DODO AQUA ORP

Online ORP / Redox Potential Sensor

MODEL **DOT-RXS-200**

ORDER CODE **DA-ORP**

ORP (Redox Potential)

Works with **DODO LOGGER** · **DODOTiK Platform** · **DODOLINK** mobile app · any Modbus-RTU master

−1500 … +1500 mV	**±6 mV, 1 mV resolution**
RS-485 Modbus-RTU	**IP68, 3/4" NPT immersion**
DC 12–24 V, < 0.3 W	**5 m cable, GX12 fitted**

Datasheet Rev 1.0

1. Overview

DODO AQUA ORP (DOT-RXS-200) measures oxidation-reduction potential - the net tendency of a water to oxidise or reduce - across the full **−1500 to +1500 mV** span, and reports it as a signed digital value on **RS-485 Modbus-RTU**.

ORP is the measurement that tells you whether a disinfection or reduction process is actually working, as opposed to whether the dosing pump is running. In a chlorinated system it tracks disinfecting power directly, which is why pool and drinking-water plants control on ORP rather than on dose rate; in wastewater it marks the aerobic/anoxic boundary that drives nitrification and denitrification; in metal finishing it is the endpoint indicator for cyanide oxidation and chromate reduction.

The platinum measuring electrode works against the same pressurised microporous-salt-bridge reference used in the DODO AQUA pH: the internal solution bleeds outward under at least 100 kPa for a rated **20+ months**, about twice the life of a conventional industrial reference.

Headline capabilities

- **Full bipolar span** - −1500 to +1500 mV at 1 mV resolution, ±6 mV accuracy
- **Signed digital output** - RS-485 Modbus-RTU; no analog mV loop to protect
- **Long-life reference** - pressurised microporous salt bridge, 20+ months of forward bleed
- **Fast** - dual high-impedance differential front end, strong noise rejection
- **Submersible** - IP68, 3/4" NPT thread for tank, pipe or submerged mounting
- **Single-point calibration** - one standard solution, one command
- **Plug-in** - 5 m cable with the DODO LOGGER GX12 connector fitted as standard

2. Product identification

Item	Value
Product name	**DODO AQUA ORP** — Online ORP / Redox Potential Sensor
Model number	**DOT-RXS-200**
Order code	**DA-ORP** *(see section 14 for configured variants)*
Product family	**DODO AQUA** — Industrial Online Water Sensors
Brand	**DODOTiK** · www.dodotik.com

Item	Value
Interface	**RS-485, Modbus-RTU**
Cable termination	**GX12 aviation connector, 4-pin**, female (socket contacts), fitted as standard

Marking on the unit. A 40 × 24 mm printed label on the sensor body carries the **DODOTiK** logo, *DODO AQUA* and the product name *ORP*, *Model: DOT-RXS-200*, the working data — DC 12–24 V IP68; RS-485 Modbus ADDR 6 — a lot code, and *dodotik.com* beside a QR code to it. It carries no conformity marks.

The lot code is not a serial number. It reads *LOT YYMM* and identifies the production run, not the unit: every DODO AQUA ORP built in the same month carries the same code. It is what dates a warranty claim and what scopes a batch recall, and it is the number to quote alongside the model when you report a fault. Individual units are not serialised.

Quote **DOT-RXS-200** for technical support and the order code with its suffix (**DA-ORP**, ...) when you reorder — the model number identifies the hardware platform, the order code identifies the configured variant.

3. Measured parameters

Parameter	Unit	Range	Accuracy	Resolution
ORP (redox potential)	mV	−1500 ... +1500 mV	±6 mV	1 mV

> **How the value arrives.** DODO AQUA ORP returns its reading as an integer plus a decimal-place count; for this product the count is **0**, so the reading is `raw / 10^0`. Section 9.2 gives the register map.

4. How it works

Platinum measuring electrode. An inert platinum surface in contact with the medium takes up the potential set by the balance of oxidising and reducing species present. That potential is read against the reference electrode; the difference, in millivolts, is the ORP.

