EXspect 231

OPERATING INSTRUCTIONS

NIR - Absorption Sensor

EXNER
Process Equipment

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1 General information

The operating instructions enable the safe and efficient handling of the sensor EXspect 231.

The operating instructions belong to the product and must be stored in its direct vicinity and easily accessible to the staff at all times. Before starting any work, the staff must read these operating instructions carefully and understand them.

If these operating instructions incorporate documentation from suppliers (as an attachment), Exner Process Equipment assumes no guarantee for its contents, individual statements, technical data, etc.

1.1 Manufacturer

Exner Process Equipment GmbH
Carl-Metz-Str. 26
D-76275 Ettlingen

1.2 Depiction of information

For simplified and safe work with these operating instructions, uniform safety instructions and symbols are used.

Safety instructions

Safety instructions protect against injury to persons and damage to property. The measures described for averting danger must be adhered to.

The safety instructions are structured as follows:

SIGNAL WORD

Type and source of the danger
Consequences in case of non-observation
Prevention measures / Prohibitive rules

The components have the following meaning:

- Signal word: marks the seriousness of the danger
- Warning sign: draws attention to the danger
- Type and source of the danger: names the causes of the danger
- Consequences: describes the consequences in case of non-observation
- Measures: provides measures to avert the danger

DANGER

This warning message marks a danger with a high risk which results in death or severe injury if not avoided.

WARNING

This warning message marks a danger with a moderate risk which can result in death or severe injury if not avoided.

ATTENTION

This warning message marks a danger with a low risk which can result in minor or moderate injury if not avoided.

NOTE

This note contains information regarding possible material or environmental damages which do not result in injury to persons.

Symbols

Marks	Meaning
»	Instruction with no specified sequence
1.	Instruction with a specified sequence
•	List
→	Reference to Chapter
" "	Operating element, Push button, Button
✓	Result

2 Safety and protection measures

2.1 General safety instructions

The EXspect sensor is designed in such a way that no risks can arise from using the product if the operating instructions are observed.

- Read the operating instructions first.
- Only install or operate the sensor after having read and understood all notes on its safe and proper use.
- Keep the operating instructions in a safe place in order to be able consult them at all times if required.
- Only use the sensor and its accessories if they are in good order and condition.
- Ensure proper use of the sensor. Do not use it for applications for which it was not intended (e.g. as a step).
- Observe the laws, ordinances, regulations and standards applicable in the country of use and at the place of use.

2.2 Intended use

The EXspect sensor is secured to tanks or pipes. The optical part of the sensor is immersed into the process liquid in order to measure its physical properties through absorption of irradiated light.

The sensor must undergo maintenance regularly.

- Prepare a maintenance schedule for the respective process.
- Only perform maintenance work described in the operating manual.
- Changes to the sensor may only be carried out after consulting with the manufacturer.

NOTE

The manufacturer is not liable for damages arising from improper or unintended use.

2.3 Danger zones and residual dangers

Sensors are connected to containers and pipes which could be pressurised. Process liquid can only escape in case of negligent action or improper use. The system or part thereof should therefore be depressurised and emptied completely before the sensor is removed.

- Before commissioning and after each maintenance, ensure that all seals and connections are complete and fully functional.
- Take appropriate safety precautions before touching the sensor as parts of it can adopt the process temperature.

2.4 Equipment and accessories

Only use tested and approved equipment and accessories.

Seals

The EXspect 231 sensor does not require any elastomer seals. If you connect the sensor to your process using an adapter, then

» select the material properties of the process seal and the O-rings depending on the process medium and the cleaning liquid.

» consider the seal material's swelling capacity and resistance to acids and alkalis.

2.5 Requirements of the staff

Qualification

Only trained professionals may install and maintain the sensor!

Protective clothing

When starting-up or maintaining, the operating staff must wear safety goggles and appropriate protective clothing.

Accident prevention regulations (UVV)

Please observe the valid rules and regulations concerning occupational safety in the country and place of use!

2.6 Pictograms

For better orientation, pictograms and symbols are used in the operating instructions.

Pictogram	Meaning
	General warning sign

3 Technical data

3.1 Standards

The following standards were applied when manufacturing the sensor:

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

3.2 Specifications

Sensor specifications	
Measurement range	Version A: 0...100 % absorption Version B: 0...3.5 AU / 0...3850 EBC / 0...7 OD Version C: 0...6 AU / 0...6600 EBC / 0...12 OD
Resolution	0,1 % or 0,01 AU
Accuracy	± 1 %
Reproducibility	≤ 1 % from final value
Wave length	850 nm
Light source	LED
Material	Stainless steel 1.4435 (316L)
Surface finish	Ra <0.37 µm
Measuring window	Sapphire
Supply voltage	24 V DC
Output current	4...20 mA
Switch output	Can be set to NO or NC
Input contact	+24 V DC for calibrating (zeroing)
Cable connection	5 or 8-pin M12 plug
Cable length	2 m or 5 m
Process connection	G ½" for welding sockets with 35° cone

Maximum measurement range for Version B:

Unit	Optical path length		
	5 mm	10 mm	20 mm
AU	0...3.5	0...3.5	0...3.5
OD	0...7	0...3.5	0...1.75
EBC	0...3850	0...1920	0...960

