

# FLAWSIC600



Extraction Tool for Ultrasonic Transducers  
of the Ultrasonic Gas Flow Meter *II+*



## Document information

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## About this Document

These Operating Instructions explain the proper use of the sensor extraction tool type “Universal“ and type “Compact“ of the FLOWSIC600 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 dismantling 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.

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

The FLOWSIC600 documentation further includes:

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

### Symbols used in this document

**Note** To provide information about special features of the equipment and further recommendations.



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### Important

To indicate potential dangers to the equipment and possible functional impairment.

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### Warning

To indicate potential dangers to the operating staff, in particular due to electrical equipment and improper use of the equipment. Always observe such warnings, as they aim to protect you from serious injuries.

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### Always reads carefully and follow warning notes conscientiously!

**Note** Always read this manual carefully before carrying out any work on the equipment. Always comply with any safety instructions and warnings.

**Abbreviations and terms used in this manual**

DIN:	Deutsches Institut für Normung (German Standards Office)
Meter body:	Pipeline section of the measuring system to which the ultrasonic transducers are mounted
Signal processing unit (SPU):	Electronics section of the measuring system
Nominal width:	Internal diameter of the meter body, specified as 'nominal pipe size' NPS [~ inch] or 'nominal diameter' DN [~mm])
Path position:	Position of a measuring path defined by two ultrasonic transducers relative to the axis of the measuring system (see <b>Fig. 0.1</b> )
SW:	Spanner size
IP:	Inner path
OP:	Outer path

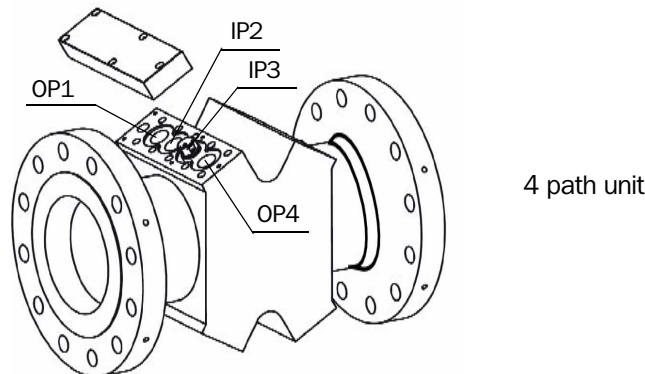
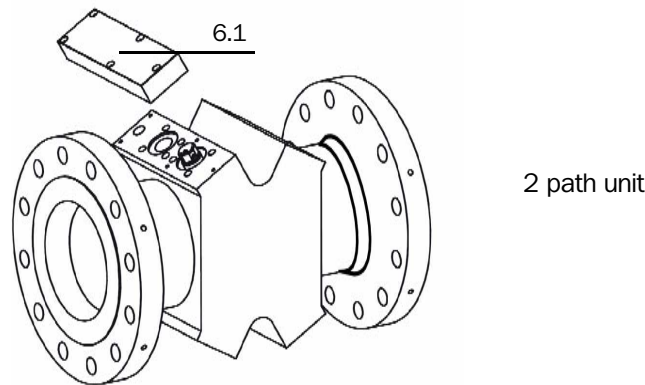
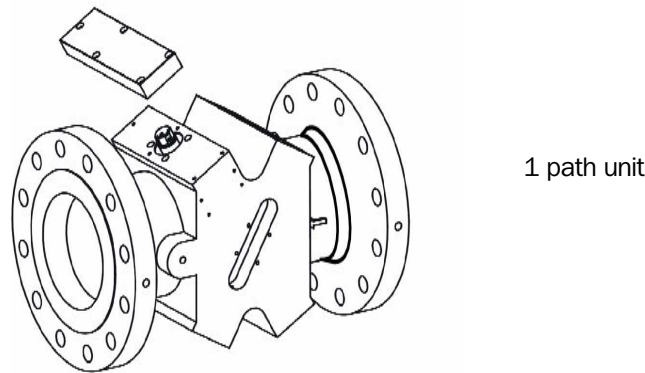
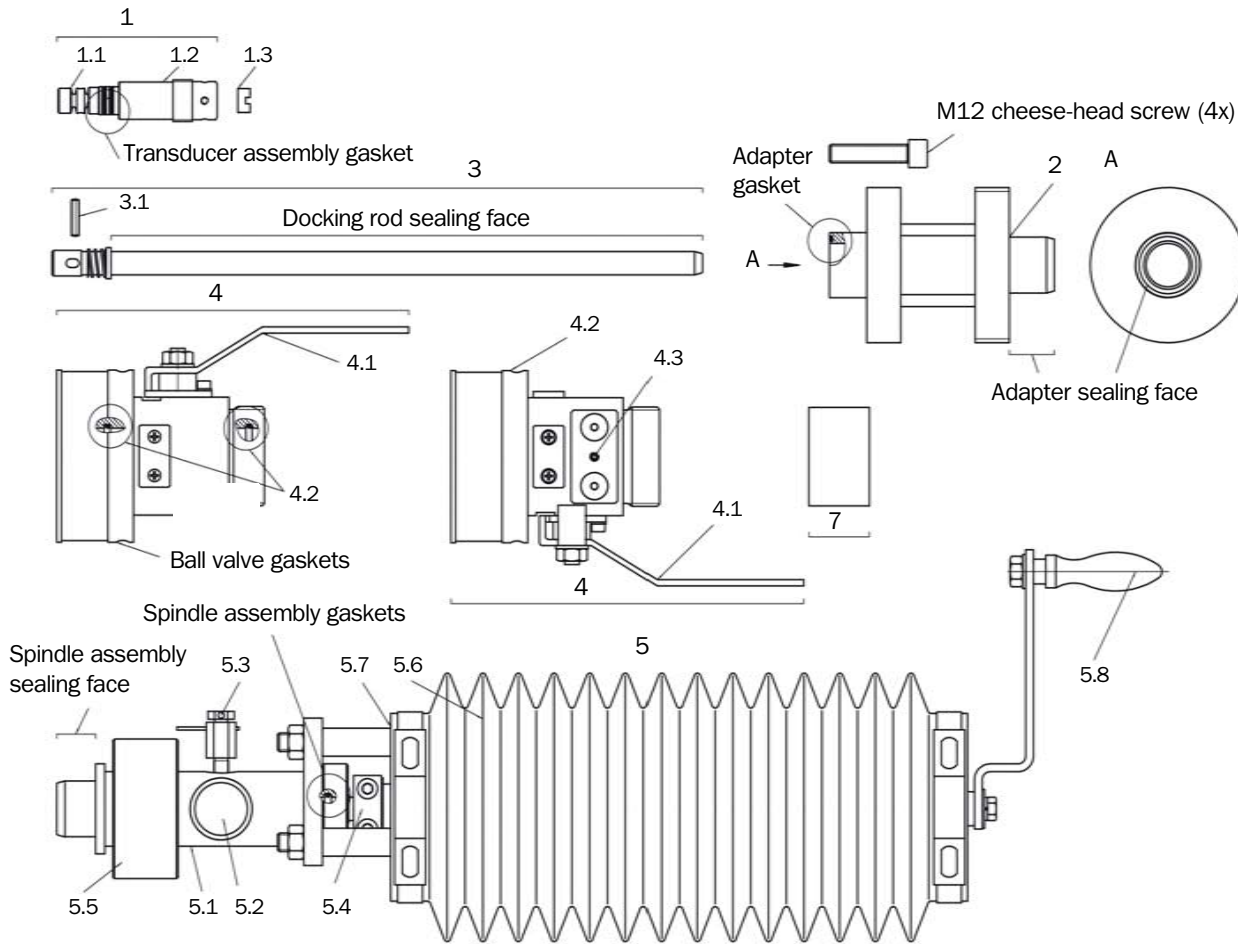


Fig. 0.1: Path positions for 1, 2 and 4 path units

**Components, names, sealing faces**

One extraction tool ready for use always consists of two parts, the real extraction tool and an adapter matching the respective ultrasonic gas meter. The parts that are required for a certain gas meter are listed in the selection table in the appendix (see table 5.1).



**Note**  
 Item 6.1 see **Fig. 0.1**,  
 Item 6.2 see **Fig. 3.2**

Item	Name
1	Transducer assembly
1.1	Ultrasonic transducer
1.2	Retaining bolt (specific to nominal width and path position)
1.3	Locking nut
2	Adapter (specific to nominal width)
3	Docking rod assembly Type 1: DN 150 (NPS 6), Type 2: other widths
3.1	Threaded pin
4	Ball valve assembly
4.1	Lever
4.2	Ball valve coupling nut
4.3	Bypass ball valve

Item	Name
5	Spindle assembly
5.1	Retraction space
5.2	Manometer
5.3	Bleed valve
5.4	Coupling
5.5	Spindle assembly coupling nut
5.6	Bellows
5.7	Bellows flange, pressure side
5.8	Crank
6	Assemblies and components at the measuring system
6.1	Cover caps
6.2	Connection cables
7	DN 63.5 cover cap

Fig. 0.2: Assemblies of the extraction tool, names

# 1 Safety Instructions

## 1.1 Intended Use of the Equipment

The extraction tool is used to dismount and mount complete transducer assemblies of the FLOWSIC600 for maintenance and exchange **without** depressurizing 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 depressurised, you can dismount and mount the transducer assemblies without the extraction tool (see Service Manual, Section 8.3).

The extraction tool is a category II device according to the Pressure Equipment Directive 2014/68/EU.



### Warning

- The extraction tool is designed for maintenance and replacement of ultrasonic transducers under pressure. The extraction tool may only be used by authorised persons according to Section 1.2 who have received appropriate training and gained experience in dealing with pressure equipment, and who know the general, legal and company-specific regulations and standards and use them.
- 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.

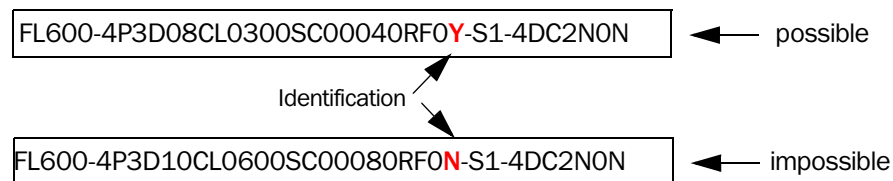
### Prerequisites

The FLOWSIC600 meter body must be prepared mechanically for the use of the extraction tool. The use is limited for a maximum pressure of 155 barg.

In addition, the transducer assemblies must be executed correspondingly (recognizable at the type key of the FLOWSIC600).

Type key:

Use:



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



**Application period** 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.

- Note**
- 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.



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**Important**

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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## 1.2 Authorised Staff

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 pressurised 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.
- Authorised staff have to participate in special trainings on the use of the extraction tool for the FLOWSIC600. 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.

### 1.3 General Safety Information and Protection Measures

Handling or using the device incorrectly can result in personal injury or material damage. Always observe at all work on the FLOW SIC600 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.




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#### 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 gasses dangerous to health it's strictly necessary that the performing staff use suitable safety equipment to prevent personal injuries.

