

# FLAWSIC600-XT

Extraction Tool for Ultrasonic Transducers

**SICK**  
Sensor Intelligence.

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**Described product**

FLAWSIC600-XT Extraction Tool for Ultrasonic Transducers

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**Original document**

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# 1 About this document

## 1.1 Function of this document

These Operating Instructions describe:

- Device components
- Installation (mounting and dismounting)
- Operation
- Maintenance work required for reliable operation

They contain the main safety information for safe operation of the FLOWSIC600-XT.

## 1.2 Scope of application

These Operating Instructions explain the proper use of the sensor extraction tool of the FLOWSIC600-XT ultrasonic gas flow meter. It contains general information on design, components and conditions for the application of this extraction tool.

The use of this extraction tool is described for dismounting and mounting one transducer assembly. If several transducer assemblies have to be replaced, the steps must be repeated for each transducer assembly.

This Operating Instructions describes the use of the extraction tool for standard applications. Additional information and assistance for special applications is available from your SICK representative. It is recommended to consult a SICK specialist before you use the extraction tool for the first time or under unusual conditions.

## 1.3 Further information

For information on the operation of the FLOWSIC600-XT refer to the Operating Instructions of the measuring system.


The FLOWSIC600-XT documentation further includes:

- Software Manual
- Service Manual (for trained staff only)

## 1.4 Symbols and document conventions

### 1.4.1 Warning symbols

Table 1: Warning symbols

Symbol	Significance
	Hazard (general)

### 1.4.2 Warning levels and signal words

**DANGER:**

Risk or hazardous situation which *will* result in severe personal injury or death.

**WARNING:**

Risk or hazardous situation which *could* result in severe personal injury or death.

**CAUTION:**

Hazard or unsafe practice which *could* result in less severe or minor injuries.


**NOTICE:**

Hazard which *could* result in property damage.

**Note:**

Hints

### 1.4.3 Information symbols

Symbol	Significance
	Important technical information for this product

## 2 For your safety

### 2.1 Basic safety information

- ▶ Read and observe these Operating Instructions.
- ▶ Observe all safety instructions.
- ▶ If anything is not clear: Please contact the manufacturer.

#### Retention of documents

- ▶ These Operating Instructions must be kept available for reference.
- ▶ These Operating Instructions must be passed on to new owners.

#### Correct use

- ▶ Only use the device as described in these Operating Instructions.  
The manufacturer bears no responsibility for any other use.
- ▶ Do not carry out any work or repairs on the device not described in this manual.
- ▶ Do not remove, add or change any components in or on the device unless such changes are officially allowed and specified by the manufacturer.  
Otherwise
  - The device can become dangerous.
  - The device can lose function.

#### Special local conditions

- ▶ Follow all local laws, regulations and company-internal operating directives applicable at the installation location.

### 2.2 Warning information on device



#### **WARNING: Danger identification on device**

The following symbol draws attention to important dangers directly on the device:



- ▶ Consult the Operating Instructions in all cases where the symbol is attached to the device or shown on the display.
-

### 2.3 General Safety Information and Protection Measures

**WARNING:**

Small gas quantities escape from the extraction tool at the removal and installation of the transducer assemblies. At proper use of the extraction tool the gas crowd locked up in the retraction space is less than 0.1 dm<sup>3</sup> (ambient pressure). Therefore at plants with poisonous or other gases dangerous to health it's strictly necessary that the performing staff use suitable safety equipment to prevent personal injuries.

Handling or using the device incorrectly can result in personal injury or material damage. Always observe at all work on the FLOWSIC600-XT the respective information and warning notes.

The following applies at all times:

- The relevant legal stipulations and associated technical regulations must be observed when preparing and carrying out any work on the measuring system. Pay particular attention to potentially hazardous parts of the equipment, such as pressure pipes and explosion protection zones. Always observe the relevant regulations.
- All work must be carried out in accordance with the local, system-specific conditions and with due consideration paid to the operating dangers and specifications.
- The operating instructions for the measuring system and plant documentation must be available on site. The instructions for preventing danger and damage contained in these documents must be observed at all times.
- Suitable safety equipment and personal protection measures must be available in sufficient supply in accordance with the potential hazard and must be used by the personnel. The operator is responsible for it.

### 2.4 Intended use

**WARNING:**

- The extraction tool is designed for maintenance and replacement of ultrasonic transducers under pressure. The extraction tool may only be used by authorized persons.
- The extraction tool may only be used for pipelines with a max. operating pressure of 155 bar and max. operating temperature of 85 °C.
- Improper use of the extraction tool may damage the equipment and endanger the operating staff.

The extraction tool is used to dismount and mount complete transducer assemblies of the FLOWSIC600-XT for maintenance and exchange without depressurized the pipeline in which the measuring system is installed. It therefore allows to carry out maintenance work without interrupting the process.

**Note:**

If the pipeline is already depressurized, you can dismount and mount the transducer assemblies without the extraction tool (see Service Manual, Section 8.3).



## 2.5 Authorized persons

The operating company and the persons responsible for safety appointed by the operating company shall always ensure the following points:

- Any work on the measuring system shall only be carried out by qualified persons and must be checked by responsible skilled persons.
- Due to their professional training, knowledge and vocational experience, as well as their knowledge of the relevant standards, regulations, health and safety regulations and equipment conditions, qualified persons shall be assigned by the person responsible for personal and plant safety to carry out such work. Qualified persons must be able to identify possible dangers and to take preventive action in due time.  
Skilled persons are defined in DIN VDE 0105 and IEC 364, or comparable standards.
- Skilled persons shall have precise knowledge of process-specific dangers, e.g. due to the effects of hot, toxic, explosive and pressurized gases, gas liquid mixtures and other process media, and of the design and working principle of the measuring system and shall have received appropriate training.
- Authorized staff have to participate in special trainings on the use of the extraction tool for the FLOWSIC600-XT. The trainings consists of a basis training and regular ongoing trainings. The participation shall be documented by means of a certificate. Information on such training measures and ongoing training is available from your SICK representative.

## 2.6 Requirements

The FLOWSIC600-XT meter body must be mechanically prepared for use of the extraction tool. Use is limited to a maximum pressure and the type key. The type key is shown in the meter's data sheet.

The extraction tool is not usable for meter bodies or transducer assemblies which don't satisfy these conditions.

Maximum pressure		
3"... 6"	100 bar(g)	1450 psi(g)
8" and larger	155 bar(g)	2248 psi(g)

Type key	
The red letter is relevant for the possible use of the FLOWSIC600-XT extraction tool	Use
FL6A-411BAA11A1063AS040A1A12NNA	not possible
FL6A-411BAA11A4063AS040A1A12NNA	possible

### 2.7 Application period



**NOTICE:**

Scope and frequency of inspections during the service life of the pressure device are specified by the legal regulations valid at the place of application.

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At proper working and at retention of the maintenance regulations, the extraction tool can be used for minimum 1,000 replacement operations (transducer dismounting and mounting). However, this does not hold true for several wear parts, such as gaskets. These wear parts must be replaced if necessary to secure the safe operation of the tool.

- We recommend to keep a log of transducer replacement operations and the operating-conditions (pressure and temperature) encountered.
- At the latest after reaching by 1,000 replacement operations, the extraction tool shall be checked at the manufacturer in the interest of the operational safety.

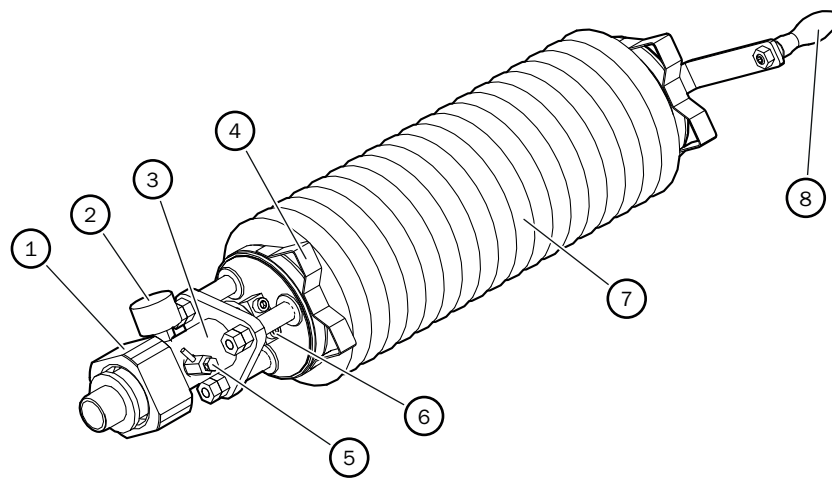
### 3 Product description

#### 3.1 Components

##### 3.1.1 Spindle assembly

The spindle assembly is the element taking up the force when pulling out or inserting the transducer assembly.

The retraction space is part of the spindle assembly. It is fitted with a manometer to monitor the pressure in the retraction space and a bleed valve to vent the retraction space. The spindle assembly is protected from pollution by way of a bellows and suitable wipers. A scaling with 10 mm steps is marked at the spindle assembly for the adjustment of the retraction lengths. The required retraction lengths can be seen in the following table.



- |                                 |               |
|---------------------------------|---------------|
| 1 Coupling nut                  | 5 Bleed valve |
| 2 Manometer                     | 6 Coupling    |
| 3 Retraction space              | 7 Bellows     |
| 4 Bellows flange, pressure side | 8 Crank       |

Fig. 1: Spindle assembly

### 3 PRODUCT DESCRIPTION

Extraction length in mm						
NPS/DN	1 path		4 path			
	mm	in	Inner path (2 and 3)		Outer path (1 and 4)	
			mm	in	mm	in
3"/80	300	11.81	265	10.43	285	11.22
4"/100	250	9.84	250	9.84	270	10.63
6"/150	284	11.18	285	11.22	305	12.01
8"/200	217	8.54	217	8.54	243	9.57
10"/250	226	8.90	226	8.90	254	10.00
12"/300	216.5	8.52	216.5	8.52	249	9.80
16"/400	221	8.70	221	8.70	265	10.43
20"/500	270	10.63	270	10.63	314	12.36
24"/600	290	11.42	290	11.42	330	12.99
26"/650	260	10.24	280	11.02	328	12.91
28"/700	262	10.31	282	11.10	332	13.07
30"/750	265	10.43	289	11.37	334	13.15
32"/800	268	10.55	289	11.37	341	13.42
34"/850	271	10.67	294	11.57	344	13.54
36"/900	274	10.79	296	11.65	359	14.13
38"/950	280	11.02	301	11.85	361	14.21
40"/1000	283	11.14	305	12.00	367	14.45
42"/1050	286	11.26	308	12.13	374	14.72
44"/1100	288	11.34	311	12.24	376	14.80
46"/1150	291	11.46	316	12.44	387	15.24
48"/1200	294	11.57	321	12.64	399	15.71

### 3.1.2 Ball valve assembly

The ball valve forms the isolating element between FLOWSIC600-XT and spindle assembly. It is used to isolate the medium in the meter body from the ambient atmosphere. A bypass ball valve in the ball valve assembly aims to fill the retraction space and equalize the pressure on both sides of the ball valve before opening.

