Programmable Counter

EZM-4931 96 x 48 DIN 1/8
Incremental Encoder Input Programmable Counter

- 6 digits Process (PV) and 6 digits Set (SV) Value Display
- Operation with 2 Set Value
- Reset, Pause and ChA-ChB Counting Inputs
- Operation with Automatic and Manual Reset
- NPN/PNP input Types
- x1 / x2 / x4 Phase Shifting Property
- Multiplication Coefficient, Division Coefficient and Point Position
- Parametric, Two point (Low Scale - High Scale) and Multiplication - Division Coefficient Reading Adjustment
- RS-232 Serial Communication with Modbus RTU Protocol
- Input Frequency Max. 200kHz
- Max. Input Frequency Selection
ABOUT INSTRUCTION MANUAL

Instruction manual of EZM-4931 Programmable Counter consists of two main sections. Explanation of these sections are below. Also, there are other sections which include order information and technical specifications of the device. All titles and page numbers in instruction manual are in "CONTENTS" section. User can reach to any title with section number.

Installation:

In this section, physical dimensions of the device, panel mounting, electrical wiring, module mounting in the device, physical and electrical installation of the device to the system are explained.

Operation and Parameters:

In this section, user interface of the device, how to access to the parameters, description of parameters are explained.

Also in these sections, there are warnings to prevent serious injury while doing the physical and electrical mounting or using the device.

Explanation of the symbols which are used in these sections are given below.

⚠️ This symbol is used for safety warnings. User must pay attention to these warnings.

⚡ This symbol is used to determine the dangerous situations as a result of an electric shock. User must pay attention to these warnings definitely.

ℹ️ This symbol is used to determine the important notes about functions and usage of the device.
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EU DECLARATION OF CONFORMITY

Manufacturer’s Name : EMKO ELEKTRONIK A.S.
Manufacturer’s Address : DOSAB, Karanfil Sk., No:6, 16369 Bursa, TURKEY

The manufacturer hereby declares that the product:

- **Product Name** : Programmable Counter
- **Type Number** : EZM-4931
- **Product Category** : Electrical equipment for measurement, control and laboratory use

Conforms to the following directives:

- 2006 / 95 / EC The Low Voltage Directive

has been designed and manufactured to the following specifications:

- EN 61000-6-4:2007 EMC Generic Emission Standard for Industrial Environments
- EN 61000-6-2:2005 EMC Generic Immunity Standard for Industrial Environments
- EN 61010-1:2001 Safety Requirements for electrical equipment for measurement, control and laboratory use

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**When and Where Issued**

06th December 2010

**Authorized Signature**

Name : Serpil YAKIN

Position : Quality Manager
1. Preface

EZM Series Programmable Counter can be used in package machines, production and quality control rollers, in cutting and processing machine of glass, plastic, marble, sheet, iron, fabric all measuring and controlling of dimension, count, total count, speed, cycle, productivity, time and can be adapted easily to all mechanical construction and automation system. They can be used in many application with their control outputs, serial communication unit and output modules.

Some application fields which they are used are below:

**Application Fields**
- Measuring Dimension and Control Automation,
- In Cutting and Processing machine of glass, plastic, marble, sheet, iron and fabric
- Package machines,
- Quality Control rollers,
- Filling Systems,
- Tool Benches,

1.1 General Specifications

<table>
<thead>
<tr>
<th>Standard</th>
<th>EZM-4931</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply Voltage Input</strong></td>
<td><strong>Control Output (Relay or SSR)</strong></td>
</tr>
<tr>
<td><strong>Counting Inputs (Ch A, Ch B)</strong></td>
<td><strong>Serial Communication</strong></td>
</tr>
<tr>
<td><strong>Reset and Pause Inputs</strong></td>
<td><strong>Optional</strong></td>
</tr>
<tr>
<td><strong>Optional Output-1</strong></td>
<td><strong>Optional Output-2</strong></td>
</tr>
</tbody>
</table>

- **Standart**
  - 230 V ~ 50/60Hz
- **Optional Supply Input**
  - 115 V ~ 50/60Hz, 24 V ~ 50/60Hz
- **Incremental Encoder**
- **Switch**
  - Proximity Sensor (NPN, PNP)
  - Optik Sensor (NPN, PNP)
- **Optional Serial Communication**
  - RS-232
  - Modbus - RTU
  - Protocol
  - 4800 - 38400 Baud Rate
1.2 Ordering Information

All order information of EZM-4931 Programmable Counter are given on the table at left. User may form appropriate device configuration from information and codes that at the table and convert it to the ordering codes.

Firstly, supply voltage then output modules and other specifications must be determined. Please fill the order code blanks according to your needs.

Please contact us, if your needs are out of the standards.

<table>
<thead>
<tr>
<th>A</th>
<th>Supply Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>24V ~ (-15%;+10%), 50/60Hz</td>
</tr>
<tr>
<td>4</td>
<td>115 V ~ (-15%;+10%), 50/60 Hz</td>
</tr>
<tr>
<td>5</td>
<td>230 V ~ (-15%;+10%), 50/60 Hz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D</th>
<th>Serial Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>RS-232</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E</th>
<th>Output-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>None</td>
</tr>
<tr>
<td>01</td>
<td>Relay Output ( 5A@250V~ Resistive Load )</td>
</tr>
<tr>
<td>02</td>
<td>SSR Driver Output (Maximum 14mA, 10V )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FG</th>
<th>Output-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>None</td>
</tr>
<tr>
<td>01</td>
<td>Relay Output ( 5A@250V~ Resistive Load )</td>
</tr>
<tr>
<td>02</td>
<td>SSR Driver Output (Maximum 14mA, 10V )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>U</th>
<th>Encoder Supply Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12V ~</td>
</tr>
<tr>
<td>1</td>
<td>5V ~</td>
</tr>
</tbody>
</table>

Symbol means Vac, ~ Symbol means Vdc, ≃ Symbol means Vac and Vdc

1.3 Warranty

EMKO Elektronik warrants that the equipment delivered is free from defects in material and workmanship. This warranty is provided for a period of two years. The warranty period starts from the delivery date. This warranty is in force if duty and responsibilities which are determined in warranty document and instruction manual performs by the customer completely.

