Knick

User Manual

ARI106

Inline Fitting

Read before installation.
Keep for future use.

www.knick.de

Supplemental Directives

READ AND SAVE THIS DOCUMENT FOR FUTURE REFERENCE. BEFORE ATTEMPTING TO ASSEMBLE, INSTALL, OPERATE OR MAINTAIN THE PRODUCT, PLEASE ENSURE A COMPLETE UNDERSTANDING OF THE INSTRUCTIONS AND RISKS DESCRIBED HEREIN. ALWAYS OBSERVE ALL SAFETY INFORMATION. FAILURE TO COMPLY WITH INSTRUCTIONS IN THIS DOCUMENT COULD RESULT IN SERIOUS INJURY AND/OR PROPERTY DAMAGE. THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE.

These supplemental directives explain how safety information is laid out in this document and what content it covers.

Safety Chapter

This document's safety chapter is designed to give the reader a basic understanding of safety. It illustrates general hazards and gives strategies on how to avoid them.

Warnings

This document uses the following warnings to indicate hazardous situations:

Symbol	Category	Meaning	Remark
⚠	**WARNING**	Designates a situation that can lead to death or serious (irreversible) injury.	The warnings contain information on how to avoid the hazard.
⚠	**CAUTION**	Designates a situation that can lead to slight or moderate (reversible) injury.	
None	**NOTICE**	Designates a situation that can lead to property or environmental damage.	

Symbols Used in this Document

Symbol	Meaning
→	Reference to additional information
✓	Interim or final result in instructions for action
▶	Sequence of figures attached to an instruction for action
①	Item number in a figure
(1)	Item number in text

Table of Contents

1 Safety

This document contains important instructions for the use of the product. Always follow all instructions and operate the product with caution. If you have any questions, please contact Knick Elektronische Messgeräte GmbH & Co. KG (sometimes hereafter referred to as "Knick") using the information provided on the back page of this document.

1.1 Intended use

The ARI106 is an inline fitting for installation in boilers, tanks, and pipes. The product is used to mount a sensor for measuring process parameters such as pH, oxygen, ORP, or conductivity.

The ARI106 can be used with the following sensor types:

Sensors [1)]	Outer diameter 12 mm, length 120 mm, sensor head thread PG 13.5
Liquid-electrolyte sensors	Outer diameter 12 mm, length 120 mm

The defined operating conditions must be observed when using this product.

→ *Specifications, p. 28*

USE CAUTION AT ALL TIMES WHEN INSTALLING, USING, MAINTAINING OR OTHERWISE INTERACTING WITH THE PRODUCT. ANY USE OF THE PRODUCT EXCEPT AS SET FORTH HEREIN IS PROHIBITED, AND MAY RESULT IN SERIOUS INJURY OR DEATH, AS WELL AS DAMAGE TO PROPERTY. CUSTOMER SHALL BE SOLELY RESPONSIBLE FOR ANY DAMAGES RESULTING FROM OR ARISING OUT OF AN UNINTENDED USE OF THE PRODUCT.

1.2 Personnel Requirements

Customer shall ensure that any personnel using or otherwise interacting with the product is adequately trained and has been properly instructed.

The operating company shall comply and cause its personnel to comply with all applicable laws, regulations, codes, ordinances and relevant industry qualification standards related to product. Failure to comply with the foregoing shall constitute a violation of operating company's obligations concerning the product, including but not limited to an unintended use as described in this document.

1) Valid for pH sensors with solid electrolyte, oxygen, ORP, and conductivity sensors.

1.3 Residual Risks

The product has been developed and manufactured in accordance with generally accepted safety rules and regulations, as well as an internal risk assessment. Despite the foregoing, the product may among others bear the following risks:

Environmental Influences

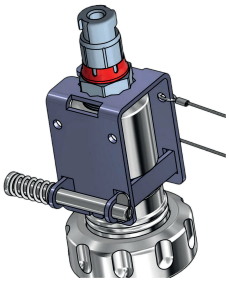
The effects of moisture, ambient temperature, chemicals, and corrosion can negatively impact the safe operation of the product.

Please observe the following instructions:

- Only operate the ARI106 in compliance with the stated operating conditions. → *Specifications, p. 28*
- If using aggressive chemical process media, adjust the inspection and maintenance intervals accordingly. → *Sensor Inspection and Maintenance, p. 22*

1.4 Safety Accessories

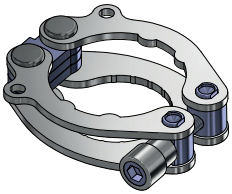
Specially developed accessories are available to increase safety. → *Accessories, p. 25*



ZU1099 Sensor Securing System for ARI 106/106H Inline Fitting

The sensor securing system prevents the screw joint between the inline fitting and the sensor from coming loose.

The sensor securing system's bracket and retainer connect the ARI106 to the sensor. The drop nose pin can be replaced by a padlock.



ZU1092 Sensor Securing System for ARI 106/106H Inline Fitting

The sensor securing system prevents the coupling nut between the inline fitting and the process connection from coming loose.

The noses of the retainer clamps engage in the pockets of the coupling nut and connect them to the process connection.

1.5 Hazardous Substances

IN THE EVENT OF ANY CONTACT WITH HAZARDOUS SUBSTANCES OR OTHER INJURY HEREUNDER, SEEK IMMEDIATE MEDICAL ATTENTION OR FOLLOW APPLICABLE PROCEDURES TO ADDRESS HEALTH AND SAFETY OF PERSONNEL. FAILURE TO SEEK IMMEDIATE MEDICAL ATTENTION MAY RESULT IN SERIOUS INJURY OR DEATH.

In certain situations (e.g., sensor replacement or corrective maintenance), personnel may come into contact with the following hazardous substances:

- Process medium

The operating company is responsible for conducting a hazard assessment.

See the relevant manufacturers' safety data sheets for hazard and safety instructions on handling hazardous substances.

1.6 Safety Training

Upon request, Knick Elektronische Messgeräte GmbH & Co. KG will provide safety instruction and product training during initial commissioning of the product. Further information is available from the relevant Knick representatives.

2 Product

2.1 Package Contents

- ARI106 in the version ordered
- User Manual

2.2 Product Identification

The different versions of the ARI106 are coded in a product code.