Reference system. As on the pH sensor, the internal reference solution is pressurised to at least 100 kPa and bleeds outward through a microporous salt bridge, keeping process liquid out of the junction for a rated 20+ months.

Front end. A dual high-impedance differential amplifier reads the electrode pair without loading it and digitises the result in the probe body, so the millivolt signal never travels down a cable.

No temperature channel. Unlike the other four DODO AQUA sensors, the ORP returns **no temperature value** and applies no temperature compensation. ORP is conventionally reported uncompensated, because the relationship between redox potential and temperature depends on which species are present and is not generally known. Compare ORP readings taken at similar temperatures.

5. Technical specifications

5.1 Measurement

Parameter	Value
Measured parameters	**ORP (oxidation-reduction potential)**
Measuring range	**−1500 ... +1500 mV**
Resolution	**1 mV**
Accuracy	**±6 mV**
Temperature compensation	**None** - ORP is reported uncompensated
Calibration	**One-point**, in a prepared ORP standard solution

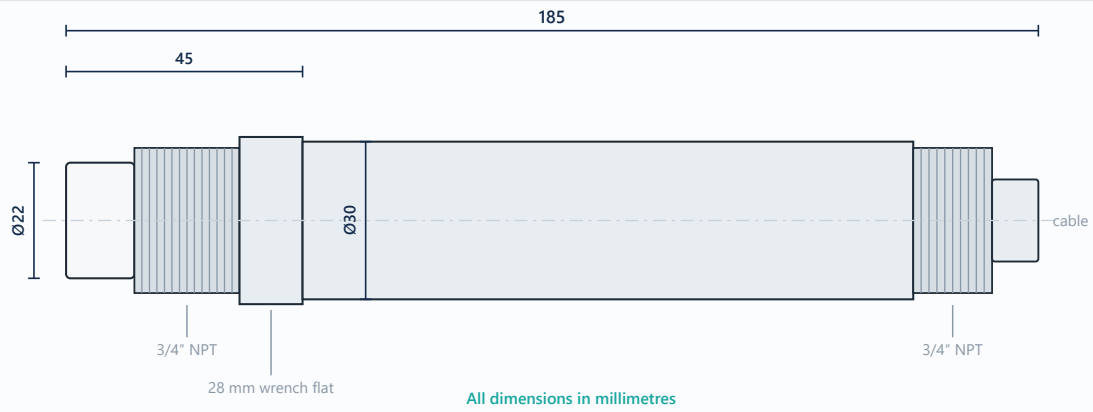
5.2 Electrical

Parameter	Value
Supply voltage	**DC 12–24 V ±10 %**
Power consumption	**< 0.3 W @ 12 V**
Output	**RS-485, Modbus-RTU**
Baud rate	**9600** *(default)*
Frame format	**8 data bits, 1 stop bit, no parity (8N1)**
Default slave address	**6**
Addressing	Field-changeable over the bus, range 1–127
Cable	**5 m, Φ6 mm shielded, corrosion-resistant jacket**, GX12 4-pin female fitted; other lengths on request

5.3 Mechanical and environmental

Parameter	Value
Body diameter	**Φ30 mm**
Overall length	**185 mm**
Wetted material	**POM**
Mounting	**Immersion, 3/4" NPT thread** - tank, pipe or submerged
Working temperature	**0 ... +65 °C**
Working pressure	**< 0.1 MPa**
Ingress protection	**IP68**

