

Operating Instructions

FLWSIC600-XT Extraction Tool

Extraction Tool for Ultrasonic Transducers

Described product

Product name: FLOWSIC600-XT Extraction Tool

Manufacturer

Endress+Hauser SICK GmbH+Co. KG
Bergener Ring 27
01458 Ottendorf-Okrilla
Germany

Legal information

This work is protected by copyright. Any rights derived from the copyright shall be reserved for Endress+Hauser SICK GmbH+Co. KG. Reproduction of this document or parts of this document is only permissible within the limits of the legal determination of Copyright Law. Any modification, shortening or translation of this document is prohibited without the express written permission of Endress+Hauser SICK GmbH+Co. KG. The trademarks stated in this document are the property of their respective owner.

© Endress+Hauser SICK GmbH+Co. KG. All rights reserved.

Original document

This document is an original document of Endress+Hauser SICK GmbH+Co. KG



Contents

1	About this document.....	5
1.1	Function of this document.....	5
1.2	Scope of application	5
1.3	Target groups	5
1.4	Further information.....	5
1.5	Symbols and document conventions	6
1.5.1	Warning symbols.....	6
1.5.2	Warning levels and signal words.....	6
1.5.3	Information symbols	7
2	For your safety.....	8
2.1	Basic safety information	8
2.2	Warning information on device	8
2.3	Intended use	9
2.3.1	Purpose of the device.....	9
2.3.2	Correct use.....	9
2.4	Authorized persons	9
2.5	Requirements.....	10
2.6	Service life.....	10
3	Product description	11
3.1	Components	11
3.1.1	Spindle assembly.....	11
3.1.2	Ball valve assembly	13
3.1.3	Adapter.....	14
3.1.4	Docking rod	17
3.1.5	Transducer assembly.....	18
4	Replacing the transducer assembly	19
4.1	Before you start.....	19
4.2	Tools and auxiliaries	19
4.3	Dismounting a transducer assembly.....	20
4.3.1	Preparation	21
4.3.2	Dismounting.....	22
4.3.3	Mounting the adapter on the meter body.....	23
4.3.4	Mounting the ball valve	24
4.3.5	Mounting the spindle assembly	25
4.3.6	Connecting the docking rod in the spindle assembly	25
4.3.7	Checking the safety of the extraction tool	26
4.3.8	Pulling out the transducer assembly	26
4.3.9	Dismounting the spindle assembly.....	27
4.3.10	Dismounting the transducer assembly from the spindle assembly	30

4.4	Mounting the transducer assembly	31
4.4.1	Preparation	31
4.4.2	Mounting the transducer assembly.....	31
4.4.3	Mounting the transducer assembly on the docking rod	32
4.4.4	Mounting the spindle with the ball valve	32
4.4.5	Checking the safety of the extraction tool	33
4.4.6	Pressure equalization in the retraction space	33
4.4.7	Opening the ball valve	34
4.4.8	Mounting the transducer assembly to the meter body	35
4.4.9	Dismounting the spindle assembly	36
4.4.10	Dismounting the ball valve assembly.....	37
4.4.11	Dismounting the adapter	37
4.4.12	Dismounting the docking rod.....	38
4.4.13	Checking the retaining screw for correct seat	38
4.4.14	Connecting the transducer assembly.....	38
4.4.15	Mounting the cover caps	38
5	Maintenance.....	39
6	Appendix	40
6.1	Space requirements	40
6.2	Accessories and spare parts.....	41
7	Checklist	42

1 About this document

1.1 Function of this document

These Operating Instructions describe:

- Device components
- Installation
- Operation
- Maintenance work required for reliable operation

1.2 Scope of application

These Operating Instructions describe the proper use of the FLWSIC600-XT Extraction Tool under pressure and contain general information on components, design and use of the tool.

The use of this extraction tool is described for dismounting and mounting an ultrasonic transducer under operating pressure. If several ultrasonic transducers have to be replaced, the steps must be repeated for each ultrasonic transducer.

Additional information and assistance for special applications are available from your Endress+Hauser representative. It is recommended to consult an Endress+Hauser specialist before using the extraction tool for the first time or under unusual conditions.

1.3 Target groups

This Manual is intended for persons who have completed a service training course, have a valid certificate and have been explicitly trained in the use of the extraction tool.

1.4 Further information

Information on operation can be found in the Operating Instructions for FLWSIC600-XT.

The FLWSIC600-XT documentation also includes:

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

1.5 Symbols and document conventions

1.5.1 Warning symbols

Symbol	Significance
	Hazard (general)
	Hazard from voltage
	Hazard in potentially explosive atmospheres
	Hazard by explosive substances/mixtures
	Hazard by inflammable substances
	Hazard by oxidizing substances
	Hazard by toxic substances
	Hazard by acidic substances
	Hazard by noxious substances
	Hazard by laser radiation
	Hazard by ultraviolet radiation (UV light)
	Hazard by magnetic fields
	Hazard by moving mechanism
	Hazard by high temperature or hot surfaces
	Hazard by low temperature
	Hazard for environment and organisms

1.5.2 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

1.5.3 Information symbols

Symbol	Significance
	Information on product characteristics with regard to protection against explosions (general)
	Information on product characteristics with regard to Explosion Protection Directive ATEX 2014/34/EU
	Important technical information for this product
	Important information for electrical or electronic functions

2 For your safety

2.1 Basic safety information

**WARNING:**

Small amounts of gas may escape from the extraction tool when dismantling and mounting transducer assemblies. For systems with toxic or other hazardous gases, it is essential that the personnel carrying out the work use suitable protective equipment to prevent personal injury.

**WARNING:**

The extraction tool may only be used for pipelines with a maximum operating pressure of 100 bar(g) for nominal sizes < 8", 155 bar(g) for ≥ 8" and a maximum operating temperature of 85 °C.

Always observe the following points:

- ▶ Read and observe these Operating Instructions.
- ▶ Observe all safety instructions and relevant regulations.
- ▶ If anything is unclear: Please contact your Endress+Hauser representative.
- ▶ The relevant statutory provisions and associated technical regulations must be observed when preparing and carrying out work on the measuring system. Pay particular attention to potentially hazardous parts of the system, such as pressure lines and explosion protection zones.
- ▶ All work must be carried out in accordance with the local, plant-specific conditions and observing operational hazards and specifications.
- ▶ The Operating Instructions for the measuring system and the plant documentation must be available on site. Always observe the information on the prevention of danger and damage given therein.
- ▶ 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 operating company is responsible here.

2.2 Warning information on device

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



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

2.3 Intended use



If the pipeline is already depressurized, you can dismount and mount the transducer assemblies without the extraction tool (see FLOWSIC600-XT Service Manual).

2.3.1 Purpose of the device

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

2.3.2 Correct use

- ▶ Only use the device as described in these Operating Instructions. The manufacturer bears no responsibility for any other use.
- ▶ Do not perform any work or repairs on the device that are not described in these Operating Instructions.
- ▶ Do not remove, add to or modify any components in or on the device unless such modifications are officially permitted and prescribed by the manufacturer.

Otherwise:

- The device does not function correctly.
- The device can become dangerous.

2.4 Authorized persons

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

- Any work on the measuring system may only be carried out by qualified persons and must be checked by responsible skilled persons.
- Qualified persons must be commissioned by the person responsible for personal and plant safety to carry out this work on the basis of their specialist training, knowledge and professional experience as well as their knowledge of the relevant standards, regulations, occupational safety regulations and plant conditions. Qualified persons must be able to recognize potential hazards and take preventive measures in good time.
- Qualified persons are defined in DIN VDE 0105 and IEC 364 or comparable standards.
- Skilled persons must have precise knowledge of the process-specific hazards, e.g. due to the effects of hot, toxic, explosive and pressurized gases, gas-liquid mixtures and other process media, as well as of the design and mode of operation of the measuring system, and must be trained accordingly.
- Authorized personnel must attend special training courses on the use of the extraction tool for the FLOWSIC600-XT. The training courses comprise basic training and regular ongoing training. Participation must be documented by a certificate. Information on such training measures and ongoing training is available from your Endress+Hauser representative.

2.5 Requirements

The FLWSIC600-XT meter body must be mechanically designed for use with the extraction tool. Use is limited to a maximum pressure and the type code.

All information can be found in the Operating Instructions, the type plate, the Data Sheet and the project documentation.

The extraction tool cannot be used for meter bodies that do not fulfill the following conditions.

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

Type code	Use
The position highlighted in red indicates the possible use of the FLWSIC600-XT extraction tool.	
FL6A-411BAA11A1063AS040A1A12NNA	Not possible
FL6A-411BAA11A4063AS040A1A12NNA	Possible

2.6 Service life

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

When used correctly, the extraction tool can be used for at least 1,000 transducer replacements. However, this does not apply to some wearing parts, such as seals. These wearing parts must be replaced if necessary to ensure safe operation of the extraction tool.

In the interest of operational safety, the extraction tool must be checked by the manufacturer after 1,000 transducer extractions at the latest. It is therefore recommended to keep a log of the transducer replacements and the operating conditions (pressure and temperature) involved.

It is recommended to have the extraction tool checked for operational safety by the manufacturer every 5 years. After 10 years, an inspection by the manufacturer is mandatory to ensure continued safe and trouble-free use.

3 Product description

3.1 Components

3.1.1 Spindle assembly

The spindle assembly is the element that transmits the force when the transducer assembly is pulled out or inserted.

The retraction space is part of the spindle assembly. It is equipped with a manometer for monitoring the pressure in the retraction space and a bleed valve for venting the retraction space.

