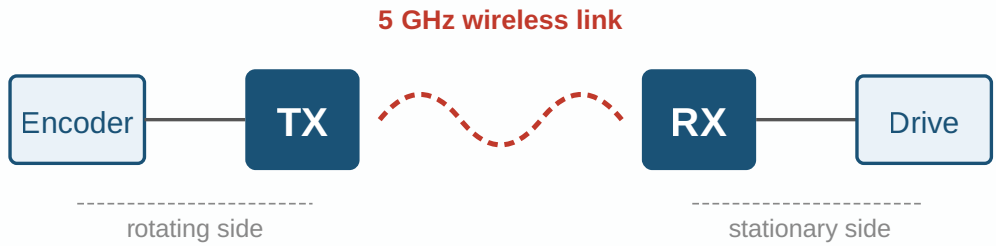
W E N C 2

Wireless Encoder Transmission System

Slip-ring-free encoder transmission for rotating motors

Cable & wire machinery automation since 2001 · electronics & automation since 1994



WENC2 is a two-device system that transmits incremental quadrature encoder signals from the rotating or moving section of a machine over a 5 GHz wireless link. **TX** reads the encoder inputs; **RX** regenerates the same signals as true quadrature outputs. From the drive's point of view, RX appears as a physically connected encoder; no hardware or software modification is required on the drive side.

Models

WENC2-MONO
1 encoder channel. Single bobbin or single rotating axis applications.

WENC2-DUO
2 encoder channels. Pay-off or take-up, plus capstan or traverse motor.

WENC2-TRI
3 encoder channels. Multi-axis twisting / winding systems (capstan + take-up + traverse).

Position tracking (position follower)

- No pulse lost: missing pulses are completed after a short link interruption
- 4 output modes selectable per encoder channel
- Speed transfer, safe, predictive and servo position tracking
- Suited to metering, counting and drive position-follower applications

Engineering Problem

Signal integrity	Momentary brush-to-surface disconnections cause pulse loss; oxidation and arc-induced noise can produce spurious pulses.

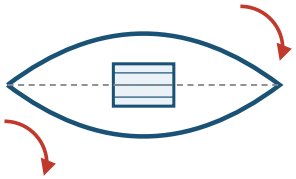
Mechanical wear	Brushes and ring surfaces require periodic maintenance; missed intervals lead to unplanned downtime.
Limited closed-loop	Because the feedback signal is not reliable, the inner motor cannot be truly closed-loop controlled. To compensate, auxiliary haul-off / tension regulation equipment such as caterpillar haul-off, capstan or dancer is added to the line; this extends the line and increases investment.

WENC2 Approach

Instead of carrying the encoder signal through a slip ring, a TX is placed on the rotating side and an RX on the stationary side. The signal is transmitted wirelessly and regenerated on the RX side. As a result, the drive sees a real encoder and can operate in true closed-loop; mechanical wear sources are eliminated; and in certain applications the need for auxiliary tension/haul-off regulation equipment is reduced or removed altogether.

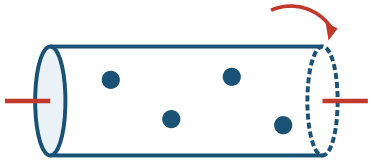
Applications in Cable and Wire Manufacturing

The machines below include motor / encoder systems located inside a rotating body, bow or bobbin. The classical solution is a slip ring. WENC2 eliminates the slip ring on the encoder feedback path in each example.



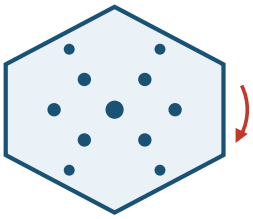
Double Twist Buncher

Take-up bobbin, capstan and traverse motors are located inside the rotating bow; two twists are produced per rotor turn. The take-up encoder delivers more stable tension in torque mode, the capstan encoder provides accurate lay length via closed-loop, and the traverse encoder enables a precise winding pattern under closed-loop control. All encoder signals are carried across via WENC2.