6. Dimensions



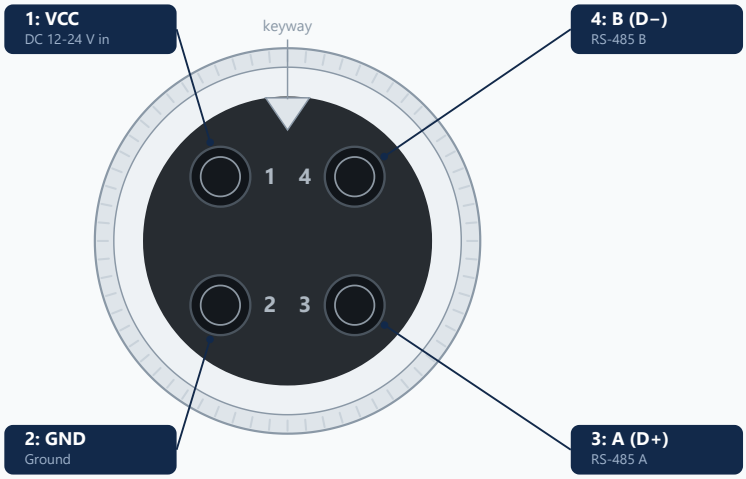
Dimension	Value
Overall length	**185 mm**
Body diameter	**Φ30 mm**
Electrode guard diameter	**Φ22 mm**
Process thread	**3/4" NPT**, both ends
Wrench flat	**28 mm**

Dimension	Value
Cable length	**5 m** (standard)

7. Installation and wiring

7.1 Connector and pinout

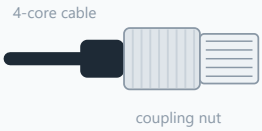
The 5 m cable is terminated in a **GX12 4-pin female aviation connector**, fitted as standard. It screws directly onto the **DODO LOGGER** Modbus RS-485 sensor socket — no stripping, no terminal block, no tools.



Socket face view · looking into the connector

GX12 aviation connector

4-pin female, fitted to the sensor cable
Threaded coupling nut, screw-locking
Mates the DODO LOGGER Modbus RS-485 socket



Keyed: one mating orientation only

Numbering as marked on the insert. The solder side of the connector is the mirror of this view.

Pin	Signal	Function
1	VCC	Power + (DC 12–24 V)
2	GND	Ground
3	A (D+)	RS-485 **A**
4	B (D−)	RS-485 **B**

The GX12 4-pin female connector fitted to the sensor cable, seen on the socket face. The four socket contacts and the keyway notch are visible; the drawing above gives the signal that lands on each.

Connector	Value
Type	**GX12 aviation connector, 4-pin**
Gender on sensor cable	**Female (socket contacts)**
Coupling	Threaded nut, screw-locking
Keying	Moulded keyway — one mating orientation only
Mates with	DODO LOGGER Modbus RS-485 sensor socket (GX12, 4-pin)

The logger passes its own input voltage straight through to VCC, so a 12 V or 24 V logger supply sits inside this sensor's DC 12–24 V window with no separate PSU.

> **Pin numbering** is read from the **socket face** — looking into the connector, as drawn. The solder side is the mirror of that view.
>
> **The connector is not the wet part.** The **IP68** rating covers the sensor body and its moulded cable gland. The GX12 mating pair is a screw-locking dry-side connector: keep it above water, inside the logger enclosure or in a sealed junction box. A connector standing in water eventually tracks between contacts, and the symptom is an intermittent Modbus timeout rather than an obvious failure.
>
> **Third-party controllers.** The sensor is a plain Modbus-RTU device, so a PLC, DCS, recorder or any other RS-485 master reads it directly. Mate the GX12 to a matching panel socket or a GX12-to-flying-lead patch lead; the pin numbering above is all the information needed. Never cut the cable at the sensor's own gland — that gland is part of the IP68 seal.
>
> **Ordering without the connector.** Order code **DA-ORP-BL** ships bare-ended instead. Those four cores are red VCC, black GND, blue 485A, white 485B, and that is the only variant where the colours matter — on every other order the cable is moulded and terminated, and no conductor is ever exposed.

7.2 Installation

Orientation is a hard requirement. The probe must sit at **15° or more above horizontal**, electrode end down - never inverted and never horizontal. A horizontal probe traps a gas bubble against the reference junction, and the result is a slow drift that recalibration will not cure.

Clearance. Keep the electrode at least **2 cm** clear of the vessel floor and side walls, in moving medium.

Mounting options. The 3/4" NPT thread takes a side-wall fitting, top flange, pipe tee, submersion pipe or flow cell. Tighten on the **28 mm wrench flat**, never on the body.