The product code is stated on the nameplate, the delivery note, and the product packaging. → *Nameplates, p. 10*

2.2.1 Example of a Version

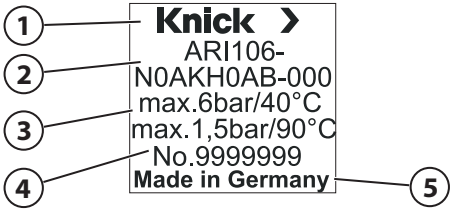
Inline fitting		**ARI106**	**–**	**N**	**1**	**A**	**H**	**H**	**0**	**A**	**B**	**–**	**0**	**0**	**0**	**/**	**0**	**0**	**3**
Sensor	Liquid electrolyte (pressurization possible)				**1**								–			/			
Gasket material	FKM					**A**							–			/			
Fitting body / head materials	1.4435 / 1.4404						**H**						–			/			
Process connection	Ingold socket 25 mm, groove 29.0 mm							**H**	**0**				–			/			
Immersion depth	Short									**A**			–			/			
Probe guard	With										**B**		–			/			
Special variant	None												–	**0**	**0**	**0**	/		
Certificates	Inspection Certificate 3.1 according to EN 10204															/	**0**	**0**	**3**

2.2.2 Product code

Inline fitting		**ARI106 – N**								-				/			
Sensor	Solid electrolyte		**0**							**–**				**/**			
	Liquid electrolyte (pressurization possible)		**1**							**–**				**/**			
	Liquid electrolyte (manual pressurization)		**5**							**–**				**/**			
Gasket material	FKM			**A**						**–**				**/**			
	EPDM			**B**						**–**				**/**			
	FFKM			**K**						**–**				**/**			
	Silicone			**T**						**–**				**/**			
Fitting body / head materials	PEEK / 1.4404				**C**					**–**				**/**			
	1.4435 / 1.4404				**H**					**–**				**/**			
	PVDF / 1.4404				**G**					**–**				**/**			
	PVDF / PVDF		**0**		**D**					**–**				**/**			
	PP-H / 1.4404				**I**					**–**				**/**			
	PP-H / PP-H		**0**		**K**					**–**				**/**			
	Ti / 1.4404				**T**					**–**				**/**			
	C22 / 1.4404				**B**					**–**				**/**			
Process connection	Ingold socket 25 mm, groove 29.0 mm					**H**	**0**			**–**				**/**			
	Ingold socket 25 mm, groove 45.0 mm					**H**	**Z**			**–**				**/**			
Immersion depth	Short							**A**		**–**				**/**			
Probe guard	None								**A**	**–**				**/**			
	With								**B**	**–**				**/**			
Special variant	None									**–**	**0**	**0**	**0**	**/**			
Certificates	None													**/**	**0**	**0**	**0**
	Inspection Certificate 3.1 according to EN 10204													**/**	**0**	**0**	**3**
	FDA													**/**	**0**	**0**	**F**

2.3 Nameplates

The ARI106 is identified by a nameplate.

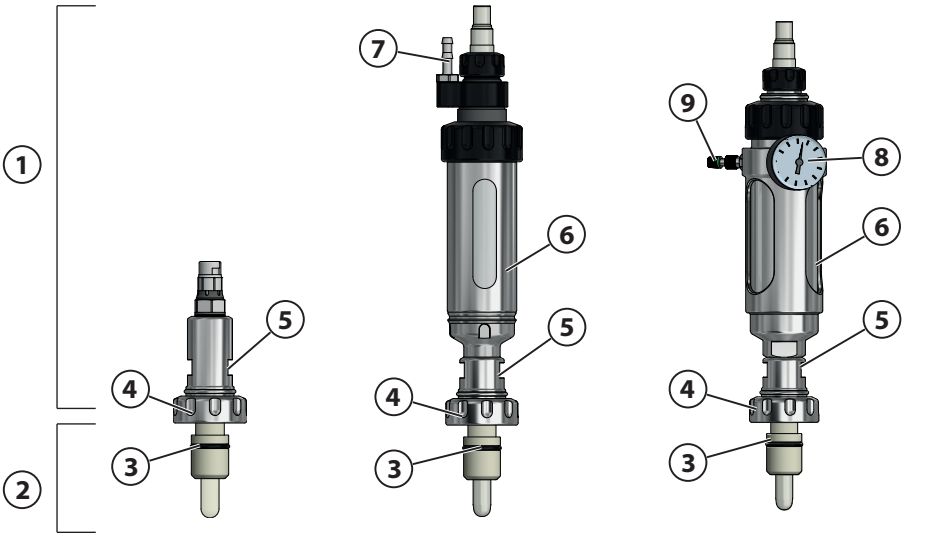


1	Manufacturer	4	Serial number
2	Type (two-line product code)	5	Origin
3	Operating pressure and temperature range		

2.4 Design and Function

The ARI106 inline fitting is a modular system with components made of stainless steel, PEEK, PVDF, PP-H, titanium, or C22.

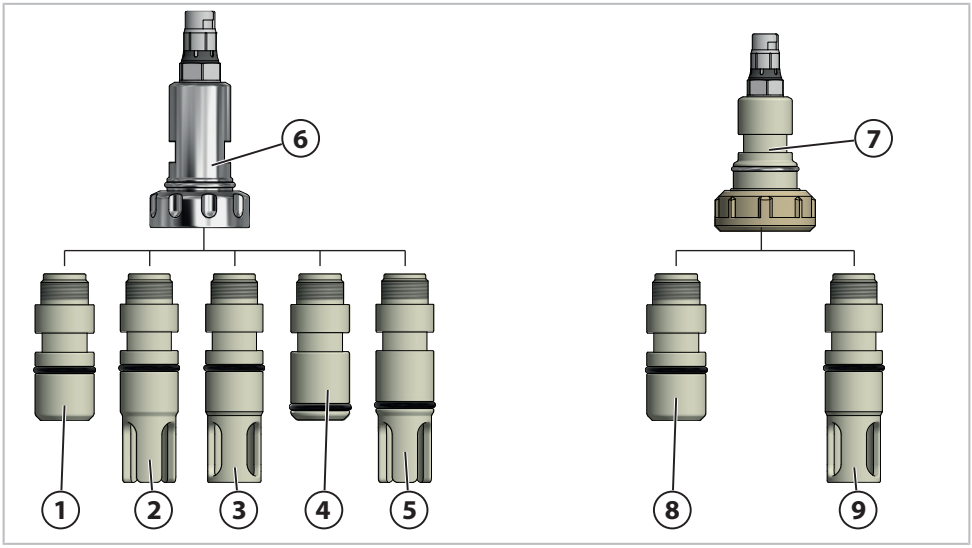
The fitting's head and body are securely connected by a screw joint.



