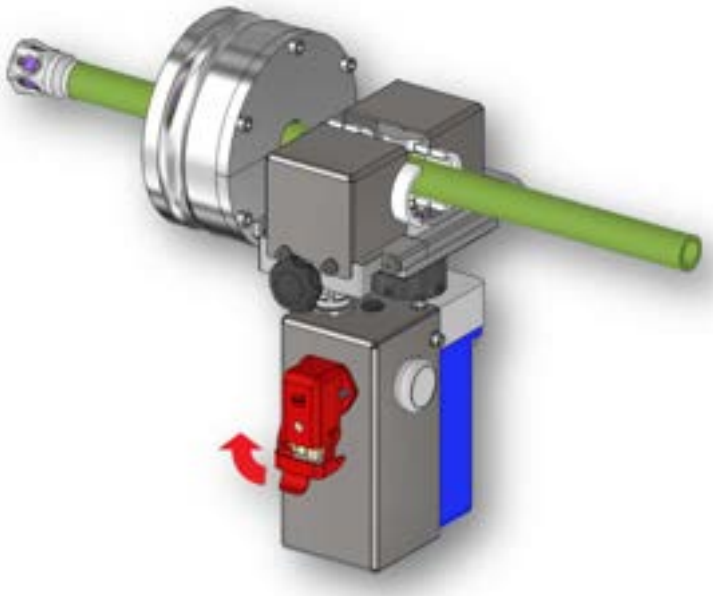


Figure 40 Push up the safety bar

2. Insert the plug into the socket (pay attention to direction).

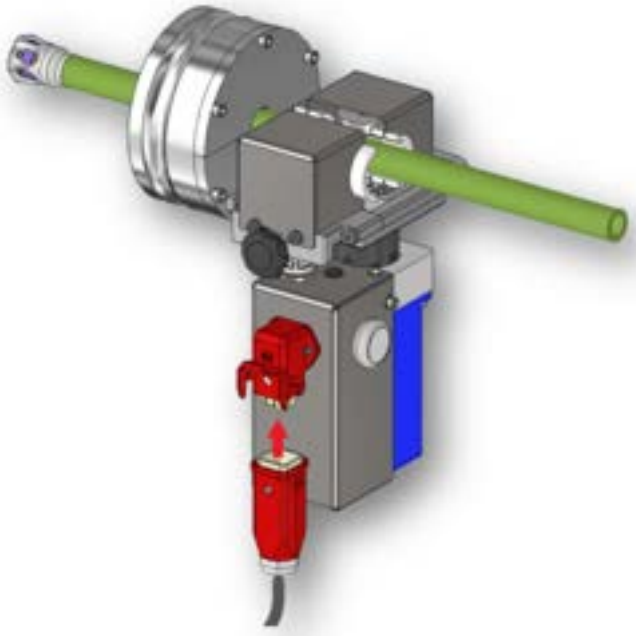


Figure 41 Insert plug

3. Fold down the safety bar until it audibly engages.

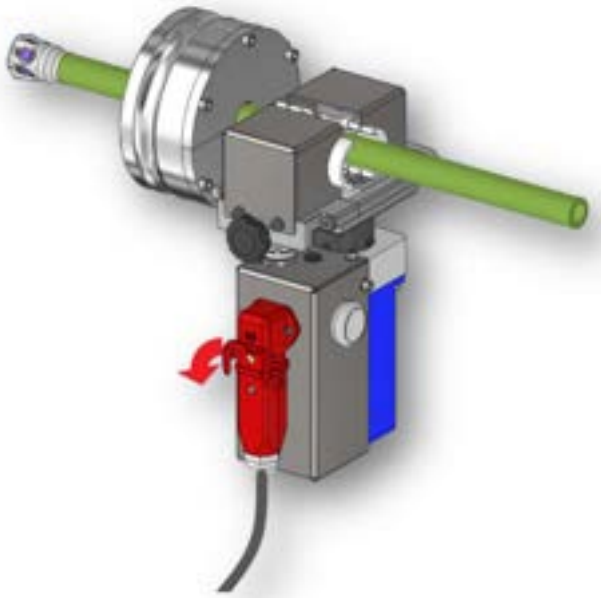


Figure 42 Fold down safety bar

4. The plug is now secured.

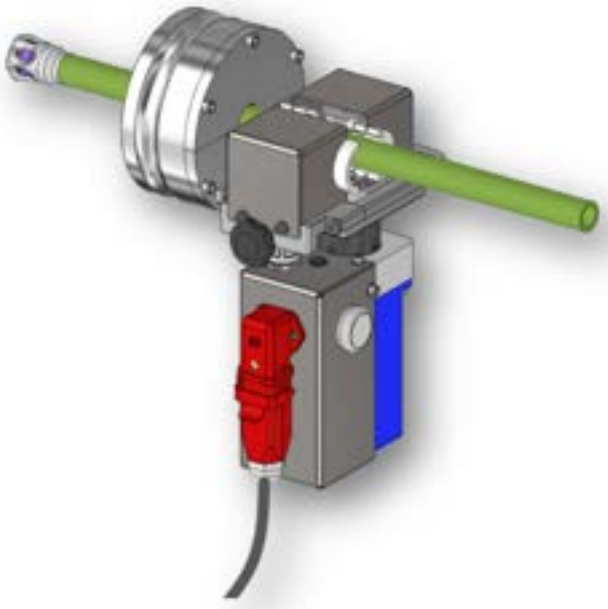


Figure 43 Plug secured

5. To disconnect the connection, push up the safety bar.

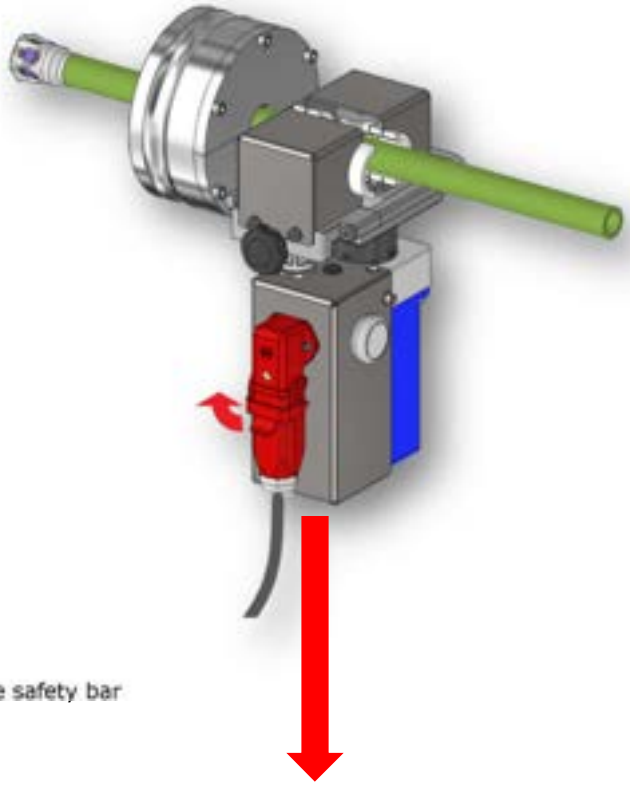


Figure 44 Push up the safety bar

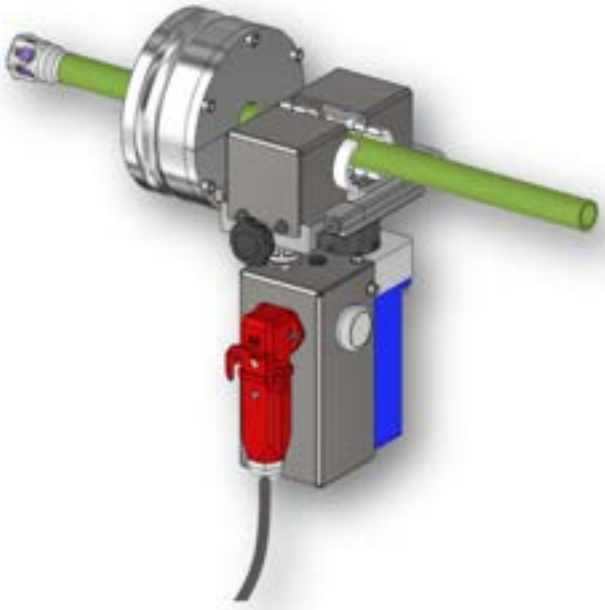


Figure 45 Plug unsecured

6. Pull out the plug.

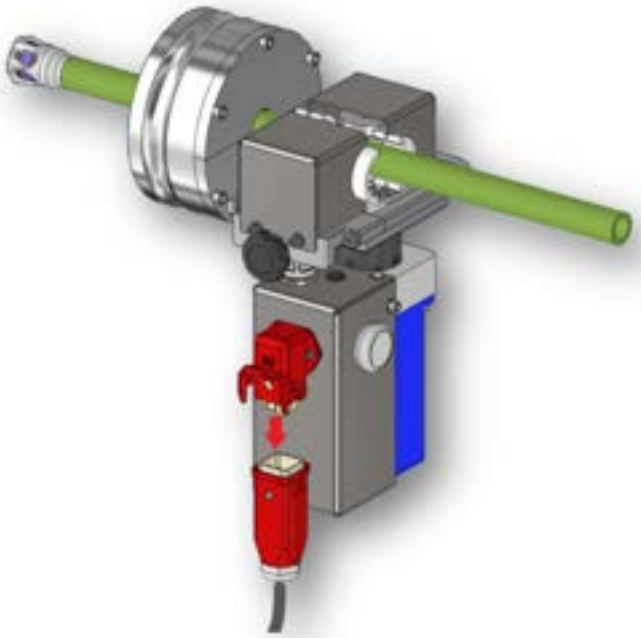


Figure 46 Remove plug

9.2.7 Removing the hose package from the retraction unit/place the hose package

1. Remove the retraction unit from the head garage.

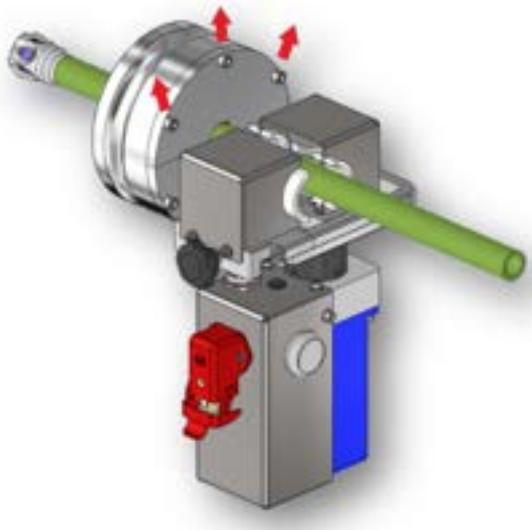


Figure 47 Remove retraction unit

2. Loosen and remove the screws on the upper half-shell of the cover.