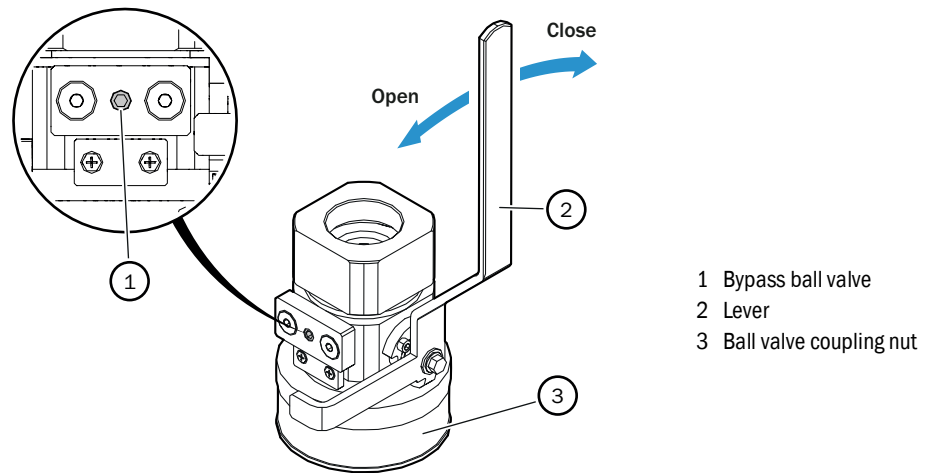
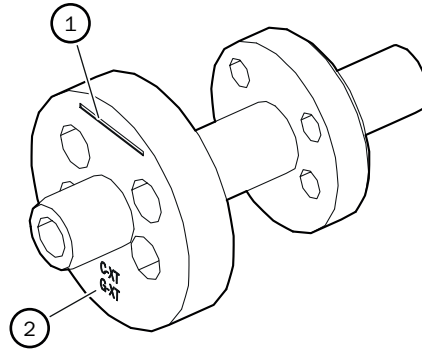


Fig. 2: Ball valve assembly

### 3 PRODUCT DESCRIPTION

#### 3.1.3 Adapter

The adapter forms a tight connection between extraction tool and meter body. Special adapters are used for different nominal sizes, path geometries and connection diameters of the flow measuring device. The alignment of the adapter on the meter body and the screws to be used are also precisely defined.

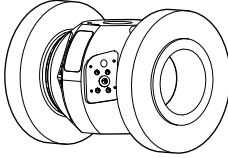
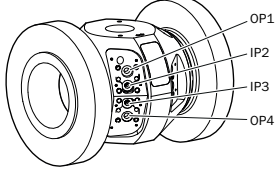

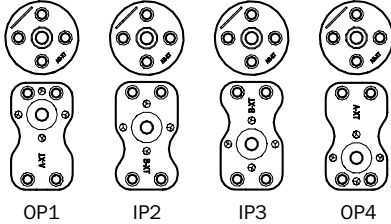

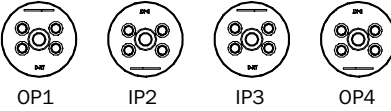

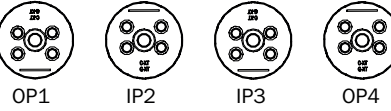

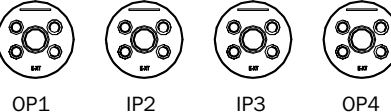

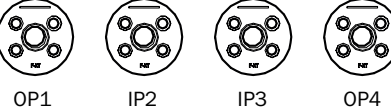


- 1 Position marking
- 2 Adapter identification


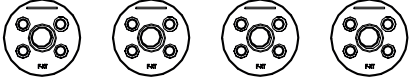

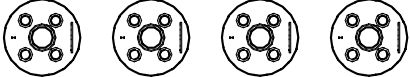
Fig. 3: Indication of the adapter (example C-XT/G-XT adapter)

Extraction Tool Selection Table								
FLAWSIC600-XT Characteristics				Tool Selection				
NPS/DN	Length	Path Config.	Applicability	Adapter code	Adapter Order no.	Extraction Tool Order no.		
3"/80/P10	3D/5D	4P, 8P, 4R	Standard up to SC80	A-XT, B-XT, AB-XT	2089930	2085677 (Extraction tool 3"-6")		
4"/100/P10		5C		A-XT, B-XT, AB-XT, G-XT	2089931			
6"/150/P10				D-XT	2089256			
8"/200/P18					C-XT	2089260	2089932 (Extraction tool 8"-16")	
10"/250/P18					E-XT	2088296		
12"/300/P18				4P,8P,5C,4R	F-XT	2088771		
16"/400/P18					F-XT	2088771		
20"/500/P18						I	4068568	2039004 (Extraction tool universal)
24"/600/P18						I	4068568	

Screws for the respective adapter and meter body		
NPS/DN	Adapter	Screw
3"	C-XT / G-XT	M12x90
	A-XT / B-XT	M12x80
	AB-XT	M12x45
4"	D-XT	M12x90
6"	C-XT	M12x70
8"	E-XT	M12x70
10" and larger	F-XT	M12x70

Adapter installation positions (schematic diagram)		
NPS/DN	Path number	
	1 path version	4 paths version
		
3"/80	 <p>The direction of the marking does not matter here</p>	 <p>The direction of the marking of the AB-XT adapter does not matter here</p>
4"/100	 <p>The mark points upwards of the meter</p>	
6"/150	 <p>The mark points in the direction of the center of the meter</p>	
8"/200	 <p>The mark points in the direction of the center of the meter</p>	
10"-12"/250-300	 <p>The mark points in the direction of the center of the meter</p>	

### 3 PRODUCT DESCRIPTION

Adapter installation positions (schematic diagram)		
NPS/DN	Path number	
	1 path version	4 paths version
16"/400	 <p>The mark points upwards of the meter</p>	 <p>OP1      IP2      IP3      OP4</p>
20"-24"/ 500-600	 <p>The mark points in the direction of the center of the meter</p>	 <p>OP1      IP2      IP3      OP4</p>



**3.1.4 Docking rod assembly**

The docking rod with its threaded pin forms the link between transducer assembly and spindle assembly. It is lead to the atmospheric side in a gas-tight manner through the ball valve assembly.

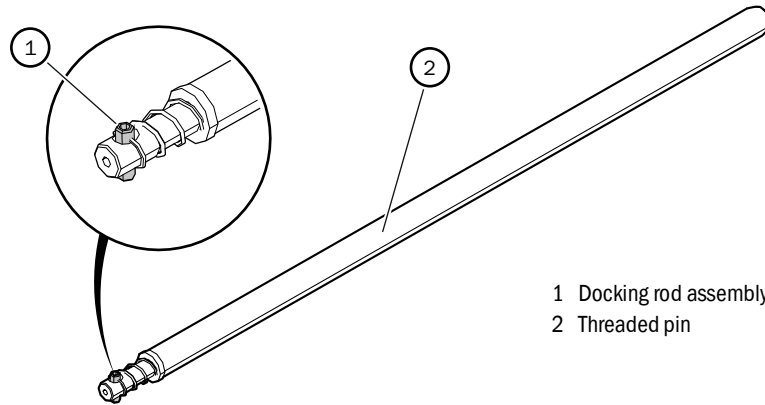


Fig. 4: Docking rod

Use of the docking rod			
Nominal Size	Length		Part no.
	mm	in	
<b>Extraction tool 3" - 6"</b>			
DN 80/3" - DN150/6"	445	17.52	4088725
<b>Extraction tool 8" - 16"</b>			
DN 200/8" - DN 400/16"	489	19.25	4049657
For FLOWSIC600 DN 150/6" only	419	16.49	7041860

- The type designation is marked at the docking piece.
- The description of working steps is valid for both types.

3.1.5 Transducer assembly

The transducer assembly consists of an ultrasonic transducer and retaining bolt connected by a cotter pin (3" to 6") or locknut (8" and larger). A special wrench is required to install the lock nut.

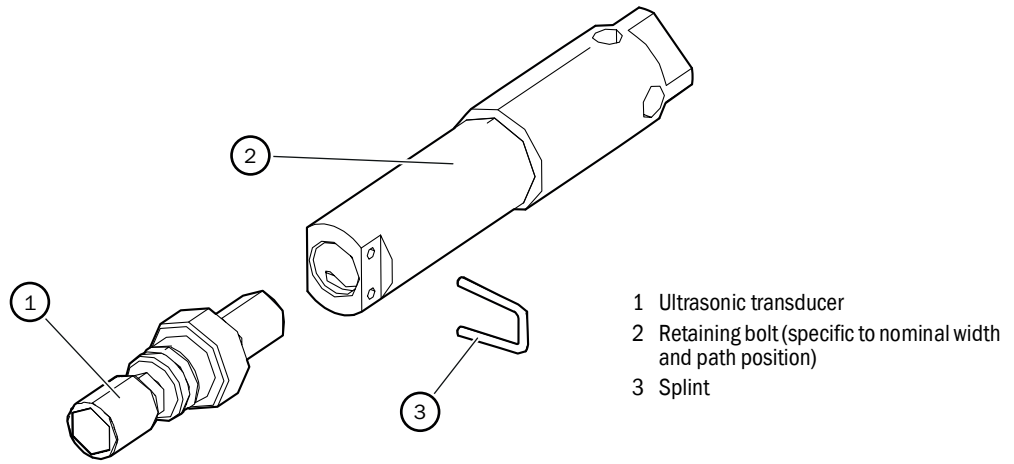


Fig. 5: Transducer assembly 3" - 6"

