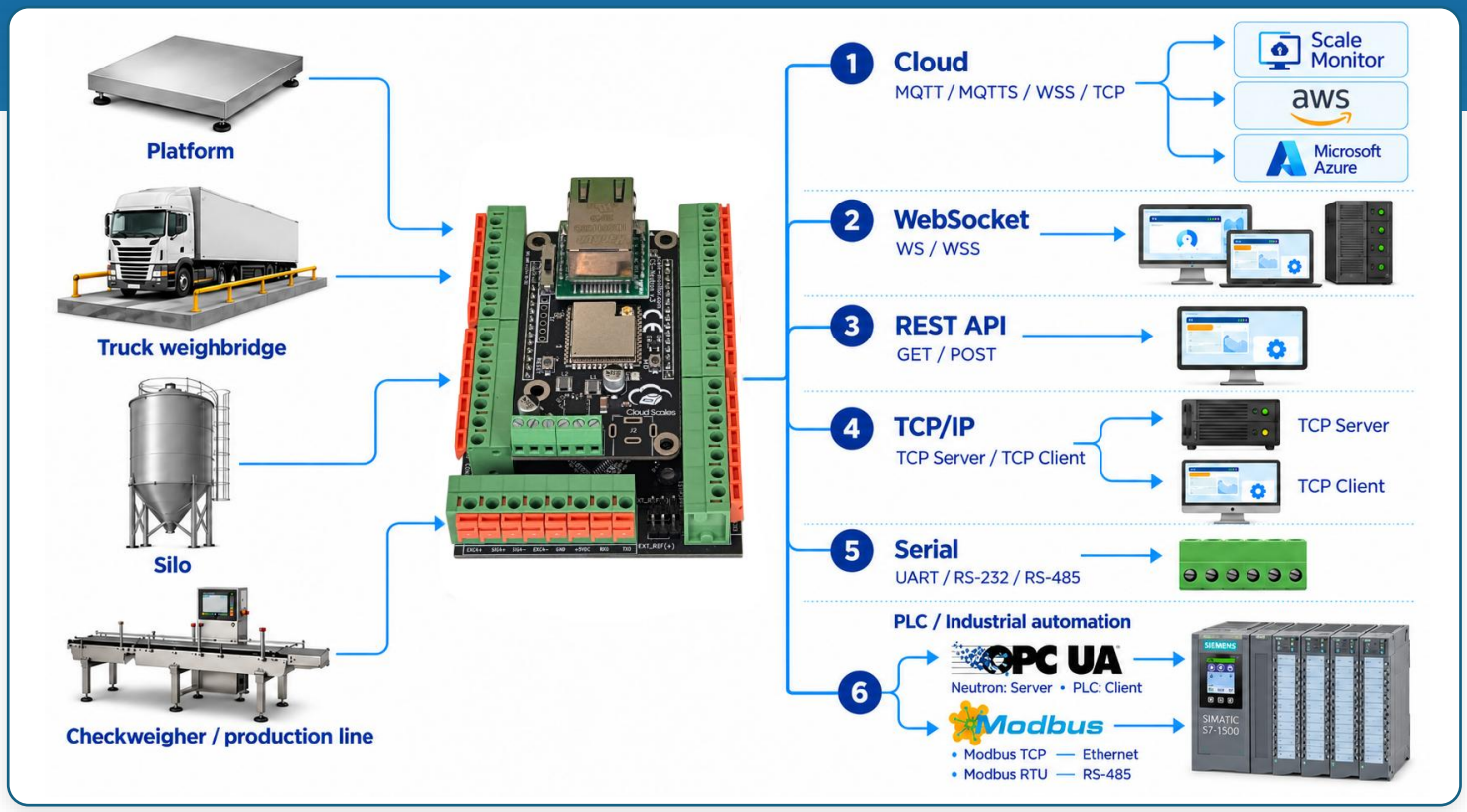
NEUTRON NS

Compact smart scale without display
with I/O and cloud connectivity

- Build connected scales
- Automate with digital I/O
- Integrate with Scale Monitor, cloud, ERP, MES, PLC, SCADA and IIoT

Cloud Scales



Product overview

CloudScale Neutron NS is a compact smart scale without display for building cloud-connected weighing systems with local weighing intelligence. It combines the Neutron CPU board with the I/O board, adding direct load-cell measurement, digital inputs, digital outputs and secure cloud communication in one scalable platform.