ARI106-N0**H0AA-000/*** ARI106-N1**H0AA-000/*** ARI106-N5**H0AA-000/***

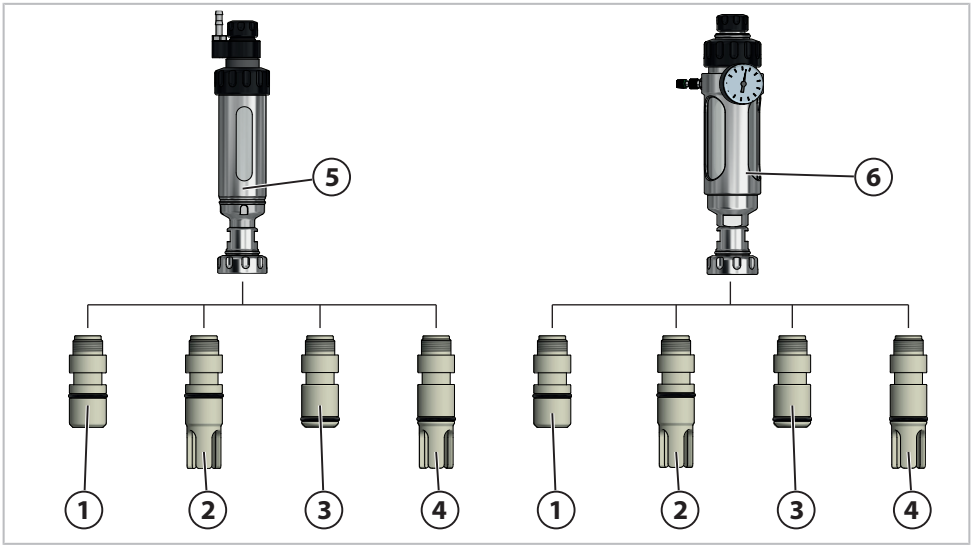
1	Fitting head	6	Pressure chamber
2	Fitting body	7	Pressure connector
3	O-ring 20 x 2.5 mm	8	Manometer
4	Coupling nut	9	Air pump connection
5	A/F 24		

Modules for Sensors



1	Fitting body with groove 29 mm, without sensor protection, material PEEK; PVDF, PP-H, 1.4435, Ti, or C22	6	Fitting head with coupling nut, material 1.4404
2	Fitting body with groove 29 mm, with sensor protection, material PEEK, 1.4435, Ti, or C22	7	Fitting head with coupling nut, material PVDF or PP-H
3	Fitting body with groove 29 mm, with sensor protection, material PVDF or PP-H	8	Fitting body with groove 29 mm, without sensor protection, material PVDF or PP-H
4	Fitting body with groove 45 mm, without sensor protection, material PEEK or 1.4435	9	Fitting body with groove 29 mm, with sensor protection, material PVDF or PP-H
5	Fitting body with groove 45 mm, with sensor protection, material PEEK or 1.4435		

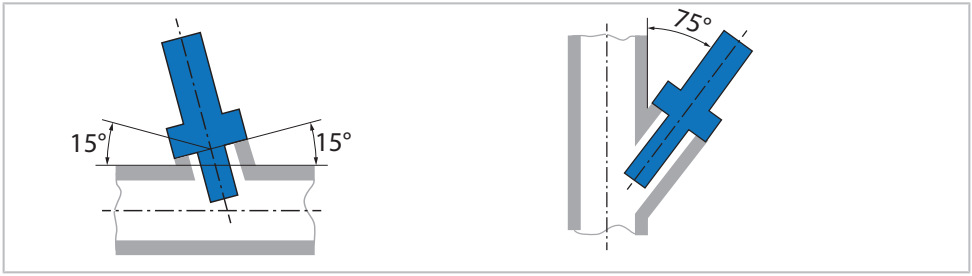
Modules for Liquid Electrolyte Sensors



1	Fitting body with groove 29 mm, without sensor protection, material PEEK; PVDF, PP-H, 1.4435, Ti, or C22	4	Fitting body with groove 45 mm, with sensor protection, material PEEK or 1.4435
2	Fitting body with groove 29 mm, with sensor protection, material PEEK, 1.4435, Ti, or C22	5	Fitting head with coupling nut, pressure chamber for liquid-electrolyte sensors, material 1.4404
3	Fitting body with groove 45 mm, without sensor protection, material PEEK or 1.4435	6	Fitting head with coupling nut, pressure chamber for liquid-electrolyte sensors – for manual filling –, material 1.4404

2.5 Installation Position

The ARI106 is designed for sensor installation at an angle of up to 15° above the horizontal plane, and with vertical piping, at an angle of up to 75° relative to the vertical plane.



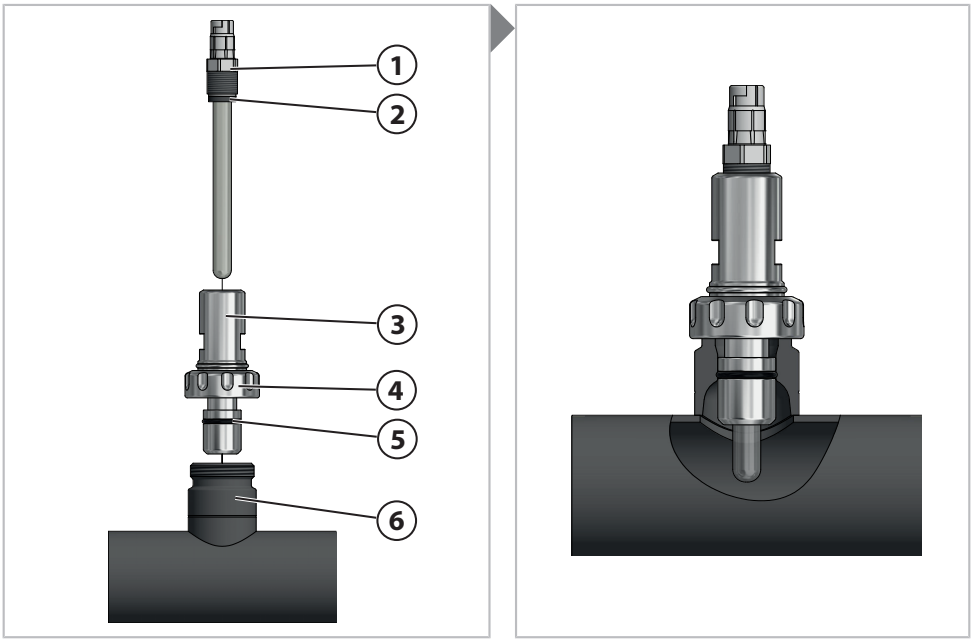
3 Installation

3.1 General Installation Instructions

Note: Installation of the ARI106 inline fitting requires a weld-in socket or ingold socket with a G1¼" external thread. → *Accessories, p. 25*

