Knick

User Manual

Ceramat WA154

Retractable Fitting

Read before installation.
Keep for future use.

www.knick-international.com

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 (hereinafter sometimes referred to as "Knick") using the information provided on the back page of this document.

1.1 Intended Use

The Ceramat WA154 (the "product") is a retractable fitting for installation in boilers, tanks, and pipes. The product is used to mount a sensor for measuring process parameters. The sensor is immersed in the process medium by the Ceramat WA154. The Ceramat WA154 is pneumatically operated.

Cleaning, calibration, or sensor replacement under process conditions by the customer (hereinafter sometimes referred to as the "operating company") may be conducted, subject to the requirements set forth herein, by placing the product into the service position (SERVICE limit position).

If the product is used with any product or part not authorized by Knick, the operating company assumes all risks and liabilities related thereto.

The Ceramat WA154 is suitable for the following sensor types:

Solid-electrolyte sensors	Body diameter 12 mm, body length 425 mm, sensor head thread PG 13.5
Liquid-electrolyte sensors	Body diameter 12 mm, body length 450 mm
Optical sensors[1)]	Body diameter 12 mm or 12.7 mm (½")

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

The defined operating conditions must be observed when using this product. → *Specifications, p. 51*

With the modular structure, customers can easily adapt the Ceramat WA154 to changed conditions. → *Changes for Different Conditions, p. 17*

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. THE OPERATING COMPANY SHALL BE SOLELY RESPONSIBLE FOR ANY DAMAGES RESULTING FROM OR ARISING OUT OF AN UNINTENDED USE OF THE PRODUCT.

The Ceramat WA154-X version is certified for operation in hazardous locations. → *Operation in Explosive Atmospheres, p. 7*

1.2 Personnel Requirements

The operating company 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.

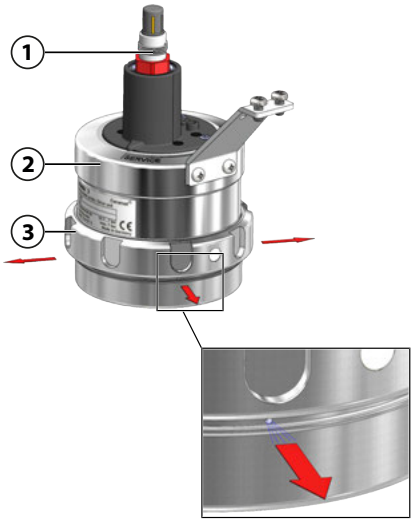
1) Use with optical sensors requires additional adapters. The special datasheets contain information on the design and use of the adapters. → *Product Code, p. 10*

1.3 Safeguards

The safety concept of the Ceramat WA154 expands on the interaction within a Knick process analysis system. The safeguards and safety functions of the Ceramat WA154 rely on the functionalities of the electro-pneumatic controller and the industrial transmitter.
→ *Process Analysis System: Installation Example, p. 19*

When operating the Ceramat WA154 without the Knick process analysis system, safeguards and safety function are not available. The operating company must assess the risks and take appropriate measures. Media and energy connections must be able to be safely disconnected from the Ceramat WA154 using shut-off devices.

Only operate the product as intended.



Automatic immersion lock for dismounted solid-electrolyte sensor

The safeguard is only available for versions of the Ceramat WA154 for solid-electrolyte sensors and when using a Knick process analysis system.

The safeguard is made inoperable for versions of the Ceramat WA154 featuring a sensor socket with scraper rings made of PEEK or if a sensor socket is retrofitted with scraper rings made of PEEK.

The function of the safeguard is only ensured if the O-ring and compression ring are correctly installed on the solid-electrolyte sensor **(1)**.

Function: Moving to the process position (PROCESS limit position) without or with an incorrectly mounted solid-electrolyte sensor **(1)** can be detected and prevented.

Compressed air flows perceptibly and audibly through the corresponding holes beneath the coupling nut **(3)** of the drive unit **(2)**. The inflowing compressed air is detected by a flow switch in the electro-pneumatic controller.

The industrial transmitter shows the message Sensor Removed, the Ceramat WA154 does not move to the process position (PROCESS limit position).

Ambient influences can have a negative effect on the functionality of safeguards (e.g., from components sticking together). → *Residual Risks, p. 6*

See also
→ *Immersion Lock Without a Mounted Solid-Electrolyte Sensor: Functional Test, p. 34*

1.4 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:

- Ceramat WA154 may only be operated in compliance with the specified operating conditions. → *Specifications, p. 51*
- Install the product inside a protected area of the plant. Alternatively, take appropriate action to protect the Ceramat WA154.
- If using aggressive chemical process media, adjust the inspection and maintenance intervals accordingly. → *Inspection and Maintenance Intervals, p. 33*

- Adhering and sticky process media can impact the functionality of the Ceramat WA154 (e.g., by causing components to stick together). Adjust the inspection and maintenance intervals accordingly. → *Inspection and Maintenance Intervals, p. 33*

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
- Calibration or cleaning medium
- Lubricant

The operating company is responsible for conducting a job hazard analysis.

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

1.6 Operation in Explosive Atmospheres

Ceramat WA154-X is certified for operation in hazardous locations.

- EU Type Examination Certificate KEMA 04ATEX4035X
- IECEx Certificate of Conformity IECEx DEK 23.0051X

The conditions for installation and operation in hazardous locations can be found on the corresponding certificates.

Exceeding the standardized atmospheric conditions within the manufacturer's specifications, e.g., with regard to the ambient temperature and pressure, does not endanger the retractable fitting's durability.
→ *Specifications, p. 51*

Related certificates are included in the product's scope of delivery and are available at www.knick-international.com in the current version.

Observe all applicable local and national codes and standards for the installation of equipment in explosive atmospheres. For further guidance, consult the following:

- IEC 60079-14
- EU directives 2014/34/EU and 1999/92/EC (ATEX)

1.6.1 Possible Ignition Hazards During Installation and Maintenance

To avoid mechanically generated sparks, handle the Ceramat WA154-X with care and take suitable protective action, e.g., use covers and pads.

The metallic parts of the Ceramat WA154-X must be connected to the plant's equipotential bonding system using the metallic process connection or the grounding connection provided for this purpose.

When components are replaced with genuine Knick spare parts made of other materials (e.g., O-rings), the information on the nameplate may then deviate from the actual version of the Ceramat WA154-X. The operating company must assess and document the changes.
→ *Nameplates, p. 12*

Mechanically Generated Sparks

Single impacts on metal parts or collisions between metal parts of the Ceramat WA154-X are not a potential ignition source if the following conditions are met:

- Possible impact velocity is less than 1 m/s.
- Possible impact energy is less than 500 J.

If these conditions cannot be ensured, the operating company must reassess single impacts on metal parts or collisions between metal parts as potential sources of ignition. The operating company must implement suitable risk minimization measures, e.g., by ensuring a non-explosive atmosphere.

1.6.2 Possible Ignition Hazards During Operation

When using non-water-based cleaning, rinsing, or calibration media with a low conductivity of less than 1 nS/m, electrostatic charging of internal, conductive components may occur. The operating company must assess the associated risks and take appropriate action.

The sensors that are used must be approved for operation in hazardous locations. Further information can be found in the sensor manufacturer's documentation.

1.7 Safety Training

Upon request, Knick Elektronische Messgeräte GmbH & Co. KG will provide safety briefings and product training during initial commissioning of the product. More information is available from the relevant local contacts.

1.8 Maintenance and Spare Parts

Preventive Maintenance

Preventive maintenance can keep the product in good condition and minimize downtimes. Knick provides recommended inspection and maintenance intervals. → *Maintenance, p. 33*

Lubricants

Only use lubricants approved by Knick. Special applications or upgrades to special lubricants are available on request. Usage of any other lubricants shall constitute an unintended use of the product.
→ *Maintenance, p. 33*

Tools and Mounting Aids

Special and accessory tools help maintenance personnel to replace components and wear parts safely and professionally. → *Tools, p. 47*

Spare Parts

For professional corrective maintenance of the product, only use Knick genuine spare parts. Usage of any other spare parts shall constitute an unintended use of the product.
→ *Spare Parts, p. 45*

Repair Service

The Knick Repair Service offers professional corrective maintenance for the product to the original quality. Upon request, a replacement unit can be obtained for the period of the repair.

Further information can be found at www.knick-international.com.

2 Product

2.1 Package Contents

- Ceramat WA154 in the version ordered
- User Manual
- As applicable, supplementary datasheet for special versions[1)]
- EU Declaration of Conformity[2)]
- EU Type Examination Certificate[2)]

2.2 Product Identification

The various versions of the Ceramat WA154 product are coded in a model designation.

The model designation is stated on the nameplate, the delivery note, and the product packaging.

2.2.1 Model Designation Example

Basic unit with pneum. drive unit, stainless steel design		**WA154**	**–**	**X**	**0**	**H**	**B**	**B**	**1**	**1**	**3**	**0**	**0**	**B**	**B**	**2**	**0**	**–**	**0**	**0**	**0**
Explosion protection	ATEX Zone 0			**X**														**–**			
Sensor	Sensor ⌀ 12 mm with PG 13.5				**0**													**–**			
Seal material	FFKM – FDA					**H**												**–**			
Sensor protection tube material	Hastelloy C22[3)]						**B**											**–**			
Sensor socket material	Hastelloy C22, short protection							**B**	**1**									**–**			
Sensor socket scraper ring	Natural PEEK									**1**								**–**			
Immersion depth	300 mm										**3**	**0**	**0**					**–**			
Wetted material	Hastelloy C22[3)]													**B**				**–**			
Process connections	Loose flange, PN10/16, DN 65														**B**	**2**		**–**			
Probe guard	Without																**0**	**–**			
Special version	Without																	**–**	**0**	**0**	**0**

1) Supplied depending on the ordered version of the Ceramat WA154. → *Product Code, p. 10*

2) Only for versions certified for operation in hazardous locations.

3) Special option, lead time on request

2.2.2 Product Code

Basic unit with pneum. drive unit, stainless steel design		**WA154**	**–**	_	_	_	_	_	_	_	_	_	_	_	_	_	_	**–**	_	_	_
Explosion protection	ATEX Zone 0			**X**														**–**			
	Without			**N**														**–**			
Sensor	Sensor ⌀ 12 mm with PG 13.5				**0**													**–**			
	pH sensor ⌀ 12 mm with pressurization, sensor pressure chamber for compressed air supply				**1**													**–**			
	Optical sensor ⌀ ½" (12.7 mm)				**2**													**–**			
	Optical sensor ⌀ 12 mm				**3**													**–**			
Seal material	FKM					**A**												**–**			
	EPDM					**B**												**–**			
	EPDM - FDA					**E**												**–**			
	FKM - FDA					**F**												**–**			
	FFKM - FDA					**H**												**–**			
	FFKM					**K**												**–**			
Sensor protection tube material	Hastelloy C22[1)]						**B**											**–**			
	1.4404						**H**											**–**			
	Titanium[1)]						**T**											**–**			
Sensor socket material	Hastelloy C22, without protection							**B**	**0**									**–**			
	Hastelloy C22, short protection							**B**	**1**									**–**			
	1.4404, without protection							**H**	**0**									**–**			
	1.4404, short protection							**H**	**1**									**–**			
	1.4404, long protection							**H**	**2**									**–**			
	1.4404, full protection							**H**	**3**									**–**			
	PEEK, without protection							**E**	**0**									**–**			
	Titanium, without protection							**T**	**0**									**–**			
	Titanium, short protection							**T**	**1**									**–**			
Sensor socket scraper ring	Without									**0**								**–**			
	Natural PEEK									**1**								**–**			
Immersion depth	Non-standard immersion depth 23 ... 299 mm (increasing by 1 mm)										**0**	**0**	**0**					**–**			
	Immersion depth 150 ... 300 mm (increasing by 10 mm), e.g., 300 mm										**3**	**0**	**0**					**–**			
Wetted material	Hastelloy C22[1)]													**B**				**–**			
	1.4404													**H**				**–**			
	Titanium[1)]													**T**				**–**			
Process connections	Loose flange, PN10/16, DN 50														**B**	**1**		**–**			
	Loose flange, PN10/16, DN 65														**B**	**2**		**–**			
	Loose flange, PN10/16, DN 80														**B**	**3**		**–**			
	Loose flange, PN10/16, DN 100														**B**	**4**		**–**			
	Loose flange, PN10/16, DN 125[1)]														**B**	**5**		**–**			
	Loose flange, PN10/16, DN 150[1)]														**B**	**6**		**–**			
	Loose flange, PN16, DN 200[1)]														**B**	**7**		**–**			
	Loose flange, PN40, DN 50														**E**	**1**		**–**			
	Loose flange, PN40, DN 65														**E**	**2**		**–**			
	Loose flange, PN40, DN 80														**E**	**3**		**–**			

1) Special option, lead time on request

Basic unit with pneum. drive unit, stainless steel design		**WA154 - _ _ _ _ _ _ _ _ _ _ _ _ _ _ - _ _ _**
	Loose flange, PN40, DN 100	E 4 -
	Loose flange, PN40, DN 125[1]	E 5 -
	Loose flange, PN40, DN 150[1]	E 6 -
	Loose flange, PN40, DN 200[1]	E 7 -
	Dairy pipe DN 50	C 1 -
	Dairy pipe DN 65	C 2 -
	Dairy pipe DN 80	C 3 -
	Dairy pipe DN 100	C 4 -
	Loose flange, ANSI 316, 150 lbs, 2″	D 1 -
	Loose flange, ANSI 316, 150 lbs, 2.5″	D 2 -
	Loose flange, ANSI 316, 150 lbs, 3″	D 3 -
	Loose flange, ANSI 316, 150 lbs, 3.5″ [1]	D 4 -
	Loose flange, ANSI 316, 150 lbs, 4″ [1]	D 5 -
	Loose flange, ANSI 316, 150 lbs, 5″ [1]	D 6 -
	Loose flange, ANSI 316, 150 lbs, 6″ [1]	D 7 -
	Loose flange, ANSI 316, 300 lbs, 2″	P 1 -
	Loose flange, ANSI 316, 300 lbs, 2.5″	P 2 -
	Loose flange, ANSI 316, 300 lbs, 3″	P 3 -
	Loose flange, ANSI 316, 300 lbs, 3.5″ [1]	P 4 -
	Loose flange, ANSI 316, 300 lbs, 4″ [1]	P 5 -
	Loose flange, ANSI 316, 300 lbs, 5″ [1]	P 6 -
	Loose flange, ANSI 316, 300 lbs, 6″ [1]	P 7 -
	Clamp 2.5″	J 3 -
	Clamp DN 50, DIN 32676	J H -
	BioControl DS 65[1]	L 2 -
	Varivent (≥ DN 50)	V 1 -
Probe guard	Without	0 -
	With, variant 1	1 -
Special version	Without	- 0 0 0
	Equipment with special grease (provided by customer)	- 0 0 1
	Sensor protection tube for Ø 12 mm optical sensor (Hellma) and additional torsion prevention for the sensor cables, adapter rotating 12 mm/PG 13.5 (according to the drawing)	- 0 0 B
	Customer-specific special datasheet	- 0 0 F
	Ceramat, inlet and outlet made of 1.4404	- 0 0 K

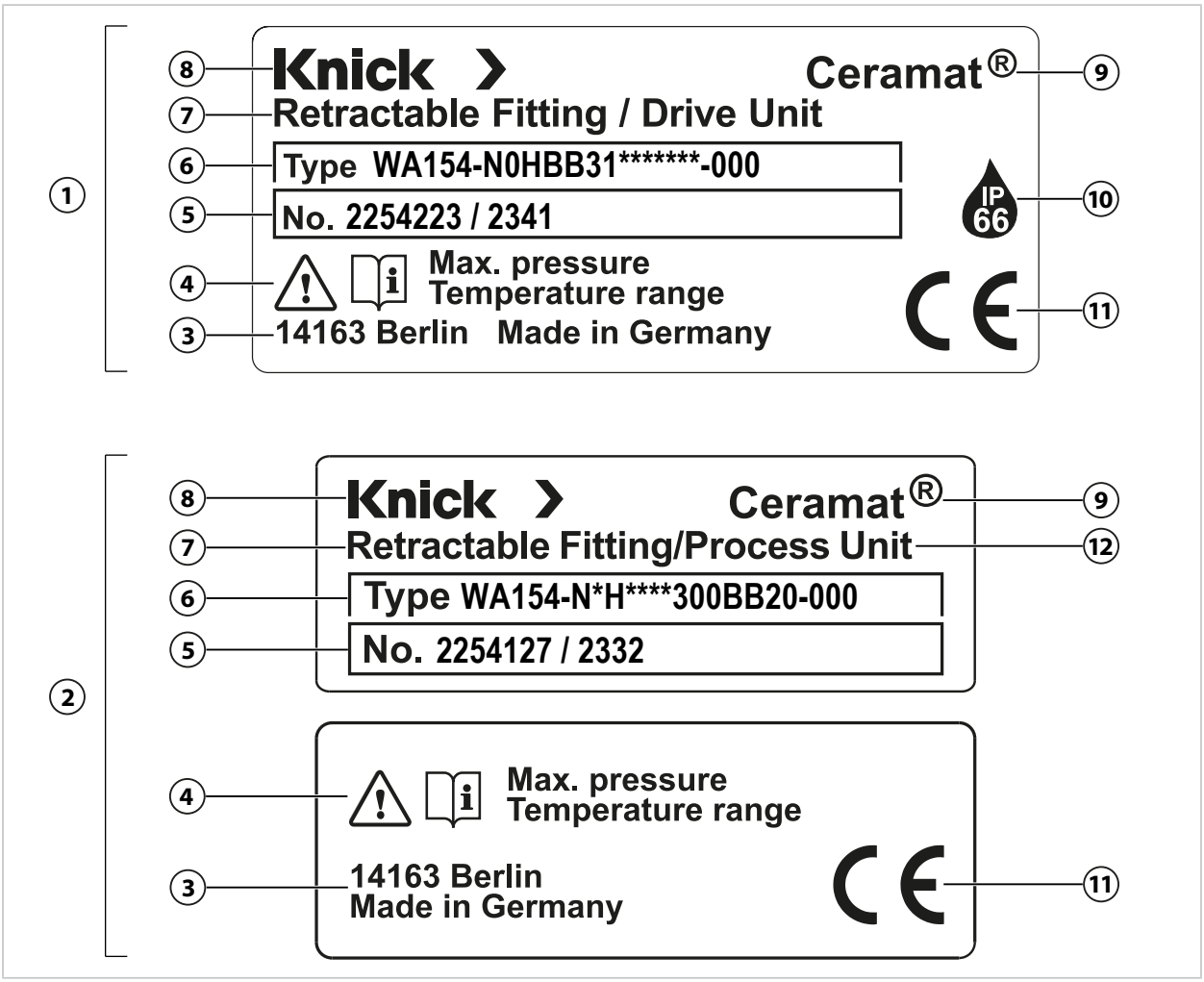
1) Special option, lead time on request

2.3 Nameplates

The Ceramat WA154 is identified by nameplates on the drive unit and the process unit. The information provided on the nameplates varies according to the version of the Ceramat WA154.