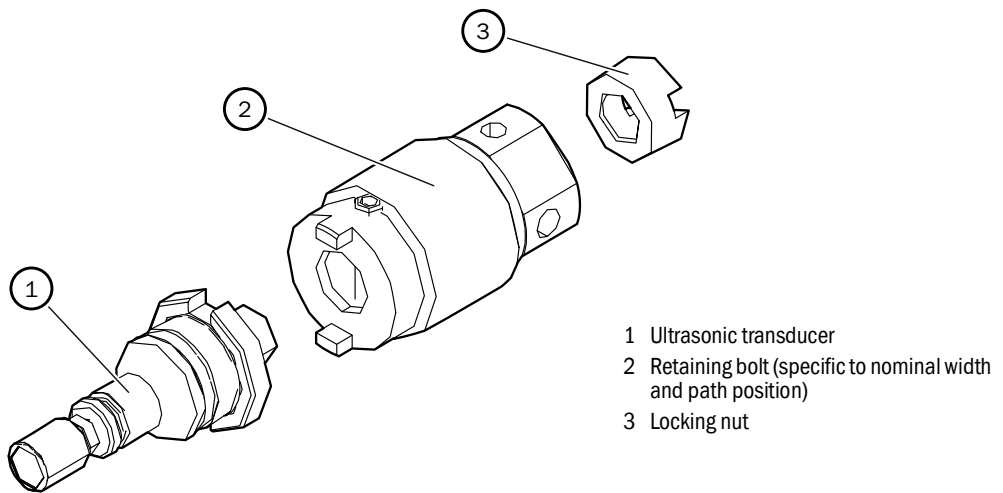


Fig. 6: Transducer assembly 8" - 48"

## 4 Operation

### 4.1 Before you start



**NOTICE:**

Make sure to change the corresponding transducer parameters (see FLOWSIC600-XT Service Manual) after replacing transducer assemblies. Otherwise the FLOWSIC600-XT does not produce precise measuring results.



**NOTICE:**

The general design of the ultrasonic transducers is the same for each meter size and measuring path. However, there are specific retaining bolts for each meter size (nominal diameter) and path position. The transducer assemblies must only be fitted to the specified meter size and measuring path. Mounting transducer assemblies to wrong meter sizes or measuring paths may lead to leaks and thus forms a jeopardy to the operating staff and equipment. It is indicated on the retaining bolts for which meter size and measuring path the transducer assembly is suitable.

### 4.2 Tools and Auxiliaries

Tool	Required for
Allen key, SW 2.5	Fastening and loosening the threaded pin forming the link between docking rod and retaining bolt
Allen key, SW 3	Loosening and fastening the screws at the cover caps on the meter body
Allen key SW 5	Filling the retraction space through the bypass ball valve before opening the ball valve
Allen key SW 6	Fastening and loosening the coupling of the spindle assembly at the docking rod
Allen key SW 10	Dismounting and mounting the adapter to the meter body using M12 cheese-head screws
Wrench SW 12	Venting the retraction space through the bleed valve
Wrench SW 18	Dismounting the lever of the ball valve
Wrench SW 22	Tightening the retaining bolt in the meter body
Special key Order no. 4047937	Tightening and loosening the locking nut forming the link between ultrasonic transducer and retaining bolt
Silicone grease (e.g. RS 494-124)	Lubrication of the O-ring gaskets
Anti-seize lubricant (e.g. Loctite 8156)	Treatment of the retaining bolt and M12 cheese-head screws used to mount the adapter
Thread lubricant	Lubrication of the spindle assembly (see "Maintenance" section)
Foaming agent (e.g. in accordance with DIN 30657)	Leak detection
Coax plug-on auxiliary Order No. 4047938	Connection between cable and transducer assembly
Sticky tape	Fixation of conductors

### 4.3 Dismounting a Transducer Assembly

This Section describes in detail all steps necessary to extract a transducer assembly. A quick guide can also be found in the Appendix



**WARNING:**

- Small gas quantities ( $< 0,1 \text{ dm}^3$  at normal conditions) escape from the extraction tool at the removal of the transducer assemblies during depressurized the retraction space. Therefore at plants with poisonous or other gases dangerous to health it's strictly necessary that the performing staff use suitable safety equipment to prevent personal injuries.
- 



**NOTICE:**

- Make sure all necessary parts are available and undamaged before mounting the extraction tool. Pay particular attention to the gaskets. Insertion slopes must not be damaged nor have sharp edges. Replace defective O-rings. The extraction tool only may be used by authorized staff (see "Authorized persons", page 9)!
- 



**NOTICE: Measures in a metrologically secured area**

- ▶ If stipulated by national regulations, measures on the device in the metrologically secured area after commissioning may be carried out only under official supervision (e.g. in the presence of a calibration officer). In detail, these are measures that include, for example, breaking seals and the opening of the parameter locking switch.
  - ▶ This must be coordinated with the authorities before carrying out the measures. After the device has been placed on the market, the national metrology and calibration laws of the country in which the device is used apply.
  - ▶ All measures must be carried out on the basis of the Operating Instructions and the Service Manual.
  - ▶ If the parameter locking switch has to be opened, it must be closed again immediately afterwards and marked with a white SICK seal.
  - ▶ Broken seals must be replaced with a white SICK seal after completion of the measures or renewed by the calibration authority or test facility.
  - ▶ When ultrasonic transducer pairs or electronic subassemblies are replaced with components of the same type according to this Service Manual, no new metrological test regarding adherence of the error limit is necessary if this is allowed according to the national regulations.
  - ▶ Document the component replacement in a Configuration Protocol. Store the Configuration Protocol together with the device documentation.
- 

#### 4.3.1 Preparation

Determine and make a record of the current operating pressure in the pipeline in which the FLOWSIC600-XT is installed. It is used as a reference value for the pressure reading at the manometer.

### 4.3.2 Checking the initial condition of the extraction tool

Part	Activity
Adapter	<ul style="list-style-type: none"> <li>• O-ring in place and undamaged</li> <li>• Sealing face free from damage and dirt</li> </ul>
Docking rod	<ul style="list-style-type: none"> <li>• Surface of the docking rod free from damage and dirt</li> <li>• Thread of the threaded pin free from damage; replace defective threaded pins if necessary</li> </ul>
Ball valve	<ul style="list-style-type: none"> <li>• O-rings in place and undamaged</li> <li>• Test smooth running of the ball by operating the lever</li> <li>• Bypass ball valve closed</li> </ul>
Spindle assembly	<ul style="list-style-type: none"> <li>• Gasket in place and undamaged</li> <li>• Sealing face free from damage and dirt</li> <li>• Bleed valve closed</li> <li>• Bellows flange on the pressure side in the position corresponding to the retraction length, pipe size and path position (see <a href="#">“Spindle assembly”, page 11</a>)</li> </ul>

### 4.3.3 Dismounting

- 1 Removing the cover caps on the FLOWSIC600-XT which protect the transducer assemblies
  - ▶ Remove the fastening screws
  - ▶ Take off the caps.
- 2 Preparing the transducer assembly
  - ▶ Pull off the cable which runs to the SPU from the transducer assembly using the coax plug on auxiliary.
  - ▶ Fix the connection cable so that it does not obstruct you; protect the cables against contamination as well as possible.  
For multi-path devices: The cables to the other paths do not have to be disconnected. However, you should fix the connection cables so that they do not obstruct you.
  - ▶ Make sure the locking nut which forms the link between ultrasonic transducer and retaining bolt is in place and tight. If necessary, tighten the locking nut by turning it in clockwise direction with the special key.
- 3 Mounting the docking rod



**Note:**

Always use a docking rod suitable for the actual nominal size of the measuring device. (see “Docking rod assembly”, page 17)

- ▶ Fix the docking rod to the retaining bolt of the transducer assembly with the threaded pin. The threaded pin must disappear completely in the retaining bolt. If the tapped hole in the retaining bolt for the insertion of the threaded pin is not accessible, you may turn (loosen) the retaining bolt cautiously by max. 90 ° in anti-clockwise direction.

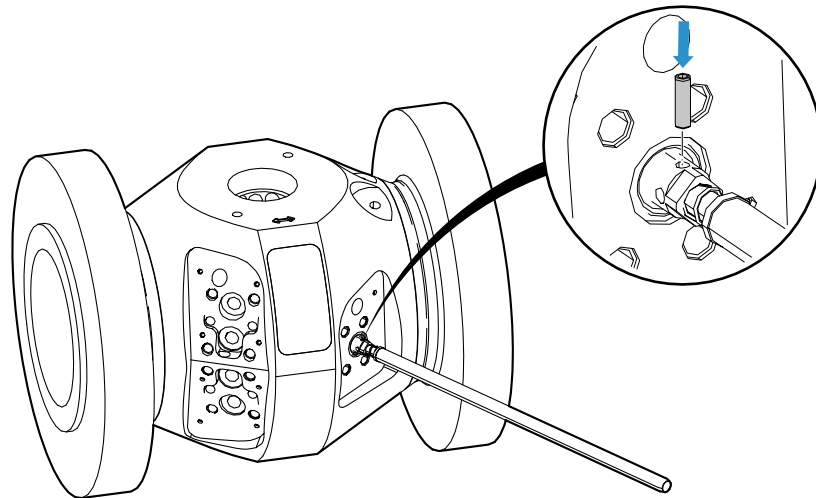


Fig. 7: Mounting the docking rod to the transducer assembly

#### 4.3.4 Mounting the adapter to the meter body

**Note:**

- Pay attention to the correct position of the adapter (see “Adapter”, page 14)!
- For 3 inch 4 path devices, the A-XT or B-XT adapter must be mounted first and then the AB-XT adapter!

- 1 Slide the adapter with the O-ring side first over the docking rod.
- 2 Apply anti-seize lubricant on to the four M12 cheese-head screws (DIN 912) and fasten the appropriate adapter to the meter body.
- 3 Tighten the screws cross-wise to press the O-ring on to the sealing face of the meter body. Make sure the adapter does not jam.