7.3 Handling and maintenance

- Rinse the platinum in distilled or deionised water before measuring and blot with filter paper. Immerse about one third of the electrode in the sample.
- Store the probe wet - protective sleeve or vessel filled with **3.5 mol/L potassium chloride**. Never store it dry.
- Avoid prolonged immersion in distilled water or protein solutions, and keep silicone grease off the electrode.
- A dulled or coated platinum surface can be cleaned with dilute hydrochloric acid followed by a water rinse.
- Keep the terminal dry; wipe with absolute alcohol if contaminated.
- If the probe will no longer calibrate after cleaning, the electrode has reached end of life. Replace it.

8. Calibration

ORP needs **one** calibration point. Rinse the probe thoroughly before moving between solutions - carry-over is the dominant error source.

Preparing the standard. Dissolve 2.1 g of hydrazine in 200 mL of pH buffer:

- pH 4.00 buffer → **+256 mV** standard
- pH 6.86 buffer → **+86 mV** standard
- pH 9.18 buffer → **−40 mV** standard

Make up 250 mL of the pH buffer and use 200 mL of it. Stand the probe in the prepared standard for 3–5 minutes; if the settled reading is not the standard value, write the calibration command for that standard.

> Hydrazine is toxic and a suspected carcinogen. Prepare these standards only with appropriate ventilation, gloves and eye protection, or buy ready-made ORP standard solution.

9. Modbus-RTU interface

9.1 Link settings

Setting	Value
Protocol	Modbus-RTU
Slave address	**6** (default), range 1–127
Baud rate	**9600**
Data bits	**8**
Stop bits	**1**
Parity	**None**

> **DODO AQUA ORP ships on slave address 6.** Every unit of a given product leaves the factory on the same address, so two of them on one RS-485 bus collide on first power-up — and the symptom is garbled or missing replies rather than a clean error. Address each sensor individually, one on the bus at a time, before wiring the bus up. Section 9.5 has the command.

9.2 Register map

The reading is held in **holding registers starting at 0x0000**, read with function code **0x03**. DODO AQUA ORP returns **2 registers** in one transaction.

Register	Name	Access	Notes
0x0000	Measured value	Read	2 registers: ORP value *(signed)*, decimals. **No temperature channel**

Register	Name	Access	Notes
0x1000	Calibration	Write	In the standard solution; write the actual standard value in mV
0x1006	Calibration value	Read	Returns the stored calibration value
0x2002	Device address	Read / Write	Default **6**, range 1–127
0x2020	Factory reset	Write	Write 0 - restores factory calibration

> **The decimal point travels with the value.** The reading is `value / 10^decimals`. The exponent is fixed for a given product and range, so an integrator can treat it as a constant - but it must be read once at commissioning and checked, because it is the device that decides it, not the datasheet.

9.3 Reading the measured value

Request — read 2 registers from 0x0000 on slave 6:

```
06 03 00 00 00 02 C5 BC
```

Response:

```
06 03 04 00 78 00 00 0C EA
```

Bytes	Raw	Decodes to
`00 78`	0x0078 = 120	ORP value, raw
`00 00`	0	decimal places → **120 mV**

9.4 Calibration commands

Written with function code **0x06**. The sensor echoes the frame back on success.

Calibration	Request frame	Response
Calibrate in the +86 mV standard	`06 06 10 00 00 56 0C 83`	`06 06 10 00 00 56 0C 83`
Calibrate in the +256 mV standard	`06 06 10 00 01 00 8D 2D`	`06 06 10 00 01 00 8D 2D`

9.5 Changing the slave address

Write the new address to register **0x2002** with function code **0x06**. Changing a sensor from address 6 to address 1:

```
06 06 20 02 00 01 E3 BD
```

Bytes	Meaning
`06`	Current slave address
`06`	Function code 0x06 — write single register
`20 02`	Register 0x2002
`00 01`	New address = 1
`E3 BD`	CRC16, low byte first

The reply carries the **new** address, not the old one. Valid addresses are 1–127.