Nameplate, Version without ATEX Approval

Note: The figure shows a nameplate for the Ceramat WA154-N version by way of example.

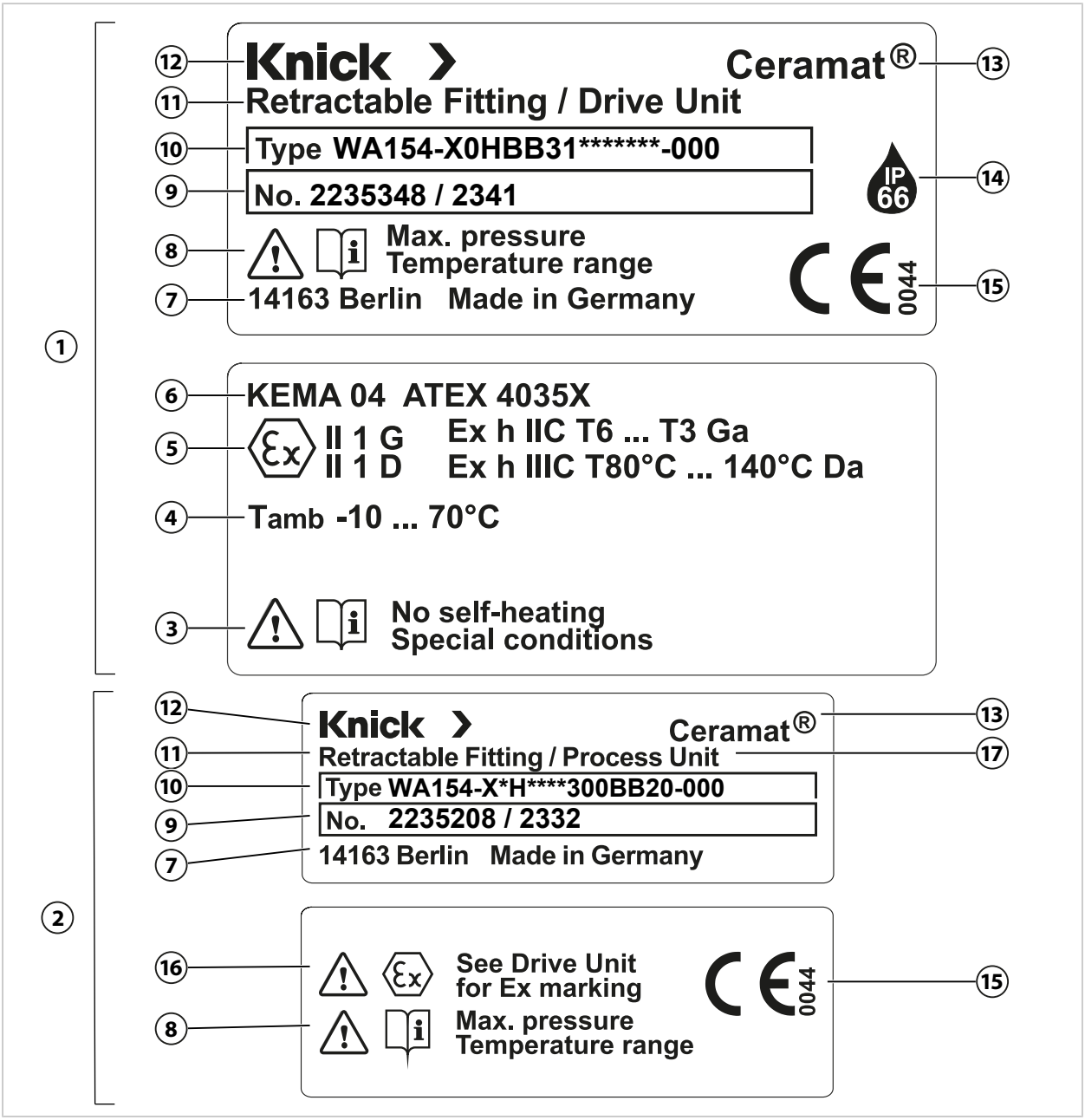


1	Drive unit nameplate	**7**	Product line: Retractable fitting Assembly group: Drive unit
2	Process unit nameplate	**8**	Manufacturer
3	Manufacturer address with designation of origin	**9**	Product family
4	Max. operating pressure and temperature range[1)]	**10**	IP protection
5	Serial number/production year and week YYWW	**11**	CE mark
6	Model designation	12	Product line: Retractable fitting Assembly group: Process unit

[1)] Additional information can be found in the related EU Type Examination Certificate or in the sections → *Safety, p. 5* and → *Specifications, p. 51*.

Nameplate, Version with ATEX Approval

Note: The figure shows a nameplate for the Ceramat WA154-X version by way of example.



1	Drive unit nameplate	10	Model designation
2	Process unit nameplate	11	Product line: Retractable fitting Assembly group: Drive unit
3	No self heating/special conditions[1)]	12	Manufacturer
4	Permitted ambient temperature	13	Product family
5	ATEX marking/information on explosion protection	14	IP protection
6	EU Type Examination Certificate test number	15	CE mark with identification number
7	Manufacturer address with designation of origin	16	Reference to ATEX information on the drive unit
8	Max. operating pressure and temperature range[1)]	17	Product line: Retractable fitting Assembly group: Process unit
9	Serial number/production year and week YYWW		

[1)] Additional information can be found in the related EU Type Examination Certificate or in the sections → *Safety, p. 5* and → *Specifications, p. 51*.

2.4 Symbols and Markings

	Special conditions and danger points! Observe the safety information and instructions on safe use of the product as outlined in the product documentation.
	Reminder to read the documentation
	CE mark with identification number[1] of the notified body involved in the production control.
	ATEX marking[1] of the European Union for operation in hazardous locations → *Operation in Explosive Atmospheres, p. 7*
	IP66 protection: The product is dust-tight and offers complete protection against contact as well as protection against strong water jets.
	Display indicating process position (PROCESS limit position). → *Moving into the Process Position (PROCESS Limit Position), p. 27*
	Display indicating service position (SERVICE limit position). → *Moving into the Service Position (SERVICE Limit Position), p. 27*

2.5 Design and Function

The Ceramat WA154 consists of two main assembly groups:

- Drive unit
- Process unit

The drive unit is connected to the process unit by a coupling nut. The drive and process units can be disconnected under process conditions. → *Drive Unit: Removal, p. 36*

Different versions of the drive unit and the process unit can be combined.
→ *Changes for Different Conditions, p. 17*

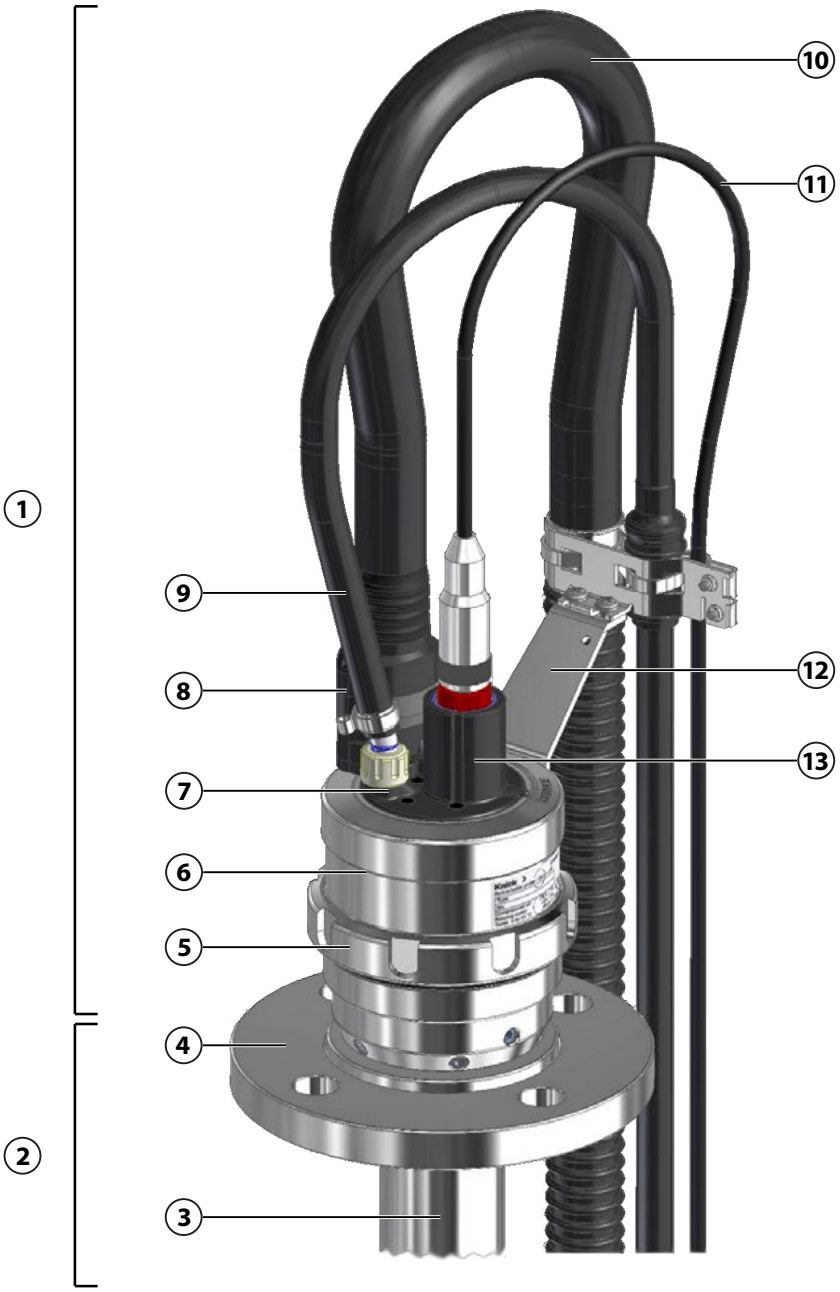
The process connection is use to fasten the Ceramat WA154 at the process port of the measuring point.

The pneumatically operated drive unit moves the Ceramat WA154 into the service position (SERVICE limit position) or the process position (PROCESS limit position). → *Service and Process Position, p. 18*

[1] Dependent on the ordered version → *Product Code, p. 10*

2.5.1 Retractable Fitting

Note: The figure shows an example version of the Ceramat. → *Product Code, p. 10*

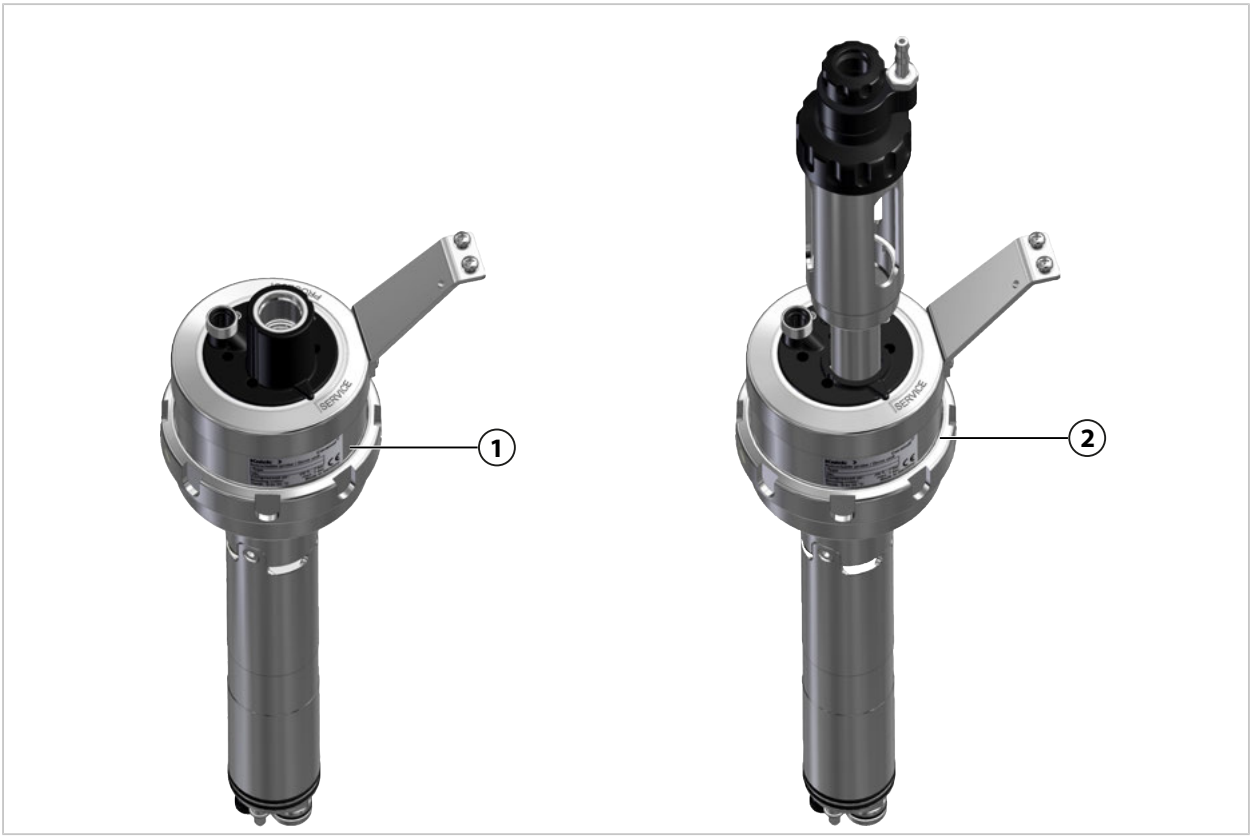


1	Drive unit	**8**	Multiplug[1)]
2	Process unit	**9**	Outlet hose[1)]
3	Sensor housing with ceramic rotary slides	**10**	Media connection[1)]
4	Process connection (e.g., flange)	**11**	Sensor cable[1)]
5	Coupling nut	**12**	Strain relief bracket
6	Drive unit	**13**	Sensor holder
7	Media outlet		

1) Not included in the package contents of the Ceramat WA154.

2.5.2 Drive Units

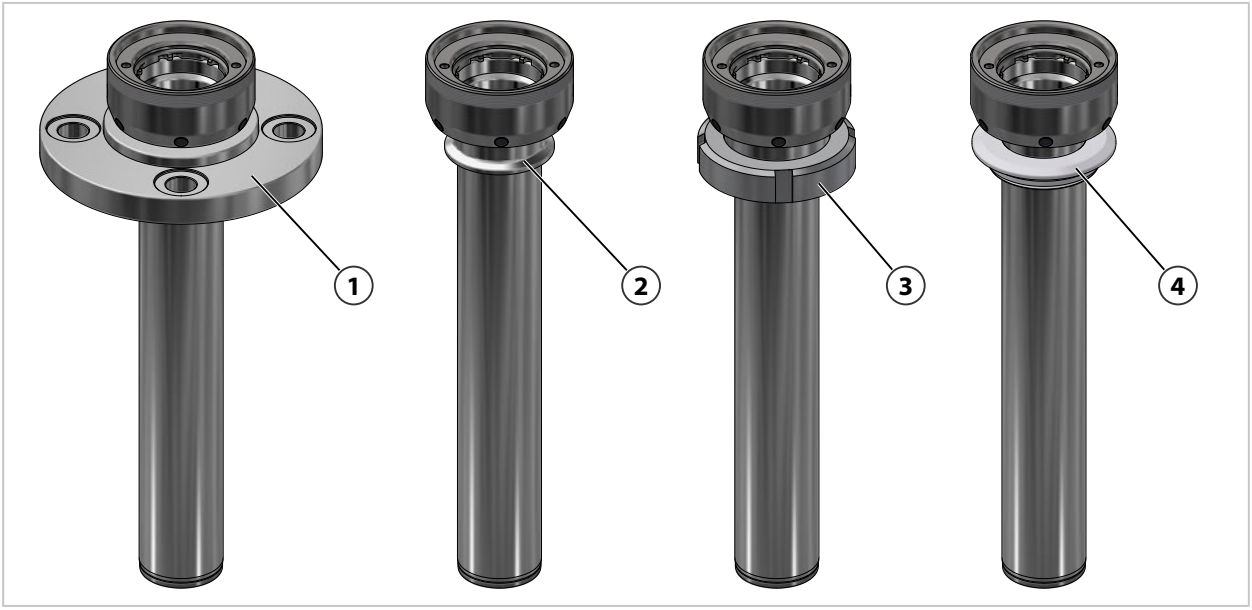
Note: The figure shows a selection from the product line. → *Product Code, p. 10*



1 Drive unit, solid-electrolyte sensor	**2** Drive unit, liquid-electrolyte sensor

2.5.3 Process Connections

Note: The figure shows a selection from the product line. → *Product Code, p. 10*



1 Flange	3 Dairy pipe
2 Clamp	4 Varivent

2.6 Changes for Different Conditions

The Ceramat WA154 can be adapted to changed conditions by the customer. Prior to making any changes, contact Knick Elektronische Messgeräte GmbH & Co. KG. The following are examples of possible changes:

- Change to a different process connection → *Process Connections, p. 16*
- Replacement of process-wetted components with other material characteristics → *Maintenance, p. 33*
- Replacement of the drive unit to mount a different sensor type → *Drive Units, p. 16*

Any changes may result in deviations between the information on the nameplate and the actual version of the Ceramat WA154. The operating company must assess and document the changes. In the event of a change to the version, the product must be identified accordingly.