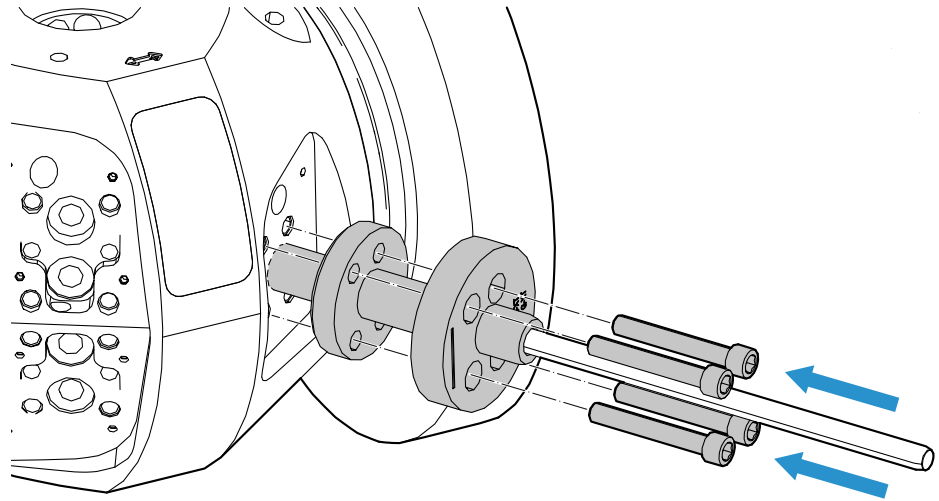


Fig. 8: Mounting the adapter to the meter body

### 4.3.5 Mounting the ball valve

**WARNING:**

Make sure the ball valve is in its "OPEN" position. Otherwise the ball may be damaged and the extraction operation may fail. The ball valve is fully open when the lever is in the "OPEN" position and touches the mechanical stop.

- 1 Lube all O-rings and insertion slopes with silicone grease before mounting the ball valve assembly.
- 2 Slide the ball valve assembly over the docking rod and on to the adapter.  
If the ball valve assembly cannot be sled over the docking rod easily, the ball valve is not fully open. In this case, turn the lever of the ball valve in its "OPEN" position.
- 3 Screw the coupling nut at the ball valve on to the adapter until it touches a perceptible mechanical stop.
- 4 The coupling nut and adapter are in line when the coupling nut was tightened correctly.

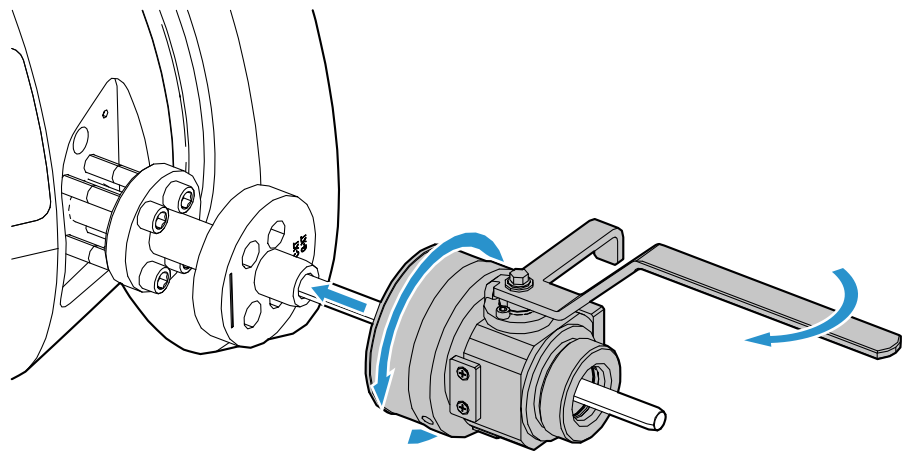


Fig. 9: Mounting the ball valve to the adapter



### 4.3.6 Mounting the spindle assembly

- 1 Lube all O-rings and the docking rod with silicone grease before mounting the spindle assembly.
- 2 Prepare the spindle assembly so that the bellows flange on the pressure side is about at position "50".
- 3 Slide the spindle assembly cautiously over the docking rod and the ball valve assembly until the coupling nut of the spindle assembly engages with the thread at the ball valve assembly. Take into account that the spindle assembly is fixed to the ball valve assembly by means of a stop in the coupling nut.
- 4 Screw the coupling nut on to the ball valve assembly by hand until it stops.

**Note:**

Don't use any tools to fit the screw!

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- 5 Check the entire assembly for firm seat.

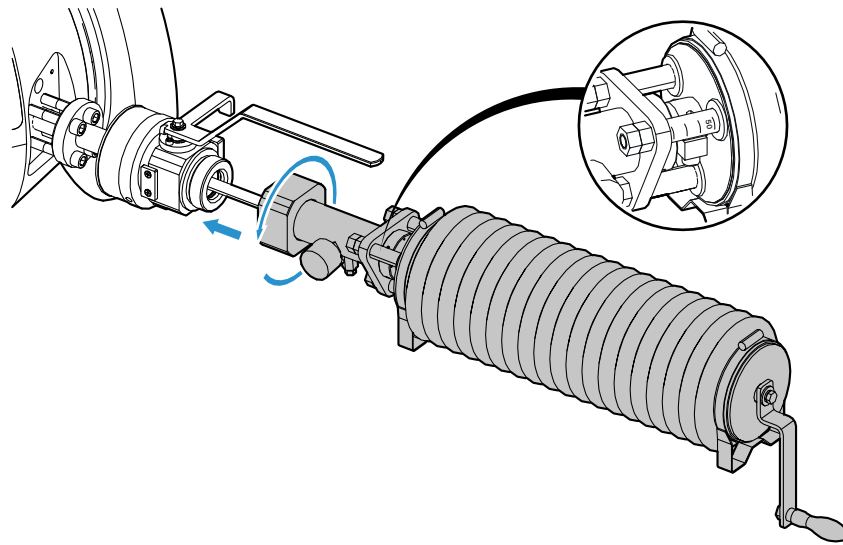


Fig. 10: Mounting the spindle assembly to the ball valve assembly

### 4.3.7 Connecting the spindle assembly and docking rod

- 1 Turn the spindle assembly on to the docking rod until it stops. The bellows flange on the pressure side is about at position “0” of the spindle assembly.
- 2 Then tighten the cheese-head screws at the coupling (1) in order to establish a connection between the docking rod and spindle assembly.

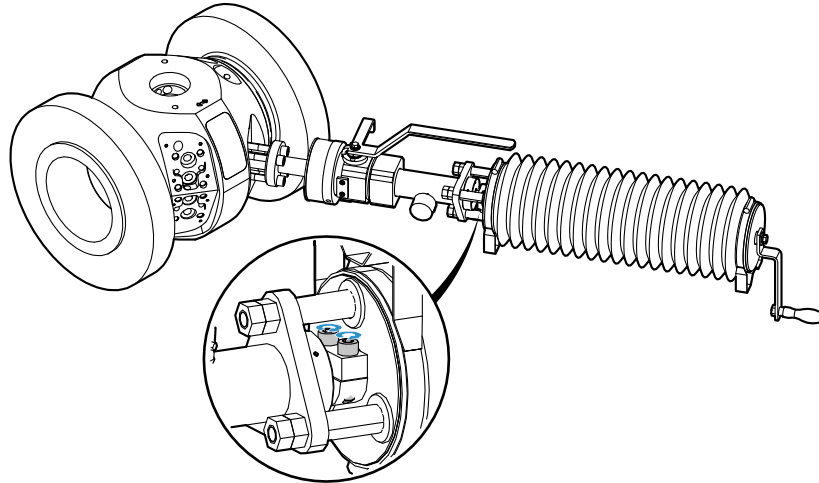


Fig. 11: Connecting the spindle assembly and docking rod

### 4.3.8 Checking the safety of the extraction tool

- 1 Check all assemblies for firm seat.
- 2 The bleed valve at the retraction space of the spindle assembly must be closed.
- 3 The bypass ball valve in the ball valve assembly must be closed.
- 4 The manometer must indicate zero.

### 4.3.9 Pulling out the transducer assembly



**WARNING:**

Check the extraction tool for leaks before you continue. Pay particular attention to the connections to the manometer and bleed valve at the retraction space. Avoid the risk of personal injury or damage to the equipment. Do not continue before you are absolutely sure that the extraction tool is gas-tight. If you find a leak, push the transducer assembly back into the meter body with the help of the extraction tool and gasket the leak. Only continue removing the transducer assembly when the extraction tool is absolutely tight.

- 1 Detach the transducer assembly from the meter body by turning the crank in counterclockwise direction.

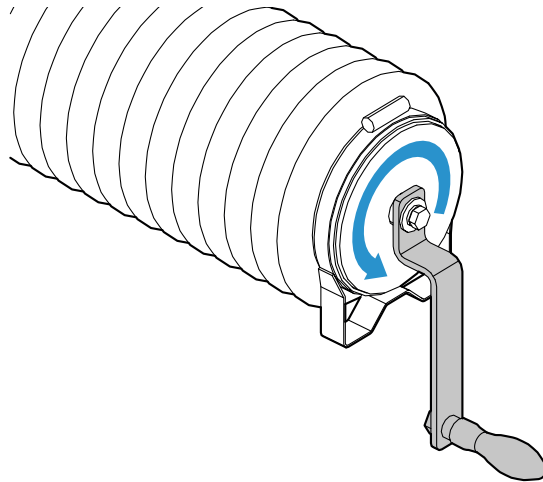


Fig. 12: Turning the crank counterclockwise



**Note:**

When pulling the transducer assembly out of the meter body, the sealing O-rings of the transducer assembly are removed from their seat. The entire ball valve assembly and the retraction space are filled with the medium in the meter body and the pipeline pressure is exerted on them. Check the pressure in the retraction space on the manometer.

- 2 Use foaming agents for leak detection.



**Note:**

If the spindle assembly is not retracted far enough, the transducer assembly may be damaged when you close the ball valve.

- 3 Retract the spindle until the bellows flange on the pressure side has clearly moved beyond the mark for the corresponding transducer position (marks for individual pipe sizes and measuring path positions (see [“Spindle assembly”, page 11](#)).

### 4.3.10 Dismounting the spindle assembly

- 1 When the required retraction position is reached, close the ball valve (1).  
Close the ball valve cautiously. If you cannot close the ball valve, retract the spindle assembly further.
- 2 After closing the ball valve, depressurise the retraction space by opening the bleed valve slowly with a wrench.

The bleed valve is arranged at a position where exiting gases do not put the operating staff at risk. Check the position and blow-off direction of the bleed valve again before you open it. The manometer at the retraction space must show a continuous pressure drop and finally read "0". Pressure equalization should be achieved after max. 2 minutes for any pressures. The bleed valve may not be closed. Possible minimal leaks in the ball valve can be detected by covering the bleed valve with a leak detection spray so that escaping gas is seen.