1.4 Maintenance

Repairs should only be performed by trained and specialized personnel. Cut power to the device before accessing internal parts.

Do not clean the case with hydrocarbon-based solvents (Petrol, Trichlorethylene etc.). Use of these solvents can reduce the mechanical reliability of the device. Use a cloth dampened in ethyl alcohol or water to clean the external plastic case.
Before beginning installation of this product, please read the instruction manual and warnings below carefully.

In package,
- One piece unit
- Two pieces mounting clamps
- One piece instruction manual

A visual inspection of this product for possible damage occurred during shipment is recommended before installation. It is your responsibility to ensure that qualified mechanical and electrical technicians install this product.

If there is danger of serious accident resulting from a failure or defect in this unit, power off the system and separate the electrical connection of the device from the system.

The unit is normally supplied without a power switch or a fuse. Use power switch and fuse as required.

Be sure to use the rated power supply voltage to protect the unit against damage and to prevent failure.

Keep the power off until all of the wiring is completed so that electric shock and trouble with the unit can be prevented.

Never attempt to disassemble, modify or repair this unit. Tampering with the unit may result in malfunction, electric shock or fire.

Do not use the unit in combustible or explosive gaseous atmospheres.

During the equipment is putted in hole on the metal panel while mechanical installation some metal burrs can cause injury on hands, you must be careful.

Montage of the product on a system must be done with its fixing clamps. Do not do the montage of the device with inappropriate fixing clamp. Be sure that device will not fall while doing the montage.

It is your responsibility if this equipment is used in a manner not specified in this instruction manual.
2.1 General Description

Mounting Clamp

Panel surface
(maximum thickness 15 mm / 0.59 inch)

Product Label

Front Panel
IP65 protection
NEMA 4X

2.2 Dimensions

Maksimum 15mm / 0.59 inch

Counter EZM-4931

96mm / 3.78 inch

10.5 ± 1 mm / 0.41 inch 76 mm / 2.99 inch
2.3 Panel Cut-Out

129 mm / 5.08 inch (min)

46 mm / 1.81 inch (min)

92mm / 3.62 inch

65 mm / 2.56 inch (min)
2.4 Environmental Ratings

Operating Conditions

- **Operating Temperature**: 0 to 50 °C
- **Max. Operating Humidity**: 90% Rh (non-condensing)
- **Altitude**: Up to 2000m.

Forbidden Conditions:
- Corrosive atmosphere
- Explosive atmosphere
- Home applications (The unit is only for industrial applications)

2.5 Panel Mounting

1. Before mounting the device in your panel, make sure that the cut-out is the right size.

2. Check front panel gasket position.

3. Insert the device through the cut-out. If the mounting clamps are on the unit, put out them before inserting the unit to the panel.

During installation into a metal panel, care should be taken to avoid injury from metal burrs which might be present. The equipment can loosen from vibration and become dislodged if installation parts are not properly tightened. These precautions for the safety of the person who does the panel mounting.
2.6 Installation Fixing Clamp

Montage of the unit to a system must be done with its own fixing clamps. Do not do the montage of the device with inappropriate fixing clamps. Be sure that device will not fall while doing the montage.

The unit is designed for panel mounting.

1-Insert the unit in the panel cut-out from the front side.

2- Insert the mounting clamps to the holes that located top and bottom sides of device and screw up the fixing screws until the unit completely immobile within the panel.

2.7 Removing from the Panel

Before starting to remove the unit from panel, power off the unit and the related system.

1-Loosen the screws.

2- Pull mounting clamps from top and bottom fixing sockets.

3- Pull the unit through the front side of the panel.
3. Electrical Wirings

You must ensure that the device is correctly configured for your application. Incorrect configuration could result in damage to the process being controlled, and/or personal injury. It is your responsibility, as the installer, to ensure that the configuration is correct. Parameters of the device has factory default values. These parameters must be set according to the system’s needs.

Only qualified personnel and technicians should work on this equipment. This equipment contains internal circuits with voltage dangerous to human life. There is severe danger for human life in the case of unauthorized intervention.

Be sure to use the rated power supply voltage to protect the unit against damage and to prevent failure.

Keep the power off until all of the wiring is completed so that electric shock and trouble with the unit can be prevented.

3.1 Terminal Layout and Connection Instructions
Electrical wiring of the device must be the same as ‘Electrical Wiring Diagram’ below to prevent damage to the process being controlled and personnel injury.

NOTE-1: Sensor supply voltage:
If Power Supply is 230V~ or 115V~, then Sensor supply voltage is 5V〜±05% or 12V〜(-%30;+%10), 50 mA maximum short circuit protection.
If Power Supply is 24V〜, then Sensor supply voltage is (12V〜 or 5V〜)±05%, 50 mA maximum short circuit protection.
3.3 View of Device Label

Device Label for 230V ∼ Supply Voltage Input and Relay Outputs

Device Label for 24V ∼ Supply Voltage Input and Relay Outputs
3.4 Connection of Device Supply Voltage Input

Connection of Universal Supply Voltage Input

![Connection Diagram]

**Note-1:**
There is internal 33 RΩ fusible flameproof resistor in 115V ～ 50/60 Hz and 230V ～ 50/60 Hz
There is internal 4R7 Ω fusible flameproof resistor in 24V ～ (-%15;+%10) 50/60Hz

**Note-2:** External fuse is recommended

Make sure that the power supply voltage is the same indicated on the instrument.

Switch on the power supply only after that all the electrical connections have been completed.

Supply voltage range must be determined in order. While installing the unit, supply voltage range must be controlled and appropriate supply voltage must be applied to the unit. Controlling prevents damages in unit and system and possible accidents as a result of incorrect supply voltage.

There is no power supply switch on the device. So a power supply switch must be added to the supply voltage input. In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrument. Power supply switch shall be easily accessible by the user.

Power switch must be two poled for separating phase and neutral. On/Off condition of power switch is very important in electrical connection. On/Off condition of power switch must be signed for preventing the wrong connection.