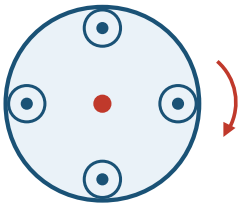
Tubular Strander / Buncher

Multiple bobbins inside a rotating tube with 100% back-twist. The tension motor encoder signal of each bobbin is transmitted wirelessly.



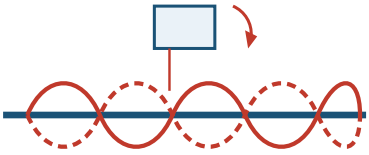
Rigid / Cage Strander

Fixed bobbins inside a rotating frame (19 / 37 / 61 bobbin configurations). Back-tension and length encoders are carried over WENC2.



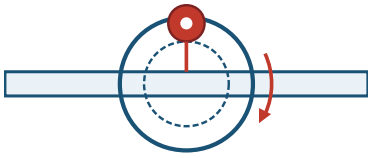
Planetary Strander

Cage and planet bobbins have two independent rotation axes. For large-section conductors, both planet and cage motor encoder signals are transmitted.



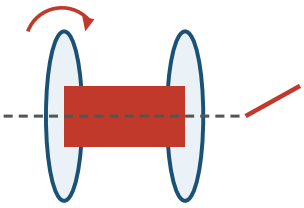
Armouring Line

Fork or planetary type rotating bobbins for GI wire / strip armour winding. Accurate lay length is produced without a rotating caterpillar, using take-up speed, spool diameter and rev calculation; the traverse motor delivers a correct winding pattern under closed-loop. A more stable haul is achieved with smaller motors; installation, maintenance and energy costs are noticeably reduced. Bobbin encoder signals are transmitted via WENC2 to the stationary controller.



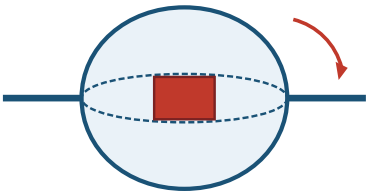
Taping / Lapping Line

Rotating taping / wrapping head (insulating tape, mica, paper, foil). Head position and tension are controlled wirelessly.



Rotary Pay-off / Take-up

Rotating take-up or pay-off bobbin. The bobbin speed and length encoder signal, together with the traverse encoder providing a correct winding pattern under closed-loop, reach the central drive without a slip ring layer. Stable tension and speed are obtained.



Drum Twister

MV / HV cable twisting inside a large rotating drum. Accurate lay length is produced without a rotating caterpillar, based on take-up speed, spool diameter and rev calculation; the traverse motor also maintains a correct winding pattern under closed-loop. Installation, maintenance and energy costs are noticeably reduced. The drum-internal motor encoder signals are transmitted outside the drum via the 5 GHz link.

Typical Product Types

LV / MV / HV power cables · Railway signal and control cables · Automotive cables · Steel wire ropes · Coaxial and fiber-optic cables · Armoured control and communication cables.

Other Industrial Areas

WENC2 may also be considered as an alternative solution in applications where encoder signals are carried across a slip ring or equivalent rotary connection. The list below shows usage examples with asynchronous (AC inverter-driven) motors.

Sector	Example Application
Cranes and gantries	Rotary trolley, rotating cabin, hoist drum encoder
Centrifuges	High-speed basket, decanter speed (AC motor driven)
Rotary dryer / fermenter	Rotating drum speed and position monitoring
Mixers and reactors	Rotating agitator speed / position (AC drive)
Textile	Bobbin winder, traverse winding
Heavy machinery / mining	Rotating milling head, screen, TBM sensor data

> **Application note:** WENC2 works with asynchronous (ACIM / AC inverter-driven) motors and HTL-level 2- or 4-wire quadrature encoders.

