DODO AQUA pH

Industrial Online pH Sensor

MODEL **DOT-PHS-200**

ORDER CODE **DA-PH**

pH · Temperature

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

- **0–14 pH, ±0.1 pH**
- **RS-485 Modbus-RTU**
- **IP68, 3/4" NPT immersion**
- **DC 12–24 V, < 0.3 W**
- **Automatic temperature compensation**
- **5 m cable, GX12 fitted**

Datasheet Rev 1.0

1. Overview

DODO AQUA pH (DOT-PHS-200) is a submersible industrial pH sensor with the signal conditioning built into the probe body, so what leaves the sensor is already a calibrated digital pH value on **RS-485 Modbus-RTU** - no separate transmitter, no analog pH loop, no high-impedance cable run to protect.

That matters more for pH than for any other measurand. A raw glass electrode puts out a few tens of millivolts across hundreds of megohms, and the usual field failure is not the electrode but the cable between the electrode and a transmitter mounted somewhere drier. Digitising at the probe removes that cable from the measurement entirely.

The sensing element is a **dual high-impedance differential amplifier** feeding a patented reference system: the internal reference solution bleeds outward through a microporous salt bridge under at least 100 kPa (1 bar), so the junction is always flowing out rather than drawing process liquid in. The factory rates that forward bleed at **over 20 months**, roughly twice the service life of a conventional industrial reference.

Headline capabilities

- **Full range** - 0–14 pH at 0.01 pH resolution, ±0.1 pH accuracy
- **Compensated** - automatic temperature compensation via a built-in NTC element
- **Digital at the probe** - RS-485 Modbus-RTU out; no pH transmitter needed
- **Long-life reference** - pressurised microporous salt bridge, 20+ months of forward bleed
- **Submersible** - IP68, 3/4" NPT thread for tank, pipe or submerged mounting
- **Two-point calibration** - over the bus, with the standard 6.86 / 4.00 / 9.18 buffers
- **Plug-in** - 5 m cable with the DODO LOGGER GX12 connector fitted as standard

2. Product identification

Item	Value
Product name	**DODO AQUA pH** — Industrial Online pH Sensor
Model number	**DOT-PHS-200**
Order code	**DA-PH** *(see section 14 for configured variants)*
Product family	**DODO AQUA** — Industrial Online Water Sensors
Brand	**DODOTiK** · www.dodotik.com
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 *pH*, *Model: DOT-PHS-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 pH 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-PHS-200** for technical support and the order code with its suffix (**DA-PH**, ...) 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
pH	pH	0–14 pH	±0.1 pH	0.01 pH
Temperature	°C	0–65 °C *(working range)*	— *(compensation element, not a specified output)*	0.1 °C

> **How the value arrives.** DODO AQUA pH returns its reading as an integer plus a decimal-place count; for this product the count is **2**, so the reading is `raw / 10^2`. Section 9.2 gives the register map.

4. How it works

pH - glass electrode with an on-board differential front end. The glass membrane develops a potential against the internal reference that varies with hydrogen-ion activity. A dual high-impedance differential amplifier inside the probe body reads that potential without loading it, and converts it to a calibrated digital pH value.

Reference system. The internal reference solution is held under at least 100 kPa and oozes outward through a microporous salt bridge. The outward flow is what keeps the junction clear of the process liquid; it is rated for more than 20 months of continuous bleed.

Temperature compensation - NTC. A thermistor in the probe body measures medium temperature and the front end applies the Nernstian correction automatically, so the reported pH is already compensated. The temperature channel is readable over Modbus as a diagnostic; it is a compensation element rather than a specified process thermometer.

5. Technical specifications

5.1 Measurement

Parameter	Value
Measured parameters	**pH**, with temperature as a compensation channel

Parameter	Value
Measuring range	**0–14 pH**
Resolution	**0.01 pH**
Accuracy	**±0.1 pH**
Temperature compensation	**Automatic (NTC)**
Calibration	**Two-point** - zero at pH 6.86, slope at pH 4.00 or 9.18

