

DODO AQUA CL

Amperometric Free Chlorine Sensor

MODEL DOT-FCS-200

ORDER CODE DA-CL

Free Chlorine (HClO) · Temperature

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



0–2.000 mg/L free chlorine

0.001 mg/L resolution

Response < 30 s

Flow cell, 30–60 L/h

RS-485 Modbus-RTU

Flow cell included

Datasheet Rev 1.0

1. Overview

DODO AQUA CL (DOT-FCS-200) measures **free chlorine** - the hypochlorous acid (HClO) that actually does the disinfecting - continuously, from 0 to 2.000 mg/L at 0.001 mg/L resolution, over **RS-485 Modbus-RTU**.

This is the measurement that regulators ask for and that a redox reading only approximates. ORP tells you a water is oxidising; free chlorine tells you how much disinfectant is in it, in the units the compliance report is written in. A sensor at the far end of a distribution network, or at the outlet of a treatment works, is what turns chlorine dosing from a scheduled job into a controlled one.

Measurement is **amperometric, by the constant-voltage method**: a fixed potential is held across the electrodes and the current that flows is proportional to the free chlorine reducing at the cathode. The membrane and electrolyte are PTFE and POM wetted; response is **under 30 seconds**.

Unlike the other four DODO AQUA sensors, this one is **not an immersion probe**. It is installed in the supplied flow cell with a controlled 30–60 L/h sample stream across the membrane - see section 7.

Headline capabilities

- **Free chlorine, directly** - HClO in mg/L, not a redox proxy
- **High resolution** - 0.001 mg/L over a 0–2.000 mg/L span
- **Fast** - response under 30 seconds
- **Compensated** - automatic temperature compensation via Pt1000
- **Flow cell included** - the sample cell ships with the sensor

- **Two-point calibration** - zero in chlorine-free water, slope against a standard
- **Low power** - 0.2 W at 12 V
- **Plug-in** - 5 m cable with the DODO LOGGER GX12 connector fitted as standard

2. Product identification

Item	Value
Product name	DODO AQUA CL — Amperometric Free Chlorine Sensor
Model number	DOT-FCS-200
Order code	DA-CL (<i>see section 14 for configured variants</i>)
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 *CL*, *Model: DOT-FCS-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 CL 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-FCS-200** for technical support and the order code with its suffix (**DA-CL**, ...) 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
Free chlorine (HClO)	mg/L	0–2.000 mg/L	±5 % of reading or ±0.05 mg/L	0.001 mg/L
Temperature	°C	5–50 °C	±0.5 °C	0.1 °C

How the value arrives. DODO AQUA CL returns its reading as an integer plus a decimal-place count; for this product the count is **3**, so the reading is $\text{raw} / 10^3$. Section 9.2 gives the register map.

4. How it works

Amperometric, constant-voltage (three-electrode) measurement. A fixed polarising potential is held between the working and reference electrodes. Free chlorine diffuses through a permeable membrane into the electrolyte and is reduced at the working electrode; the current that flows is proportional to its concentration. Because the potential is held constant rather than swept, the measurement settles quickly - under 30 seconds.

Temperature compensation - Pt1000. Membrane permeability and the reduction current both move with temperature. A platinum element in the sensor drives automatic compensation and is reported as its own channel.

Why flow matters. The measurement consumes chlorine at the membrane. If the sample is not replaced fast enough, the sensor depletes the water immediately in front of it and reads low; too fast, and the flow disturbs the diffusion layer. The specified window is **30–60 L/h**, which is why the sensor is supplied with a flow cell rather than sold as an immersion probe.

Why pH matters. Free chlorine exists as hypochlorous acid (HClO) and hypochlorite ion (OCl⁻), and the split is set by pH. This sensor responds to HClO, so it is specified for media between **pH 4 and pH 9**. Outside that window the reading is not a reliable measure of free chlorine. In a plant where pH moves, log it alongside - the **DODO AQUA pH** shares the bus.

5. Technical specifications

5.1 Measurement

Parameter	Value
Measured parameters	Free chlorine (HClO) and temperature
Measuring principle	Amperometric, constant-voltage method
Measuring range	0–2.000 mg/L
Resolution	0.001 mg/L
Accuracy	±5 % of reading or ±0.05 mg/L; temperature ±0.5 °C
Response time	< 30 s
Medium pH range	4–9 pH
Sample flow rate	30–60 L/h
Temperature compensation	Automatic (Pt1000)
Calibration	Two-point - zero in chlorine-free water, slope against a standard