If an external fuse is used, it must be on phase connection in ～ supply input.
3.5 Counting Input Connection

3.5.1 Incremental Encoder & Switch Connection

NOTE-1: Reset and Pause inputs have protection time against electrical contact debounce. Protection time can be set with [Pro-03] parameter (2 - 50 msec.).
3.6 Galvanic Isolation Test Values of EZM-4931 Programmable Counter

2000V ~ (for EZM-4931.1... and EZM-4931.2...)

- Supply Voltage Input
- 2000V ~ Relay-1 Output
- 2000V ~ Relay-2 Output
- 2000V ~ Optional SSR Driver-1
- 2000V ~ Optional SSR Driver-2
- 2000V ~ RS-232 Serial Communication
- 2000V ~ 12V or 5V Sensor Supply Voltage
- 2000V ~ Digital Inputs
- 0 V
3.7 Output Connections

3.7.1 Relay-1 Output Connection

Fuses must be selected according to the applications.

3.7.2 SSR Driver-1 Output Connection

Fuses must be selected according to the applications.
3.7.3 Relay-2 Output Connection

Fuses must be selected according to the applications.

3.7.4 SSR Driver-2 Output Connection

Fuses must be selected according to the applications.
4. Definition of Front Panel and Accessing to the Set Parameters

4.1 Definition of Front Panel

NOTE-1: Adjusting the device, while the Two Point Reading Adjustment mode ($P_{ro-10} = 00000$), lower adjustment value $P_{ro-13}$ and Upper adjustment value $P_{ro-14}$ can be negative. For example; While most significant digit (6th digit) of lower adjustment value is changed from 0 to 9 with increment button, after 9, “-” character is shown. If when “-” character is on the most significant digit (6th digit) of Lower adjustment value and Enter button is pressed, adjustment value becomes negative.
When power is applied to the device, software revision number of the controller is momentarily illuminated on actual value display. Then operation screen is observed.

When power on, view of the screen is shown below:

![Screen View](image)

Software Revision

Operation Screen is shown

⚠️ If there is an unexpected situation while opening the device, power off the device and inform a qualified personnel.
4.3 Adjustment of SET Value

Changing SET1 value.

When shift button is pressed, 6th digit of SET1 value starts to flash.

Press SET1 button to exit without saving Set value.

When shift button is pressed, 5th digit of SET1 value starts to flash.

When shift button is pressed, 4th digit of SET1 value starts to flash.

Increase the flashing value with increment button.

Save the value as SET1 value by pressing Enter button.

If Pro-07 Reset and Set Protection parameter is 000002, 000003 or 000004 then SET1 value can not be changed. For details, refer to parameters section.
4.4 Resetting the Count Value

When RESET button is pressed, Actual Value becomes the Reset-Offset Value.

If \( \text{Pro-07} \) Reset and Set Protection parameter is 00001 or 00003 then Count Value can not be reset. For details, refer to parameters section.

RESET operation can be realized by Reset button or applying signal to the RESET input. These two operations are named MANUAL RESET in parameters section.

At the end of MANUAL RESET operation, Count Value becomes Reset Offset Value \( \text{Pro-09} \).
4.5 Accessing to the Program Parameters

In this section Accessing to the Program parameters process is shown. For details on parameters refer to **PROGRAM PARAMETERS** section.

**Operation Screen**

![Operation Screen]

When PROG button is pressed for 3 seconds, password screen will be display.

**Password Screen**

![Password Screen]

Enter password with shift and increment buttons.

The most significant digit of the parameter (4th digit for this parameter) flashes.

**Password Screen**

![Password Screen]

Press Enter button to confirm password.

**Input Types and Functions**

You can change the parameter with **INCREMENT** button, save it to the memory and pass to the next parameter with **ENTER** button.

Press PROG button to exit from programming section without doing any changes.

Press **ENTER** button
Max. Input Frequency

You can change the parameter with INCREMENT button, save it to the memory and pass to the next parameter with ENTER button.

Press ENTER button.

Adjustment Type Selection

You can change the parameter with INCREMENT button, save it to the memory and pass to the next parameter with ENTER button.

Press ENTER button.

Encoder Type

If \( \text{Pro-10} \) is 000000;
Parametric Reading Adjustment

Min. Value for dual point adjustment value

If \( \text{Pro-10} \) is 000001;
Two Point Reading Adjustment

Multiplication Coefficient

If \( \text{Pro-10} \) is 000002;
Multiplication - Division Coefficient Reading Adjustment

Press PROG button to exit from programming section without doing any changes.

Press PROG button to exit from programming section without doing any changes.

You can change the parameter with INCREMENT button, save it to the memory and pass to the next parameter with ENTER button.

Press ENTER button.

Press ENTER button.

Pitch

Max. Value for dual point adjustment value

Division Coefficient
Output Functions

You can change the parameter with INCREMENT button, save it to the memory and pass to the next parameter with ENTER button.

Press ENTER button.

Return to Factory Settings

You can change the parameter with INCREMENT button, save it to the memory and pass to the next parameter with ENTER button.

Press ENTER button.

Program Password

User can change the parameter with INCREMENT button, save it to the memory and pass to the next parameter with ENTER button.

Continue to press ENTER button for scanning all parameters.

Operation Screen

Press PROG button to exit from programming section without doing any changes.

When password screen is shown if ENTER button is pressed without entering the password, this Parameter can not be observed.

The most significant digit of the parameter (4th digit for this parameter) flashes.

Input Types and Functions

Press PROG button to exit from programming section without doing any changes.

Press ENTER button.

Press PROG button to exit from programming section without doing any changes.
5. Program Parameters

Input Types and Functions.
( Default = 2 ) MODBUS ADDRESS:40001.

