

# MICROPROCESSOR-BASED WEIGHT METER OF MATERIALS

## MS81046Z

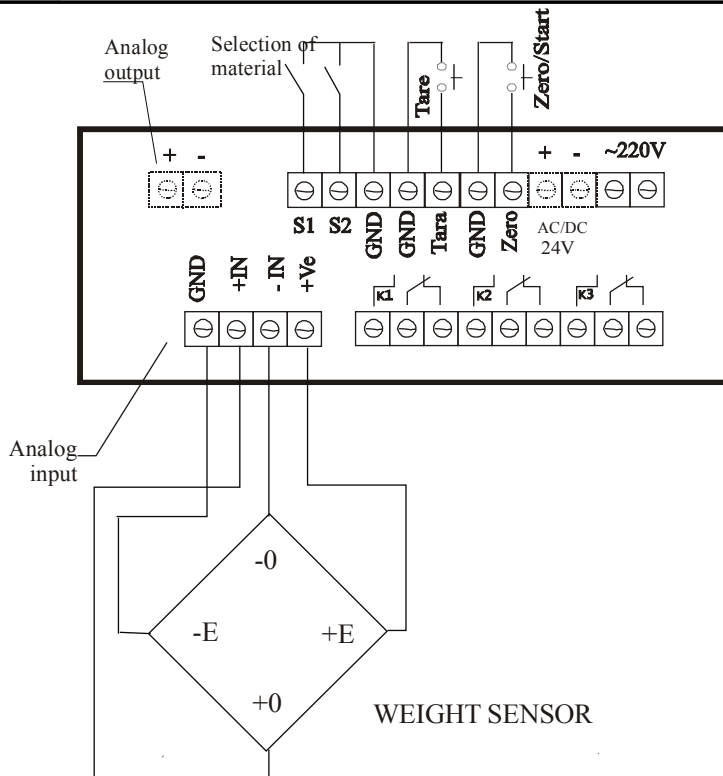
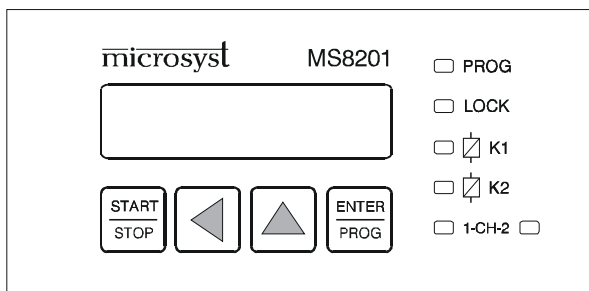


**TECHNICAL DESCRIPTION AND INSTRUCTIONS FOR USAGE**

# I. TECHNICAL DATA

<b>Digital inputs</b>		4
Tare, Zero/Start, Selection of group of parameters – 2 inputs		Active level 0V, for Tare and Zero $t_{min}= 20$ ms
<b>Analog input</b>		1
- from sensor for weight - linear current - linear voltage		0(4) ÷ 20 mA DC 0 ÷ 1(10) V DC
<b>Outputs</b>		4
Digital: K1,K2,K3	Relay 250 V / 5,10 A; OC for TTL or SSR 250 V / 10,20,40 A; Triac 250 V / 2 A;	T of forming of the output – 20 ms
Analog: Transmitting current Transmitting voltage		0(4) ... 20 mA DC 0 ... 1 (10 ) V DC T of forming of the output – 60 ms
<b>Indication and keyboard</b>		
Display		6 digits LED 14 mm
Range of the display		-99999 ÷ 99999
Accuracy		±1 LSB
Format of the display	XXXXX X.XXXX XX.XXX XXX.XX XXXX.X	
Keyboard		Folio
<b>Operating conditions</b>		
Operating temperature		0 ... 50 °C
Operating relative humidity		0 ... 80 % RH
<b>Dimensions</b>		
Overall dimensions (WxHxL)		96 x 48 x 128 mm
Installation		Panel in a hole 90x44 mm
Weight		Max 400 g.
Power supplying voltage		220 V $\pm \frac{10}{15}$ %
Frequency of the power supplying voltage		50 Hz ( $\pm 1$ Hz)
Instance of protection		IP40
<b>Storage</b>		
Storage temperature		-10 ... 70 °C
Storage relative humidity		0 ... 95 % RH

## II. FRONT AND BACK PANEL



### III. OPERATION PRINCIPLE

The controller is used as a part of the control during processes of dosing of materials. On the basis of the weight, measured at the input three digital and one analog output are formed. 4 sets of set-points are available:

- Dose1 / weight of switching to output K1 “dose 1”
- Dose2 / weight of switching to output K2 “dose 2”
- Dose3 / weight of switching of output K3 “dose 3”

The selection of one of four sets at the adjustment of the set-points or in operating mode can be realized by combination of the inputs S1, S2 (p. 3).