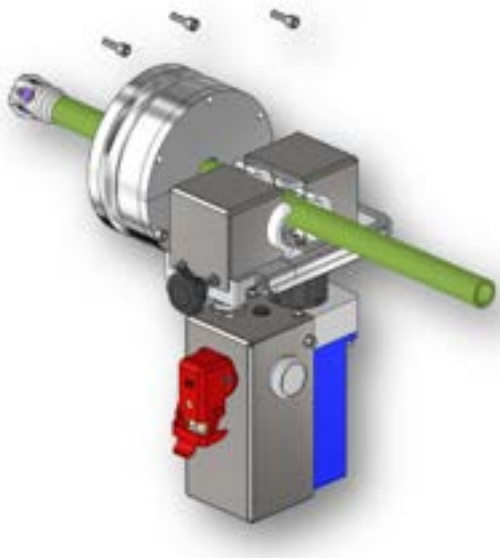


Figure 48 Loosen half-shell of the cover

3. Loosen half-shell of the cover.

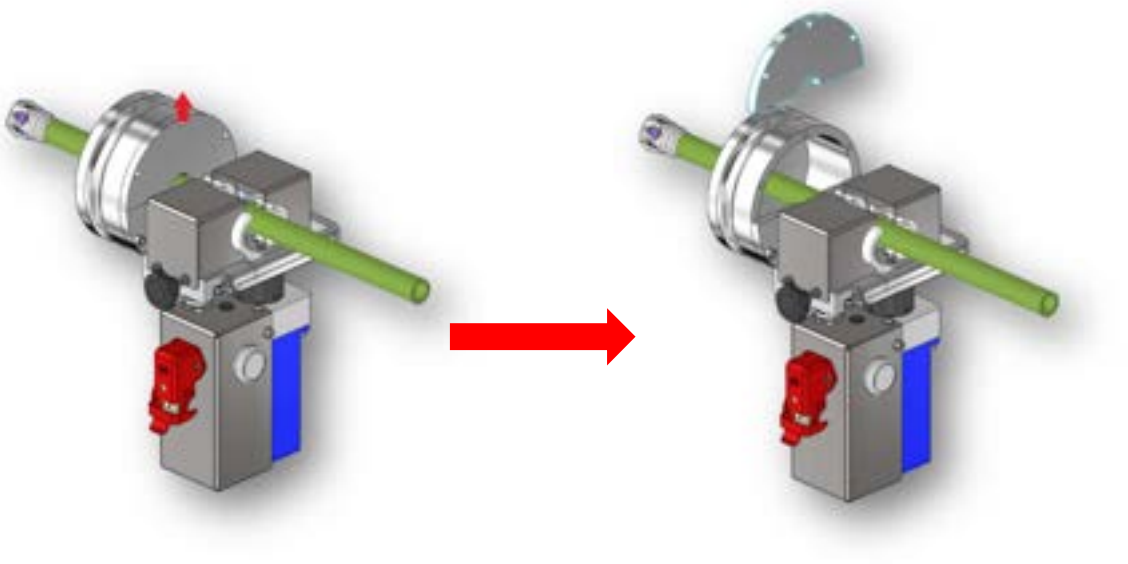


Figure 49 Loosen half-shell

4. After removing the covers, open the clamp of the retraction unit completely.

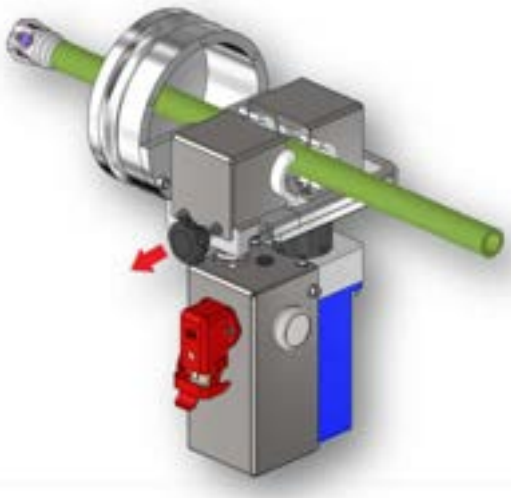


Figure 50 Open clamp of the retraction unit

5. Remove the hose package carefully out of the retraction unit.

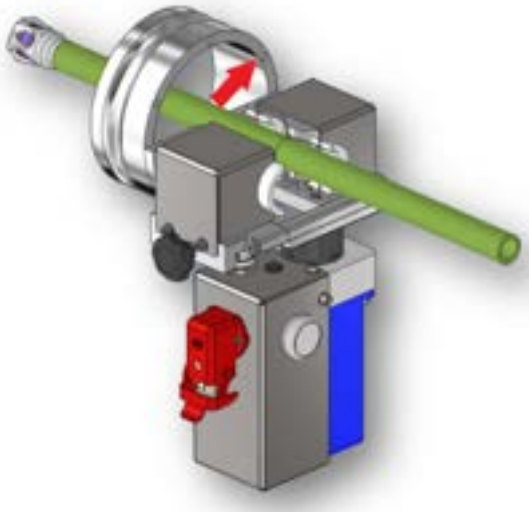


Figure 51 Remove hose package

6. When placing a new hose package, proceed in the reverse sequence (repeat step 5 → 1).

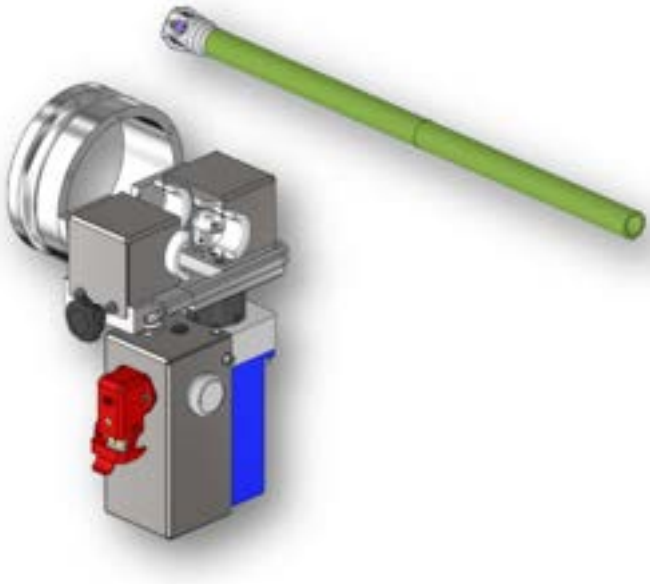


Figure 52 Place in new hose package

9.2.8 LED head

Figure 53 LED head

	LED head
High-performance UV-LED´s	20
Output	50 watts
Area of application	DN50 – DN100
Head diameter	24mm

9.2.9 Lubricating the retraction unit

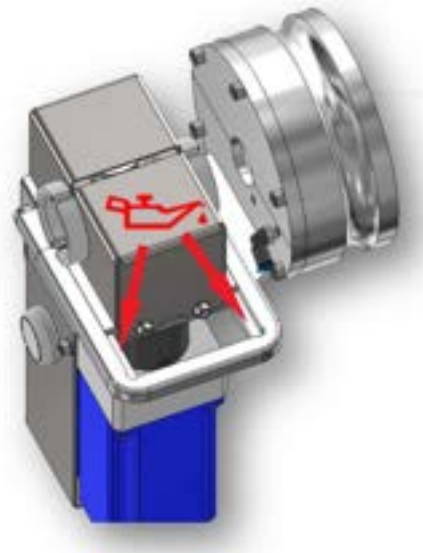


Figure 54 Lubricating the retraction unit

☞ Lubricate weekly or as needed with multi-purpose grease.