It is recommended that changes to the Ceramat WA154 be carried out by the Knick Repair Service. After making the necessary changes, a functional and pressure test is carried out and, if necessary, a modified nameplate is attached. → *Knick Repair Service, p. 35*

More information on changes can be found in the related supplementary datasheet.

2.7 Service and Process Position

The Ceramat WA154 can assume two limit positions (service or process position).

Note: The Ceramat WA154 is only disconnected from the process in the service position (position indicator points to SERVICE). This is *not* the case in any other position, i.e., there remains contact with the process.

Service Position (SERVICE Limit Position)

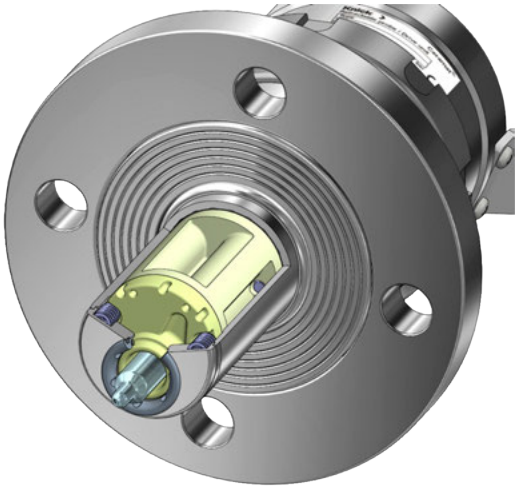
- The ceramic rotary slide is closed (sensor is retracted in the sensor housing).
- The sensor is not in contact with the process medium.
- The position indicator points to SERVICE.
- The sensor can be installed, removed, and, as necessary, cleaned under process conditions.
- The drive unit can be removed under process conditions.

Process Position (PROCESS Limit Position)

- The ceramic rotary slide is open (sensor is extended out of the sensor housing).
- The sensor is in contact with the process medium.
- The position indicator points to PROCESS.
- The desired process parameters can be measured.

Service position (SERVICE limit position)

Process position (PROCESS limit position)



On reaching one of the limit positions, a contact is closed in the limit switch. The electrical signal can be processed further, for example in the electro-pneumatic controller, the process analyzer, or the process control system (PCS).

See also
→ *Moving into the Process Position (PROCESS Limit Position), p. 27*
→ *Moving into the Service Position (SERVICE Limit Position), p. 27*

3 Installation

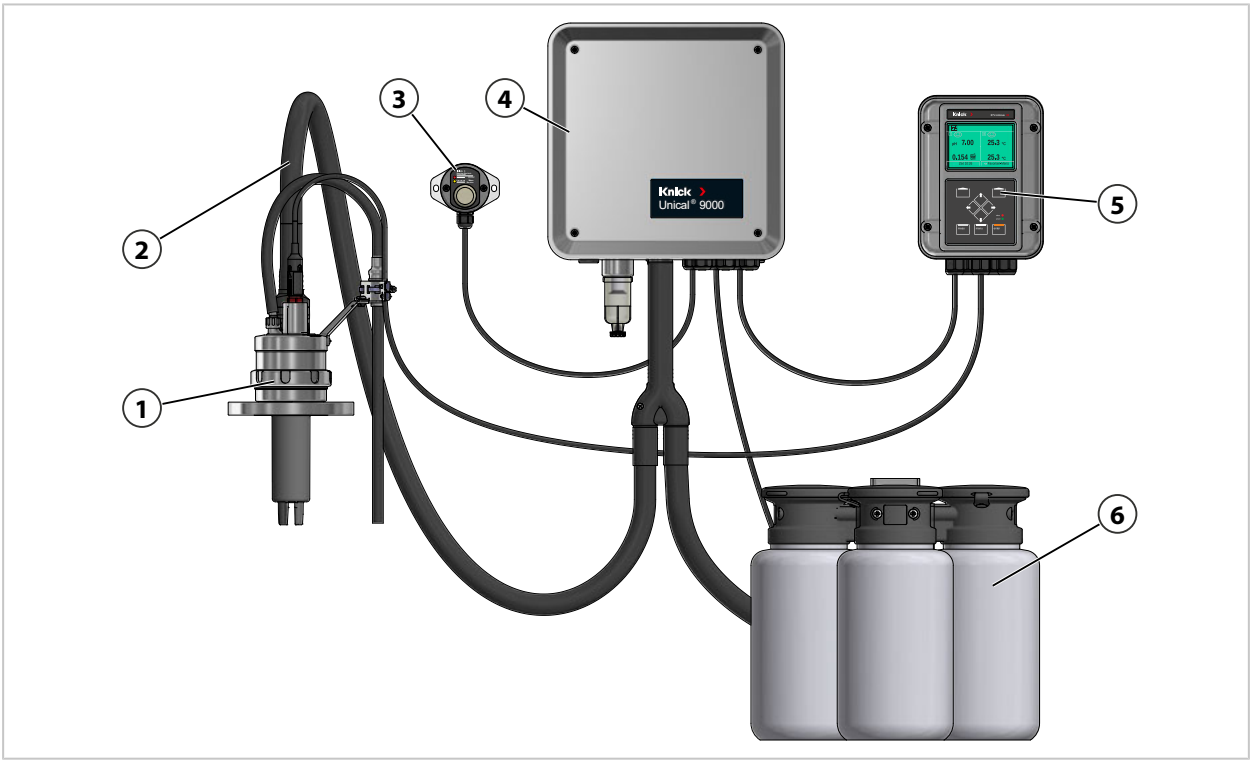
3.1 General Installation Instructions

Process Analysis System: Installation Example

The Ceramat WA154 is designed for operation within a fully automatic Knick process analysis system. The process analysis system may typically comprise the following products:

- Protos industrial transmitter
- Unical 9000 electro-pneumatic controller
- Ceramat WA154 retractable fitting

Note: The figure shows an installation example of a process analysis system from Knick. More information is available on www.knick-international.com.

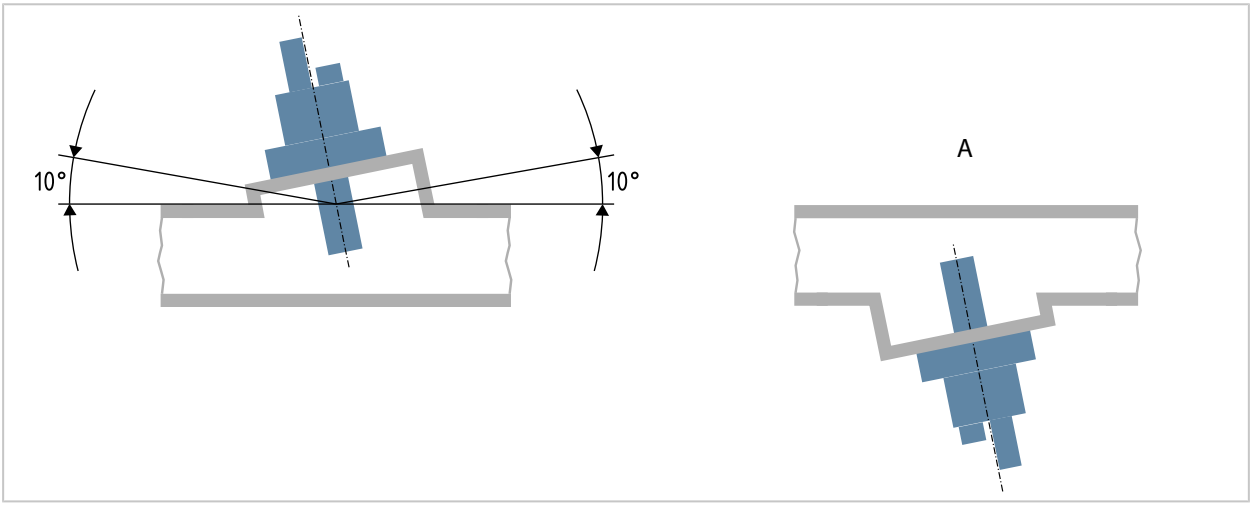


1	Retractable fitting (shown here: Ceramat WA153)	4	Unical 9000 controller
2	Media connection	5	Protos industrial transmitter
3	Service switch	6	Media adapter with metering pumps

Note: Alternatively, it is possible to operate the Ceramat WA154 without a process analysis system. To do this, accessory ZU0631 "standard media connection" is required. In that case, the Ceramat WA154 is automatically controlled by a process control system (PCS) or manually using accessory ZU0646 "manually operated pneumatic valve". → *Accessories, p. 46*

3.2 Retractable Fitting: Installation

⚠ WARNING! Risk of explosion from mechanically generated sparks when used in explosive atmospheres. Take appropriate action to prevent mechanically generated sparks. Follow the safety instructions. → *Operation in Explosive Atmospheres, p. 7*



01. Check the package contents of the Ceramat WA154 for completeness. → *Package Contents, p. 9*
02. Check the Ceramat WA154 for damage.
03. Ensure the required installation clearances for sensor installation and the movement of hoses and cables. → *Dimension Drawings, p. 48*

    Note: The installation angle of the Ceramat WA154 depends on the sensor type. An installation angle from 10° above the horizontal is permitted for all sensor types. An upside down installation angle (see View A) is only permitted when using sensors that are approved for upside down operation[1)].
04. Fasten the Ceramat WA154 to the process port with the process connection.
05. Optional: For use in potentially explosive atmospheres, connect the metallic parts of the Ceramat WA154 with the equipotential bonding of the system.

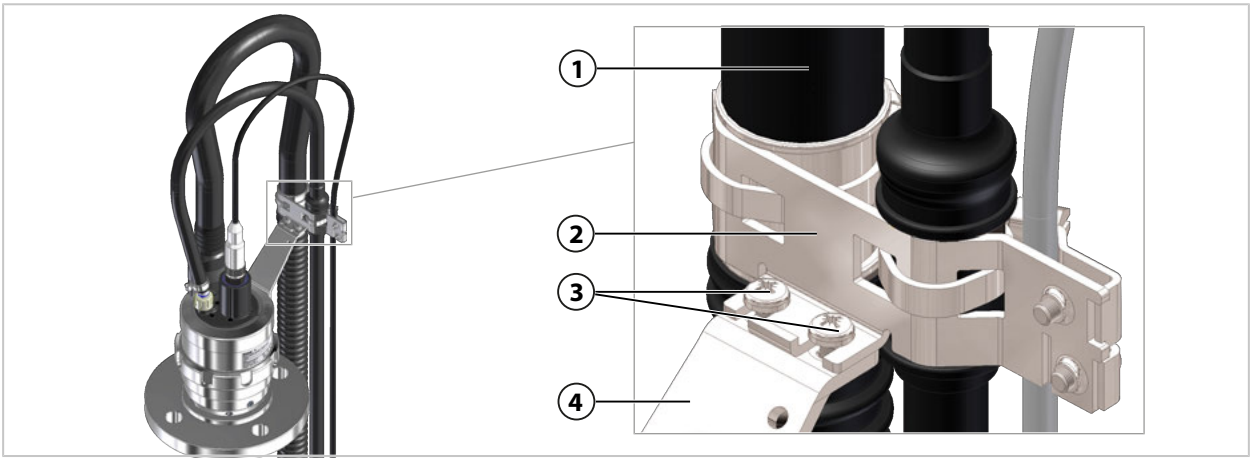
See also

→ *Operation in Explosive Atmospheres, p. 7*
→ *Commissioning, p. 26*

1) Observe the instructions for use relating to the sensor.

3.3 Media Connection: Installation at Strain Relief Bracket

Note: The figure shows installation on the Ceramat WA154 strain relief bracket when using the media connection. The steps involved are the same when using accessory ZU0631, "Standard media connection". → *Process Analysis System: Installation Example, p. 19*



01. Position the bracket **(2)** of the media connection **(1)** on the strain relief bracket **(4)** of the Ceramat WA154. If necessary, loosen the screws **(3)** a few rotations.
02. Tighten the screws **(3)** using a screwdriver.

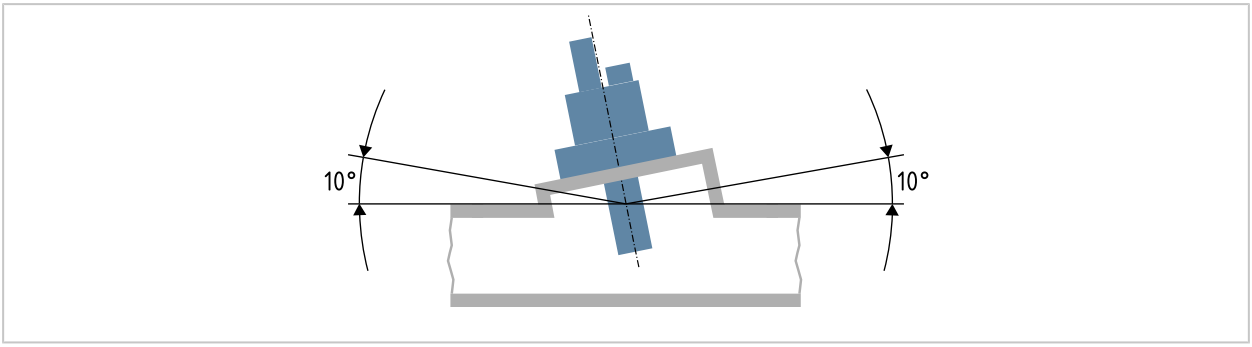
3.4 Outlet

3.4.1 Outlet Hose: Installation Instructions

Install the outlet hose a maximum of 1 meter down (measured from the level of the calibration chamber). The resulting negative pressure creates a risk of the calibration chamber being drained if the outlet hose is not ventilated.

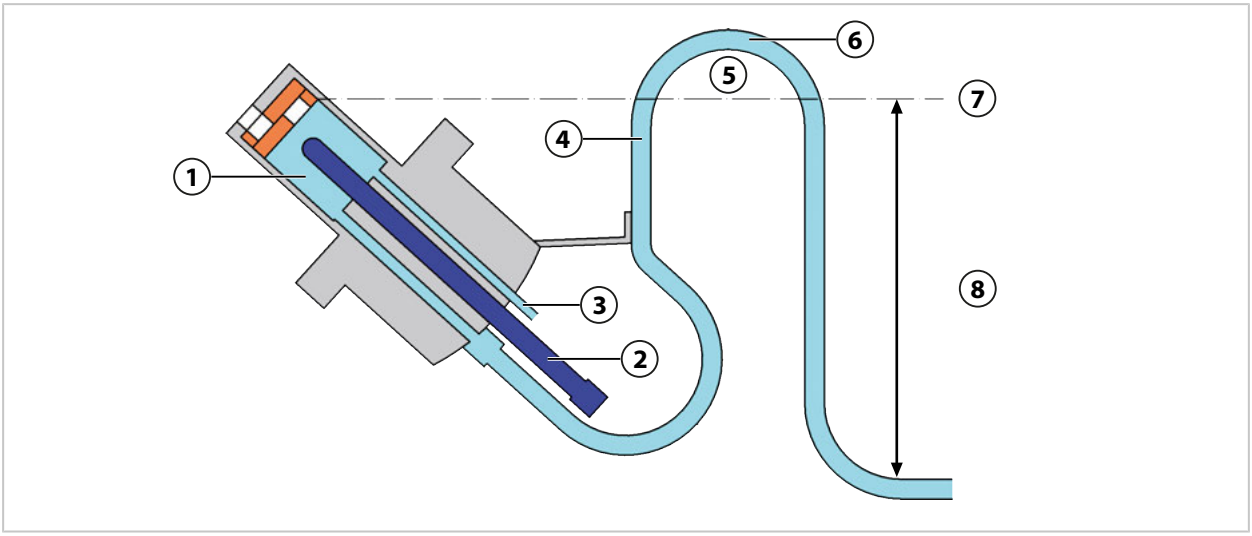
Installation Angle up to 10° Above the Horizontal Plane

Install the outlet hose in an arc and fasten it to the strain relief bracket on the Ceramat WA154. With an installation angle of up to 10° above the horizontal plane, this prevents the calibration chamber from leaking due to gravity.