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# FLAWSIC600

## Ultrasonic Gas Flow Meter

### Product Description

**Tools and Auxiliaries required to operate the Extraction Tool**

**Main Assemblies and major functional Elements**





## 2 Product Description

### 2.1 Tools and Auxiliaries required to operate the Extraction Tool

	Tool	Required for
1	Allen key, SW 2.5	Fastening and loosening the threaded pin (3.1) forming the link between docking rod (3) and retaining bolt (1.2)
2	Allen key, SW 3	Loosening and fastening the screws at the cover caps (6.1) on the meter body
3	Allen key SW 5	Filling the retraction space (5.1) through the bypass ball valve (4.3) before opening the ball valve (4)
4	Allen key SW 6	Fastening and loosening the coupling (5.4) of the spindle assembly (5) at the docking rod (3)
5	Allen key SW 10	Dismounting and mounting the adapter (2) to the meter body using M12 cheese-head screws
6	Wrench SW 12	Venting the retraction space (5.1) through the bleed valve (5.3)
7	Wrench SW 18	Dismounting the lever (4.1) of the ball valve (4)
8	Wrench SW 22	Tightening the retaining bolt (1.2) in the meter body
9	Special key Order no. 4047937	Tightening and loosening the locking nut (1.3) forming the link between ultrasonic transducer (1.1) and retaining bolt (1.2)
10	Silicone grease (e.g. RS 494-124)	Lubrication of the O ring gaskets
11	Anti-seize lubricant (e.g. Loctite 8156)	Treatment of the retaining bolt (1.2) and M12 cheese-head screws used to mount the adapter (2)
12	Thread lubricant	Lubrication of the spindle assembly (5) (see "Maintenance" section)
13	Foaming agent (e.g. in accordance with DIN 30657)	Leak detection
14	Coax plug-on auxiliary Order No. 4047938	Connection between cable and transducer assembly (1)
15	Sticky tape	Fixation of conductors

### 2.2 Main Assemblies and major functional Elements

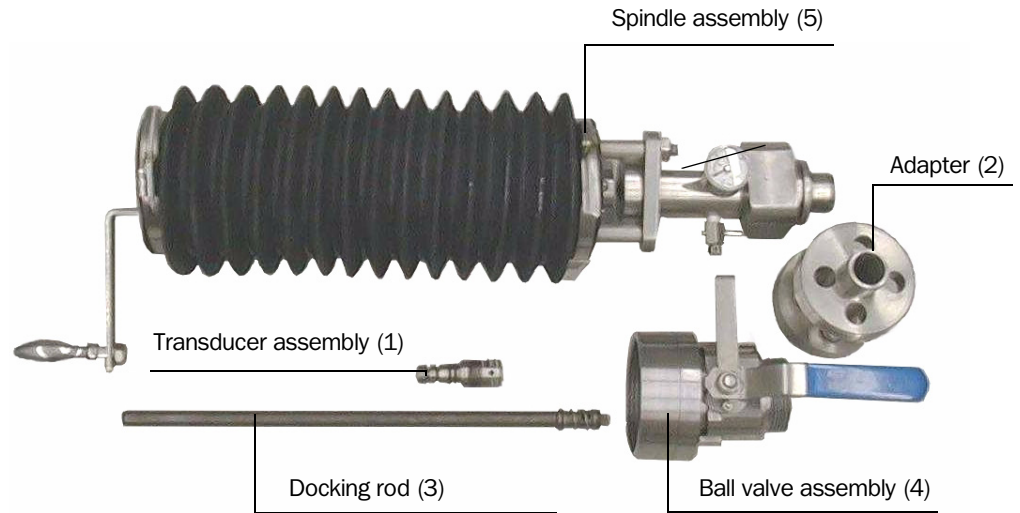
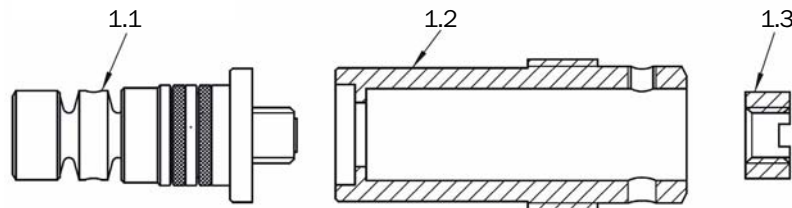


Fig. 2.1: Overview of main assemblies

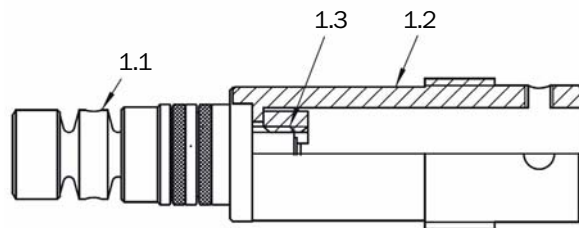
#### 2.2.1 Transducer assembly (1)

The transducer assembly comprises an ultrasonic transducer (1.1) and a retaining bolt (1.2) which are connected by means of a locking nut (1.3). A special key is required to mount the locking nut.

Transducer assembly dismantled



Transducer assembly assembled



Special key

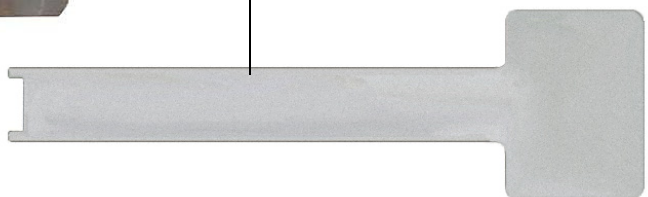


Fig. 2.2: Transducer assembly (1)

**2.2.2 Adapter (2)**

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 (see appendix, table 5.1).



Fig. 2.3: Adapter (2)

**2.2.3 Docking rod assembly (3)**

The docking rod with its threaded pin (3.1) forms the link between transducer assembly (1) and spindle assembly (5). It leads to the atmospheric side in a gas-tight manner through the ball valve assembly (4).

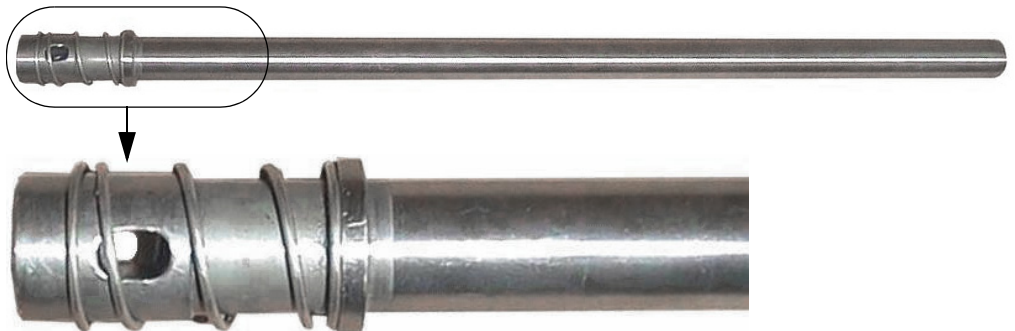


Fig. 2.4: Docking rod (3)

The docking rod is available in 3 variants for the different nominal sizes of the meter body.

Variant	Nominal size	Length		Identification	Part no.
		mm	in		
<b>Extraction tool "Compact"</b>					
1	DN150/6"-3D	419	16.49	1	7041860
2	DN 100/4" - DN 300/12", not DN 150/6"-3D	349	13.47	2	7041863
<b>Extraction tool "Universal"</b>					
1	DN 100/4" - DN 600/24", not DN 150/6"-3D	419	16.49	1	7041860
3	DN 150/6"-3D, DN 650/26" - DN 1200/48"	489	19.25	3	4049657

The type designation is marked at the docking piece.

The description of working steps is valid for both types.

**2.2.4 Ball valve assembly (4)**

The ball valve (4) forms the isolating element between FLOWSIC 600 and spindle assembly (5). It is used to isolate the medium in the meter body from the ambient atmosphere.

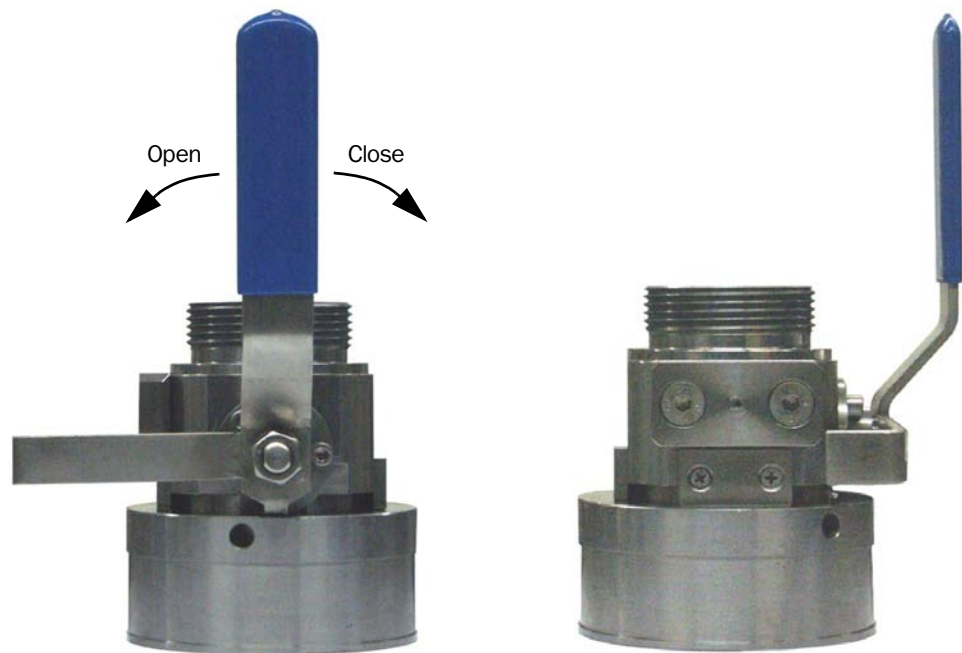


Fig. 2.5: Ball valve assembly (4)

A bypass ball valve (4.3) in the ball valve assembly aims to fill the retraction space (5.1) and equalise the pressure on both sides of the ball valve before opening (4) (see **Fig. 2.6**).

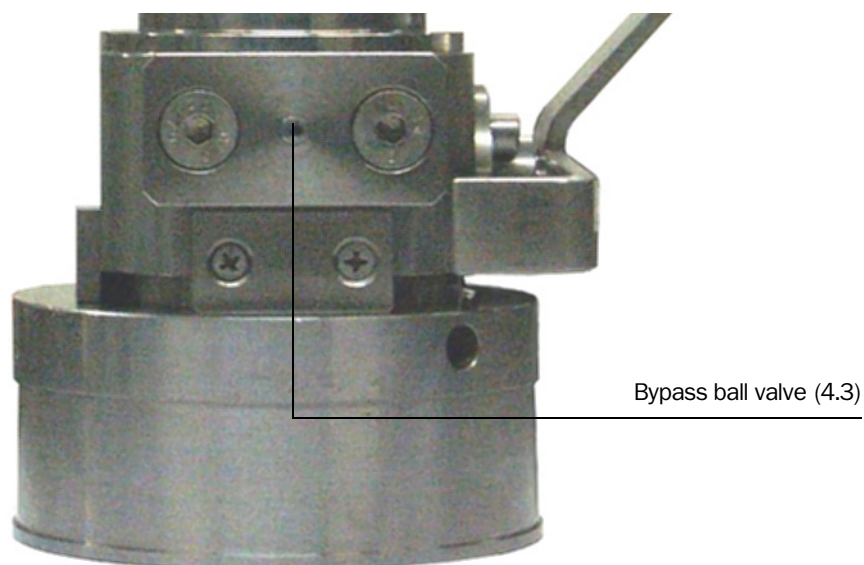


Fig. 2.6: Bypass ball valve (4.3) in the ball valve assembly (4)



### 2.2.5 Spindle assembly (5)

The spindle assembly (5) is the element taking up the force when pulling out or inserting the transducer assembly (1).

The retraction space (5.1) is part of the spindle assembly (5). It is fitted with a manometer (5.2) to monitor the pressure in the retraction space (5.1) and a bleed valve (5.3) to vent the retraction space (5.1).