The controller indicates the set of parameters, which is selected as a current one in the title of menu “Prog” – Prog 1, 2 and so on.

By the parameter ‘Config’ you can select one of the two possible schemes of operation:

#### MODE A

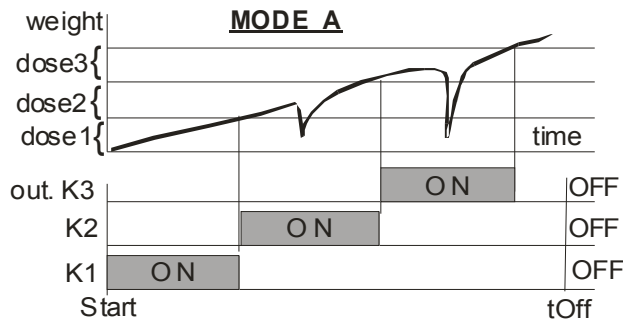
After power supplying the device is waiting for start of input Zero/Start. Active level of this input starts the process. Output K1 is switched on. At reaching of dose1 K1 switches off and K2 switches on. When reaching of dose1+dose2 K2 switches off and K3 switches on. At level dose1+dose2+dose3 output K3 switches off. Next start – at passing from inactive to active level of the input Zero/Start.

The sequence of switching on Start→K1→K2→K3→Stop can not be changed. The controller misses one or more stages, if the weight at start exceeds their set-points.

The whole process is limited by time by the parameter tOff.

Start (parameter ConFiG) with or without tare can be configured.

The unification of the inputs Tare and Zero/Start is possible and taring and start can be done.



The start by active level of input Zero/Start at power supplying must be assessed according to the option ‘taring at start’. If the option is active or inputs Zero/Start and Tare are united, you can use an impulse, not a constant input signal to avoid second taring at loss and second appearing of the power supplying voltage.

There is a button Start/Stop on the front panel, which has operation analogical to input Zero/Start or stops the process, if it has been already started.

Inversion of the outputs is possible (parameter ConFiG).

The parameters dose1, 2 and 3 are set-points for dosing (for example when mixing different components)

#### MODE B:

The parameters dose1, 2 and 3 are levels of switching.

After power supplying normal operating mode activates. 3 digital outputs form.

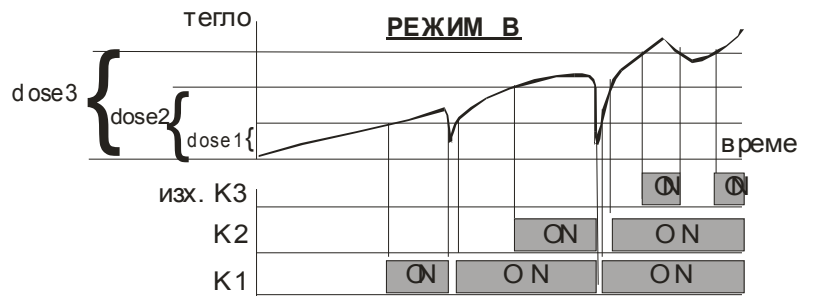
Output K1 switches on at exceeding of weight “dose 1” and switches off at weight less than “dose 1”. Its logic of operation can be inverted by bit 0 of the parameter “ConFiG”.

Output K2 switches on at exceeding of weight “dose 2” and switches off at weight less than “dose 2”. It can be inverted by bit 1 of the parameter “ConFiG”.

Output K3 switches on at weight more than “dose 3” and switches off at weight less than “dose 3”. It can be inverted by bit 2 of the parameter “ConFiG”.

Input Zero/Start has the function ‘reset’ of the tare (indications as after calibration).

In this mode the button Start/Stop on the front panel must not be used.