Unlike the communication-only CSL Neutron module, Neutron NS is positioned as a compact displayless scale core. It can connect directly to analog load cells, operate up to four independent weighing channels, process zero/tare/calibration functions locally, and exchange weighing data with Scale Monitor, cloud platforms, local software and automation systems. When a local operator display is required, the CloudScale Neutron NT7 version with a 7-inch touchscreen indicator is available.

Together with the Scale Monitor platform and the customer's own device - phone, tablet or PC - Neutron NS forms the best and most versatile combination for customers looking for independence, a practical DIY platform and the freedom to tailor weighing screens, data fields, workflows, cloud dashboards and integrations according to their own needs.

Key benefits

- Cloud-ready compact scale without display
- Compact design, ideal for OEM integration
- Ethernet, Wi-Fi and Bluetooth BLE connectivity options
- Supports legacy interfaces such as UART, RS-232 and RS-485
- Suitable for Scale Monitor and custom cloud applications
- Reduces dependency on legacy local software
- Remote configuration, diagnostics and support-friendly architecture
- Dedicated communication protocol for external control and system integration
- Designed for flexible use with PC, tablet or smartphone operation

Typical use cases

- Fully digital weighing environments operated through PC, tablet or smartphone
- Smart production systems where weighing is part of an automated process
- Multi-channel weighing systems with several platforms or load-cell inputs
- Dosing, check weighing, counting, batching and process weighing applications
- Local I/O control combined with cloud data collection
- Remote monitoring, diagnostics, service and calibration support
- ERP, MES, WMS and quality system integration
- OEM smart scale electronics for new weighing equipment

Main functions

Weighing core	Automation I/O	Cloud & local communication
Direct connection of analog load cells through a 4-channel, 24-bit ADC with programmable digital filtering.	Six configurable opto-isolated digital inputs and six digital outputs for scale and process control tasks.	Connection to Scale Monitor, MQTT/MQTTS, WebSocket/WSS, REST API, TCP, Modbus RTU&TCP, Bluetooth BLE, Wi-Fi and optional Ethernet.
Supports multi-range and multi-division scale configuration, zero tracking, zero at power-on, stability detection and calibration with up to 8 linearization points per scale.	Inputs can be used for functions such as zero, tare, start/stop signals, state monitoring or counter mode.	Two-way communication for weighing data upload, command exchange, configuration, diagnostics and remote support.
One Neutron NS can manage up to four scale channels, making it suitable for compact single-scale systems and multi-platform installations.	Outputs can be controlled by commands or by scale logic for tolerance, out-of-tolerance, quick dosing, slow dosing and similar applications.	Provides a consistent integration layer for cloud dashboards, ERP, MES, WMS, IoT workflows and custom software applications.

Why Neutron?

Modern weighing systems often need more than a traditional indicator with a serial output. They require secure cloud connectivity, local control logic, remote service, traceable data and simple integration with business software. Neutron NS provides this by combining scale electronics, digital I/O and IIoT connectivity in one compact displayless platform that works naturally with Scale Monitor and the customer's device - phone, tablet or PC.

For scale builders and OEMs

• Build new connected scales without developing the full electronics stack from scratch
• Connect load cells directly and configure each weighing channel independently
• Add secure cloud connectivity and remote diagnostics from the beginning
• Reduce development time for smart indicators and weighing terminals

For industrial users and integrators

• Standardize weighing data and automation signals in one device
• Use Scale Monitor for dashboards, data collection and remote monitoring
• Integrate weighing data with ERP, MES, WMS, QA, SCADA and IoT platforms
• Add local I/O functions for dosing, tolerance checks and process control

Smart Integration Possibilities

The Neutron NS is ideal for:

- Scale Monitor cloud platform
- customer-owned phones, tablets and PCs as flexible weighing terminals
- independent DIY platform for customer-specific weighing workflows
- custom software applications
- cloud dashboards and remote monitoring
- data collection and traceability
- integration with ERP, MES, and IoT systems
- service and maintenance applications.

