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User manual
for electronic preset counter

SLN-44

- Firmware version: from **v.1.00**
- Type of input: **contact / OC** or **voltage**
- Power supply: **12-24V DC** or **100-240V AC**

CE

Read the user's manual carefully before starting to use the unit or software.
Please keep this manual for future reference.
Producer reserves the right to implement changes without prior notice.

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Explanation of symbols used in the manual:

- This symbol denotes especially important guidelines concerning the installation and operation of the device. Not complying with the guidelines denoted by this symbol may cause an accident, damage or equipment destruction.

IF THE DEVICE IS NOT USED ACCORDING TO THE MANUAL THE USER IS RESPONSIBLE FOR POSSIBLE DAMAGES.

- This symbol denotes especially important characteristics of the unit. Read any information regarding this symbol carefully

1. BASIC REQUIREMENTS AND USER SAFETY

- **The manufacturer is not responsible for any damages caused by inappropriate installation, not maintaining the proper technical condition and using the unit against its destination.**
- Installation should be conducted by qualified personnel. During installation all available safety requirements should be considered. The fitter is responsible for executing the installation according to this manual, local safety and EMC regulations.
- The unit must be properly set-up, according to the application. Incorrect configuration can cause defective operation, which can lead to unit damage or an accident.
- **If in the case of a defect of unit operation there is a risk of a serious threat to the safety of people or property additional, independent systems and solutions to prevent such a threat must be used.**
- **The unit uses dangerous voltage that can cause a lethal accident. The unit must be switched off and disconnected from the power supply prior to starting installation of troubleshooting (in the case of malfunction).**
- Neighbouring and mating equipment must meet the requirements of appropriate standards and regulations concerning safety and be equipped with adequate anti-overvoltage and anti-interference filters.
- **Do not attempt to disassemble, repair or modify the unit yourself. The unit has no user serviceable parts. Units, in which a defect was stated must be disconnected and submitted for repairs at an authorized service centre.**

- In order to minimize fire or electric shock hazard, the unit must be protected against atmospheric precipitation and excessive humidity.
- Do not use the unit in areas threatened with excessive shocks, vibrations, dust, humidity, corrosive gasses and oils.
- Do not use the unit in explosion hazard areas.
- Do not use the unit in areas with significant temperature variations, exposed to condensation or icing.
- Do not use the unit in areas exposed to direct sunlight.
- Make sure that the ambient temperature (e.g. inside the control box) does not exceed the recommended values. In such cases forced cooling of the unit must be considered (e.g. by using a ventilator).

The unit is designed for operation in an industrial environment and must not be used in a household environment or similar.

2. GENERAL CHARACTERISTICS

The **SLN-44** is a DIN 48 x 48 mm electronic preset counter with a Blue STN LCD display with white backlight. The display is 6 digits dual layer display divided into: main display and sub-display. The main display has a 10.0 x 5.0 mm figure size showing the count value and the sub-display shows the preset values. Included in the display are preset level indicators and output indicators which can be toggled by a push of a button.

The **SLN-44** is available in 1 or 2 level preset type which makes it an ideal counter for general counting or total/batching counting applications. It is 100 - 240V AC or 12-24V DC powered and has an external power supply of 12V DC for sensors. The **SLN-44** can count bidirectional (Quadrature), Add, Subtract or Add/Subtract and upon reaching the preset value/s, the built-in output relays are actuated.

Functional modes, operation modes and output modes are fully programmable with the menu driven display using the front panel buttons. Functional modes includes: count speed (upto 10 kHz), input signal (contact / open collector or voltage), prescale, decimal point position, key protection and free write. It has a built-in EEPROM memory to avoid loss of count during sudden power cut. The front panel protection is IP 54. Wiring connections is secured with the terminal screws.

This makes the **SLN-44** the most versatile and functional preset counter even for the complicated applications such as packaging (batching), converting (prescale), cut-to-length and many more.

