Shenzhen Definition Electric Co., Ltd

Strain-Gauge High-Precision Weighing Module

Milligram-Resolution Digital Weigh Cell with RS485 Dual-Channel Modbus RTU



ABSTRACT

A high-precision, strain-gauge based digital weighing module delivering milligram-level readability for lithium battery manufacturing, military, chemical processing, pharmaceutical production, and food processing industries. Features RS485 dual-channel Modbus RTU communication, Class II accuracy, and cast aluminum housing with optional SUS304/SUS316 stainless steel construction.

Product Overview

Engineered for precision in demanding industrial environments.

The **Strain-Gauge High-Precision Weighing Module** is a compact, high-accuracy weigh cell designed for lithium battery manufacturing, military, chemical processing, pharmaceutical production, and food processing industries. It delivers milligram-level readability in a rugged, industrial-grade package.

The module integrates a precision strain-gauge sensor with on-board digital signal conditioning and RS485 dual-channel Modbus RTU communication, enabling seamless integration with PLCs, touch-screen HMIs, and host computer systems.



Overview of the high-precision weighing module with scale pan.

Class II Accuracy Milligram-level resolution with stable, repeatable readings.	**Dual RS485** Two independent Modbus RTU channels for HMI and host.
8–36 V DC Wide input range for industrial buses and battery power.	**Rugged Housing** Cast aluminum standard; SUS304/SUS316 optional.

≤1.5 s	Class II	24 V DC	2×RS485
RESPONSE TIME	ACCURACY CLASS	NOMINAL SUPPLY	MODBUS RTU

Technical Specifications

Capacity ranges, performance, and electrical interfaces.

Available capacity and division combinations

Division	Capacity / Division Pairs
0.001 g	110 g, 210 g, 300 g, 420 g, 510 g, 600 g
0.01 g	300 g, 600 g, 1 200 g, 2 100 g, 3 000 g, 4 100 g, 5 100 g, 6 000 g



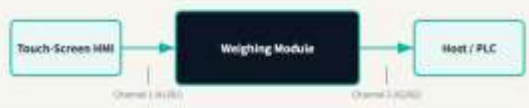
Side elevation with dimensional reference.

Parameter	Specification
Housing material	Cast aluminum (customizable: SUS304 / SUS316 stainless steel)
Accuracy class	Class II
Response time	≤ 1.5 seconds
Communication	RS485 independent dual-channel; Modbus RTU protocol (function codes 01, 03, 05, 06, 16)
Channel 1 (A1/B1)	Fixed: station ID = 1, 115200 baud, 8 data bits, 1 stop bit, no parity — for touch-screen HMI
Channel 2 (A2/B2)	Configurable: station ID, baud rate, parity, and stop bits — for host computer
Data format	Double-word, low word first (CD BA)
Power supply	24 V DC nominal; acceptable range 8–36 V DC
Dimensions — Type 1	220 × 500 × 58 mm (with round scale pan, Ø 548 mm)
Dimensions — Type 2	220 × 100 × 110.5 mm
Scale pan	Type 1: round pan, Ø 548 mm; suitable for 0.1 g / 0.01 g / 0.001 g divisions
Operating environment	Designed for industrial use: lithium battery, military, chemical, pharmaceutical, and food processing applications

Communication Protocol

Two independent RS485 Modbus RTU channels for flexible system integration.

The module features two independent RS485 communication channels, each implemented as a full-duplex Modbus RTU interface. This dual-channel architecture allows simultaneous connection to a local touch-screen HMI and a remote host computer or PLC without conflicts.



Non-Standard Fast Command: Send hex command FF 02. The module begins weight detection. If the weight stabilizes within the timeout (register 4x0610), it returns FF 02 xx xx xx xx (weight value). If stability is not achieved within the timeout, it returns FF 12.



Front view showing the interface connectors.

