DESCRIPTION

The DX 53x sensor family includes 3 variations of state-of-the-art dissolved oxygen sensors.
The optical measuring principle eliminates the need of chemical substances and frequent maintenance as well as the necessity of minimum flow at measuring membrane.

DX 530: Digital optical dissolved oxygen sensor, economic field style

The best choice for field measuring in sweet water aquafarming, river monitoring, well water analysis and wastewater monitoring.

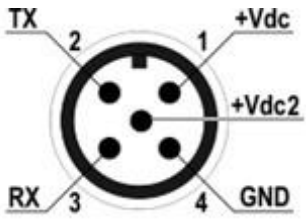
DX 532: Digital optical dissolved oxygen sensor, robust with depth measuring

The extra robust field specialist for harsh environments like wastewater and sea water aquafarming. Due to integrated hydrostatic depth measurement channel and consequent water protection oxygen saturation profiles can be recorded very comfortably, and thermoclines can easily be located down to nearly 30 m: oxygen rich Epilimnion/ oxygen lacking Hypolimnion.

DX 535: Digital optical dissolved oxygen sensor, compact lab style 12 mm

Near-surface waters, wastewater up to 1 m water depth, also ideally suited for laboratories due to small diameter Ø 12 mm, e.g. BSB determination: due to the fact, that used measurement principle is non- consuming, this ensures maximum achievable precision.

Equipped with 5-pin M12 connector “DX-Sensor standard”, connectable to PROLine measuring devices with M12 digital connection.



Minimum required firmware version of the PROLine display device: V1.4.1

Available measuring channels of the sensor

Sensor		Description
DX 530	DX 532 / DX 535	
Conc.	Conc.	Last measured O_2 value in mg/l
Sat.	Sat.	Last measured O_2 value in % saturation
Temp	Temp	Last measured temperature value
Sal.	Sal.	Entered salinity value
	P	Last measured pressure value in kPa
	Depth	Calculated measurement depth in meters

INFORMATION AND SAFETY

Read this document carefully and familiarize yourself with the operation of the product before using it. Keep this document ready to hand and in the immediate vicinity of the product so that it is always available to the personnel/user in case of doubt.
Only technically qualified persons are permitted to carry out commissioning, operation, maintenance and decommissioning. The personnel must have carefully read and understood the operating manual before starting any activity.

Legal notices

- For your safety, use only the manufacturer's original spare parts and accessories. We assume no responsibility for the use of other products and any resulting damage.
- The user must have adequate knowledge of the measuring process and use of the measurements. The user is liable in case of damage/danger due to misinterpretation of the measurements as a result of inadequate knowledge.
- The liability and warranty of the manufacturer for product damages and consequential damages are voided in the event of misuse, failure to comply with these operating instructions, failure to observe safety warnings, assignment to inadequately qualified technical personnel and arbitrary modifications of the device.
- No part of this document may be reproduced, modified or translated without prior written permission of the product manufacturer. In case of ambiguity between different language versions of this document, the English version applies.
- This document does not create any legally binding obligations for the product manufacturer. All legally binding obligations are included only in the General Terms and Conditions of Sale.

Correctness of content

- This document was checked for corrected contents and is subject to a continuous updating process. This does not rule out potential errors. In the event that errors are discovered or in case of suggestions to make this document more user-friendly, please inform us via the contact information given in this document.
- We reserve the right to change the product specifications and the contents of this document with-out prior notice.

Explanation of symbols used

DANGER

Warning of danger that could result in death, serious bodily injury, or serious property damage if not observed.

CAUTION

Warning of potential danger or harmful situation that may cause damage to the device or the environment if not observed.

NOTE

Action that may have a direct effect on operation or may cause an unexpected behavior.

Safety information

Fault-free operation and operational safety of the product can only be guaranteed if the general safety requirements and the specific safety requirements in this document are observed.
Do not use the product in climatic conditions other than those specified in this document.
Do not use the product in places with:

- Rapid ambient temperature variations that may cause condensation.
- Direct vibrations / shocks to the device/sensor.
- High-intensity electromagnetic fields or static electricity.

Intended use

The product is a sensor for measuring dissolved oxygen in water.
The sensor is intended exclusively for use with hand-held measuring devices in the PROLine series with digital inputs.

Foreseeable misuse

If the following notices are disregarded, personal injury or death, as well as property damage can occur.

DANGER

- Do not use in safety / emergency stop devices!
- Not suitable for use in hazardous areas (Ex-environments)!
- Not suitable for diagnostic or other medical purposes on patients!
- Not suitable for SIL (Safety Integrity Level)!
- The device is not suitable for contact with food!
- Not suitable for children!
- Do not use as PPE (Personal Protection Equipment).