Maximum measurement range for Version C:

Unit	Optical path length		
	5 mm	10 mm	20 mm
AU	0...6	0...6	0...6
OD	0...12	0...6	0...3
EBC	0...6600	0...3300	0...1650

3.3 Dimensions

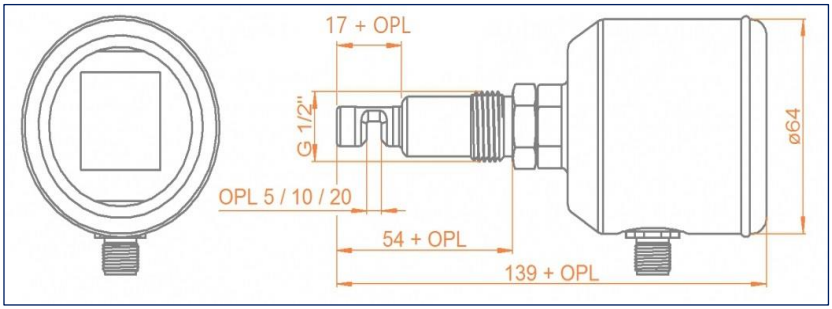


Fig. 1: Sensor dimensions

3.4 Environmental conditions

Ambient temperature: -10...70 °C

Transport and storage temperature: -20...80 °C

3.5 EXspect process conditions

Max. permissible pressure PS: 16 bar (232 psi)

Max. permissible temperature TS: 90 °C

Max. permissible sterilisation temperature 135 °C max. 1 hour

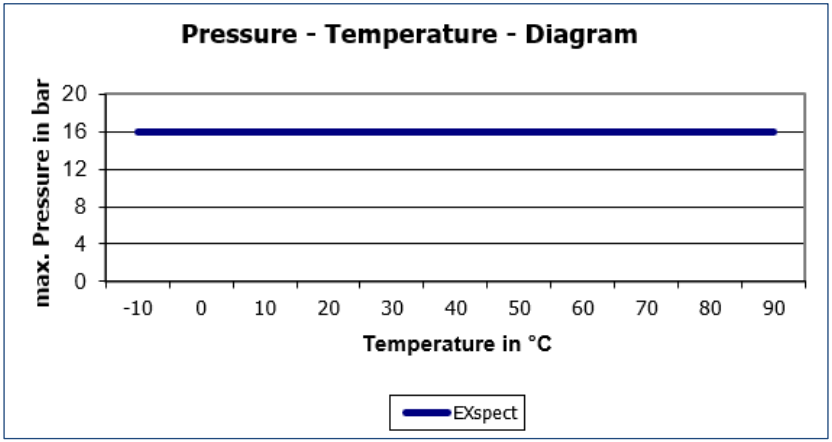


Fig. 2: EXspect 231 pressure-temperature diagram

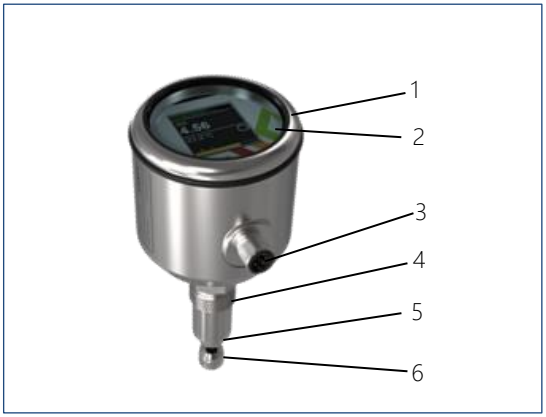
3.6 Identification plate

Fig. 3: Identification plate

4 Product description

4.1 NIR - Absorption Sensor EXspect 231

4.1.1 Components



1	Housing cover
2	Touch display
3	M12 port
4	Pressure screw
5	Process connection
6	Measuring window

Fig. 1: NIR - absorption sensor

EXspect 231

The EXspect 231 NIR absorption sensor is a 180° transmitted light sensor in the near-infrared range (wavelength of 850 nm), which measures the absorption of fluids. The sensor is designed to monitor continuous process results or to display changes reliably. It is particularly suitable for phase separation, controlling separators, filter monitoring and measuring concentrations.

- Reliable phase separation
- Quicker product changeovers
- Reduced waste water costs
- Filter monitoring
- Colour-independent concentration measurement
- Compact design with integrated booster and display
- Durable sapphire windows
- Hygienic design, suitable for CIP

- LED light source, guaranteed stable and long-lasting signal
- Integrated contact and analogue output
- Easy parameterisation

Measurement range

The measuring range of EXspect 231 sensors is related to the various units of measure and sensor designs as follows:

EXspect 231 Design "A":

0...100 %	Absorption

EXspect 231 Design "B":

0...3.5 AU	Absorption unit
0...3.850 EBC	European Brewery Convention
0...15.400 FAU	Formazine absorption unit
0...31.570 mg/l	Milligrams per litre of dry substance (Reference: Formazine)

The maximum measuring range is dependent on the selected optical path length.