10 Commissioning

☑ "BRAWO® Pico" is properly installed

➠ Section "Assembly and Installation"

10.1 Daily commissioning

☑ Voltage and compressed air supply connected

Turn the "Supply voltage" (B-1.1) selection switch on the control unit (B-1) to position "I".

➥ Supply voltage is switched on

➥ Software loads onto the touch screen (B-1.3)

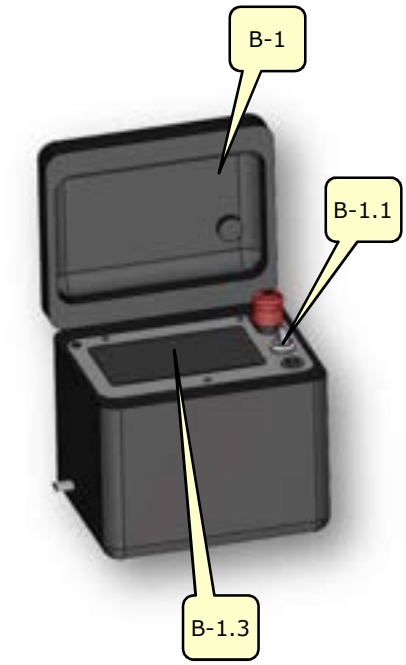


Figure 55 Control unit

➥ Main menu appears on the touch screen

➥ "BRAWO® Pico" is ready for operation

Figure 56 Main menu

10.2 Commissioning after a longer standstill

☞ If the "BRAWO® Pico" is put back into operation after extended standstill (>2 weeks), the system time must be reset.

➠ Section "Setting time / date"

10.3 Commissioning after EMERGENCY STOP

DANGER

Acknowledging the EMERGENCY STOP button

Severe injury results, if the EMERGENCY STOP button is released before the hazardous situation has been removed and a secure state has been made:

- Before unlocking the EMERGENCY STOP button make sure that no person or object is in the danger zone

☑ EMERGENCY STOP signal has occurred

☑ Remove the emergency condition.

☑ No persons and/or objects in the danger zone

1. Unlock the EMERGENCY STOP button (N-1) on the control unit (B-1) by pulling it out.

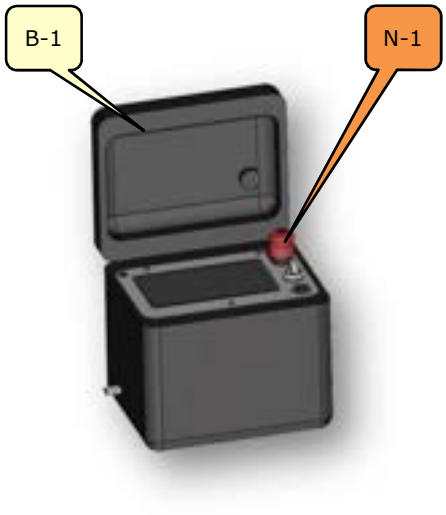


Figure 57 EMERGENCY STOP button

2. In the main menu select the "Acknowledge" button.

➥ EMERGENCY STOP is acknowledged

➥ "BRAWO® Pico" is ready for operation

Figure 58 Main menu

11 Software description

Diverse settings can be made using the touch screen, in order to set the "BRAWO® Pico" to the existing conditions of the construction site.

Furthermore, information on the cured section, the liner interior pressure, the temperature of the LED head and its current consumption is displayed.

☞ The "Confirm" (✓) button appears in the sub-menu only after changing a parameter.

11.1 Main menu

Figure 59 Main menu

Button / Display	Function / Description
	**Lower left**: Traveled (retracted) distance **Center**: Current retraction speed **Lower right**: Target speed
	**Center**: Liner interior pressure **Lower right**: Minimum pressure ☞ If the minimum pressure is not reached, the UV LEDs and the retraction unit are switched off.
	**Center**: Actual temperature of LED head **Lower right**: Temperature limit value ☞ If the maximum limit value is exceeded, the UV LEDs and the retraction unit are switched off.
	**Center**: Actual current consumption of LED head **Lower right**: Minimum current consumption ☞ If the limit value is not reached, the UV LEDs are switched off and retraction is stopped.

Figure 60 Main menu

Button / Display	Function / Description
	Hose liner preselection from Brawoliner® ➠ Section “Liner” “menu”
	Pipe dimension preselection ☞ The selection of the pipe dimension and the hose liner generates a suggestion for optimum retraction speed (presetting). ☞ However, the retraction speed can also be set manually.
	Turn UV LEDs on/off
	Manual setting of the retraction speed and switching on/off ➠ Section “Retraction unit” “menu”
	Access general settings

11.2 "Liner" menu

Figure 61 "Liner" menu

In this menu the liner type to be cured and its nominal diameter are selected. Fixed defined liner types and nominal diameters from Brawoliner® are in memory.

Selection is confirmed by selecting the button.

When the button is selected, the settings are deleted and the main menu called up.

11.3 "Pipe dimension preselection" menu

Figure 62 "Pipe dimension preselection" menu

In this menu the pipe dimension of the channel to be refurbished is selected.

Selection is confirmed by selecting the button.

When the button is selected, the settings are deleted and the main menu called up.

11.4 "Retraction time" menu

Figure 63 "Retraction time" menu

Button / Display	Function / Description
	Turn on retraction unit
	Turn off retraction unit
	Reduce retraction speed
	Set retraction speed **+** : Increase retraction speed **-** : Decrease retraction speed ☞ The retraction speed can be set in a range from 0.1 m/min to 2.0 m/min.
	 Zero retraction distance  Change pull direction

☞ Continued on the next page.

Selecting the  button calls up the main menu and the previously made selection/setting is deleted.

Selecting the  button accepts the previously made selection/setting.

Figure 64 Reduce retraction speed

 **:** If this button is selected and confirmed with  , the retraction speed reduces to 1/3 of the set speed. If the button is deselected, the retraction speed returns to the preset speed.

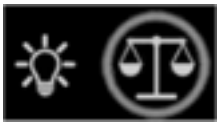
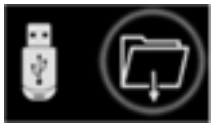
Figure 65 Selecting turtle

If the  is selected, this is also visualized on the main screen.

11.5 General settings

☞ Continued on the following pages.

Figure 66 General settings

Button / Display	Function / Description
	Calibrating current sensors
	Create backup / data protection
	Set time / date

11.5.1 Calibrating current sensors

☞ The LED head should have a temperature of approx. 50 °C before calibration.

1. Connect LED head.

Push the  button

Confirm with the  button.

In the main menu press the  button.

Afterwards the "LED head on/off" menu is displayed.

Select  button and confirm with  button.

➥ The LED head is turned on.
➥ The calibration process is started.

After 5 seconds, press the  button again and confirm with the  button.

➥ The LED head is turned off.
➥ The calibration process is completed.

Figure 67 Calibrating the current consumption of the LED head

11.5.2 Create backup / data protection

1. Plug the USB stick in the USB interface (B-1.2) on the control unit (B-1).

Push the  button

➥ The  button illuminates in green
➥ The data are transferred on the USB stick.

☞ Transfer of the data can take a few minutes.

➥ The  button goes out
➥ Download is completed

2. Remove USB stick from the USB interface (B-1.3).

Figure 68 Download LED-Kopf current consumption

11.6 General settings (continued)

Figure 69 General settings (continued)

Button / Display	Function / Description
	Set the max. temperature limit value of the LED head ☞ If the maximum limit value is exceeded, the UV LEDs and the retraction unit are switched off.
	Set the min. current consumption limit value of the LED head ☞ If the limit value is not reached, the UV LEDs and the retraction unit are switched off.
	Set minimum pressure for switching on the LED head ☞ The minimum pressure can be set in a range from 0.1 bar to 0.5 bar.

☞ An optical warning is output via the touchscreen when the set limit values are exceeded.
Furthermore, UV LEDs and the retraction unit are switched off.

11.6.1 Turn the error messages on/off

Figure 70 Turn the error messages on/off

Button / Display	Function / Description
	Turn the LED head on/off
	Turn the temperature monitoring on/off
	Turn the current limiter on the LED - head on/off
	Turn the working pressure monitoring on/off
	Pulling unit on/off

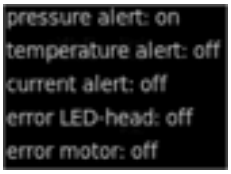
11.6.2 Information menu

Figure 71 Information menu

The information menu gives an overview of the current operating status of the "BRAWO® Pico".

Display	Description
LED: off	Status display of the LED unit.
current: 0.00A current limit: 2.5A	Display of the set minimum current consumption of the LED head.
temperature: 22.0°C temperature limit: 70.0°C	Display of the temperature of the LED head and the set limit value (max. temperature).
pressure: 0.01bar pressure limit: 0.10bar	Display of the current interior pressure of the liner and the set minimum pressure.
motor: off target speed: 0.25m/min speed: 0m/min motor direction: pull distance: 0.10m	Display of the switching status of the retraction unit, the set and the current retraction speed and the traveled (retracted) distance.