360° Installation Angle

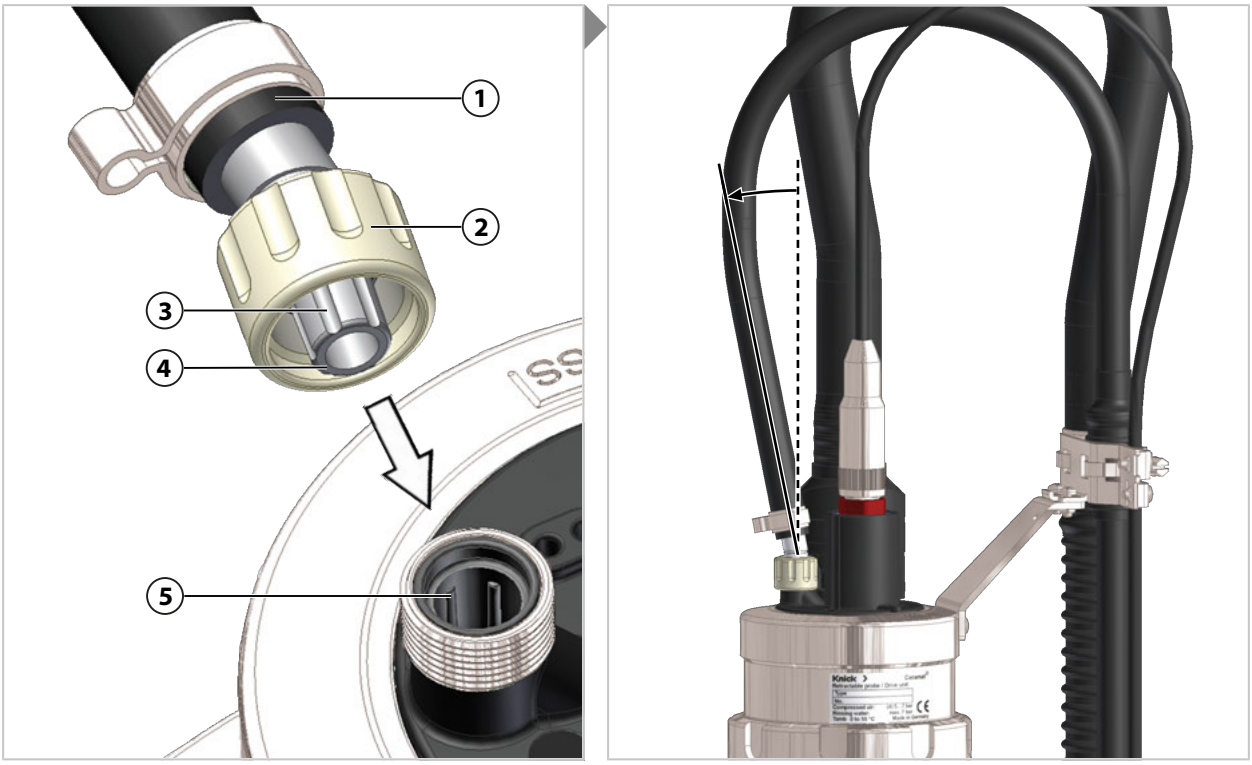
If the Ceramat WA154 is installed at an angle of 360° (i.e., upside-down), install the outlet hose in an arc above the level of the calibration chamber (see figure). This prevents the calibration chamber from leaking due to gravity.



1	Calibration chamber	**5**	Area above level of calibration chamber
2	Sensor	**6**	Hose arc (outlet hose)
3	Inlet	**7**	Level of calibration chamber
4	Outlet hose	**8**	Max. 1 m below level of calibration chamber

3.4.2 Outlet Hose: Installation

Note: The outlet is used to discharge rinse medium and trapped process medium and must not be closed. By moving the sensor to the respective limit positions, pressurized process medium can enter the calibration chamber and be compressed when the outlet is closed. This process medium may splash out during sensor replacement.



01. Push the outflow nozzle **(4)** into the mount on the Ceramat WA154. In the process, correctly position the coding ribs **(5)** in the coding recesses **(3)** (locking device).
02. Turn the outflow nozzle **(4)** so that the outlet hose **(1)** points outward.
03. Fasten the coupling nut **(2)** finger tight.

3.5 Media Connection

3.5.1 Media Connection: Installation Instructions

To connect the media to the Ceramat WA154, the following options are available:

- "Media connection" of the electropneumatic controller (operation with process analysis system)
- Accessory ZU0631 "standard media connection" (operation without process analysis system)

"Media connection" for operation with process analysis system

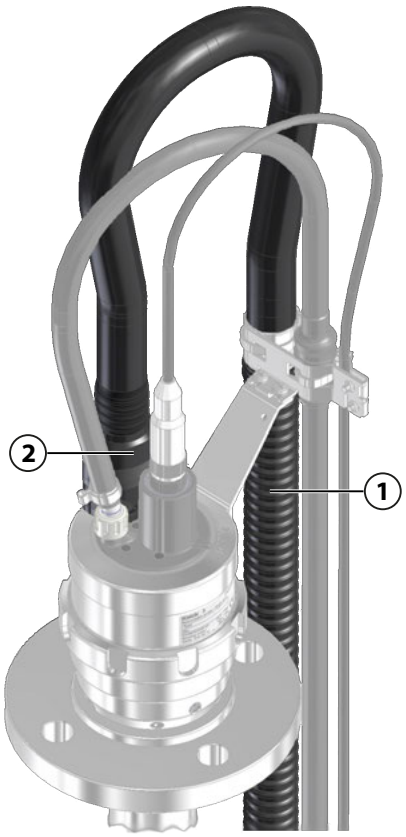
When using a process analysis system from Knick, all supply lines and the connecting cable for the limit signal are joined in one hose: the media connection **(1)**. The connection to the Ceramat WA154 is established via a common plug-in connection, the multiplug **(2)**.

The supply lines of the different media are connected to the electropneumatic controller of the process analysis system. More information is available in the documentation of the electropneumatic controller.

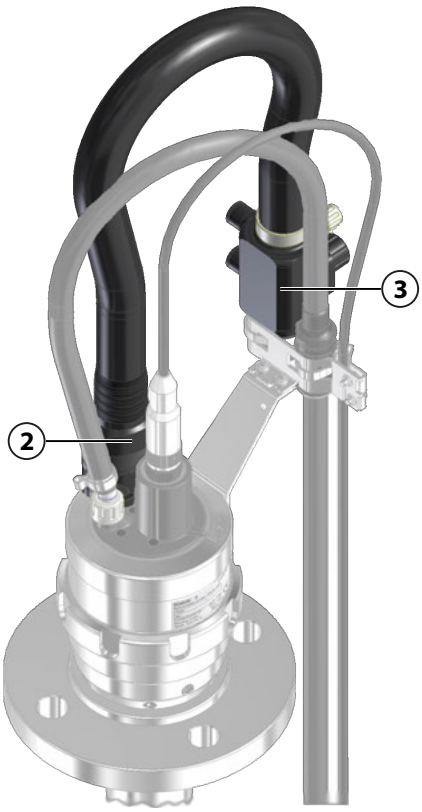
"Standard media connection" for operation without the process analysis system

To control the Ceramat WA154 using accessory ZU0646 "manually operated pneumatic valve" or the process control system (PCS), accessory ZU0631 "standard media connection" **(3)** is required. The Ceramat WA154 is connected using a common plug-in connection, the multiplug **(2)**.

The supply lines of the different media are connected using any position to accessory ZU0631 "standard media connection" **(3)** or accessory ZU0646 "manually operated pneumatic valve". More information is available in the associated accessory documentation. → *Accessories, p. 46*



"Media connection" for operation with process analysis system

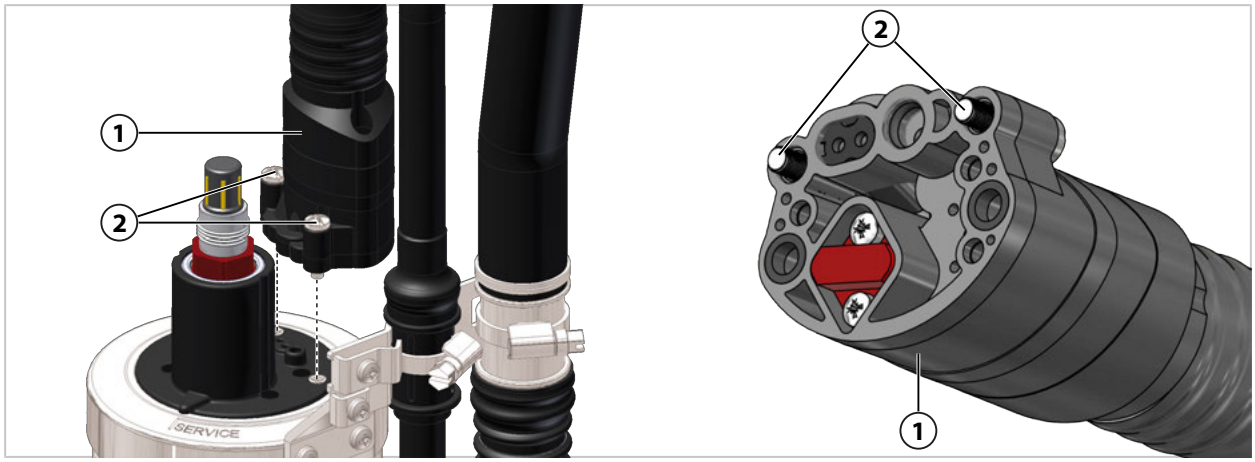


Accessory ZU0631 "standard media connection" for operation without process analysis system

See also

→ *Process Analysis System: Installation Example, p. 19*

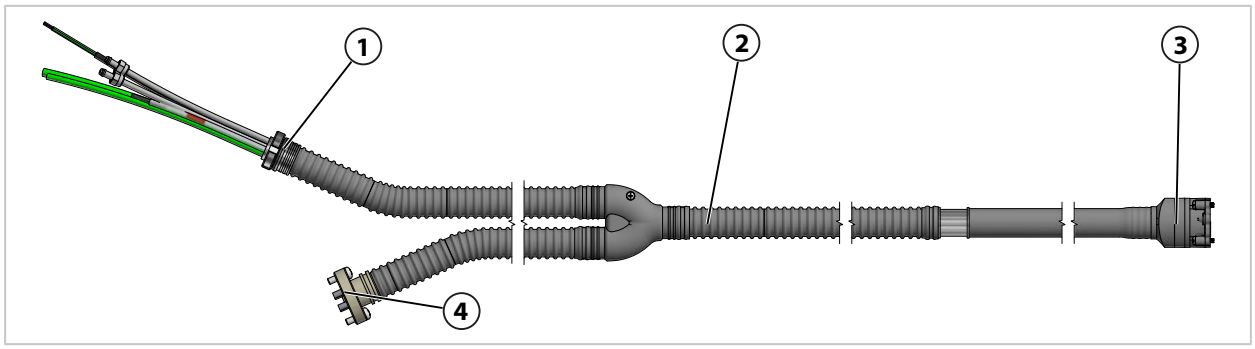
3.5.2 Multiplug: Installation



01. Check the gaskets and O-rings of the multiplug **(1)** for correct positioning and damage, and replace them if necessary. → *Troubleshooting, p. 38*
02. Position and connect the multiplug **(1)** to the Ceramat WA154.
03. Fasten the multiplug **(1)** with two screws **(2)**.

3.5.3 Electro-Pneumatic Controller: Connection

The associated documentation contains a description of how to connect the Ceramat WA154 to the electropneumatic controller with the media connection.



1	Electropneumatic controller connection	**3**	Multiplug for connection of the Ceramat WA154
2	Media connection	**4**	Media adapter connection[1)]

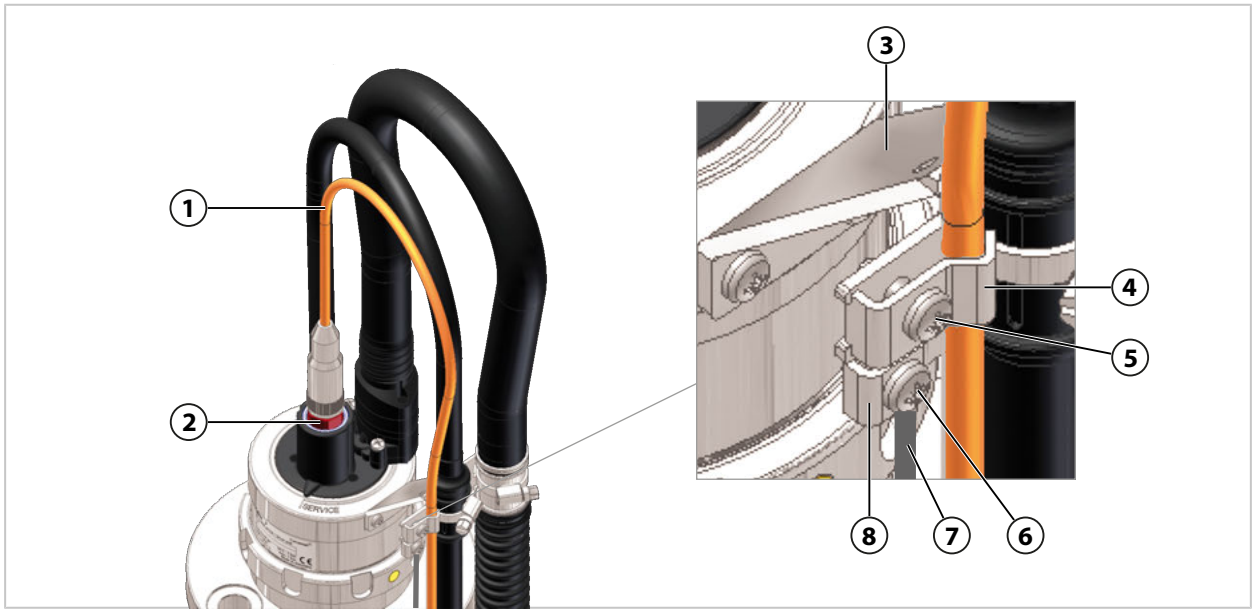
3.5.4 ZU0631 Standard Media Connection: Installation

Note: Accessory ZU0631, "Standard media connection", is only required for operation of the Ceramat WA154 without a process analysis system. → *Process Analysis System: Installation Example, p. 19*

The method of installing accessory ZU0631, "Standard media connection", is set out in the accessory documentation. → *Accessories, p. 46*

1) Availability depends on the version of the process analysis system.

3.6 Sensor Cable: Installation



01. Install the sensor. → *Installing and Removing a Sensor, p. 28*
02. Connect the sensor cable **(1)** to the sensor **(2)**.
    Note: Loosely fasten the sensor cable with the clamp, but do not constrict it. If you do, rotary movement of the Ceramat WA154 may damage the sensor cable. The sensor cable arc must be long enough so that the sensor cable does not impede the stroke movement of the Ceramat WA154.
03. Guide the sensor cable **(1)** to the strain relief bracket **(3)** in a curve, fasten it with a clip **(4)** and tighten the screw **(5)**.
04. Optional: Fasten the equipotential bonding conductor **(7)** with a terminal **(8)** and tighten the screw **(6)**. → *Operation in Explosive Atmospheres, p. 7*

4 Commissioning

⚠ WARNING! If the Ceramat WA154 fitting is damaged or improperly installed, process medium, potentially containing hazardous substances, may escape. Follow the safety instructions.
→ *Safety, p. 5*

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

01. Install the Ceramat WA154. → *Retractable Fitting: Installation, p. 20*
02. Install the media connection or ZU0631, "Standard media connection", on the strain relief bracket.
    → *Media Connection: Installation at Strain Relief Bracket, p. 21*
03. Install the outlet hose. → *Outlet, p. 21*
04. Install the multiplug. → *Multiplug: Installation, p. 24*
05. Install the sensor. → *Installing and Removing a Sensor, p. 28*
06. Install the sensor cable. → *Sensor Cable: Installation, p. 25*
07. Ensure that the process connection is securely fastened to the process port.
08. Optional: Ensure that the Ceramat WA154-X is correctly connected to the plant's equipotential bonding system. → *Operation in Explosive Atmospheres, p. 7*
09. Move the Ceramat WA154 into the process position (PROCESS limit position).
    → *Moving into the Process Position (PROCESS Limit Position), p. 27*
    ✓ The position indicator points to PROCESS.
10. Move the Ceramat WA154 into the service position (SERVICE limit position).
    → *Moving into the Service Position (SERVICE Limit Position), p. 27*.
    ✓ The position indicator points to SERVICE.
11. Check the Ceramat WA154 for leaks under process conditions.[1)]
    ✓ The Ceramat WA154 and connections have no leaks.

[1)] If using a fully automatic Knick process analysis system, a range of functions can be tested via the process analyzer.
→ *Process Analysis System: Installation Example, p. 19*

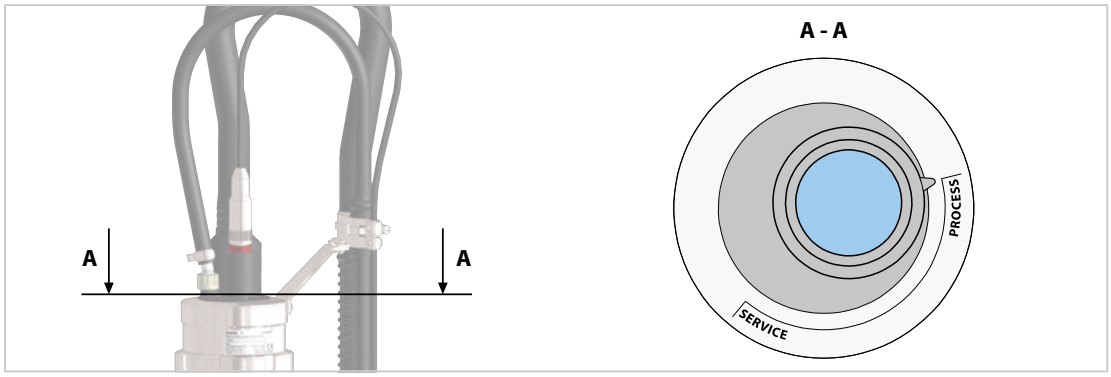
5 Operation

5.1 Moving into the Process Position (PROCESS Limit Position)

⚠ WARNING! Process, rinse, or additional media, potentially containing hazardous substances, may escape from the Ceramat WA154. Only move the Ceramat WA154 into the process position (PROCESS limit position) if a sensor is installed. → *Installing and Removing a Sensor, p. 28*

⚠ CAUTION! Risk of crushing injuries to hands and fingers. When moving to the limit positions, the Ceramat WA154 performs a rotary movement (approx. 140°) and a stroke movement (approx. 43 mm). Do not touch the Ceramat WA154 while it is moving to the limit positions.