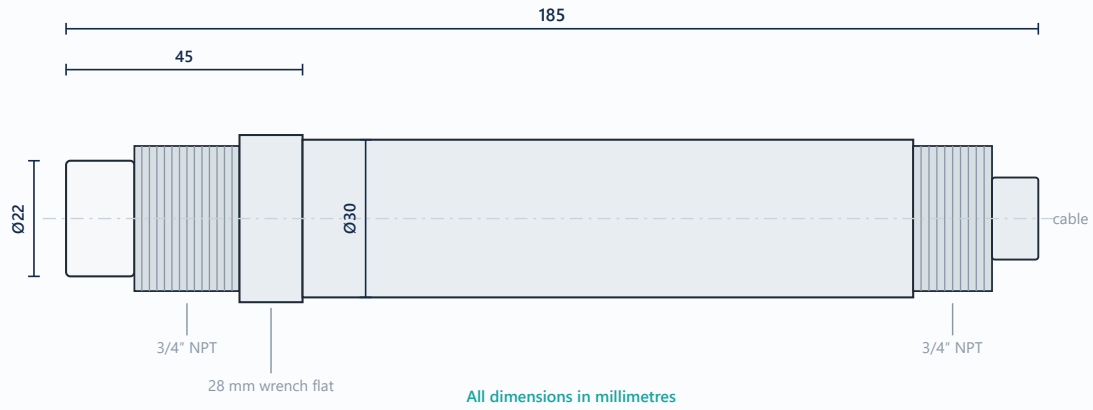
5.2 Electrical

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	**< 0.2 MPa**
Ingress protection	**IP68**

6. Dimensions

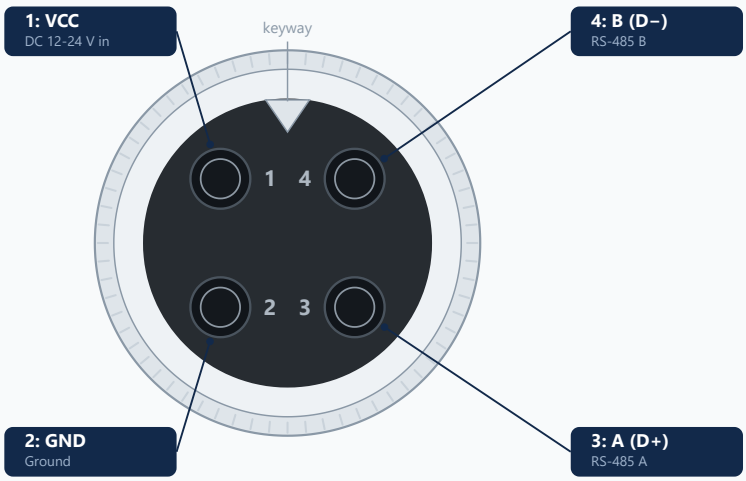


Dimension	Value
Overall length	**185 mm**
Body diameter	**Φ30 mm**
Electrode guard diameter	**Φ22 mm**
Process thread	**3/4" NPT**, both ends
Wrench flat	**28 mm**
Cable length	**5 m** (standard)

7. Installation and wiring

7.1 Connector and pinout

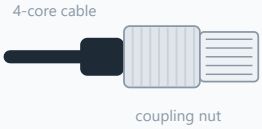
The 5 m cable is terminated in a **GX12 4-pin female aviation connector**, fitted as standard. It screws directly onto the **DODO LOGGER** Modbus RS-485 sensor socket — no stripping, no terminal block, no tools.



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-PH-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**, glass end down. It must never be mounted upside down or horizontally: the internal reference electrolyte has to stay in contact with the junction, and a horizontal probe traps a gas bubble against it. The symptom is a slow, drifting reading that no amount of recalibration fixes.

Clearance. Keep the electrode at least **2 cm** from the vessel floor and side walls. Mount it where the medium moves - a probe in a dead corner reads the dead corner.

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

7.3 Handling and maintenance

- Rinse the glass in distilled or deionised water before each measurement and blot it dry with filter paper - carrying droplets of the previous sample into the next one is the most common source of pH error.
- Store the probe wet. When it is out of service, cap it with the protective sleeve filled with **3.5 mol/L potassium chloride**, or stand it in a vessel of the same solution. A glass electrode allowed to dry out is often not recoverable.
- Never store it in distilled water or in a protein solution, and keep silicone grease away from the glass.
- If the glass goes translucent or scales up, wash it in dilute hydrochloric acid and rinse with water.
- Keep the terminal dry. If it is contaminated, wipe with absolute alcohol and dry before reconnecting.
- If the probe will no longer hold a calibration after cleaning, the electrode has reached end of life. Replace it.