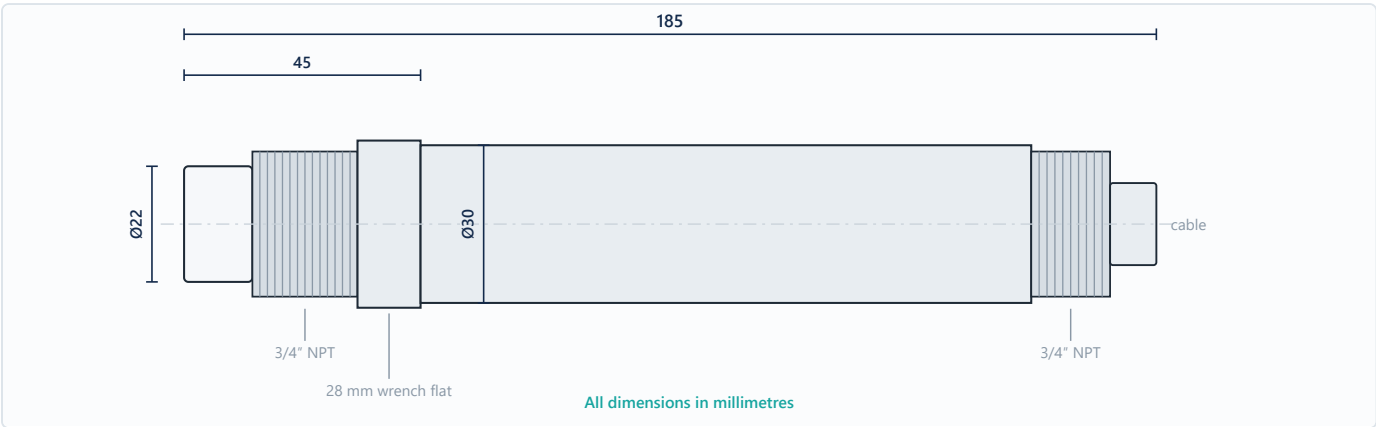
5.2 Electrical

Parameter	Value
Supply voltage	DC 12–24 V ±10 %
Power consumption	0.2 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, 4-core shielded twisted pair , GX12 4-pin female fitted; other lengths on request

5.3 Mechanical and environmental

Parameter	Value
Body diameter	Φ30 mm
Overall length	185 mm (see section 6)
Wetted material	POM and PTFE
Mounting	Flow cell - supplied with the sensor. Not an immersion probe
Working temperature	+5 ... +50 °C
Working pressure	< 0.1 MPa
Ingress protection	IP68

6. Dimensions

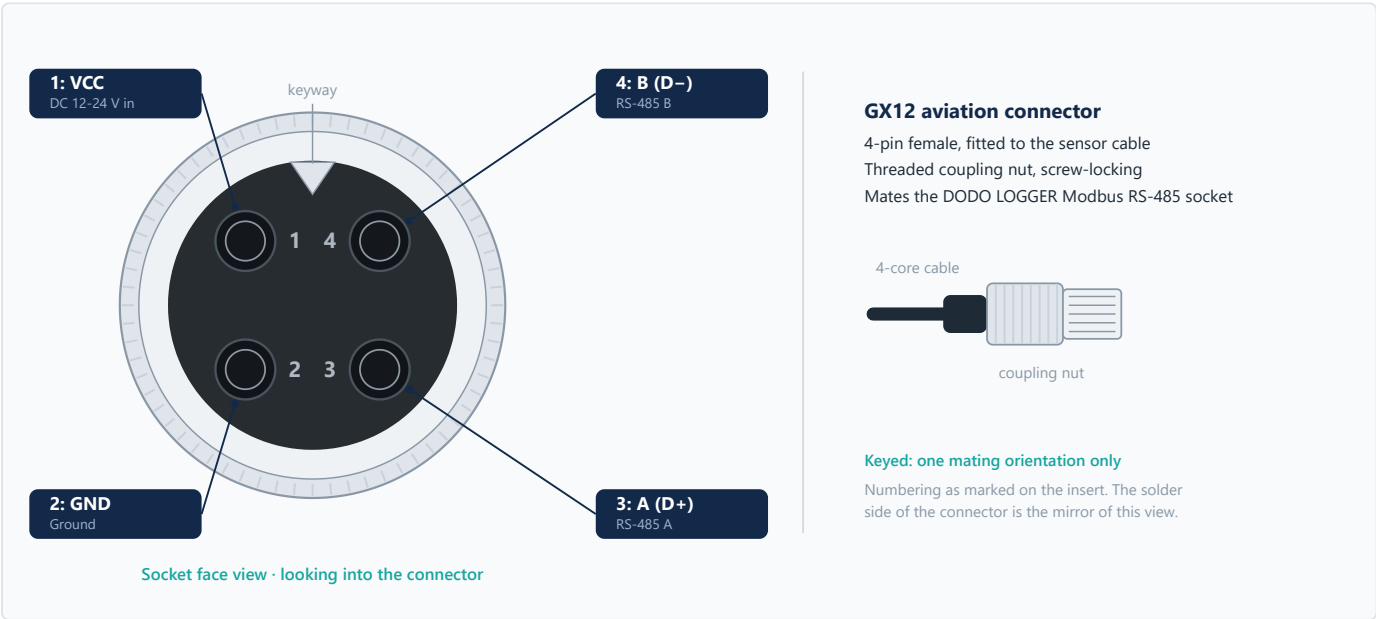


Dimension	Value
Overall length	185 mm
Body diameter	$\Phi 30$ mm
Electrode guard diameter	$\Phi 22$ mm
Process thread	3/4" NPT, both ends
Wrench flat	28 mm
Cable length	5 m (standard)

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.