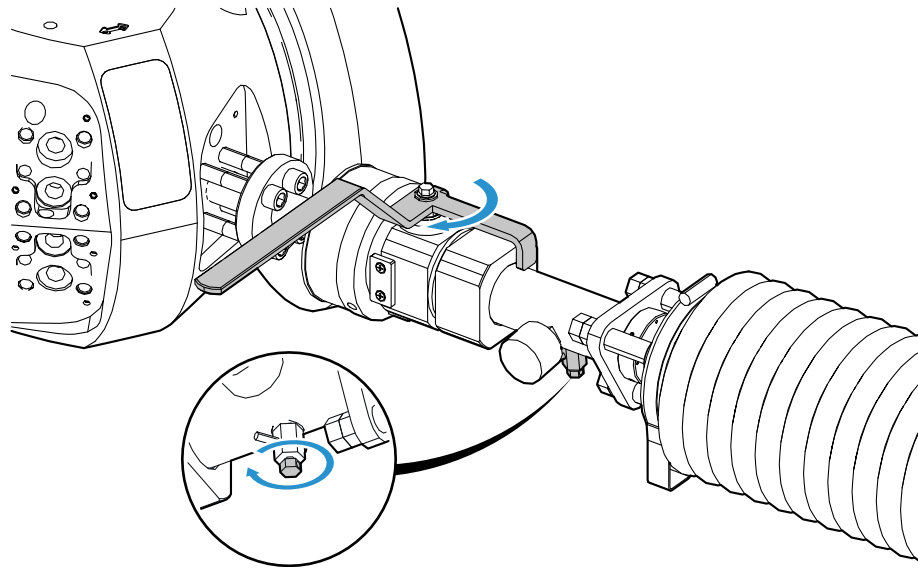


Fig. 13: Closing the ball valve



**WARNING:**

If a complete pressure equalization cannot be achieved, the retraction space was not fully cut off. Do not continue in this case.

Carry out the following steps to solve the problem:

**Possible problem 1:**

- Bypass ball valve in the ball valve assembly is not fully closed.
  - ▶ Close the bleed valve.
  - ▶ Make sure the bypass ball valve in the ball valve assembly is fully closed.
  - ▶ Open the bleed valve.
- If a complete pressure equalization can still not be achieved, continue solving possible problem 2.

**Possible problem 2:**

- Ball valve is not fully closed.
  - ▶ Close the bleed valve.
  - ▶ Open the ball valve and close it again cautiously.

- ▶ Open the bleed valve.
- If a complete pressure equalization can still not be achieved, continue solving possible problem 3.

**Possible problem 3:**

- Ball valve is defective.
  - ▶ Close the bleed valve.
  - ▶ Insert the transducer assembly as described in [Section 3.3](#).
  - ▶ Dismantle the extraction tool and send the ball valve for check to SICK.



**WARNING:**

For safety reasons, the spindle assembly must only be dismantled after removing the lever from the ball valve assembly. This aims to avoid unintentional opening of the ball valve while the spindle assembly is dismantled.

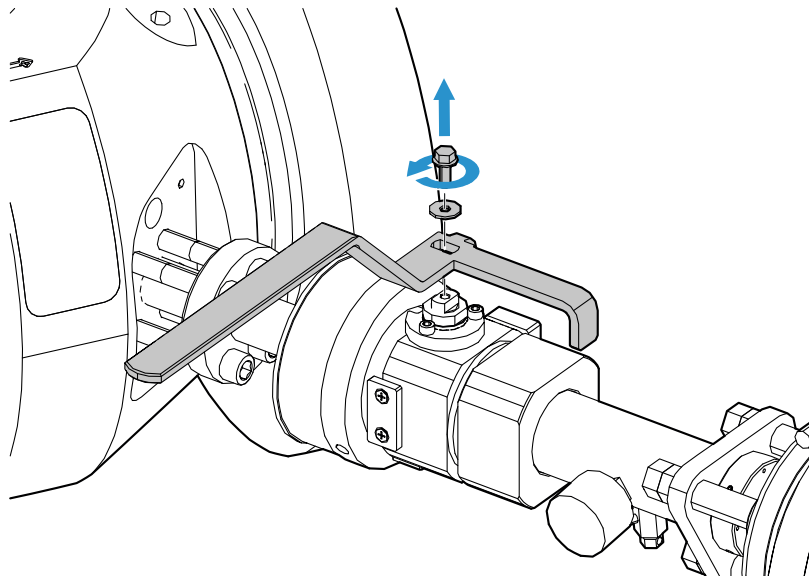


Fig. 14: Dismounting the lever from the ball valve



**Note:**

Dismantling only by hand without tool!

- 3 After complete pressure equalization and dismantling the lever from the ball valve, you can remove the spindle assembly by undoing the coupling nut which forms the connection to the ball valve assembly.  
If the retraction space is still under pressure, it is not possible to dismantle the spindle assembly.
- 4 Dismount the spindle assembly, docking rod and the transducer assembly attached to it.

- 5 Plug the DN 63.5 cover cap on to the ball valve assembly to protect the thread, gaskets and ball valve ball.

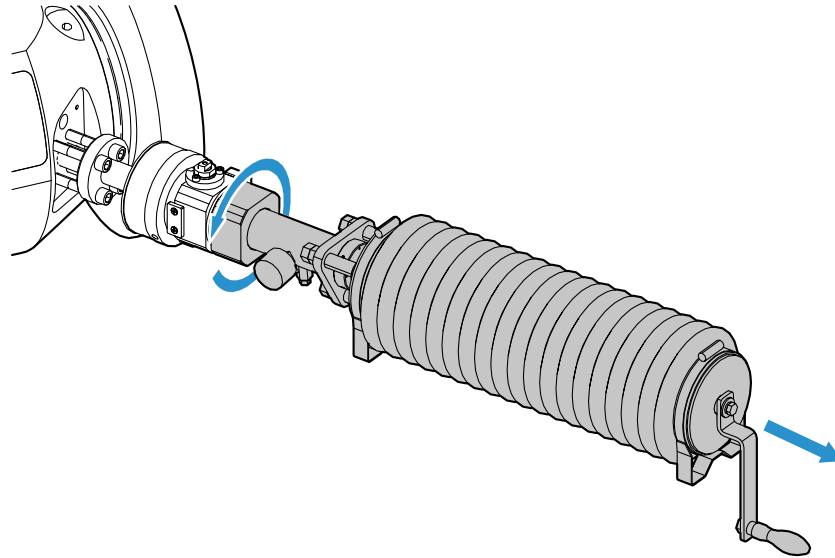


Fig. 15: Dismounting the spindle assembly from the ball valve assembly

### 4.3.11 Dismount the transducer assembly from the spindle assembly

- 1 Turn the docking rod with the transducer assembly out of the retraction space.
- 2 Loosen the coupling and remove the transducer assembly with docking rod from the spindle assembly.
- 3 Loosen the threaded pin and disconnect the transducer assembly from the docking rod.
- 4 Undo the locking nut using the special key and disconnect the ultrasonic transducer from the retaining bolt.

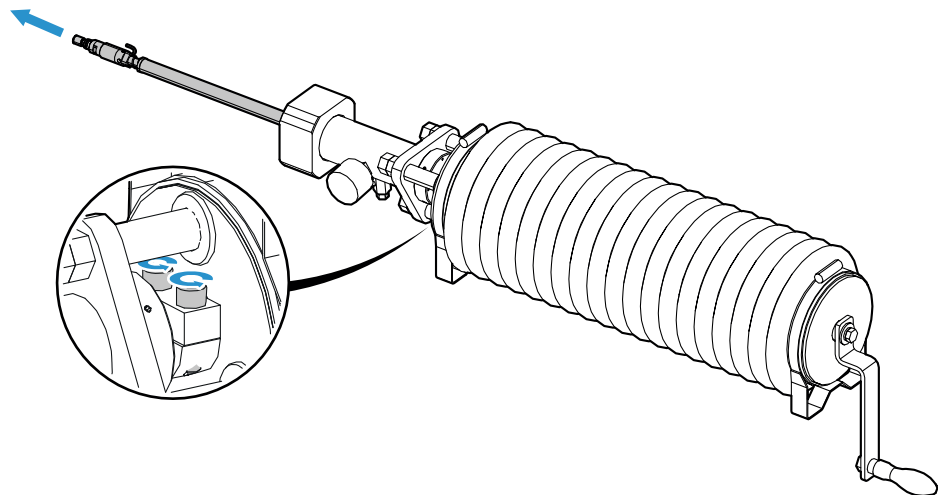


Fig. 16: Undoing the coupling to dismount the docking rod

## 4.4 Mounting a Transducer Assembly

This Section describes in detail all steps necessary to mount a transducer assembly. A quick guide can also be found in the Appendix.



### WARNING:

- Make sure all necessary parts are available and undamaged before mounting the extraction tool. Pay particular attention to the gaskets. Insertion slopes must not be damaged nor have sharp edges. Replace defective O-rings.
- Always replace the O-rings at the ultrasonic transducer when (re-)inserting it. Only use genuine O-rings for FLOWSIC600-XT ultrasonic transducers.
- The extraction tool only may be used by authorized staff in accordance.



### WARNING:

Small gas quantities ( $< 0,1 \text{ dm}^3$ ) at normal conditions escape from the extraction tool at the removal of the transducer assemblies during pressurizing the retraction space (see Section 3.2.12). Therefore at plants with poisonous or other gazes dangerous to health it's strictly necessary that the performing staff use suitable safety equipment to prevent personal injuries.

### 4.4.1 Checking the condition of the extraction tool

Part	Activity
Docking rod	<ul style="list-style-type: none"> <li>• Surface of the docking rod (3) free from damage and dirt</li> <li>• Thread of the threaded pin (3.1) free from damage; replace defective threaded pins if necessary</li> </ul>
Spindle assembly	<ul style="list-style-type: none"> <li>• Gasket in place and undamaged</li> <li>• Sealing face free from damage and dirt</li> <li>• Bleed valve (5.3) closed</li> <li>• Bellows flange on the pressure side (5.7) in the position corresponding to the retraction length, pipe size and path position.</li> </ul>

### 4.4.2 Mounting the transducer assembly



### WARNING:

The transducer assemblies to be mounted must correspond with the nominal size of the measuring system and the measuring path in which it is installed. Always use retaining bolts suitable for the actual nominal size of the measuring device and the path position. Mounting mismatched transducer assemblies may lead to leaks and thus form a jeopardy to the operating staff and equipment.

