EXNER PROCESS EQUIPMENT

EXSPECT 271

NIR backscatter sensor
Technical Information

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EXspect 271 TI de 200227

Table of contents

1 Product description

1.1 EXspect 271 NIR backscatter sensor

Components

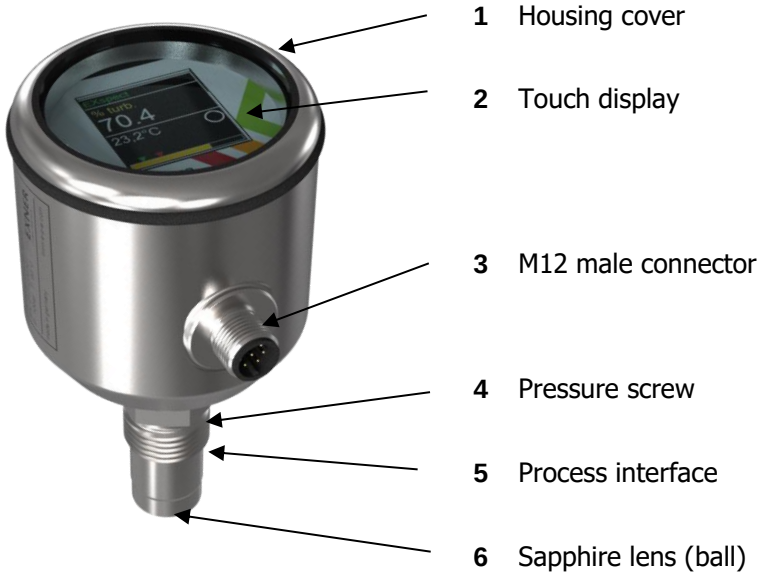


Fig. 1: NIR backscatter sensor

EXspect 271

The EXspect 271 NIR backscatter sensor enables monitoring of the turbidity of liquids for continuous monitoring of process results or safe indication of variations. It is particularly suitable for phase separation, separation control, filter monitoring and concentration measurement.

- Precise phase separation
- Fast product changes
- Reduced waste water costs
- Filter monitoring
- Colour-independent concentration measurement
- Compact design with integrated amplifier and display
- Durable sapphire lens
- Hygienic design, CIP/SIP-compliant
- LED light source for guaranteed stable and long-lasting signal
- Integrated compact and analogue output
- Easy parameterization
- Turbidity in % or customer-specific unit

Display At the display, the current measuring value is displayed. The touch display enables sensor configuration.

Calibration input By short-time application of a 24 V DC signal at the calibration input, the current measuring value is reset to 0. This way, the transmitter can be calibrated for known measuring media (reset to zero). This can also be realised by means of the "Offset Val" menu function.

1.2 Functions

Reset to zero Applies an offset to reset the current measuring value to 0.
This function corresponds to the calibration input via the external contact.

Display toggling Sets the measuring value to be displayed:

- Turbidity
- Customer-defined unit (CDU)

The CDU value set by default can only be changed and adjusted at sensors with M12 8-pin connection and with the communication interface ECI-01 such as the EXpert 2.x software.

Independent from display toggling, the analogue output always returns a signal depending on the turbidity.

Measuring range minimum Sets the 4 mA point for the output current. The range can be freely selected between 0…100 %.

Measuring range maximum Sets the 20 mA point for the output current. The range can be freely selected between 0…100 %.

Damping Applies damping at the turbidity value by continuous averaging.

Switch-off point Sets the switch-off point of the contactor. The range can be freely selected between 0…100 %.

Switch-on point Sets the switch-on point of the contactor. The range can be freely selected between 0…100 %.

Switching function Sets the switching function of the contactor. NC and NO contacts can be selected.

Switching delay Sets the switching function of the contactor. The range can be freely selected between 0...200 seconds.

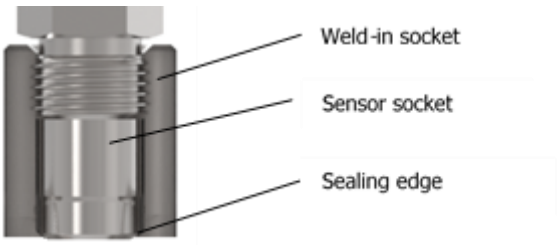
Language Sets the display language

1.3 Process integration

Sensor The EXspect 271 sensor is directly installed in the pipe or the container by means of a ½" process interface or inserted in existing process connections using respective adapters.