CAUTION

Do not use if:

- There is visible damage to the device.
- The device is not working as expected.
- The device has been stored under unsuitable conditions for an extended period.

On suspicion that the device can no longer be operated without danger, it must be decommissioned and prevented from recommissioning with appropriate labelling.
In case of doubt, send the device to the manufacturer for repair or maintenance.

CAUTION

When using a hand-held measuring device with USB operation, the sensor must be protected against ESD.
e.g.:

- Use an electrically isolated USB supply

Disposal

Separation by material and recycling of device components and packaging must take place at the time of disposal. The valid regional statutory regulations and directives applicable at the time must be observed.

Electrical and electronic equipment marked with specific symbol in compliance with 2012/19/EU Directive must be disposed of separately from household waste. European users can hand them over to the dealer or to the manufacturer when purchasing a new electrical and electronic equipment, or to a WEEE collection point designated by local authorities. Illegal disposal is punished by law.

Please note: Any existing batteries must be removed beforehand and disposed of separately!

CONFIGURATION

For basic operation of the display device, please refer to the instructions for the display device used.

Sensor-configuration

The sensor-specific configuration for the PROLine device series can be found in the device menu under the "Port x" parameter (x stands for the number of the socket used)

MENU	DESCRIPTION
– Port x	Input number "x" measurement settings
= Calibration	Call up the calibration function for the sensor
= Probe info	Information on the connected probe
= Temp units	Set the measurement unit for temperature
= Salinity	Set the salinity of the liquid *(required for measuring value correction in salt water)*
= Alarm settings	Setting of the alarm thresholds
≡ Alerting	Selection of the quantity with which to associate the alarm
≡ Min. Alarm (*1)	Lower alarm threshold (alarm if measure < threshold)
≡ Max. Alarm (*1)	Upper alarm threshold (alarm if measure > threshold)
≡ Hysteresis (*1)	Thresholds hysteresis
= Factory defaults	Reset user corrections to factory settings (answer safety query with 'Yes')

(*1) The item does not appear if "Alerting" is set to "Off".

Notes for sensor adjustment:

The display devices have two adjustment functions:
1-point (recalibration of the 100% value only)
2-point (recalibration of the 100% and 0% values)

Preparation: Wrap the sensor head with cap in a damp cloth to create a water/oxygen-saturated atmosphere around the sensor.
With the DX 532 and DX 535, the sensor can also be placed in the storage bottle – make sure that the sponge inside is soaked with water and that the measuring head is not in direct contact with it.

Preparation for 2-point adjustment: Also prepare the calibration vessel for 0%

The adjustment process is automatically aborted after ~90 seconds without a stable value

Adjustment:

Press the „**Start**" button to start the adjustment.

- The device waits until a stable measured value is detected – during this time, "Please wait" is displayed. After successful adjustment, a check mark is displayed at100% O2.

If no 2-point adjustment is required for the measurement task, complete the adjustment by pressing the „**Done**" button.

For the second adjustment point at 0%, place the sensor in the 0% calibration vessel and start the second adjustment by pressing „**Start**".

- The device waits again until a stable measured value is detected – during this time, "Please wait" is displayed. After successful adjustment, a check mark is also displayed at 0% O2 .

Complete the adjustment by pressing the „**Done**" button.

Note: After use in 0% solution, rinse the sensor with clear water.

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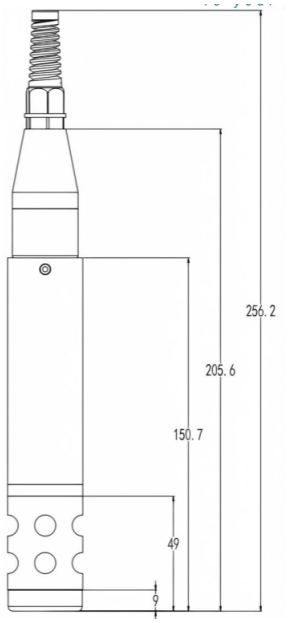
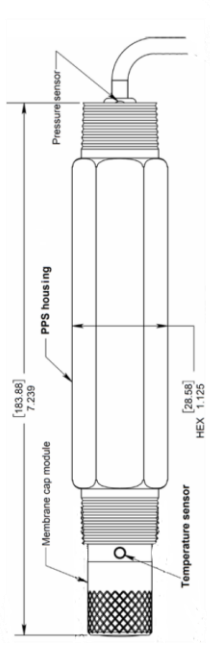
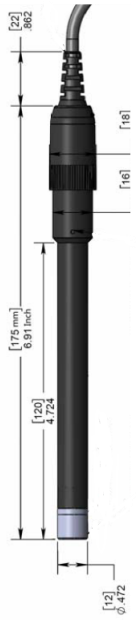
TECHNICAL SPECIFICATIONS