3. TECHNICAL DATA

Power supply voltage (depending on version)	12 - 24V DC -15%/+10% or 100 - 240V AC -15%/+10%
Power consumption	2,5 W for 24V DC; 7 VA for 240V AC
Pulse inputs	
contact / OC	sink current approx. 11 mA
voltage	input impedance 7KΩ, available to duplex wire DC sensor
Input levels	
low level:	0V ÷ 4V
high level:	6V ÷ 30V
Outputs	
relay:	1 or 2 x 250V AC 5A / 30V DC max. 5A
sensor power supply:	12V DC / max. 100 mA (only in AC version)
Output delay	30Hz - 17 ms; 1kHz/5kHz/10kHz - 12 ms
Preset level	1 or 2
Output mode	1 Level Preset: Standard, Equal, Lower Limit, Upper Limit 2 Level Preset: Standard, Equal, Upper-Lower Limit, Upper-Upper Limit
Output time	Standard output: one shot (10 - 9990 ms) or HOLD, HOLD 1, HOLD 2 Equal, Upper, Lower output: latched only when requirements are full
Count speed	30Hz, 1kHz, 5kHz, 10kHz, selectable

Count mode	add/subtract (add/subtract individual input, 90° quadrature input)
Reset	Front panel reset, Remote reset, Auto-reset
Remote reset time	2 ms or 20 ms (selectable)
Prescale	0.001 - 99.999 (0 setting is not available)
Display	Blue STN LCD display with white backlight, digit size: 10 x 5 mm
Display range	-99999 ÷ 999999, plus decimal point on position 0.0, 0.00, 0.000 or no decimal point
Data memory	non-volatile memory, EEPROM type (10 years, can be used 10000 times)
Front panel protection	IP 54
Housing type	panel
Housing dimensions	48 x 48 x 70 mm (DC version), 48 x 48 x 106 mm (AC version)
Panel cut size	45 x 45 mm (+0,6 mm)
Weight	approx. 120 g (DC version), approx. 160 g (AC version)
Operating temperature	-10°C to +50°C (non-freezing)
Humidity	45 to 85% (non-condensing)

This is a class A unit. In housing or a similar area it can cause radio frequency interference. In such cases the user can be requested to use appropriate preventive measures.

4. DEVICE INSTALLATION

The unit has been designed and manufactured in a way assuring a high level of user safety and resistance to interference occurring in a typical industrial environment. In order to take full advantage of these characteristics installation of the unit must be conducted correctly and according to the local regulations.

- Read the basic safety requirements on page 3 prior to starting the installation.
- Ensure that the power supply network voltage corresponds to the nominal voltage stated on the unit's identification label.
- The load must correspond to the requirements listed in the technical data.
- All installation works must be conducted with a disconnected power supply.
- Protecting the power supply clamps against unauthorized persons must be taken into consideration.

4.1. UNPACKING

After removing the unit from the protective packaging, check for transportation damage. Any transportation damage must be immediately reported to the carrier. Also, write down the unit serial number on the housing and report the damage to the manufacturer.

Attached with the unit please find:
- user's manual,
- accessories (gasket, clip and terminal cover).

4.2. ASSEMBLY

- The unit is designed for mounting indoor inside housings (control panel, switchboard) assuring appropriate protection against electric impulse waves. Metal housing must be connected to the grounding in a way complying with the governing regulations.
- Disconnect the power supply prior to starting assembly.
- Check the correctness of the performed connections prior to switching the unit on.

In order to assembly the unit, a 45 x 45 mm mounting hole (Figure 4.1) must be prepared. Place the unit in the mounting hole inserting it from the front side of the panel, then install the clip into the rear of the counter, push forward and clamp into place while holding the counter firmly against the direction of the clip. The dimension of the clip is 47.5 x 60.5 mm.