The spindle arrangement is protected from pollution by a bellows and suitable wipers. A scale with 10 mm increments is attached to the spindle assembly for adjustment of the retraction lengths.

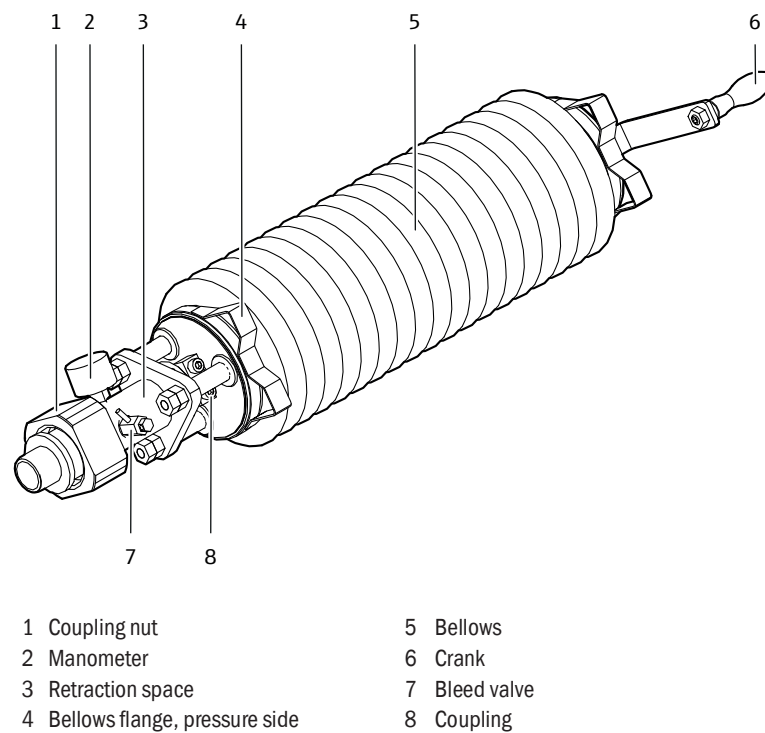


Fig. 1: Spindle assembly

The required retraction lengths are shown in the following Table.

Retraction length in mm						
NPS/DN	1-path		4-path / 8-path			
			Inner path (2 and 3)		Outer path (1 and 4)	
	mm	in	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 acts as isolating element between the FLOW SIC600-XT and the 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 is used to fill the retraction space and equalize the pressure on both sides of the ball valve before opening.

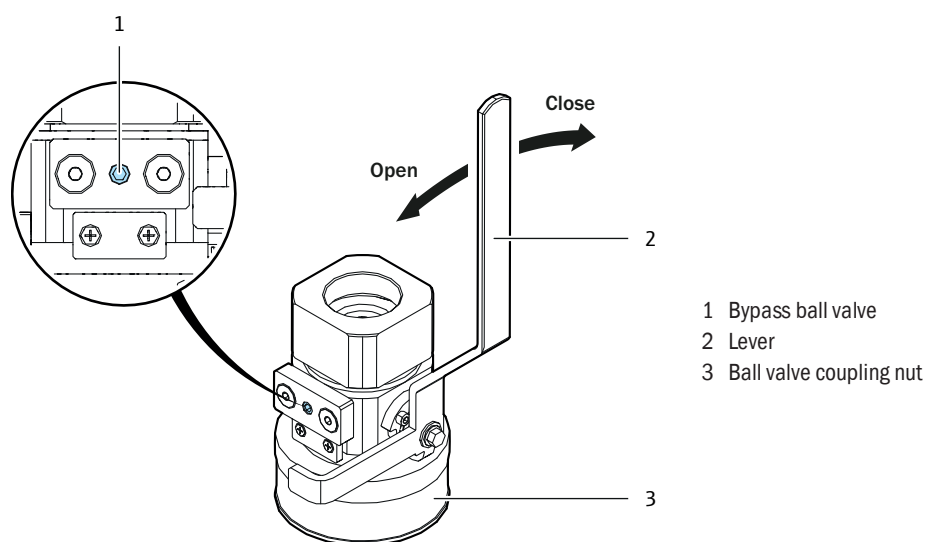


Fig. 2: Ball valve assembly

3.1.3 Adapter

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

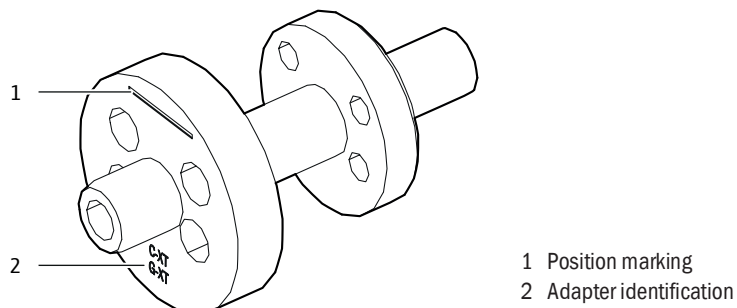
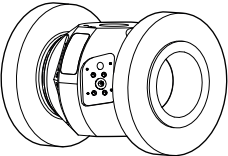
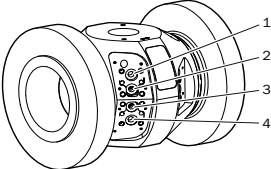
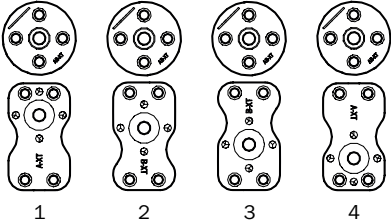
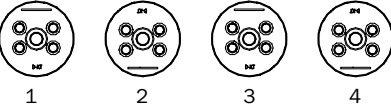
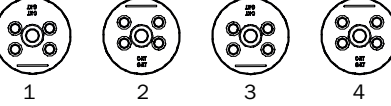
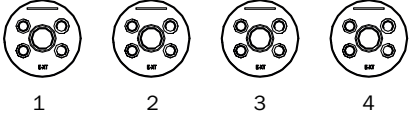
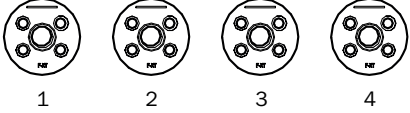
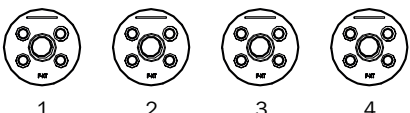
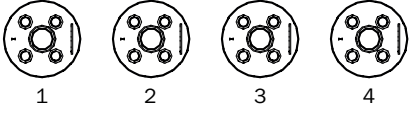


Fig. 3: Adapter information (example C-XT/G-XT adapter)

Adapter Selection Table						
FLOWSIC600-XT characteristics				Adapter type		
NPS/DN	Length	Path config.	Scope of application	Adapter code	Adapter order No.	Extraction tool order No.
3"/80/P10	3D/5D <					

Screws for the respective adapter and meter body		
NPS/DN	Adapter	Screws
3"/80	G-XT	M12x90
	A-XT / B-XT	M12x80
	AB-XT	M12x45
4"/100	D-XT	M12x90
6"/150	C-XT	M12x80
8"/200	E-XT	M12x70
10" - 16"/250 - 400	F-XT	M12x70

Adapter installation positions (schematic diagram)		
NPS/DN	Path layout	
	1-path version	4-path version/8-path version
		
3"/80	 The direction of the marking is not relevant here	 The alignment of the marking of the AB-XT adapter is not relevant here
4"/100	 The marking points upwards to the meter.	
6"/150	 The markings point in the direction of the center of the meter	

Adapter installation positions (schematic diagram)		
NPS/DN	Path layout	
	1-path version	4-path version/8-path version
8"/200	 The markings point in the direction of the center of the meter	 1 2 3 4
10"-12"/250-300	 The markings point in the direction of the center of the meter	 1 2 3 4
16"/400	 The marking points upwards from the meter	 1 2 3 4
20"-48"/500-1200	 The marking points in the direction of the center of the meter	 1 2 3 4

3.1.4 Docking rod

The docking rod with its threaded pin forms the link between transducer assembly and spindle assembly. It is routed gas-tight through the ball valve to the atmosphere side.

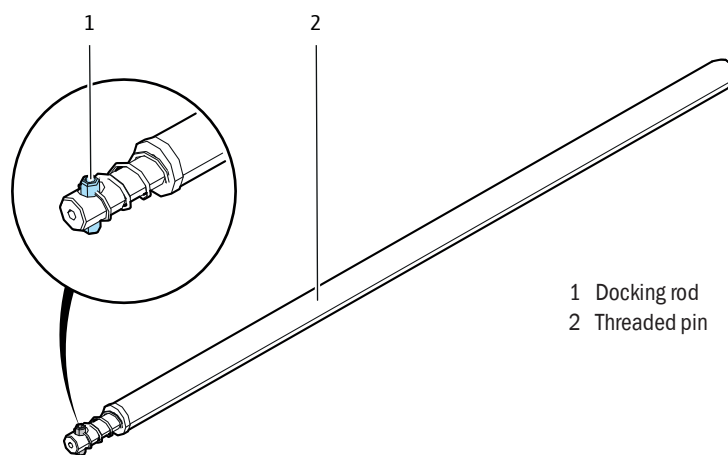


Fig. 4: Docking rod

Use of the docking rod			
Nominal size	Length		Part No.
	mm	in	
3" - 6" / DN80 - DN150	445	17.52	4088725
8" - 48" / DN200 - DN1200	489	19.25	4049657

- The description of the working steps is valid for both types.