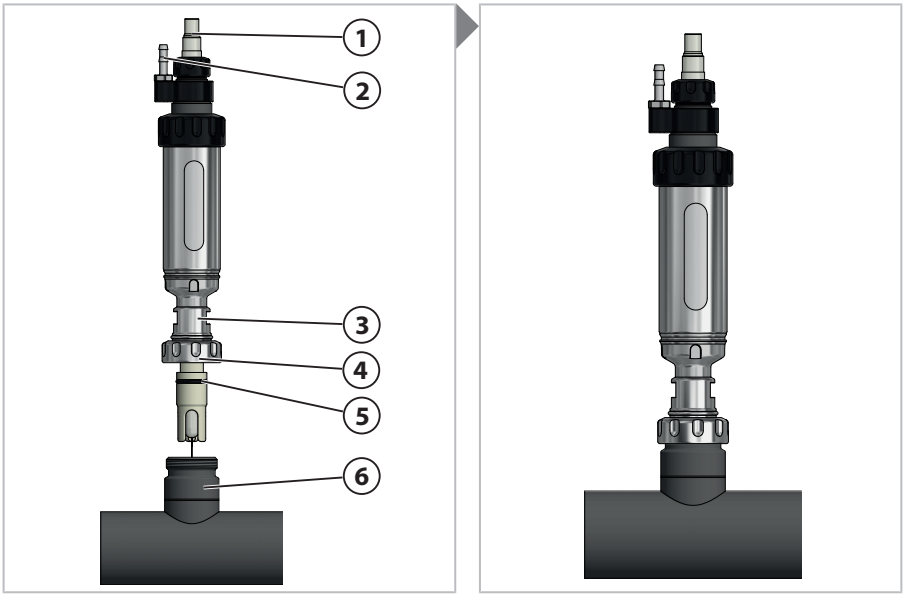
- The threads of the coupling nut and weld-in socket must be clean and undamaged.
- Ensure that O-rings are clean, undamaged, and dry. Adhesives and assembly pastes are not permitted for O-rings.

3.2 Installation of Inline Fitting with Sensor



01. Check the sensor **(1)**, thrust ring **(2)**, and O-ring 20 x 2.5 mm **(5)** for damage.
02. Fit the ARI106 **(3)** on the coupling **(6)**, press firmly down, and tighten the coupling nut **(4)**.
03. Fit the sensor **(1)** in the ARI106 **(4)** and tighten it.
04. Optional: Install the ZU1092 retainer clamp to protect the coupling nut from accidentally coming loose. → *Accessories, p. 25*
05. Optional: Install the ZU1099 sensor securing system to protect the sensor from accidentally coming loose. → *Accessories, p. 25*

3.3 Installation of Inline Fitting with Liquid-Electrolyte Sensor



01. Check the sensor **(1)** and O-ring 20 x 2.5 mm **(5)** for damage.

⚠ **CAUTION! Risk of cutting injuries from broken sensor glass.** Handle the sensor with care. Follow the safety instructions in the sensor manufacturer's documentation.

02. Fit the ARI106 **(3)** on the coupling **(6)**, press firmly down, and tighten the coupling nut **(4)**.

03. Connect the compressed air supply to the connection nozzle **(2)**.

3.4 Pressure and Leak Testing

Note: Pressure and leak tests must be carried out in accordance with the relevant operating regulations or the operating company's instructions.

01. Check the process connections for leaks.

02. Check the ARI106 inline fitting with the sensor securely attached for leaks.

Note: When using liquid-electrolyte sensors, process medium may enter the electrolyte through the junction. Set the air pressure in the pressure chamber to 0.5 to 1.0 bar above the process medium pressure.

03. Observe the specification limits during pressure testing. → *Specifications, p. 28*
    ✓ The ARI106 inline fitting with sensor is leak-tight.

4 Commissioning

4.1 Commissioning the Inline Fitting with Sensor

Note: Upon request, Knick will provide safety briefings and product training during initial commissioning of the product. More information is available from the relevant Knick representatives.

01. Install the ARI106. → *Installation of Inline Fitting with Sensor, p. 14*
02. Install the sensor. → *Installing and Removing the Sensor, p. 19*
03. Check the ARI106 for leaks under process conditions. → *Pressure and Leak Testing, p. 15*
    ✓ The ARI106 inline fitting is ready for operation.

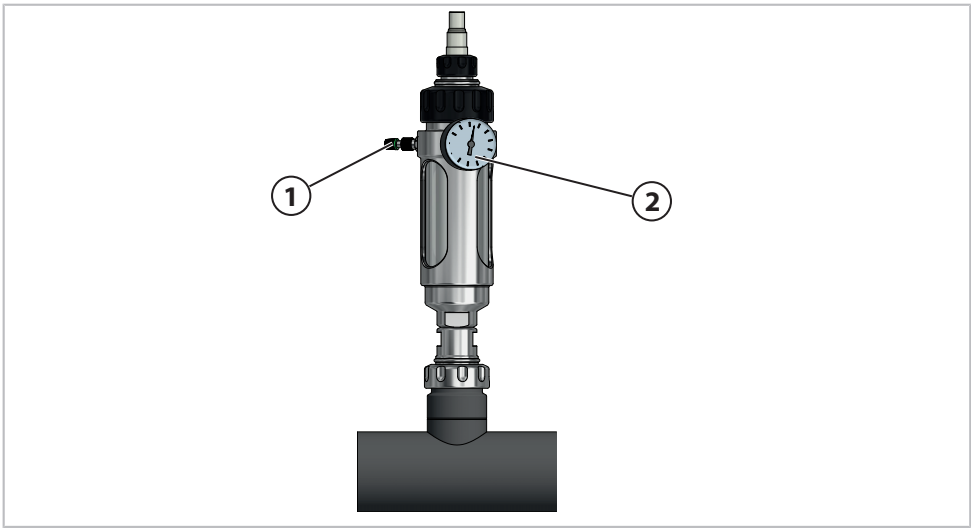
4.2 Commissioning the Inline Fitting with Liquid-Electrolyte Sensor

Note: Upon request, Knick will provide safety briefings and product training during initial commissioning of the product. More information is available from the relevant Knick representatives.