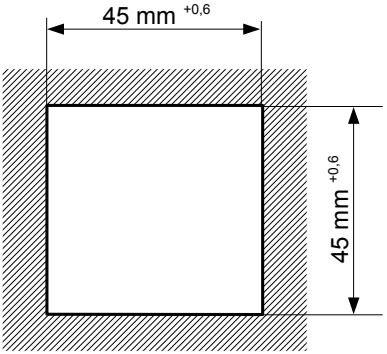


Figure 4.1. Panel cut-out dimensions

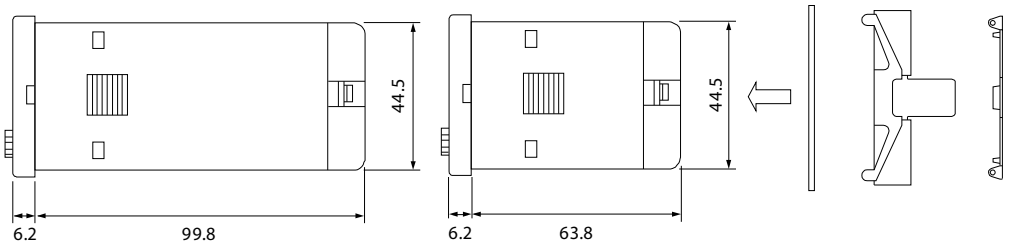


Figure 4.2. Dimensions of the case and installing of clip, gasket and terminal cover.

4.3. WIRING AND REAR TERMINALS

Caution

- Installation should be conducted by qualified personnel. During installation all available safety requirements should be considered. The fitter is responsible for executing the installation according to this manual, local safety and EMC regulations.
- The power supply network cable diameter must be selected in such a way that in the case of a short circuit of the cable from the side of the unit the cable shall be protected against destruction with an electrical installation fuse.
- Wiring must meet appropriate standards and local regulations and laws.
- In order to secure against accidental short circuit the connection cables must be terminated with appropriate insulated cable tips.
- Tighten the clamping screws. The recommended tightening torque is 0.5 Nm. Loose screws can cause fire or defective operation. Over tightening can lead to damaging the connections inside the units and breaking the thread.
- In the case of the unit being fitted with separable clamps they should be inserted into appropriate connectors in the unit, even if they are not used for any connections.
- After the installation is completed do not touch the unit's connections when it is switched on, because it carries the risk of electrical shock.

Due to possible significant interference in industrial installations appropriate measures assuring correct operation of the unit must be applied. To avoid the unit of improper indications keep recommendations listed below.

- Avoid common (parallel) leading of signal cables and transmission cables together with power supply cables and cables controlling induction loads (e.g. contactors). Such cables should cross at a right angle.
- Use of screened signal cables is recommended. Signal cable screens should be connected to the earthing only at one of the ends of the screened cable.
- In the case of magnetically induced interference the use of twisted couples of signal cables (so-called "spirals") is recommended. The spiral (best if shielded) must be used with RS-485 serial transmission connections.
- In the case of interference from the power supply side the use of appropriate antiinterference filters is recommended. Bear in mind that the connection between the filter and the unit should be as short as possible and the metal housing of the filter must be connected to the earthing with largest possible surface. The cables connected to the filter output must not run in parallel with cables with interference (e.g. circuits controlling relays or contactors).

Connections of power supply voltage and measurement signals are executed using the screw connections on the back of the unit's housing.

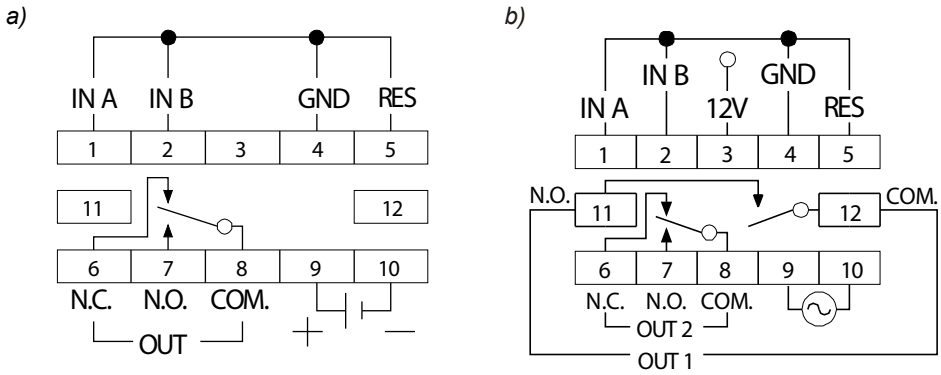


Figure 4.3. Rear terminals description:
a) version with 1 preset level, b) version with 2 preset levels