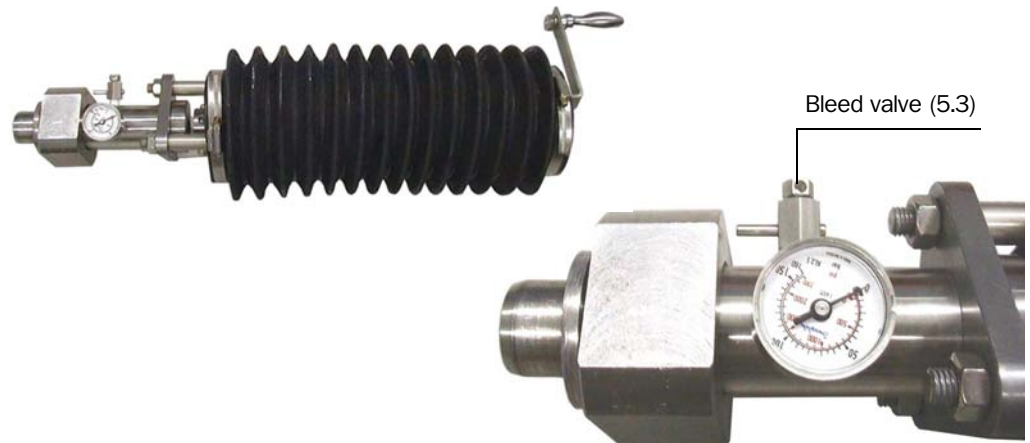


Fig. 2.7: Spindle assembly (5) (left) and bleed valve (5.3) and manometer (5.2) detail (right)

The spindle assembly is protected from pollution by way of a bellows (5.6) and suitable wipers.

A scaling with 10 mm steps (see **Fig. 2.8**) is marked at the spindle assembly (5) for the adjustment of the retraction lengths. The required retraction lengths can be seen in the following table.

	Retraction length in mm			
	1 path	2 paths	4 paths	
			IP	OP
4"/100	186	193	----	----
6"/150	255	266	260	288
8"/200	185	199	190	230
10"/250	186	204	193	242
12"/300	192	213	200	256
14"/350	192	216	202	267
16"/400	190	218	201	275
20"/500	197	232	210	304
24"/600	198	240	211	326
26"/650	260	289	280	328
28"/700	262	296	282	332
30"/750	265	297	289	334
32"/800	268	299	289	341
34"/850	271	301	294	344
36"/900	274	307	296	359
38"/950	280	311	301	361
40"/1000	283	317	305	367
42"/1050	286	321	308	374
44"/1100	288	325	311	376
46"/1150	291	328	316	387
48"/1200	294	331	321	399

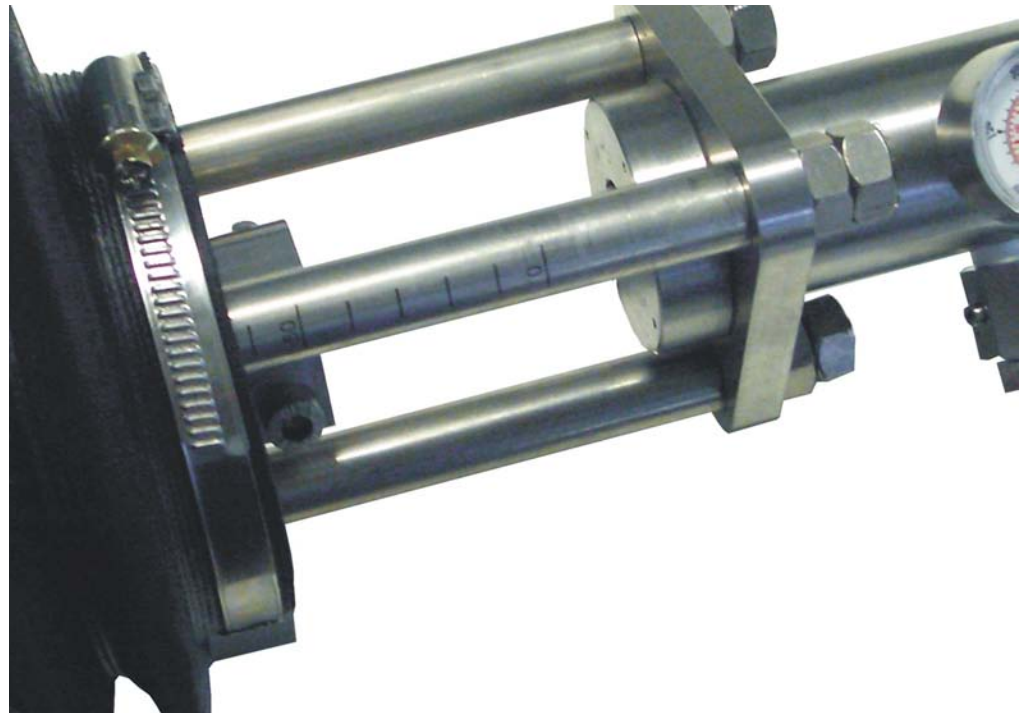


Fig. 2.8: Scaling at the spindle assembly

# **FLWSIC600**

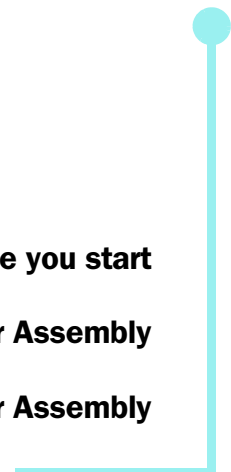
## **Extraction Tool**

### **Operation**

**Before you start**

**Dismounting a Transducer Assembly**

**Mounting a Transducer Assembly**





## 3 Operation

### 3.1 Before you start

The following details and component names relate to the overview drawing (see **Fig. 0.2**) in the document.



---

#### Important

- Make sure to change the corresponding transducer parameters (see Service Manual, Section 8.3.3) after replacing transducer assemblies (1). Otherwise the FLOWSIC600 does not produce precise measuring results.
  - The general design of the ultrasonic transducers (1.1) is the same for each meter size and measuring path. However, there are specific retaining bolts (1.2) for each meter size (nominal diameter) and path position. The transducer assemblies (1) 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 (1.2) for which meter size and measuring path the transducer assembly is suitable.
- 



Fig. 3.1: Selection of retaining bolts with different lengths

### 3.2 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, Section 5.6.



#### Important

- Make sure all necessary parts are available and undamaged before mounting the extraction tool (see Section 3.2.2). Pay particular attention to the gaskets. Insertion slopes must not be damaged nor have sharp edges. Replace defective O rings. All gaskets and sealing faces are shown in **Fig. 0.2**.
- The extraction tool only may be used by authorized staff in accordance with Section 1.2! The using persons must be in the full possession of her intellectual and physical strengths.



#### Warning

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

#### 3.2.1 Preparation

Determine and make a record of the current operating pressure in the pipeline in which the FLOWSIC600 is installed. It is used as a reference value for the pressure reading at the manometer (5.2).

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

	Activity
Adapter (2)	<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 (3)	<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 (3.1) if necessary</li> </ul>
Ball valve (4)	<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 (4.1)</li> <li>• Bypass ball valve (4.3) closed</li> </ul>
Spindle assembly (5)	<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 (see table in Section 2.2.5)</li> </ul>

### 3.2.3 Removing the cover caps (6.1) which protect the transducer assemblies

Remove the fastening screws and take off the caps.

### 3.2.4 Preparing the transducer assembly (1)

- ▶ Pull off the cable which runs to the SPU from the transducer assembly using the coax plug-on auxiliary (see **Fig. 3.22**).
- ▶ Fix the connection cable (6.2) so that it does not obstruct you (e.g. attach it to the SPU with sticky tape).

- Note** For multi-path devices: The cables to the other paths do not have to be disconnected. However, you should fix the connection cables (6.2) so that they do not obstruct you.
- ▶ Make sure the locking nut (1.3) which forms the link between ultrasonic transducer (1.1) and retaining bolt (1.2) is in place and tight. If necessary, tighten the locking nut (1.3) by turning it in clockwise direction with the special key.

### 3.2.5 Mounting the docking rod (3)

Fix the docking rod to the retaining bolt (1.2) of the transducer assembly (1) with the threaded pin (3.1). The threaded pin (3.1) must disappear completely in the retaining bolt (1.2).

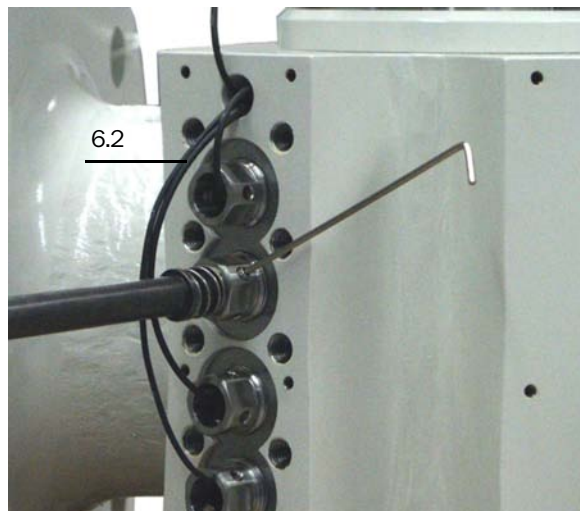


Fig. 3.2: Mounting the docking rod (3) to the transducer assembly (1)

- Notes**
- If the tapped hole in the retaining bolt (1.2) for the insertion of the threaded pin (3.1) is not accessible, you may turn (loosen) the retaining bolt (1.2) cautiously by max. 90 ° in anticlockwise direction.
  - Always use a docking rod (3) suitable for the actual nominal size of the measuring device. (see table in Section 2.2.3).

**3.2.6 Mounting the adapter (2) to the meter body**

- Notes**
- The sealing face at the meter body must be free from dust, dirt, rust and damage.
  - Pay attention to the correct position of the adapter (see appendix table 5.2)!

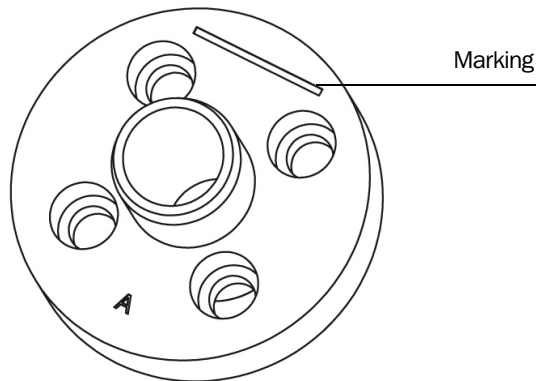


Fig. 3.3: Indication of the adapter

- ▶ Slide the adapter with the O ring side first over the docking rod. Apply anti-seize lubricant on to the four M12 cheese-head screws (DIN 912) and fasten the appropriate adapter (2) to the meter body. 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. 3.4: Mounting the adapter (2) to the meter body



### 3.2.7 Mounting the ball valve (4)

**Note** Lube all O rings and insertion slopes with silicone grease before mounting the ball valve assembly (4).



#### Important

Make sure the ball valve (4) is in its "OPEN" position. Otherwise the ball may be damaged and the extraction operation may fail. The ball valve (4) is fully open when the lever is in the "OPEN" position and touches the mechanical stop.

► Slide the ball valve assembly (4) over the docking rod (3) and on to the adapter (2).

**Note** If the ball valve assembly (4) cannot be sled over the docking rod (3) easily, the ball valve (4) is not fully open. In this case, turn the lever of the ball valve in its "OPEN" position.

► Screw the coupling nut (4.2) at the ball valve on to the adapter (2) until it touches a perceptible mechanical stop.