**x1 Phase Shifting** (for incremental encoders)
Upcount on rising edge of Ch-A input when Ch-B is at 0
Downcount on rising edge of Ch-A input when Ch-B is at 1

Encoder is travelling in the Reverse Direction
Encoder is travelling in the Forward Direction

**x2 Phase Shifting** (for incremental encoders)
Upcount on rising edge of Ch-A when Ch-B is at 0
Downcount on rising edge of Ch-A when Ch-B is at 1
Upcount on falling edge of Ch-A when Ch-B is at 1
Downcount on falling edge of Ch-A when Ch-B is at 0
**x4 Phase Shifting** (for incremental encoders)

- Upcount on rising edge of Ch-A when Ch-B is at 0
- Downcount on falling edge of Ch-A when Ch-B is at 0
- Downcount on rising edge of Ch-A when Ch-B is at 1
- Upcount on falling edge of Ch-A when Ch-B is at 1

- Downcount on rising edge of Ch-B when Ch-A is at 0
- Upcount on falling edge of Ch-B when Ch-A is at 0
- Upcount on rising edge of Ch-B when Ch-A is at 1
- Downcount on falling edge of Ch-B when Ch-A is at 1

---

**Encoder is travelling in the Reverse Direction**

**Encoder is travelling in the Forward Direction**

---

**Pro-02**

*Max. Input Frequency*

(Default = 0) MODBUS ADDRESS: 40002.

- 100kHz < *Input Frequency* < 200kHz
- 50kHz < *Input Frequency* < 100kHz
- 25kHz < *Input Frequency* < 50kHz
- 12kHz < *Input Frequency* < 25kHz
- 0kHz < *Input Frequency* < 12kHz
**Pro-03**  
**Filter time for Reset and Pause Input**  
(Default = 50) MODBUS ADDRESS:40003.  
It is used to protect against the electrical contact debounce or the signal that is less than the determined pulse time. It can be adjusted from [000002] to [000050] milisecond.

**Pro-04**  
**Counting Direction**  
(Default = 0) MODBUS ADDRESS:40004.  
- [000000] Upcount (0 ⇒ Preset).
- [000001] Downcount (Preset ⇒ 0).

**Pro-05**  
**Sensor Type Selection**  
(Default = 0) MODBUS ADDRESS:40005.  
- [000000] NPN type sensor selected
- [000001] PNP type sensor selected

**Pro-06**  
**Point Position for Display**  
(Default = 0) MODBUS ADDRESS:40006.  
- [000000] No point
- [000001] Between first and second digits
- [000002] Between second and third digits
- [000003] Between third and fourth digits
- [000004] Between fourth and fifth digits
**Pro-07**  
**Reset and Set protection (For accessing from front panel)**  
*(Default = 0) MODBUS ADDRESS: 40007.*

- **000000**  
  There is no Reset and Set protection.
- **000001**  
  Only RESET button protection is active. Actual value cannot be reset by Reset button. Actual value can be reset only when reset input is active.
- **000002**  
  SET1 and SET2 cannot be changed.
- **000003**  
  Full protection; Reset protection is active, also SET1 and SET2 cannot be changed.
- **000004**  
  SET1 cannot be changed.
- **000005**  
  SET2 cannot be changed.

**Pro-08**  
**Reset Input Change**  
*(Default = 0) MODBUS ADDRESS: 40008.*

- **000000**  
  Reset on rising edge of Reset input.
- **000001**  
  Reset on falling edge of Reset input.

**Pro-09**  
**Reset Offset**  
*(Default = 0) MODBUS ADDRESS: LOW WORD = 40009, HIGH WORD = 40010.*

It can be adjusted from **000000** to **999999**.
For details, refer to the section where output functions **Pro-17** are defined.

**Pro-10**  
**Reading Adjustment Type Selection**  
*(Default = 0) MODBUS ADDRESS: 40011.*

- **000000**  
  Parametric (one point) Reading Adjustment  
  Encoder Type and Pitch value must be entered
- **000001**  
  Two Point Reading Adjustment  
  Min. Value for dual point adjustment value and Max. Value for dual point adjustment value must be entered.
- **000002**  
  Multiplication - Division Coefficient Reading Adjustment  
  Multiplication and Division Coefficient value must be entered.
Encoder Type
( Default = 1000 ) MODBUS ADDRESS:40012.

NOTE-1

Number of pulse of Encoder is used pulse.
It can be adjusted from [ ] to [ ] pulse/rnd.

Pitch
( Default = 1000 ) MODBUS ADDRESS:40013.

NOTE-1

Encoder’s amount of progress on an round.
It can be adjusted from [ ] to [ ] mm/rnd.

Min. Value for dual point adjustment value
( Default = 0 ) MODBUS ADDRESS: LOW WORD = 40014,HIGH WORD = 40015.

NOTE-2

Encoder, manually brought to the lower point after that low point value is entered for two point reading adjustment. It can be adjusted from [ ] to [ ] .

Max. Value for dual point adjustment value
( Default = 1000 ) MODBUS ADDRESS: LOW WORD = 40016,HIGH WORD = 40017.

NOTE-2

Encoder, manually brought to the upper point after that high point value is entered for two point reading adjustment. It can be adjusted from [ ] to [ ] .

Multiplication Coefficient
( Default=01.0000)MODBUS ADDRESS: LOW WORD=40018,HIGH WORD= 40019.

NOTE-3

It can be adjusted from [ ] to [ ] . Changes in this parameter is evaluated when counting starts.
If this value is [ ] Multiplication is not performed.

Division Coefficient
( Default=01.0000)MODBUS ADDRESS: LOW WORD=40020,HIGH WORD= 40021.

NOTE-3

It can be adjusted from [ ] to [ ] . Changes in this parameter is evaluated when counting starts.
If this value is [ ] Division is not performed.

NOTE - 1 : Reading Adjustment Type Selection parameter Pro - 10 is [ ] , then these parameters can be accessed.

NOTE - 2 : Reading Adjustment Type Selection parameter Pro - 10 is [ ] , then these parameters can be accessed.

NOTE - 3 : Reading Adjustment Type Selection parameter Pro - 10 is [ ] , then these parameters can be accessed.
Device continues to count till manual reset is applied. When Manual Reset happens, count value becomes Reset Offset value. Outputs are not active in this parameter.

**Counting direction : 0 $\Rightarrow$ P (Upcount)**

Device continues to count till manual reset is applied. When Manual Reset happens, count value becomes Reset Offset value. Outputs are not active in this parameter.