Fig. 2: Process integration

Weld-in sockets The installation by means of weld-in sockets ensures a hygienic process adaptation, which can be used with minimal dead space and without elastomer. Since this is a purely metallic sealing system, no further sealing materials such as e.g. elastomers are introduced.



Please always use the auxiliary welding plug offered as accessories, so that the heat generated during welding can be safely dissipated and a distortion of the bore can be effectively prevented.

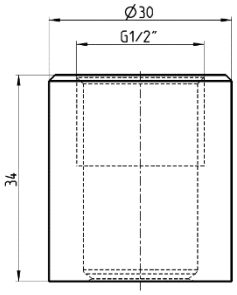
Welding in tanks / pipings

1.) Drill a hole with outside-diameter of the weld-in socket (Tolerance max. +0,2 mm)

2.) Attach the weld-in socket with 4 evenly distributed points (fig. 1, following page)

3.) Screw in auxiliary welding plug

4.) Weld the 4 sections between the points (fig. 2, right of fig.1 on following page)



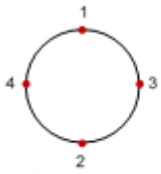


fig. 1

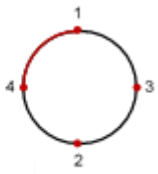


fig. 2

Transmitter

The transmitter is supplied with 24 V DC and is equipped with a freely adjustable switching contact and a 4…20 mA output for measuring value output. By means of a 24 V input, the measuring value can be reset to 0 %.

Pressure / Temperature

The EXspect sensor can be used up to a pressure of 10 bar and a maximum process temperature of 141 °C.

To protect the LED which is used, it is switched off at a temperature of 90 °C. Measurement is then no longer possible. The display shows the error message "LED Current". After lowering the medium temperature below 90 ° C, the LED is reactivated and error message disappears.

Installation position

The sensors can be generally operated in any position. However, it has to be ensured that the pipe is completely filled and that heavy turbulence of the medium and the formation of air bubbles occurs

at the position of the sensor. The readability of the display, easy access and operation should also be taken into consideration.

The following graphic describes the recommended installation positions of the sensor. Particularly installation at the side of the pipe is recommended.

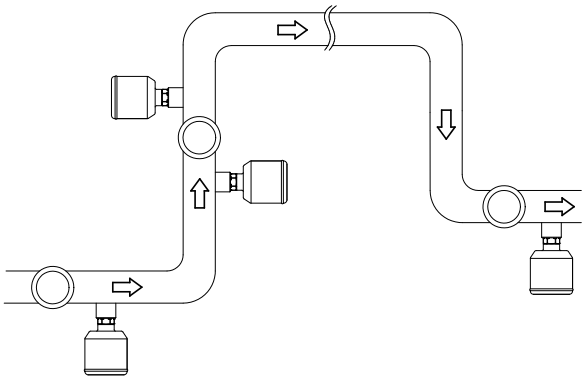


Fig. 3: Installation positions

1.4 Checking and calibration

For checking and calibration of the EXspect 271 sensor, reference normals (EXcap 120) with varying reflection values are available. As necessary, they can be plugged onto the sensor. To ensure proper checking/calibration, it has to be ensured that the reference normal is precisely applied at the sensor and that the marking (arrow) of the standard points to the connector of the sensor.

Fig. 4: Reference normal with marking

2 Parameterization

2.1 User menu

ATTENTION!

Incorrectly set parameters can lead to incorrect measuring values and switching points. This can affect the process.

☑ Make sure that parameters are only changed by authorised and qualified personnel.

The sensor can be parameterized optionally via the touch display or an M12 connector (8-pin) in combination with the communication interface ECI-01 and the software EXpert 2.x.

Touch the display to open the menu.

Touch the arrow symbol to access individual parameters or sensor and display data. To configure a parameter, touch the tool symbol.

Afterwards, select the respective setting with the arrows and confirm the selection with the Enter symbol.

The desired value is also selected with the arrows. To set a numeric value, it can be increased/decreased by single digits by briefly pressing the respective arrow. Keep an arrow pressed, to change the numeric value in steps of 10.

Press enter to confirm the entered value and leave the setting mode. Press ESC if no value is to be changed and to leave the setting mode.