Note: Depending on the installation of the Ceramat WA154, moving it into the limit positions is triggered differently: industrial transmitters, service switch of the electro-pneumatic controller, process control system (PCS) or ZU0604 "Pneumatic manual control valve".
→ *Process Analysis System: Installation Example, p. 19*



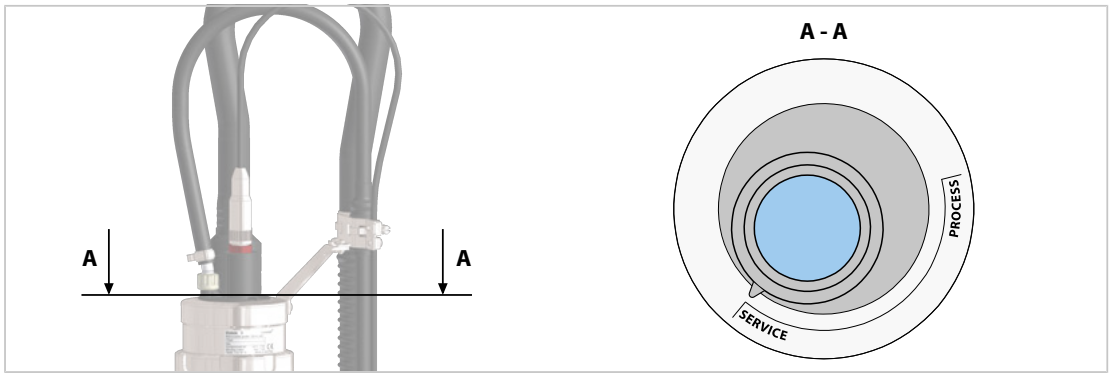
01. Install the sensor. → *Installing and Removing a Sensor, p. 28*
02. Move the Ceramat WA154 into the process position (PROCESS limit position).
    ✓ The position indicator points to PROCESS.

5.2 Moving into the Service Position (SERVICE Limit Position)

⚠ CAUTION! Risk of crushing injuries to hands and fingers. When moving to the limit positions, the Ceramat WA154 performs a rotary movement (approx. 140°) and a stroke movement (approx. 43 mm). Do not touch the Ceramat WA154 while it is moving to the limit positions.

Note: The Ceramat WA154 is only disconnected from the process in the service position (position indicator points to SERVICE). This is *not* the case in any other position, i.e., there remains contact with the process.

Note: Depending on the installation of the Ceramat WA154, moving it into the limit positions is triggered differently: industrial transmitters, service switch of the electro-pneumatic controller, process control system (PCS) or ZU0604 "Pneumatic manual control valve".
→ *Process Analysis System: Installation Example, p. 19*



01. Move the Ceramat WA154 into the service position (SERVICE limit position).
    ✓ The position indicator points to SERVICE.

5.3 Installing and Removing a Sensor

5.3.1 Safety Instructions when Installing and Removing Sensors

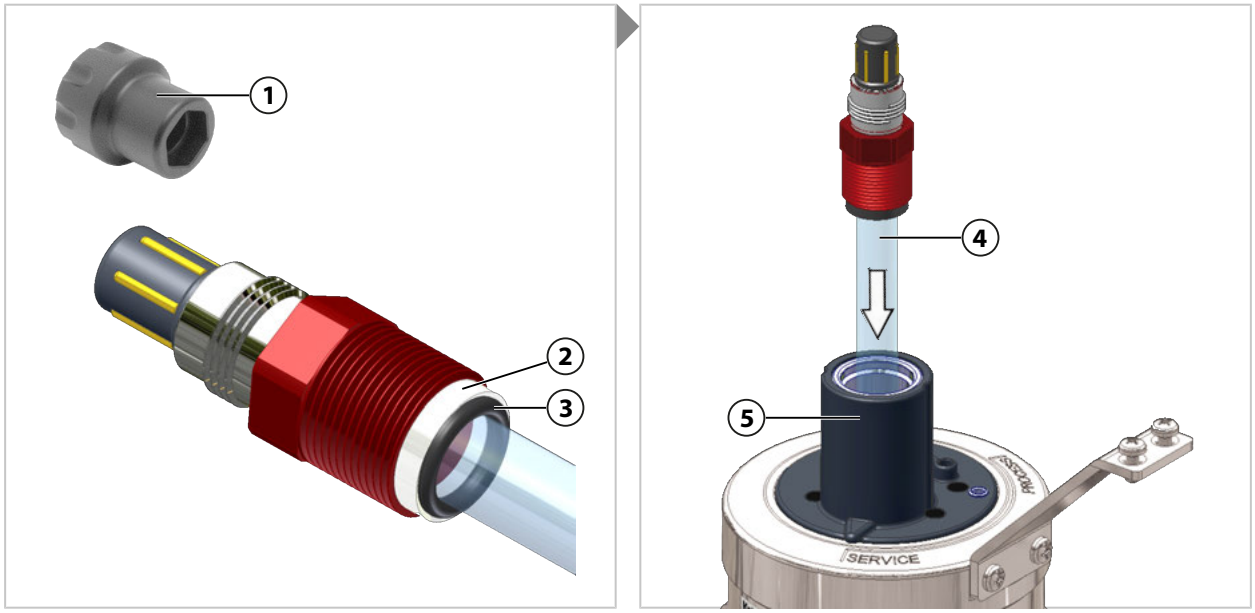
⚠ WARNING! Process medium, potentially containing hazardous substances, may escape from the Ceramat WA154. Only replace the sensor in the service position (SERVICE limit position). Secure the Ceramat WA154 from unintentional movement out of the service position (SERVICE limit position). Follow the safety instructions. → *Safety, p. 5*

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

Note: The Ceramat WA154 is only disconnected from the process in the service position (position indicator points to SERVICE). This is *not* the case in any other position, i.e., there remains contact with the process.

Note: The outlet is used to discharge trapped rinse medium and must not be closed. By moving the Ceramat WA154 to the limit positions, pressurized process medium may enter the calibration chamber. When the outlet is closed, this process medium may be compressed and splash out during a sensor replacement. → *Design and Function, p. 14*

5.3.2 Solid-Electrolyte Sensor: Installation

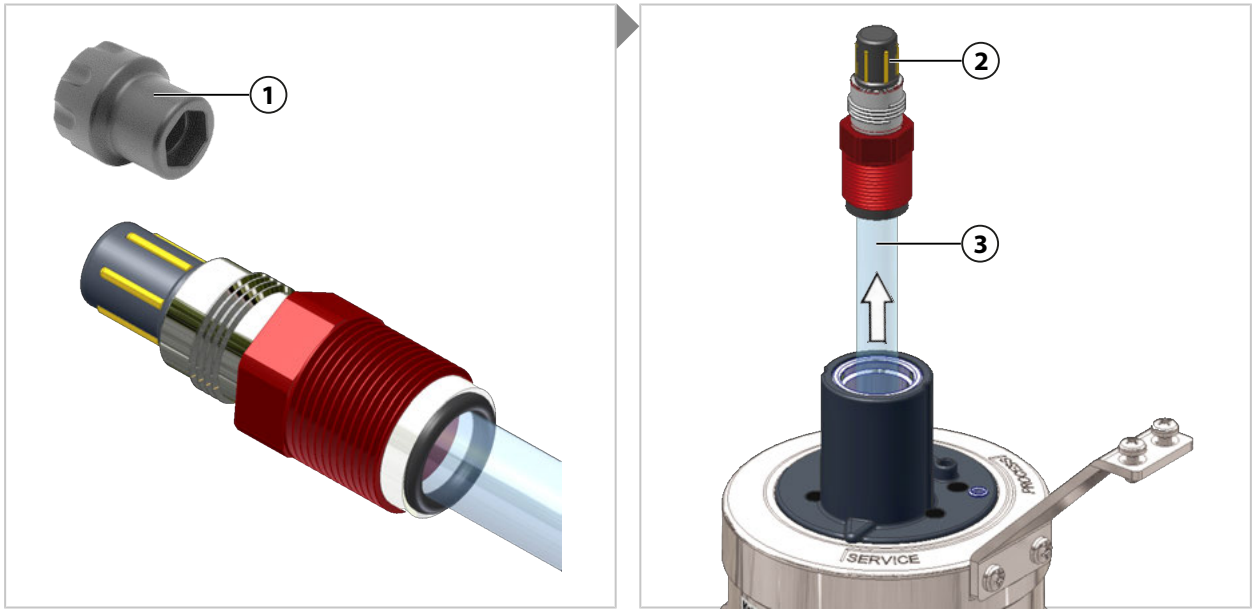


01. Move the Ceramat WA154 into the service position (SERVICE limit position).
→ *Moving into the Service Position (SERVICE Limit Position), p. 27*.
02. Check the outlet for escaping process medium. If process medium escapes, stop the process (depressurize or drain off the process medium if necessary) and perform troubleshooting.
→ *Troubleshooting, p. 38*
03. Check that the sensor is permitted. → *Intended Use, p. 5*
    - ✓ Diameter 12.0 to 0.5 mm
    - ✓ Length 425 mm
    - ✓ Pressure resistance permissible for process
    - ✓ No damage (e.g., glass breakage)
04. Check that the compression ring **(2)** and O-ring **(3)** of the sensor **(4)** are correctly positioned.
05. Check the sensor 4, compression ring **(2)**, and O-ring **(3)** for damage.
Note: Do not install or commission damaged sensors, thrust rings, or O-rings.
06. Remove the watering cap from the sensor tip and rinse the sensor **(4)** with water (see documentation of the sensor manufacturer).

07. Check the interior of sensor holder **(5)** for foreign bodies (e.g., compression ring, O-ring). Remove any foreign bodies.
08. Insert the sensor **(4)** into the Ceramat WA154.
09. Tighten the sensor **(4)** using a spanning wrench **(1)** to max. 3 Nm (A/F 19). Recommended tool: ZU0647 "sensor spanning wrench" → *Tools, p. 47*
10. Connect the sensor cable. → *Sensor Cable: Installation, p. 25*

5.3.3 Solid-Electrolyte Sensor: Removal

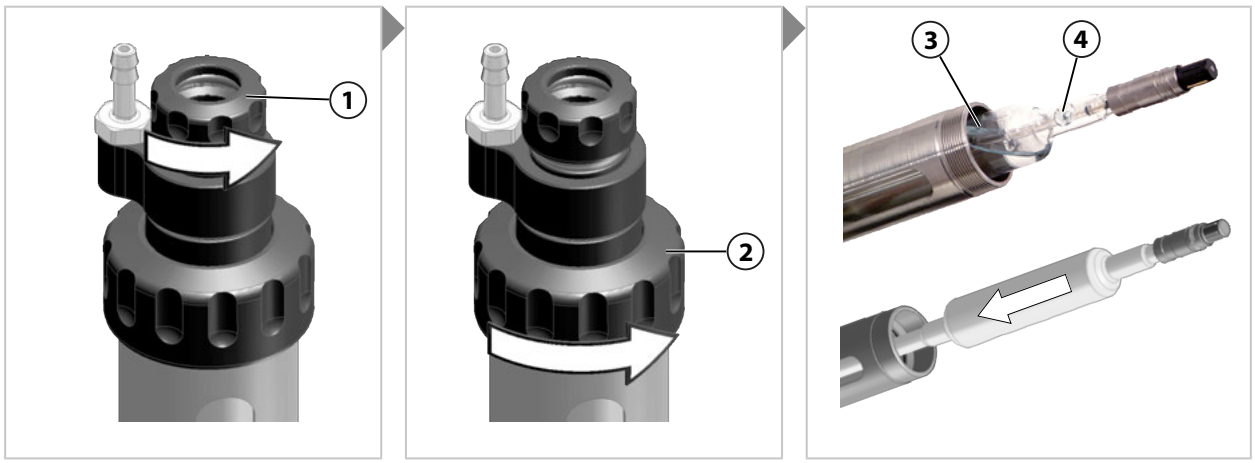
Note: Rinse the sensor prior to removal in order to prevent entrainment of chemically aggressive process medium in the area of the sensor holders.



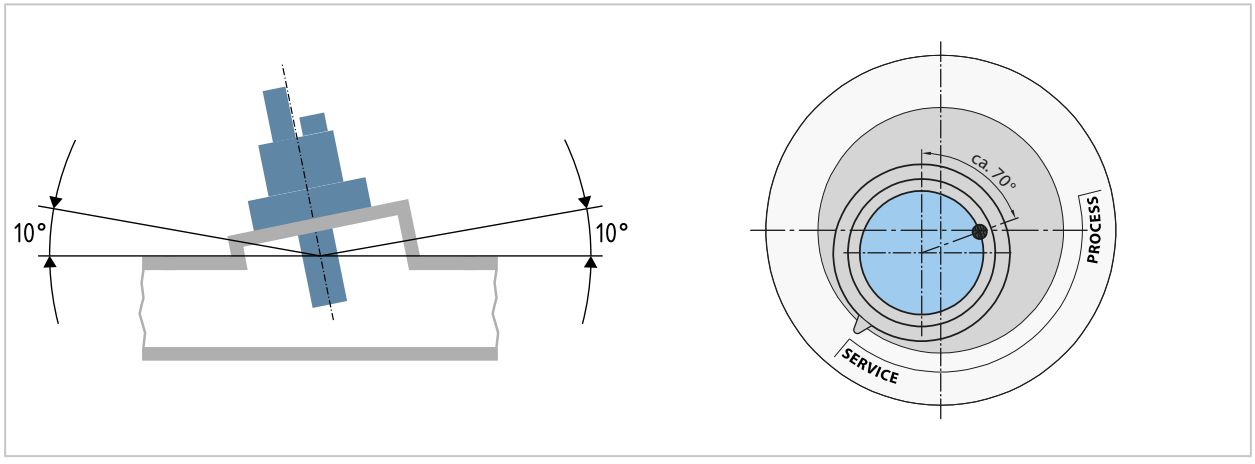
01. Move the Ceramat WA154 into the service position (SERVICE limit position). → *Moving into the Service Position (SERVICE Limit Position), p. 27*.
02. Check the outlet for escaping process medium. If process medium escapes, stop the process (depressurize or drain off the process medium if necessary) and perform troubleshooting. → *Troubleshooting, p. 38*
03. Disconnect the cable bushing of the sensor cable from the sensor head **(2)**.
04. Release the sensor **(3)** using the spanning wrench **(1)** (A/F 19 mm). Recommended tool: ZU0647 "Sensor spanning wrench" → *Tools, p. 47*
05. Pull the sensor **(3)** out of the Ceramat WA154.
06. If the sensor glass is broken, check the seals of the sensor holder, the sensor socket, and the sealing ring for damage and replace if necessary. → *Troubleshooting, p. 38*

5.3.4 Liquid-Electrolyte Sensor: Installation

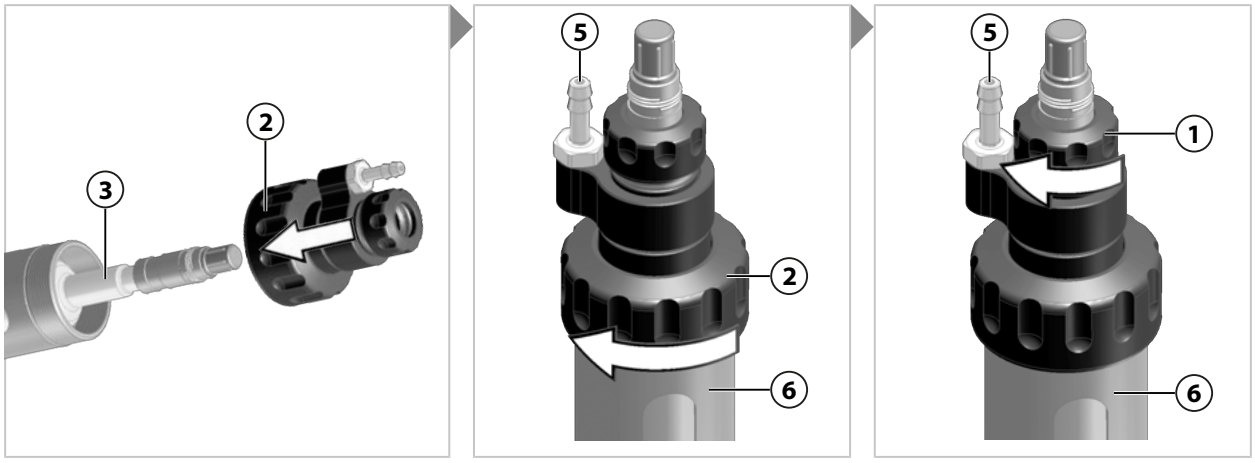
Note: To ensure that the electrolyte flows from the reference electrode to the process medium, the air pressure in the sensor pressure chamber must be 0.5 to 1 bar above that of the process medium. Recommended accessory: ZU0670 "Air supply for pressurized sensors". → *Accessories, p. 46*



01. Move the Ceramat WA154 into the service position (SERVICE limit position).
→ *Moving into the Service Position (SERVICE Limit Position), p. 27*.
02. Check the outlet for escaping process medium. If process medium escapes, stop the process (depressurize or drain off the process medium if necessary) and perform troubleshooting.
→ *Troubleshooting, p. 38*
03. Loosen the small coupling nut **(1)** by a few rotations, but do not remove it completely.
04. Completely unscrew the large coupling nut **(2)** and remove the entire unit.
05. Check that the sensor is permitted. → *Intended Use, p. 5*
    - ✓ Diameter 12 mm
    - ✓ Length 450 mm
    - ✓ Pressure resistance permissible for process
    - ✓ No damage (e.g., glass breakage)
06. Remove the watering cap from the sensor tip and rinse the sensor **(3)** with water (see documentation of the sensor manufacturer).
07. Remove the closure of the sensor's **(3)** filling hole **(4)**.
    Note: The electrolyte liquid of the Ceramat WA154 may leak out of the sensor if the installation position is tilted. While moving to the limit position, a rotational movement is performed in addition to a lifting movement. Therefore, rotate the filling hole by approx. 70° from the vertical.