**Counting direction : P $\Rightarrow$ 0 (Downcounting)**

Device continues to count till manual reset is applied. When Manual Reset happens, count value becomes Reset Offset value. Outputs are not active in this parameter.
Manual Reset-1.
Device continues to count till manual reset is applied.
(Output PulseTime $P_{o-21}$ is not considered)

Counting direction: 0 $\Rightarrow$ P (Upcount)

When count value reaches to SET1 value, Output-1 becomes active. If Output-1 pulse time $P_{o-20}$ is $000000$, Output-1 does not change condition until manual reset input is active. If Output-1 pulse time $P_{o-20}$ is not 0, at the end of the pulse time Output-1 becomes inactive.

When count value reaches to SET2 value, Output-2 becomes active.
Counting continues over SET2 value. When Manual Reset happens, count value becomes Reset Offset value.
Output-2 pulse time $P_{o-21}$ is not considered.

Counting direction: P $\Rightarrow$ 0 (Downcounting)

When the count value reaches to SET1 value, Output-1 becomes active. If Output-1 Pulse Time $P_{o-20}$ is $000000$, Output-1 does not change condition until manual reset input is active. If Output-1 pulse time $P_{o-20}$ is not 0, Output-1 becomes inactive at the end of the pulse time. When actual value reaches to $000000$, Output-2 becomes active. Counting continues under $000000$. When Manual Reset happens, count value becomes Reset Offset value.
Output-2 pulse time $P_{o-21}$ is not considered.
(Output-2 Pulse Time \( \text{Pro-21} \) is not considered)

Counting direction : 0 \( \Rightarrow \) P (Upcount)  

When the count value reaches to SET1 value, Output-1 becomes active. If Output-1 pulse time \( \text{Pro-20} \) is \( \text{000000} \), Output-1 does not change position until manual reset input is active. If Output-1 pulse time \( \text{Pro-20} \) is not 0, Output-1 becomes inactive at the end of the pulse time.

When the count value reaches to SET2 value, Output-2 becomes active. Counting does not continue over SET2 value. For starting to count manual reset input must be active. When Manual Reset happens, count value becomes Reset Offset value.

Output-2 Pulse Time \( \text{Pro-21} \) is not considered.

Counting direction : P \( \Rightarrow \) 0 (Downcounting)  

When the count value reaches to SET1 value, Output-1 becomes active. If Output-1 pulse time \( \text{Pro-20} \) is \( \text{000000} \), Output-1 does not change condition until manual reset input is active. If Output-1 pulse time \( \text{Pro-20} \) is not 0, Output-1 becomes inactive at the end of the pulse time.

When the count value reaches to \( \text{000000} \) value, Output-2 becomes active. Counting does not continue under \( \text{000000} \). For starting to count manual reset input must be active. When Manual Reset happens, count value becomes Reset Offset value.

Output-2 pulse time \( \text{Pro-21} \) is not considered.
Counting direction : 0 → P (Upcount)  

When the count value reaches to SET1 value, Output-1 becomes active. If Output-1 Pulse Time $P_{0-20}$ is not 0, Output-1 changes position at the end of the pulse time. If Output-1 Pulse Time $P_{0-20}$ is 0, it changes position until Manual Reset input is active or according to Output-2.

When the count value reaches to SET2 value, Output-2 becomes active. Counting continues until manual reset input is active. If Output-2 Pulse Time $P_{0-21}$ is not 0, Output-2 changes position at the end of the pulse time. If Output-1 is active, it becomes inactive with Output-2. When Manual Reset happens, count value becomes Reset Offset value.

Counting direction : P → 0 (Downcount)  

When the count value reaches to SET1 value, Output-1 becomes active. If Output-1 Pulse Time $P_{0-20}$ is not 0, Output-1 changes position at the end of the pulse time. If Output-1 Pulse Time $P_{0-20}$ is 0, it changes position until Manual Reset input is active or according to Output-2.

When the count value reaches to SET2 value, Output-2 becomes active. Counting continues until manual reset input is active. If Output-2 Pulse Time $P_{0-21}$ is not 0, Output-2 changes position at the end of the pulse time. In this case, if Output-1 is active, it becomes inactive with Output-2. When Manual Reset happens, count value becomes Reset Offset value.
When the count value reaches to SET1 value, Output-1 becomes active. If Output-1 pulse time \( \text{Pro-20} \) is not 0, Output-1 changes position at the end of the pulse time. If Output-1 Pulse Time \( \text{Pro-20} \) is 0, it changes position until Manual Reset input is active or according to Output-2. When count value reaches to \( \text{Pro-20} \) value, Output-2 becomes active. Counting continues until manual reset input is active. If Output-2 Pulse time \( \text{Pro-21} \) is not 0, Output-2 changes position at the end of the pulse time. In this case, if Output-1 is active, it becomes inactive with Output-2. When Manual Reset happens, count value becomes Reset Offset value.

**Manual Reset-4.**

Counting continues until Manual Reset input is active. Pulse times \( \text{Pro-20} \) and \( \text{Pro-21} \) is not considered.

### Counting direction : 0 → P (Upcount)

\[ \text{Pro-04} = \text{000000} \]

When the count value reaches to SET1 value, Output-1 becomes active. Output-1 does not change position until manual reset input is active. Output-1 pulse time \( \text{Pro-20} \) is not considered.

When the count value reaches to SET2 value, Output-2 becomes active. Counting continues until manual reset input is active. If Output-2 Pulse time \( \text{Pro-21} \) is not 0, Output-2 changes position at the end of the pulse time. In this case, if Output-1 is active, it becomes inactive with Output-2. When Manual Reset happens, count value becomes Reset Offset value.

### Counting direction : P → 0 (Downcount)

\[ \text{Pro-04} = \text{000000} \]

When the count value reaches to SET1 value, Output-1 becomes active. Output-1 does not change position until manual reset input is active. Output-1 pulse time \( \text{Pro-20} \) is not considered.

When the count value reaches to SET2 value, Output-2 becomes active. Output-2 does not change position until manual reset input is active. Output-2 pulse time \( \text{Pro-21} \) is not considered. When Manual Reset happens, count value becomes Reset Offset value.
When the count value reaches to SET1 value, Output-1 becomes active. Output-1 does not change position until manual reset input is active. Output-1 pulse time $[P_{a-o-20}]$ is not considered.

