

DODO AQUA EC

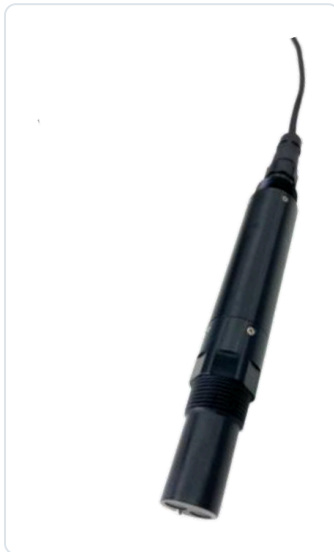
Online Conductivity & TDS Sensor

MODEL DOT-ECS-200

ORDER CODE DA-EC

Conductivity · TDS · Temperature

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



Six ranges, 0–400 mS/cm

EC + TDS + temperature

±1 % of reading

RS-485 Modbus-RTU

IP68, 3/4" NPT immersion

5 m cable, GX12 fitted

Datasheet Rev 1.0

1. Overview

DODO AQUA EC (DOT-ECS-200) measures electrical conductivity, total dissolved solids and temperature in one submersible probe, over **RS-485 Modbus-RTU**.

Conductivity is the workhorse measurement of water treatment: it is how you tell that an RO membrane is passing salt, that a boiler needs blowing down, that a rinse tank has stopped rinsing, or that a borehole has started drawing saline water. TDS is the same measurement expressed the way the people who read the report prefer it, through a coefficient that is **user-settable on this device** (default 0.64) so the conversion matches your water rather than a generic one.

The product spans **six measuring ranges across three cell constants**, from ultrapure water at 0–20 µS/cm up to brine at 0–400 mS/cm. The range and cell constant are **factory-set and specified at order** - see section 14.

Headline capabilities

- **Three measurands, one probe** - conductivity, TDS and temperature
- **Six ranges** - 0–20 µS/cm through 0–400 mS/cm, across three cell constants
- **User-settable TDS coefficient** - default 0.64, changed over the bus to suit the water
- **Compensated** - automatic temperature compensation via Pt1000
- **Selectable baud** - 9600 or 19200 over the bus
- **Low power** - < 0.1 W at 12 V, the lowest draw in the DODO AQUA family
- **Submersible** - IP68, 3/4" NPT thread, < 0.6 MPa working pressure

2. Product identification

Item	Value
Product name	DODO AQUA EC — Online Conductivity & TDS Sensor
Model number	DOT-ECS-200
Order code	DA-EC (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, the product name *DODO AQUA EC*, Model: *DOT-ECS-200*, the working data — 0–20.00 µS/cm DC 12–24 V; RS-485 Modbus ADDR 6 · IP68; CELL CONSTANT K = 0.01 — a lot code, and *dodotik.com* beside a QR code to it. It carries no conformity marks. DODO AQUA EC is sold in six ranges on one identical body, so the label is printed per range: the one above is a **DA-EC-K001-20U**.

The lot code is not a serial number. It reads *LOT YYMM* and identifies the production run, not the unit: every DODO AQUA EC 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-ECS-200** for technical support and the order code with its suffix (**DA-EC**, ...) 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
Electrical conductivity	µS/cm or mS/cm	Six ranges - see section 14	±1 % of reading	Range-dependent - see section 14
Total dissolved solids (TDS)	mg/L or g/L	Range-dependent	±1 % of reading	Range-dependent
Temperature	°C	0–65 °C	±0.3 °C	0.1 °C

4. How it works

Conductivity - contacting electrode cell. The probe passes an alternating excitation between electrodes of known geometry and measures the current the water carries. The ratio of electrode spacing to area is the **cell constant K**, and it sets the usable range: a low-K cell resolves very pure water, a high-K cell stays linear in brine. Three cell constants are offered (**K = 0.01, 0.1 and 1.0**) and each covers part of the overall 0–400 mS/cm span.