		DX 530 economic field probe	DX 532 heavy duty field probe up to 30 m depth	DX 535 Compact lab style probe Ø12 mm
Measuring ranges				
	Oxygen saturation	0.0 … 200.0 % O_2 sat.	0.0 … 500.0 % O_2 sat.	0.0 … 500.0 % O_2 sat.
	Oxygen concentration	0.00 … 20.00 mg/l (ppm)	0.00 … 50.00 mg/l (ppm)	0.00 … 50.00 mg/l (ppm)
	Temperature	0.0 … 45.0 °C	0.0 … 50.0 °C	0.0 … 50.0 °C
	Pressure	--	400 … 5000 hPa, hydrostatic depth measuring	500 … 1150 hPa
Resolution		0.1 % O_2 sat. 0.01 mg/l, 10 ppb	0.1 % O_2 sat. 0.01 mg/l, 10 ppb	0.1 % O_2 sat. 0.01 mg/l, 10 ppb
		--	Depth: 0.01 m	--
Compensation				
	Temperature	fully automatic		
	Salinity	automatic with user-input (0 … 50 ppt)	automatic with user-input (0 … 55 ppt)	
	Atmospheric pressure	--	Automatic until 20 cm immersion, below: value of 1 point adjustment/calibration	
Accuracy				
	Oxygen	0 … 100 %: < ±0.3 mg/l 100 … 200 %: < ±3 %	0 … 100 %: < ±1 % 100 … 200 %: < ±2 %	0 … 100 %: < ±1 % 100 … 200 %: < ±2 %
	Temperature	±0.2 °C	±0.2 °C	±0.2 °C
	Pressure	--	±0.2 kPa Depth: ±0.25 m	±0,2 kPa Depth: ±0.25 m
Max immersion depth		10 m (max 3h per day, dry afterwards recommended)	40 m	1 m
Response Time (rising values *1)		T_{90} = 30 s	T_{90} = 30 s	T_{90} = 35 s
Adjustment		1-point (100%) in air-saturated water or water-saturated air (storage bottle) 2-point: (Zero and 100%)		
Sensor cap life		min 1.5 years with optimum treatment, user replaceable	up to 2 years with optimum treatment, user replaceable	
Membrane protection		Included	Included	optionally GSKA 3600/3610
Recommended interval adjustment/calibration		6 months (depending on precision requirement and treatment)		

*1: *Falling values, especially at very low values, may take significantly longer.*

Operating conditions	0 … 45 °C	-5 … 50 °C	0 … 50 °C / 0…85 %RH, non-condensing
Atmospheric Pressure		400 … 1150 hPa	500 … 1150 hPa
Max abs. pressure	2000 hPa	10000 hPa	1250 hPa
Storage temperature	-10 … 50 °C	-20 … 70 °C	0 … 50 °C

Protection degree	IP68	IP68	IP67
Power consumption	~30 mA	~60 mA	~60 mA
Output	DX-Sensor interface M12		
Connection	Jack socket for detachable cable / M12 DX sensor connection	Fixed cable ending with M12 connector	Fixed cable ending with M12 connector
Dimensions	Ø32 x 256 mm, incl. connector and bending protection 	Membrane head: Ø22 mm, ¾" NPT Max. Ø29 mm Length: ~245 mm incl. bending protection and cap  *Pict. without protection cap*	Shaft: Ø12 mm x 120 mm, Length: ~197 mm incl. bending protection 
Weight	~330 g incl. 3 m cable ~405 g incl. 5 m cable	~350 g incl. 5 m cable ~1330 g incl. 29.5 m cable	~140 g incl. 2 m cable
Material	PVC housing, stainless steel membrane cap	PPS housing	Black ABS housing, SS1316 membrane cap
Cable	incl. connection cable PUR 3 or 5 m	PUR cable 5 m or 29.5 m	PUR cable 2 m

Directives and standards	The devices conform to the following Directives of the Council for the harmonization of legal regulations of the Member States: • 2014/30/EU EMC Directive • 2011/65/EU RoHS Applied harmonized standards: • EN 61326-1:2013 Emission limits: Class B Immunity according to table 1 Additional errors: < 3 % FS • EN IEC 63000:2018

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