**Note** The coupling nut (4.2) and adapter (2) are in line when the coupling nut was tightened correctly.

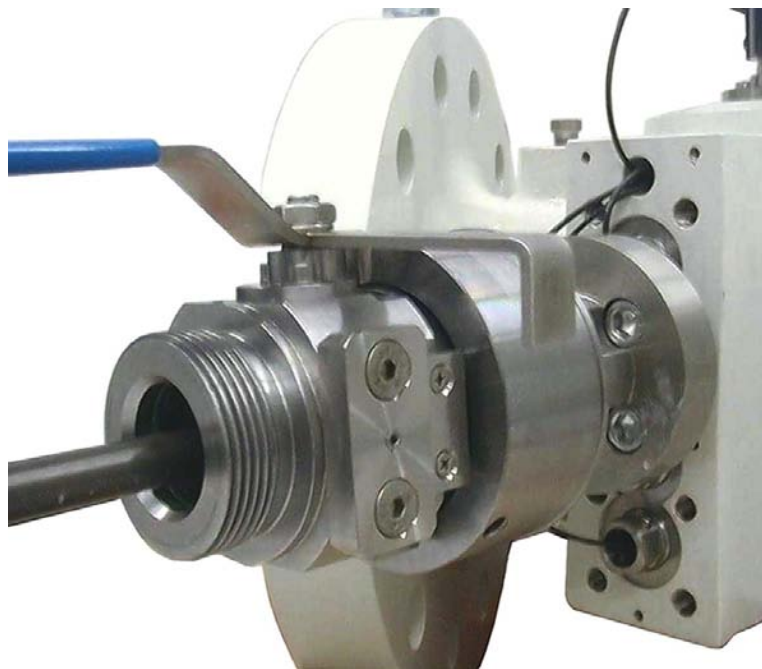


Fig. 3.5: Mounting the ball valve (4) to the adapter (2)

**3.2.8 Mounting the spindle assembly (5)**

**Note** Lube all O rings and the docking rod (3) with silicone grease before mounting the spindle assembly (5).

- ▶ Prepare the spindle assembly (5) so that the bellows flange on the pressure side (5.7) is about at position “50” (see **Fig. 3.6**).

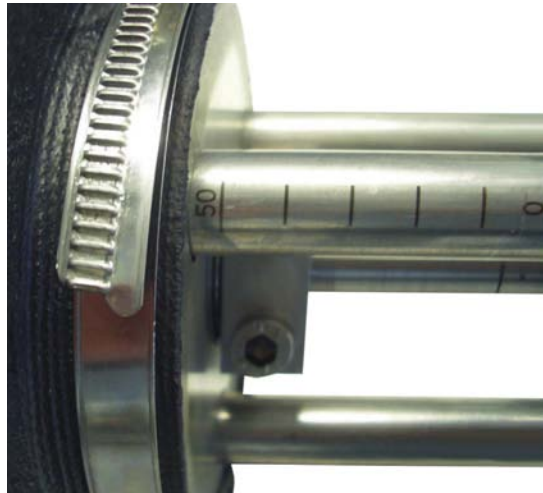


Fig. 3.6: Bellows flange on the pressure side (5.7) before mounting the spindle assembly (5)

- ▶ Slide the spindle assembly (5) cautiously over the docking rod (3) and the ball valve assembly (4) until the coupling nut of the spindle assembly (5.5) engages with the thread at the ball valve assembly (4). Take into account that the spindle assembly (5) is fixed to the ball valve assembly (4) by means of a stop in the coupling nut (5.5).
- ▶ Screw the coupling nut (5.5) on to the ball valve assembly (4) by hand until it stops.
- ▶ Check the entire assembly for firm seat.

Don't use any tool!

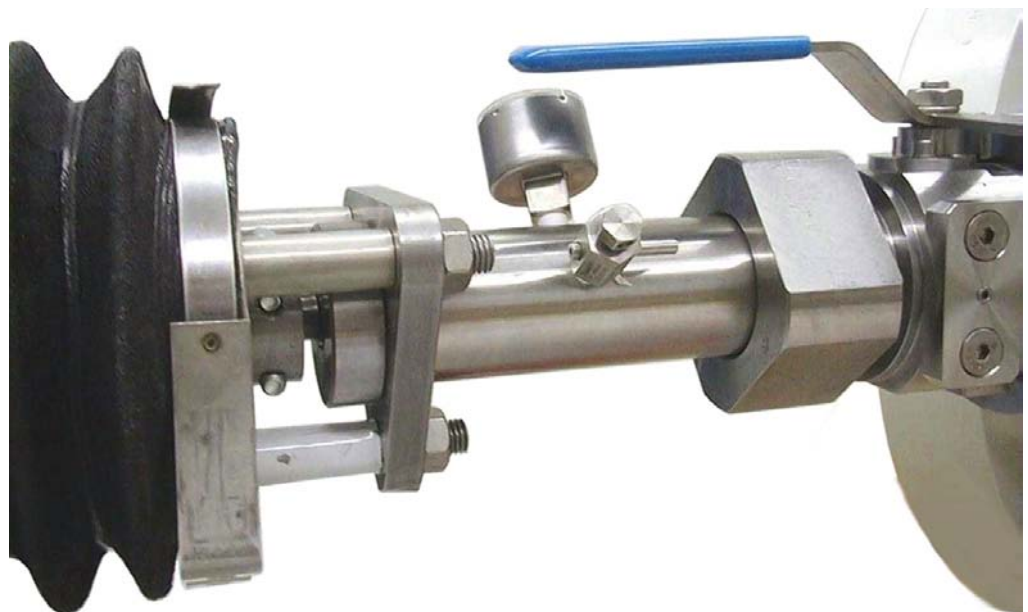


Fig. 3.7: Mounting the spindle assembly (5) to the ball valve assembly (4)

### 3.2.9 Connecting the spindle assembly (5) and docking rod (3)

- ▶ Turn the spindle assembly (5) on to the docking rod (3) until it stops. The bellows flange on the pressure side is about at position “0” of the spindle assembly.
- ▶ Then tighten the cheese-head screws at the coupling (5.4) in order to establish a connection between the docking rod (3) and spindle assembly (5).



Fig. 3.8: Connecting the spindle assembly (5) and docking rod (3)

### 3.2.10 Checking the safety of the extraction tool

- ▶ Check all assemblies for firm seat.
- ▶ The bleed valve (5.3) at the retraction space (5.1) of the spindle assembly (5) must be closed.
- ▶ The bypass ball valve (4.3) in the ball valve assembly (4) must be closed.
- ▶ The manometer (5.2) must indicate zero.

**3.2.11 Pulling out the transducer assembly (1)**

- ▶ Detach the transducer assembly (1) from the meter body by turning the crank (5.8) in anticlockwise direction.

**Note** When pulling the transducer assembly (1) out of the meter body, the sealing O rings of the transducer assembly (1) are removed from their seat. The entire ball valve assembly (4) and the retraction space (5.1) 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 (5.2).



**Warning**

Check the extraction tool for leaks before you continue. Pay particular attention to the connections to the manometer (5.2) and bleed valve (5.3) at the retraction space (5.1). 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 (1) back into the meter body with the help of the extraction tool (see Section 3.3.10) and gasket the leak. Only continue removing the transducer assembly (1) when the extraction tool is absolutely tight.

**Note** Use foaming agents for leak detection (see Section 2.1).

- ▶ Retract the spindle unit (5) until the bellows flange on the pressure side (5.7) has clearly moved beyond the mark for the corresponding transducer position (marks for individual pipe sizes and measuring path positions – see table in Section 2.2.5).

**Note** If the spindle assembly (5) is not retracted far enough, the transducer assembly (1) may be damaged when you close the ball valve (4).

### 3.2.12 Dismounting the spindle assembly (5)

- ▶ When the required retraction position is reached, close the ball valve (4) (see **Fig. 3.9**).

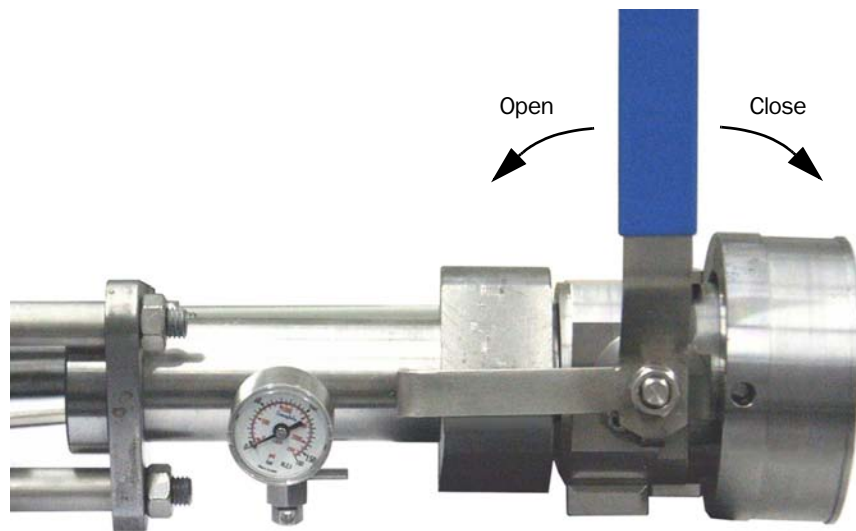


Fig. 3.9: Closing the ball valve (4)

**Note** Close the ball valve (4) cautiously. If you cannot close the ball valve (4), retract the spindle assembly (5) further.

- ▶ After closing the ball valve (4), depressurise the retraction space (5.1) by opening the bleed valve (5.3) (see **Fig. 3.10**).



Fig. 3.10: Opening the bleed valve (5.3)

- Notes**
- The bleed valve (5.3) 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 (5.3) again before you open it.
  - The manometer (5.2) at the retraction space (5.1) must show a continuous pressure drop and finally read "0". Pressure equalisation should be achieved after max. 2 minutes for any pressures.
  - The bleed valve (5.3) may not be closed. Possible minimal leaks in the ball valve can be detected by covering the bleed valve (5.3) with a leak detection spray so that escaping gas is seen (see Section 3.3.10).



**Warning**

If a complete pressure equalisation 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 (4.3) in the ball valve assembly (4) is not fully closed.
  - Close the bleed valve (5.3).
  - Make sure the bypass ball valve (4.3) in the ball valve assembly (4) is fully closed.
  - Open the bleed valve (5.3).

If a complete pressure equalisation can still not be achieved, continue solving possible problem 2.

- Possible problem 2: Ball valve (4) is not fully closed.
  - Close the bleed valve (5.3).
  - Open the ball valve (4) and close it again cautiously.
  - Open the bleed valve (5.3).

If a complete pressure equalisation can still not be achieved, continue solving possible problem 3.

- Possible problem 3: Ball valve (4) is defective.
  - Close the bleed valve (5.3).
  - Insert the transducer assembly (1) as described in Section 3.3.
  - Dismantle the extraction tool and send the ball valve (4) for check to SICK .



**Important**

For safety reasons, the spindle assembly (5) must only be dismantled after removing the lever (4.1) from the ball valve assembly (4) (see **Fig. 3.11**). This aims to avoid unintentional opening of the ball valve (4) while the spindle assembly (5) is dismantled.

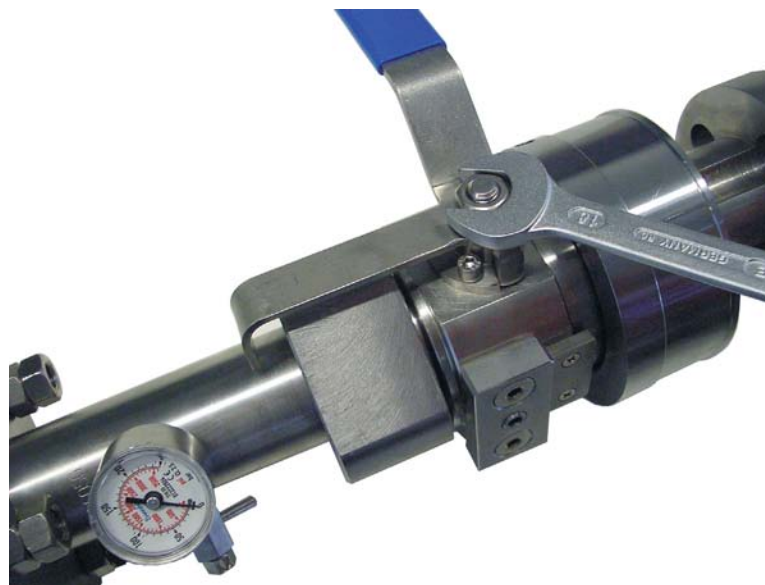


Fig. 3.11: Dismounting the lever (4.1) from the ball valve (4)

Dismantling only by hand without tool!