8. Calibration

The sensor is calibrated at the factory. **Do not recalibrate a probe that is reading correctly** - each calibration writes over the stored reference and a calibration performed in a badly made buffer is worse than none.

Zero (pH 6.86). Make up 250 mL of pH 6.86 buffer from distilled water and one sachet of calibration powder, stirring until fully dissolved. Stand the probe in it for 3–5 minutes. If the reading has settled anywhere other than 6.86, write the zero-calibration command.

Slope (pH 4.00 or 9.18). Repeat with the buffer that brackets your process: **4.00** for acidic media, **9.18** for alkaline. Rinse the probe between buffers - carry-over from one buffer into the next is the main cause of a bad slope.

Buffer values move with temperature. The factory reference table gives pH 6.86 as 6.98 at 0 °C and 6.83 at 50 °C; calibrate near process temperature where you can.

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 pH 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 pH returns **4 registers** in one transaction.

Register	Name	Access	Notes
0x0000	Measured value + temperature	Read	4 registers: pH value, pH decimals, temperature value, temperature decimals

Register	Name	Access	Notes
0x1000	Zero calibration	Write	In pH 6.86 buffer; write 0
0x1002	Slope calibration (pH 4.00)	Write	In pH 4.00 buffer; write 0
0x1004	Slope calibration (pH 9.18)	Write	In pH 9.18 buffer; write 0
0x1006	Zero calibration value	Read	Returns the stored zero offset
0x1008	Slope calibration value	Read	Slope × 1000
0x1010	Temperature calibration	Read / Write	Write actual temperature × 10; read the stored offset × 10
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 4 registers from 0x0000 on slave 6:

```
06 03 00 00 00 04 45 BE
```

Response:

```
06 03 08 00 62 00 02 01 01 00 01 24 59
```

Bytes	Raw	Decodes to
`00 62`	0x0062 = 98	pH value, raw
`00 02`	2	decimal places → **pH 0.98**
`01 01`	0x0101 = 257	temperature, raw
`00 01`	1	decimal place → **25.7 °C**

9.4 Calibration commands

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

Calibration	Request frame	Response
Zero, in pH 6.86 buffer	`06 06 10 00 00 00 8C BD`	`06 06 10 00 00 00 8C BD`
Slope, in pH 4.00 buffer	`06 06 10 02 00 00 2D 7D`	`06 06 10 02 00 00 2D 7D`
Slope, in pH 9.18 buffer	`06 06 10 04 00 00 CD 7C`	`06 06 10 04 00 00 CD 7C`

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 pH 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 pH 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	**4**
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
Cloud	MQTT/TLS to the DODOTiK Platform, or POST to your own HTTPS endpoint

Suggested field definitions

Field	Data type	Scale	Unit
`ph`	uint16	0.01	pH
`temp`	int16	0.1	°C

> **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 pH 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 glass electrode is a wearing part; reference life is rated at 20+ months of continuous service

13. Applications

- **Drinking-water treatment** - coagulation, softening and final-stage pH control
- **Wastewater and effluent** - neutralisation before discharge, consent monitoring
- **Aquaculture** - pond and recirculating-system water quality
- **Hydroponics and fertigation** - nutrient-solution pH control
- **Chemical dosing** - acid/alkali balance in a process loop
- **Industrial process water** - boiler feed, cooling circuits, scrubber liquor

14. Ordering information

Order code	Description
DA-PH	DODO AQUA pH (DOT-PHS-200), 0–14 pH, RS-485 Modbus-RTU, 5 m cable with GX12 4-pin female connector
DA-PH-L10	As DA-PH, 10 m cable
DA-PH-L20	As DA-PH, 20 m cable
DA-PH-BL	As DA-PH, bare leads instead of the GX12 connector (for PLC, DCS or terminal-block wiring)

> **Before you order:** Mounting below 15° above horizontal traps a bubble on the reference junction.

What's in the box:

- DODO AQUA pH sensor with 5 m cable, GX12 4-pin female connector fitted
- Calibration powder, 3 sachets (pH 6.86, 4.00, 9.18)

- 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-PHS-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 ORP**, **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.

© DODOTiK. All rights reserved. Specifications subject to change without notice. Datasheet Rev 1.0.