Figure 4.4. Connection of power source:
a) supply 100 - 240V AC, b) supply 12 - 24V DC

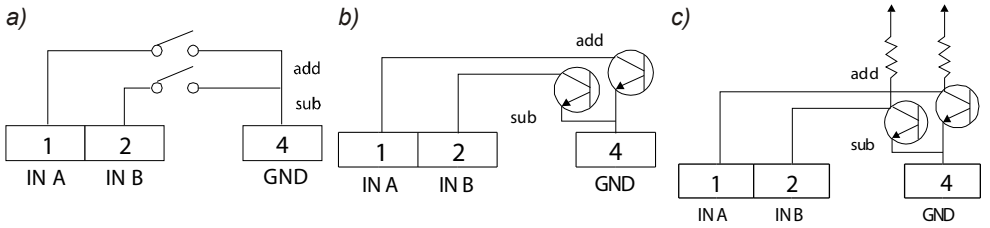
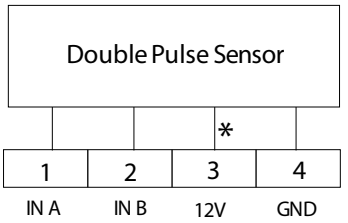


Figure 4.5. Connection of individual add and subtract input (2 inputs):
a) Contact input, b) Open collector input, c) Voltage input



* For DC powered models, use terminal 9 instead of terminal 3.

Figure 4.6. Connection of 90° quadrature input (2 inputs)

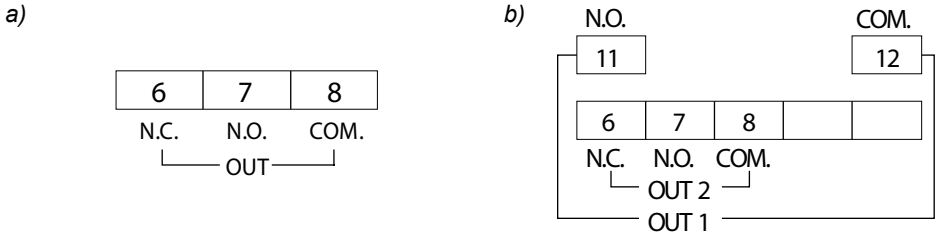
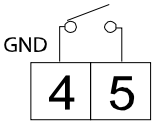


Figure 4.7. Connection of output:
a) version with 1 preset level, b) version with 2 preset levels



To reset remotely, short terminals 4 and 5 with a relay, microswitch, etc. (The unit does not count while shorted)

Figure 4.8. Connection of reset

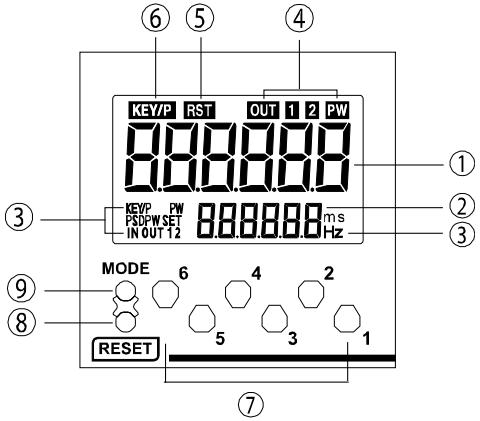
4.4. MAINTENANCE

The unit does not have any internal replaceable or adjustable components available to the user. Pay attention to the ambient temperature in the room where the unit is operating. Excessively high temperatures cause faster ageing of the internal components and shorten the fault-free time of unit operation.
In cases where the unit gets dirty do not clean with solvents. For cleaning use warm water with small amount of detergent or in the case of more significant contamination ethyl or isopropyl alcohol.