- ▶ After complete pressure equalisation and dismantling the lever (4.1) from the ball valve (4), you can remove the spindle assembly (5) by undoing the coupling nut (5.5) which forms the connection to the ball valve assembly (4).

**Note**

- ▶ If the retraction space (5.1) is still under pressure, it is not possible to dismantle the spindle assembly (5).
- ▶ Dismount the spindle assembly (5), docking rod (3) and the transducer assembly (1) attached to it.
- ▶ Plug the DN 63.5 cover cap (7) on to the ball valve assembly (4) to protect the thread, gaskets and ball valve (4) ball.

### 3.2.13 Dismount the transducer assembly (1) from the spindle assembly (5)

- ▶ Turn the docking rod (3) with the transducer assembly (1) out of the retraction space.
- ▶ Loosen the coupling (5.4) (see **Fig. 3.12**) and remove the transducer assembly (1) with docking rod (3) from the spindle assembly (5)
- ▶ Loosen the threaded pin (3.1) and disconnect the transducer assembly (1) from the docking rod (3).
- ▶ Undo the locking nut (1.3) using the special key and disconnect the ultrasonic transducer (1.1) from the retaining bolt (1.2).

You can now service or replace the ultrasonic transducer (1.1).



Fig. 3.12: Undoing the coupling (5.4) to dismount the docking rod (3)

### 3.3 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 (Section 5.6).



#### Important

- Make sure all necessary parts are available and undamaged before mounting the extraction tool (see Section ). Pay particular attention to the gaskets. Insertion slopes must not be damaged nor have sharp edges. Replace defective O rings. All gaskets and sealing faces are shown in **Fig. 0.2**.
- Always replace the O rings at the ultrasonic transducer (1.1) when (re-)inserting it. Only use genuine O rings for FLOWSIC600 ultrasonic transducers.
- The extraction tool only may be used by authorized staff in accordance with Section 1.2! The using persons must be in the full possession of her intellectual and physical strengths.



#### Warning

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

#### 3.3.1 Checking the condition of the extraction tool

	Activity
Docking rod (3)	<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 (3.1) if necessary</li> </ul>
Spindle assembly (5)	<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 (see table in Section 2.2.5)</li> </ul>

#### 3.3.2 Mounting the transducer assembly (1)

Connect the ultrasonic transducer (1.1) and retaining bolt (1.2) by tightening the locking nut (1.3) with the special key so that a small axial play is possible between retaining bolt (1.2) and ultrasonic transducer (1.1) also after the connection. This is required to equalize small tolerances in the meter body.



#### Warning

The transducer assemblies (1) 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 (1.2) suitable for the actual nominal size of the measuring device and the path position. Mounting mismatched transducer assemblies (1) may lead to leaks and thus form a jeopardy to the operating staff and equipment.



**Note** Treat the threads of the retaining bolts (1.2) with anti-seize lubricant in order to avoid jamming.

### 3.3.3 Mounting the transducer assembly (1) to the docking rod (3)

Fix the docking rod (3) to the retaining bolt (1.2) of the transducer assembly (1) with the threaded pin (3.1). The threaded pin (3.1) must disappear completely in the retaining bolt (1.2).



Fig. 3.13: Mounting the transducer assembly (1) to the docking rod (3)

### 3.3.4 Inserting the docking rod (3) into the spindle assembly (5)

**Note** Lube all O rings at the ultrasonic transducer (1.1) and the docking rod (3) with silicone grease before mounting the spindle assembly (5).

- ▶ Insert the docking rod (3) into the spindle assembly (5) cautiously until the docking rod (3) stops in the coupling (5.4).
- ▶ Check the position of the spindle assembly (5). The lower side of the bellows flange on the pressure side (5.7) must be beyond the retraction mark corresponding to the pipe size and path position (see table in Section 2.2.5 and **Fig. 2.8**).

### 3.3.5 Connecting the spindle assembly (5) and docking rod (3)

Tighten the cheese-head screws of the coupling (5.4) to get a fixed connection between docking rod (3) and spindle assembly (5).



Fig. 3.14: Fixing the coupling (5.4) between the spindle assembly (5) and docking rod (3)

**3.3.6 Mounting the spindle assembly (5)**

- ▶ Take the DN 63.5 cover cap (7) off the ball valve assembly (4).
- ▶ Slide the spindle assembly (5) cautiously on to the ball valve assembly (4) until the coupling nut of the spindle assembly (5.5) engages with the thread at the ball valve assembly (4).
- ▶ Screw the coupling nut (5.5) on to the ball valve assembly (4) until it stops.

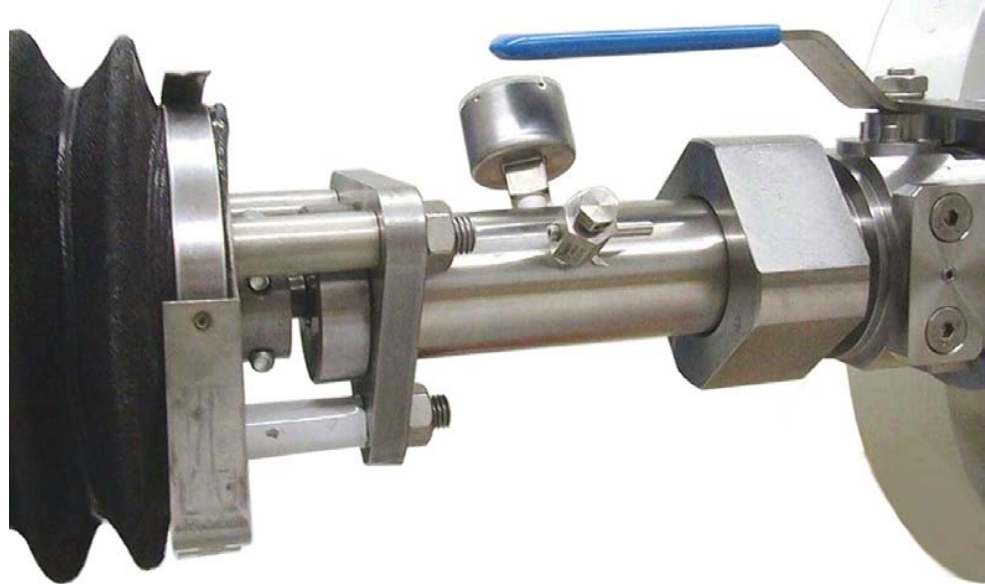


Fig. 3.15: Mounting the spindle assembly (5) to the ball valve assembly (4)

**Note** If the spindle assembly (5) cannot be screwed on to the ball valve assembly (4), the docking rod (3) with transducer assembly (1) must be screwed further out of the spindle assembly (5).

**3.3.7 Checking the safety of the extraction tool**

- ▶ Check all assemblies for firm seat.
- ▶ The bleed valve (5.3) at the retraction space (5.1) of the spindle assembly (5) must be closed.
- ▶ The manometer (5.2) must indicate zero.

**3.3.8 Pressure equalisation in the retraction space (5.1)**

To ensure proper function of the ball valve (4), the pressure in the retraction space (5.1) must be raised to the pressure in the meter body and the pipeline before opening the ball valve.

- ▶ Open the bypass ball valve (4.3) in the ball valve assembly (4).  
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 (see **Fig. 3.16**). The manometer (5.2) at the spindle assembly (5) must show a continuous rise in pressure in the retraction space until the pipeline pressure is achieved. Pressure equalisation should be achieved after max. 2 minutes.

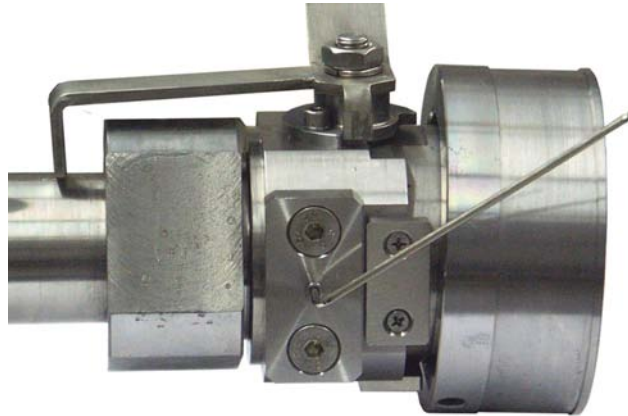


Fig. 3.16: Opening the bypass ball valve (4.3) in the ball valve assembly (4)



### Warning

- If a complete pressure equalisation is not achieved in the retraction space, the gaskets in the ball valve assembly (4) may become damaged if you continue. Defective gaskets may block the opening in the ball valve (4). In this case, the transducer assembly (1) can only be inserted after depressurisation of the pipeline section in which the measuring system is installed. Only continue if a complete pressure equalisation has been achieved.
- Check the extraction tool for leaks before you continue. Pay particular attention to the connections to the manometer (5.2) and bleed valve (5.3) at the retraction space (5.1). 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 (4.3) in the ball valve assembly (4) and gasket the leak. Only continue inserting the transducer assembly (1) when the extraction tool is absolutely tight.

- ▶ After pressure equalisation, close the bypass ball valve (4.3) in the ball valve assembly (4). To do so, turn the bypass ball valve in clockwise direction until it stops using a 5 mm Allen key.
- ▶ After the safety check, remount the lever (4.1) to the ball valve (4) (see **Fig. 3.17**).

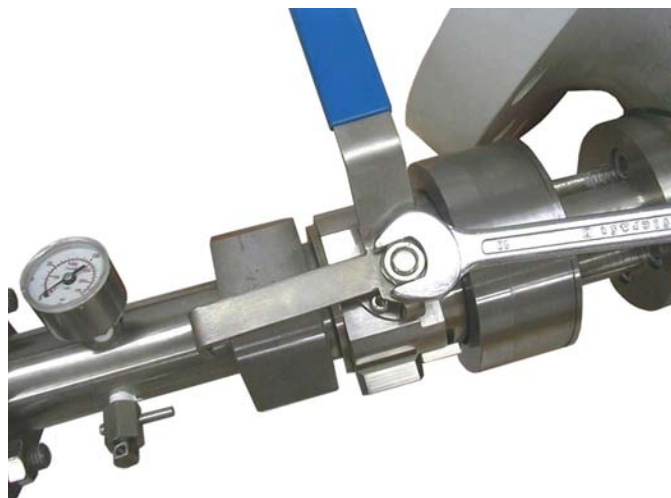


Fig. 3.17: Mounting the lever (4.1) to the ball valve (4)

**3.3.9 Opening the ball valve (4)**



**Important**

A full pressure equalisation in the retraction space (5.1) (see above) forms a necessary precondition for opening the ball valve (4). The pressure equalisation can be determined by comparing the manometer (5.2) reading and the operating pressure in the pipeline.

Open the ball valve (4) after full pressure equalisation between meter body and retraction space (5.1).

**3.3.10 Mounting the transducer assembly (1) to the meter body**

- ▶ Turn the crank (5.8) in clockwise direction to move the transducer assembly (1) with the docking rod (3) towards the meter body. The threads at the transducer assembly (1) and meter body engage automatically.

- Notes**
- 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.
  - Correct seat of the transducer is achieved when it comes to a clear stop. The bellows flange on the pressure side (5.7) must be about at the retraction mark “0” then (see **Fig. 3.18**).



Fig. 3.18: Bellows flange on the pressure side (5.7)



**Important**

Interrupt the process if the parts are restricted or jam when you move the transducer assembly (1) towards and into the meter body before reaching the “0” mark. Before you continue, you must retract the transducer assembly (1) again, dismantle the spindle assembly (5) and check the transducer assembly (1) (see Section 3.2.11 +).

- ▶ Depressurise the retraction space (5.1) and ball valve (4) by opening the bleed valve (5.3) after the transducer assembly (1) is fully inserted.