3.1.5 Transducer assembly

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

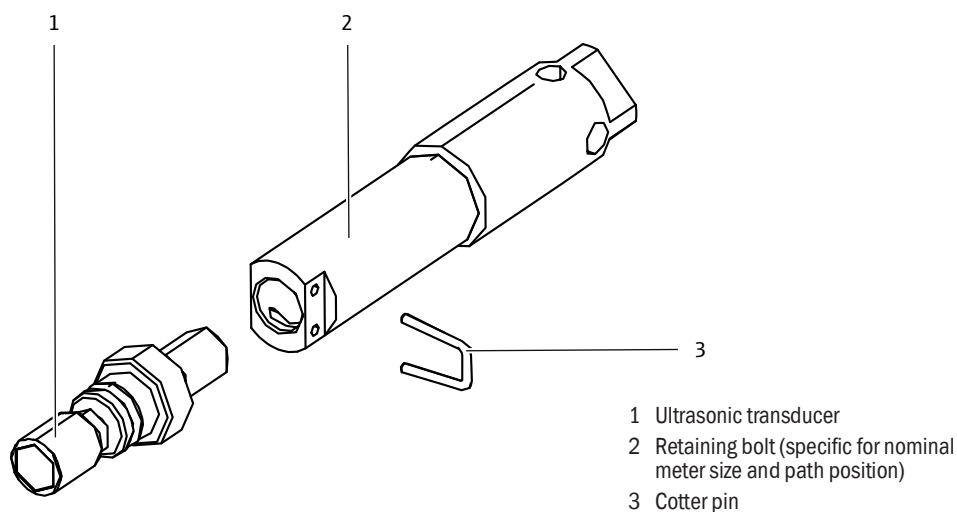


Fig. 5: Transducer assembly 3" - 6"

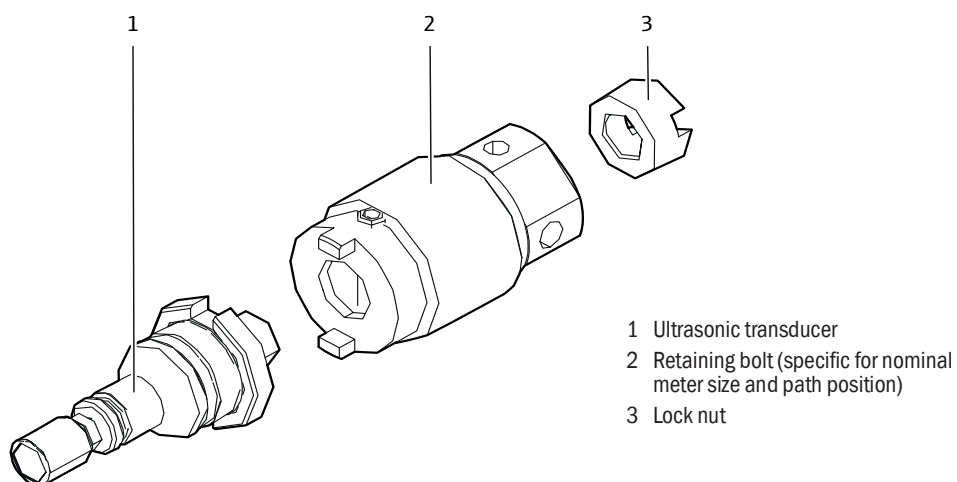


Fig. 6: Transducer assembly 8" - 48"

4 Replacing the transducer assembly

4.1 Before you start

Replacing or cleaning ultrasonic transducer pairs requires knowledge of the FLOWSIC600-XT Service Manual! The correct selection of replacement transducers, parameter adjustments in the device and checking the device functionality after transducer replacement or cleaning (e.g. zero point check) are described in the relevant Sections of the Service Manual.

4.2 Tools and auxiliaries

- Allen key (SW 2,5, SW 3, SW 5, SW 6, SW 10)
- Socket wrench (SW 12, SW 18, SW 22)
- Special wrench (Part No. 4047937)
- Silicone grease (e.g. RS 494-124)
- Loctite (e.g. Loctite 8156)
- Thread lubricant
- Leakage spray
- Coax connection tool (Part No. 4047938)

4.3 Dismounting a transducer assembly

This Section describes in detail all steps required to extract a transducer assembly under pressure. You will find a checklist in the Appendix, [see "Checklist", page 42](#).

**WARNING:**

Small quantities of gas ($< 0.1 \text{ dm}^3$) escape from the extraction tool during depressurization of the retraction space. For systems with toxic or other hazardous gases, it is essential that the personnel carrying out the work use suitable protective equipment to prevent personal injury.

Measures in a metrologically secured area

- If stipulated by national regulations, measures on the device may only be carried out under official supervision (e.g. in the presence of a calibration officer). In detail, these are measures such as breaking seals and opening the parameter locking switch.
- This must be coordinated with the authority 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.
- If the parameter locking switch has to be opened, it must be closed again after changing individual parameters.
- Broken seals must be replaced after completion of the measures and sealed in accordance with national regulations or renewed by the calibration authority or test facility.
- When replacing the ultrasonic transducer with identical components in accordance with these Service Instructions, no new metrological test is required to ensure compliance with the error limit if this is permitted under national regulations.
- We recommend documenting the component replacement in a Configuration log and saving the Parameter report. Keep the Configuration log together with the device documentation.

4.3.1 Preparation

Before dismounting, the current operating pressure in the pipeline in which the FLOWSIC600-XT is installed must be determined and recorded. This value is used as a reference value for the pressure display on the manometer.

Check all components for damage and completeness before dismounting. Pay particular attention to the seals and the docking rod. These must not be damaged or have sharp edges. Defective seals and O-rings must be replaced before using the extraction tool.

Assembly	Activity
Adapter	• O-ring undamaged and correctly fitted • Sealing surface free from damage and dirt
Docking rod	• Docking rod surface free from damage and dirt • Thread of the threaded pin free from damage; replace defective threaded pins if necessary
Ball valve	• O-ring undamaged and correctly fitted • Bypass ball valve closed
Spindle assembly	• O-ring undamaged and correctly fitted • Sealing surface free from damage and dirt • Bleed valve closed

4.3.2 Dismounting

- 1 Remove the cover caps from the ultrasonic transducers on the FLOW SIC600-Xt.
 - ▶ Loosen the fastening screws.
 - ▶ Take off the caps.
- 2 Pull off the transducer cable.
 - Secure the transducer cable so that it does not hinder further work.
 - Protect the transducer cable from dirt and, if necessary, push it back into the meter body so that it does not interfere with further work.
 - For devices with several paths: The cables of the other paths do not have to be disconnected. Ensure that the other transducer cables do not interfere with further work.
 - With the 3" version, a further transducer cable must be removed in order to carry out the other work steps.
- 3 Mark the position of the retaining screw to the meter body with a line.
- 4 Loosen the transducer retaining screw slightly with a special wrench.
- 5 Mount the docking rod.

**Note:**

Always use a docking rod suitable for the actual nominal size of the measuring device.

- ▶ Attach the docking rod to the retaining bolt of the transducer assembly using the threaded pin. The threaded pin must disappear completely in the retaining bolt. If the threaded hole in the retaining bolt is not accessible, the retaining bolt can be carefully rotated by a maximum of 1 turn (90° counterclockwise).
- ▶ Apply silicone grease to the rear end of the docking rod.

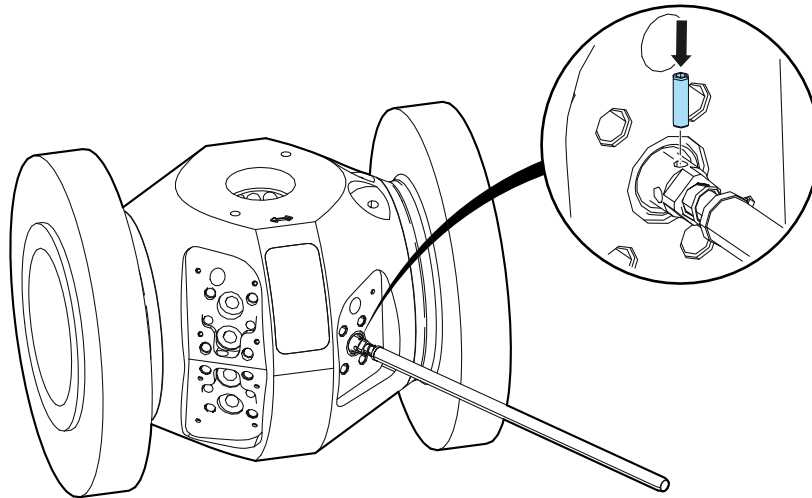


Fig. 7: Mounting the docking rod

4.3.3 Mounting the adapter on the meter body



Note:

- ▶ Ensure the adapter is correctly aligned!
- ▶ Use the correct screw length for the respective adapter!
- ▶ For 3", 4" meters, the A-XT or B-XT adapter must be fitted first and then the AB-XT adapter!

- 1 Place the adapter onto the docking rod with the O-ring side first.
- 2 Attach the adapter to the meter body using the M12 screws.
- 3 Tighten the screws crosswise.