EXspect 231 Design "C"

0...6 AU	Absorption unit
0...6.600 EBC	European Brewery Convention
0...26,400 FAU	Formazine absorption unit
0...26.400 TEF	Formazine turbidity unit
0...54.120 mg/l	Milligrams per litre of dry substance (Reference: Formazine)

The maximum measuring range is dependent on the selected optical path length.

Display

The current measurement value is shown on the display. The sensor can be configured using the touch display.

Calibration input

The current measurement value can be set to 0 by briefly connecting a 24 V DC signal to the calibration input. With this, the transmitter can be adjusted to familiar measurement media (zeroed). The same is possible using the "Offset Val" menu function.

4.2 Function

Measuring unit

Defines the measuring unit to be displayed. Various units can be selected depending on the sensor design. For absorption measurements, you can choose between AU (**a**bsorption **u**nit) and a self-defined free measurement, a CDU (**c**ustomer-**d**efined **u**nit). Other units available include:

EBC	**E**uropean **B**rewery **C**onvention
FAU	**F**ormazine **a**bsorption **u**nit
TEF	turbidity unit Formazine – german: **T**rübungs**e**inheit **F**ormazin
mg/l	**m**illi**g**rams per **l**itre

The following is valid for measurement in Formazine: 1 FAU = 1 FTU = 0.25 EBC = 2.05 mg/l

NOTE

The measurement unit CDU which can be defined individually is only available for sensor versions B and C.

Zeroing

Set the current measurement value to 0 by using Offset. The same function as the input adjustment function via the external contact.

Display toggling

Defines which measurement value should be displayed:

- Absorption
- Customer-defined unit (CDU)

The factory pre-set CDU value can only be changed or adjusted for sensors with the 8-pin M12 connector and with the ECI-01 communication interface, as well as the EXpert 2.x software.

Regardless of the display toggling, the analogue output always provides an absorption-dependent signal.

Lower measuring range

Defines the 4 mA point for the output current. You can choose from a range of 0...100 % of the possible measuring range.

Upper measuring range

Defines the 20 mA point for the output current. You can choose from a range of 0... 100 % of the possible measuring range.

Damping

Attenuates the measurement value through a flowing averaging process.

Switch-off point

Defines the point at which the contact switch switched off. The range can be freely selected between 0...100 %.

Switch-on point

Defines the point at which the contact switch is activated. The range can be freely selected between 0...100 %.

Switch function

Defines the digital output function for the contact switch. You can choose between making contact and breaking contact.

Switching delay

Defines the switch delay for the contact switch. You can choose freely from a range of 0... 200 seconds.

Language

Defines the display language.

4.3 Process integration

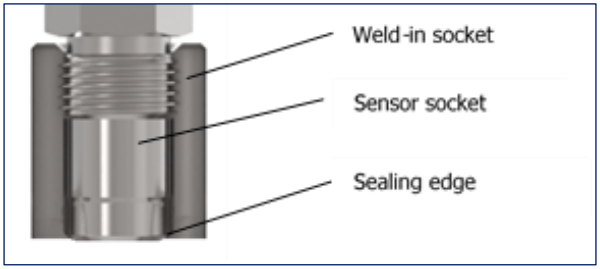
Sensor

The EXspect 231 sensor is integrated directly into pipes or tanks with its G ½" connector, or by using corresponding adapters with the existing process connectors. The minimum possible pipe diameter depends on the selected process connection/adapter as well as the insertion depth of the welding socket or the socket height for a tri-clamp connection.

Fig. 5: Process integration

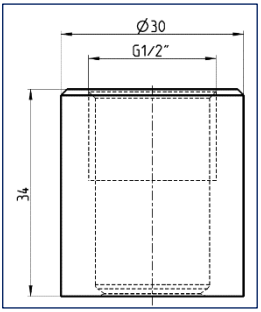
Welding sockets

Installation using welding sockets guarantees hygienic process adaptation, which can be used without dead space and free of elastomers. As this is a purely metal-sealed system, no other sealing materials, e.g. elastomers, may be used.

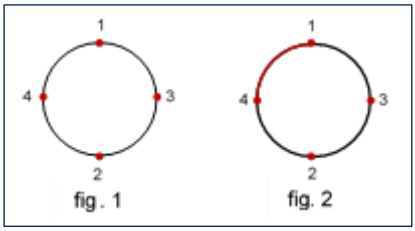


Please always use the weld-in plugs supplied so that the heat resulting from the welding process can be dissipated safely, and to effectively prevent the drill hole from becoming distorted.

Welding in tanks / pipes



1. Drill a hole with the same outside diameter as the weld-in plug (maximum tolerance is +0.2 mm)
2. Attach plugs at 4 evenly-spaced points (Fig. 1 below)
3. Screw in weld-in plugs
4. Weld the parts between the 4 points (Fig. 2 below)



Transmitter

The transmitter is powered by a 24 V DC supply, has a freely programmable contact switch, and a 4...20 mA output for outputting measurement values. The measuring value can be set to 0% via 24V input.

Pressure / Temperature

The EXspect sensor can be used at a pressure up to 16 bar and at a maximum process temperature of 90 °C.