Compatible weighing applications

Neutron NS is designed primarily as a compact scale without display for analog load-cell based weighing systems. It can also communicate with external indicators or serial devices when the application requires integration with existing equipment.

Ideal for:

- Bench scales
- Floor scales
- Tank and hopper scales
- Multi-platform weighing systems
- Dosing and batching systems
- Checkweighing and counting applications
- Service and retrofit projects
- OEM weighing terminals
- Laboratory and production weighing stations
- Logistics and warehouse weighing
- Remote monitoring installations
- Scale Monitor connected systems
- Custom ERP / MES / WMS integrations
- PLC, SCADA and HMI project
- IoT and data collection projects

For direct weighing applications, compatibility depends mainly on the load-cell configuration, capacity, division, metrological requirements and installation environment. For serial integration with external devices, Neutron NS supports UART, RS-232 and RS-485 interfaces with configurable serial parameters. If you are unsure which configuration is suitable, contact us and we will check the best connection method for your application.

Security

Neutron has security built into it's core - device-level security features as Secure Boot and Flash Encryption, helping protect firmware integrity and sensitive data stored on the device. Only trusted firmware can be executed, while encrypted storage and secure communication help reduce risk in unattended, industrial, and OEM deployments.

Enterprise Wi-Fi	Encrypted communication	Secure boot
Supports secure Wi-Fi connection, including WPA2, WPA3, and enterprise authentication for professional and corporate IT environments.	Supports encrypted data transfer using TLS secure protocols such as HTTPS, MQTTS, and WSS for safe cloud and server communication.	Ensures that only trusted and authorized firmware can run on the device, helping protect the system from unauthorized modifications.
Flash encryption	**Unique MID and PIN**	**OTA**
Protects sensitive data stored inside the device by encrypting the internal flash memory.	Each Neutron module has a unique module ID and PIN for secure identification, configuration, and remote support access.	Supports secure over-the-air firmware updates, allowing remote upgrades, maintenance, and feature improvements without physical access to the device.

OEM version/private label

OEM smart scale solutions for scale manufacturers

Neutron NS is also available as an OEM smart scale platform for manufacturers who want to add modern weighing electronics, I/O functions and cloud support to their products. Instead of developing a new displayless scale core, IoT gateway, firmware layer, management platform and security architecture from scratch, manufacturers can integrate Neutron NS directly into their own scales, indicators, terminals or weighing systems.

We can support OEM customers with custom PCB design, private label versions, custom firmware, branded cloud solutions and application-specific weighing workflows. This allows manufacturers to offer a complete digital weighing package under their own brand, while reducing development time, project risk and engineering cost.

Custom PCB	Private label	Custom firmware
Neutron NS-based hardware adapted to the manufacturer's scale, enclosure, connector, load-cell wiring or installation requirements.	Product branding adapted to the manufacturer's own product family.	Dedicated firmware behavior, weighing workflows, I/O logic, protocols, configuration logic, data format or device-specific functions.
Branded cloud	**Branded Scale Monitor option**	**Scale protocol integration**
Cloud platform for managing connected interfaces, devices, firmware, parameters, diagnostics, and customer deployments.	Optional end-user cloud platform for weighing apps, virtual indicators, traceability, and remote scale management.	Support for manufacturer-specific scale behavior, calibration workflow, I/O functions, serial commands and weighing data formats.

Result for manufacturers: faster time to market, lower development cost, reduced technical risk and a practical way to add smart scale functionality, secure connectivity and cloud integration to new weighing systems.