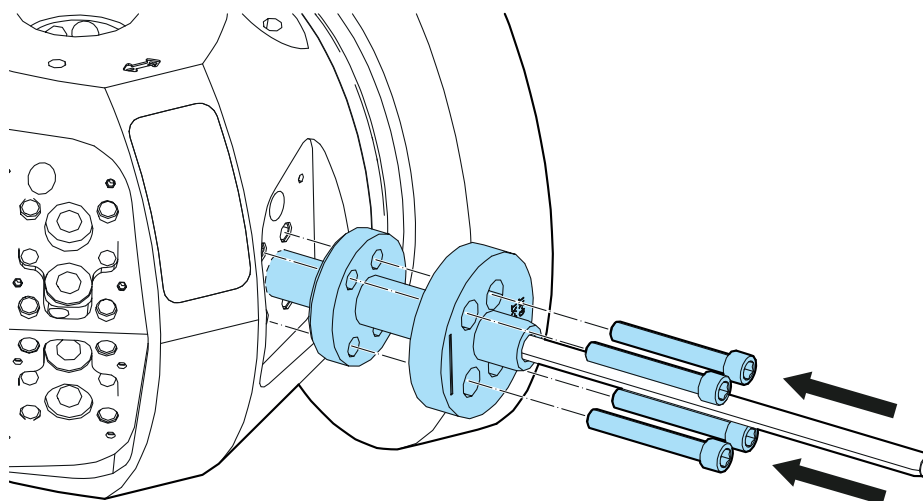


Fig. 8: Mounting the adapter on the meter body

4.3.4 Mounting the ball valve

**Note:**

The ball valve must be fully open, otherwise the ball may be damaged.
The ball valve is fully open when the lever touches the mechanical stop in the “OPEN” position.

- 1 Carefully slide the ball valve over the docking rod onto the adapter.
- 2 Screw the coupling nut of the ball valve onto the adapter.
The coupling nut is correctly tightened when the coupling nut and the adapter are in line.

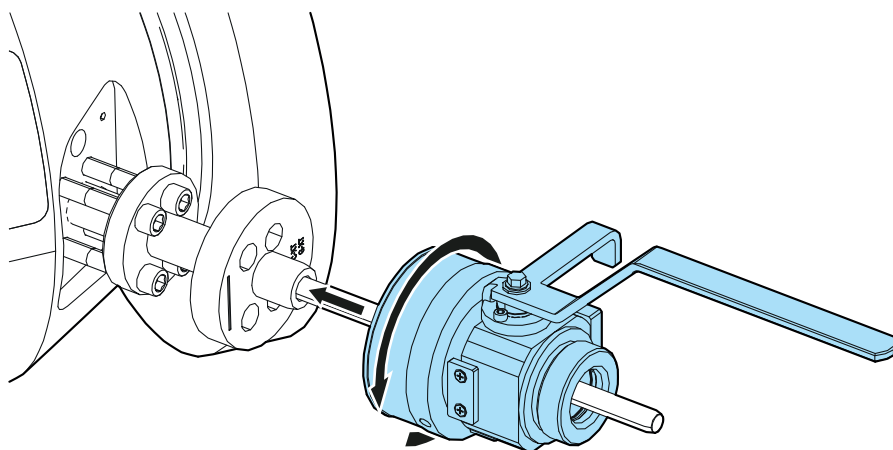


Fig. 9: Mounting the ball valve

4.3.5 Mounting the spindle assembly

- 1 Prepare the spindle assembly so that the bellows flange is in position "50".
- 2 Carefully slide the spindle assembly over the docking rod up to the ball valve.
- 3 Screw the coupling nut of the spindle assembly onto the thread of the ball valve.
- 4 Check everything for tight fit.

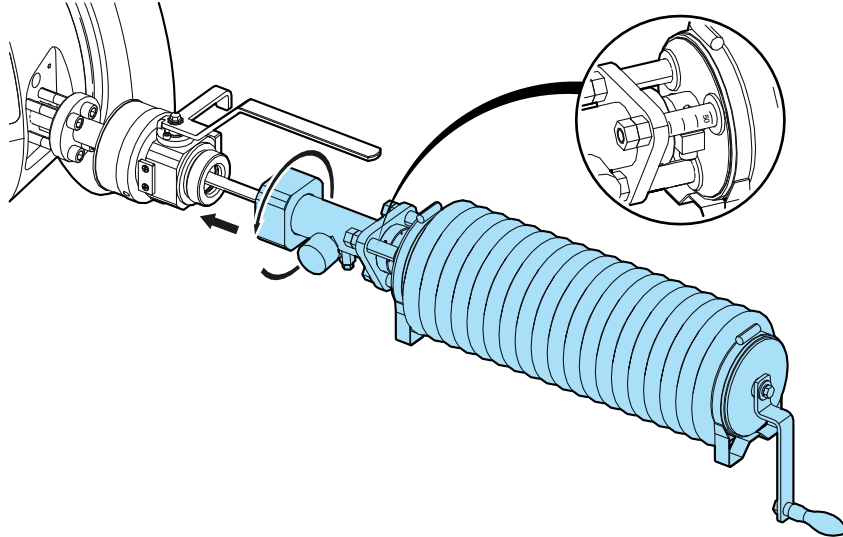


Fig. 10: Mounting the spindle assembly

4.3.6 Connecting the docking rod in the spindle assembly



To ensure a tight fit of the docking rod, it must protrude a few millimeters beyond the coupling.

- 1 Turn the spindle assembly onto the docking rod until the bellows flange is in the "0" position.
- 2 Tighten the screws on the coupling to create a connection between the docking rod and the spindle assembly.

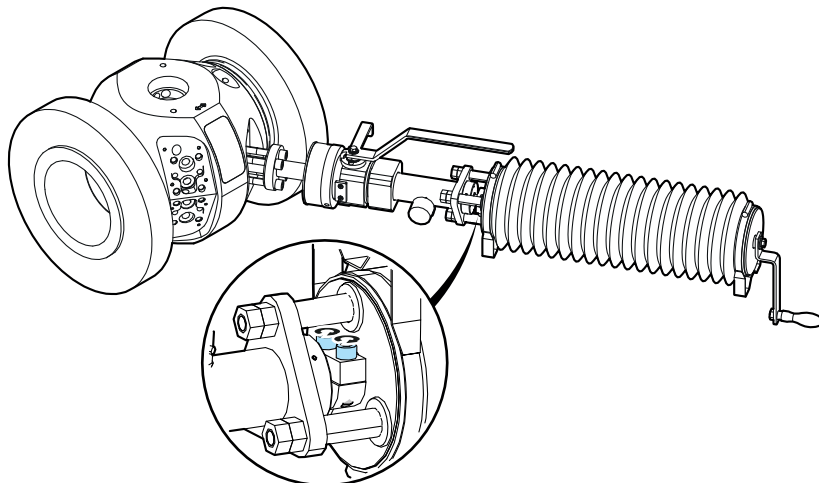


Fig. 11: Connecting the docking rod and the spindle assembly

4.3.7 Checking the safety of the extraction tool

- ▶ Check all components for tight fit.
- ▶ The bleed valve on the retraction space of the spindle assembly must be closed.
- ▶ The bypass valve on the ball valve must be closed.
- ▶ The manometer must show zero.

4.3.8 Pulling out the transducer assembly

**WARNING:**

Check the extraction tool for leaks before proceeding. 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. Only continue when you are absolutely sure that the extraction tool is gas-tight. If you detect a leak during use, stop the process and reinsert the transducer assembly. Do not proceed with removing the transducer assembly until the extraction tool sits absolutely tight.

- 1 Turn the crank counterclockwise to detach the transducer assembly from the meter body.

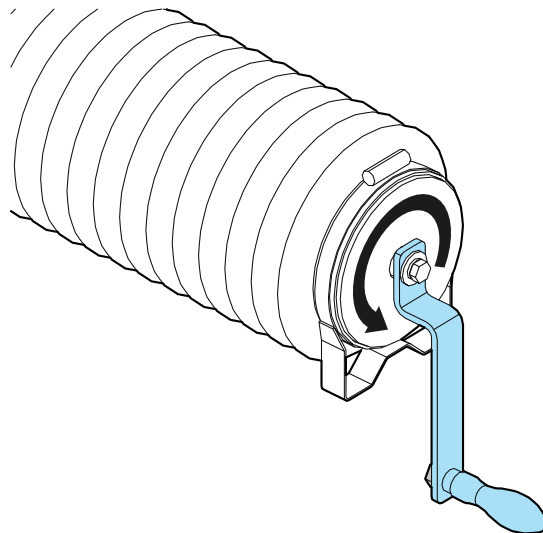


Fig. 12: Turning the crank counterclockwise.

- 2 Check the pressure in the retraction space on the manometer.
When the ultrasonic transducer is pulled out of the meter body, the sealing O-rings of the transducer assembly are removed from their seat. The entire ball valve and the retraction space are filled with the medium in the meter body and subjected to the pipeline pressure.
- 3 Use a suitable leakage spray for leak detection.

**Note:**

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

- 4 Retract the spindle until the bellows flange has moved well beyond the marking for the corresponding transducer position. Refer to the corresponding Table for the required retraction lengths, see [“Spindle assembly”, page 11](#).

4.3.9 Dismounting the spindle assembly

- 1 Carefully close the ball valve when the required retraction length is reached.
The process must be aborted immediately when the ball valve cannot be closed completely.
- 2 Check the direction of the bleed valve.
- 3 Slowly open the bleed valve with a wrench to release the pressure in the retraction space.
The manometer at the retraction space must drop quickly and finally read "0". Pressure equalization should take a maximum of 10 seconds. The bleed valve must not be closed.