When the count value reaches to SET2 value, Output-2 becomes active. Output-2 does not change position until manual reset input is active. Output-2 pulse time $[P_{a-o-21}]$ is not considered.

When Manual Reset happens, count value becomes Reset Offset value.

Manual Reset-5.
Counting continues until Manual Reset input is active. Pulse times $[P_{a-o-20}]$ and $[P_{a-o-21}]$ is not considered.

**Counting direction : 0 → P (Upcount)**

When the count value reaches to SET1 value, Output-1 becomes active. Output-1 does not change position until manual reset input is active or Count value becomes equal to Reset Offset value. Output-1 pulse time $[P_{a-o-20}]$ is not considered.

When the count value reaches to SET2 value, Output-2 becomes active. Output-2 does not change condition until manual reset input is active or Count value becomes equal to Reset Offset value. Output-1 pulse time $[P_{a-o-21}]$ is not considered.

**Counting direction : P → 0 (Downcount)**
When the count value reaches to SET1 value, Output-1 becomes active. Output-1 does not change, condition until manual reset input is active or Count value becomes equal to Reset Offset value. Output-1 pulse time $[\text{Pro}-2]$ is not considered.
When the count value reaches to SET2 value, Output-2 becomes active. Output-2 does not change, condition until manual reset input is active or Count value becomes equal to Reset Offset value. Output-1 pulse time $[\text{Pro}-2]$ is not considered.

**Manual Reset-6.**
Counting continues until Manual Reset input is active. (Output-2 Pulse Time $[\text{Pro}-2]$ is not considered)

**Counting direction : $0 \Rightarrow P$ (Upcount) $[\text{Pro}-4]$**

When count value reaches to SET1 value, Output-1 becomes active. If Output-1 pulse time $[\text{Pro}-2]$ is not considered, Output-1 does not change condition until manual reset input is active. If Output-1 pulse time $[\text{Pro}-2]$ is not 0, at the end of the pulse time Output-1 becomes inactive.
When count value reaches to SET2 value, Output-2 becomes active. Output-2 does not change, condition until manual reset input is active or Count value becomes equal to Reset Offset value. Output-2 pulse time $[\text{Pro}-2]$ is not considered.

**Counting direction : $P \Rightarrow 0$ (Downcount) $[\text{Pro}-4]$**
When count value reaches to SET1 value, Output-1 becomes active. If Output-1 pulse time $P_{0-20}$ is 0, Output-1 does not change condition until manual reset input is active. If Output-1 pulse time $P_{0-20}$ is not 0, at the end of the pulse time Output-1 becomes inactive.

When count value reaches to SET2 value, Output-2 becomes active. Output-2 does not change condition until manual reset input is active or Count value becomes equal to Reset Offset value.

Output-2 pulse time $P_{0-21}$ is not considered.

**Counting direction : $0 \Rightarrow P$ (Upcount)***

When count value reaches to SET1 value, Output-1 becomes active. If Output-1 pulse time $P_{0-20}$ is 0, Output-1 does not change condition until manual reset input is active. If Output-1 pulse time $P_{0-20}$ is not 0, at the end of the pulse time Output-1 becomes inactive.

When count value reaches to SET2 value, Output-2 becomes active. If Output-2 pulse time $P_{0-21}$ is 0, Output-2 does not change condition until manual reset input is active. If Output-2 pulse time $P_{0-21}$ is not 0, at the end of the pulse time Output-2 becomes inactive.

**Counting direction : $P \Rightarrow 0$ (Downcount)***
When the count value reaches to SET1 value, Output-1 becomes active. If Output-1 pulse time $P_{o-20}$ is not 0, Output-1 does not change condition until manual reset input is active. If Output-1 pulse time $P_{o-20}$ is not 0, at the end of the pulse time Output-1 becomes inactive.

When count value reaches to SET2 value, Output-2 becomes active. If Output-2 pulse time $P_{o-21}$ is not 0, Output-2 does not change condition until manual reset input is active. If Output-2 pulse time $P_{o-21}$ is not 0, at the end of the pulse time Output-2 becomes inactive.

Automatic Reset-1.

Counting direction: 0 $\rightarrow$ P (Upcount)

When the count value reaches to SET1 value, Output-1 becomes active. If Output-1 pulse time $P_{o-20}$ is not 0, Output-1 changes position at the end of the pulse time. If Output-1 Pulse Time $P_{o-20}$ is not 0, it changes position until Manual Reset input is active or according to Output-2 position.

When the count value reaches to SET2 value, Output-2 becomes active. Count value is reset. If Output-2 pulse time $P_{o-21}$ is not 0, Output-2 changes position at the end of the pulse time. In this case, if Output-1 is active, it becomes inactive with Output-2.
Counting Direction: $P \Rightarrow 0$ (Downcount)

When the count value reaches to SET1 value, Output-1 becomes active. If Output-1 pulse time $P_{O-20}$ is not 0, Output-1 changes position at the end of the pulse time. If Output-1 Pulse Time $P_{O-20}$ is 0000000, it changes position until Manual Reset input is active or according to Output-2 position.

When the count value reaches to 000000 value, Output-2 becomes active. Count value becomes equal to Set-2 value and counting is started again. If Output-2 pulse time $P_{O-21}$ is not 0, Output-2 changes position at the end of the pulse time. In this case, if Output-1 is active, it becomes inactive with Output-2.
When the count value reaches to SET1, Output-1 becomes active. If Output-1 pulse time is not 0, Output-1 changes position at the end of the pulse time. If Output-1 Pulse Time is , it changes position until Manual Reset input is active or according to Output-2 position.

When the count value reaches to SET2, Output-2 becomes active. Counting is stopped. If Output-2 pulse time is not 0, count value is reset and Output-2 becomes inactive at the end of the pulse time. In this case, if Output-1 is active, it becomes inactive with Output-2.
When the count value reaches to SET1, Output-1 becomes active. If Output-1 pulse time is not 0, Output-1 changes position at the end of the pulse time. If Output-1 Pulse Time is , it changes position until Manual Reset input is active or according to Output-2 position.