Technical specifications

General	Description
Product name	CloudScale Neutron NS / Neutron NS
Product type	Compact smart scale without display, with integrated Neutron CPU board and I/O board.
Primary function	Direct load-cell measurement, local weighing functions, digital I/O control and cloud/local software communication.
Serial interfaces	UART, RS-232, RS-485
Network interfaces	Wi-Fi, Bluetooth BLE and optional Ethernet depending on version
Cloud integration	Scale Monitor Cloud, AWS IoT Core, Azure IoT Hub, HiveMQ, EMQX, Mosquitto, local cloud platforms, WebSocket client (WS & WSS), REST/API integrations and server applications
Business software integration	ERP, MES, WMS, QA systems, data collection and traceability applications
Communication mode	Two-way communication: weighing data upload and command/configuration exchange
Configuration	Remote and local configuration depending on deployment scenario
Firmware	Upgradeable firmware architecture; OTA support throught HTTPS or Cloud Management Platform CMP
Installation	OEM integration or external connection to existing scales
Application area	Industrial weighing, laboratories, logistics, production, service and maintenance
Scale and ADC	
ADC	4-channel, 24-bit sigma-delta ADC Note: The ADC has 4 multiplexed channels. Only one scale is converted at a time.
Filters	Programmable hardware and software filters, up to 4,800 conversions per second
Internal/displayable resolution	up to 22 bits (~4.2 million internal divisions), depending on filtering and update rate
No. of scales	Up to 4 scales. For each scale you can set: • Measurement unit (freely configurable text) • Scale type: multi-division / multi-range (up to 3 ranges per scale) • Free configuration of division and maximum capacity for each range • Zero tracking • Zero at power-on (auto zero on boot) • Digital filter settings • Number of divisions for stability detection • Stability window • Calibration with up to 8 linearization points per scale
No. of load cells	Connect up to 16 analog load cells (350 Ω) Load cell supply 5Vdc ± 5%, max 250 mA Minimum load cell signal per division: 0.023 µV Minimum load cell signal: 1 mV/V (lower sensitivities are supported but maximum resolution might be reduced)
Load cell connection	4-wire connection (without sense lines; REF+ and REF− must be closed with jumpers) 6-wire connection (with sense/reference lines)
Input & output	
Digital inputs	6 x configurable inputs (optocouplers) — 10-24Vdc +/- 5%, min/max current 4/35 mA Digital input scan be configured either as an ON/OFF input with real-time state updates via Bluetooth or Cloud, or as a counter input. Inputs can be used also for scale function such as zero, tare, start/stop dosing etc. In counter mode, inputs support counting frequencies of up to 1,000 Hz. Counter values are reported at a fixed update interval of 5 seconds. The maximum supported counter value is 18.4 billion (2^64 – 1).

	The current input state or counter value can be requested at any time by sending a command. Counters can be freely set or reset. Note: Although any GPIO can be assigned as a counter input, Neutron is limited to four simultaneous active counters due to hardware constraints.	
Digital outputs	6 x fotomosfet optocoupler outputs	5-24Vdc, max current 150 mA
	Digital output can be controlled via command sent via Bluetooth or cloud. Digital outputs can be controlled also via scale depending on the application for instance activated in tolerance, out of tolerance, quick dosing, slow dosing etc.	
Wi-Fi		
Frequency	2.4 GHz Wi-Fi (IEEE 802.11b/g/n) 2412 MHz to 2484 MHz (Channels 1–14).	
Range	up to 50 m indoor and up to 150 m outdoor	
Encryption	Open/none, WPA2/3-PSK, WPA2/3-Enterprise (EAP-TLS, EAP-TTLS)	
Antenna	External with self adhesive tape included; connector IPEX MHF1 (u.FL)	
Bluetooth BLE		
BLE 5.0	Supports Bluetooth to bidirectional serial redirection to UART/RS-232 or RS485 port	
Ethernet (optional – see product list)		
10BaseT/100BaseTX Mb/s	Support Auto Negotiation (Full and half duplex, 10 and 100-based) LED outputs (Full/Half duplex, Link, Speed, Active)	
Network		
DHCP	Yes	
Static IP	Yes	
DNS & mDNS	Yes	
NTP	Yes	
MQTT	MQTT (unencrypted), MQTTS/WSS (encrypted with bundle CA and support for own certificate) Protocol version: 3.1.1, Supports: QoS 0-2, custom URL/IP&port, client ID/credentials, mTLS, TLS	
WebScoket client	WS (unencrypted), WSS (encrypted with bundle CA and support for own certificate); supports also BASIC authorization	
REST	GET/POST with support for HTTP or HTTPS using your own certificate and optional token	
TCP/IP	Client and server	
Supported clouds	Scale Monitor Cloud, Amazon AWS, Microsoft Azure, HiveMQ, EMQX, Mosquitto	
Modbus TCP	Yes, TCP port 502 via Wi-Fi or Ethernet interface	
Serial connection		
UART	Yes	
RS-232	Yes, maximum distance up to 15 m	
RS-485	Yes, with optional address configuration from 0-255; maximum allowed distance: 1200 m with shielded 2 x 24AWG twisted pair with outer braid + aluminum strip	
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps	
Data bits	7 or 8	
Parity	None, even, odd	
Modbus	Yes, RTU with configurable slave ID via RS-232 or RS-485 interface	
OPC UA	Built-in server; unsecured None / Anonymous mode or Basic256Sha256 / SignAndEncrypt with username and password authentication.	
Supply & environment		
Power supply	5~24 Vdc ± 5%	
Connector	Terminal block or male connector for adapter (see product list).	
Temperature range	-10 ~ +40 °C	
Humidity	Max 85% non-condensing	