Connect the ultrasonic transducer and retaining bolt by tightening the locking nut with the special key so that a small axial play is possible between retaining bolt and ultrasonic transducer also after the connection. This is required to equalize small tolerances in the meter body.

Treat the threads of the retaining bolts with anti-seize lubricant in order to avoid jamming.

### 4.4.3 Mounting the transducer assembly to the docking rod

Fix the docking rod to the retaining bolt of the transducer assembly with the threaded pin. The threaded pin must disappear completely in the retaining bolt.

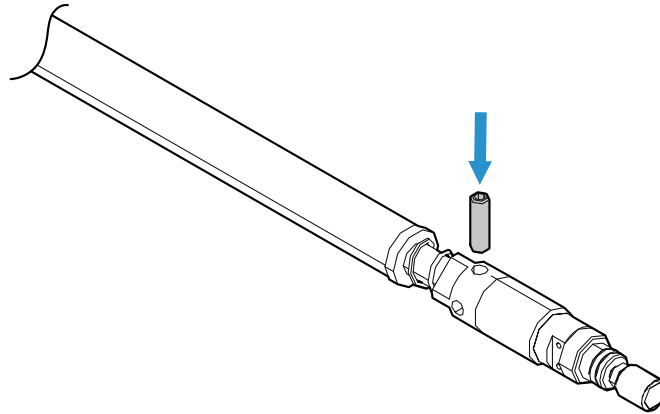


Fig. 17: Mounting the transducer assembly to the docking rod

### 4.4.4 Inserting the docking rod into the spindle assembly

- 1 Lube all O-rings at the ultrasonic transducer and the docking rod with silicone grease before mounting the spindle assembly.
- 2 Insert the docking rod into the spindle assembly cautiously until the docking rod stops in the coupling.
- 3 Check the position of the spindle assembly. The lower side of the bellows flange on the pressure side must be beyond the retraction mark corresponding to the pipe size and path position (see “Spindle assembly”, page 11).
- 4 Tighten the cheese-head screws of the coupling to get a fixed connection between docking rod and spindle assembly.

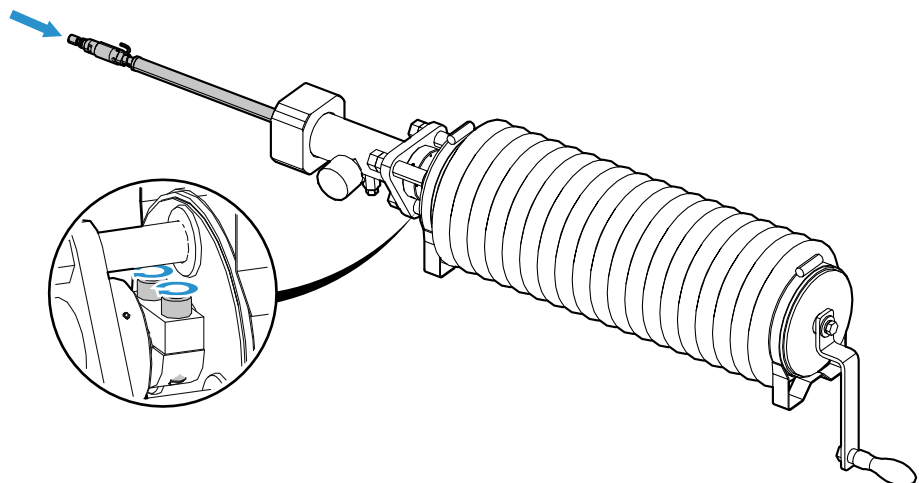


Fig. 18: Mounting the docking rod and fixing the coupling to the spindle assembly



#### 4.4.5 Mounting the spindle assembly

**Note:**

If the spindle assembly cannot be screwed on to the ball valve assembly, the docking rod with transducer assembly (1) must be screwed further out of the spindle assembly .

- 1 Take the DN 63.5 cover cap off the ball valve assembly.
- 2 Slide the spindle assembly cautiously on to the ball valve assembly until the coupling nut of the spindle assembly engages with the thread at the ball valve assembly.
- 3 Screw the coupling nut on to the ball valve assembly until it stops.

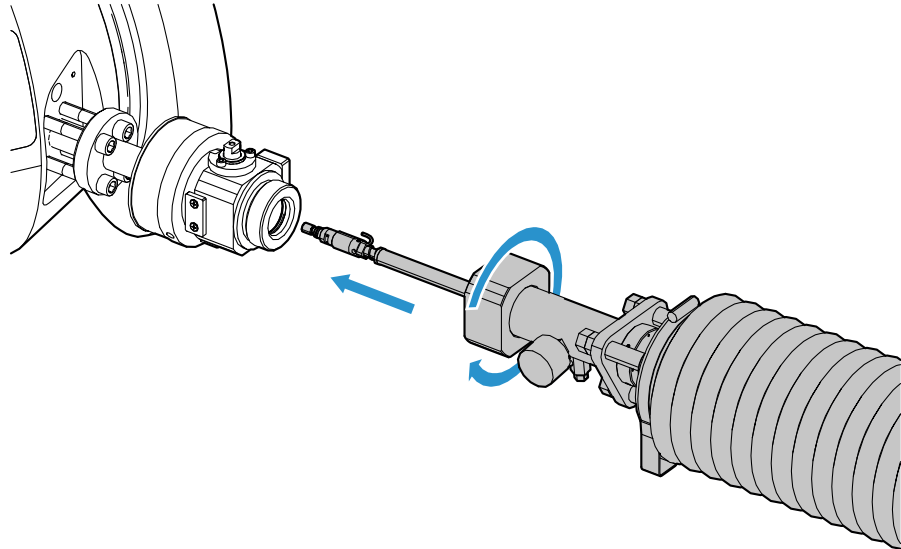


Fig. 19: Mounting the spindle assembly and the rod to the ball valve assembly

#### 4.4.6 Checking the safety of the extraction tool

- 1 Check all assemblies for firm seat.
  - The bleed valve at the retraction space of the spindle assembly must be closed.
  - The manometer must indicate zero.

### 4.4.7 Pressure equalisation in the retraction space

**WARNING:**

- If a complete pressure equalization is not achieved in the retraction space, the gaskets in the ball valve assembly may become damaged if you continue. Defective gaskets may block the opening in the ball valve. In this case, the transducer assembly can only be inserted after depressurisation of the pipeline section in which the measuring system is installed. Only continue if a complete pressure equalization has been achieved.
- Check the extraction tool for leaks before you continue. Pay particular attention to the connections to the manometer and bleed valve at the retraction space. Avoid the risk of personal injury or damage to the equipment. Do not continue before you are absolutely sure that the extraction tool is gas-tight. If you find a leak, close the bypass ball valve in the ball valve assembly and gasket the leak. Only continue inserting the transducer assembly when the extraction tool is absolutely tight.

To ensure proper function of the ball valve, the pressure in the retraction space must be raised to the pressure in the meter body and the pipeline before opening the ball valve.

- 1 Open the bypass ball valve slowly in the ball valve assembly. To do so, turn the spindle in the bypass ball valve by at least 180° in anticlockwise direction using a 2.5 mm Allen key. The manometer at the spindle assembly must show a continuous rise in pressure in the retraction space until the pipeline pressure is achieved. Pressure equalization should be achieved after max. 2 minutes.
- 2 After pressure equalization, close the bypass ball valve in the ball valve assembly.
- 3 To do so, turn the bypass ball valve in clockwise direction until it stops using a 5 mm Allen key.
- 4 After the safety check, remount the lever to the ball valve.

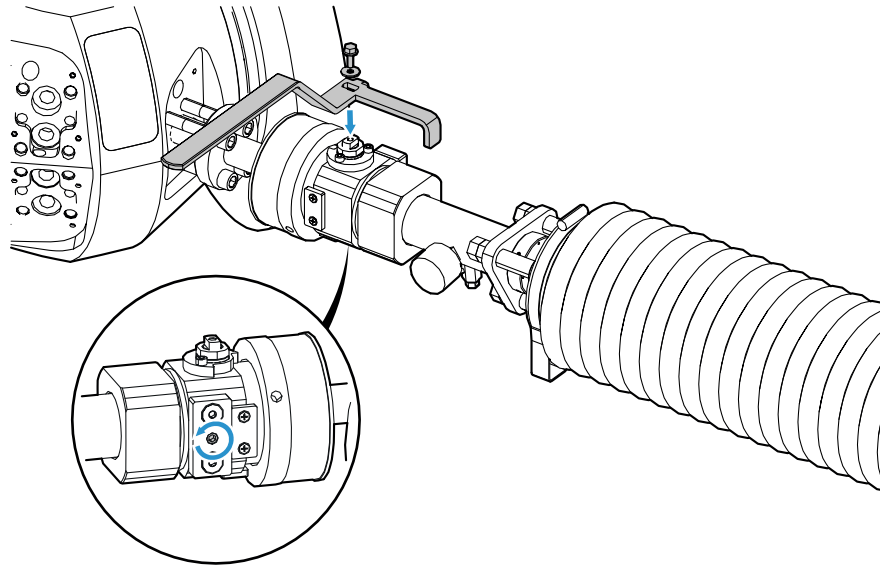


Fig. 20: Opening the bypass valve and mounting the lever

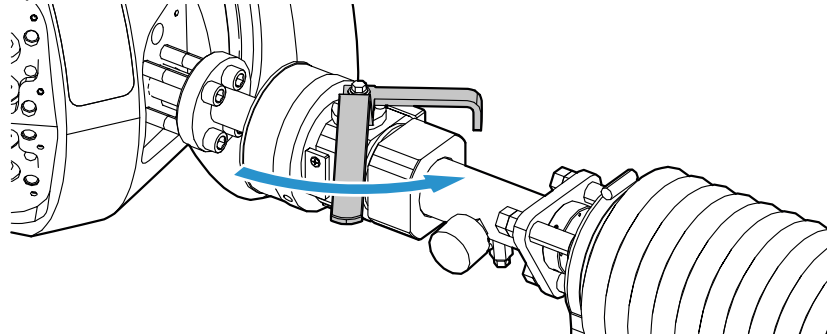
#### 4.4.8 Opening the ball valve



**WARNING:**

A full pressure equalization in the retraction space forms a necessary precondition for opening the ball valve. The pressure equalization can be determined by comparing the manometer reading and the operating pressure in the pipeline.

- 1 Open the ball valve after full pressure equalization between meter body and retraction space.