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

NOTE

Please observe the pressure and temperature diagrams in → Chapter 3

Installation locations

In principle, the sensors can be used at any location. However, you must ensure that the pipe is completely filled, and that the sensor is not set up in a place where bubbles form due to agitation of the medium. You should also consider how easy it is to read the display and how easy it is to access and operate the sensor.

The following diagram shows the favoured locations for installing the sensor. As you can see, the sensor is better mounted on the side of the pipe.

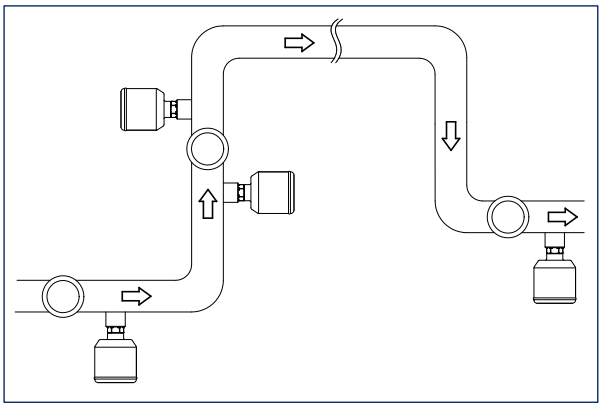


Fig. 6: Installation positions

When installing the sensor, you should ensure that the opening with the measuring windows is in flow direction or parallel to it. If the sensor is assembled against the flow direction, this can lead to the medium being agitated in an unwanted way and/or the formation of bubbles, which can lead to distorted measurement values.

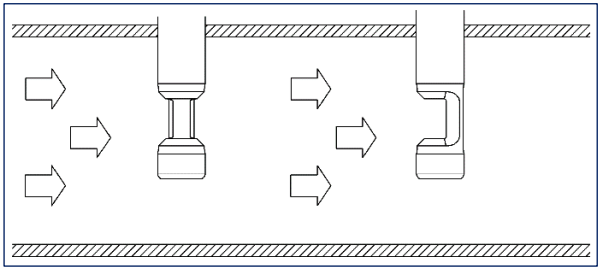


Fig. 7: Sensor positioning

4.4 Checking and adjustment

Reference filters (EXcap 110) with various absorption values are available for inspecting and calibrating the EXspect 231 sensor. If necessary, they can be attached to the sensor. To guarantee the inspection/adjustment is carried out without any errors, you should ensure that the reference filter is placed precisely on the sensor, and that the filter plate is

at the lower measuring window of the sensor. The optical sensor unit must be dry and clean for this.

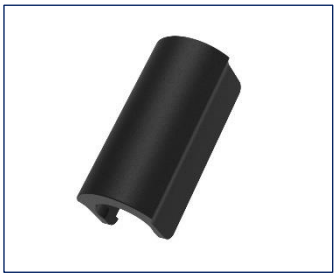


Fig. 8: Reference filter

In order to be able to carry out an inspection or adjustment of the sensor using the reference filter, the unit "AU" must be selected in advance for the sensor versions "B" and "C". The following table can be used for a comparison of version "A".

AU	0.35	1	2	3
% absorption	55.35	90	99	99

5 Delivery

5.1 Scope of delivery

The sensor is checked in the factory and is shipped ready for installation in packaging which offers the sensor optimal protection.

The delivery includes:

- EXspect sensor
- Protective case for the optical unit
- Operating instructions
- Certificate for surfaces (option)

NOTE

Keep the sensor in its packaging. It is safest there until it is installed.

5.2 Checking the delivery

Before you release the sensor for assembly, please ensure the following:

- Packaging and device are in good order and condition
- The sensor's identification plate corresponds with the information in the purchase order
  (→ Chapter 3.6 "Identification plate")

In case of queries, please contact your dealer directly.

6 Assembly

6.1 Preparing the plant

Requirements:

- Sufficient working space is available to operate the sensor.
- The process is deactivated.
- The tanks and pipes are depressurised, empty and clean.
- The connecting piece and the process connector fit together.
- The pipe is earthed.

6.2 Mechanical connection

ATTENTION

Risk of injury due to escaping process liquid!

Depending on the process liquid's properties, you may incur scalding or chemical skin burns.

» Check that the tanks or pipes to which the sensor is being connected is depressurised, empty and clean!

Sensors with process connection Thread G1/2" (Code: G12):

» Use the appropriate process connector with a 35° sealing cone (see also → Chapter 11 "Spare parts and accessories")

» Tighten the pressure screw (see Fig. 9), to max. 10-20 Nm.

Sensors with process connection compliant to EHEDG/3A (Code: T15 / T20 / VRN):

» Please note the additional information for hygienic installation which is described in the "EHEDG & 3A supplementary sheet".

1	Pressure screw

Fig. 9: Pressure screw on the sensor

6.3 Electrical connection

Requirements:

- Use an original cable with the correct connector plug.

NOTE

In addition, ensure that the connection cable runs only within one building, that it does not leave it and does not exceed a maximum cable length of 29.90 meters.