Fig. 3.19: Opening the bleed valve (5.3)

#### Notes

- The bleed valve (5.3) 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 (5.3) again before you open it.
- The manometer (5.2) at the retraction space (5.1) must show a continuous pressure drop and finally read "0". Pressure equalisation should be achieved after max. 3 minutes.
- After full pressure equalisation, 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.



#### Warning

If a complete pressure equalisation cannot be achieved, the meter body was not fully sealed by the transducer assembly (1). Do not continue in this case. For troubleshooting, completely retract, dismount and check the transducer assembly (1) (see Section 3.2.11).

**3.3.11 Dismounting the spindle assembly (5)**

- ▶ After full pressure equalisation between the retraction space and ambient air, disconnect the docking rod (3) from the spindle assembly (5) by removing the cheese-head screws at the coupling (5.4) in the ball valve assembly (4).

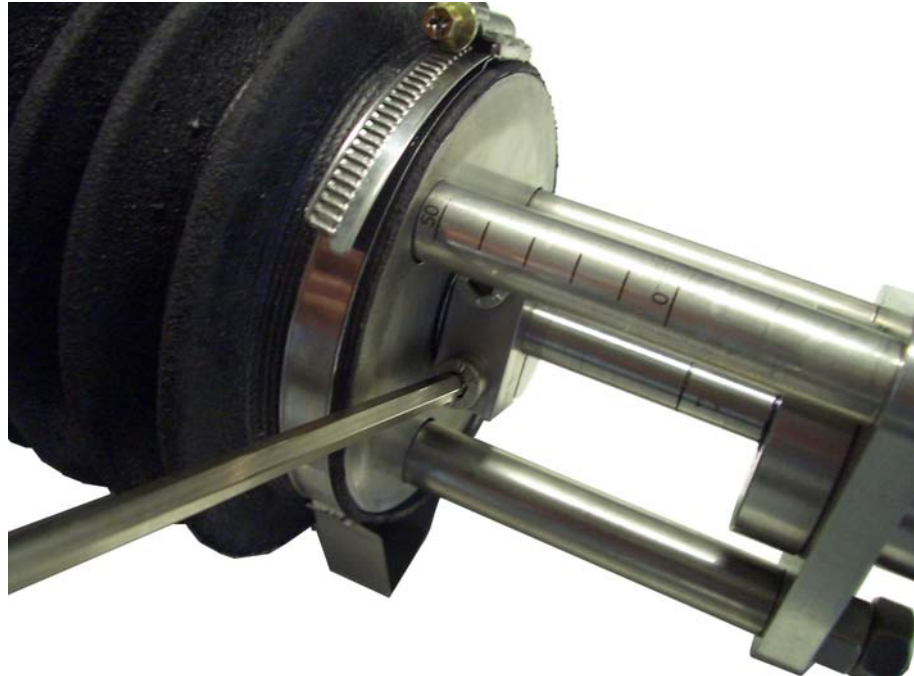


Fig. 3.20: Undoing the cheese-head screws at the coupling (5.4)

- ▶ Disconnect the spindle assembly (5) from the ball valve assembly (4) by screwing off the coupling nut (5.5).

- Notes**
- Be very cautious when dismounting the spindle assembly (5) to avoid the docking rod (3) to be damaged.
  - The docking rod (3) remains in the ball valve (4).

**3.3.12 Dismounting the ball valve assembly (4)**

- ▶ Screw off the coupling nut (4.2) to dismount the ball valve assembly (4) from the adapter (2).
- ▶ Pull back the ball valve assembly (4) over the docking rod (3).

- Notes**
- Be very cautious when dismounting the ball valve assembly (4) to avoid the docking rod (3) to be damaged.
  - The docking rod (3) remains in the adapter (2).

**3.3.13 Dismounting the adapter (2)**

- ▶ Undo the four M12 cheese-head screws (DIN 912) with which the adapter is fixed and pull back the adapter (2) over the docking rod (3).

- Notes**
- Be very cautious when dismounting the adapter (2) to avoid the docking rod (3) to be damaged.
  - The docking rod (3) remains in the transducer assembly (1).

### 3.3.14 Dismounting the docking rod (3)

Undo the threaded pin (3.1) from the retaining bolt (1.2) and disconnect the docking rod (3) from the transducer assembly (1).

**Note** If the tapped holes in the retaining bolt (1.2) for the insertion of the threaded pin (3.1) are not accessible, you may turn (loosen) the retaining bolt (1.2) cautiously by max. 90° in anticlockwise direction.

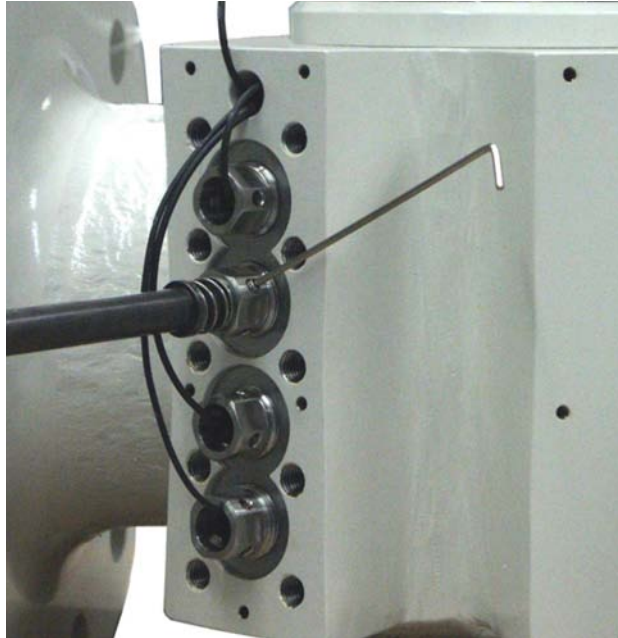


Fig. 3.21: Dismounting the docking rod (3)

### 3.3.15 Checking the transducer assembly (1) for correct seat



#### Important

After the installation of the transducer assembly (1) 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 (1) is firmly seated by tightening the retaining bolt (1.2) 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!

**3.3.16 Connecting the transducer assembly (1)**

Connect the transducer assembly (1) to the SPU electronics unit by plugging the cable connectors on to the transducer contact.

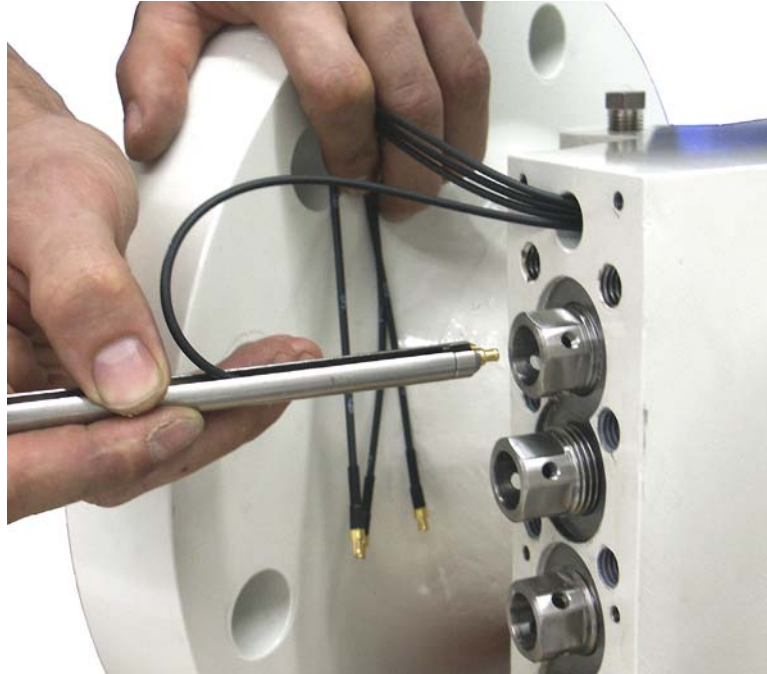


Fig. 3.22: Contacting the transducer assembly (1) using the coax plug-on auxiliary

- Notes**
- The electrical connection of the ultrasonic transducer (1.1) is of intrinsically safe design (EEx [ia], see FLOWSIC600 Operating Instruction Section 2.10). This makes it possible to disconnect and reconnect the ultrasonic transducers (1.1) electrically in hazardous areas without the need to interrupt the SPU power supply.
  - You may use the coax plug-on auxiliary to connect the transducer, in particular for large meter sizes.
  - The correct function of the measuring path is indicated on the SPU by:
    - LED type: The LEDs shine.
    - LCD type: The flashing display changes to continuous display of selected variables.

**3.3.17 Mounting the cover caps (6.1)**

**Note** Before mounting the cover caps (6.1), make sure the gaskets and sealing faces at the cover caps (6.1) and meter body are undamaged and clean. Remove rust and dirt if necessary. Replace defective gaskets if necessary.

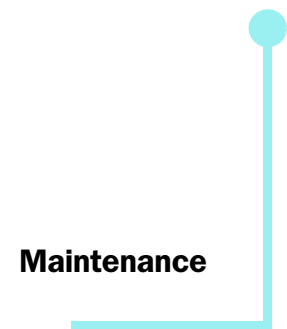
- ▶ Put on the caps (6.1) and fix them with the fastening screws.
- ▶ Enter the transducer parameters as described in the Service Manual, Section 8.3.3.



# FLAWSIC600

## Extraction Tool

### Maintenance





## 4 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 (for the position of the O rings see **Fig. 0.2**).



---

### Important

- ▶ 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 (for the position of the sealing faces see **Fig. 0.2**). 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.

Extraction Tool

# **FLAWSIC600**

## **Extraction Tool**

### **Appendix**

**Selection Table for Extraction Tool**

**Overview Drawing**

**Dimensions**

**Space Requirements for using the Extraction Tool**

**Accessories and Spare Parts**

**Quick Guide**





# 5 Appendix

## 5.1 Selection Table for Extraction Tool

FLOWSIC600 Characteristics				Tool Selection		
NPS/ DN	Length	Path Configur.	Applicability	Adapter code	Adapter Order no.	Extraction Tool Order no.
4"/ 100	5D	1/2	Standard up to SC 80	A	7041847	2032451 (Extraction Tool 'Compact')
		1/2	Standard up to SC 120	B	4050102	
6"/ 150	3D up to CL600/PN100	1/2	Standard up to SC 80	C	4050100	
		4/ 2plex		D	7041848	
	5D up to CL900/PN100	1/2	Standard up to SC 120	E	4050101	
		4/ 2plex		F	4040996	
8"/ 200	3D	1/2	Standard up to SC 80	E	4050101	
		4/ 2plex		A	7041847	
		1/2	Standard up to SC 120	E	4050101	
		4/ 2plex		G	4050491	
10"/ 250	3D	1/2/4/2plex	Standard up to SC120	H	7041849	
12"/ 300						
14"/ 350						
16"/ 400						
20"/ 500						
24"/ 600						
26"/ 650						
28"/ 700						
30"/ 750	2D	1/2/4/2plex	Standard up to SC120	D	7041848	
32"/ 800						
34"/ 850						
36"/ 900						
38"/ 950						
40"/ 1000						
42"/ 1050						
44"/ 1100						
46"/ 1150						
48"/ 1200						