TDS - derived, with a coefficient you control. TDS is calculated from conductivity by a multiplier. The industry default of **0.64** assumes a typical mixed-salt water; a water dominated by a different ion gives a different factor. The coefficient is held in a register and can be rewritten over the bus, so the reported TDS can be matched to a laboratory result for your own water.

Temperature compensation - Pt1000. Conductivity rises roughly 2 % per °C, so an uncompensated reading is a thermometer as much as a conductivity meter. A platinum Pt1000 element in the probe drives automatic compensation, and the temperature is also reported as its own channel to ±0.3 °C.

5. Technical specifications

5.1 Measurement

Parameter	Value
Measured parameters	Conductivity, TDS and temperature
Measuring range	Six ranges , 0–20 µS/cm ... 0–400 mS/cm - see section 14
Cell constants	K = 0.01, 0.1, 1.0
Accuracy	±1 % of reading ; temperature ±0.3 °C
TDS coefficient	0.64 default, user-settable over the bus
Temperature compensation	Automatic (Pt1000)
Calibration	Two-point - zero in air, slope in a standard solution

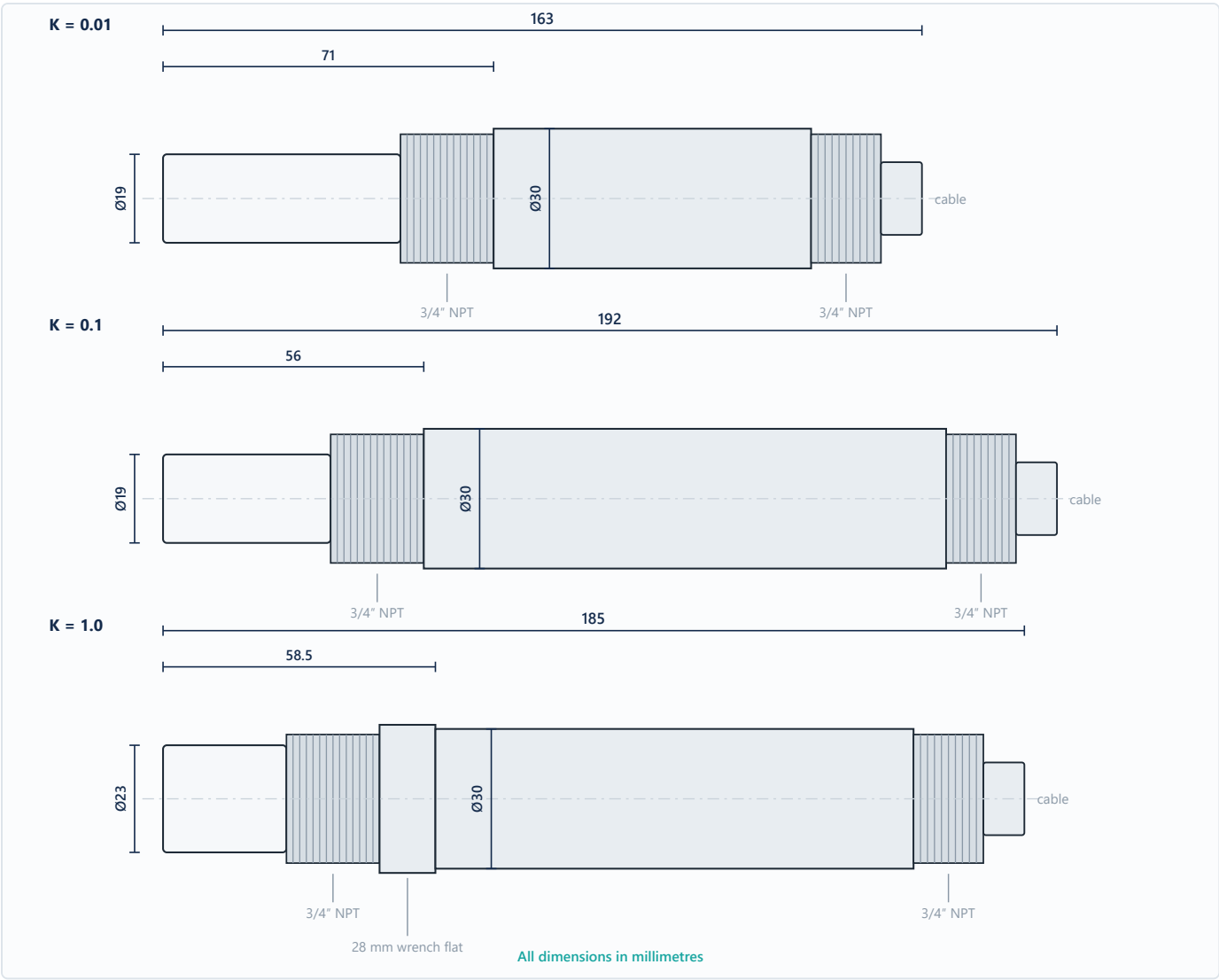
5.2 Electrical

Parameter	Value
Supply voltage	DC 12–24 V ±10 %
Power consumption	< 0.1 W @ 12 V
Output	RS-485, Modbus-RTU
Baud rate	9600 (<i>default</i>) or 19200 , selectable over the bus
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	163 mm (K = 0.01) · 192 mm (K = 0.1) · 185 mm (K = 1.0)
Wetted material	ABS and ABS/PC alloy
Mounting	Immersion, 3/4" NPT thread - tank, pipe or submerged
Working temperature	0 ... +65 °C
Working pressure	< 0.6 MPa
Ingress protection	IP68

6. Dimensions



Dimension	Value
Overall length, K = 0.01	163 mm
Overall length, K = 0.1	192 mm
Overall length, K = 1.0	185 mm
Body diameter	$\Phi 30$ mm
Electrode diameter, K = 0.01 / 0.1	$\Phi 19$ mm
Electrode diameter, K = 1.0	$\Phi 23$ mm
Process thread	3/4" NPT, both ends
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.

1: VCC
DC 12–24 V in

keyway

4: B (D–)
RS-485 B

2: GND
Ground

3: A (D+)
RS-485 A

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

4-core cable



coupling nut