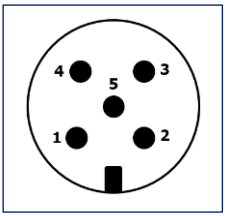
Sensor connection:

The colour coding indicated corresponds to that used by Exner accessories. You can learn about the relevant pin configuration from the following diagrams.

Fig. 10: Plug connection on the sensor (5-pin / 8-pin)

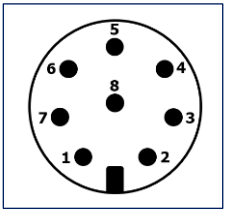
M12 connector, 5-pin (view as per Fig. 10):

Pin	Colour	Name
1	Brown	DC + (24 V DC)
2	White	Switch output (DOut level)
3	Blue	DC – (GND)
4	Black	Analogue output (4-20 mA)
5	Grey	Calibration (Cal. offset)



M12 connector, 8-pin (view as per Fig. 10):

Pin	Colour	Name
1	Brown	Switch output (DOut level)
2	White	DC + (24 V DC)
3	Blue	Only for service
4	Black	Only for service



5	Grey	Calibration (cal. offset)
6	Pink	Analogue output (4-20 mA)
7	Purple	DC – (GND)
8	Orange	Fault (DOut Fault)

» Plug the connector into the sensor socket and tighten the union nut hand-tight.

NOTE

If the analogue output is not required or not connected, the corresponding cable must be set to "GND".

7 Parameterisation

7.1 User menu

WARNING

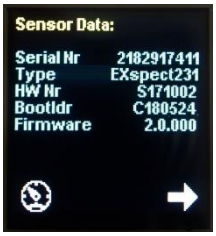
Setting parameters incorrectly can result in incorrect measurement values and digital output switching points being displayed. This can have an unwanted impact on your processes.

NOTE

Ensure that only authorised and trained staff make changes to the parameterisation.

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

1. Touch the display to open the menu.



2. You can access the individual parameters, as well as the sensor and display data by pressing the arrow symbol. If you want to configure a parameter, touch the tool symbol.

3. Then select the appropriate setting using the arrow keys and confirm by pressing the enter symbol.

4. The desired value is also selected using the arrow keys. If a numerical value is set, it can be increased/decreased by one digit by briefly touching the respective arrow key. Keeping the arrow key pressed longer changes the numerical value by increments of 10.

5. Pressing the enter symbol confirms the value entered and exits this setting level. If no value has been changed and you wish to leave the setting menu level, press the ESC symbol.

6. You can return to the readout display by touching the speedo symbol or automatically if no entries have been made or if the display is not touched within a period of 30 seconds.

User menu

The values **in bold** are the **standard user parameters**.

Parameter	Name	Value range	Description
Offset	Offset activation	**OFF**, ON	Activates/deactivates the setting "Offset"
Offset Val	Offset	Version A: -100.0 ... **0.0** (for unit %) Version C: -6.0 ... **0.0** (for unit AU)	Defines the offset value.
Unit	Display toggling	Version A: **%** Version B/C: **AU**, FAU, TEF, EBC, mg/l, CDU	Determines which measurement value should be displayed: Description of the unit as per Chapter 2 Adjust the CDU value settings using the EXpert software. Regardless of the display toggling, the analogue output always provides a signal dependent on the absorption.

AO min	Lower output limit (analogue output min)	Version A: **0.0** ... 100.0 (for unit %) Version C: **0.0** ... 6.0 (for unit AU)	Defines the absorption value at which the minimum output current is emitted.
AO max	Upper output limit (analogue output max)	Version A: 0.0 ... **100.0** (for unit %) Version C: **0.0** ... 6.0 (for unit AU)	Defines the absorption value at which the maximum output current is emitted.
Damping	Attenuation	**0** ... 100	Attenuates the absorption measurement values by displaying a sliding average across a set number of measurement values.
DO on	Switch-on point (digital output on)	Version A: **0.0** ... 100.0 (for unit %) Version C: **0.0** ... 6.0 (for unit AU)	Defines the point at which the digital output is switched on
DO off	Switch-off point (digital output off)	Version A: **0.0** ... 100.0 (for unit %) Version C: **0.0** ... 6.0 (for unit AU)	Defines the point at which the digital output is switched off.
DO funct	Switch function (digital output on)	**NO**, NC	NO = normally open NC = normally closed

DO delay	Switching delay Digital Output delay	**0** ... 200 s.	Delays the digital output switch by up to 200 seconds.
Language	Language settings	**German,** English, French, Dutch	Defines the display language.

7.2 Adjust the sensor to the medium (zeroing)

To recognise recurring product conditions, the sensor can be adjusted to these product conditions.

1. Select the parameter "Offset ON".
2. Immerse the sensor tip into the reference liquid and, as soon as the measurement value is stabilised, select the "SET" menu function under the parameter "Offset Val" to set the offset. This sets the measurement value 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 approx. 5 seconds.

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

- Offset activation (offset ON)
- Setting the offset value (SET OffsValue)

Offset can be activated or deactivated if the voltage (24 V DC) is only applied to the calibration input for approx. 1 sec. "Zeroing" does not take place.

NOTE

Constant electrical voltage may neither exist at the calibration input (Pin 5, see → Chapter 6.3) nor when connecting the cable. The calibration input must be kept deenergised. Voltage (24V DC) may only be applied short-term for the switching operations described.