Tab. 5.1: Selection table for extraction tool

Extraction Tool

5.2 Overview Drawing

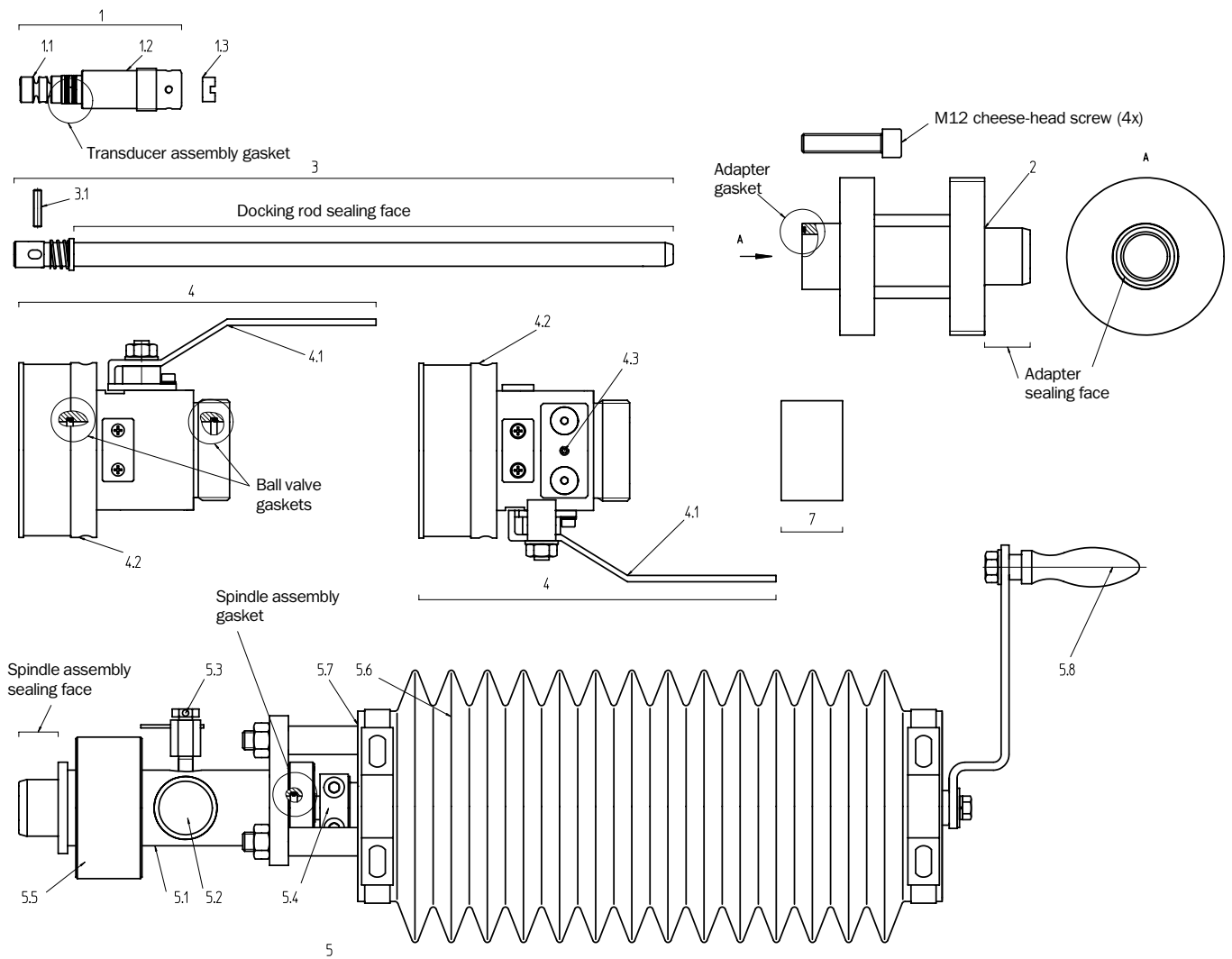


Fig. 5.1 Extraction tool



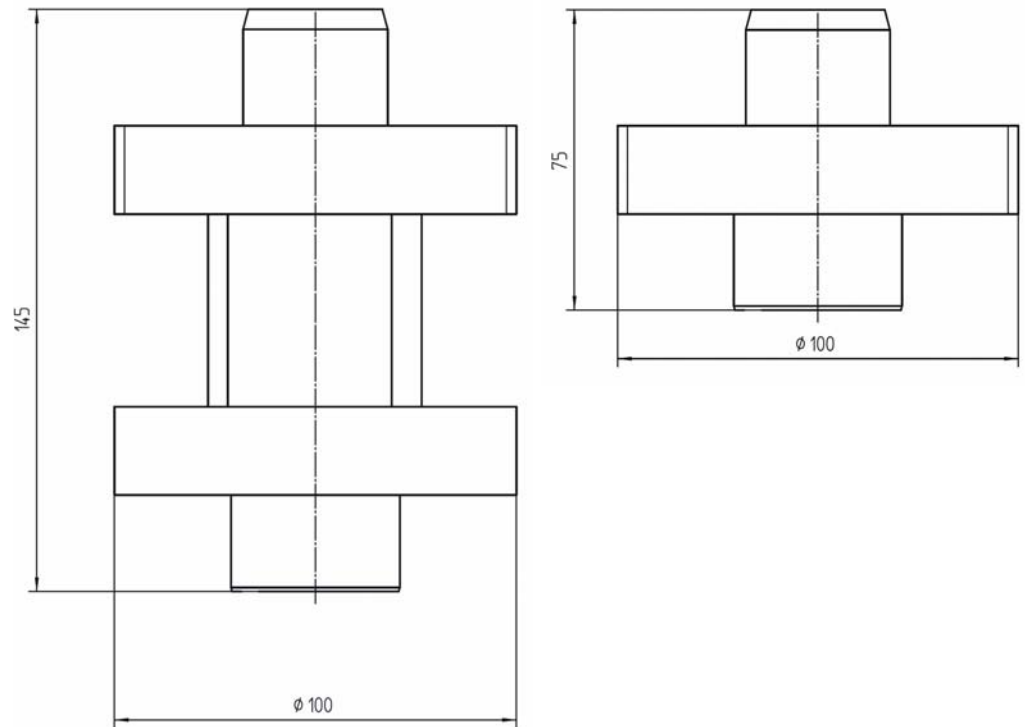
### 5.3 Dimensions

All dimensions in mm

#### 5.3.1 Adapter

Adapter C, D

Adapter A, B, E, F, G, H



Mass: 1.5 kg

0.8 kg

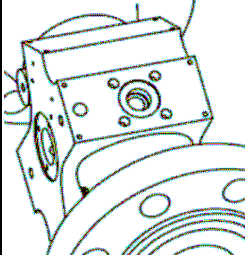
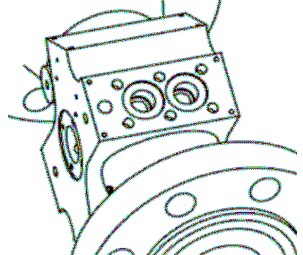
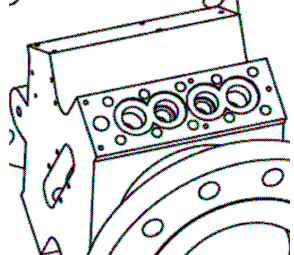

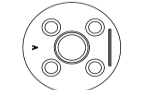
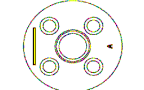


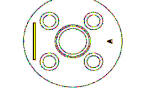

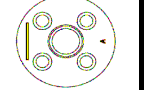
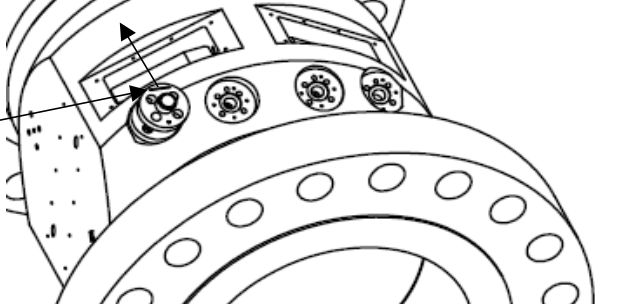
Fig. 5.2: Adapter

#### Adapter use

	Use for nominal sizes	Part no.
Adapter type A	8", 3D, 4 path, up to SC80 and 4", 5D, 1/2 path, up to SC80	7041847
Adapter type B	4", 5D, 1/2 path, > SC80 up to SC120	4050102
Adapter type C	6", 3D, up to CL600, 1/2 path, up to SC80	4050100
Adapter type D	6", 3D, up to CL600, 4 path, up to SC80 and for 26" up to 48", up to SC 120	7041848
Adapter type E	6", 5D, > CL600, 1/2 path, > SC80 up to SC120 and for 8", 3D, 1/2 path, up to SC120	4050101
Adapter type F	6", 5D, > CL600, 4 path, > SC80 up to SC120	4040996
Adapter type G	8", 3D, 4 path, > SC80 up to SC120	4050491
Adapter type H	10" up to 24", 3D, 1/2/4 path, up to SC120	7041849

Tab. 5.2: Adapter required

Adapter installation positions

Adapter installation positions (schematic diagram)					
	Path number				
	1 path version	2 paths version		4 paths version	
					
		Path 1	Path 2		
					
					
	<b>Defined installation situation</b>				
	 <p>Marking always points in the direction of middle of the meter</p>				