To return to the display, press the dial symbol or wait for 30 seconds without making any input or touching the display.

User menu

Standard user parameters are indicated in **bolt** and **underlined**.

Parameter	Designation	Value range	Description
Offset	Enabling offset	**OFF**, ON	Enables/disables the offset setting
Offset Val	Offset	-100,0 … **0,0** (for unit %)	Sets the offset value. A reliable offset value can only be set if the current measured value does not change or only minimally changes over a period of approx. 5 seconds.
Unit	Display toggling	**%**, CDU	Sets the measuring value to be displayed:

Parameter	Designation	Value range	Description
			%: Turbidity **CDU**: Customer-defined unit The CDU value is to be defined via the EXpert software. Independent from display toggling, the analogue output always returns a signal depending on the turbidity.
AO min	Minimum output limit (Analog Output min)	**0,0** … 100,0 (for unit %)	Sets the turbidity value for minimum output.
AO max	Maximum output limit (Analog Output max)	0,0 … **100,0** (for unit %)	Sets the turbidity value for maximum output.
Damping	Damping	**0** … 100	Applies damping to the turbidity measuring value by returning a moving average over the set number of measuring values.
DO On	Switch-on point (Digital Output on)	**0.0** … 100.0 (for unit %)	Sets the switch-on point.
DO off	Switch-off point (Digital Output off)	**0.0** … 100.0 (for unit %)	Sets the switch-off point.
DO funct	Switching function Digital Output typ	**NO**, NC	NO = Normally open contact NC = Normally closed contact
DO Delay	Switching delay Digital Output delay	**0** … 200 s	Delays the switching point by up to 200 seconds
Language	Language settings	**Deutsch,** English, Français, Nederlands	Sets the display language.

2.2 Calibrating the sensor for the medium (reset to zero)

For recognition of repeating product conditions, the sensor can be calibrated to these product conditions.

Select the parameter "Offset ON". Dip the sensor tip into the reference liquid and, as soon as the measured value has stabilized, select the "SET" menu function under parameter "Offset Val" to set the offset. This way, the value is set to 0.

Alternatively, a 24 V DC switching signal can be applied at the calibration input. In order to activate the offset and to set the value of the reference liquid as "zero value" at the same time, the

adjustment input must be supplied with a voltage of 24 V DC for a short time (approx. 5 sec.).

Briefly applying 24 V DC to the calibration input has the same function as the two following settings in the display:

- Activation Offset (Offset ON)
- Setting the Offset value (SET OffsValue)

If the voltage (24 V DC) is only applied to the calibration input for approx. 1 sec., the offset can be activated or deactivated. A "reset to zero" does not take place.

!!! At the calibration input (Pin 5, see chapter 4.3), an electrical voltage must be applied permanently or when connecting the cable. The adjustment input must be kept de-energized. It is only for a short time to apply a voltage (24V DC) to the described switching operations.

2.3 Output current

The EXspect sensor is equipped with a 4…20 mA output to return the turbidity values. The output current is configured by means of the following parameters:

"AO min" sets the measuring range minimum and respectively the 4 mA point.

"AO max" sets the measuring range maximum and respectively the 20 mA point.

"Damping" sets the damping applied on display and output current.

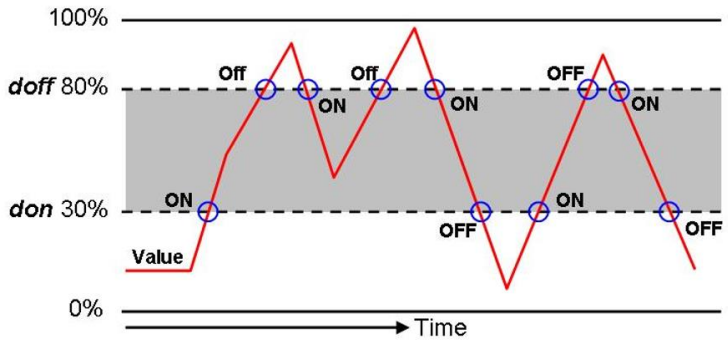
2.4 Switching point

The EXspect sensor is equipped with a PNP switching output that can be configured by means of four parameters.