#### 4.4.9 Mounting the transducer assembly to the meter body



**WARNING:**

Interrupt the process if the parts are restricted or jam when you move the transducer assembly towards and into the meter body before reaching the "0" mark. Before you continue, you must retract the transducer assembly again, dismount the spindle assembly and check the transducer assembly.



**Note:**

When screwing the transducer assembly (1) into the meter body, you work against the pressure in the pipeline, so that you may experience certain stiffness which depends on the gas pressure.

- 1 Turn the crank in clockwise direction to move the transducer assembly with the docking rod towards the meter body. The threads at the transducer assembly and meter body engage automatically.

Correct seat of the transducer is achieved when it comes to a clear stop. The bellows flange on the pressure side must be about at the retraction mark "0" then.

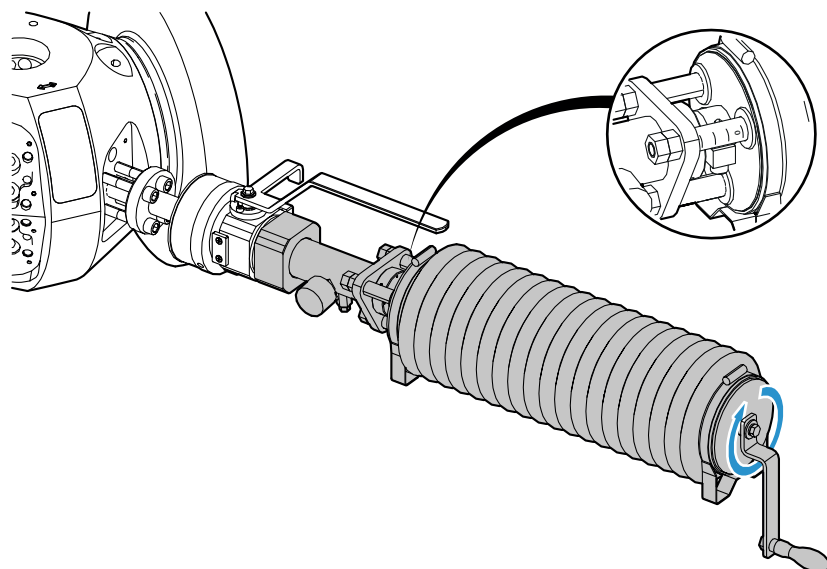


Fig. 21: Mounting the transducer assembly to the meter body

**WARNING:**

If a complete pressure equalization cannot be achieved, the meter body was not fully sealed by the transducer assembly. Do not continue in this case. For troubleshooting, completely retract, dismount and check the transducer assembly.

- 2 Depressurize the retraction space and ball valve by opening the bleed valve after the transducer assembly is fully inserted.

The bleed valve is arranged at a position where exiting gases do not put the operating staff at risk. Check the position and blow-off direction of the bleed valve again before you open it. The manometer at the retraction space must show a continuous pressure drop and finally read "0". Pressure equalization should be achieved after max. 3 minutes. After full pressure equalization, check the transducer seat tightness at the bleed valve of the extraction tool by using a leak detection spray for a period of 5 min.

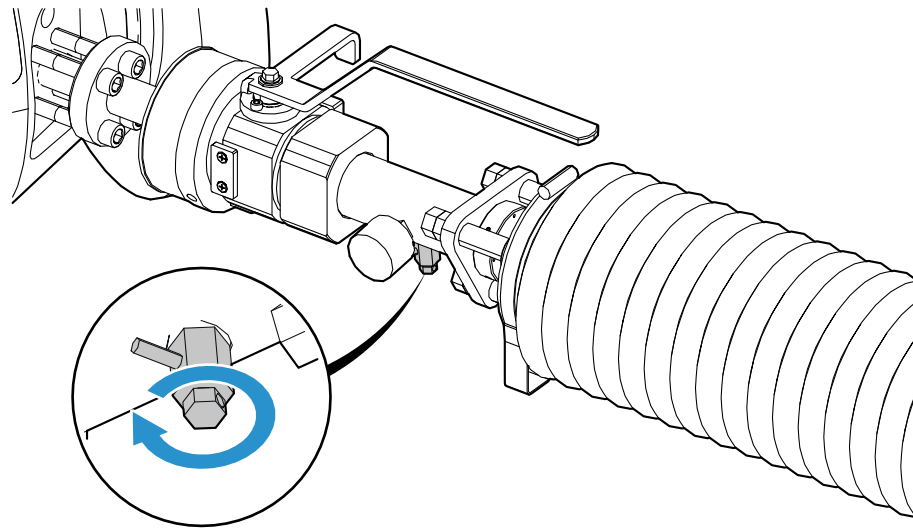


Fig. 22: Opening the bleed valve

#### 4.4.10 Dismounting the spindle assembly



**Note:**

- Be very cautious when dismounting the spindle assembly to avoid the docking rod to be damaged.
- The docking rod remains in the ball valve.

- 1 After full pressure equalization between the retraction space and ambient air, disconnect the docking rod from the spindle assembly by removing the cheese-head screws at the coupling in the ball valve assembly.
- 2 Disconnect the spindle assembly from the ball valve assembly by screwing off the coupling nut.

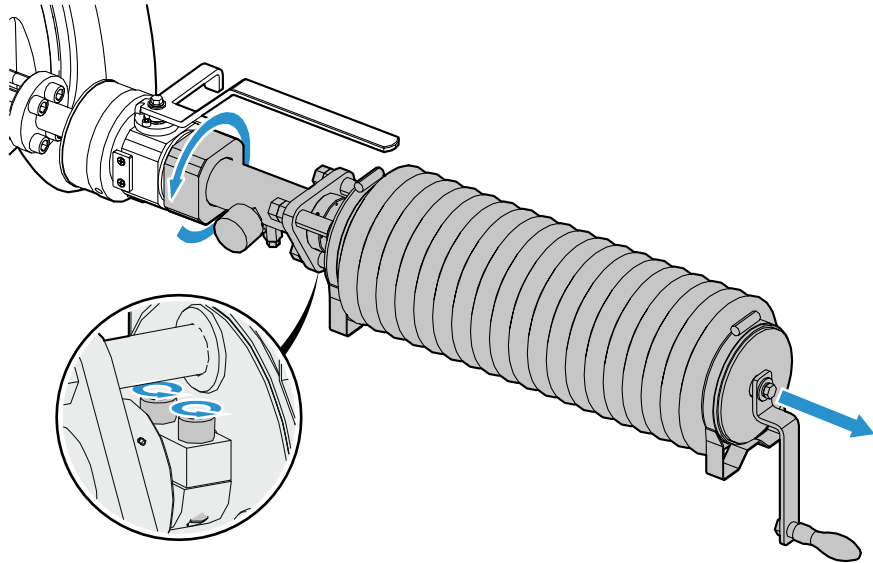


Fig. 23: Dismounting the spindle assembly

#### 4.4.11 Dismounting the ball valve assembly



**Note:**

- Be very cautious when dismounting the spindle assembly to avoid the docking rod to be damaged.
- The docking rod remains in the ball valve.

- 1 Screw off the coupling nut to dismount the ball valve assembly from the adapter.
- 2 Pull back the ball valve assembly over the docking rod.

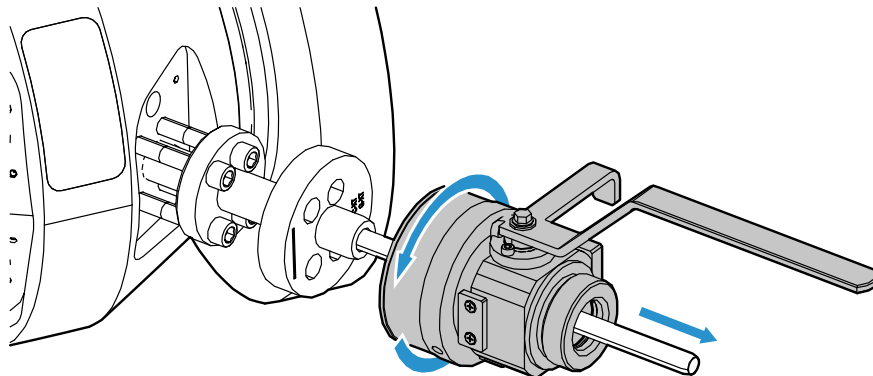


Fig. 24: Dismounting the ball valve from the adapter

### 4.4.12 Dismounting the adapter



**Note:**

- Be very cautious when dismantling the spindle assembly to avoid the docking rod to be damaged.
- The docking rod remains in the ball valve.

- 1 Undo the four M12 cheese-head screws (DIN 912) with which the adapter is fixed and pull back the adapter over the docking rod.

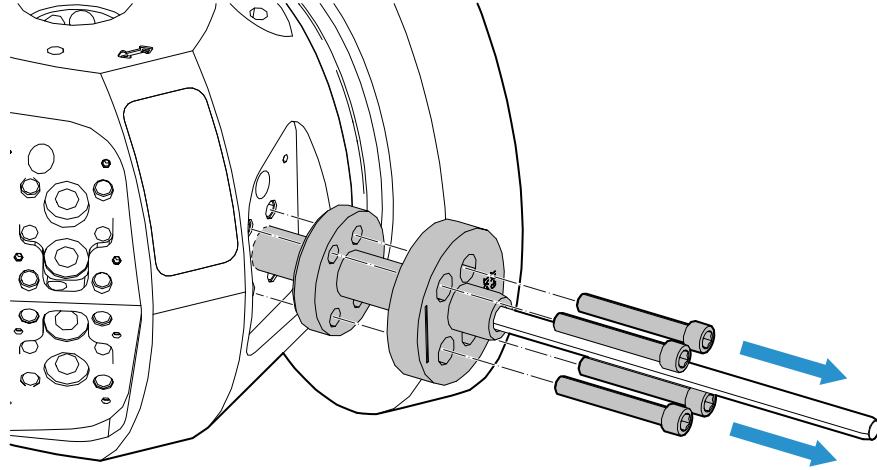


Fig. 25: Dismounting the adapter from the meter body

### 4.4.13 Dismounting the docking rod



**Note:**

If the tapped holes in the retaining bolt for the insertion of the threaded pin are not accessible, you may turn (loosen) the retaining bolt cautiously by max. 90° in anticlockwise direction.

- 1 Undo the threaded pin from the retaining bolt and disconnect the docking rod from the transducer assembly.

