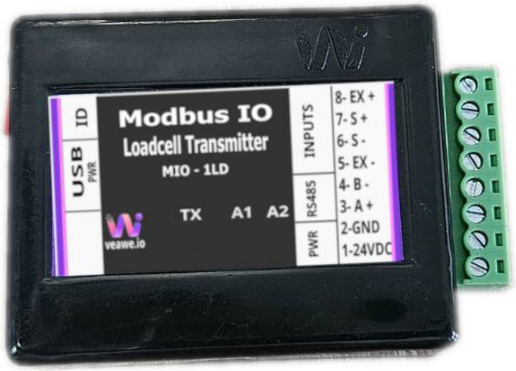
veawe™	Remote IO Module / Modbus transmitter MIO-1LD

Loadcell to Modbus Remote I/O Module

Compact Modbus RTU remote I/O module for loadcell sensor / strain gauge input.



Key Features

- One Load Cell / Strain Gauge input to Modbus RTU
- Two modes of operation – Scale Mode and Force Mode
- 20-bit resolution analog to digital precision conditioner
- Clean analog front-end designed for industrial environments
- Free software based easy configuration
- Integer and IEEE754 float value support
- Modbus RTU over RS-485
- Write to remote device – Master Mode
- DIP switch for address selection from 1 to 15
- Wide Supported baud rates from 300 to 115200
- DIN Rail mount support
- Dimensions: 60mm x 50mm x 20mm (L x W x H)

Supported Modbus Function Codes

- 01 – Read Coils
- 02 – Read Discrete Inputs
- 03 – Read Holding Registers
- 04 – Read Input Registers
- 05 – Write Single Coil
- 06 – Write Single Register
- 15 – Write Multiple Coils
- 16 – Write Multiple Registers

Basic Registers

Analog Input Values

Address	Type	Description
30001	int16	INT 16 bit loadcell scaled value
30021–30022	float	FLOAT loadcell scaled value
30043–30044	int32	Actual raw ADC counts

Weight Measurement

Address	Type	Description
30041–30042	int32	Live Value – Current loadcell scaled value
00731	bit	Tare now
10731	bit	Stable flag

Force Measurement

Address	Type	Description
30041–30042	int32	Live Value – Current loadcell scaled value
30045–30046	int32	Peak Value
30047–30048	uint32	Production count
30051	int16	Peak Time
10733	bit	Peak Captured

ModViz – Modbus Configuration & Visualization Tool

ModViz is a powerful yet simple configuration and visualization tool designed to work seamlessly with **Veawe Modbus I/O modules**. It enables engineers, system integrators, and technicians to quickly configure, monitor, and test field devices through an intuitive graphical interface.

The Software can be downloaded from https://veawe.io/modviz/

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Discrete Inputs (1xxxx)

Stable Flag

Address	Description
10731	Stable Flag becomes 1 when the measured value remains within the configured Stable Window for the configured Stable Time.
10732	-

In **Scale Mode** – This flag indicates the load value is now stable as per the configured condition

Peak Captured

Address	Description
10733	Peak Captured becomes 1 after Peak Threshold is exceeded and the measured value subsequently drops by the configured Peak Drop percentage.

In **Force Mode** – This flag indicates the peak force value is captured and is available as per the configured condition

Analog Input Live Alarm Status

Address	Description
10601	Loadcell alarm active indication

If an loadcell sensor vale is out of the range set in Alarm Configuration:

- Corresponding alarm led is ON.
- Alarm indication status bit is set

Analog Sensor Open Status

Address	Description
10621	loadcell sensor open indication

If an analog sensor device is faulty / open / out of voltage range:

- Corresponding sensor open status bit is set

Analog Input Latched Alarm Status

Address	Description
10641	Loadcell latched alarm status, Auto clears on read

- Latched alarm status stays high even after the alarm is cleared and auto clears only after the master reads this bit

Coils (0xxxx)

Loadcell Tare Now

Address	Description
00731	Tare Now
00732	Clear Tare – Clears the Tare counts

Tare loadcell current value. This bit auto clears

- All scaled loadcell value become zero

Loadcell Peak Reset

Address	Description
00733	Resets the captured peak measurement.

In Force Mode

Resets the captured peak measurement. This command clears:

- Peak Value
- Peak Time
- Time Above Threshold
- Peak Captured Flag

This bit automatically clears after execution.

Counter Reset

Address	Description
00734	Reset Production counter
00601	Reset alarm counters for loadcell

Writing 1 to the coil resets the corresponding Retentive counter value, This bit is self clearing

Input Registers (3xxxx)

Loadcell Live Values

Address	Type	Description
30001	int16	loadcell scaled value
30021–30022	float	loadcell scaled engineering values in float
30041–30042	int32	loadcell scaled engineering values in 32bit integer
30043–30044	int32	loadcell raw adc count values in 32bit integer

Force Measurement Values

Address	Type	Description
30041–30042	int32	Live Value – Current loadcell scaled value
30043–30044	int32	loadcell raw adc count values in 32bit integer
30045–30046	int32	Peak Value – Maximum pressing value
30047–30048	uint32	Production count – Number of successfully completed Peak Capture events.
30051	uint16	Peak Time – Time from Peak Threshold crossing until Peak Value is detected.
30052	uint16	Time Above Threshold – Dwell time under load

Analog Input Alarm Counter Values

Address	Type	Description
30601–30602	int16	Load cell alarm counters

Holding Registers (4xxxx)

Loadcell Operating Mode

Address	Type	Description
40731	int16	0 = Scale, 1 = Force

The loadcell module operates in two modes based on this register

Scale Mode

Measures weight, updates the filtered value, and asserts the Stable Flag when the configured stability conditions are met.