Using any other agents can cause permanent damage to the housing.

Product marked with this symbol should not be placed in municipal waste.
Please check local regulations for disposal and electronic products.

5. FRONT PANEL DESCRIPTION



① Main display (measurement result)
② Second display (preset / programming setting)
③ Program item display
④ Output indicator
⑤ External reset input indicator
⑥ Key lock indicator

Symbols and functions of push-buttons:

⑦
[1] [2] [3]
[4] [5] [6]

Functions:
- change of the present position in menu,
- modification of the parameter value being edited.

⑧
[RESET]

Functions:
- reset of actual displayed value of measurement.

⑨
[MODE]

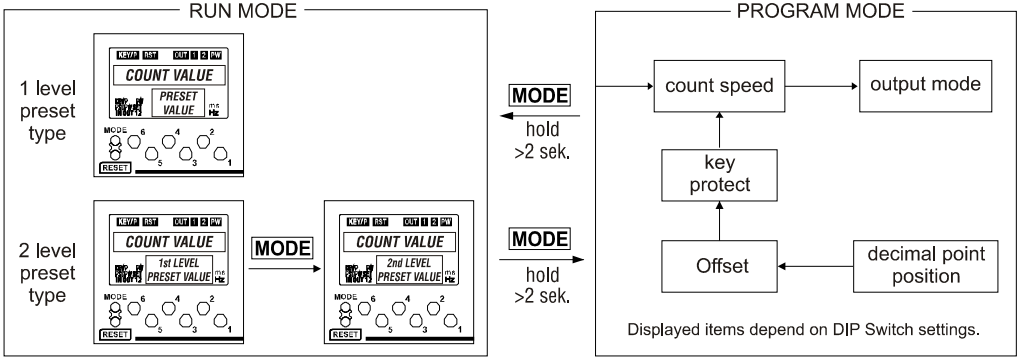
Functions:
- enter to Program Mode (press and hold by at least 2 sec.),
- exit the current level and enter to previous menu (or to Run Mode),
- change of the individual counter modes.

Description of program item display:

IN Hz	Count speed
OUT	Output mode
OUT ms	Output time
PS	Prescale
DP	Decimal point position
W	Write
KEY/P	Key lock protection
SET	Preset value setting

6. PRINCIPLE OF OPERATION

The **SLN-44** has 2 operation modes: **Run Mode** and **Program Mode**. Counting and Preset Values setting are done in the Run Mode. Settings such as selection of countspeed and output mode etc. are done in the Program Mode. The meaning of particular device parameters is decribed in chapter: ***7. Device Programming***.
To enter to the Program Mode (being in the Run Mode) operator must press and hold at least 2 sec. [**MODE**] button. Wait for 2 seconds to return to the Run Mode.



7. DEVICE PROGRAMMING

The setting of the **SLN-44** unit is configured using the DIP switch and the Program Mode functions. Set the DIP switch first. The configuration is decribed in chapter: ***7.1 DIP SWITCH SETTINGS***. The DIP switch enables to set the Input mode, Count speed, Count mode, Reset time, etc. The Program mode enables to set the Output mode, Operation mode, Prescale, Decimal point, etc.

After about 2 sec. since last use of the buttons, device exits the Program Mode and returns to the Run Mode (only if no parameters are in editing mode).

7.1. DIP SWITCH SETTINGS

All connections must be made while power supply is disconnected! Turn OFF the unit before changing the DIP switch settings. Any changes in the DIP switch settings will not take effect until the unit is switched OFF then powered ON. Default of DIP switch is all OFF.