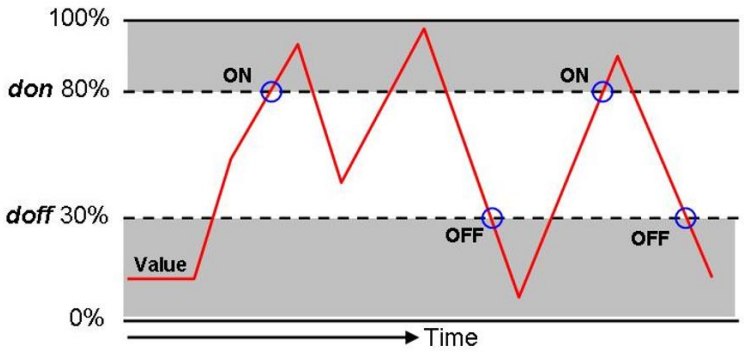
"DO On" sets the switch-on point and "DO Off" the switch-off point.

Together, these two parameters define the function of the switching output:

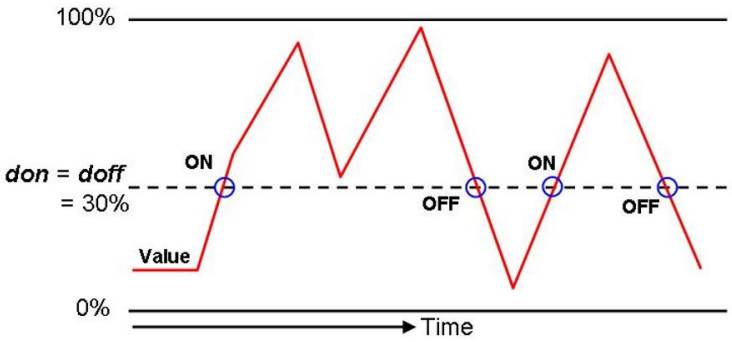
If "DO On" is lower than "DO Off", the output is switched on if the measuring value is between the switching points (window function).



If "DO On" is higher than "DO Off", the output is switched on if "DO On" is exceeded by the measuring value. It is not switched off before the "DO Off" measuring value is fallen below (hysteresis function).



If "Do On" and "DO Off" are identical, the output is switched on if the "DO On + DO Off" switching value is exceeded by the measuring value and switched off if the "DO On + DO Off" switching value is fallen below again.



In the range of 0 to 100 %, both parameters can be set independently.

"Do funct" reverts the function of the switching output.
If the value is set to NO, the switching output acts as NO contact.
If the value is set to NC, the switching output acts as NC contact.

"DO delay" applies a delay of up to 200s to the reaction of the switching output. This value applies for both, switching on and switching off.

2.5 Display

The EXspect sensor is equipped with a detachable display. It is not possible to operate the sensor without them.

It can be configured either at the display or via the ECI-01 (for EXspect 271) communication interface.

!!! If the sensor is parameterised via the display, make sure that when removing the sealing cap, the pressure screw is fixed with a suitable tool so that it can not move. After parameterization, the sealing cap of the sensor must be correctly set back in the correct position.

The parameterization by means of the communication interface ECI-01 and the PC software EXpert 2.x are only possible with sensors with an 8-pin connector.

!!! Before the sensor is connected to the PC for the first time via the communication interface ECI-01, the software Expert 2.x must be installed in advance on the PC.

3 Technical data

3.1 Standards

EN 61326-1: 2013-7
EN 61326-2-3: 2013-7
DIN/EN 27027 (ISO 7027)

3.2 Specifications

Sensor specifications	
Measuring range	0…100 %
Resolution	0,1 %
Accuracy	± 1,5 %
Reproducibility	≤ 1 % from final value
Wavelength	850 nm
Light source	LED
Material	Stainless steel 1.4435 (316L)
Surface quality	electropolished Ra <0.37 µm
Lens	Sapphire ball
Supply voltage	24 V DC
Output current	4…20 mA
Switching output	NO or NC, parameterizable
Input contact	+24 V DC for calibration (reset to zero)
Cable connection	M12 plug, 5 or 8-pin
Cable length	2 m or 5 m
Process interface	G ½" for welded fitting with 15° cone