When the count value reaches to value, Output-2 becomes active. Counting is stopped. If Output-2 pulse time is not 0, count value becomes equal to SET2 value, counting is started again and Output-2 becomes inactive. In this case, if Output-1 is active, it becomes inactive with Output-2.
When the count value reaches to SET1, Output-1 becomes active. If Output-1 pulse time \( P \) is not 0, Output-1 changes position at the end of the pulse time. If Output-1 Pulse Time \( P \) is not 0, it changes position until Manual Reset input is active or according to Output-2 position.

When the count value reaches to SET2, Output-2 becomes active and count value is reset. But SET2 value is observed in actual value display. If Output-2 pulse time \( P \) is not 0, count value is observed in actual value display and Output-2 becomes inactive. In this case, if Output-1 is active, it becomes inactive with Output-2.
When the count value reaches to \( \text{SET1} \), \( \text{Output-1} \) becomes active. If \( \text{Output-1} \) pulse time \( P_{\text{O-1}} \) is not 0, \( \text{Output-1} \) changes position at the end of the pulse time. If \( P_{\text{O-1}} \) is \( 0 \), it changes position until Manual Reset input is active or according to \( \text{Output-2} \) position.

When the count value reaches to \( \text{SET2} \) value, \( \text{Output-2} \) becomes active, count value becomes equal to \( \text{SET2} \) and counting continues. But \( \text{Output-2} \) becomes inactive at the end of the pulse time. In this case, if \( \text{Output-1} \) is active, it becomes inactive with \( \text{Output-2} \).
When the count value reaches to SET1, Output-1 becomes active. If Output-1 pulse time $\text{Pr}-20$ is not 0, Output-1 changes position at the end of the pulse time. If Output-1 Pulse Time $\text{Pr}-20$ is 0, it changes position until Manual Reset input is active or according to Output-2 position.

When the count value reaches to SET2, Output-2 becomes active and counting continues over 0. If Output-2 pulse time $\text{Pr}-21$ is not 0, count value is reset and Output-2 becomes inactive at the end of the pulse time. In this case, if Output-1 is active, it becomes inactive with Output-2.
When the count value reaches to SET1, Output-1 becomes active. If Output-1 pulse time \( \text{Pro-20} \) is not 0, Output-1 changes position at the end of the pulse time. If Output-1 Pulse Time \( \text{Pro-20} \) is \( 000000 \), it changes position until Manual Reset input is active or according to Output-2 position.

When count value reaches to \( 000000 \) value, Output-2 becomes active and counting continues under 0. If Output-2 pulse \( \text{Pro-21} \) time is not 0, count value becomes equal to SET2 and Output-2 becomes inactive. In this case, if Output-1 is active, it becomes inactive with Output-2.
Automatic Reset-5.
Pulse times $[Pro\_20]$ and $[Pro\_21]$ is not considered.

**Counting direction : 0 $\Rightarrow$ P (Upcount)**

If count value is equal or greater than SET1 value, then Output-1 becomes active. Output-1 pulse time $[Pro\_20]$ is not considered.
If count value is equal or greater than SET2 value, then Output-2 becomes active. If count value is less than SET2 value, Output-2 becomes inactive. Output-2 pulse time $[Pro\_21]$ is not considered.

**Counting direction : P $\Rightarrow$ 0 (Downcount)**

If count value is equal or less than SET1 value, then Output-1 becomes active. If it is greater than SET1 value, Output-1 becomes inactive. Output-1 pulse time $[Pro\_20]$ is not considered.
If count value is equal or less than OUTPUT value, then Output-2 becomes active. If count value is greater than OUTPUT value, then Output-2 becomes inactive. Output-2 pulse time $[Pro\_21]$ is not considered.
Output-1 Operation Form  
( Default = 0 )  MODBUS ADDRESS:40023.

- 000000: Output-1 Normally non-energised.
- 000001: Output-1 Normally energised.

Output-2 Operation Form  
( Default = 0 )  MODBUS ADDRESS:40024.

- 000000: Output-2 Normally non-energised.
- 000001: Output-2 Normally energised.

Output-1 Pulse Time  
( Default = 0000.00 )  MODBUS ADDRESS:40025.
It determines how long Output-1 will be active.
It can be adjusted from 000000 to 999999 seconds.
If it is 000000 second, then it operates indefinitely.
For details, refer to the section where output functions Pro-17 are defined.

Output-2 Pulse Time  
( Default = 0000.00 )  MODBUS ADDRESS:40026.
It determines how long Output-2 will be active.
It can be adjusted from 000000 to 999999 seconds.
If it is 000000 second, then it operates indefinitely.
For details, refer to the section where output functions Pro-17 are defined.

Max Set Value  
( Default=999999)MODBUS ADDRESS: LOW WORD=40027,HIGH WORD= 40028.
Maximum value for Set Values.
It can be adjusted from 000000 to 999999.

Min Set Value  
( Default=000000)MODBUS ADDRESS: LOW WORD=40029,HIGH WORD= 40030.
Minimum value for Set Values.
It can be adjusted from 000000 to 999999.

Display Type Selection  
( Default = 0 )  MODBUS ADDRESS:40031.

- 000000: Display value is incremental encoder counter value.
- 000001: Display value is calculated value.
Count value is saved to memory when power is disconnected and restored on power up.

Count value is not saved to memory when power is disconnected. When power up [ ] is shown on the screen.

Slave Address
(Default = 1) MODBUS ADDRESS:40033.

Device address for serial communication bus. It can be adjusted from [ ] to [ ] .

Communication Parity Selection
(Default = 0) MODBUS ADDRESS:40034.

No parity.
Odd Parity.
Even Parity.

Baud Rate
(Default = 1) MODBUS ADDRESS:40035.

4800 Baud Rate.
9600 Baud Rate.
19200 Baud Rate.
38400 Baud Rate.

Communication Stop Bit selection
(Default = 0) MODBUS ADDRESS:40036.

1 Stop Bit.
2 Stop Bits.
Return to Factory Settings
(Default = 0) MODBUS ADDRESS: 40037.

Restore all settings to factory default. This parameter has a special password.

Program Password
(Default = 0) MODBUS ADDRESS: 40038.

It is used for accessing to the program parameters. It can be adjusted from 00000 to 99999. If it is 00000, there is no password protection while accessing to the parameters.

