



MD61001 - Multifunctional 2-channel strain gauge bridge transducer



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Description

MD61001 - Multifunctional 2-Channel Converter for Strain Gauge Bridges

The Modig MD61001 is a multifunctional measuring module that works with load cells for weight measurement. It features two independent measurement channels that process signals from strain gauge bridges and output them as analog outputs - 0...10 V voltage or 0/4...20 mA current. All operating parameters, as well as measured and calculated weight values, can be read and modified via a USB-C interface emulating a serial port.

Basic features and parameters

- 2 measurement channels adapted for connecting load cells for weight measurement (strain gauge bridges)
- 2 analog outputs - the analog signal at the outputs will be proportional to the signals from the strain gauge bridges (proportional to the load on the load cell). Each output is independently configured and operates in one of 3 modes:
 - 0...10 V voltage mode,
 - 0...20 mA current mode,
 - 4...20 mA current mode.
- USB-C interface operating in CDC mode, emulating a serial port
- Configuration of operating parameters and reading measurement results via the USB interface (including reading results converted into grams)
- Control via simple text commands
- Tare and calibration functions triggered via buttons or the USB interface
- Power supply 24 V/0.1 A

Standard equipment

Code	Description
MD61001	• Assembled and commissioned module • USB cable with USB-A and USB-C plugs

Component layout

Strain sensors and tare/calibration buttons

Measurement sensors - strain gauge bridges should be connected to the connectors marked SENSOR1 and SENSOR2. Each connector has 5 pins:

Connector pin	Description, function
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E+, E- (Excitation +/-)	Bridge power supply. The Modig MD61001 device generates the appropriate power supply for the measurement bridge. Wires are typically red/orange for the positive pole and black/blue/white for the negative pole.
A+, A- (Analog signal +/-)	Analog signal output from the measurement bridge. Wires are typically green for the positive pole and white/black for the negative pole. Proper polarity of the signals connected to the connector must be maintained.
□	Shielding. Connect to the metal body of the load cell and to the shielding of the connecting cable (if the load cell has a shielded cable).

Next to each measurement bridge connector, there is a button marked **ZERO**. Pressing the button activates one of two functions:

1. Zeroing (Taring) - after connecting the measurement bridge, set the measuring sensor to the neutral position, e.g., a load cell equipped with a pan, with no object on the pan. Taring can be performed by pressing the button marked **ZERO**, assigned to the given measurement channel, and holding it for about 2 seconds (until the LED indicating the operating mode - V/C briefly turns off);
1. Calibration - to calibrate the measurement channel and obtain results expressed in grams, you should:
 1. Place a reference weight, e.g., 1000 g, on the measuring sensor pan. The reference value can be set using appropriate commands; by default, it is precisely 1000 g.
 2. . Press the button marked **ZERO**, assigned to the given measurement channel, and hold it for about 5 seconds until the LED indicating the operating mode - V/C turns off a second time - noticeably longer;

Analog outputs and output operating mode indication

The output signals are routed to the OUTPUTS connector:

Connector pin	Description, function
O1	Output of the first measurement channel.
G	Output signal ground.
O2	Output of the second measurement channel.

Each analog output can operate in one of 3 modes:

- mode 1 - 0...10 V voltage output,
- mode 2 - 0...20 mA current output,
- mode 3 - 4...20 mA current output.

LED indicators are placed near the analog output connector, signaling the set operating mode of the given output. The signaling is as follows:

- illumination of the red diode marked **V** indicates operation in voltage output mode - mode 1;
- illumination of the green diode marked **C** indicates operation in current output mode - mode 2 or mode 3 (depending on settings).

Additionally, the device signals the operation of the input reading and value processing process by short, cyclic blinking of an LED that is normally off. If a given output operates in voltage mode, the red diode **V** is lit, and then short flashes of the green diode **C** signal the operation of the process for the given measurement channel. For current mode, the **C** diode is lit and the **V** diode blinks cyclically.

Power supply

The Modig MD61001 device requires a DC power supply of 24 V with a capacity of no less than 100 mA. Power should be connected to the PWR connector:

Connector pin	Description, function
+	Positive pole of 24 V DC power supply.
-	Negative pole of power supply (ground).
	Shielding. Connected to the device enclosure and routed to the measurement bridge connectors. If possible, connect to ground.

Communication connector

The Modig MD61001 device is equipped with a USB-C connector and a USB interface controller implementing the CDC-ACM class. This means that when connected to a host, it is recognized as a virtual COM port (VCP) and allows text-mode communication.

The device can operate when powered from the USB interface, but the analog outputs will not function correctly.

Communication method

Communication with the device involves sending and receiving simple text commands via any serial terminal program.

The command format for reading parameters is as follows: **> GET : 4000 \r \n** where:

- ">" - command starting symbol,
- "GET" - command indicating parameter read,
- ":" - symbol separating the command from the address value,
- "4000" - address value specifying which parameter will be read,
- "\r \n" - combination indicating command termination - hex values 0x0D 0x0A.

The command format for writing parameters is as follows: **> SET : 4000 = 1 \r \n** where:

- ">" - command starting symbol,
- "SET" - command indicating parameter write or task execution,
- ":" - symbol separating the command from the address value,
- "4000" - address value specifying which parameter will be written or which action will be performed,
- "=" - symbol separating the address from the value,
- "\r \n" - combination indicating command termination - hex values 0x0D 0x0A.