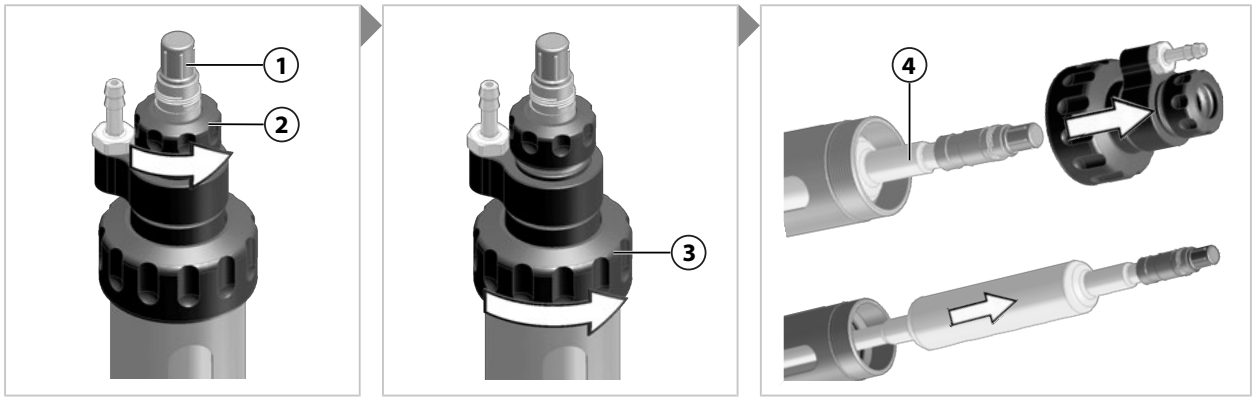
08. Insert the sensor **(3)** into the Ceramat WA154.



09. Attach the large coupling nut **(2)** and tighten it by hand.
10. Tighten the small coupling nut **(1)** by hand.
11. Connect the sensor cable. → *Sensor Cable: Installation, p. 25*
12. When installing for the first time: Connect the compressed air supply for the sensor pressure holder **(6)** to the hose insert NW6 **(5)**. → *Specifications, p. 51*

5.3.5 Liquid-Electrolyte Sensor: Removal

Note: Rinse the sensor prior to removal in order to prevent entrainment of chemically aggressive process medium in the area of the sensor holders.



01. Move the Ceramat WA154 into the service position (SERVICE limit position).
→ *Moving into the Service Position (SERVICE Limit Position), p. 27*.
02. Check the outlet for escaping process medium. If process medium escapes, stop the process (depressurize or drain off the process medium if necessary) and perform troubleshooting.
→ *Troubleshooting, p. 38*
03. Disconnect the cable socket of the sensor cable from the sensor head **(1)**.
04. Loosen the small coupling nut **(2)** by a few rotations, but do not remove it completely.
05. Completely unscrew the large coupling nut **(3)** and remove 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.
06. Pull out the sensor **(4)**.
07. If the sensor glass is broken, check the seals of the sensor holder, the sensor socket, and the sealing ring for damage and replace if necessary. → *Troubleshooting, p. 38*

5.4 Cavity Rinsing

In the service position (SERVICE limit position), the inlet and outlet of the Ceramat WA154 are directly connected to the calibration chamber.

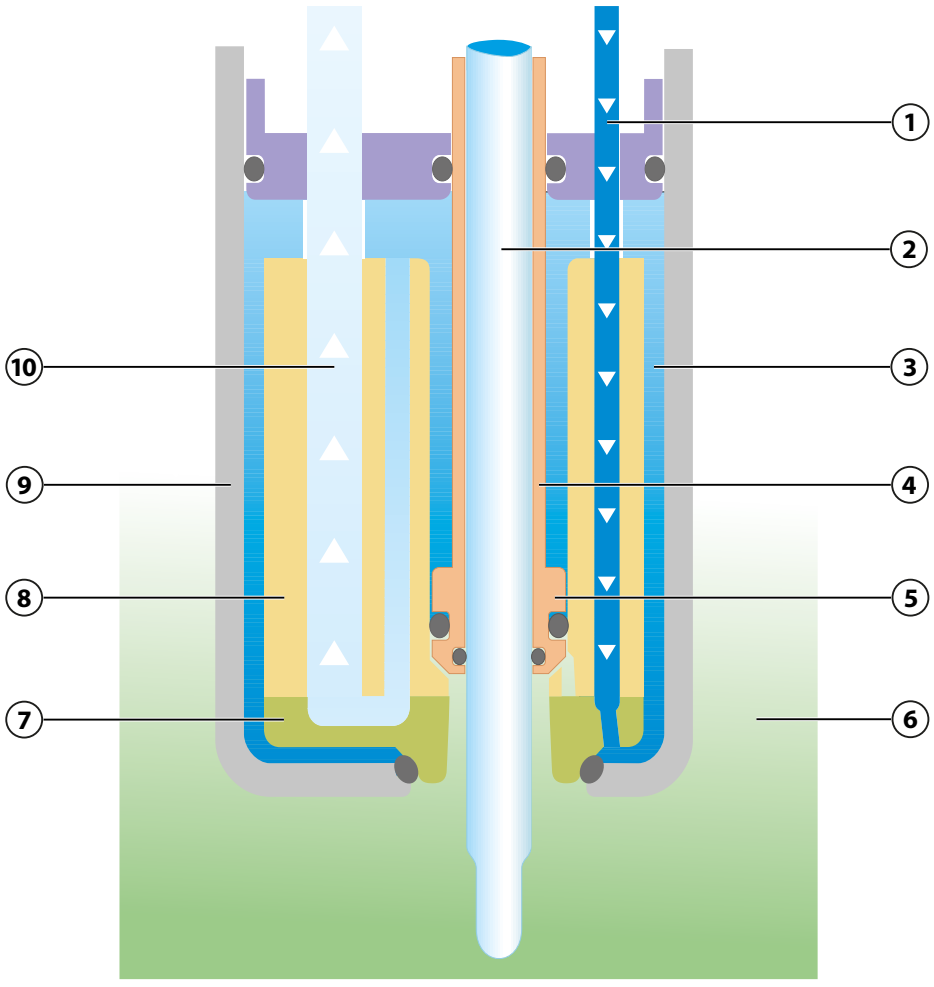
The ceramic rotary slides are installed in the sensor housing and have contact with the process medium. There is a risk that process medium may penetrate the cavities between the ceramic rotary slides and the sensor housing.

In this case, the process medium may be drained off by rinsing the cavities. This helps to keep the Ceramat WA154 in good working condition for longer.

When moving the Ceramat WA154 into the process position (PROCESS limit position), the inflow into the cavities is reversed. By activating the rinse function (e.g., in the process analyzer), the cavities are rinsed and media is drained off via the outlet.

It is advisable to rinse the cavities for 30 seconds every 8 hours. This interval may be adjusted in the event of very frequent movements and if using chemically aggressive or adherent process media.

Note: The figure shows the Ceramat WA154 in the process position (PROCESS limit position).



1	Inlet	**6**	Process medium
2	Sensor	**7**	Ceramic rotary slide, bottom part (fixed)
3	Cavity	**8**	Ceramic rotary slide, top part (rotating)
4	Sensor tube	**9**	Sensor housing
5	Sensor socket	**10**	Outlet

6 Maintenance

6.1 Inspection and Maintenance

6.1.1 Inspection and Maintenance Intervals

NOTICE! Different process conditions (e.g., pressure, temperature, chemically aggressive media) impact the inspection and maintenance intervals. Analyze the specific application and its process conditions. Determine qualified experiences from comparable applications and derive suitable intervals.

Interval[1)]	To Do
Initial inspection after a few weeks	1. Move the Ceramat WA154 to the process position (PROCESS limit position). → *Moving into the Process Position (PROCESS Limit Position), p. 27* 2. Check the outlet hose for escaping process medium. If process medium is escaping: Stop the process (depressurize or discharge the process medium, if necessary) and remedy the fault. → *Troubleshooting, p. 38*
	1. Move the Ceramat WA154 to the service position (SERVICE limit position). → *Moving into the Service Position (SERVICE Limit Position), p. 27* 2. Remove the drive unit. → *Drive Unit: Removal, p. 36* 3. Visual inspection of the O-rings to check the basic suitability of the materials used under the existing process conditions. Replace O-rings if necessary. → *Seal Kits, p. 42* 4. Mount the drive unit. → *Drive Unit: Installation, p. 37*
After 1 to 2 years or 30 000 strokes[2)]	1. Move the Ceramat WA154 to the service position (SERVICE limit position). → *Moving into the Service Position (SERVICE Limit Position), p. 27* 2. Remove the drive unit. → *Drive Unit: Removal, p. 36* 3. Visual inspection of O-rings subject to dynamic load on the sensor socket and the O-rings subject to static load. Replace O-rings if necessary. → *Seal Kits, p. 42* 4. If necessary, check that the cavity rinsing is functioning perfectly. 5. Mount the drive unit. → *Drive Unit: Installation, p. 37*
	1. Upon suspicion of deposits or in case of chemical attacks on the sensor housing (visible in the sensor housing after drive unit is removed), check the process unit. 2. If necessary, send the process unit to the responsible local representative for repair. → *knick-international.com*
After 10 years or after 500 000 strokes	1. Remove the Ceramat WA154. → *Retractable Fitting: Removal, p. 41* 2. Send the Ceramat WA154 to the responsible local representative for complete maintenance (replacement of pneumatic seals and lubricating grease, check all functions, pressure test, and leak test). → *knick-international.com*

1) The intervals listed are approximate recommendations based on the experience of Knick. The actual intervals depend on the specific application.

2) Following successful first inspection and confirmation of the suitability of all materials used, the interval may be lengthened.

6.1.2 Lubricants Used and Permitted

Application	Pharma and Food		Chemicals and Wastewater
Lubricant	Beruglide L[1] (silicone-free)	Paraliq GTE 703[2] (containing silicone)	Syntheso Glep 1 (silicone-free)
Elastomer seal materials			
FKM	+	+	+
FFKM	+	+	+
EPDM	+	+	+

Note: Lubricant Paraliq GTE 703 contains silicone and has good lubricating properties even at elevated temperatures and with numerous travel movements. Paraliq GTE 703 is used as a special version at the customer's express request.

6.1.3 Immersion Lock Without a Mounted Solid-Electrolyte Sensor: Functional Test

Note: The functional test can only be performed with versions of the Ceramat WA154 intended for solid-electrolyte sensors and during operation within a Knick process analysis system.
→ *Safeguards, p. 6*

01. Move the Ceramat WA154 into the service position (SERVICE limit position).
→ *Moving into the Service Position (SERVICE Limit Position), p. 27*.
02. Remove the drive unit. → *Drive Unit: Removal, p. 36*
03. Remove the sensor. → *Installing and Removing a Sensor, p. 28*
04. Press the service switch on the electro-pneumatic controller.
✓ Ceramat WA154 does not move.
✓ The process analyzer displays the Sensor Removed message.
05. Install the sensor. → *Installing and Removing a Sensor, p. 28*
06. Loosen the sensor around one full turn.

⚠ CAUTION! Risk of product damage if the drive unit's coupling nut is excessively tightened.
The clear, audible escape of compressed air underneath the coupling nut during the functional test is normal and does not indicate a fault. Do not tighten the coupling nut any further.

07. Press the service switch on the electro-pneumatic controller.
✓ Ceramat WA154 does not move.
✓ Compressed air noticeably and audibly escapes underneath the drive unit's coupling nut.
✓ The process analyzer displays the Sensor Removed message.
08. Fully screw in and tighten the sensor. → *Installing and Removing a Sensor, p. 28*
09. Press the service switch on the electro-pneumatic controller.
✓ Ceramat WA154 moves to the process position (PROCESS limit position).
✓ The position indicator points to PROCESS.
10. Move the Ceramat WA154 into the service position (SERVICE limit position).
→ *Moving into the Service Position (SERVICE Limit Position), p. 27*.
11. Mount the drive unit. → *Drive Unit: Installation, p. 37*
12. Repeat the functional test every 12 months. As applicable, adjust the interval to match the specific application for which the Ceramat WA154 is used.

[1] FDA-compliant, registered in accordance with NSF-H1.
[2] FDA-compliant, registered in accordance with USDA-H1.

6.2 Corrective Maintenance

6.2.1 Corrective Maintenance Safety Instructions

⚠ WARNING! Process medium, potentially containing hazardous substances, may escape from the Ceramat WA154. Only perform corrective maintenance in the service position (SERVICE limit position). Disconnect the Ceramat WA154 from all power sources and secure it against accidental reconnection. Follow the safety instructions. → *Safety, p. 5*

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

Note: The sensor housing with the ceramic rotary slides is the first barrier to the process. In case of a defect, the drive unit, e.g., broken ceramic, as the second barrier.

6.2.2 Knick Repair Service

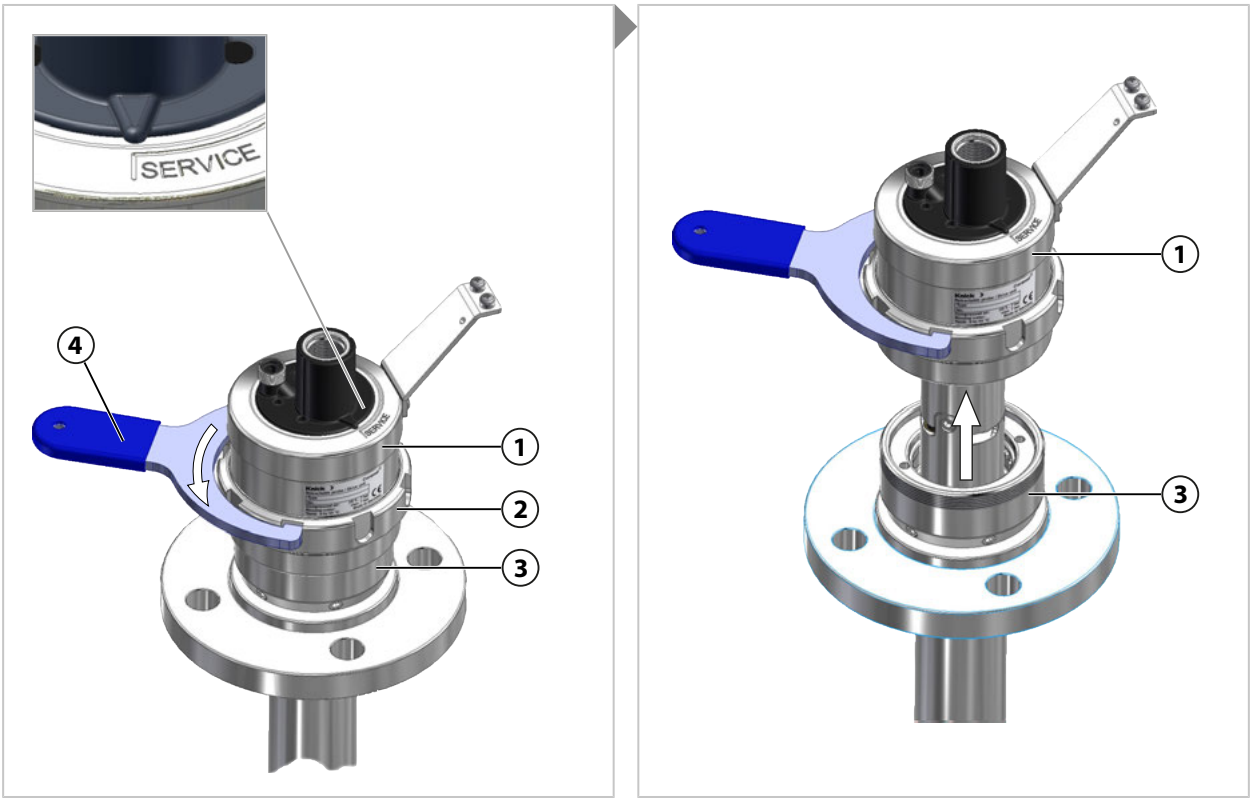
The Knick Repair Service offers professional corrective maintenance for the product to the original quality. Upon request, a replacement unit can be obtained for the period of the repair.

Further information can be found at www.knick-international.com.

See also
→ *Return, p. 41*

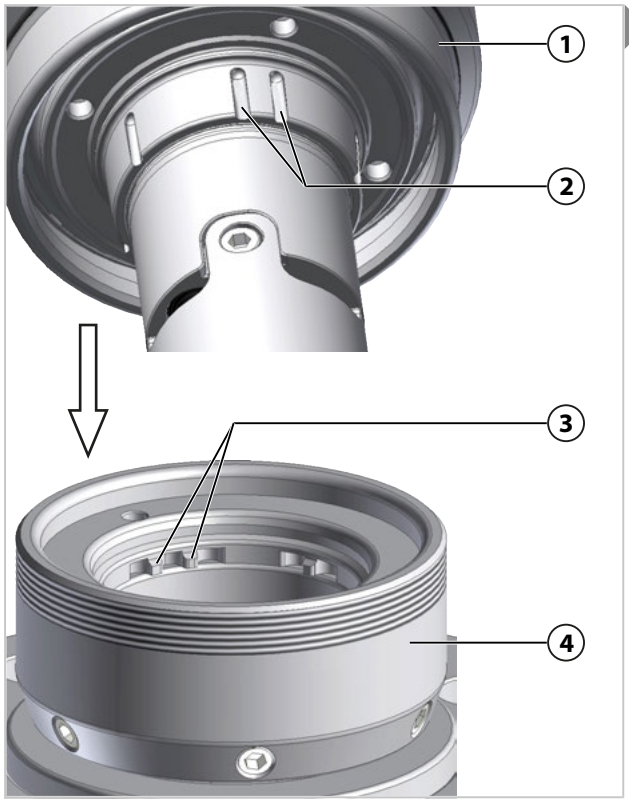
6.2.3 Drive Unit: Removal

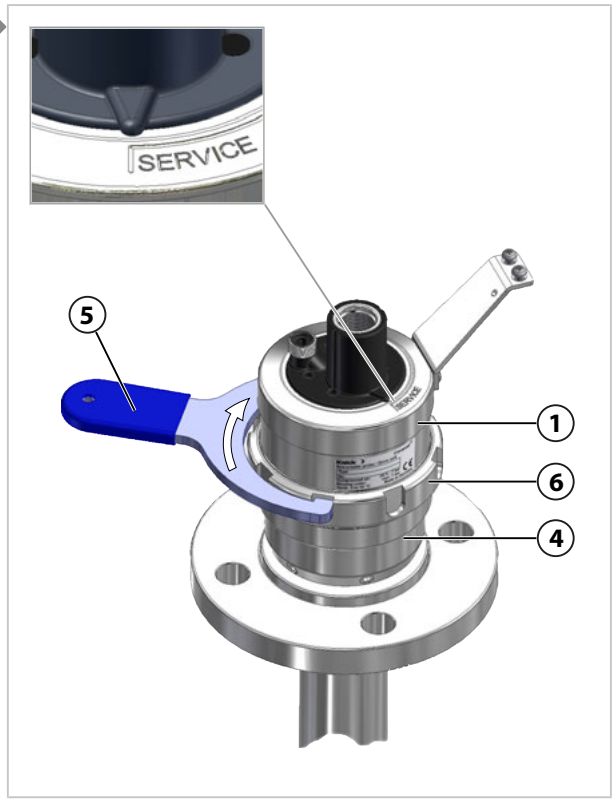
Note: The drive unit needs to be removed for procedures such as maintenance, cleaning, or trouble-shooting. → *Troubleshooting, p. 38*



01. Move the Ceramat WA154 into the service position (SERVICE limit position).
→ *Moving into the Service Position (SERVICE Limit Position), p. 27*.
02. Switch off the compressed air supply and vent the compressed air system.
03. Rinse the media connections and blow free if necessary in order to avoid carry over of the process medium. → *Process Analysis System: Installation Example, p. 19*
04. Check the outlet for escaping process medium. If process medium escapes, stop the process (depressurize or drain off the process medium if necessary) and perform troubleshooting.
→ *Troubleshooting, p. 38*
05. Disconnect the multiplug from the drive unit **(1)**, if necessary.
06. Disconnect the outlet hose from the drive unit **(1)**, if necessary.
07. If necessary, disconnect the cable socket of the sensor cable from the sensor and remove the sensor. → *Installing and Removing a Sensor, p. 28*
Note: Do not tilt the coupling nut. Recommended tool: ZU0648 Ceramat spanning wrench.
→ *Tools, p. 47*
08. Loosen the coupling nut **(2)** approx. 1.5 turns counterclockwise using the spanning wrench **(4)**, but do not completely unscrew it.
09. Check the outlet for escaping process medium. If process medium escapes, stop the process (depressurize or drain off the process medium if necessary) and perform troubleshooting.
→ *Troubleshooting, p. 38*
10. Completely release the coupling nut **(2)**. While doing so, the drive unit **(1)** is pulled out of the process unit **(3)**. This motion can be supported by slightly lifting the drive unit **(1)** while turning the coupling nut **(2)**.
11. Pull the drive unit **(1)** out of the process unit **(3)**.