7.3 Output current

The EXspect sensor is equipped with a 4...20 mA output for displaying the absorption measurement values. The outlet current is configured using the following parameters:

"AO min" defines the lower measuring range and the 4 mA point.

"AO max" defines the upper measuring range and the 20 mA point.

"Damping" defines the attenuation damping affecting the display and the output current.

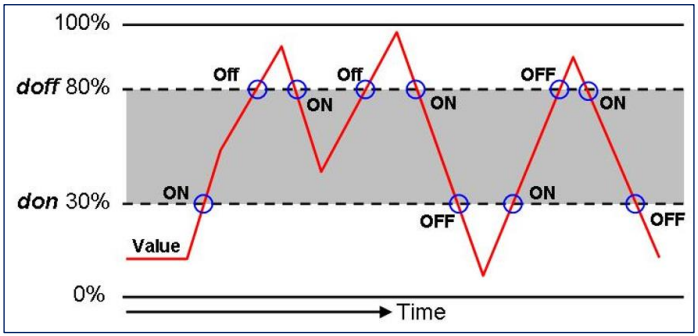
7.4 Switching points

The EXspect sensor has a PNP switch output which is configured using four parameters.

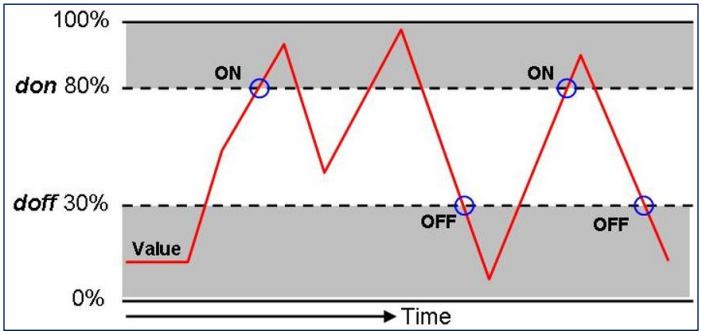
"DO ON" defines the point at which the digital output is switched on, and "DO OFF" defines the point at which it is switched off.

The two parameters in combination determine the switch output function:

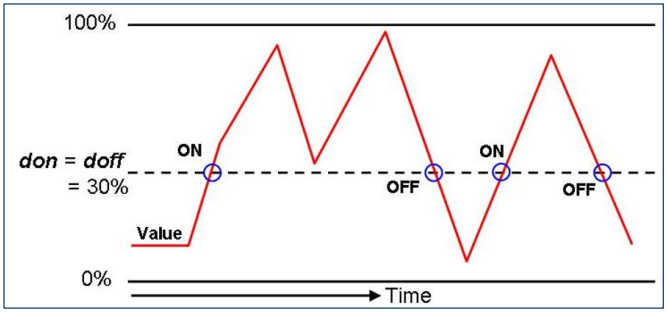
If the "DO ON" value is lower than the "DO OFF" value, the digital output is activated if the measurement value is between the two switch points (window function).



If the "DO ON" value is higher than the "DO OFF" value, the output is activated when the measurement value exceeds the "DO ON" value. It only switches off again if the measurement value falls below the "DO OFF" value (hysteresis function).



If the "DO ON" and "DO OFF" values are identical, the output switches on when the measurement value exceeds the switch value "DO ON + DO OFF" if the measuring value is again lower than the switch value "DO ON + DO OFF".



Both parameters can be defined as being between 0 and 100% of the possible measuring range, and independently of each other.

"DO funct" inverts the functions of the switch output.

If the value = NO, the switch output works as a closer, if the value = NC, it works as an opener.

"DO delay" delays the reaction of the switch output by up to 200 s. This value applies to switching the output on and off in equal measure.

7.5 Display

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

Parameters can be set via the display or communication interface ECI-01 (for EXspect).

NOTE

If sensor parameters are set using the display, it should be noted that when removing the cover plate, the pressure screw is fastened using an appropriate tool so that it cannot move. After setting parameters, the sensor cover must be put back properly and in the correct place.

Parameterisation using the ECI-01 communication interface and the EXpert 2.x PC software is only possible for sensors with an 8-pin connector.

NOTE

Before connecting the sensor to a PC via the ECI-01 communication interface for the first time, you must first install the EXpert 2.x software on it.

8 Maintenance

8.1 Important maintenance notes

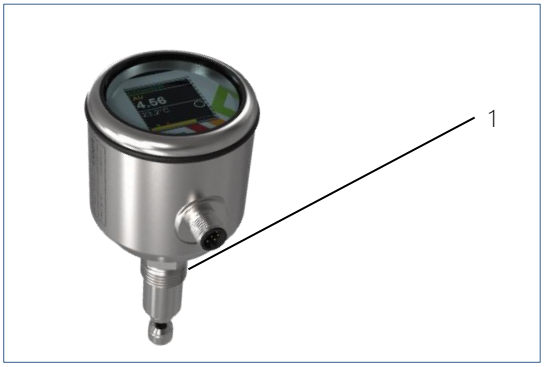
- Prepare a maintenance plan for the respective process!
- Only trained personnel is allowed to perform maintenance work.
- Always wear appropriate protective clothing when performing maintenance works.
- Only perform maintenance works or repairs described in the operating manual!
- Changes to the design may only be carried out after consulting with the manufacturer.
- Pipes or tanks must be depressurised, empty and clean before you remove the sensor from the process.