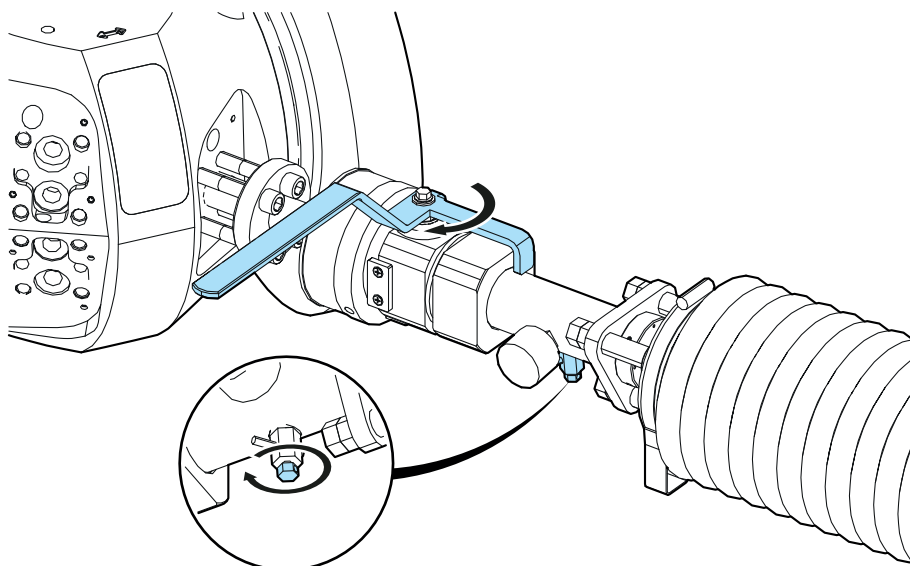


Fig. 13: Closing the ball valve



WARNING:

If complete pressure equalization cannot be achieved, the retraction space has not been completely sealed off. Do not continue in this case!

Carry out the following steps to solve the problem:

Possible problem 1:

- The bypass valve on the ball valve assembly is not fully closed.
 - ▶ Close the bypass valve.
 - ▶ Ensure the ball valve is completely closed.
 - ▶ Open the bypass valve.
- If complete pressure equalization is still not achieved, continue with the solution to possible problem 2.

Possible problem 2:

- Ball valve is not fully closed.
 - ▶ Close the bleed valve.
 - ▶ Open the ball valve and carefully close it again.
 - ▶ Open the bleed valve.
- If complete pressure equalization is still not achieved, continue with the solution to possible problem 3.

Possible problem 3:

- The ball valve is defective.

- ▶ Close the bleed valve.
- ▶ Reinsert the transducer assembly.
- ▶ Remove the extraction tool and send the ball valve to Endress+Hauser for inspection.

**WARNING:**

For safety reasons, the spindle assembly may only be dismantled after the lever has been removed from the ball valve assembly. This is to prevent unintentional opening of the ball valve while the spindle assembly is dismantled.

- 4 Remove the ball valve lever.
 - ▶ Remove the screw on the lever.
 - ▶ Remove the lever.

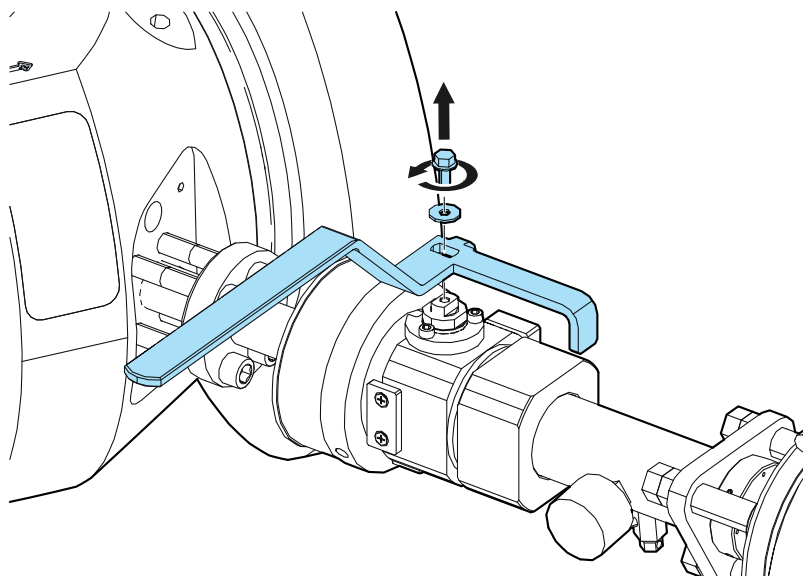


Fig. 14: Dismounting the lever

- 5 Remove the spindle assembly.
 - ▶ Loosen the coupling nut of the spindle on the ball valve.
 - ▶ Carefully remove the spindle assembly together with the docking rod and transducer assembly from the ball valve assembly.
- 6 Protect the thread and seals at the ball valve assembly from damage and cover them if necessary.

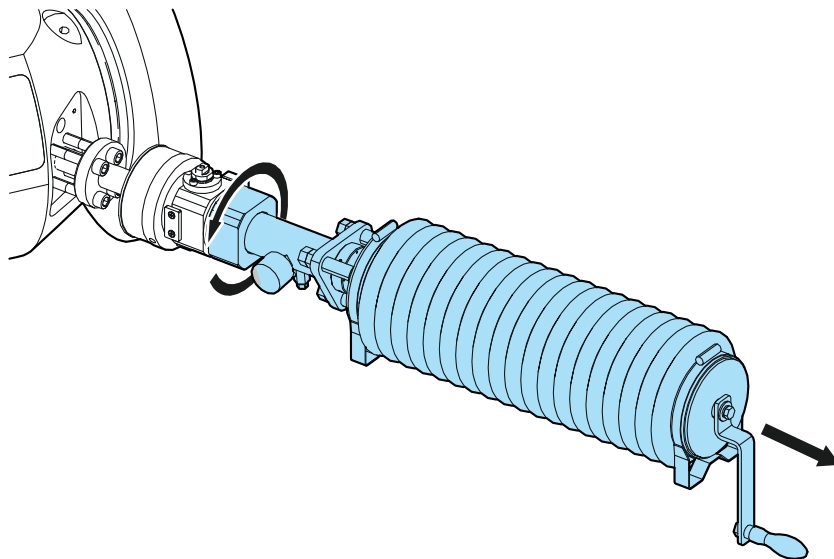


Fig. 15: Dismounting the spindle assembly from the ball valve assembly

4.3.10 Dismounting the transducer assembly from the spindle assembly

- 1 Turn the docking rod with the transducer assembly out of the retraction space.
- 2 Remove the threaded pin of the docking rod from the retaining screw.
- 3 Remove the transducer assembly from the docking rod.
 - ▶ Remove the cotter pin (3" to 6") or the lock nut (8" and larger) using the special wrench.
 - ▶ Detach the transducer assembly from the retaining bolt.

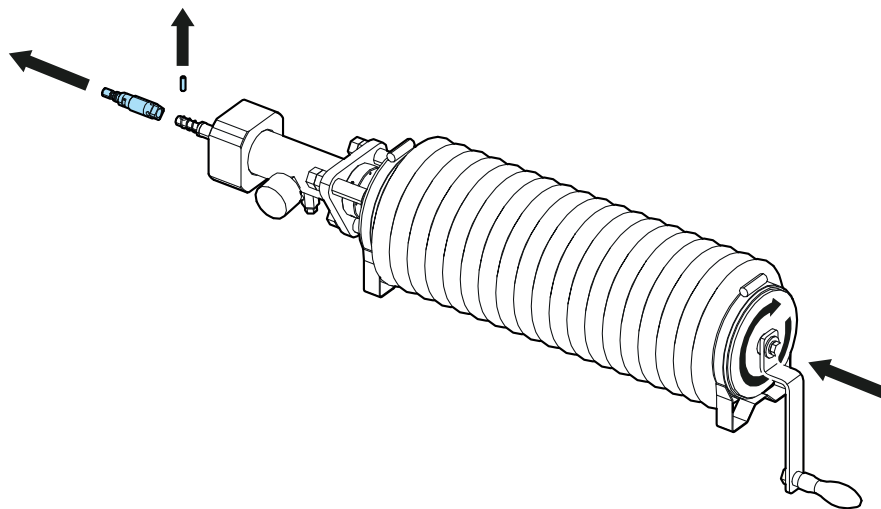


Fig. 16: Dismounting the transducer assembly from the spindle assembly

4.4 Mounting the transducer assembly

This Section describes in detail all steps required to install the transducer assembly. You will find a Checklist in the Appendix, [see "Checklist", page 42](#).



WARNING:

Small quantities of gas (< 0.1 dm³ under normal conditions) escape from the extraction tool during the depressurization of the retraction space. For systems with toxic or other hazardous gases, it is essential that the personnel carrying out the work use suitable protective equipment to prevent personal injury.

4.4.1 Preparation

Check all components for damage and completeness before mounting. Pay particular attention to the seals and the docking rod. These must not be damaged or have sharp edges. Replace defective O-rings. The O-rings of the ultrasonic transducers must be replaced with new O-rings every time they are changed (mounting and dismounting).

Assembly	Activity
Docking rod	• Docking rod surface free from damage and dirt • Thread of the threaded pin free from damage; replace defective threaded pins if necessary
Spindle assembly	• O-ring undamaged and correctly fitted • Sealing surface free from damage and dirt • Bleed valve closed

4.4.2 Mounting the transducer assembly

When transducer assemblies must be replaced, only transducer assemblies of the same type may be used. Transducer assemblies may only be exchanged in pairs.

- 1 Connect the transducer assembly with the retaining bolt using the cotter pin (3" to 6") or the lock nut (8" and larger) and a special wrench. A small amount of axial play between the retaining bolt and the transducer assembly should be possible.

4.4.3 Mounting the transducer assembly on the docking rod

- 1 Connect the transducer assembly to the docking rod.
- 2 Screw the threaded pin into the docking rod. The threaded pin must disappear completely in the retaining bolt.
- 3 Turn the spindle assembly back completely until the transducer assembly is fully immersed in the spindle assembly.