9.6 Error responses

If the sensor cannot execute a command it replies with the function code plus 0x80 and an error code:

Field	Value
Address	The sensor's own address
Function code	Requested function code **+ 0x80**
Error code	**0x01** — function-code error · **0x03** — data error
CRC	CRC16, low byte first

10. DODO LOGGER, DODOTiK Platform and the DODOLINK app

DODO AQUA ORP is a complete monitoring point on its own: plug it into a **DODO LOGGER** and the readings are recorded locally, sent to the cloud, and visible on a phone — with no firmware work and no integration project.

DODO LOGGER — the companion data logger. The sensor's fitted GX12 connector screws straight onto its Modbus RS-485 socket; up to four sensors per logger, uplink over Wi-Fi, LoRaWAN or 4G LTE.

10.1 Reading the sensor with DODO LOGGER

DODO AQUA ORP is read through the logger's **no-code sensor library**. An installer defines the sensor once in the logger's web interface, assigns it to one of the four universal slots, and the readings begin logging to SD and publishing to the cloud — no firmware reflash and no backend change, because the logger self-describes its schema to the platform.

Item	Behaviour
Slot type	Modbus RS-485 (GX12 4-pin socket)
Connection	**Plug-in** — the fitted GX12 connector mates directly; no wiring
Function code	**0x03** (read holding registers)
Start register	**0x0000**
Register count	**2**
Baud rate	**9600**, 8N1
Power	Supplied by the logger; pass-through of its 12–24 V input
Sensors per logger	Up to 4 slots; each sensor on the bus needs a unique address
Logging	Every reading to microSD, always on, offline included

Item	Behaviour
Cloud	MQTT/TLS to the DODOTiK Platform, or POST to your own HTTPS endpoint

Suggested field definitions

Field	Data type	Scale	Unit
`orp`	**int16**	1	mV

> **Define the ORP field as `int16`, not `uint16`.** The sensor reports down to −1500 mV in two's complement. Decoded as unsigned, −40 mV reads as 65 496 — a number that looks like a live measurement and will not trip any range check.
>
> **The device also returns its decimal-place registers.** The logger's sensor library carries a fixed scale factor per field, so the exponent registers are normally left undefined and the scale above is used instead. Read them once at commissioning to confirm the exponent is what this datasheet states; it is the device that decides it.

10.2 DODOTiK Platform and the DODOLINK mobile app

Readings published by the logger arrive at the **DODOTiK Platform** (`platform.dodotik.com`) over MQTT/TLS, and at the **DODOLINK** mobile app for iOS and Android. Because the logger publishes its own schema, a new sensor appears in both with no backend deployment and no app update.

Where	What you get
DODO LOGGER — on the device	Browser dashboard served by the logger itself, on the local network or its own access point. Live readings, slot configuration, and CSV download straight off the microSD card. No app, no internet.
DODOTiK Platform — web	Live dashboards, full history, alert thresholds and device management across every logger on the account.
DODOLINK — iOS and Android	The same live readings and alerts on a phone, for operators who are not at a desk.
Your own system — instead of, or alongside	The logger can POST self-describing JSON to your HTTPS endpoint, or the sensor can be read directly by any Modbus-RTU master — PLC, DCS, SCADA or a paperless recorder.

> **Nothing here is a lock-in.** DODO AQUA ORP is a standard Modbus-RTU device on a standard RS-485 bus. The DODO LOGGER, the platform and the app are the fastest route from probe to dashboard, not the only one — the register map in section 9 is everything a third-party integrator needs.

11. The DODO AQUA family

DODO AQUA is the DODOTiK water-sensor line. Every member outputs RS-485 Modbus-RTU and carries the same GX12 4-pin female connector, so any mix of them runs on a single DODO LOGGER bus — up to four slots, each on its own address.