## IV. INSTRUCTIONS FOR OPERATION

### 1. Screen menus and function of the buttons

Up	Change of the screen menus in the following sequence: <ul style="list-style-type: none"> <li>- Zero – Displaying of the value of tare</li> <li>- Count – Number of dosings</li> <li>- Call – Mode calibration – can be hidden</li> <li>- Prog – Adjustment of the parameters</li> <li>- Measure – Current measured value</li> </ul> <p>If you don't press any button for more than 5 sec., you will pass to the main menu again.</p>
Left	Passing to the main menu – Measure
Start/Stop	Start/Stop in mode A
Enter/Prog	According to the current selected menu this button has the following functions: <ol style="list-style-type: none"> <li>1. Measure – taring of the device.</li> <li>2. Zero – Zeroing of the current tare</li> <li>3. Count – Reset of the counter</li> <li>4. Call – Entering mode of calibration</li> <li>5. Prog – Entering mode of adjustment of parameters</li> </ol> <p>Tare , Zero and Call can be forbidden by the parameter “Config” (crp.8).</p>

### 2. Calibration of the device

Before calibration the device must be tared.

The calibration can be done as it follows:

1. Put a standard weight.
2. Weight for stabilization of the indication on the display.
3. Enter mode “Calibration”.
4. By the pointers you can correct the displayed value according to the standard weight.
5. Press the button “Enter/Prog” for confirmation.

You will exit mode “CALIBRATION” also automatically 10 sec. after pressing of a button, and the changed value is saved.

3. The device can be tared by input ‘Tare’ any time excluding the procedure of calibration, during adjustment of parameters and during filling for mode A. It is valid also for input ‘Zero/Start’ – zeroing of the tare/start of filling. In mode B, for the taring there is an additional condition – first pass through тарирането 'Zero' (indications as after calibration). This condition can be reset by bit 5 in ConFiG. During taring the measuring of the weight starts 1 s. after activation of the input and continues 1 s. If this weight is more than tArEH<sub>i</sub> (% of HiL-t) the operation becomes invalid and “tArEEr” appears flashing. If the device has been switched on in case the button Enter/Prog has been pressed (activation of system parameters), the taring is made without condition and at weight > tArEH<sub>i</sub> till switching off of the power supply (the message “tArEEr” appears).

### 4. Mode “ADJUSTMENT OF PARAMETERS”

The adjustment of the parameters – mode “Prog”. The change of the parameters is realized by the buttons “Left” and “Up”. The current digit for change appears with symbol – flashing point, and by the button “UP” you can change the value, and by the button “Left” you can change the position of the flashing point. If the change of the digit is permitted, it changes, if the flashing point is on the leftist digit.

“doSE1”	Dose 1 / weight of switching of output K1. Dimension and decimal point according to the maximum measured weight and resolution of the sensor. In mode A it is a dose, and in mode B – level. All features are valid for the next two set-points.
“doSE 2”	Weight of switching of output K2.
“doSE 3”	Weight of switching of output K3.

After adjustment of “doSE 3”, “End” appears. If you press a button different from “Enter/Prog”, you will pass to second adjustment of the set-points. By pressing of “Enter/Prog” you can exit the mode of adjustment.

## 5. LEDs

The controller has four LEDs - **K1**, **K2**, **LOCK** and **PROG**. The LEDs **K1**, **K2** and **LOCK** are emitting light when the respective outputs K1, K2 and K3 are switched on. The LED **PROG** is emitting light in mode of programming of the parameters of the controller.

## 6. Messages about errors

A) “**ErrorA**” – error at measuring. It is necessary to check the connection of the measuring weight sensor with the device. The parameter ErLevL determines the limit for switching on of this message.

B) “**ErrorU**” – The weight of the tare plus some of the operating set-points exceed the weight that the device can measure.

C) “**tArEEr**” – the weight of the tare > tArEHi (% of HiL-t)

## V. OTHER POSSIBILITIES OF THE CONTROLLER

The controller realizes automatic reading of the number of switchings of output K3, saving them in non-volatile memory. The counter increases with 1 when the measured weight exceeds the parameter **doSE 3**. After reaching of 1000000 the counter is reset and continuous operating. In the main menu there is a possibility for reset of the counter (see 'Instructions for operation' p.1)

## VI. SYSTEM PARAMETERS OF THE CONTROLLER, ACCESSIBLE AT PRESSED BUTTON Enter/Prog AT POWER SUPPLYING TILL APPEARING OF “Tune”.