Technical Specifications

Wireless Communication	
Band	5 GHz
Topology	Point-to-point (peer-to-peer)
Channel management	Automatic channel switching
Protocol	Wi-Fi 6ax compliant 5 GHz robust protocol

Electrical	
Supply	15–30 V DC
Encoder supply output (TX)	+23.5 V filtered
Operating temperature	-20 °C … +70 °C
Terminal	16 clamps (TX and RX)

Encoder Interface	
Input type	Incremental quadrature (A/B/~A/~B)
Wiring	4-wire (differential) or 2-wire
Number of channels	1 / 2 / 3 (model-dependent)
Motor RPM range	0–6000 RPM @ 1024 ppr (102.4 kHz); theoretical ≈ 8800
TX input isolation	Optically isolated
RX output level	HTL (24 V), overcurrent and short-circuit protected

Commissioning	
Pairing	Web UI or single button (double press on both units)
Web UI IP	192.168.10.1
OTA update	Wireless, signed and encrypted (RX and TX)
Position tracking	4 output modes, no pulse loss
Secure update	Anti-rollback
LED indication	4 signal LEDs + POWER; signal-strength bar

Comparison with Alternative Solutions

Solution	Signal Quality	Maintenance	Closed-loop	Initial Investment
Carbon-brush slip ring	Low	Periodic	Limited	Low
Gold / silver contact slip ring	Medium	Periodic	Limited	Medium
2.4 GHz general-purpose IoT link	Low (latency)	Low	No	Low
WENC2 (5 GHz dedicated link)	**High**	**None**	**Yes**	**Medium**

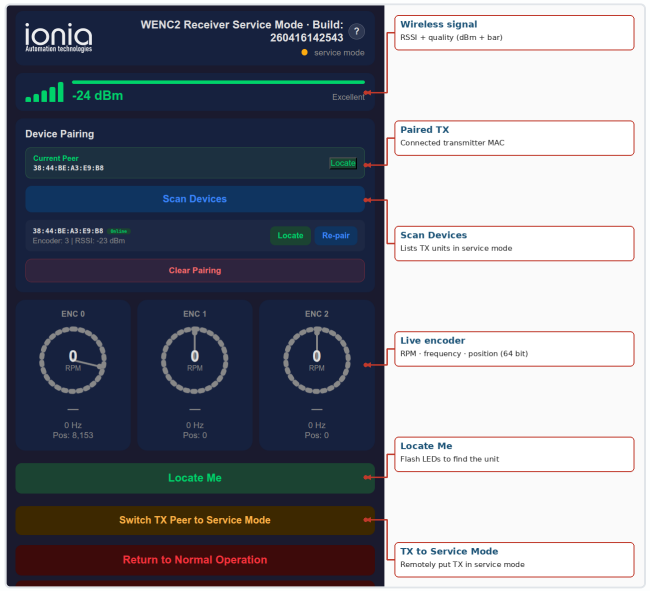
Ordering Information

Order Code	Encoder Channels	Contents
WENC2-MONO	1	1 × TX + 1 × RX
WENC2-DUO	2	1 × TX + 1 × RX
WENC2-TRI	3	1 × TX + 1 × RX

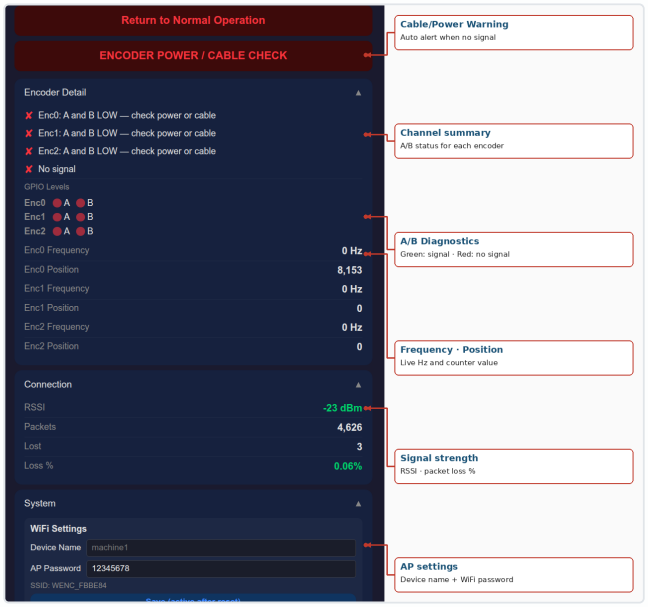
Field firmware upgrades are possible via OTA.