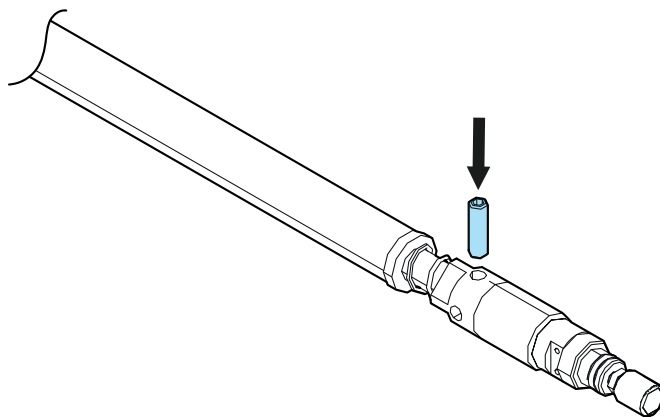


Fig. 17: Mounting the transducer assembly on the docking rod

4.4.4 Mounting the spindle with the ball valve

- 1 Carefully push the spindle assembly onto the ball valve until the coupling nut of the spindle assembly engages in the thread of the ball valve assembly.
- 2 Screw the coupling nut onto the ball valve assembly to the stop.

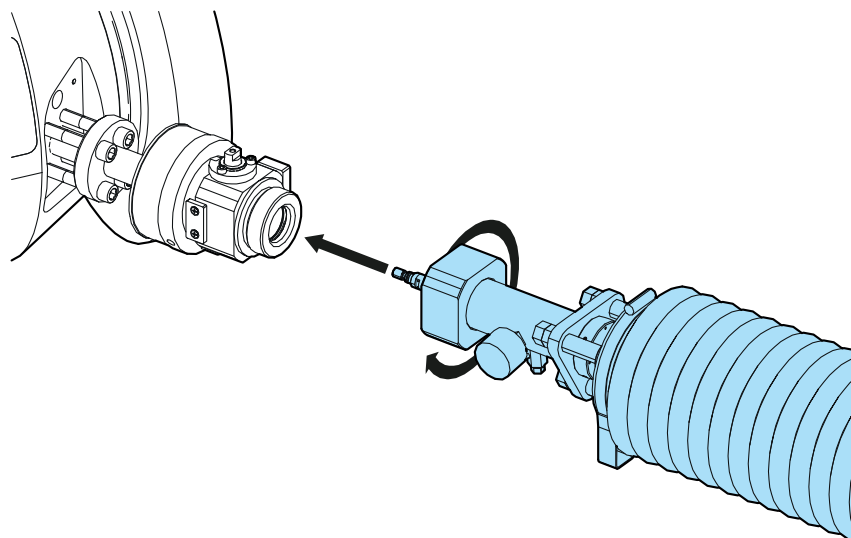


Fig. 18: Mounting the spindle assembly with the ball valve assembly

4.4.5 Checking the safety of the extraction tool

- ▶ Check all components for tight seat.
- ▶ The bleed valve must be closed.
- ▶ The bypass valve in the ball valve assembly must be closed.
- ▶ The manometer must read zero.

4.4.6 Pressure equalization in the retraction space



WARNING:

If complete pressure equalization in the retraction space is not achieved, the seals in the ball valve assembly may be damaged during continued operation. Defective seals can block the opening in the ball valve. In this case, the transducer assembly can only be inserted after the pressure has been relieved in the pipe section in which the measuring system is installed. Only continue when the pressure has been fully equalized.

To ensure proper function of the ball valve, the pressure in the retraction space must correspond to the pressure in the meter body before the ball valve is opened.

- 1 Check the extraction tool for leaks. Pay particular attention to the connections to the manometer and bleed valve at the retraction space.
If a leak is detected, close the bypass valve at the ball valve and check all parts for correct fit.
- 2 Turn the bypass valve at the ball valve at least 180° counterclockwise using a 2.5 mm Allen key. The manometer on the spindle unit must indicate an increase in pressure in the retraction space until the pipeline pressure is reached. Pressure equalization should take a maximum of 10 seconds.
- 3 Attach the ball valve lever.
 - ▶ Put on the lever.
 - ▶ Attach the screw at the lever.

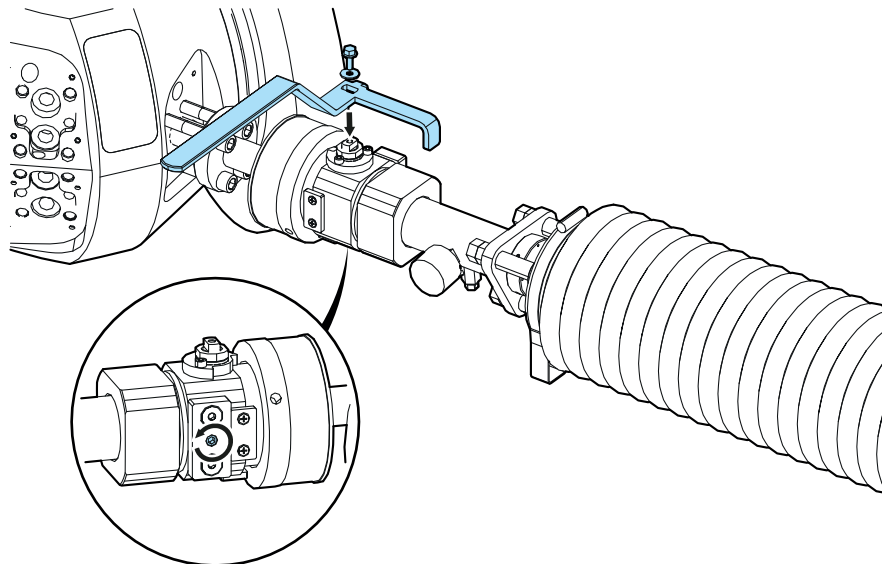


Fig. 19: Opening the bypass valve and mounting the lever

4.4.7 Opening the ball valve

**WARNING:**

Full pressure equalization in the retraction space is a prerequisite for opening the ball valve. The pressure equalization can be determined by comparing the manometer reading and the operating pressure in the pipeline.

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

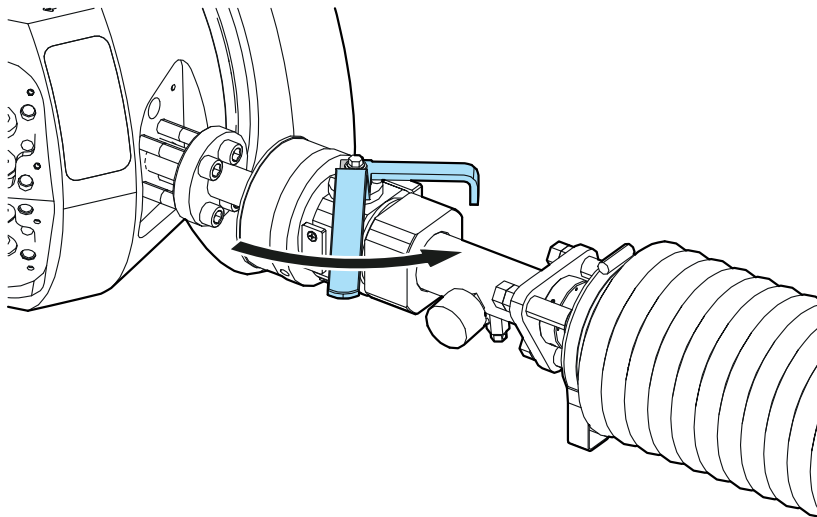


Fig. 20: Opening the ball valve

4.4.8 Mounting the transducer assembly to the meter body



WARNING:

If full pressure equalization cannot be achieved, the meter body was not fully sealed by the transducer assembly. Do not continue in this case.



Note:

To avoid damaging the device, stop the process if parts are blocked or jammed before you reach the "0" mark. Before you continue, you must retract the transducer assembly again, dismount the spindle assembly and check the transducer assembly.

- 1 Turn the crank clockwise to move the transducer assembly in the direction of the meter body.

The thread of the retaining screw automatically engages in the thread of the meter body. The correct position of the transducer assembly is achieved by a clear stop. The bellows flange on the pressure side must then be approximately at the initial marking.

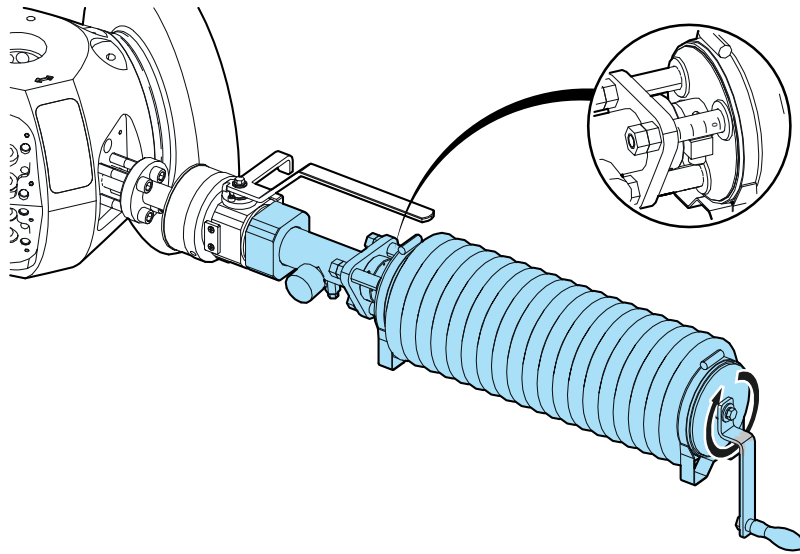


Fig. 21: Mounting the transducer assembly to the meter body

4.4.9 Dismounting the spindle assembly


Note:

Be very careful when removing the spindle assembly to avoid damaging the docking rod. The docking rod remains on the meter body for the time being.