“ <b>A1</b> ”	Multiplying coefficient for linearization of the sensor. (It is calculated automatically in mode of calibration) Dimension - $\pm 99999$ ( $1024^{\text{th}}$ )
“ <b>Point</b> ”	Position of the decimal point. Possible values: 128, 64, 32, 16 and 0 for 0.0000, 00.000, 000.00, 000.0 and 00000
“ <b>Hi L-t</b> ”	Maximum value of the set-points in mode B or of their sum in mode A. It determines the limits at their change. 0 .. 99999
<b>tArAHi</b>	Maximum weight of tare (% of Hi L-t). At attempt for taring over this limit message TarEEr appears till correct taring and <b>start in mode A is not accepted</b> . 0 .. 100
“ <b>Filt D</b> ”	Coefficient of the filter of the display. Dimension - 0 .. 1.00
“ <b>Filt J</b> ”	Jump of clearing of the filter of the display. Dimension - 0 .. 99999
“ <b>ConFiG</b> ”	Configuration word. <i>For adjustment see below</i> . Dimension: 0 .. 127
“ <b>Flt Ar</b> ”*	Average filter of the measured weight. Dimension: 1 .. 5
“ <b>Flt EP</b> ”**	Exponential filter of the measured weight. Dimension: 1 .. 5
“ <b>Flt J</b> ”	Zone of operation of the filter in percents of the range. Dimension: 0.1 .. 100.0
“ <b>Flt t</b> ”	Time for accepting of value out of the zone <b>Flt J</b> Dimension: 0.00 .. 2.00 sec.
<b>Hi nEt</b>	Weight, corresponding to the higher limit of the range of the analog output. $A_{out} = (AP1 \cdot \frac{W}{Hi\ nEt} + AP0) \cdot 16$ {W – current indication, Aout – value of the input of DAC} Dimension: 0 .. 99999
<b>AP1</b>	Multiplying coefficient of the analog output. Dimension: -99999 .. 99999
<b>AP0</b>	Coefficient “offset” at the forming of A out Dimension: -99999 .. 99999
<b>ErLevL</b>	Limit of the message ErrorA – error when measuring At measurement less than this value message <b>ErrorA</b> appears. Dimension: 0 .. 200 x 32 (ADC units)
<b>tOff</b>	In mode A – time for emergency stopping of the dosing. It is being read from the switching on of the first output. This option can be cancelled by entering of 0. 0..65535 x 2s

\* The values of the parameter correspond to the following average sums:

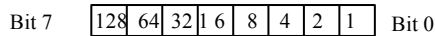
1 – single measurement

2 – 2 consecutive measurements

- 3 – 4 consecutive measurements
- 4 – 8 consecutive measurements
- 5 – 16 consecutive measurements

\*\* When the value is bigger, the filter is heavier. The noise is suppressed, there is a delay.

Adjustment of the configuration word:



Bit 0 – inversion of output K1

Example for mode B:

Bit 0	measured weight < doSE 1	measured weight ≥ doSE 1
0	K1 is switched off	K1 is switched on
1	K1 is switched on	K1 is switched off

**Bit 1** – inversion of output K2 (analogically to K1)

**Bit 2** - inversion of output K3 (analogically to K1)

**Bit 3** – Menu for calibration “Call”

0 – Allowed, 1 –Forbidden

**Bit 4** – Taring by the buttons on the front panel.

0 – Allowed, 1 – Forbidden

**Bit 5** – Reset of the tare by the buttons on the front panel

0 – Allowed, 1 – Forbidden

Bits 4 and 5 do not operate on the inputs ‘Tara’ and ‘Zero’

**Bit 6** – mode A

0 – Start without taring

1 - taring at start

mode B

0 – taring is possible only after reset

1 - taring does depend on the reset

**Bit7** - 0– РЕЖИМ А 1- РЕЖИМ В

*Each bit in the configuration word has a weight value, shown above. The sum of the weight values is saved in the configuration word.*

*Example: – K1, K2 and K3 without inversion; Menu “Call” – forbidden; allowed - Tara and Zero by the keyboard, taring independent on the reset; MODE B*

$$“ConFiG” = 128 + 64 + 0 + 0 + 8 + 0 + 0 + 0 = 200$$

**The change of these values must be done with great attention. After activation of the access, it is possible till switching off of the power supply (at activation of menu for adjustment of the parameters dose 1,2,3). When entering menu for adjustment of system parameters, the outputs are in inactive status (it depends on bits 0, 1 and 2 of the parameter CONFIG. At saved 0 – output off, at 1 – output on).**

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