Suitable for slow and accurate measurement

Force Mode

Acquires high-speed samples, detects threshold, peak values and measure time taken

Designed to capture short-duration peak forces accurately.

Loadcell Sample Speed

Address	Type	Description
40732	int16	0 = Slow, 1 = Fast

Applies to both modes

Scale Mode may need to set this to Slow

Force Mode may need to set this to Fast

Loadcell Filter Strength

Address	Type	Description
40733	int16	0 = Off, 1 = Fast 2 = Normal 3 = Stable, 4 = Very Stable 5 = Slow

Applies to both modes. Sets the filter value of the loadcell input.

Suggested as below depending on the application

Scale Mode

Platform scales – Stable / Very Stable

Check weighing – Fast / Normal

Tank weighing – Very stable / Slow

Force Mode

Based on the type of applications like Presses, tension testing, etc Fast or Normal

Stable Window

Address	Type	Description
40734	int16	Maximum allowed variation of the measured weight for stability detection.

Scale Mode

e.g. 5 for ± 5 grams variation

Force Mode

Not applicable

Stable Time

Address	Type	Description
40735	int16	Time the measured weight must remain within the Stable Window before Stable Flag is asserted.

Scale Mode

Stable Time is expressed in units of 10 ms.

Actual Stable Time = Register Value × 10 ms

e.g. - set to 100 for 1 sec

Force Mode

Not applicable

Decimal Point & Unit

Address	Type	Description
40736	int16	Indicated the configured decimal point
40737	int16	Indicated the configured unit

Defined unit values, not used internally. Useful for remote device

ADC Counts	Custom	g	kg	ton	N	kN	kgf	tonf	lbf	oz
0	1	2	3	4	5	6	7	8	9	10

Peak Threshold

Address	Type	Description
40741-42	int32	The minimum value to start the peak measurement

Scale Mode

Not applicable

Force Mode

e.g:- Unit = N Peak Threshold = 500
Capture begins above 500 N

Unit = kg Peak Threshold = 20
Capture begins above 20 kg

Peak Drop

Address	Type	Description
40743	int16	Peak is considered captured when the measured value falls below the recorded peak by the configured percentage.

Scale Mode

Not applicable

Force Mode

e.g 100 for 10.0 % Peak value measurement

Peak Reset Mode

Address	Type	Description
40744	int16	0 = Auto rearm 1 = Hold until reset (Ignore new values until reset)

Scale Mode

Not applicable

Force Mode

Resets all the peak values

Analog Input Calibration

Address	Type	Description
40621–40622	float	Loadcell gain calibration

The calibration register for weight measurement or force measurement
Use a standard and accurate known weight to set the gain

Analog Input Alarm Configuration

Address	Type	Description
40661	int16	AI1 alarm mode
40681	int16	AI1 alarm minimum

Address	Type	Description
40701	int16	AI1 alarm maximum

Alarms works with 16 bit scaled values only

Alarm Modes Values: -

0 = Disabled

1 = Outside minimum or maximum

2 = Maximum only

4 = Inside minimum and maximum window

3 = Minimum only

Communication Settings

Address	Type	Description
40101	int16	Modbus slave address (switch value)
40102	int16	Baud rate selection
40103	int16	Serial format selection
40104	int16	Serial device mode 0 = slave, 1 = master
40105	int16	Remote read/write poll interval e.g 10 = 1 Seconds

Modbus Address (40101) is set using the rotary/dip switches

Baud Rate Register (40102) and Serial Format Register (40103)

40102				40103	
Value	Baud Rate	Value	Baud Rate	Value	Format
0	300	7	9600	0	8N1
1	600	8	14400	1	8E1
2	1200	9	19200	2	8O1
3	1800	10	38400	3	8N2
4	2400	11	57600	4	8E2
5	4800	12	62500	5	8O2
6	7200	13	115200		

Default: 19200 baud

Default: 8N1

Default Mode

Default mode is useful when communication settings are unknown.

When rotary address switch is set to 00:

- Slave Address = 1
- Baud Rate = 19200
- Serial Format = 8N1

Changing to default mode does not overwrite stored settings. Stored settings remain unchanged until written through Modbus.

LED Indications

LED	Description
Power	Module power ON indication
Tx	RS-485 transmit status and active blink
A1	activity status LED1 On when above threshold
A2	activity status LED1 Scale Mode: ON when stable flag Force Mode: ON when peak flag

Electrical Specifications

Parameter	Value
Supply Voltage	9–24V DC or USB 5V
Excitation Voltage	5V DC
Communication Port	RS-485

Connector Terminal Details

DC Input RS485 Analog Inputs V&I

24V+	24V-	A+	B-	EX-	S-	S+	EX+
1	2	3	4	5	6	7	8

Engineering Value and Calibration

The module internally measures loadcell milli volt input as a raw integer value using a 20 bit high precision ADC after an industrial grade analog front end.

Example:

- 0mV = 0
- 20mV = 5,24,287
- -20mV = -5,24,288

Raw values represents ADC counts and not the milli Volt equivalents

Engineering value registers allow the raw loadcell value to be converted into user units such as:

● g ● Kg ● ton ● ton ● N ● kN ● kgf ● tonf

Engineering values are available in float format using IEEE754 registers and integer 32

Formula:

Engineering Value = Net Raw Value × Gain

Where:

- Net Raw Value = measured ADC counts after Tare (Raw ADC Counts − Tare Offset)
- Gain = engineering unit multiplier when the known load is applied

Net Raw Counts = 353000

Gain = 0.0025
Engineering Value = 353000 × 0.0025 = 882.5

(Also Raw ADC Counts = 365420, Tare Offset = 12420)

Loadcell sensor connection diagram

“Note: All images and connection diagrams shown are for illustrative purposes only and may differ from the actual product.”