Dimensions (PCB only)	
CS-NGP-WB	95x70x25 mm (LxWxH); Wi-Fi & Bluetooth
CS-NGP-WBE	95x70x35 mm (LxWxH); Wi-Fi, Bluetooth & Ethernet

Ordering information

CloudScaleLink modules have the following product code structure:

CS	-	NS	GP	-	WB	E
1		2	3		4	5

1) Product family

CS	CloudScale family

2) Model family

NS	Neutron scale

3) Version / application type

GP	General purpose edition for OEM integration. Power supply unit not included.
HV	CloudScale Neutron in vertical housing with integraged power supply unit. Power supply cable length 3 m.
HH	CloudScale Neutron in horizontal housing with integraged power supply unit. Power supply cable length 3 m.
HV5	CloudScale Neutron in vertical housing with integraged power supply unit. Power supply cable length 5 m.
HH5	CloudScale Neutron in horizontal housing with integraged power supply unit. Power supply cable length 5 m.

4) Wi-Fi/Bluetooth Interface

WB	Wi-Fi & Bluetooth

5) Ethernet Interface

E	Ethernet

Example of Neutron NS in housing.

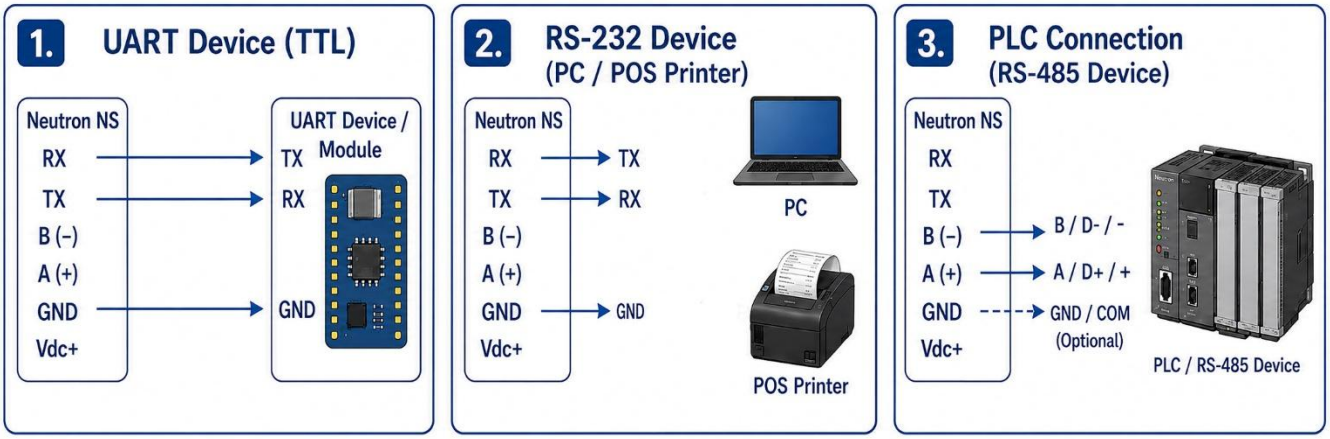
Connection scheme

Neutron NS is equipped with a screw terminal block for power supply and serial communication. It supports typical UART, RS-232 and RS-485 wiring configurations.