3.3 Dimensions

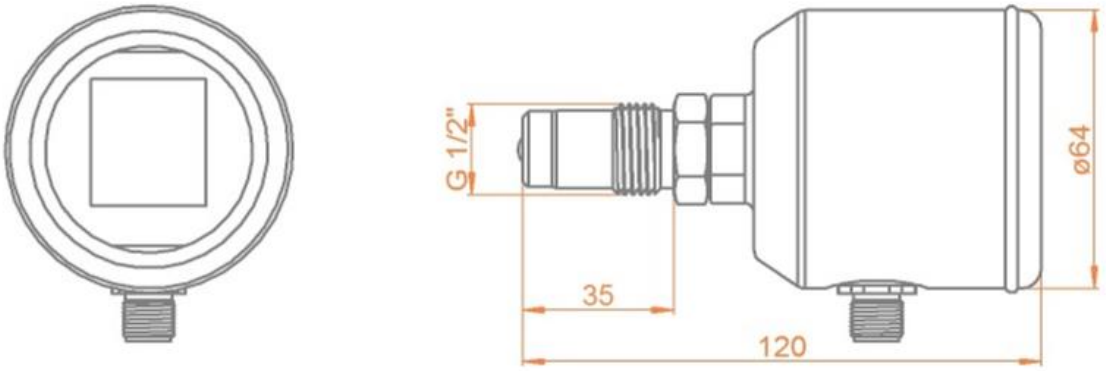


Fig. 5: Sensor dimensions

3.4 Ambient conditions

Ambient temperature	-10…70 °C
Transport and storage temperature	-20…80 °C

3.5 EXspect process conditions

Max. adm. pressure PS:	20 bar	
Max. adm. temperature TS:	90 °C	
Max. adm. sterilisation temperature	141 °C	max. 2 h

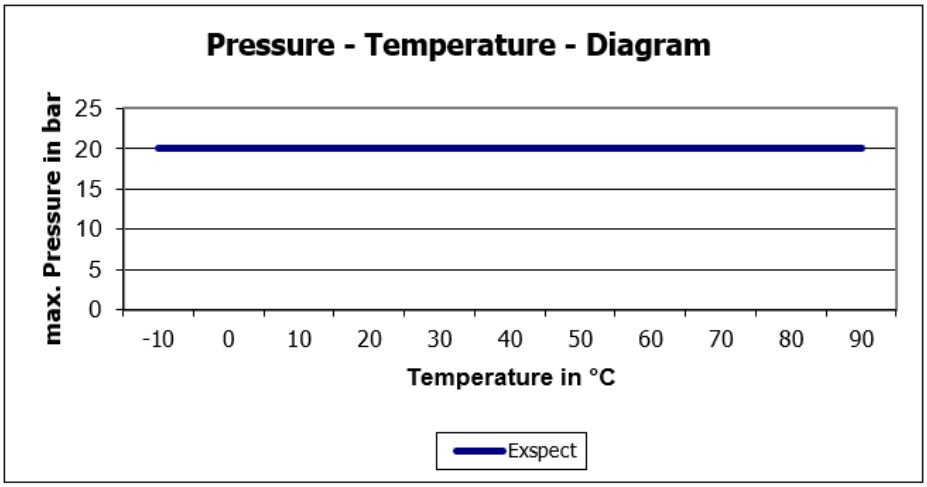


Fig. 6: EXspect pressure-temperature diagram

3.6 Order structure for EXspect 271

EXspect 271 sensor

Code	Measuring range
A	0…100 % turbidity

Code	Material (medium-contact)
4435	Stainless steel, 1.4435 (316L)
XXXX	Special version

Code	Sealing material (medium-contact)
MET	Metal sealing
XXX	Special version

Code	Process interface
G12	G1/2" thread
XXX	Special version

Code	Interface
AS	analogue 4…20 mA / M12 5-pin
AD	analogue 4…20 mA / digitally parameterizable / M12 8-pin
XX	Special version