6.2.4 Drive Unit: Installation





01. Make sure that the drive unit **(1)** is located in the service position (SERVICE limit position).
→ *Service and Process Position, p. 18*
Note: The coupling nut can only be tightened if the process unit is correctly inserted and pushed in far enough that the coupling nut's thread can engage.
02. Push the drive unit **(1)** into the process unit **(4)** while aligning the guide grooves **(2)** of the drive unit **(1)** so that they fit into the guide ridges **(3)** of the process unit **(4)**.
03. Put the coupling nut in place **(6)** and screw it on clockwise up to the perceptible stop. When screwing on the coupling nut **(6)**, continue to push down the drive unit **(1)** to make it easier to screw on, if necessary.
Note: Do not tilt the coupling nut. Recommended tool: ZU0648 Ceramat spanning wrench.
→ *Tools, p. 47*
04. Tighten the coupling nut **(6)** hand-tight, turning the spanning wrench **(5)** clockwise.
05. If necessary, install the outlet hose. → *Outlet, p. 21*
06. If necessary, install the multiplug. → *Multiplug: Installation, p. 24*
07. If necessary, install the sensor. → *Installing and Removing a Sensor, p. 28*
08. If necessary, install the sensor cable. → *Sensor Cable: Installation, p. 25*

7 Troubleshooting

USE CAUTION WHEN CONDUCTING ANY TROUBLESHOOTING. FAILURE TO ABIDE BY THE REQUIREMENTS SET FORTH HEREIN MAY RESULT IN SERIOUS INJURY OR DEATH, AS WELL AS DAMAGE TO PROPERTY.

Fault status	Possible cause	Remedy
Medium escapes from the outlet hose.	Ceramic rotary slide defective.	Send the Ceramat WA154 to the responsible local representative for repair. → *knick-international.com*
	Sensor housing defective.	Send the Ceramat WA154 to the responsible local representative for repair. → *knick-international.com*
Medium escapes from the connection point of the multiplug.	Multiplug installed incorrectly.	Install the multiplug correctly. → *Multiplug: Installation, p. 24*
	Seals or O-rings of the multiplug damaged or missing.	Check seals and O-rings of the multiplug for correct position and damage; replace if necessary.
	Connection point soiled.	Clean the connection point and multiplug.
	Foreign body between connection point and multiplug.	Remove any foreign bodies (e.g., old O-rings).
	Multiplug defective.	Send the media connection to the responsible local representative for repair. → *knick-international.com*
Ceramat WA154 is not moving.	Multiplug installed incorrectly.	Install the multiplug correctly. → *Multiplug: Installation, p. 24*
	Sensor installed incorrectly.	Install the sensor correctly. → *Installing and Removing a Sensor, p. 28*
	Compression ring or O-ring of the sensor damaged or missing.	Check the compression ring and O-ring of the sensor for correct position and damage; replace if necessary.
	Foreign body in the sensor holder.	Remove any foreign bodies (e.g., old compression ring or old O-ring).
	Seals or O-rings of the drive unit damaged.	Replace the seals or O-rings of the drive unit and the calibration chamber.
	Drive unit defective.	Send the Ceramat WA154 to the responsible local representative for repair. → *knick-international.com*
	Compressed air supply interrupted.	Install the multiplug correctly. → *Multiplug: Installation, p. 24*
		Check the compressed air system for proper functioning.
		Check the electro-pneumatic controller for proper functioning.
		Check the industrial transmitter for error messages.
Ceramat WA154 does not fully move to the SERVICE or PROCESS limit position.	Faulty drive unit.	Follow the instructions for help. → *Malfunction: Retractable fitting does not move completely to the SERVICE or PROCESS limit position, p. 40*
	No compressed air supply.	Install the multiplug correctly. → *Multiplug: Installation, p. 24*
		Check the function of the compressed air system.
		Check the function of the electro-pneumatic controller.
		Check the process analyzer for error messages.

[1] Without a sensor or with an incorrectly installed sensor, the clear and audible escape of compressed air underneath the coupling nut is normal and does not indicate a fault. Do not tighten the coupling nut any further. → *Safeguards, p. 6*

Fault status	Possible cause	Remedy
Compressed air flows out perceptibly and audibly beneath the coupling nut of the drive unit.[1)]	The sensor is missing or is not correctly installed.	Install the sensor correctly. → *Installing and Removing a Sensor, p. 28*
		Check the compression ring and O-rings of the sensor for correct position and damage; replace if necessary.
	Foreign body in the sensor holder.	Remove any foreign bodies (e.g., old compression ring or old O-ring).
Sensor glass shattered.	Mechanical impact on the sensor glass (e.g., by process medium).	Replace the sensor. → *Installing and Removing a Sensor, p. 28*
		Remove any glass splinters from the sensor holder and the sensor housing. Check the sensor tube gaskets for damage and replace them if necessary. → *Drive Unit: Removal, p. 36*
		If required, stop the process (depressurize or drain off the process medium if necessary) and remove the Ceramat WA154. Remove glass splinters from the ceramic rotary slides and check the sensor housing gaskets for damage; replace them if necessary. → *Retractable Fitting: Removal, p. 41*
No or wrong measured value displayed.	Faulty sensor.	Replace the sensor. → *Installing and Removing a Sensor, p. 28*
	Defective plug connection or damaged sensor cable.	Fasten plug connection or replace damaged sensor cable. → *Sensor Cable: Installation, p. 25*.
	Process analyzer incorrectly configured.	Correctly configure the process analyzer (see relevant documentation).

1) Without a sensor or with an incorrectly installed sensor, the clear and audible escape of compressed air underneath the coupling nut is normal and does not indicate a fault. Do not tighten the coupling nut any further.
→ *Safeguards, p. 6*

Malfunction: Retractable fitting does not move completely to the SERVICE or PROCESS limit position

⚠ **CAUTION! Risk of injury to hands and fingers from the drive unit's rotary movement.** Do not manually turn the drive any further or reach inside the Ceramat WA154.

NOTICE! Risk of product damage if additional manual force is applied (i.e., not due to the compressed air in the retractable fitting). Do not turn the drive any further by force.

01. Increase the drive control pressure up to the maximum permissible value to move fully to the service position (SERVICE limit position) or the process position (PROCESS limit position).
    → *Specifications, p. 51*
    ✓ Position indicator points to SERVICE or PROCESS marking.
    Note: If troubleshooting is successful, continue with Step 02. If troubleshooting is not successful, continue with Step 03.
02. Troubleshooting successful: Check the cause of the malfunction. If necessary, dismount the drive unit. Perform maintenance on the drive unit or check the functionality of the process unit using a substitute drive.
03. Troubleshooting unsuccessful: Stop process, depressurize or discharge process medium if necessary. Remove Ceramat WA154 and send to the local representative responsible for repairs.
    → *knick-international.com*

See also

→ *Knick Repair Service, p. 35*
→ *Retractable Fitting: Removal, p. 41*
→ *Drive Unit: Removal, p. 36*

8 Decommissioning

8.1 Retractable Fitting: Removal

⚠ WARNING! Risk of explosion from mechanically generated sparks when used in explosive atmospheres. Take appropriate action to prevent mechanically generated sparks. Follow the safety instructions. → *Operation in Explosive Atmospheres, p. 7*

⚠ WARNING! Process or rinse medium, potentially containing hazardous substances, may escape from the Ceramat WA154 or the process port. Follow the safety instructions. → *Safety, p. 5*

01. Stop the process; depressurize or drain off the process medium if necessary.
02. Move the Ceramat WA154 into the service position (SERVICE limit position).
    → *Moving into the Service Position (SERVICE Limit Position), p. 27*.
03. Switch off the compressed air supply and vent the compressed air system.
04. Disconnect the cable bushing of the sensor cable from the sensor.
05. Loosen and remove the sensor cable from the media connection bracket.
06. If required, loosen and remove the equipotential bonding line from the media connection bracket.
07. Remove the multiplug.
08. Remove the outlet hose.
09. Remove the media connection bracket from the strain relief bracket of the Ceramat WA154.
10. Loosen the process connection.
11. Remove the Ceramat WA154 from the customer's process port.
12. Close off the process port appropriately.

8.2 Return

If a product must be returned, send it to the responsible local representative in a clean condition and securely packaged. → *knick-international.com*

Upon contact with hazardous substances, decontaminate or disinfect the product before shipping. Always include the relevant return form (Declaration of Decontamination) with shipments, in order to avoid hazards to our Service employees. → *knick-international.com*

8.3 Disposal

To dispose of the product properly, follow the local regulations and laws.

The Ceramat WA154 can contain various materials, depending on the version concerned.
→ *Product Code, p. 10*

9 Spare Parts, Accessories, and Tools

9.1 Seal Kits

The Ceramat WA154 is a modular system. The correct seal kits required for corrective maintenance depend on the version ordered.

The ordered version of the Ceramat WA154 is encoded in a product code. → *Product Identification, p. 9*

The seal kits for the Ceramat WA154 are also encoded in a product code. The options in the seal kit product code correspond to the options in the product code for the Ceramat WA154.

Note: Option 1 (pH sensor ⌀ 12 mm with pressurization) encoded in the Ceramat WA154 product code is integrated in Option 0 of the seal kit product codes.

Three different seal kits are available:

- ZU0988 Seal kit without sensor socket
- ZU0989 Seal kit with sensor socket
- ZU0990 Sensor socket with seals

Note: Further seal kits are available on request.

Each seal kit comes with an accompanying slip that provides information about the package contents, where the O-rings are to be installed, and where the lubrication points are. The O-rings must be greased with the supplied lubricant.

9.1.1 Example: Product code seal kit

The following example shows the product code ZU0989-0HB11-000 of the accessory "Seal kit with sensor socket" in relation to the product code of the corresponding version of the Ceramat WA154.

Basic unit with pneum. drive unit, stainless steel design		WA154	–	X	0	H	B	B	1	1	3	0	0	B	B	2	0	–	0	0	0
Seal kit with sensor socket		ZU0989	–		0	H		B	1	1								–	0	0	0
Explosion protection	ATEX Zone 0			X														–			
Sensor	Sensor ⌀ 12 mm with PG 13.5				0													–			
Seal material	FFKM – FDA					H												–			
Sensor protection tube material	Hastelloy C22						B											–			
Sensor socket material	Hastelloy C22, short protection							B	1									–			
Sensor socket scraper ring	Natural PEEK									1								–			
Immersion depth	300 mm										3	0	0					–			
Wetted material	Hastelloy C22													B				–			
Process connection	Loose flange, PN10/16, DN 65														B	2		–			
Probe guard	Without																0	–			
Special version	Without																	–	0	0	0

ZU0988 Seal Kit Without Sensor Socket

ZU0988 seal kit contains all O-rings for the selected version. The sensor socket is not included.
→ *Spare Parts, p. 45*

Note: Option 1 (pH sensor ⌀ 12 mm with pressurization) encoded in the Ceramat WA154 product code is integrated in Option 0 of the seal kit product code.

Seal kit without sensor socket		**ZU0988**	–	_	_	_	_	–	_	_	_
Sensor	pH sensor ⌀ 12 mm with PG 13.5 or pressurization			0				–			
	Optical sensor ⌀ ½″ (12.7 mm)			2				–			
	Optical sensor ⌀ 12 mm			3				–			
Gasket material	FKM				A			–			
	EPDM				B			–			
	EPDM – FDA				E			–			
	FKM – FDA				F			–			
	FFKM – FDA				H			–			
	FFKM				K			–			
Sensor socket	None					0	0	–			
Scraper for sensor socket	None						0	–			
Special version	None							–	0	0	0

ZU0989 Seal Kit With Sensor Socket

ZU0989 seal kit contains the sensor socket and all O-rings for the selected version.

Note: Option 1 (pH sensor ⌀ 12 mm with pressurization) encoded in the Ceramat WA154 product code is integrated in Option 0 of the seal kit product code.

Seal kit with sensor socket		**ZU0989**	–	_	_	_	_	–	_	_	_
Sensor	pH sensor ⌀ 12 mm with PG 13.5 or pressurization			0				–			
	Optical sensor ⌀ ½″ (12.7 mm)			2				–			
	Optical sensor ⌀ 12 mm			3				–			
Gasket material	FKM				A			–			
	EPDM				B			–			
	EPDM – FDA				E			–			
	FKM – FDA				F			–			
	FFKM – FDA				H			–			
	FFKM				K			–			
Sensor socket	Hastelloy C 22, without protection					B	0	–			
	Hastelloy C 22, short protection					B	1	–			
	1.4404, without protection					H	0	–			
	1.4404, short protection					H	1	–			
	1.4404, long protection					H	2	–			
	1.4404, full protection					H	3	–			
	PEEK, without protection					E	0	–			
	Titanium, without protection					T	0	–			
	Titanium, short protection					T	1	–			
Scraper for sensor socket	None						0	–			
	With PEEK, natural						1	–			
Special version	None							–	0	0	0

ZU0990 Sensor Socket With Seals

ZU0990 seal kit contains only the sensor socket and all seals and slide rings installed on it.

Note: Option 1 (pH sensor ⌀ 12 mm with pressurization) encoded in the Ceramat WA154 product code is integrated in Option 0 of the seal kit product code.

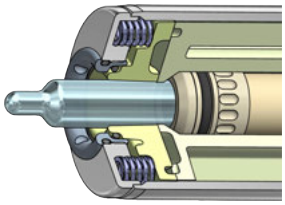
Sensor socket with seals		ZU0990	–	_	_	_	_	_	–	_	_	_
Sensor	pH sensor ⌀ 12 mm with PG 13.5 or pressurization			0					–			
	Optical sensor ⌀ ½″ (12.7 mm)			2					–			
	Optical sensor ⌀ 12 mm			3					–			
Gasket material	FKM				A				–			
	EPDM				B				–			
	EPDM – FDA				E				–			
	FKM – FDA				F				–			
	FFKM – FDA				H				–			
	FFKM				K				–			
Sensor socket	Hastelloy C 22, without protection					B	0		–			
	Hastelloy C 22, short protection					B	1		–			
	1.4404, without protection					H	0		–			
	1.4404, short protection					H	1		–			
	1.4404, long protection					H	2		–			
	1.4404, full protection					H	3		–			
	PEEK, without protection					E	0		–			
	Titanium, without protection					T	0		–			
	Titanium, short protection					T	1		–			
Scraper for sensor socket	None							0	–			
	With PEEK, natural							1	–			
Special version	None								–	0	0	0

9.2 Spare Parts

Sensor sockets

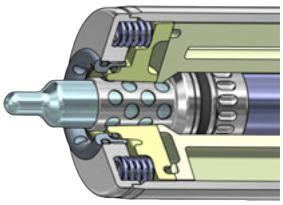
The sensor socket is screwed together with the sensor protection tube and seals the sensor for the process while the sensor socket slides into the ceramic lock. The interface between the sensor socket and ceramic is also sealed.

All sensor sockets may be ordered via the accessory product code ZU0990.
→ *ZU0990 Sensor Socket With Seals, p. 44*



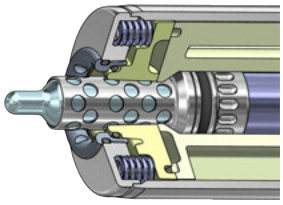
Sensor socket without a sensor protection tube

This version is suitable for process media that tends not to form incrustations.



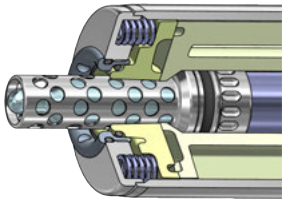
Sensor socket with a short sensor protection tube

This version is suitable for process media that tends to form small brittle incrustations.