01. Install the ARI106. → *Installation of Inline Fitting with Liquid-Electrolyte Sensor, p. 15*
02. Connect the compressed air supply for a liquid-electrolyte sensor.
03. Check the ARI106 for leaks under process conditions.
    → *Pressure and Leak Testing, p. 15*
    ✓ The ARI106 inline fitting is ready for operation.

4.3 Commissioning the Inline Fitting with Liquid-Electrolyte Sensor and Manual Pressurization

Note: Upon request, Knick will provide safety briefings and product training during initial commissioning of the product. More information is available from the relevant Knick representatives.



01. Install the ARI106. → *Installation of Inline Fitting with Liquid-Electrolyte Sensor, p. 15*
02. Using the hand pump, manually fill the pressure chamber via valve **(1)** up to a maximum of 7 bar (101 psi).

Note: Pay attention to the pressure indicator on the manometer **(2)**.

03. Check the ARI106 for leaks under process conditions. → *Pressure and Leak Testing, p. 15*
    ✓ The ARI106 inline fitting is ready for operation.

5 Operation

5.1 General Notes on Operation

Operation of the ARI106 is maintenance-free. The process, however, may require the sensors to be replaced or removed for cleaning or calibration during operation of the ARI106.

For further information, refer to the applicable documentation of the sensor manufacturer.

5.2 Safety Instructions when Installing and Removing Sensors

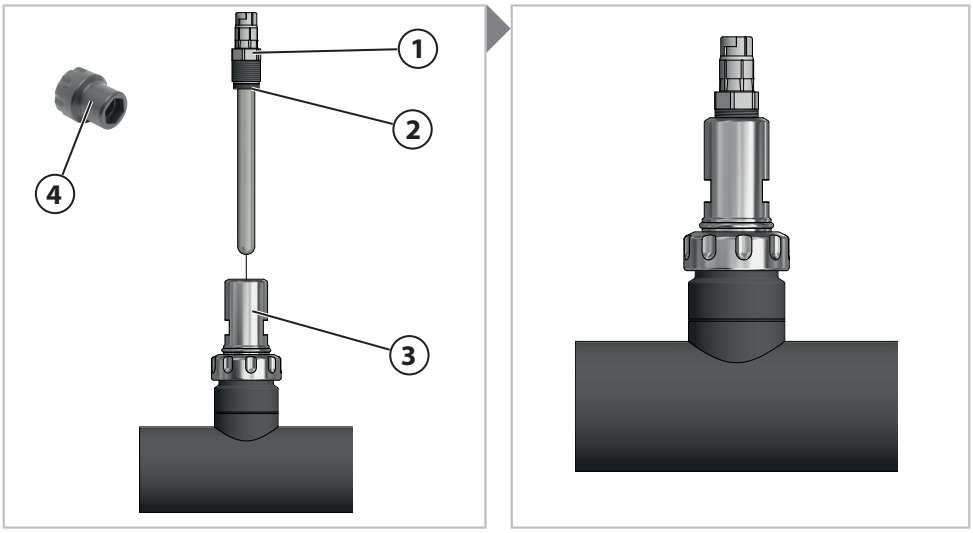
⚠ **WARNING! Process medium, potentially containing hazardous substances, may escape from the ARI106.** Depressurize the area, block the pipe system (no process medium in the area of the fitting), and, as required, rinse the pipe system. Do not install damaged sensors.

⚠ **WARNING! When using the ARI106 without a sensor, process medium containing hazardous substances may escape.** Seal the sensor opening with a pressure screw.

⚠ **CAUTION! Risk of cutting injuries from broken sensor glass.** Handle the sensor with care. Follow the safety instructions in the sensor manufacturer's documentation.

Installing and Removing the Sensor

Installation



01. Check to ensure that the sensor **(1)** is suitable for use.
    - ✓ Diameter 12.0 mm
    - ✓ Length approx. 120 mm
    - ✓ Process connection PG 13.5
    - ✓ Pressure resistance permissible for process → *Specifications, p. 28*
02. Check the sensor **(1)** for damage.

Note: Do not install or commission damaged sensors or O-rings.

03. Push the sensor **(1)** into the ARI106 **(3)**.
04. Screw tight the sensor with accessory ZU0647 **(4)**.
05. Connect the sensor to the sensor cable, the sensor cable to the analyzer.
06. Optional: Install the ZU1099 sensor securing system. → *Accessories, p. 25*
07. Test for leaks.

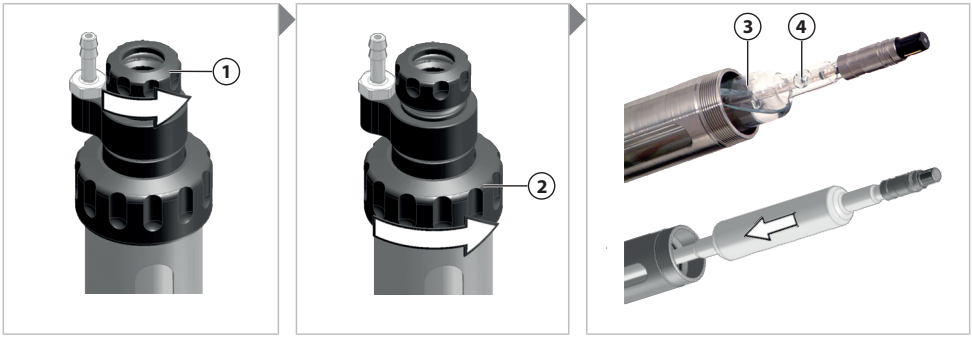
Removal

01. Disconnect the sensor **(1)** from the sensor cable, the sensor cable from the analyzer.
02. Optional: Remove the ZU1099 sensor securing system.
03. Loosen the sensor **(1)** and remove it from the ARI106 **(3)**.