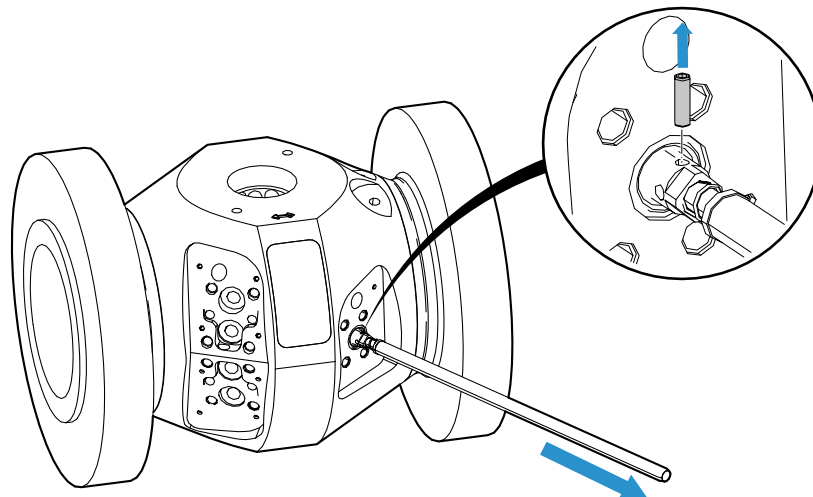


Fig. 26: Dismounting the docking rod from the transducer assembly

#### 4.4.14 Checking the transducer assembly for correct seat

**WARNING:**

After the installation of the transducer assembly the thread of the fastening screw stands out of the transducer bore of the meter body up to max. 2 mm. Make sure the transducer assembly is firmly seated by tightening the retaining bolt as follows:

- Reverse the retaining bolt against clockwise direction for 1/4 turn.
- Turn the retaining bolt sensibly in clockwise direction to stop. Don't use a torque wrench since the fixing torque is pressure-dependent!

#### 4.4.15 Connecting the transducer assembly

- 1 Connect the transducer assembly to the SPU electronics unit by plugging the cable connectors on to the transducer contact.
  - The electrical connection of the ultrasonic transducer is of intrinsically safe design. This makes it possible to disconnect and reconnect the ultrasonic transducers electrically in hazardous areas without the need to interrupt the SPU power supply.
  - You may use the coax connection tool to connect the transducer, in particular for large meter sizes.
- 2 Establish a connection to the meter via the operating software FLOWgate™ and check the diagnostics.
- 3 Perform a speed of sound check to ensure a correct measurement after the transducer extraction.

#### 4.4.16 Mounting the cover caps

Before mounting the cover caps, make sure the gaskets and sealing faces at the cover caps and meter body are undamaged and clean. Remove rust and dirt if necessary. Replace defective gaskets if necessary.

- 1 Put on the caps and fix them with the fastening screws.
- 2 Enter the transducer parameters as described in the Service Manual (only necessary if the transducers have been replaced).

### 5 Maintenance

Safe operation of the extraction tool requires the sealing elements to be checked regularly. It is recommended to check the O-rings in the adapter and in the ball valve before each use.



**Note:**

- At the latest after reaching by 1,000 replacement operations, the extraction tool shall be checked at the manufacturer in the interest of the operational safety!
  - Always replace damaged or defective parts!
- 

Check all insertion slopes and sealing faces for possible damage. Cracks or notches in the sealing faces may damage the O-rings and thus lead to leaks.

Mechanically moving parts of the extraction tool are designed to be protected. However, it is recommended to check the condition of the docking rod and spindle assembly regularly. Mechanical damage to the docking rod and spindle assembly may cause leaks or jams in the retraction mechanism.

It is recommended to lubricate the spindle regularly. Undo the pressure side band clamp that holds the bellows to be able to lubricate the spindle thread. You can now pull back the bellows and the spindle thread is accessible. Grease should be applied directly to the spindle thread at least round the spindle nut.



## 6 Appendix

### 6.1 Space Requirements for using the Extraction Tool

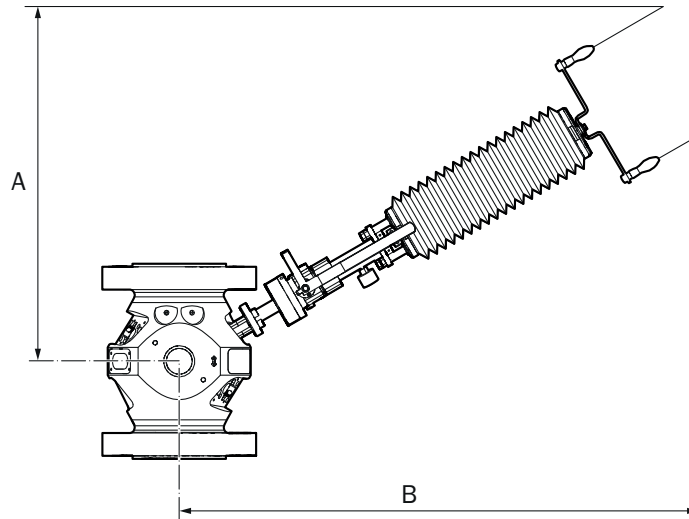


Fig. 27: Space requirements for the extraction tool

DN/NPS	Space requirements for the extraction tool (dimensions rounded up)			
	Clearance A		Clearance B	
	mm	in	mm	in
min	760	29.92	1350	53.15
max	1200	47.24	2000	78.74

### 6.2 Accessories and Spare Parts

Description	Order number
Special key	4047937
COAX connection tool NL200	4047938
Accessories extraction tool - consisting of: <ul style="list-style-type: none"> <li>- 2 x O-ring 36*3</li> <li>- 2 x O-ring 31,42*2,6</li> <li>- 2 x Quadring 14,7*2,62</li> <li>- 10 x Threaded pin M5*25</li> <li>- 8 x Allenscrew M12*45</li> <li>- 2 x Protection cap for ball tap thread GPN 250/63,5</li> </ul>	2039006

6.3 Quick Guide

<b>Dismounting a transducer assembly</b>	
1	Preparation
2	Check the initial condition of the extraction tool.
3	Dismount the cover caps: ▶ Undo the fastening screws and take off the caps.
4	Prepare the transducer assembly: ▶ Pull off the connection cable. ▶ Check the locking nut.
5	Mount the docking rod: ▶ Insert the threaded pin into the retaining bolt.
6	Mount the docking rod: ▶ Insert the threaded pin into the retaining bolt.
7	Mount the adapter to the meter body: ▶ Slide the adapter over docking rod ▶ Screw-in the four M12 cheese-head bolts.
8	Mount the ball valve: ▶ Make sure the ball valve is open. ▶ Slide the ball valve assembly over the docking rod. ▶ Screw the coupling nut on to the adapter until it stops.
9	Mount the spindle assembly: ▶ Move the spindle assembly to position "50". ▶ Slide the spindle assembly over the docking rod. ▶ Screw the coupling nut on to the ball valve assembly.
10	Connect the spindle assembly and docking rod: ▶ Screw the spindle assembly on to the docking rod until it stops. ▶ Fasten the cheese-head screws at the coupling.
11	Check the safety of the extraction tool: ▶ Firm seat? ▶ Bleed valve closed? ▶ Bypass ball valve in the ball valve assembly closed? ▶ Manometer shows no pressure?
12	Pull out the transducer assembly: ▶ Turn the crank of the spindle assembly until the correct retraction mark becomes visible.
13	Dismount the spindle assembly: ▶ Close the ball valve. ▶ Open the bleed valve. ▶ Wait until the pressure equalisation is achieved Manometer shows no pressure? No leakage quantity at the bleed valve traceable? ▶ Dismount the lever from the ball valve. ▶ Dismount the spindle assembly from the ball valve by undoing the coupling nut.
14	Disconnect the transducer assembly from the spindle assembly: ▶ Undo the cheese-head screws at the coupling. ▶ Pull out the docking rod with transducer assembly. ▶ Undo the threaded pin at the transducer assembly. ▶ Undo the locking nut.

<b>Mounting a transducer assembly</b>	
1	Check the condition of the extraction tool.
2	Mount the transducer assembly: <ul style="list-style-type: none"> <li>▶ Fasten the locking nut.</li> </ul>
3	Mount the transducer assembly to the docking rod: <ul style="list-style-type: none"> <li>▶ Insert the threaded pin into the retaining bolt.</li> </ul>
4	Insert the docking rod into the spindle assembly: <ul style="list-style-type: none"> <li>▶ Check the position of the spindle assembly.</li> <li>▶ Push the docking rod into the coupling until it stops.</li> </ul>
5	Connect the spindle assembly and docking rod: <ul style="list-style-type: none"> <li>▶ Fasten the cheese-head screws at the coupling.</li> </ul>
6	Mount the spindle assembly: <ul style="list-style-type: none"> <li>▶ Push the spindle assembly and docking rod into the ball valve.</li> <li>▶ Screw the coupling nut on to the ball valve assembly .</li> </ul>
7	Check the safety of the extraction tool: <ul style="list-style-type: none"> <li>▶ Firm seat?</li> <li>▶ Bleed valve closed?</li> <li>▶ Manometer shows no pressure?</li> </ul>
8	Pressure equalisation in the retraction space: <ul style="list-style-type: none"> <li>▶ Open the bypass ball valve in the ball valve assembly.</li> <li>▶ Wait until the pressure equalisation is achieved.</li> <li>▶ Close the bypass valve.</li> <li>▶ Mount the lever to the ball valve.</li> </ul>
9	Open the ball valve.
10	Mount the transducer assembly to the meter body: <ul style="list-style-type: none"> <li>▶ Turn the crank of the spindle assembly until the transducer assembly engages with the meter body and the "0" mark is reached.</li> <li>▶ Open the bleed valve.</li> <li>▶ Wait until the pressure equalisation is achieved.</li> </ul>
11	Dismount the spindle assembly: <ul style="list-style-type: none"> <li>▶ Undo the cheese-head screws at the coupling.</li> <li>▶ Dismount the spindle assembly from the ball valve by undoing the coupling nut.</li> </ul>
12	Dismount the ball valve assembly.
13	Dismount the adapter.
14	Dismount the docking rod: <ul style="list-style-type: none"> <li>▶ Remove the threaded pin from the retaining bolt.</li> </ul>
15	Check the transducer assembly for correct seat: <ul style="list-style-type: none"> <li>▶ Tighten the retaining bolt.</li> </ul>
16	Connect the transducer assembly.
17	Mount the cover cap.
18	Enter the new transducer parameters.

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