8.2 Checking the process connector

The sensor is held and sealed in the connector by the pressure screw (1).

NOTE

Regularly check that the process connector is sealed. If necessary, tighten the pressure screw (1) to 10-20 Nm.



1	Pressure screw

Fig. 11: Pressure screw on the sensor

WARNING

Process fluid is escaping from the process connector

Danger depending on the properties of the process medium!

» Tighten the pressure screw with 10-20 Nm.

8.3 Clean the measurement window

Absorption in the process is measured by two measurement windows (sapphire). The measurement value can be distorted by contaminants or deposits.

Clean deposits from the measurement window regularly.

- Remove the sensor from the process connector.
- Remove any deposits from the window.
- Check the panes for possible damage.

ATTENTION

Risk of injury due to escaping process liquid!

» Wear safety goggles and protective clothing!

» Check that the tank or pipe to which the sensor is being connected is depressurised, empty and clean!

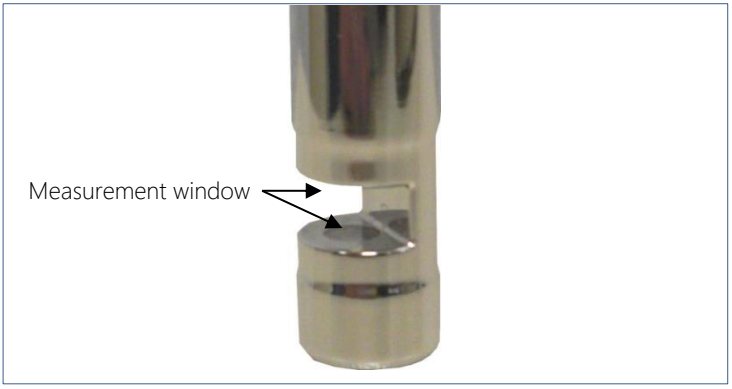


Fig.12: Measurement window on the sensor

8.4 Maintenance plan

Perform the servicing work at recommended intervals!

Interval	Work
Every three months	» Make a visual check of the sealing of the process connector. » Tighten the pressure screw to a maximum of 10 - 20 Nm.
Yearly	» Remove the sensor and clean the measurement window.

Adjust the intervals for required maintenance to suit your process conditions.

9 Troubleshooting in case of problems

9.1 No or incorrect measurement value

Possible cause	Remedy
No voltage to the sensor	» Check/make electrical connection → Chapter 6.3
Contaminants on measurement aperture	» Clean the measurement window → Chapter 8.4
Calibration faulty	» Zero the sensor with clear, distilled water or calibrate to the medium → Chapter 7.2 » Check offset / zeroing

9.2 Widely fluctuating measurement values

Possible cause	Remedy
Bubbles in the system	» Attenuate the display and output current → Chapter 7.3
Sensor is not fully submerged in the process fluid	» Change the installation site

9.3 Output current does not match the measurement value

Possible cause	Remedy
Parameters for output current set incorrectly	» Check output current parameterisation and change if necessary → Chapter 7.3
Electrical connection missing	» Check / establish electrical connection → Chapter 6.3

9.4 Switch output is switching incorrectly

Possible cause	Remedy
Parameters for switch output set incorrectly	» Check parameterisation of switch output and change if necessary → Chapter 7.4
Faulty electrical connection	» Check / establish electrical connection → Chapter 6.3

9.5 Display cannot be operated

Possible cause	Remedy
Plug connection from display to sensor contaminated or defective	» Check and clean plug connection » Replace display if necessary
Display defective	» Replace display

9.6 Error message on the display

Error message	Remedy
Data Error	» Measures depend on other errors shown on the display
COMM Error!	» Measures depend on other errors shown on the display
Error!	» Measures depend on other errors shown on the display
Warning!	» Measures depend on other errors shown on the display
EEPROM Error	» Send sensor back to manufacturer for testing

Error message	Remedy
CDU Cal Error	» Check / correct the calibration values and restart the sensor if fewer than two calibration values or selected calibration points are outside the possible range
Sensor Overtemp	» Reduce medium temperature
LED Current	» Reduce media temperature (to protect the LEDs, their shutdown occurs at a temperature exceeding 90 °C). If the error message is displayed even if the temperature is below 90 °C, return the sensor to the manufacturer for inspection.
LED Voltage	» Send sensor back to manufacturer for testing
HW Error (Hardware error)	» Check power supply
Gen Error (General error)	» Reset to factory settings or send back to manufacturer for testing
AO Alarm (Analogue output)	» Check connector cable and plug
Low Signal!	» Use sensor with a larger measurement range as the selected zero point exceeds the sensor's maximum measurement range