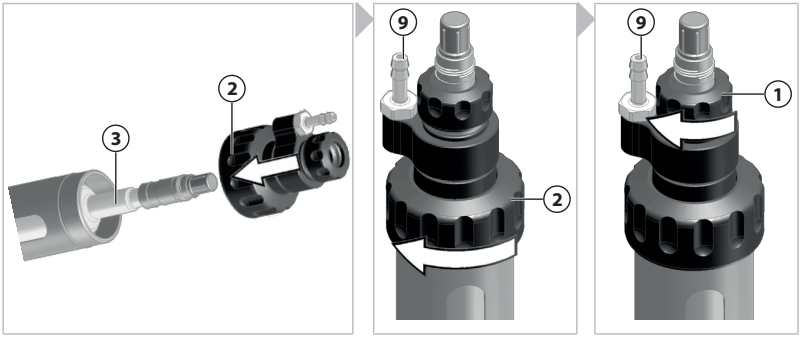
Installing and Removing a Liquid-Electrolyte Sensor

Installation

Note: To ensure that the electrolyte flows from the reference electrode to the process medium, the air pressure in the pressure chamber must be 0.5 to 1 bar above that of the process medium.

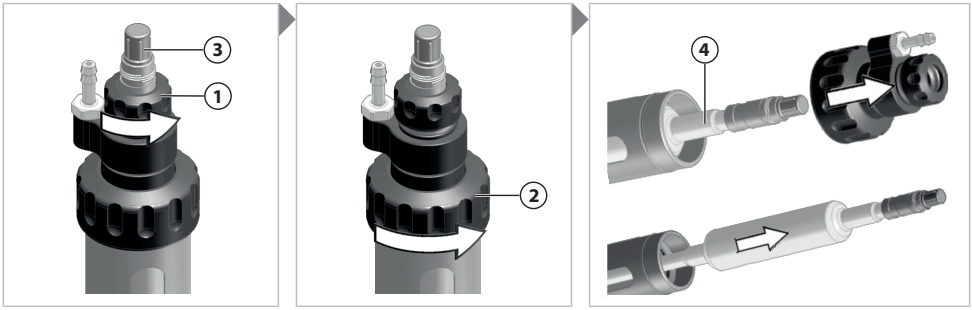


01. Loosen the small coupling nut **(1)** by a few rotations; do not loosen completely.
02. Fully loosen the large coupling nut **(2)** and pull off the entire unit.
03. Remove the watering cap from the sensor tip and rinse the sensor **(3)** with water.
04. Remove the cap of the filling hole **(4)** of the sensor **(3)**.
05. Push in the sensor **(3)**.



06. Position the large coupling nut **(2)** and fasten finger tight.
07. Fasten the small coupling nut **(1)** finger tight.
08. Connect the sensor to the sensor cable, the sensor cable to the analyzer.
09. On first-time installation: Connect the air pressure inlet for the pressure chamber to the connection nozzle **(9)**.

Removal



01. Disconnect the sensor cable from the sensor head **(3)**.
02. Loosen the small coupling nut **(1)** by a few rotations; do not loosen completely.
03. Fully loosen the large coupling nut **(2)** and pull off the entire unit.

Note: Hold the sensor's filling hole upward at an inclined angle during removal to prevent electrolyte from escaping. Follow the instructions in the sensor manufacturer's documentation. During transport and storage, close the sensor's filling hole with the cap.

04. Pull out the sensor **(4)**.
05. If the sensor glass is broken, check the sensor holder O-rings for damage and replace them if necessary.

6 Maintenance

6.1 Sensor Inspection and Maintenance

Information on inspection and maintenance can be found in the user manuals of the installed sensors.

For further information, refer to the applicable documentation of the sensor manufacturer.

6.2 Knick Premium Service

Knick offers individually compiled services tailored to the customer's requirements for inspections and functional tests on the product.

Further information can be found at www.knick.de.

7 Troubleshooting

Malfunction state	Possible remedies
Process medium leakage	Properly secure the sensor adapter coupling nut
	Screw in sensor(s) completely.
	Check sensor(s).
	Check condition of sensor material.
	Check condition of sensor gasket(s).
	Check condition of gasket material.
	Check condition of fitting material.
Axial protrusion of sensor	Screw in the sensor completely and adhere to the tightening torque.
	Comply with temperature/pressure values.
	Use the ZU1099 sensor securing system. → *Accessories, p. 25*

8 Decommissioning

8.1 Inline Fitting: Removal

Note: Obtain approval from the operating company prior to commencing removal of the inline fitting. Adhere to the on-site safety regulations.

⚠ **WARNING! Process medium, potentially containing hazardous substances, may escape from the ARI106.** Depressurize the area, block the pipe system (no process medium in the area of the fitting), and, as required, rinse the pipe system.

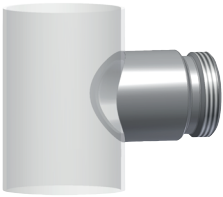
01. Depressurize the process.
02. Disconnect the sensor cable from the sensor/analyzer.
03. Loosen the inline fitting's coupling nut and pull out the inline fitting.
04. Seal off the process ports appropriately.

9 Spare Parts, Accessories, and Tools

9.1 Accessories

ZU0717 (Straight) Weld-In Socket for Tank Walls

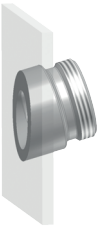
Process connection: Ingold socket (Ø 25 mm, G1 ¼)



ZU0717/DN (Straight) Weld-In Socket for Pipelines

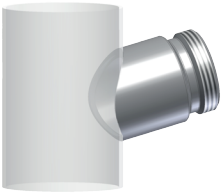
Process connection: Ingold socket (Ø 25 mm, G1 ¼)

adapted to DN50 ZU0717/DN50
adapted to DN65 ZU0717/DN65
adapted to DN80 ZU0717/DN80
adapted to DN100 ZU0717/DN100



ZU0718 (15° Incline) Weld-In Socket for Tank Walls

Process connection: Ingold socket (Ø 25 mm, G1 ¼)



ZU0718/DN (15° Incline) Weld-In Socket for Pipelines

for connecting with Ingold socket (Ø 25 mm, G1 ¼)

adapted to DN50 ZU0718/DN50
adapted to DN65 ZU0718/DN65
adapted to DN80 ZU0718/DN80
adapted to DN100 ZU0718/DN100