UART is mainly intended for direct MCU/PCB integration, RS-232 for connection to PCs, POS printers or label printers, and RS-485 for PLCs and other industrial devices.

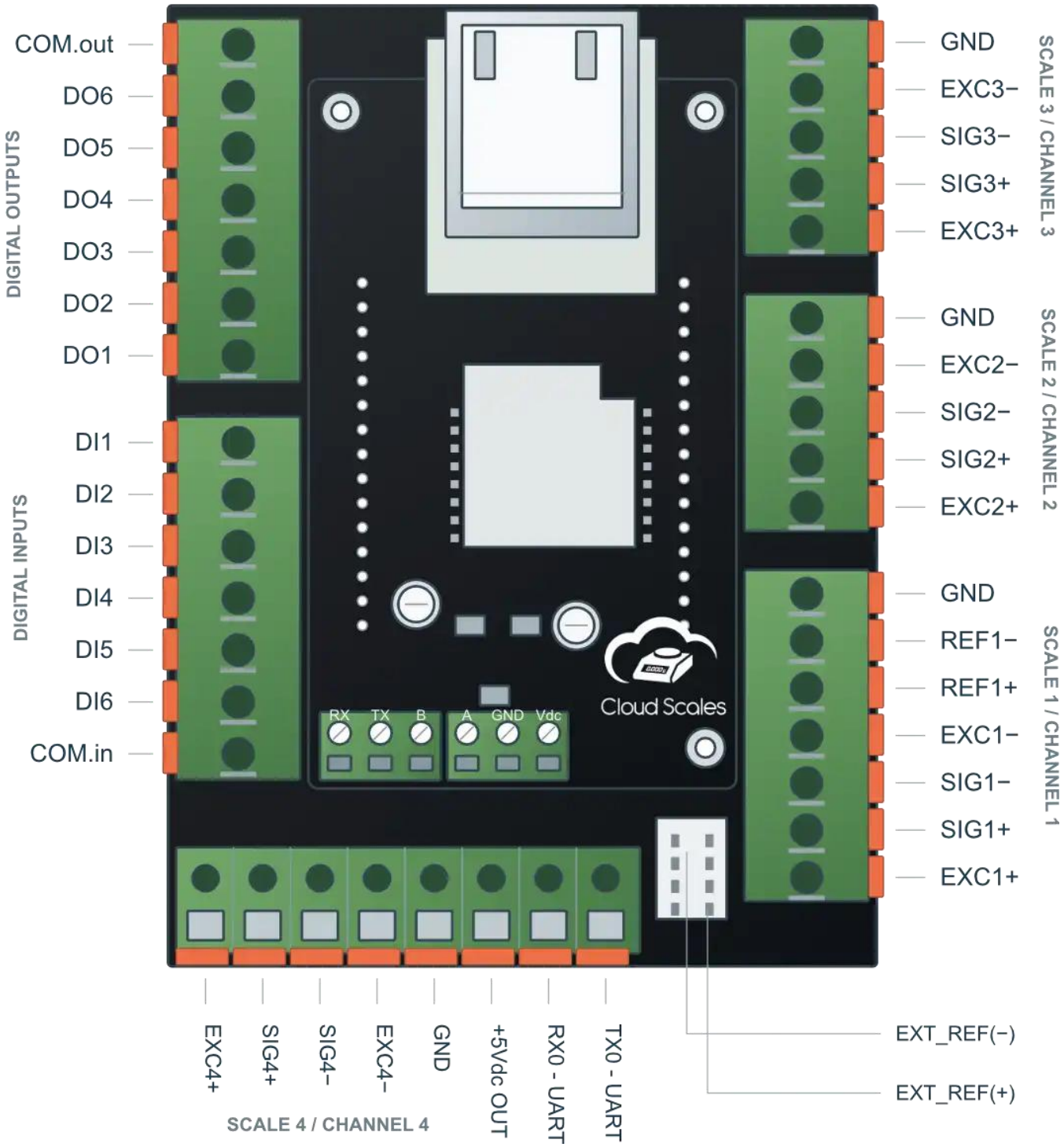
Terminal	Function	Description
RX	Serial receive	Data input to Neutron
TX	Serial transmit	Data output from Neutron
B(-)	RS-485 B / negative line	Differential RS-485 bus line
A(+)	RS-485 A / positive line	Differential RS-485 bus line
GND	Signal ground	Common reference ground
Vdc+	Power input	Positive DC supply input, 5-24Vdc