When programming button is pressed, Pro will appear on the display.

If program password is not “0” while accessing to the program parameters:
1- If user does not enter the value correctly; operation screen will appear without entering to operator parameters.

2- When Pro in top display and in bottom display, if user presses ENTER button without entering password (for observing the parameters):
   User can see all parameters except Program Password but device does not allow to do any changes with parameters.
   (Please refer to Section 7. Failure Messages in EZM-4931 Programmable Counter (1))

6. Read Input Register Command

Input registers can not be changed by the user. Input registers can be only read.

<table>
<thead>
<tr>
<th>Adres</th>
<th>Parameter Name</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>30001</td>
<td>Preset Active Value Signed</td>
<td>0 – Positive / 1 – Negative</td>
</tr>
<tr>
<td>30002</td>
<td>Preset Active Value High</td>
<td>0 - 1</td>
</tr>
<tr>
<td>30003</td>
<td>Preset Active Value Low</td>
<td>0 - 65535</td>
</tr>
<tr>
<td>30004</td>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>30005</td>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>30006</td>
<td>NPN / PNP Status</td>
<td>0 – NPN / 1 – PNP</td>
</tr>
<tr>
<td>30007</td>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>30008</td>
<td>Out1 Status</td>
<td>0 – Passive / 1 – Active</td>
</tr>
<tr>
<td>30009</td>
<td>Out2 Status</td>
<td>0 – Passive / 1 – Active</td>
</tr>
<tr>
<td>30010</td>
<td>SSR1 Status</td>
<td>0 – Passive / 1 – Active</td>
</tr>
<tr>
<td>30011</td>
<td>SSR2 Status</td>
<td>0 – Passive / 1 – Active</td>
</tr>
<tr>
<td>30012</td>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>30013</td>
<td>Count Active Value High</td>
<td>0 - 1</td>
</tr>
<tr>
<td>30014</td>
<td>Count Active Value Low</td>
<td>0 - 65535</td>
</tr>
<tr>
<td>30015</td>
<td>Device Type &amp; Revision</td>
<td>0 - 65535</td>
</tr>
<tr>
<td>30016</td>
<td>Display Decimal Point</td>
<td>0 - 4</td>
</tr>
<tr>
<td>30017</td>
<td>Set Point-1 Value High</td>
<td>0 - 1</td>
</tr>
<tr>
<td>30018</td>
<td>Set Point-1 Value Low</td>
<td>0 - 65535</td>
</tr>
<tr>
<td>30019</td>
<td>Set Point-2 Value High</td>
<td>0 - 1</td>
</tr>
<tr>
<td>30020</td>
<td>Set Point-2 Value Low</td>
<td>0 - 65535</td>
</tr>
</tbody>
</table>
1-If the password is not [Pro-PS], user can access to the parameters without entering the password and by pressing ENTER button. User can see all parameters except for programming password parameter [Pro-PS] but user can not do any changes in parameters. If password is entered for accessing to the parameters correctly, most significant digit of the parameter flashes. But if the password is not entered, flashing of the most significant digit is not realised.

2-If Actual Value is flashing; It appears if any of the count value is greater than the maximum count value. To remove this warning and reset the count value press RESET button.

3-If Actual Value is flashing and counting is stopped; It appears if any of the count value is lower than the minimum count value. To remove this warning and reset the count value press RESET button.
8. Specifications

Device Type: Programmable Counter.

Housing & Mounting: 96mm x 48mm x 86.5mm 1/8 DIN 43700 plastic housing. For panel mounting. Panel cut-out is 92x46mm.

Protection Class: NEMA 4X (IP65 at front, IP20 at rear).

Weight: Approximately 0.29 Kg.

Environmental Ratings: Standard, indoor at an altitude of less than 2000 meters with none condensing humidity.

Storage / Operating Temperature: -40 °C to +85 °C / 0 °C to +50 °C.

Storage / Operating Humidity: 90 % max. (None condensing).

Installation: Fixed installation.

Over Voltage Category: II.

Pollution Degree: II. Office or workplace, none conductive pollution.

Operating Conditions: Continuous.

Supply Voltage and Power:

- 230 V (~) (-%15 / +%10) 50/60 Hz. 6VA.
- 115 V (~) (-%15 / +%10) 50/60 Hz. 6VA.
- 24 V (~) (-%15 / +%10) 50/60 Hz. 6VA.
- 24 V (=) (-%15 / +%10) 6W.

Electrical Characteristics:

Of Digital Inputs:
- Rated voltage: 16 V @ 5mA.
- Maximum continuous permissible voltage: 30 V.
- Logic 1 minimum level: 3 V.
- Logic 0 maximum level: 2 V.

Maximum Input Frequency:

- If \( P_{\text{ros}} = 0 \): 200 kHz.
- If \( P_{\text{ros}} = 1 \): 100 kHz.
- If \( P_{\text{ros}} = 2 \): 50 kHz.
- If \( P_{\text{ros}} = 3 \): 25 kHz.
- If \( P_{\text{ros}} = 4 \): 12 kHz.

Output Types:

- Relay Output on Resistive Load 5A@250V (~).
- 100,000 operation (Full Load).
- SSR Driver Output.
  (Maximum 14mA, Maximum 10V (= ).)

Optional Communication Type: RS-232 Communication.

Communication Protocol: MODBUS RTU.

Process Display: 13 mm Red 6 digit LED display.

Set Display: 8 mm Green 6 digit LED display.

Led Indicators:
- SV1 (Set1 value), SV2 (Set2 value), O1 / 2 (Control Output ) LEDs.

Approvals: GOST-R, CE.
9. Other Informations

Manufacturer Information:
Emko Elektronik Sanayi ve Ticaret A.Ş.
Demirtaş Organize Sanayi Bölgesi Karanfil Sk. No:6 16369
BURSA/TURKEY

Phone : +90 224 261 1900
Fax  : +90 224 261 1912

Repair and Maintenance Service Information:
Emko Elektronik Sanayi ve Ticaret A.Ş.
Demirtaş Organize Sanayi Bölgesi Karanfil Sk. No:6 16369
BURSA/TURKEY
Phone : +90 224 261 1900
Fax  : +90 224 261 1912

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