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-EC-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

Clearance is a specification, not a guideline. A contacting conductivity cell measures the water in and immediately around its electrodes, and a nearby wall distorts the current field. Keep the electrode at least **2 cm** from the vessel floor and side walls, in both service and calibration.

Air is the enemy. A bubble lodged between the electrodes reads as a sharp drop in conductivity. Mount the probe where the flow sweeps the cell, angled so bubbles rise clear of it, and not in the plume directly under a fill pipe.

Mounting options. The 3/4" NPT thread takes a side-wall fitting, top flange, pipe tee, submersion pipe or flow-through cell. On the K = 1.0 body, tighten on the **28 mm wrench flat**.

7.3 Handling and maintenance

- Cleaning interval is set by the water, not by the clock - a clean RO permeate line may go a year, a scaling cooling circuit a month.
- Clean with a **soft brush**, then rinse with distilled water. Recalibrate after every clean.
- Do not scratch the electrode surfaces. Unlike the inductive DODO AQUA SAL, this is a contacting cell and its geometry *is* the calibration: an abraded electrode has a different cell constant.
- Do not use abrasive powders or wire wool on the electrodes.
- Check the cell for trapped debris whenever a reading drops suddenly and stays low.

8. Calibration

Two points: zero in air, slope in a standard solution.

Zero, in air. Rinse the probe in distilled water and blot it dry with filter paper. Leave it powered and standing in air for about **3 minutes** - a damp cell will not zero. When the reading has settled, write the zero command.

Slope, in a standard solution. Use a standard between **20 % of full scale and full scale** for the range the sensor was built for. Stand the probe vertically with at least **2 cm** of clearance from the container floor and walls. Write the slope command with the standard's actual value.

The scaling of the value written to the slope register depends on the range the unit was built for - see section 9.4.