Figure 72 Information menu

Display	Description
	Status of the error messages (switched on/off) for • Minimum pressure • LED head temperature • LED head current consumption • Error on the LED head • Error on the retraction motor
	Specific data of the LED head
	Machine-specific data
	QR code contains the contact data

11.7 Set time / date

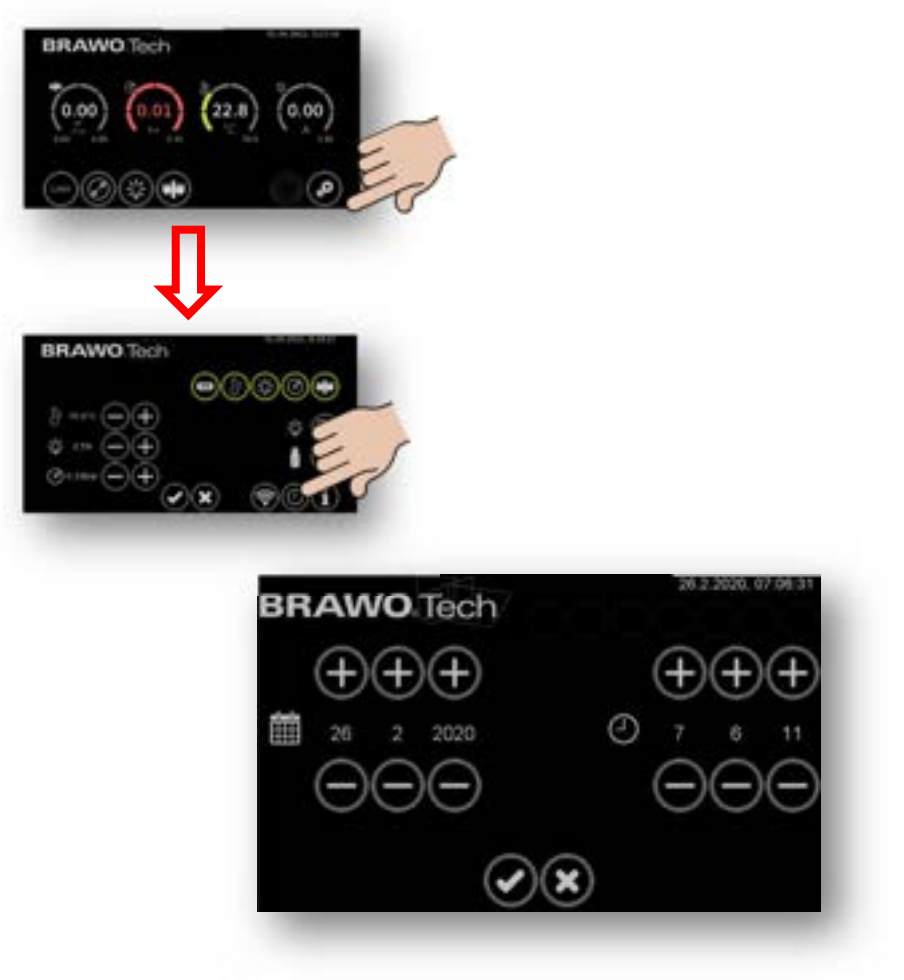


Figure 73 Set date / time

Time and date are set with the "+" and "-" buttons.

Selecting the button calls up the main menu and the previously made selection/setting is deleted.

Selecting the button accepts the previously made selection/setting.

11.8 Connecting to WiFi

Figure 74 Main menu

1. Navigate to the Settings menu from the main menu by pushing the  button.
2. The WiFi symbol  is found in the settings.
3. If the  is pushed, the WiFi connections appear.

Figure 75 WiFi connections

The WLAN provided by the system is displayed under Access Point.

SSID	WLAN name
Password	Password
IP	IP address of the system
URL	The WebUI can be reached under this URL
QR code links	If this is scanned with the cellphone, a WLAN connection can be directly made
QR code upper right	When connected with WLAN, the WebUI can be opened directly via a cellphone.

☞ The external WLAN of the customer with which the system is connected is displayed under WLAN.

SSID	Name of the network
IP	IP address of the system
URL	The WebUI can be reached under this URL
QR code lower right	When connected with customer WLAN, the WebUI can be called up directly with a cellphone via a QR code.

☞ The configuration and the connection with the customer WLAN is configured via WebUI.

11.9 Updating software

To get into the software update environment, the EMERGENCY STOP button (N-1) must be pushed. Then navigate to software update management.

Main screen -> Settings  -> Info  -> Update symbol 

Figure 76 Software update navigation 1

☞ By pressing the update symbol, the system boots in update mode. Booting takes approx. 90 seconds. Here the display remains black several seconds. **In this case it is important to wait!**

After successful booting, the following image appears:

Figure 77 Software update navigation 2

Then a USB stick with update is inserted in the USB port.

Afterwards the USB stick is selected on the display.

Figure 78 Software update navigation 3

The selection must be confirmed with  . After confirmation the system searches for the update.

Figure 79 Software update navigation 4

If an update is found, it is displayed with the version number.

Figure 80 Software update navigation 5

This must be selected with  and confirmed.

After confirmation, the system boots in update mode. Booting takes approx. 90 seconds. Here the display remains black several seconds. In this case it is important to wait. The update then starts.

After successful booting, the following image appears:

Figure 81 Software update navigation 6

When updating the power supply must not be interrupted.

☞ After completing the update, the system restarts **multiple** times. The update is finally completed when the usual user interface is visible. The update process can take several minutes.

11.10 Web interface/WebUI

11.10.1 Menu

1. In the upper left a menu can be opened by clicking on 

. This enables navigation on the Web interface.

Figure 82 Description of WebUI

11.10.2 Live data of the system

Figure 83 Live data of the system (start screen)

1. The live values of the "BRAWO® Pico" are displayed under Sensors.

    - Pulling speed of the pulling unit in m/min
    - Pressure in bar
    - Temperature on the LED head in °C
    - Amperage of the LED in amperes
    - Traveled distance in meters

Status shows whether the LED are turned on, the motor is running or whether the magnet is turned on.

Under Log, the current log can be downloaded in German, English and French. In addition, there is the option to download the log data.

☞ All information can only be read. Control of the system is not possible via the WebUI for safety reasons.

11.10.3 Log management

11.10.3.1 Entry of the log data

On this screen of the log management, the displayed data can be entered on the log.
In addition, there is also the option here of downloading the current logs in the set system language and the log data.

Figure 84 Log management "Customer"

Option for entering the data of the customer, for example their address.

Figure 85 Log management "Project"

Option for entering the project-specific data, for example where the rehabilitation was carried out.

Figure 86 Log management "Installation team"

Entry options for specialist personnel, who carried out the rehabilitation.

Figure 87 Log management "Object details"

Information on the channel system to be rehabilitated as well as other possibly performed actions (e.g. milling work).

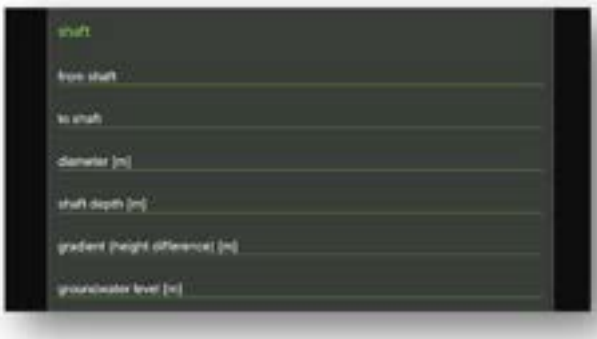


Figure 88 Log management "Shaft details"

Detailed information on the waste water pipe to be rehabilitated and the associated shafts.

Figure 89 Log management "Material"

Entry of technical data of the used knitted hose/hose liners and the resin used.

Figure 90 Log management "Installation"

Entry of the installation/environmental conditions on the construction site and other quality-relevant features.

Figure 91 Log management "Curing"

Entry of the data for the curing cycle/process (e.g. retraction speed).

Figure 92 Log management "Log"

Option to download the current logs in the set system language and the log data.

☞ The "UPDATE" button must be pressed after filling in the individual fields, to accept the entries into the log.