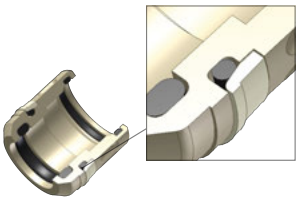
Sensor socket with a long sensor protection tube

This version is suitable for process media that tends to form larger brittle incrustations. The extended design enables a possible thick incrustation to be cleared away when entering the process, thereby better protecting the sensor from mechanical effects.



Sensor socket with a full sensor protection tube

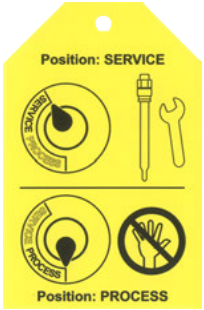
This version encloses the full length of the sensor, thereby protecting the sensor and the sensor tip from mechanical effects. In addition, this sensor socket also protects against inflowing particles in the case of flowing process media, if any.



Sensor socket with a scraper ring made of PEEK

Featuring a scraper ring made of PEEK, this version is recommended for adhesive or sticky media and particles in the process medium. The sensor socket can be selected and ordered via the accessory product code ZU0989 "Seal kit with sensor socket" and ZU0990 "Sensor socket with seals." → *Seal Kits, p. 42*

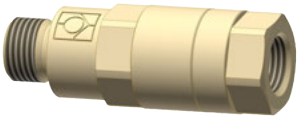
Safety Label



The safety label contains information on safely installing and removing solid-electrolyte sensors. → *Installing and Removing a Sensor, p. 28*

Damaged or lost safety labels will be replaced on request.

9.3 Accessories



RV01 Check Valve

The RV01 Check Valve prevents the return flow of the process medium, calibration medium, cleaning medium, or rinsing medium into the inlet. The check valve is selected via a product code.

Check Valve		RV01	-	_	_	_	_
Material of housing, valve body	Stainless steel 1.4404			H			
	PEEK			E			
Material of seals	FKM				A		
	EPDM				B		
	FFKM				C		
	FKM-FDA				F		
	EPDM-FDA				E		
	FFKM-FDA				H		
Inlet connection, female thread	G¼"					4	
	G⅛"					8	
Outlet connection, male thread	G¼"						4
	G⅛"						8

ZU0631 Standard Media Connection

Connection kit for manual operation of the Ceramat WA154 in conjunction with accessory ZU0646, "Pneumatically operated manual control valve," or for operation with the process control system (PCS).

ZU0646 Manually Operated Pneumatic Valve

Switch (tilt lever for rerouting the compressed air) for manual operation of the Ceramat WA154 in conjunction with accessory ZU0631 "standard media connection".

ZU0654/ZU0655 Adapter for Additional Media

The adapter enables an additional medium, e.g., hot water or steam, to be directly fed into the Ceramat WA154. A check valve is integrated into the media connection of the adapter.

The adapter is installed between the Ceramat WA154 and the multiplug of the media connection.

ZU0654/1 adapter made of PEEK, O-rings FKM
ZU0654/2 adapter made of PEEK, O-rings EPDM
ZU0654/3 adapter made of PEEK, O-rings FFKM
ZU0655/1 adapter made of 1.4571, O-rings FKM
ZU0655/2 adapter made of 1.4571, O-rings EPDM
ZU0655/3 adapter made of 1.4571, O-rings FFKM

ZU0670/1 Air Supply for Pressurized Sensors 0.5 ... 4 bar
ZU0670/2 Air Supply for Pressurized Sensors 1 ... 7 bar
ZU0713 Hose, 20 m (Extension for ZU0670)

This assembly group maintains the defined gauge pressure in the pressure chamber in versions of the Ceramat WA154 for liquid-electrolyte sensors.

ZU0953 Kit for Connecting Compressed Air Supply to the Sensor Pressure Chamber

The connection kit enables installation of accessory ZU0670 "Air supply for pressurized sensors" to customers' permanently installed ¼" pipes.

ZU0953 is an elastic connection between the permanent piping (solid ¼" pipes) and the moving parts of the Ceramat WA154.

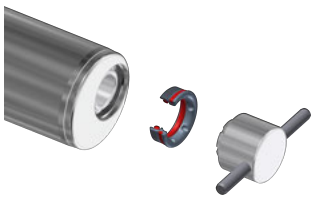
9.4 Tools

ZU0648 Spanning Wrench

Accessory ZU0648 spanning wrench is used to loosen and fasten the coupling nuts of the drive unit (disconnecting or connecting the drive unit).

ZU0647 Sensor Spanning Wrench

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



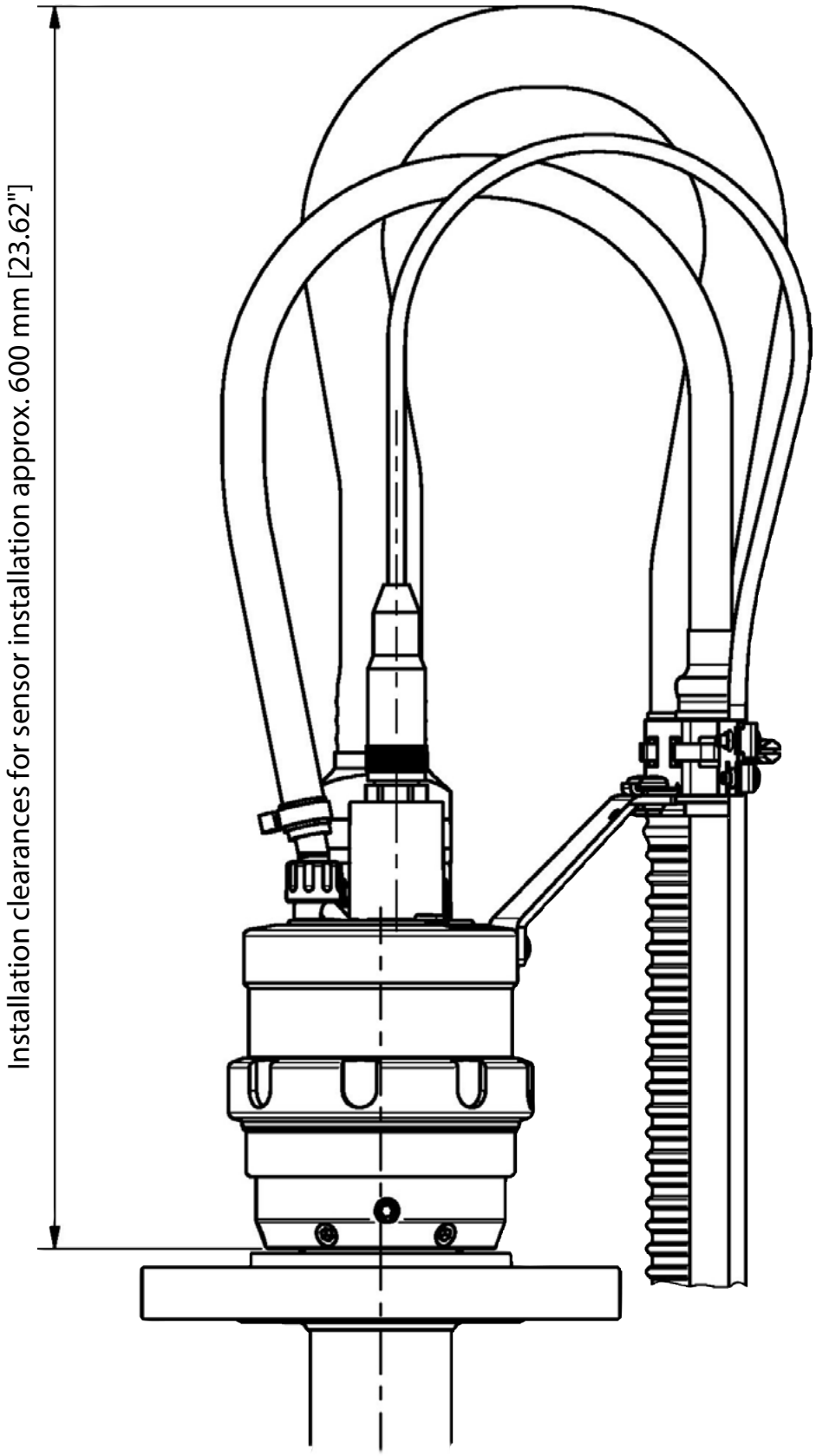
ZU0999 Spanning Wrench

On versions of the Ceramat WA154 without sensor protection, the spanning wrench is used to install and remove the sealing ring (e.g., to check the O-rings of the sealing ring and replace them if necessary).

10 Dimension Drawings

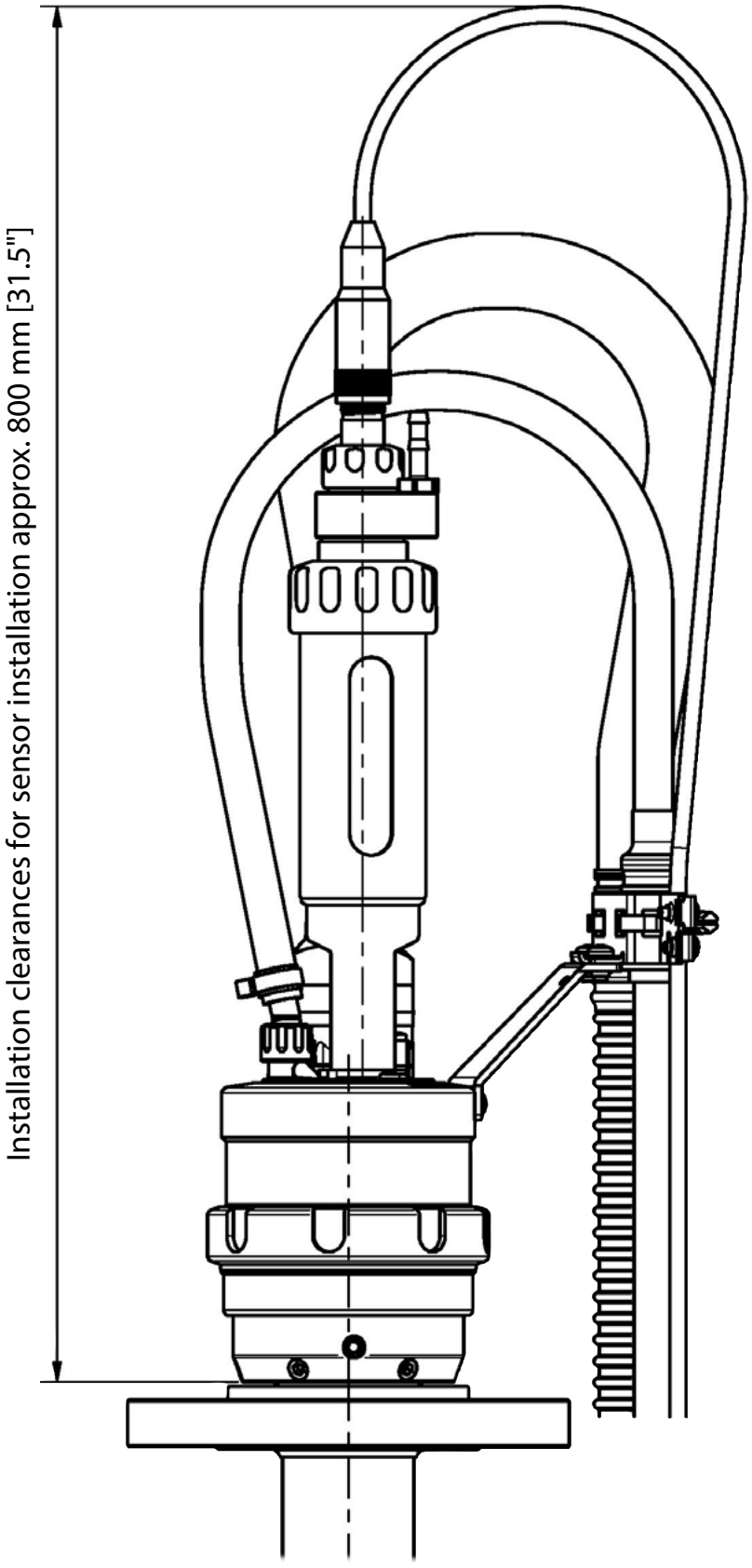
Retractable Fitting for Solid-Electrolyte Sensor

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

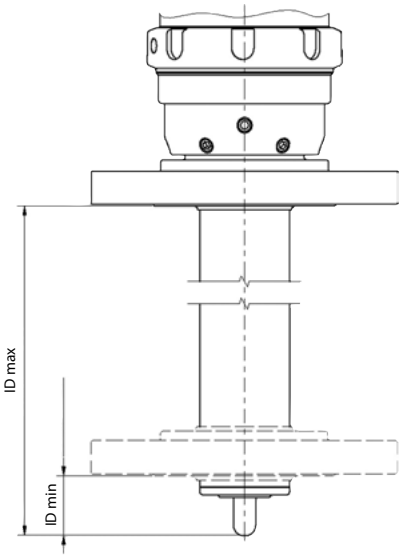


Retractable Fitting for Liquid-Electrolyte Sensor

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



Process Connections (Excerpt From the Product Line)



Flange

Max. immersion depth (ID = immersion depth) = 300 mm (11.81")
min. immersion depth (ID = immersion depth) = 23 mm (0.91")[1)]

1) Min. immersion depth 23 mm (0.91") only for non-standard immersion depths. Min. immersion depth 150 mm (5.91") for standard versions. → *Product Code, p. 10*

11 Specifications

Permitted process pressure and temperature during motion	10 bar at 0 ... 140 °C (145 psi at 32 ... 284 °F)	
Permitted process pressure and temperature static in service position	16 bar at 0 ... 40 °C (232 psi at 32 ... 104 °F)	
Permitted rinsing pressure and temperature	6 bar at 5 ... 60 °C (87 psi at 41 ... 140 °F) with the accessory ZU0654/ZU0655 "Adapter for additional media" up to 135 °C (275 °F) → *Accessories, p. 46*	
Permitted pressure for sensor control	4 ... 7 bar (58 ... 101.5 psi)	
	Necessary control pressure depending on the process pressure:	
	Control pressure	**Process pressure**
	5 bar (72.5 psi)	7 bar (101.5 psi)
	6 bar (87 psi)	8 bar (116 psi)
	7 bar (101.5 psi)	10 bar (145 psi)
Ambient temperature	-10 ... 70 °C (14 ... 158 °F)	
Ingress protection	IP66	
Sensors	→ *Product Code, p. 10*	
Process connections	→ *Product Code, p. 10*	
Immersion depths/installation dimensions	→ *Dimension Drawings, p. 48*	
Wetted materials	→ *Product Code, p. 10*	
Compressed air quality		
Standard	In accordance with ISO 8573-1:2001	
Quality class	3.3.3 or 3.4.3	
Solid contaminants	3 (max. 5 µm, max. 5 mg/m^3)	
Water content for temperatures > 15 °C (> 59 °F)	Class 4, pressure dew point 3 °C (37.4 °F) or lower	
Water content for temperatures 5 ... 15 °C (41 ... 59 °F)	Class 3, pressure dew point -20 °C (-4 °F) or lower	
Oil content	Class 3 (max. 1 mg/m^3)	
Connections		
Outlet	Joining piece that fits the outlet hose of the media connection → *Outlet, p. 21*	
For pressurized sensors	NW6 hose insert with G1/8 thread for connecting a pneumatic hose with a 6 mm or ¼" inner diameter Pressure in the sensor pressure chamber 0.5 ... 1 bar (7.25 ... 14.5 psi) above the process pressure of max. 7 bar (101.5 psi)	
For compressed air, rinsing media, and calibration solutions (control air retractable fitting)	For Unical multiplug	
Weight	Depending on material and version. Please contact Knick or your designated sales representative for detailed information.	

Abbreviations

A/F	Width across flats
ANSI	American National Standards Institute
ATEX	Atmosphères Explosibles (explosive atmospheres)
CE	Conformité Européenne (European conformity)
DIN	Deutsches Institut für Normung (German Institute for Standardization)
DN	Diamètre Nominal (inside diameter)
EPDM	Ethylene propylene diene monomer rubber
EU	European Union
FDA	U.S. Food and Drug Administration
FFKM	Perfluoro rubber
FKM	Fluoro rubber
IEC	International Electrotechnical Commission
IP	International Protection/Ingress Protection (protection from the penetration of foreign bodies or liquids)
ISO	International Organization for Standardization
KEMA	Keuring van Elektrotechnische Materialen te Arnhem (certification body for electrotechnical equipment)
PCS	Process control system
PEEK	Polyether ether ketone
PG	Panzergewinde
PP	Polypropylene
PVDF	Polyvinylidene fluoride

Glossary

CE Marking

Manufacturer's declaration, in accordance with EU Regulation 765/2008, that the product is in conformity with the applicable requirements set out in the European Union harmonization legislation providing for its affixing.

Corrective Maintenance

Measures taken to return an item under review to an operational condition, with the exception of improvements.

Hazard

A hazard is defined as a potential source of damage. The term "hazard" can be specified to indicate the origin or nature of the expected damage. (Source: EN ISO 12100)

Inspection

Measures for determining and assessing the actual condition of an item under review, including determining the causes of wear and deriving the necessary steps for future use.

Maintenance

Combination of all technical, administrative and managerial actions during the life cycle of an item intended to retain it in, or restore it to, a state in which it can perform the required function. (Source: EN 13306 Maintenance – Maintenance terminology)

Preventive Maintenance

Measures for maintaining the target condition […] and delaying the reduction of the available wear margin of an item under review.

Risk

Combination of the probability of occurrence of harm and the severity of that harm (source: EN ISO 12100)

Risk Assessment

Overall process of risk analysis and risk evaluation (source: EN ISO 12100)

Knick
Elektronische Messgeräte
GmbH & Co. KG

Beuckestraße 22
14163 Berlin
Germany
Phone: +49 30 80191-0
Fax: +49 30 80191-200
info@knick.de
www.knick-international.com

Translation of the original instructions

Version 3 • This document was published on July 26, 2024.
The latest documents are available for download on our website under the corresponding product description.

TA-203.092-KNEN03

103211