- 1 Check the position and direction of the bleed valve.
- 2 Slowly open the bleed valve with a wrench to release the pressure in the retraction space.
The manometer at the retraction space must show a continuous drop in pressure and eventually read "0". Pressure equalization should take a maximum of 10 seconds. The bleed valve must not be closed.

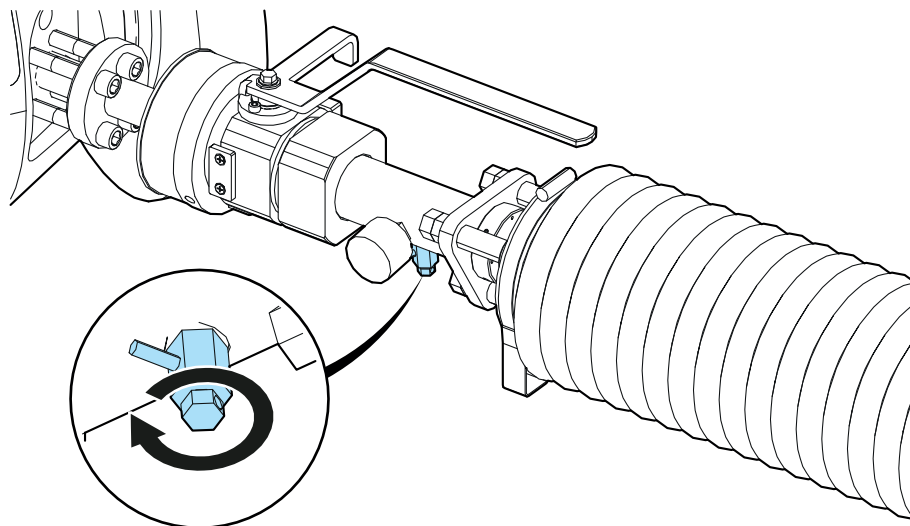


Fig. 22: Opening the bleed valve

- 3 After complete pressure equalization, loosen the screws on the coupling to disconnect the connection between spindle assembly and docking rod.
- 4 Unscrew the coupling nut of the spindle assembly.
- 5 Carefully pull the spindle assembly off the ball valve assembly and the docking rod.

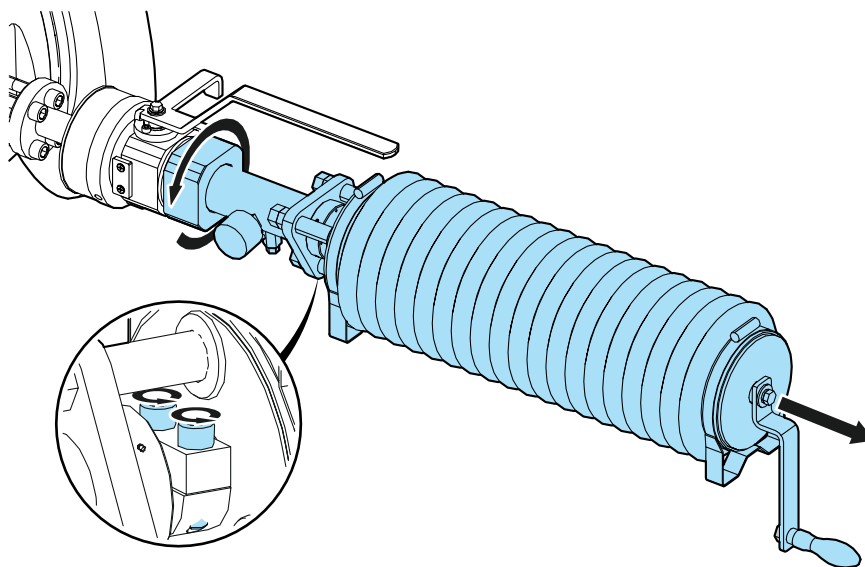


Fig. 23: Dismounting the spindle assembly

4.4.10 Dismounting the ball valve assembly



Note:

Be very careful when dismounting the ball valve assembly to avoid damaging the docking rod. The docking rod remains at the meter body for the time being.

- 1 Unscrew the coupling nut of the ball valve assembly from the adapter.
- 2 Carefully take the ball valve assembly off the adapter over the docking rod.

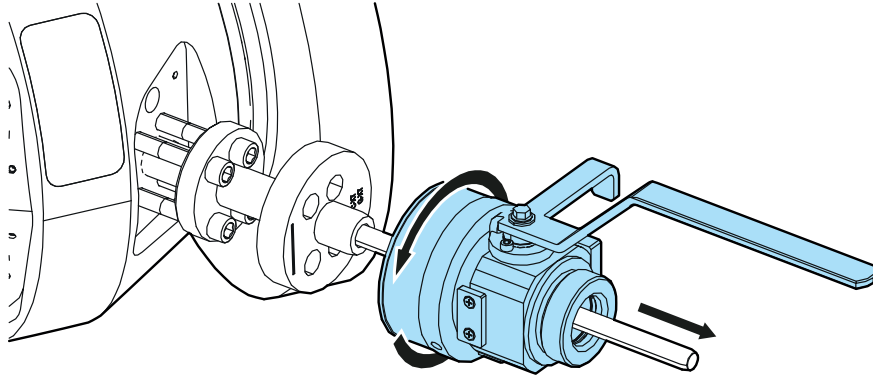


Fig. 24: Dismounting the ball valve assembly

4.4.11 Dismounting the adapter



Note:

Be very careful when dismounting the adapter to avoid damaging the docking rod. The docking rod remains at the meter body for the time being.

- 1 Loosen and remove the M12 cheese-head screws.
- 2 Carefully pull the adapter off over the docking rod.

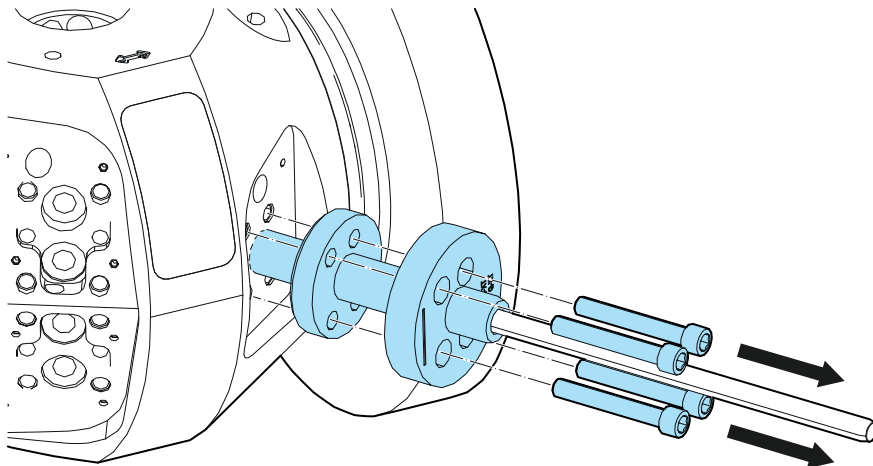


Fig. 25: Dismounting the adapter

4.4.12 Dismounting the docking rod

- 1 Loosen the threaded pin from the retaining bolt.
- 2 Remove the docking rod from the transducer assembly.
- 3 Tighten the retaining screw until the markings match the meter body.

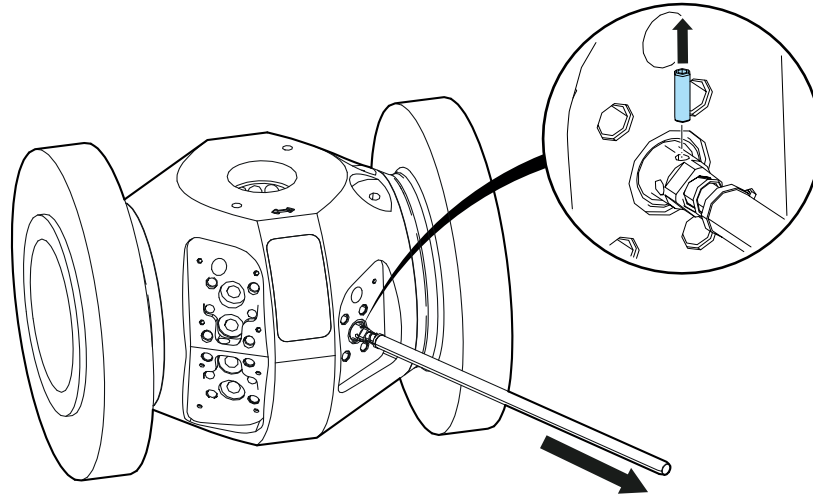


Fig. 26: Dismounting the docking rod

4.4.13 Checking the retaining screw for correct seat

- 1 Carefully tighten the retaining bolt clockwise with the following torque.
Fit 10 (P10) - 22 Nm
Fit 18 (P18) - 20 Nm
For the correct fit, see “Adapter Selection Table”, see [“Adapter”](#), page 14.

4.4.14 Connecting the transducer assembly

- 1 Connect the transducer cable to the transducer assembly.
- 2 Connect the meter with operating software FLOWgate™ (see Service Manual).
- 3 Carry out a diagnosis with FLOWgate™ (see Service Manual).
- 4 If the transducer assembly has been replaced, the parameters must be entered as described in the Service Manual.
- 5 Carry out a sound velocity test to ensure correct measurement after replacing the transducer (see Service Manual).