Product	Measures	Range	Order code
DODO AQUA pH	Industrial Online pH Sensor	0–14 pH	**DA-PH**
DODO AQUA ORP ←	Online ORP / Redox Potential Sensor	−1500 … +1500 mV	**DA-ORP**
DODO AQUA EC/TDS	Online Conductivity & TDS Sensor	Six ranges - see section 14	**DA-EC**
DODO AQUA SAL	Inductive Salinity Sensor	0–70 PSU	**DA-SAL**
DODO AQUA CL	Amperometric Free Chlorine Sensor	0–2.000 mg/L	**DA-CL**
DODO AQUA LEVEL	Submersible Hydrostatic Water-Level Sensor	0–5 m or 0–10 m	**DA-LVL**
DODO AQUA PRESSURE	Industrial Line Pressure Transmitter	0–6, 0–10 or 0–16 bar	**DA-PRS**

What they share is the bus: RS-485, Modbus-RTU at 9600 8N1, with the GX12 4-pin female connector fitted as standard. Where they differ is mounting, supply and cable. The five water-quality sensors are 3/4" NPT bodies on DC 12–24 V ±10 % with a 5 m cable, rated IP68 — except **DODO AQUA CL**, which is supplied with a flow cell and is not immersed at all. **DODO AQUA LEVEL** hangs on its own cable and **DODO AQUA PRESSURE** screws into a G1/2 port; both run on DC 12–36 V.

Default slave addresses are not the same across the line: DODO AQUA LEVEL and DODO AQUA PRESSURE on **address 1**; the five water-quality sensors on **address 6**. Address every sensor individually before putting them on one bus.

12. Quality and warranty

- **IP68** sealed body, POM wetted parts
- 72-hour burn-in and stability test on every unit before shipment
- **Warranty: 1 year** from date of sale, excluding damage from improper use
- The platinum electrode is a wearing part; reference life is rated at 20+ months of continuous service

13. Applications

- **Drinking water and swimming pools** - disinfection control on redox rather than dose rate
- **Wastewater treatment** - aerobic / anoxic boundary, nitrification and denitrification control
- **Metal finishing** - cyanide oxidation and chromate reduction endpoints
- **Cooling-tower circuits** - biocide effectiveness monitoring
- **Aquaculture** - redox as an early indicator of water-quality collapse
- **Bleaching and process chemistry** - oxidant strength in the bath

14. Ordering information

Order code	Description
DA-ORP	DODO AQUA ORP (DOT-RXS-200), −1500 … +1500 mV, RS-485 Modbus-RTU, 5 m cable with GX12 4-pin female connector
DA-ORP-L10	As DA-ORP, 10 m cable
DA-ORP-L20	As DA-ORP, 20 m cable
DA-ORP-BL	As DA-ORP, bare leads instead of the GX12 connector

> **Before you order:** Signed output: an integrator decoding the value as unsigned reads −40 mV as 65496.
>
> **Before you order:** Two registers, not four - the ORP has no temperature channel.

What's in the box:

- DODO AQUA ORP sensor with 5 m cable, GX12 4-pin female connector fitted
- Test certificate

Not included: power supply, RS-485 interface or logger.

15. Support & contact

Company	DODOTiK — industrial IoT hardware and instrumentation
Address	Aykosan Sanayi Sitesi, Çarşı Blok No: 416, Başakşehir, Istanbul, Türkiye
Phone	+90 538 282 6257
WhatsApp	+90 538 282 6257
Email	info@dodotik.com
Website	www.dodotik.com
Cloud platform	https://platform.dodotik.com
Technical support	info@dodotik.com — quote the model number from the unit label
Sales & distribution	info@dodotik.com — export pricing, volume tiers and partner terms on request

Quote the model number **DOT-RXS-200** from the label on the sensor body when you contact support, and the order code with its suffix when you reorder — the configured variant cannot be read off the unit.

The other six DODO AQUA sensors — **DODO AQUA pH**, **DODO AQUA EC/TDS**, **DODO AQUA SAL**, **DODO AQUA CL**, **DODO AQUA LEVEL**, **DODO AQUA PRESSURE** — each have their own datasheet. The **DODO LOGGER** data logger and the **DODO SOIL** 8-in-1 soil probe are documented separately.

16. Revision history

Rev	Change
1.0	First release.

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