ZU0923 (15° Incline) Safety Weld-In Socket HSD for Boiler Walls

Process port: Ingold socket (Ø 25 mm, G1 ¼)

ZU0923/DN (15° Incline) Safety Weld-In Socket HSD for Piping

Process connection: Ingold socket (Ø 25 mm, G1 ¼)

adapted to DN50 ZU0923/DN50
adapted to DN65 ZU0923/DN65
adapted to DN80 ZU0923/DN80
adapted to DN100 ZU0923/DN100

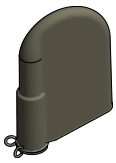
ZU0922/DN (Straight) Safety Weld-In Socket HSD for Piping

Process port: Ingold socket (Ø 25 mm, G1 ¼)

adapted to DN50 ZU0922/DN50
adapted to DN65 ZU0922/DN65
adapted to DN80 ZU0922/DN80
adapted to DN100 ZU0922/DN100

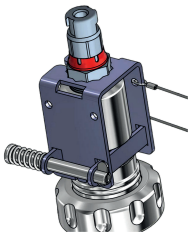
ZU0922 (Straight) Safety Weld-In Socket HSD for Boiler Walls

Process port: Ingold socket (Ø 25 mm, G1 ¼)



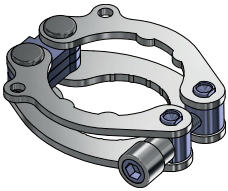
ZU0931 Protective Cap

Covers the sensor connection and helps to protect the cable routing.



ZU1099 Sensor Securing System

The sensor securing system prevents the screw joint between the sensor and fitting from accidentally coming loose.



ZU1092 Retainer Clamp

The retainer clamp prevents the coupling nut from accidentally coming loose.

9.2 Tools

ZU0647 Sensor Spanning Wrench

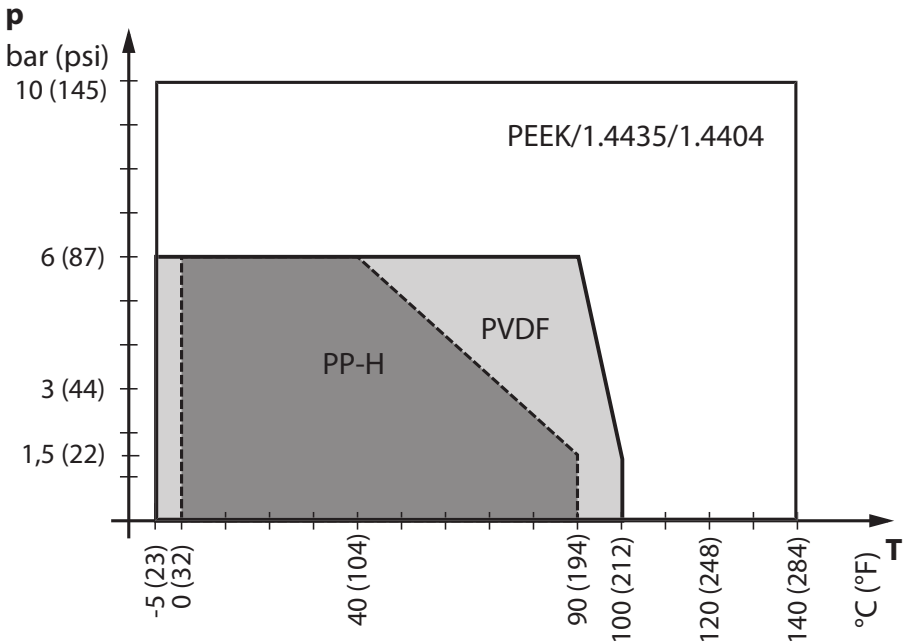
ZU0647 "Sensor spanning wrench" is used to properly tighten sensors. It prevents damage to the plastic thread of the sensor head PG 13.5 caused by applying an excessive tightening torque (e.g., when using an open-end wrench).

10 Specifications

Note: Thermoplastics have temperature-dependent mechanical properties. Observe the material properties when selecting a product.

Material process-wetted	
Fitting body	PEEK / 1.4435 / PP-H / PVDF / Ti / C22
Gaskets	EPDM / FKM / FFKM / silicone
Material non-process-wetted	
Fitting head	1.4404 / PVDF / PP-H
Sensor insertion position	±15° relative to horizontal plane 75° relative to vertical plane
Ambient temperature	-5…50 °C (23…122 °F)
Process temperature	
PEEK / stainless steel	-5…140 °C (23…284 °F)
PP-H	0…90 °C (32…194 °F)
PVDF	-5…100 °C (23…212 °F)
Process pressure	
PEEK / stainless steel	10 bar (145 psi)
PP-H	
40° C (104° F)	6 bar (87 psi)
90° C (194° F)	1.5 bar (22 psi)
PVDF	
90° C (194° F)	6 bar (87 psi)
100° C (212° F)	1.5 bar (22 psi)