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

Register	Name	Access	Notes
0x0000	Measured value + temperature	Read	4 registers: conductivity, decimals, temperature, temperature decimals
0x1000	Zero calibration	Write	In air; write 0
0x1004	Slope calibration	Write	In a standard solution; write the standard's actual value (see 9.4)
0x1010	Temperature calibration	Read / Write	Write actual temperature × 10; read the stored offset × 10

Register	Name	Access	Notes
0x1030	TDS coefficient	Read / Write	Default 0.64 ; change to suit the water
0x2002	Device address	Read / Write	Default 6 , range 1–127
0x2003	Baud rate	Read / Write	0 = 9600 (<i>default</i>) · 1 = 19200
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 02 00 00 00 B0 00 01 AD 88
```

Bytes	Raw	Decodes to
01 02	0x0102 = 258	conductivity, raw
00 00	0	decimal places → 258 µS/cm
00 B0	0x00B0 = 176	temperature, raw
00 01	1	decimal place → 17.6 °C

9.4 Calibration commands

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

Calibration	Request frame	Response
Zero, in air	06 06 10 00 00 00 8C BD	06 06 10 00 00 00 8C BD
Slope, 5000 µS/cm standard	06 06 10 04 13 88 C0 2A	06 06 10 04 13 88 C0 2A
Slope, 50 mS/cm standard	06 06 10 04 01 F4 CD 6B	06 06 10 04 01 F4 CD 6B

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 EC 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 EC 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

Item	Behaviour
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
ec	uint16	range-dependent	µS/cm or mS/cm
temp	int16	0.1	°C

The scale factor depends on the range the unit was built for. Read registers 0x0000-0x0001 once at commissioning, note the decimal-place count the device returns, and set the field scale to match. A definition copied from a differently-ranged unit reports a plausible number that is wrong by a factor of ten or a hundred.

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 EC 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 ←	Online Conductivity & TDS Sensor	Six ranges - see section 14	DA-EC

Product	Measures	Range	Order code
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, ABS and ABS/PC alloy 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

13. Applications

- **Reverse osmosis** - permeate quality and membrane-breakthrough alarms
- **Boiler and cooling water** - blowdown control on cycles of concentration
- **Drinking-water distribution** - TDS compliance and source-blending control
- **Rinse tanks** - plating and food-plant rinse-water quality
- **Hydroponics and fertigation** - nutrient-solution strength
- **Groundwater and borehole monitoring** - saline-intrusion early warning

14. Ordering information

Order code	Description
DA-EC-K001-20U	K = 0.01 · EC 0–20.00 $\mu\text{S}/\text{cm}$ · TDS 0–10 mg/L · resolution 0.01 $\mu\text{S}/\text{cm}$
DA-EC-K001-200U	K = 0.01 · EC 0–200.0 $\mu\text{S}/\text{cm}$ · TDS 0–100 mg/L · resolution 0.1 $\mu\text{S}/\text{cm}$
DA-EC-K01-5K	K = 0.1 · EC 0–5000 $\mu\text{S}/\text{cm}$ · TDS 0–3500 mg/L · resolution 1 $\mu\text{S}/\text{cm}$
DA-EC-K1-20K	K = 1.0 · EC 0–20 000 $\mu\text{S}/\text{cm}$ · TDS 0–10 000 mg/L · resolution 1 $\mu\text{S}/\text{cm}$
DA-EC-K1-200M	K = 1.0 · EC 0–200.0 mS/cm · TDS 0–100 g/L · resolution 0.1 mS/cm
DA-EC-K1-400M	K = 1.0 · EC 0–400 mS/cm · TDS 0–200 g/L · resolution 0.1 mS/cm
...-L10 / -L20	Any of the above with a 10 m or 20 m cable
...-BL	Any of the above with bare leads instead of the GX12 connector

Range and cell constant are factory-set. Specify both at order; neither can be changed in the field. A narrower range does not improve the stated $\pm 1\%$ accuracy, but it does resolve low-conductivity water that a high-K cell cannot.

Before you order: Range and cell constant are factory-set; neither can be changed in the field.

Before you order: The slope-calibration scaling depends on the range the unit was built for.

What's in the box:

- DODO AQUA EC sensor with 5 m cable, GX12 4-pin female connector fitted
- Test certificate
- Calibration solution *(optional, specify at order)*

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-ECS-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 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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