4.4.15 Mounting the cover caps

- 1 Before mounting, check the seals and sealing surfaces are clean and not damaged. Remove rust and dirt. Replace the seals if necessary.
- 2 Mount the cover caps.
- 3 Tighten the fastening screws.

5 Maintenance

- To ensure safe operation of the extraction tool, the sealing elements must be checked regularly. It is recommended to check the O-rings in the adapter and in the ball valve before each use.
- Always replace damaged or defective parts!
- In the interest of operational safety, the extraction tool must be checked by the manufacturer after 1,000 extractions at the latest.
- An inspection by the manufacturer is mandatory after 10 years to ensure continued safe and trouble-free use.
- It is recommended to have the extraction tool checked for operational safety by the manufacturer every 5 years.
- Check all insertion chamfers and sealing surfaces for possible damage. Cracks or notches in the sealing surfaces can damage the O-rings and cause leaks.
- Mechanically moving parts of the extraction tool are designed in such a way that they are protected. However, it is recommended to visually check the condition of the docking rod and spindle assembly at regular intervals.
- Mechanical damage to the docking rod and spindle assembly can lead to leaks or jams in the retraction mechanism.
- It is recommended to lubricate the spindle regularly.
 - ▶ Loosen the pressure-side band clamp that holds the bellows.
 - ▶ Pull back the bellows.
 - ▶ Lubricate the spindle thread.

The grease should be applied directly to the spindle thread, especially around the spindle nut.

6 Appendix

6.1 Space requirements

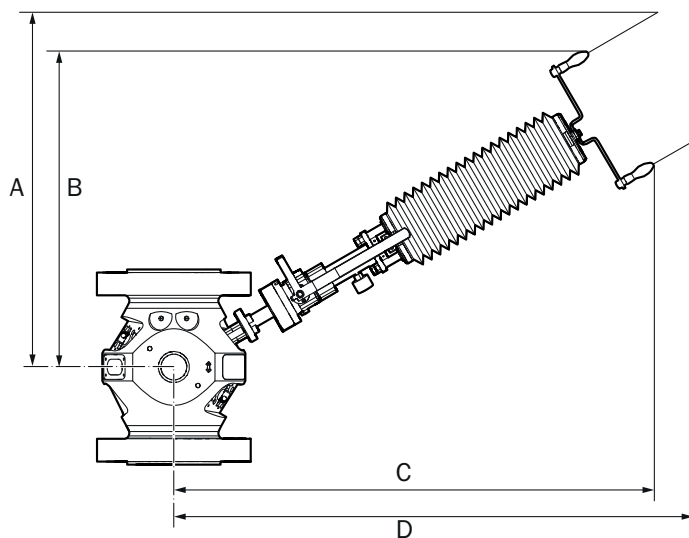


Fig. 27: Space requirements for the extraction tool

DN/NPS	Space requirements for the extraction tool							
	Clearance A		Clearance B		Clearance C		Clearance D	
	mm	inch	mm	inch	mm	inch	mm	inch
3"/80	730	28.74	590	23.23	1010	39.77	1255	49.41
4"/100	759	29.88	649	25.55	1124	44.25	1314	51.73
6"/150	860	33.86	695	27.36	1204	47.40	1489	58.62
8"/200	802	31.57	675	26.57	1169	46.02	1389	54.69
10"/250	816	32.13	689	27.13	1194	47.01	1414	55.67
12"/300	845	33.27	701	27.60	1214	47.80	1464	57.64
16"/400	880	34.65	727	28.62	1260	49.61	1525	60.04
20"/500	924	36.38	756	29.76	1310	51.57	1600	62.99
24"/600	953	37.52	785	30.91	1360	53.54	1650	64.69
26"/650	953	37.52	797	31.38	1380	54.33	1650	64.69
28"/700	967	38.07	808	31.81	1400	55.12	1675	65.94
30"/750	981	38.62	823	32.40	1425	56.10	1700	66.93
32"/800	996	39.21	837	32.95	1450	57.09	1725	67.91
34"/850	1010	39.76	849	33.43	1470	57.87	1750	68.90
36"/900	1039	40.91	863	33.98	1495	58.86	1800	70.87
38"/950	1054	41.50	878	34.57	1520	59.84	1825	71.85
40"/1000	1068	42.05	892	35.12	1545	60.83	1850	72.83
42"/1050	1083	42.64	906	35.67	1570	61.81	1875	73.82
44"/1100	1097	43.19	921	36.26	1595	62.80	1900	74.80
46"/1150	1111	43.74	935	36.81	1620	63.78	1925	75.79
48"/1200	1126	44.33	947	37.28	1640	64.57	1950	76.77

6.2 Accessories and spare parts

Description	Part No.
Special wrench	4047937
COAX connection tool NL200	4047938
COAX connection tool NL250 (3" (DN80) - 6" (DN150))	2091834
Extraction tool accessories: - 2 x O-ring 36*3 - 2 x O-ring 31.42*2,6 - 2 x Quadring 14,7*2.62 - 10 x Threaded pin M5*25 - 8 x Allen screw M12*45 - 2 x Protection cap for ball valve thread GPN 250/63.5	2039006

7 Checklist

Dismounting the transducer assembly	
1	Preparation ▶ Check the extraction tool is complete and not damaged. ▶ All tools and auxiliary materials available.
2	Remove the cover caps.
3	Prepare the transducer assembly: ▶ Remove the transducer cable.
4	Mount the docking rod: ▶ Insert the docking rod in the retaining bolt. ▶ Screw the threaded pin of the docking rod into the retaining bolt and tighten.
5	Mount the adapter on the meter body: ▶ Slide the adapter over the docking rod up to the meter body. Ensure adapter and alignment are correct. ▶ Fasten the M12 cheese-head screws.
6	Mount the ball valve: ▶ Check whether the ball valve is open. ▶ Slide the ball valve assembly over the docking rod up to the adapter. ▶ Screw the coupling nut of the ball valve onto the adapter up to the stop.
7	Mount the spindle assembly: ▶ Move the spindle assembly to position "50". ▶ Slide the spindle assembly over the docking rod up to the ball valve assembly. ▶ Screw the coupling nut of the spindle assembly onto the ball valve assembly until it stops.
8	Connect the docking rod with the spindle assembly: ▶ Turn the spindle onto the docking rod until the bellows flange is in the "0" position. ▶ Tighten the screws on the coupling.
9	Safety check: ▶ Check all components for tight seat. ▶ Check whether the bleed valve is closed. ▶ Check the pressure on the manometer.
10	Retract the transducer assembly: ▶ Turn the crank of the spindle assembly.
11	Dismount the spindle assembly: ▶ Close the ball valve. ▶ Open the bleed valve on the spindle assembly. ▶ Wait for pressure equalization. ▶ Remove the lever from the ball valve assembly. ▶ Loosen the coupling nut of the spindle on the ball valve assembly. ▶ Pull the spindle and docking rod out of the ball valve assembly.
12	Dismount the transducer assembly: ▶ Turn the spindle crank until the ultrasonic transducer and retaining bolt can be easily reached. ▶ Remove the threaded pin on the transducer assembly. ▶ Pull off the transducer assembly. ▶ Remove the cotter pin or lock nut on the transducer assembly. ▶ Pull off the transducer.

Mounting the transducer assembly	
1	Preparation ▶ Check the extraction tool is complete and not damaged. ▶ All tools and auxiliary materials available.
2	Mount the transducer assembly: ▶ Place the transducer assembly on the retaining bolt. ▶ Insert or tighten the cotter pin or lock nut on the transducer assembly. ▶ Place the transducer assembly on the docking rod. ▶ Mount the transducer assembly with threaded pin on the docking rod. ▶ Turn the spindle crank until it cannot go any further and the transducer assembly and retaining bolt disappear into the spindle assembly.
3	Mount the spindle assembly: ▶ Push the spindle assembly and docking rod into the ball valve. ▶ Screw the coupling nut of the spindle assembly onto the ball valve assembly until it stops.
4	Safety check: ▶ Check all components for tight seat. ▶ Check whether the bleed valves are closed. ▶ Check the pressure on the manometer.
5	Pressure equalization in the retraction space: ▶ Open the bypass valve in the ball valve assembly. ▶ Wait for pressure equalization. ▶ Close the bypass valve. ▶ Mount the lever on the ball valve.
6	Open the ball valve.
7	Mount the transducer assembly: ▶ Turn the crank of the spindle assembly until the transducer assembly engages with the meter body and the "O" mark is reached.
8	Dismount the spindle assembly: ▶ Open the bleed valve. ▶ Wait for pressure equalization. ▶ Loosen the screws at the coupling. ▶ Loosen the coupling nut of the spindle from the ball valve assembly. ▶ Remove the spindle from the ball valve assembly using the docking rod.
9	Dismount the ball valve assembly: ▶ Unscrew the coupling nut of the ball valve from the adapter. ▶ Pull the ball valve assembly via the docking rod from the adapter.
10	Dismount the adapter from the meter body: ▶ Unscrew the M12 cheese-head screws. ▶ Remove the adapter via the docking rod.
11	Remove the docking rod: ▶ Loosen and remove the threaded pin of the docking rod from the retaining bolt. ▶ Pull the docking rod out of the retaining bolt.
12	Check the transducer assembly and retaining bolt: ▶ Check for correct fit. ▶ Tighten the retaining bolt.
13	Connect the transducer assembly with the transducer cable.
14	Mount the cover caps.
15	Perform a diagnosis with FLOWgate™.
16	If necessary, enter the parameters of the ultrasonic transducer.

8029772/1W17/V2-0/2026-03

www.addresses.endress.com