For each command, the device will respond by returning the "<" symbol and the same command with the same address. The value will be the current/new value assigned to the given address, e.g.: **< GET : 4207 = 3 \r \n**

Note - there are no space characters in the commands.

Read addresses

The address always starts with the digit **4**. The next digit **x** indicates which measurement channel the command refers to:

- 0 - for write means both channels; for read means only measurement channel no. 1,
- 1 - means measurement channel 1,
- 2 - means measurement channel 2.

Address value (name)	Meaning, description	Command and response example
4x00 (range)	Reads the set measurement range: - 1 - first range - up to 3 kg (default) - 2 - second range - up to 10 kg	>GET:4100 <GET:4100=1
4x01 (raw)	Reads the current value from the ADC measurement converter. The value is after filtering, averaging, and includes taring, but is not converted into weight in grams.	>GET:4201 <GET:4201=1033
4x02 (zero)	Reads the taring value, i.e., the stored value compensating the result, read from the ADC measurement converter with an unloaded sensor.	>GET:4102 <GET:4102=37277
4x03 (counter)	Reads the value specifying the number of measurements making up the result calculation. Default is 18.	>GET:4203 <GET:4203=18
4x04 (weight)	Reads the current result expressed in grams. The result value is rounded to 10 g. If the signal from the strain sensors exceeds the measurement channel range, the result will take a negative sign and its value will not be correct.	>GET:4104 <GET:4104=1990
4x05 (calib_w)	Reads the load value (weight in grams) at which calibration was/will be performed. The value is rounded to 10 g. Default is 1000 g	>GET:4205 <GET:4205=1000
4x06 (calib)	Reads the stored value obtained from the ADC measurement converter, which is the calibration coefficient	>GET:4106 <GET:4106=501251
4x07 (mode)	Reads the output operating mode for the given measurement channel: 1 - 0...10 V voltage output, 2 - 0...20 mA current output, 3 - 4...20 mA current output.	>GET:4207 <GET:4207=3
4x08 (range1)	Reads the set value of the first measurement range, default is 3000 g	>GET:4108 <GET:4108=3000
4x09 (range2)	Reads the set value of the second measurement range, default is 10000 g	>GET:4109 <GET:4109=10000

Write addresses

The address always starts with the digit **4**. The next digit **x** indicates which measurement channel the command refers to:

- 0 - for write means both channels; for read means only measurement channel no. 1,
- 1 - means measurement channel 1,
- 2 - means measurement channel 2.

Address value (name)	Meaning, description	Command and response example
4x00 (range)	Sets the measurement range. Available values: • 1 - first range - up to 3 kg (default) • 2 - second range - up to 10 kg	>SET:4000=1 <SET:4000=1

4x01 (raw)	Read-only	
4x02 (zero)	Performs taring, i.e., sets the value compensating the result. After sending the command, a reading from the measurement converter is taken and the value is stored. Must be performed with an unloaded sensor.	>SET:4102 <SET:4102=37277
4x03 (counter)	Sets the value specifying the number of measurements making up the result calculation. Range 10...64, default 18. A lower value increases reaction speed (obtaining a result from 10 measurements takes approx. 300ms), a higher value improves result accuracy.	>SET:4203=32 <SET:4203=32
4x04 (weight)	Read-only	
4x05 (calib_w)	Saves the load value (weight in grams) at which calibration will be performed. The value is rounded to 10 g. Range 500...10000 g, default 1000 g	>SET:4005=2500 <SET:4005=2500
4x06 (calib)	Performs calibration. Stores the value obtained from the ADC measurement converter and sets it as the value corresponding to the load from address 4x05	>SET:4206 <SET:4206=730040
4x07 (mode)	Sets the output operating mode for the given measurement channel or both channels: 1 - 0...10 V voltage output, 2 - 0...20 mA current output, 3 - 4...20 mA current output.	>SET:4207=1 <SET:4207=1
4x08 (range1)	Sets the value of the first measurement range. Range 1000...15000, default 3000 g	>SET:4108 <SET:4108=3000
4x09 (range2)	Sets the value of the second measurement range. Range 1000...15000 default 10000 g	>SET:4209 <SET:4209=10000

Calibration

Calibration must be performed after each connection of measurement bridges (load cells) to the SENSOR 1/SENSOR 2 connectors. The calibration process consists of 3 stages.

1. Zeroing (Taring) - initially, set the measuring sensor to the neutral position, e.g., a load cell equipped with a pan, with no object on the pan. Taring can be performed in two ways:
 - press the button marked **ZERO**, assigned to the given measurement channel, and hold for about 2 seconds (until the LED indicating the operating mode - V/C briefly turns off);
 - send the command **>SET:4x02** to the device, where **x** is the measurement channel number.
2. Set the load value (weight in grams) at which calibration will be performed. To do this, send the command **>SET:4x05** to the device, where **x** is the measurement channel number. The value is rounded to 10 g. Range 500...10000 g, default is 1000 g.
3. Place a reference weight on the measuring sensor pan equal to the weight set in point 2, e.g., 1000g. Then perform one of the following actions:
 - press the button marked **ZERO**, assigned to the given measurement channel, and hold for about 5 seconds until the LED indicating the operating mode - V/C turns off a second time - noticeably longer;
 - send the command **>SET:4x06** to the device, where **x** is the measurement channel number.

After completing these steps, the calibration is finished, and the parameters will be saved in non-volatile memory within 5 seconds.



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