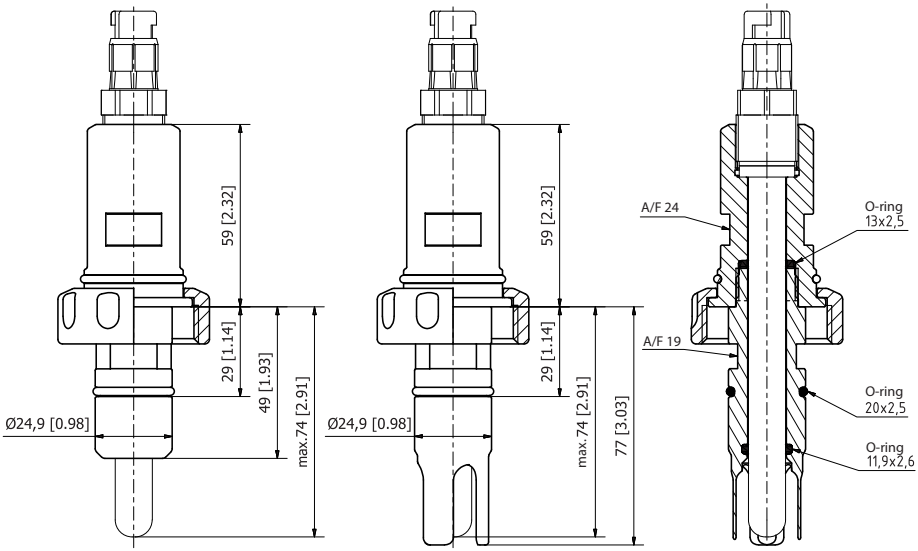
Pressure-Temperature Diagram



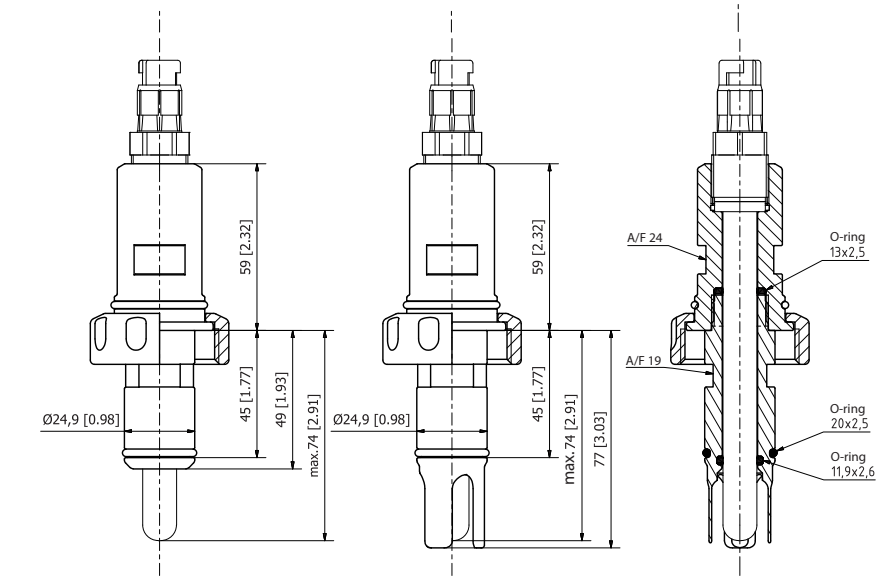
11 Dimension Drawings

Note: All dimensions are given in millimeters [inches].

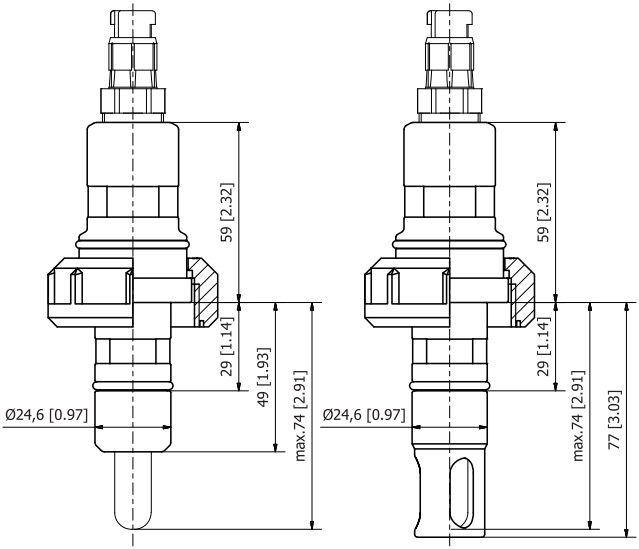
ARI106-N0**H0*A-000 and ARI106-N0**H0*B-000



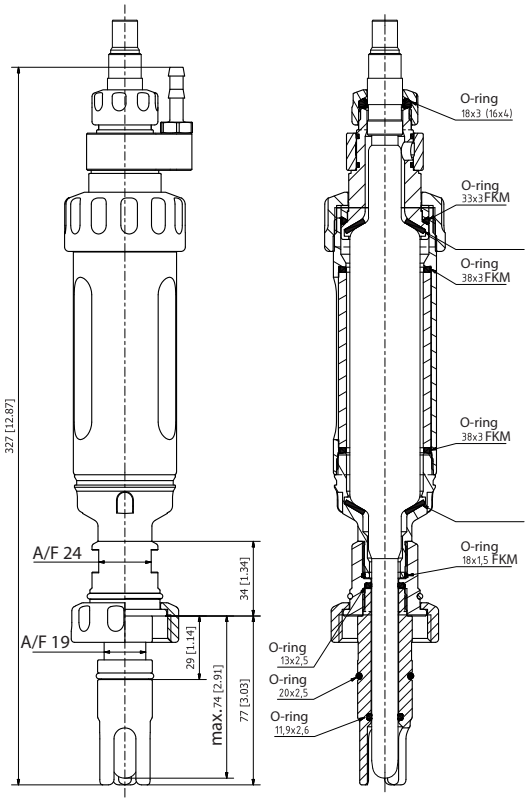
ARI106-N0**HZ*A-000 and ARI106-N0**HZ*B-000



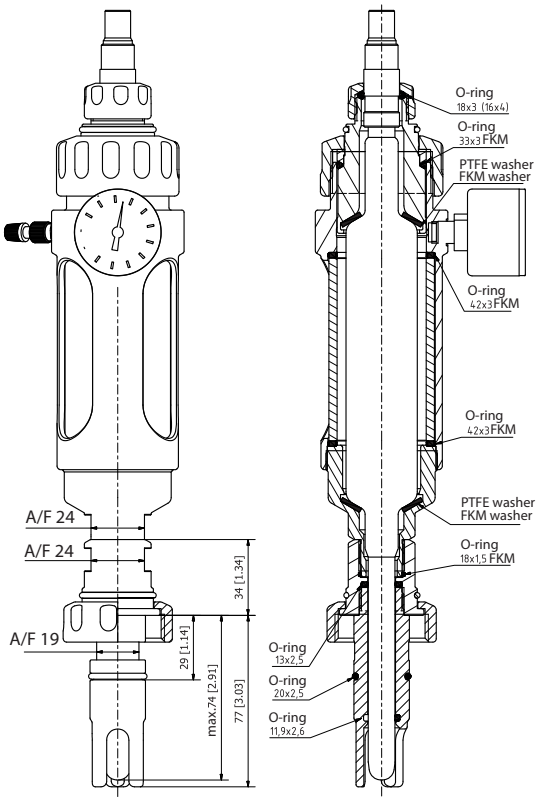
ARI106-N0*DH0*A-000, ARI106-N0*KH0*A-000, ARI106-N0*DH0*B-000, and ARI106-N0*KH0*B-000



ARI106-N1**H0**-000



ARI106-N5**H0**-000



Notes

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