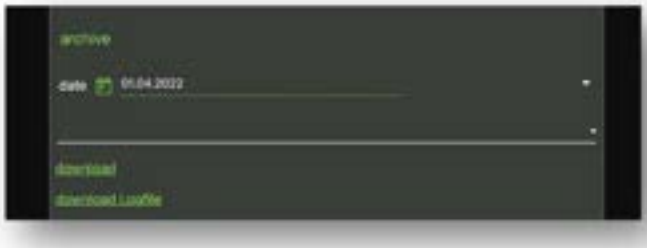
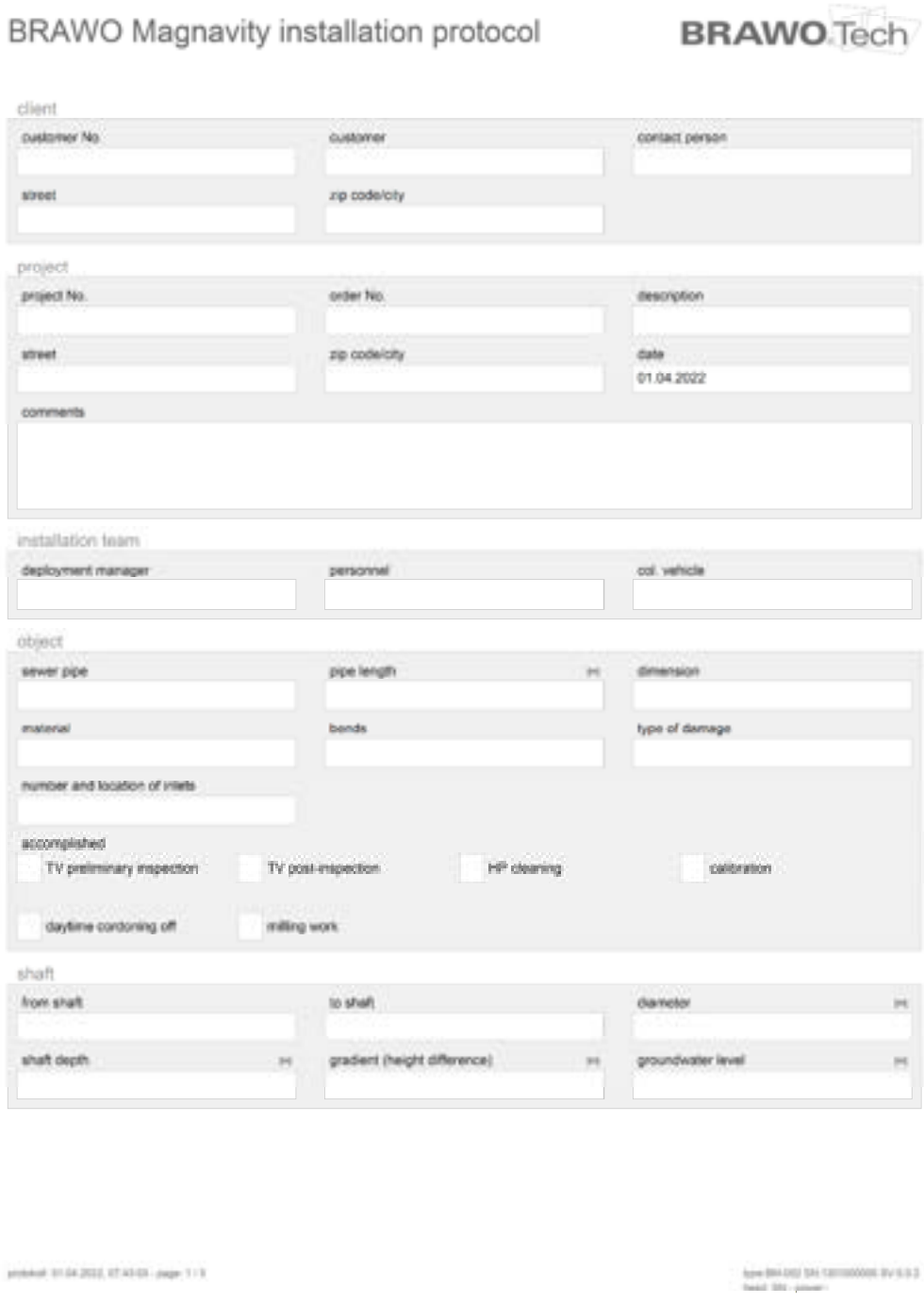


Figure 93 Log management "Archive"

A date can be selected in the Archive area under Date via a date picker.
When the date is selected, the installations carried out on this day appear via a dropdown menu.
The desired installation can be selected using the dropdown menu.
The corresponding log can be downloaded by pressing the "download" button.
Downloading of the log data is also possible using the "download log file" button.

11.10.3.2 Log sample



BRAWO Magnavity installation protocol

BRAWO Tech

client

customer No	customer	contact person
street	zip code/city	

project

project No.	order No.	description
street	zip code/city	date
		01.04.2022

comments

installation team

deployment manager	personnel	col. vehicle

object

sewer pipe	pipe length [m]	dimension
material	bends	type of damage

number and location of inlets

accomplished

- ☐ TV preliminary inspection
- ☐ TV post-inspection
- ☐ HP cleaning
- ☐ calibration
- ☐ daytime cordoning off
- ☐ milling work

shaft

from shaft	to shaft	diameter [m]
shaft depth [m]	gradient (height difference) [m]	groundwater level [m]

BRAWO Magnavity installation protocol

material

material specification by
☐ customer ☐ contractor - site manager ☐ contractor - polisher other

liner

liner selection
☐ BRAWOLINER® ☐ BRAWOLINER® 3D ☐ BRAWOLINER® XT other
dimension batch No.

resin

resin selection
☐ BRAWO® LR other batch No.

installation

environment
☐ waste water-free ☐ precipitation ambient temperature 20.0 °C

install with
☐ calibration hose ☐ preliner

liner end
☐ open ☐ closed

impregnation
☐ on site ☐ pre impregnated

resin storage temperature resin temperature before install vacuum
resin total TARGET resin total resin quantity
roller target spacing roller actual spacing inversion pressure

curing

☐ test LED-head

used UV-unit: BRAWO® Magnavity BM-002 1201000000
used LED-head curing pressure
pullback target speed pullback actual speed pressure maintenance

BRAWO Magnavity installation protocol

inversion LED-head

period of time		pressure		temperature	
begin	-	min	-	min	-
end	-	max	-	max	-
time	-	delta	-	delta	-

curing

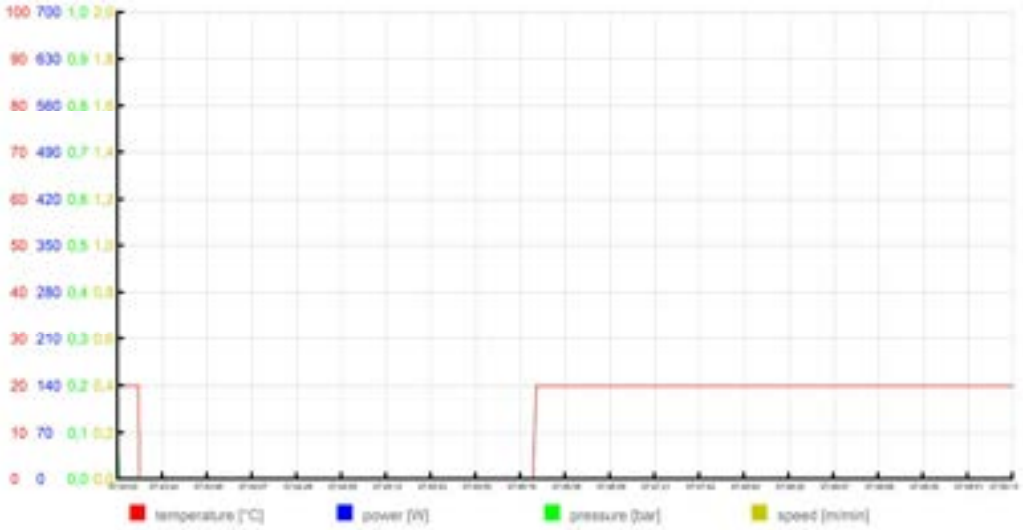
period of time		pressure		temperature		power		speed	
begin	-	min	-	min	-	min	-	min	-
end	-	max	-	max	-	max	-	max	-
time	-	delta	-	delta	-	delta	-	delta	-

pressure maintenance after end

period of time		pressure	
begin	-	min	-
end	-	max	-
time	-	delta	-

recording

period of time		pressure		temperature		power		speed	
begin	01.04.2022, 07:43:03	min	0 mbar	min	0.0 °C	min	0 W	min	0.0 m/min
end	01.04.2022, 07:50:13	max	59 mbar	max	20.0 °C	max	0 W	max	0.0 m/min
time	0:07:10	delta	59 mbar	delta	20.0 K	delta	0 W	delta	0.0 m/min



11.10.4 Info

Figure 94 Info

More parameters of the system can be seen on this screen.

Status:

- LED-circuit on/off
- Motor on/off
- Magnet on/off

Sensors:

- Current consumption LED circuit in amperes
- Temperature sensor in the LED head in °C
- Pressure in bar

Pulling unit:

- Motor direction pulling/pushing
- Target speed of the motor in m/min
- Actual speed of the motor in m/min
- Traveled distance in meters

Limits:

- Switch-off threshold minimum pressure in system
- Switch-off threshold minimum current on the LED
- Switch-off threshold maximum temperature on the LED

Error:

- LED head not recognized
- Threshold temperature on LED head exceeded
- Threshold current no reached in LED circuit
- Pulling unit not recognized
- Threshold pressure not reached in the system

Shut-down:

- Shut-down active/inactive not recognized at LED head
- Shut-down active/inactive at threshold temperature on LED head exceeded
- Shut-down active/inactive at threshold current not reached in LED circuit
- Shut-down active/inactive not recognized at pulling unit
- Shut-down active/inactive at threshold pressure not reached in the system

Machine:

- Serial number
- Software version
- Last service on machine

LED head:

- Serial number
- Output
- Last service on the LED head
- Running time since last service
- Service interval
- Operating time
- Maximum temperature since last service

☞ All information can only be read. Control of the system is not possible via the WebUI for safety reasons.

11.10.5 WiFi

Figure 95 WiFi

This screen shows the remote connections of the system and the configuration.

Access Point:

- SSID is the name of the broadcast WLAN of the system
- Password is the password associated with the system
- IP is the IP address of the system

WLAN:

The system can connect with an external WLAN and thus be integrated in a WLAN provided by the customer.