10 EXspect 231 order structure

	Code	Measurement range						
	A	0 - 100% absorption						
	B	0 - 3.5 AU / 0 - 3850 EBC / 0 - 7 OD						
	C	0 - 6 AU / 0 - 6600 EBC / 0...12 OD						
		Code	Optical path length					
		05	5 mm					
		10	10 mm					
		20	20 mm („VRN" ≥ DN50)					
		XX	Special version					
			Code	Material (touching medium)				
			4435	Stainless steel 1.4435 / 316 L				
			XXXX	Special version				
				Code	Seal material (media wetted)			
				MET	Metal sealing (without elastomer)			
				XXX	Special version			
					Code	Process connection		
					G12	Thread G ½" (metal sealing)		
					T15	Tri-Clamp 1,5" (EHEDG/3A)		
					T20	Tri-Clamp 2" (EHEDG/3A)		
					VRN	Varivent N (EHEDG/3A) DN40-125		
					XXX	Special version		
						Code	Interface	
						AS	analogue 4 - 20 mA / 5-pin M12	
						AD	analogue 4 - 20 mA / can be set digitally / 8-pin M12	
						XX	Special version	
							Code	Display
							1	With integrated display
							X	Special version
EXspect 231							Order code	

11 Spare parts and accessories

The sensor serial number must always be quoted for spare parts and accessories orders.

Accessories	Order number
2 m EXspect connector cable (M12 5-pin)	2-125-00-001
5 m EXspect connector cable (M12 5-pin)	2-125-00-002
2 m EXspect connector cable (M12 8-pin)	2-120-68-001
5 m EXspect connector cable (M12 8-pin)	2-120-68-002
PC software EXpert 2.x on a USB stick (for Windows)	2-120-69-003
Communication interface ECI-01 EXspect 271/231 for connecting to a PC via USB (connector cable M12 8-pin)	2-120-66-001

11.1 Certificates

Certificates	Order number
Certificate EN10204-2.2 for surface finish (Ra <0.37 µm)	2-121-01-001
Certificate EN10204-3.1 for material	2-121-01-002

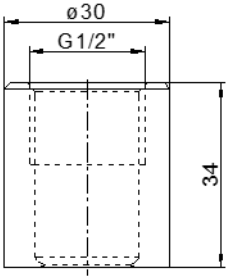
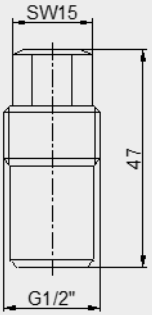
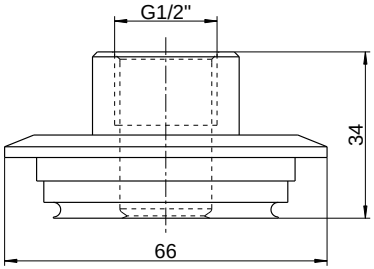
11.2 Factory inspection

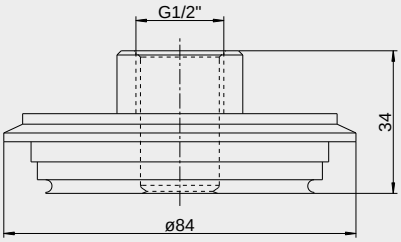
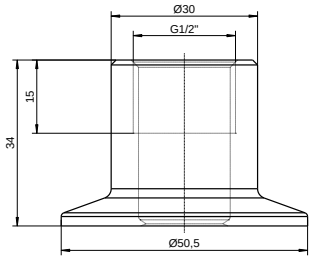
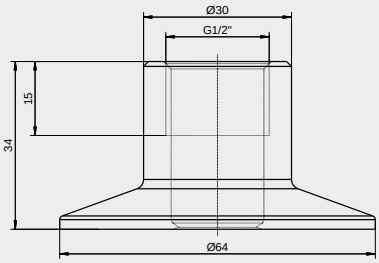
Factory inspection	Order number
Factory recalibration for NIR sensors incl. certificate (proof of return)	2-999-00-013

11.3 Spare parts

Spare parts	Order number
Operating and display unit	2-118-00-001
Housing cover with inspection glass	2-151-32-001

11.4 Installation adapters

Description	Drawing	Order number
Welding socket G ½" cylindrical		2-087-33-003
Brass welding aid G 1/2"		2-086-11-001
Varivent F DN 25-40 process adapter		2-083-33-001

Varivent N DN 40-125 process adapter		2-083-33-002
Process adapter Tri-clamp 1 1/2"		2-083-33-005
Process adapter Tri-clamp 2"		2-083-33-006

12 Disposal

Please observe the valid rules and regulations concerning disposal in the country and place of application.

Sensor

Make sure that the sensor is free of hazardous and toxic substances. Components must be disposed of separately in accordance with their respective materials.

Please observe the valid rules and regulations concerning disposal in the country and place of application.

Packaging

The packaging consists of cardboard and can be disposed with scrap paper.

13 Certificates and compliances

All freely available certificates and conformities can be found in their most current form in the “Downloads” section of our website.

To access the following address, enter it into your browser or scan the QR code below. Then select the relevant product and document from the list.

https://e-p-e.com/en/downloads

Depending on the product, additional certificates (e.g. material, surface, etc.) are available. If necessary, please send a corresponding request to Exner Process Equipment GmbH.

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