Typical wiring examples for UART, RS-232 and RS-485 devices:

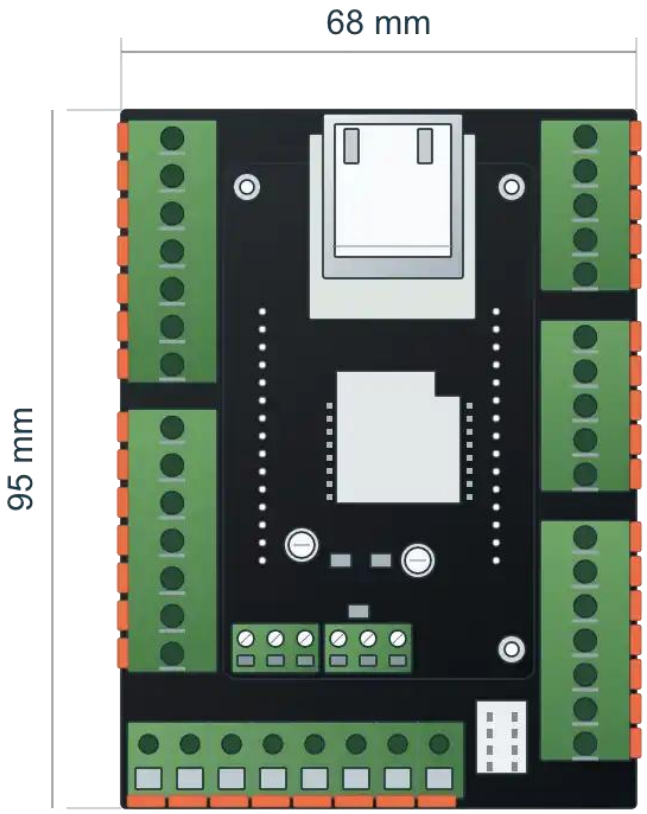


Please see manual for complete connection instructions.

TERMINAL OVERVIEW



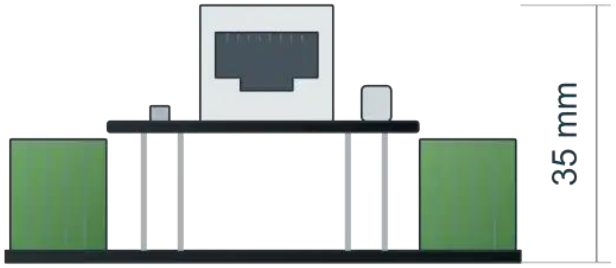
Dimensions



TOP VIEW

CS-NS-WBE

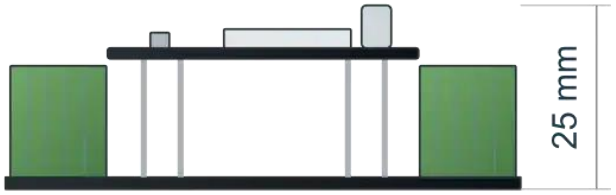
Ethernet / Wi-Fi / BLE



FRONT VIEW

CS-NS-WB

Wi-Fi / BLE — without Ethernet



FRONT VIEW