- SSID: Name of the network with which the system is connected
- IP: IP address of the system in the network with which the system is connected

Configuring W-Lan:

Using the "SCAN" button, the system searches all available networks located in the area and lists them.

Then when a network is selected from the list, it is displayed under SSID. Now the associated password of the network must be entered and the type of encoding selected. With a click on the "CONNECT" button the system connects with the entered network.

11.10.6 System

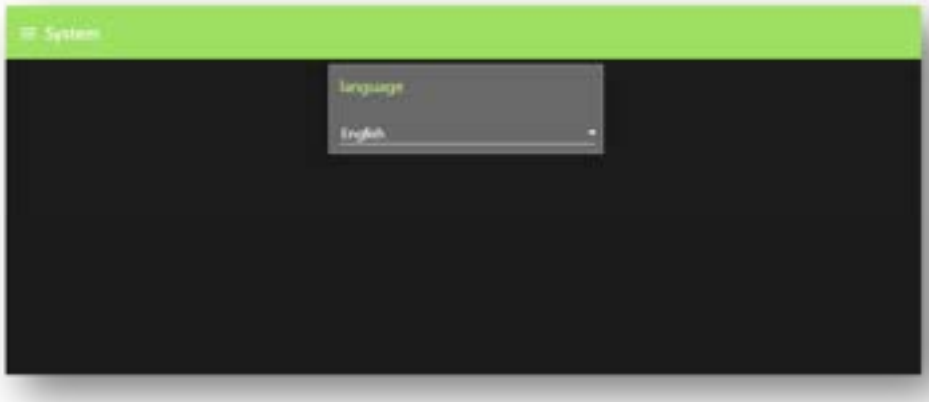


Figure 96 System

On this screen the system language can be chosen. German, English and French are available.

12 Working Operation

⚠ DANGER




UV radiation

Severe damage to the eyes due to UV radiation:

- Avoid unprotected eye contact with the UV LEDs
- Use hand protection, body covering work clothing and UV eye protection)
- Do not use UV LEDs to illuminate the workplace
- Follow safety instructions of the light manufacturer
- Only perform functional check of the UV-LEDs briefly and when using suitable UV protective equipment

⚠ WARNING


Burns

Severe burns from contact with the hot surface of the LED head:

- Keep flammable materials away from the LED head.
- Use heat-resistant safety gloves.

⚠ CAUTION

Retraction unit

There is risk of pulling in by the retraction unit during the winding process, especially to the upper limbs:

- Operation only with completely installed protective covers
- If possible do not guide the supply hose manually

☑ "BRAWO® Pico" put into operation properly

➠ Section "Commissioning"

☑ "BRAWO® Pico" parametrized according to the requirements of the liner to be cured

➠ Section "Software description"

1. Pull the LED head (1-2) into the liner to be cured.

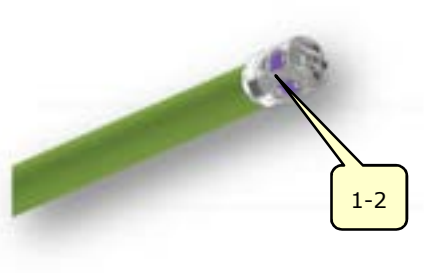


Figure 97 LED head

☞ For this, connect the LED head (1-2) with the liner and open the 3/2-way proportional valve (1-3).

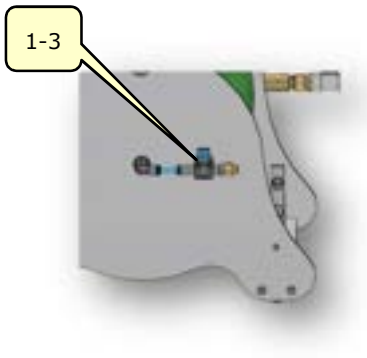
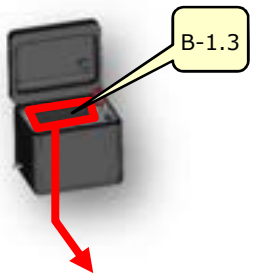


Figure 98 3/2-way directional valve

⚠ **Risk of crushing fingers.**
Hold the LED head at the rear end when closing the pneumatic lock.

➥ The pneumatic lock closes on the LED head.

Figure 99 LED head



2. Call up the settings of the retraction unit on the touch screen (B-1.3) in the main menu.

Figure 100 Main menu

3. Switch on the UV LEDs and confirm with the "✓" button.

➥ UV LEDs are switched on

Figure 101 Turn on the UV LEDs

4. After elapse of the delay time (Observe time in main menu!) Switch on the retraction unit and confirm with the "✓" button.

➥ LED head is pulled out of the liner with the set speed

➥ Liner is cured

Figure 102 Turn on retraction unit

13 Shutting down

13.1 Shutdown in a normal case

☑ Curing process completely finished

Turn the "Supply voltage" (B-1.1) selection switch on the control unit (B-1) to position "O" (off).

➥ The control power is switched off
➥ "BRAWO® Pico" is shut down

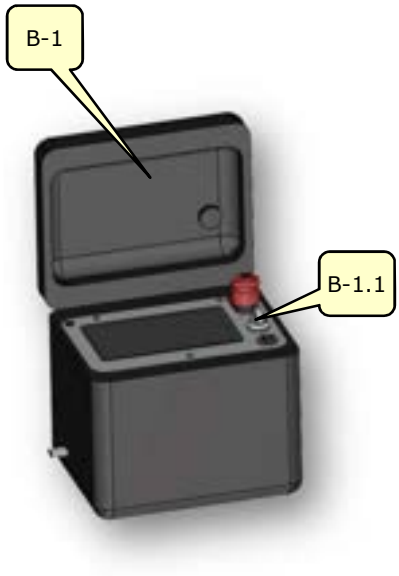


Figure 103 Control unit

13.2 Shut down in emergencies

In case of danger, immediately activate the EMERGENCY STOP button on the control unit.

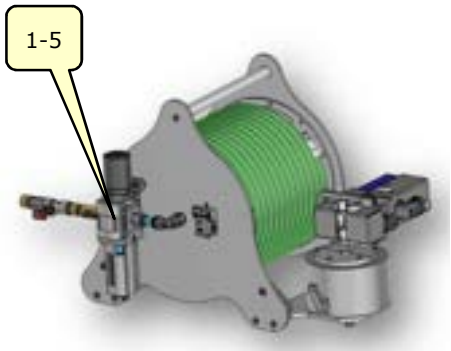
Figure 104 EMERGENCY STOP button on the control unit

➥ After pushing the EMERGENCY STOP button, operation stops in a safe condition

13.3 Shut down (switch off and secure)

☑ "BRAWO® Pico" is properly shut down

➠ Section "Shutting down in a normal case"



1. Disconnect the compressed air supply (supply) to the maintenance unit (1-5) and to the 3/2-way proportional valve.

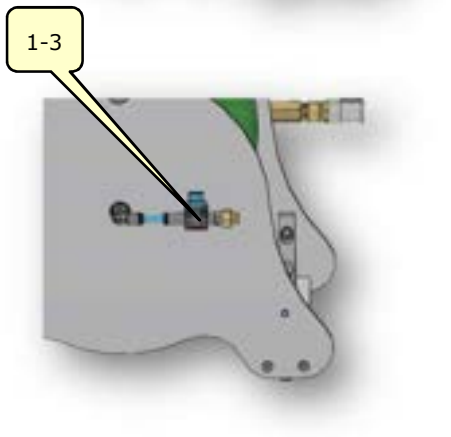
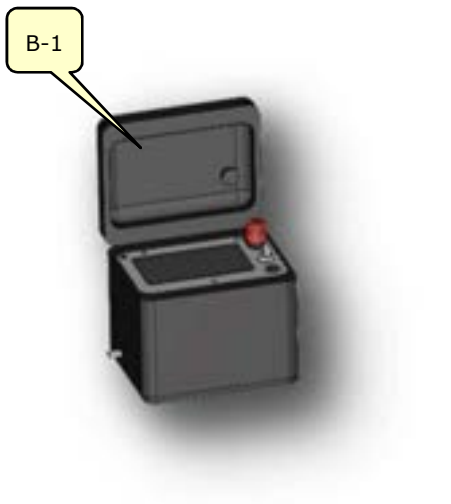


Figure 105 Compressed air supply



2. Disconnect the voltage supply (feed line) from the control unit (B-1).

Figure 106 Control unit

14 Troubleshooting

NOTE

Troubleshooting

Improperly performed troubleshooting can lead to damage:

- Troubleshooting must only be done by technical personnel
- If the malfunctions cannot be remedied, contact the manufacturer

14.1 Error display

☞ Existing malfunctions are displayed via blinking red indicators in the main menu.