Tab. 5.3: Adapter installation positions

**5.3.2 Ball valve assembly**

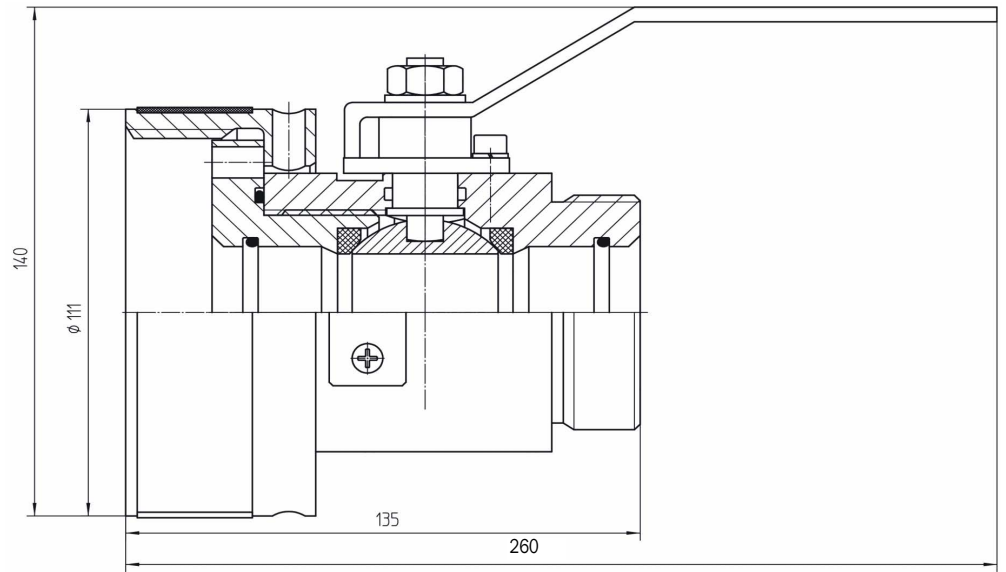


Fig. 5.3: Ball valve

**5.3.3 Spindle assembly**

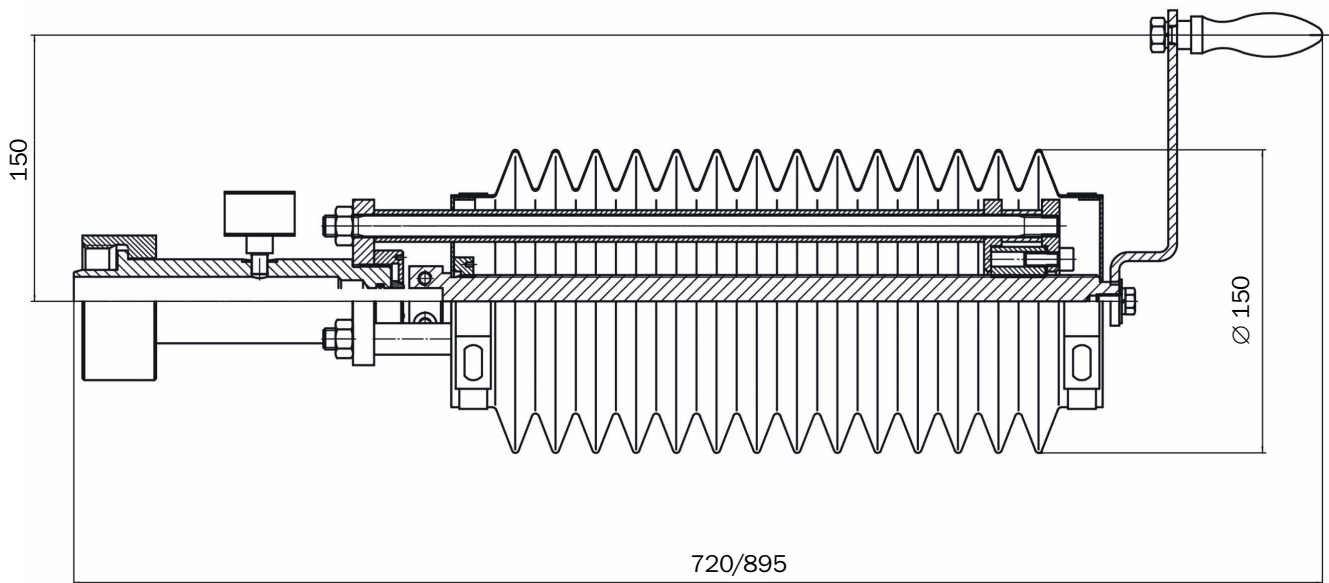


Fig. 5.4: Spindle assembly

**5.3.4 Docking rod**

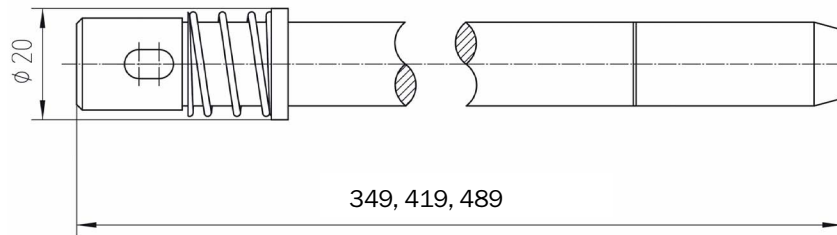


Fig. 5.5: Docking rod

Variant	Nominal size	Length		Identification	Part no.
		mm	in		
<b>Extraction tool "Compact"</b>					
1	DN150/6"-3D	419	16.49	1	7041860
2	DN 100/4" - DN 300/12", not DN 150/6"-3D	349	13.47	2	7041863
<b>Extraction tool "Universal"</b>					
1	DN 100/4" - DN 600/24", not DN 150/6"-3D	419	16.49	1	7041860
3	DN 150/6"-3D, DN 650/26" - DN 1200/48"	489	19.25	3	4049657

Tab. 5.4: Use of the docking rod

**5.3.5 Identification/Type plate**

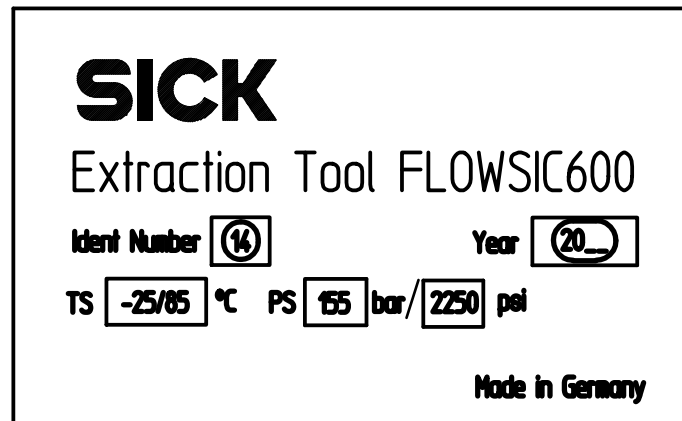


Fig. 5.6: Type plate

- TS: Design temperature
- PS: Design pressure
- Fl.Gr.: Fluid group (I: flammable)

### 5.4 Space Requirements for using the Extraction Tool

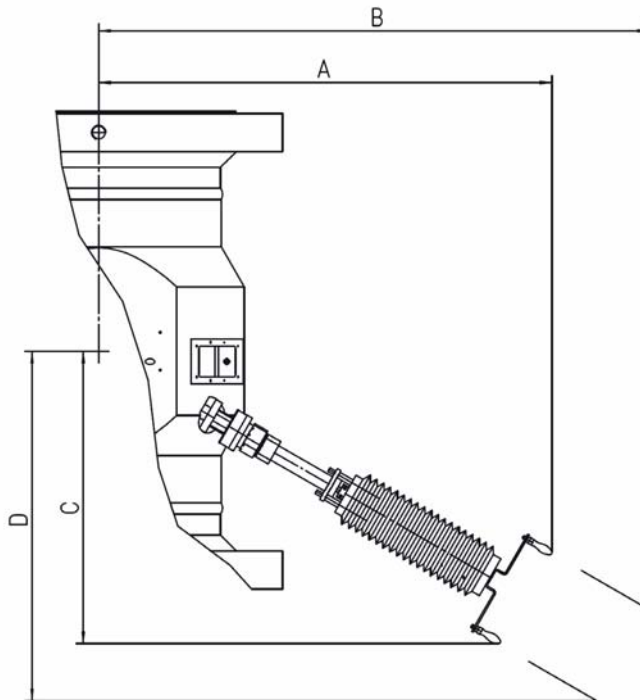


Fig. 5.7: Space requirements for the extraction tool

DN/NPS	Clearance A		Clearance B		Clearance C		Clearance D									
	"Compact"		"Universal"		"Compact"		"Universal"									
	mm	in	mm	in	mm	in	mm	in								
100/4"	910	35.83	1124	44.25	1100	43.31	1314	51.73	525	20.67	649	25.55	635	25.00	759	29.88
150/6"	990	38.98	1204	47.40	1275	50.20	1489	58.62	572	22.52	695	27.36	736	28.98	860	33.86
200/8"	955	37.60	1169	46.02	1175	46.26	1389	54.69	551	21.69	675	26.57	678	26.69	802	31.57
250/10"	980	38.58	1194	47.01	1200	47.24	1414	55.67	566	22.28	689	27.13	693	27.28	816	32.13
300/12"	1000	39.37	1214	47.80	1250	49.21	1464	57.64	577	22.72	701	27.60	722	28.43	845	33.27
400/16"			1260	49.61			1525	60.04			727	28.62			880	34.65
500/20"			1310	51.57			1600	62.99			756	29.76			924	36.38
600/24"			1360	53.54			1650	64.96			785	30.91			953	37.52
650/26"			1380	54.33			1650	64.96			797	31.38			953	37.52
700/28"			1400	55.12			1675	65.94			808	31.81			967	38.07
750/30"			1425	56.10			1700	66.93			823	32.40			981	38.62
800/32"			1450	57.09			1725	67.91			837	32.95			996	39.21
850/34"			1470	57.87			1750	68.90			849	33.43			1010	39.76
900/36"			1495	58.86			1800	70.87			863	33.98			1039	40.91
950/38"			1520	59.84			1825	71.85			878	34.57			1054	41.50
1000/40"			1545	60.83			1850	72.83			892	35.12			1068	42.05
1050/42"			1570	61.81			1875	73.82			906	35.67			1083	42.64
1100/44"			1595	62.80			1900	74.80			921	36.26			1097	43.19
1150/46"			1620	63.78			1925	75.79			935	36.81			1111	43.74
1200/48"			1640	64.57			1950	76.77			947	37.28			1126	44.33

### 5.5 Accessories and Spare Parts

	Order number
Special key	4047937
COAX connection tool NL200	4047938
Accessories extraction tool - consisting of: 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 Allenscrew M12*45 2 x Protection cap for ball tap thread GPN 250/63,5	2039006

## 5.6 Quick Guide

### 5.6.1 Dismounting a transducer assembly

1. Preparation
2. Check the initial condition of the extraction tool.
3. Dismount the cover caps (6.1):
  - Undo the fastening screws and take off the caps.
4. Prepare the transducer assembly (1):
  - Pull off the connection cable.
  - Check the locking nut (1.3).
5. Mount the docking rod (3):
  - Insert the threaded pin (3.1) into the retaining bolt (1.2).
6. Mount the adapter (2) to the meter body:
  - Slide the adapter over docking rod
  - Screw-in the four M12 cheese-head bolts.
7. Mount the ball valve (4):
  - Make sure the ball valve (4) is open.
  - Slide the ball valve assembly (4) over the docking rod (3).
  - Screw the coupling nut (4.2) on to the adapter (2) until it stops.
8. Mount the spindle assembly (5):
  - Move the spindle assembly (5) to position “50”.
  - Slide the spindle assembly (5) over the docking rod (3).
  - Screw the coupling nut (5.5) on to the ball valve assembly (4).
9. Connect the spindle assembly (5) and docking rod (3):
  - Screw the spindle assembly (5) on to the docking rod (3) until it stops.
  - Fasten the cheese-head screws at the coupling (5.4).
10. Check the safety of the extraction tool:
  - Firm seat?
  - Bleed valve (5.3) closed?
  - Bypass ball valve (4.3) in the ball valve assembly (4) closed?
  - Manometer (5.2) shows no pressure?
11. Pull out the transducer assembly (1):
  - Turn the crank (5.8) of the spindle assembly until the correct retraction mark becomes visible.
12. Dismount the spindle assembly (5):
  - Close the ball valve (4).
  - Open the bleed valve (5.3).
  - Wait until the pressure equalisation is achieved  
Manometer shows no pressure? No leakage quantity at the bleed valve (5.3) traceable?
  - Dismount the lever (4.1) from the ball valve (4).
  - Dismount the spindle assembly from the ball valve by undoing the coupling nut (5.5).
13. Disconnect the transducer assembly (1) from the spindle assembly (5):
  - Undo the cheese-head screws at the coupling (5.4).
  - Pull out the docking rod (3) with transducer assembly (1).
  - Undo the threaded pin (3.1) at the transducer assembly (1).
  - Undo the locking nut (1.3).

**5.6.2 Mounting a transducer assembly**

1. Check the condition of the extraction tool.
2. Mount the transducer assembly (1):
  - Fasten the locking nut (1.3).
3. Mount the transducer assembly (1) to the docking rod (3):
  - Insert the threaded pin (3.1) into the retaining bolt (1.2).
4. Insert the docking rod (3) into the spindle assembly (5):
  - Check the position of the spindle assembly (5).
  - Push the docking rod (3) into the coupling (5.4) until it stops.
5. Connect the spindle assembly (5) and docking rod (3):
  - Fasten the cheese-head screws at the coupling (5.4).
6. Mount the spindle assembly (5):
  - Push the spindle assembly (5) and docking rod (3) into the ball valve (4).
  - Screw the coupling nut (5.5) on to the ball valve assembly (4).
7. Check the safety of the extraction tool:
  - Firm seat?
  - Bleed valve (5.3) closed?
  - Manometer (5.2) shows no pressure?
8. Pressure equalisation in the retraction space (5.1):
  - Open the bypass ball valve (4.3) in the ball valve assembly (4).
  - Wait until the pressure equalisation is achieved.
  - Close the bypass valve (4.3).
  - Mount the lever (4.1) to the ball valve (4).
9. Open the ball valve (4).
10. Mount the transducer assembly (1) to the meter body:
  - Turn the crank (5.8) of the spindle assembly until the transducer assembly (1) engages with the meter body and the “0” mark is reached.
  - Open the bleed valve (5.3).
  - Wait until the pressure equalisation is achieved.
11. Dismount the spindle assembly (5):
  - Undo the cheese-head screws at the coupling (5.4).
  - Dismount the spindle assembly from the ball valve (4) by undoing the coupling nut (5.5).
12. Dismount the ball valve assembly (4).
13. Dismount the adapter (2).
14. Dismount the docking rod (3):
  - Remove the threaded pin (3.1) from the retaining bolt (1.2).
15. Check the transducer assembly (1) for correct seat:
  - Tighten the retaining bolt (1.2).
16. Connect the transducer assembly (1).
17. Mount the cover cap (6.1).
18. Enter the new transducer parameters.





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