Web UI Commissioning

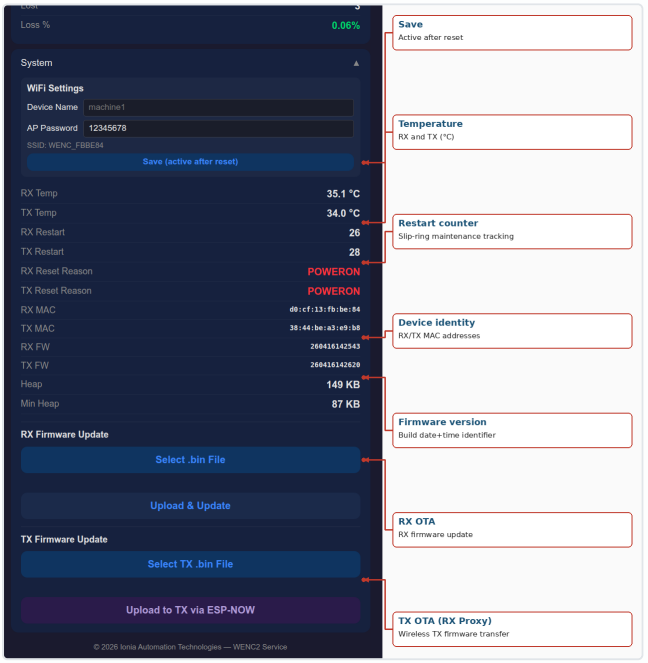
Every WENC2 device opens its own WiFi access point in service mode. A tablet or phone connects and opens `192.168.10.1` in the browser. Commissioning, diagnostics, OTA updates and slip-ring maintenance tracking are all handled from the Web UI — no external software, cable or license required.



Main Screen — Signal quality, TX pairing, live encoder data (RPM, frequency, 64-bit position).



A/B Signal Diagnostics — Per-channel A/B cable and power status, packet statistics.



System and OTA — RX/TX firmware update, restart counter (slip-ring maintenance), device identity.

History and Sustainability

The timeline below summarises the evolution of the WENC product family, its field validation and manufacturing maturity.

Late 2012	Design work on the WENC1 project began.
2016	Field testing was completed after five revisions.
2016 – 2020	Retail production was carried out based on individual orders.
January 2021	Industrial series production began; the product was named **ionia WENC**.
June 2021	Fully independent series production SMT lines were established; production processes were made systematic.
Through 2025	WENC1 remained in series production.
Q2 2025	WENC2 was manufactured.
Q1 2026	WENC2 entered series production.

We manufacture on our in-house SMT line without external dependency, keeping our quality processes under control at every stage.

Version Differences

Feature	WENC1	WENC2
Number of encoder channels	1	3 (MONO / DUO / TRI)
RF band	2.4 GHz	5 GHz
Protocol	Proprietary protocol	Peer MAC-authenticated robust protocol
Internal position counter	32-bit	64-bit
Service mode	—	Single button (service, Locate, pairing) + Web UI (tablet / phone)
Firmware update	—	OTA (wireless, signed)
Output / supply protection	Basic	Over-temperature + overcurrent
Supply peak protection	40 V	42 V Abs Max
Supply conversion	SMPS	High-efficiency next-generation SMPS
Thermal tolerance	Standard	Operation up to +70 °C

WENC2 is built on the field experience accumulated with WENC1; it offers a higher channel count, wider band and robustness, field upgradeability and comprehensive protection circuits.