Code	Display
1	with integrated display
X	Special version

EXspect 271		-		-		-		-		-		Order number

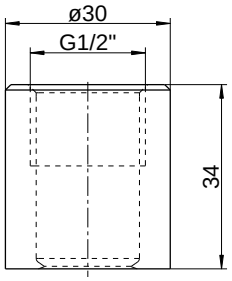
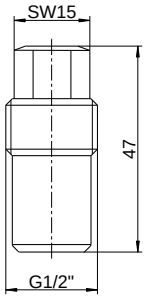
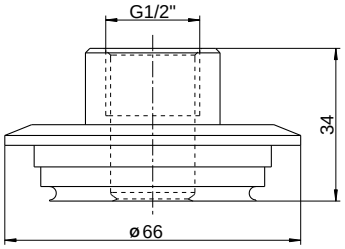
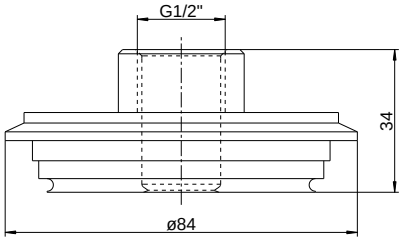
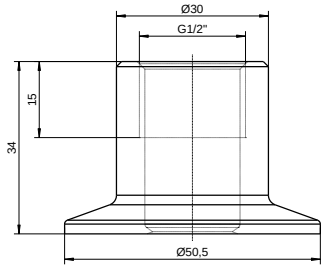
4 Spare parts and accessories

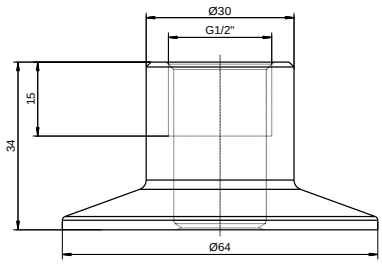
EXspect 271 accessories	
Description	**Order number**
EXspect connection cable, 2 m (M12 5-pin)	2-125-00-001
EXspect connection cable, 5 m (M12 5-pin)	2-125-00-002
EXspect connection cable, 2 m (M18 8-pin)	2-120-68-001
EXspect connection cable, 5 m (M18 8-pin)	2-120-68-002
EXpert 2.x PC software on USB stick (for Windows)	2-120-69-003
ECI-01 EXspect 271/231 communication interface for PC connection via USB (M12 8-pin cable connection)	2-120-66-001

EXspect 271 certificate	
Description	**Order number**
EN10204-2.2 certificate for surface roughness (Ra <0.37 µm)	2-121-01-001
EN10204-3.1 certificate for material	2-121-01-002

EXspect 271 factory inspection	
Description	**Order number**
Factory recalibration for NIR sensors incl. certificate (return certificate)	2-999-00-013

EXspect 271 spare parts	
Description	**Order number**
Operating display	2-118-00-001

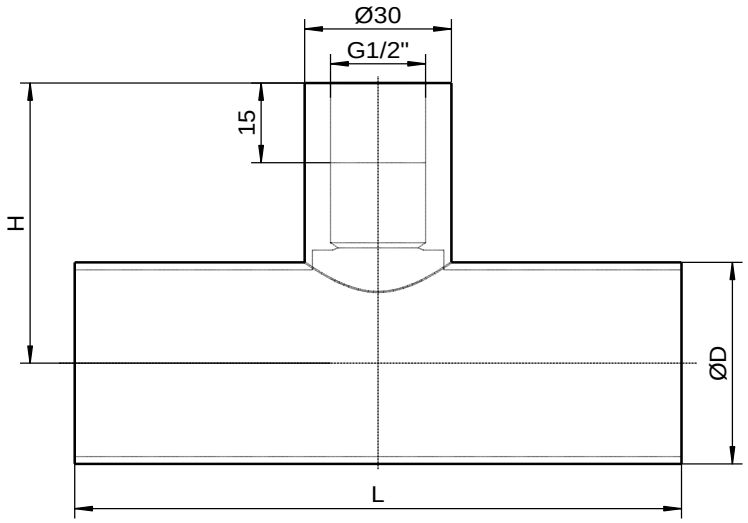
EXspect 271 installation adapter		
Description	**Drawing**	**Order number**
G ½" welded fitting, cylindrical		2-087-33-003
G1/2" welding support made of brass		2-086-11-001
Varivent F DN25-40 process adapter		2-083-33-001
Varivent N DN40-125 process adapter		2-083-33-002
Prozessadapter Tri-clamp 1 1/2"		2-083-33-005

Prozessadapter Tri-clamp 2"		2-083-33-006

Weld-in pipe with adapter G ½"

Material of pipe: 1.4435
Material of adapter: 1.4404
Pressure range: 0…10 bar

ØD	L	H	Order number
DN 25	100 mm	51,5 mm	2-083-33-007
DN 32	110 mm	54,0 mm	2-083-33-008
DN 40	120 mm	57,0 mm	2-083-33-009
DN 50	140 mm	63,5 mm	2-083-33-010
DN 65	160 mm	73,5 mm	2-083-33-011



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