Pin	Signal	Function
1	VCC	Power + (DC 12–24 V)

Pin	Signal	Function
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-CL-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

This sensor is installed in its flow cell, not in the tank. The flow cell is supplied with the sensor. Seat the sensor in the cell so the membrane sits in the **inlet** region, and keep it out of the direct line of the outlet.

Set the flow to 30–60 L/h and keep it there. The measurement consumes chlorine at the membrane, so a starved cell reads low and a flooded one reads noisy. Flow rate is a specification of this measurement, not a plumbing preference - fit a flow restrictor or regulating valve on the sample line and a visual flow indicator where an operator will see it.

Keep the sample representative. Take it from a live main, as short a run as practical, and keep the sample line opaque - chlorine decays in sunlight. A long clear sample line measures the line, not the plant.

Stay inside pH 4–9 and 5–50 °C. Outside either window the reading is not a reliable free-chlorine measurement.

7.3 Handling and maintenance

- **Activate before first use.** A new electrode, or one that has been out of service for a long period, must stand in tap water for **24 hours** before it will read correctly.
- Keep the sample flow in the 30–60 L/h window. Most 'sensor drift' on an amperometric chlorine cell is a sample-flow problem.
- Check the membrane for deposits, biofilm or bubbles whenever the reading goes sluggish. A bubble on the membrane stops the measurement.
- Recalibrate zero and slope if the value is wrong after cleaning. If it still cannot be calibrated, the electrode has reached end of life.
- Do not let the cell run dry between the sample pump stopping and starting. Repeated drying shortens electrode life sharply.

8. Calibration

The sensor is calibrated at the factory. Preparing a chlorine standard to a known concentration is genuinely difficult - the solution decays while you work - so **do not recalibrate unless the reading is demonstrably wrong**, verified against a DPD test on the same sample.

Zero, in chlorine-free water. Place the probe in chlorine-free water, wait for the value to settle, then write the zero command.

Slope, against a standard. Run a residual-chlorine standard through the flow cell - **1 to 2 mg/L HClO** is recommended - and once the value is stable write the slope command with the actual concentration × 1000. Determine the standard's true concentration by the national-standard residual-chlorine method, not by assuming what was made up.

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

Register	Name	Access	Notes
0x0000	Measured value + temperature	Read	4 registers: free chlorine, decimals, temperature, temperature decimals
0x1000	Zero calibration	Read / Write	In chlorine-free water, write 0; reading back returns the zero offset
0x1004	Slope calibration	Read / Write	In a 1–2 mg/L HClO standard; write actual concentration × 1000. Reading back returns 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. Recalibrate after a reset

The decimal point travels with the value. The reading is $\text{value} / 10^{\text{decimals}}$. 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 01 67 00 03 01 6F 00 01 EC 88
```

Bytes	Raw	Decodes to
01 67	0x0167 = 359	free chlorine, raw
00 03	3	decimal places → 0.359 mg/L
01 6F	0x016F = 367	temperature, raw
00 01	1	decimal place → 36.7 °C

9.4 Calibration commands

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

Calibration	Request frame	Response
Zero, in chlorine-free water	06 06 10 00 00 00 8C BD	06 06 10 00 00 00 8C BD
Slope, 2.000 mg/L standard	06 06 10 04 07 D0 CE D0	06 06 10 04 07 D0 CE D0

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

Bytes	Meaning
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 CL 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 CL 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)

Item	Behaviour
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
fc1	uint16	0.001	mg/L
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 CL 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 $\pm 10\%$ 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 and PTFE wetted parts
- 72-hour burn-in and stability test on every unit before shipment
- **Warranty: 1 year** on the sensor body from date of sale
- **Warranty: 6 months on the electrode**, which is a consumable - order replacements as DA-CL-EL

13. Applications

- **Drinking-water treatment works** - final-stage disinfection control and compliance
- **Distribution networks** - residual at the far end of the network, where it matters
- **Swimming pools and leisure water** - continuous free-chlorine control
- **Bottling and canning plants** - process-water disinfection
- **Cooling circuits** - biocide residual monitoring
- **Water-reuse and treatment skids** - disinfection verification before discharge

14. Ordering information

Order code	Description
DA-CL	DODO AQUA CL (DOT-FCS-200), 0–2.000 mg/L free chlorine, flow cell included, RS-485 Modbus-RTU, 5 m cable with GX12 4-pin female connector
DA-CL-L10	As DA-CL, 10 m cable
DA-CL-L20	As DA-CL, 20 m cable
DA-CL-BL	As DA-CL, bare leads instead of the GX12 connector
DA-CL-EL	Replacement electrode only

Before you order: Flow cell only. This is not an immersion probe.

Before you order: The electrode is a 6-month consumable, not a 1-year part.

What's in the box:

- DODO AQUA CL sensor with 5 m cable, GX12 4-pin female connector fitted
- Flow cell
- 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, İstanbul, 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-FCS-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 ORP**, **DODO AQUA EC/TDS**, **DODO AQUA SAL**, **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.