Figure 107 Error displays in the main menu

14.2 Error table

Error (Message)	Error	Solution
	EMERGENCY STOP button actuated	• Unlock the Emergency Stop button, acknowledge Emergency Stop button
	Service on LED head (operating hours) or the system (every 12 months) is due	• Contact the manufacturer and arrange a service visit
	LED head not connected	• Plug connector hose package <-> Reel • Plug connector reel <-> connecting cable (LED head) • Plug connector connecting cable LED head <-> control unit
	Maximum temperature on LED head exceeded	• Check cooling (air supply) • Check hose package for leaks
	LED head current limit not reached	• Check LED head connection • Functional check of the LEDs (UV safety glasses)
	Minimum working pressure not reached	• Check inversion drum, lock and liner for leaks
	Pulling unit not connected	• Check plug connector pulling unit <-> connecting cable (pulling unit) • Check plug connector connecting cable (pulling unit) <-> control unit

14.2.1 Error text

Error (message)	Error	Solution
No function, system off	Power supply is missing.	• Check connection line, plug connectors and electrical supply
Power switch green, everything off	Insufficient voltage detected. Switch-off time not satisfied.	• Switch off system, wait at least one minute, then restart power.
Motor on <-> hose stopped	Drive rollers of the retraction unit do not grip correctly	• Clean driver rollers; • Check the roller spacing and readjust if necessary

15 Maintenance and cleaning

DANGER

Accidental starting

Severe injuries are the result if the "BRAWO® Pico" starts up unexpectedly during repair or cleaning:

- Stop the "BRAWO® Pico" before maintenance or cleaning work and secure against unexpected start up, e.g. by disconnecting the power plug.

☞ The following maintenance and service work must be performed by the operator

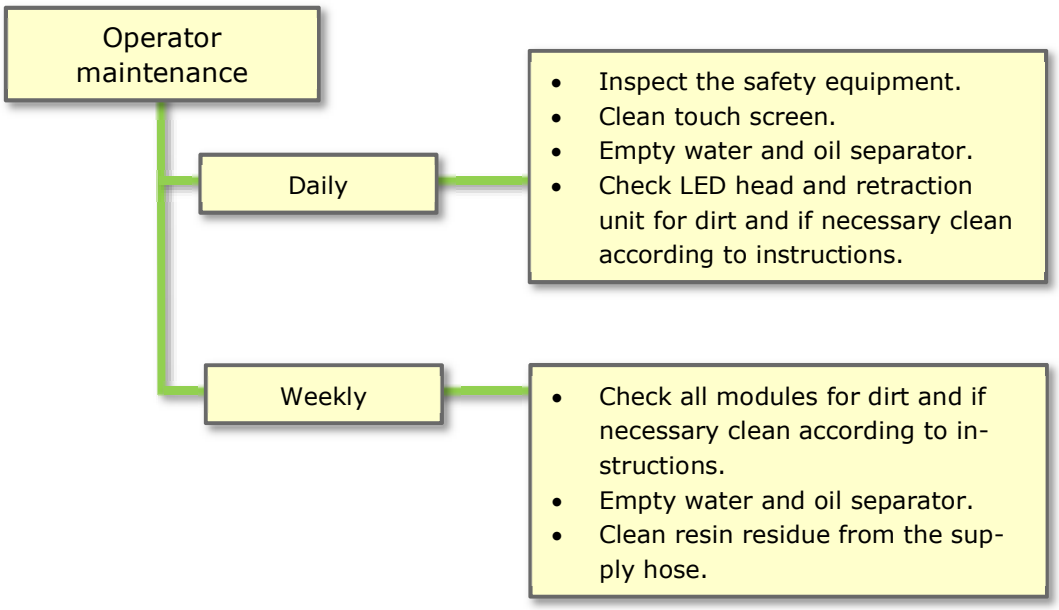


Figure 108 Maintenance/servicing

15.1 Check the UV LEDs

1. Slide the LED head (1-2) into the Y-lock.

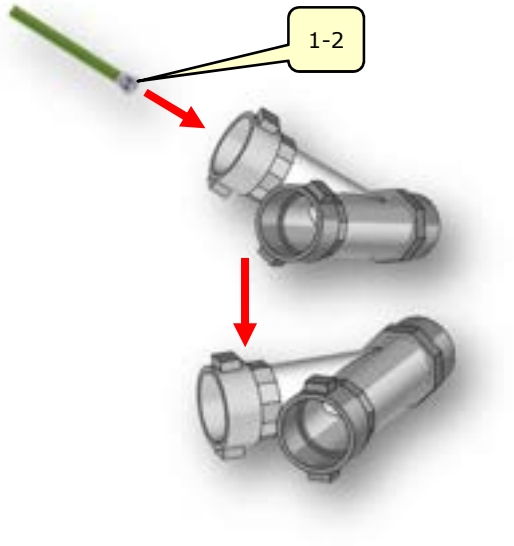


Figure 109 Slide the LED head into the Y-lock.

2. Push the  button.

➥ Working pressure monitor is switched off

☞ Make sure that temperature monitoring is active.

Figure 110 Switch off the working pressure monitoring.

⚠ UV radiation.
Use hand protection, body covering work clothing and UV eye protection. UV eye protection must comply with Welding Protection Class 5 and be certified acc. to DIN EN 166 "Personal eye protection" and DIN EN 169 "Filters for welding and related techniques.

3. In the main menu press the  button.

Figure 111 Turn the LED head on/off

4. Afterwards the LED head on/off menu is displayed.

   Push the  button.

➥ UV-LEDs are turned on

5. Check the LED head (1-2) inside the Y-lock for function.

6. In LED head on/off menu, press the  button.

➥ UV-LEDs are switched off

Figure 112 Turn the LED head on/off

7. Close the compressed air supply (5-2).

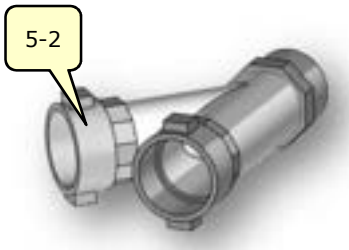


Figure 113 Close compressed air supply

8. Push the  button again.

➥ Working pressure monitor is switched on

➥ Check of the UV LEDs is completed

Figure 114 Switch on working pressure monitoring

15.2 Cleaning

NOTE

Cleaning work

Improper cleaning of the "BRAWO® Pico" and/or its assemblies can lead to damage:

- Use an absorbent cloth for cleaning after each work process.
- Follow details in the technical documentation of the individual manufacturer

15.2.1 LED head

☞ Carefully clean the protective cage of the LED head with a lint-free cloth moistened with water.
☞ Carefully clean the LED's lenses with a cotton swab moistened with glass cleaner.
☞ In case of contamination by hardened resin, the LEDs must be replaced.

15.2.2 Hose package

☞ Carefully clean the supply hose with a lint-free cloth moistened with water.

15.2.3 Retraction unit

☞ Carefully clean the retraction unit with a lint-free cloth moistened with water.

15.2.4 Control unit

☞ Carefully clean the touch screen on the control box using a lint-free cloth moistened with water.

15.2.5 Reel

☞ Carefully clean the reel with a lint-free cloth moistened with water.

15.2.6 Lock

☞ Carefully clean the lock with a lint-free cloth moistened with water.

15.3 Functional test of the safety parts

To guarantee the functionality of the following safety components, their function must be checked before starting work.

- EMERGENCY STOP button

16 Assembly / Disassembly

NOTE
Disassembly Improper dismantling can lead to damage.

16.1 Mounting/removing hose package on the reel

The LED head must be protected from damage during assembly and disassembly.

1. Open safety bar.

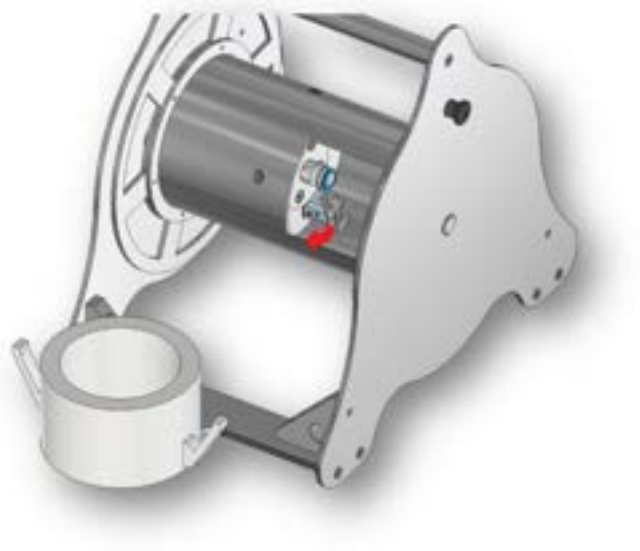


Figure 115 Open safety bar

2. Insert the plug of the hose package in the socket.

Figure 116 Insert the plug into the socket

3. Push up the safety bar, until it audibly engages.

Figure 117 Lock safety bar

➥ The plug is now securely connected.

Figure 118 Plug connected

4. Connect the T-piece with the compressed air connection.

☞ Push the hose in the coupling up to the end stop.