Channel 1 — Fixed Configuration (A1/B1)

Parameter	Value / Notes
Station ID	1
Baud rate	115 200
Data bits	8
Stop bits	1
Parity	None (N)

Channel 2 — Configurable (A2/B2)

Parameter	Value / Notes
Station ID	Configurable via Modbus register 4x0602
Baud rate	Configurable via register 4x0607
Parity	0 = none, 1 = odd, 2 = even (register 4x0611)
Stop bits	Configurable via register 4x0615

Supported Modbus function codes

Code	Function
01 / 03	Read coil status / Read holding registers
05 / 06	Force single coil / Preset single register
16	Preset multiple registers

All multi-register values use little-endian word ordering (low word first). The complete register map is listed on the next page.

Modbus Register Map

Key registers for data acquisition and configuration.

Register	Type	Description
4x0000	Int32	Current weight (integer, e.g. -123456)
4x0002	UInt16	Decimal places (e.g. 3 → -123.456)
4x0003	UInt16	Weight unit: 0 = g, 1 = kg, 2 = t
4x0004	UInt16	Status: bit 0 = stable, bit 1 = at zero, bit 2 = zero-tracking active, bit 3 = sensor OK
4x0005	UInt16	Command: 1 = calibrate zero, 2 = calibrate span, 3 = re-zero
4x0006	Float32	Current weight (floating-point)
4x0602	UInt16	Station ID (Channel 2, default 1)
4x0607	UInt16	Baud rate (Channel 2, default 1152 → 115 200)
4x0610	UInt16	Maximum detection timeout
4x0611	UInt16	Parity (Channel 2): 0 = none, 1 = odd, 2 = even
4x0615	UInt16	Stop bits (Channel 2, default 1)
4x0100	Float32	Zero-point signal
4x0102	Float32	Calibration weight signal
4x0104	Float32	Calibration weight value
4x0106	UInt16	Filter time (0.01 s units, default 50 → 0.50 s)
4x0108	UInt16	Division: 0=0.001, 1=0.002, 2=0.005, 3=0.01, 4=0.02, 5=0.05, 6=0.1, 7=0.2, 8=0.5, 9=1
4x0110	Float32	Sensor rated capacity
4x0112	Float32	Sensitivity (default 2.0 mV/V; auto-calculated after span calibration)
4x0114	UInt16	Stability window (0.01 s units, default 20 → 0.20 s)
4x0115	UInt16	Stability threshold (in divisions, default 3)
4x0116	UInt16	Zero tracking range (in divisions, default 5; 0 = disabled)
4x0117	UInt16	Zero range (in divisions, default 1)
4x0124	UInt16	Weight unit setting: 0 = g, 1 = kg, 2 = t

All multi-register values use little-endian word ordering (low word first).

Mechanical Dimensions & Power

Two form factors and a wide input supply range.

Type 1 — Round Pan

220 × 500 × 58 mm

Round scale pan Ø 548 mm. Recommended for 0.1 g, 0.01 g, and 0.001 g divisions.

Type 2 — Compact

220 × 100 × 110.5 mm

Compact variant for space-constrained installations and OEM instruments.



Dimension drawing with key measurements.

Power Supply

The module operates from a 24 V DC nominal supply with a wide input range of 8 to 36 V DC, providing flexibility for battery-powered, vehicle-mounted, and industrial power bus applications. The on-board regulation ensures stable performance across the full input voltage range.

Nominal	Min Input	Max Input
24 V DC	8 V DC	36 V DC

Housing & Environmental Options

- **Cast aluminum —** standard, optimal rigidity and thermal conductivity.
- **SUS304 —** general-purpose stainless steel for food and pharmaceutical environments.
- **SUS316 —** molybdenum-alloyed stainless steel for chemical and marine exposure.

Typical Applications

Trusted across industries where precision is non-negotiable.



Lithium battery manufacturing

Precision weighing of electrode materials and electrolyte dispensing.



Military & defense

High-accuracy component and propellant metering.



Chemical processing

Batch formulation and gravimetric dosing with milligram resolution.



Pharmaceutical production

API weighing, capsule filling verification, and quality control.



Food processing

Ingredient portioning and checkweighing on high-speed lines.



Laboratory & analytical

Precision OEM weigh cell for bench-top instruments.

Ready to integrate?

For integration support, custom pinouts, or OEM variants, contact our engineering team.

Definition · www.definitionscale.com

Specifications subject to change without notice. All values are typical unless otherwise specified.