Figure 119 Connect T-piece

5. Roll the hose package evenly on the reel.

Figure 120 Roll on the hose package

6. After rolling onto the reel the step "Remove hose package from the retraction unit/place the hose package".

Figure 121 Hose package rolled

16.2 Retraction unit

1. Remove upper half-shell of the cover.

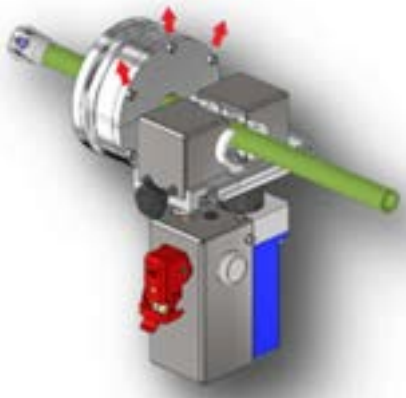


Figure 122 Remove the upper half-shell

2. Open the retraction unit completely.

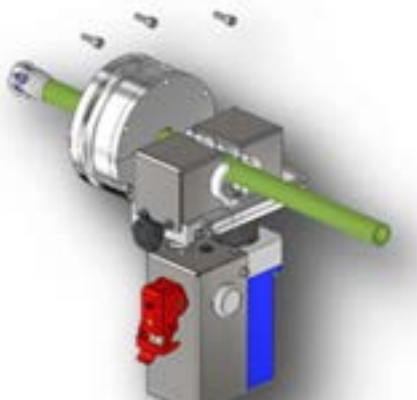


Figure 123 Open the retraction unit

3. Place the hose package in the retraction unit.

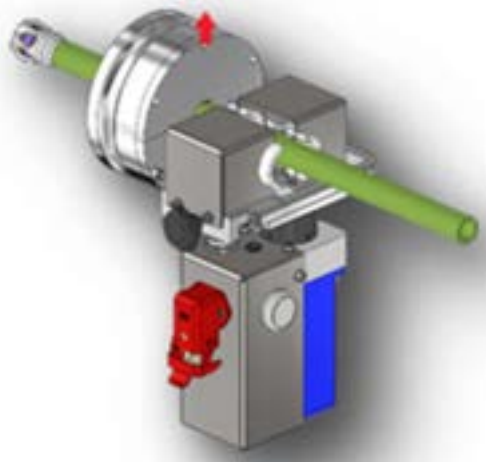


Figure 124 Place in hose package

4. Replace the cover.

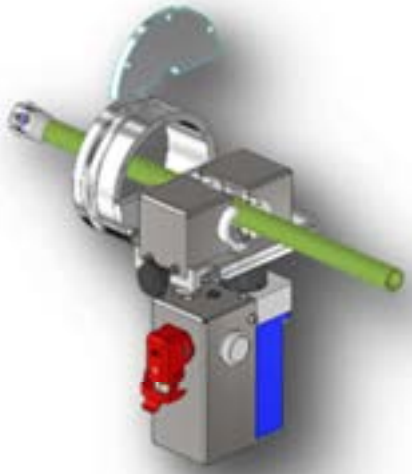


Figure 125 Mount the cover

17 Storage and disposal

NOTE

Storage and disposal

Property damage and damage to the environment can result from erroneous storage or disposal:

- Operating materials, replacement parts and motor are to be stored and disposed of properly, environmentally friendly and according to legal guidelines.
- Avoid direct sunlight and high humidity.
- Disposal may only be carried out by qualified companies.
- If possible, recycle parts and operating materials.

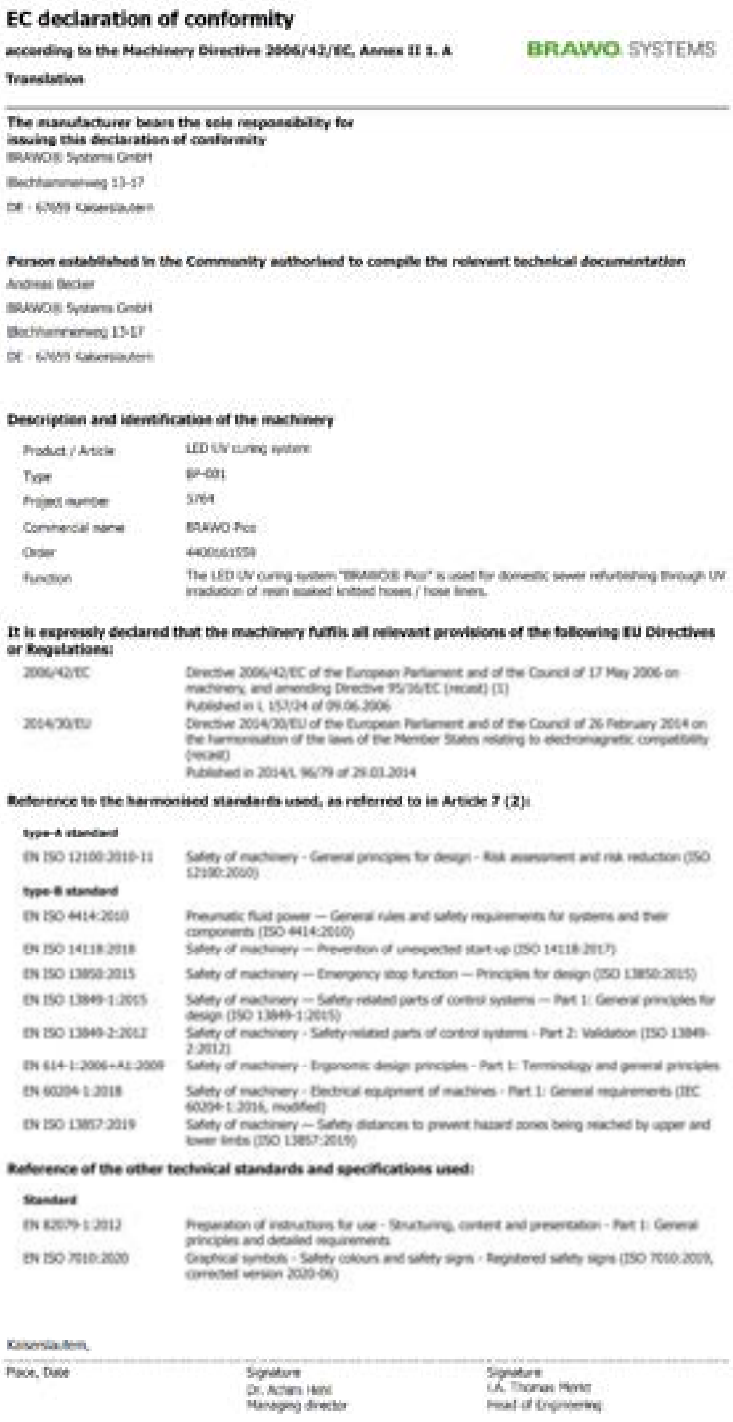
18 Guarantee

The legally regulated warranty applies to the "BRAWO® Pico", unless otherwise stipulated in the purchase contract.

If non-approved replacement parts are used, all guarantee, service, damage replacement and liability claims against the manufacturer or his contractors, dealers and representatives.

19 Declaration of conformance

☞ The signed original declaration of conformity is provided separately.



EC declaration of conformity

according to the Machinery Directive 2006/42/EC, Annex II 1. A

Translation

BRAWO SYSTEMS

The manufacturer bears the sole responsibility for issuing this declaration of conformity

BRAWO® Systems GmbH
Blechhammerweg 13-17
DE - 67659 Kaiserslautern

Person established in the Community authorised to compile the relevant technical documentation

Andreas Becker
BRAWO® Systems GmbH
Blechhammerweg 13-17
DE - 67659 Kaiserslautern

Description and identification of the machinery

Product / Article	LED UV curing system
Type	BP-001
Project number	5764
Commercial name	BRAWO Pico
Order	4400161559
Function	The LED UV curing system "BRAWO® Pico" is used for domestic sewer refurbishing through UV irradiation of resin soaked knitted hoses / hose liners.

It is expressly declared that the machinery fulfils all relevant provisions of the following EU Directives or Regulations:

2006/42/EC	Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast) (1) Published in L 157/24 of 09.06.2006
2014/30/EU	Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast) Published in 2014/L 96/79 of 29.03.2014

Reference to the harmonised standards used, as referred to in Article 7 (2):

type-A standard	
EN ISO 12100:2010-11	Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)
type-B standard	
EN ISO 4414:2010	Pneumatic fluid power — General rules and safety requirements for systems and their components (ISO 4414:2010)
EN ISO 14118:2018	Safety of machinery — Prevention of unexpected start-up (ISO 14118:2017)
EN ISO 13850:2015	Safety of machinery — Emergency stop function — Principles for design (ISO 13850:2015)
EN ISO 13849-1:2015	Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2015)
EN ISO 13849-2:2012	Safety of machinery - Safety-related parts of control systems - Part 2: Validation (ISO 13849-2:2012)
EN 614-1:2006+A1:2009	Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles
EN 60204-1:2018	Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2016, modified)
EN ISO 13857:2019	Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2019)

Reference of the other technical standards and specifications used:

Standard	
EN 82079-1:2012	Preparation of instructions for use - Structuring, content and presentation - Part 1: General principles and detailed requirements
EN ISO 7010:2020	Graphical symbols - Safety colours and safety signs - Registered safety signs (ISO 7010:2019, corrected version 2020-06)

Kaiserslautern,

Place, Date

Signature
Dr. Achim Hehl
Managing director

Signature
i.A. Thomas Heintz
Head of Engineering

Product observation

Machine: LED UV Curing System "BRAWO® Pico"
Year of manufacture: from 2022

We are legally obliged to observe our products even after delivery.

If deficiencies are found, inform the manufacturer by contacting the following:

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Tel.: +49 631 20561-100
email: info@brawosystems.com

Index of figures