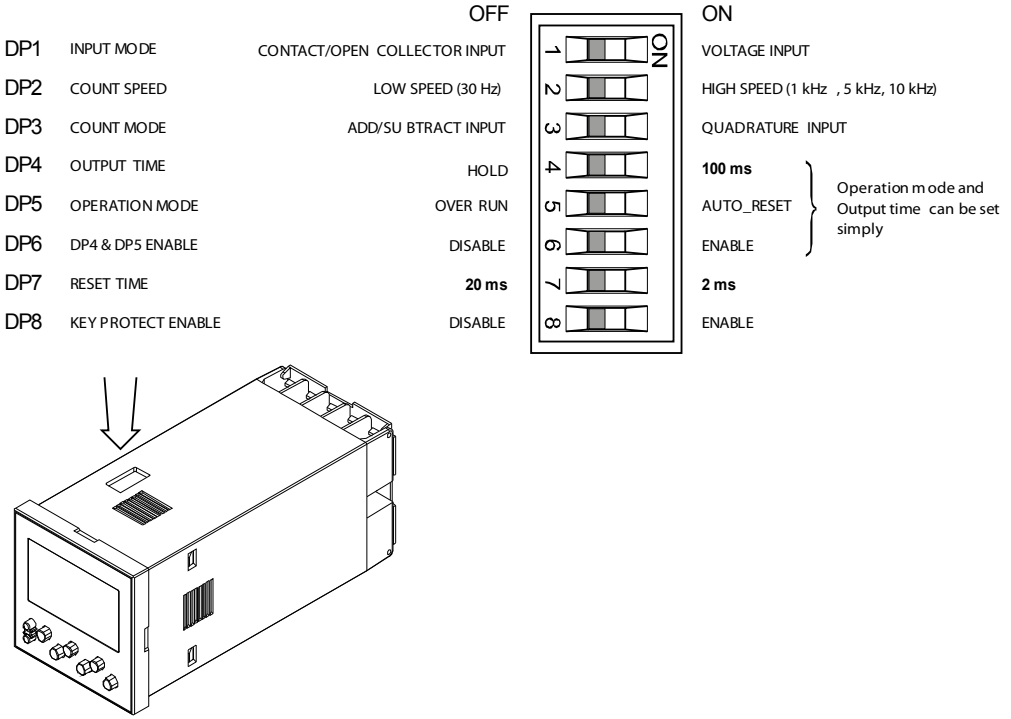


Figure 7.1. DIP switch description

7.1.1. DP1 Input type

Counter **SLN-44** is equipped with one measuring input. The are following types to be selected:

- Contact, for low speed signals
- Open collector
- Voltage, high speed

7.1.2. DP2 Count Speed

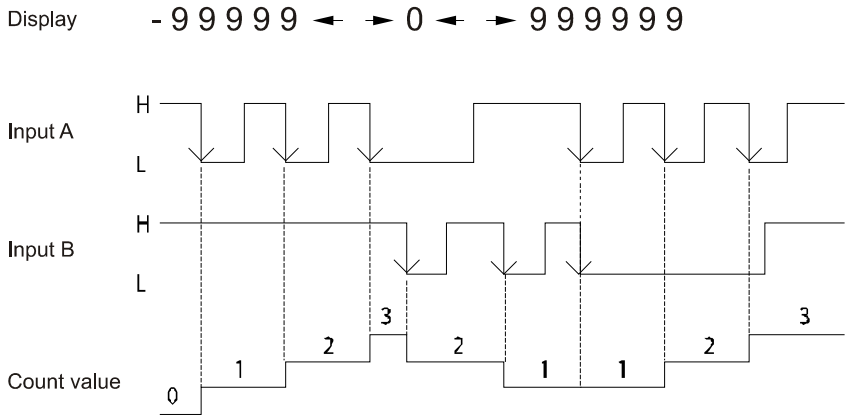
Counter allows to select required value of count speed by means of proper DIP switch configuration. For low speed input this value is 30 Hz and is constant. For high speed input count speed is selectable from the range: 1 kHz, 5 kHz or 10 kHz. Default setting is 1kHz.

7.1.3. DP3 Count mode

During normal operation the counter counts pulses from input {**A**} and {**B**}, according to selected count mode (Figure 7.2), calculates using prescale value, and shows the result on main display with selected decimal point position. The following count modes can be selected:

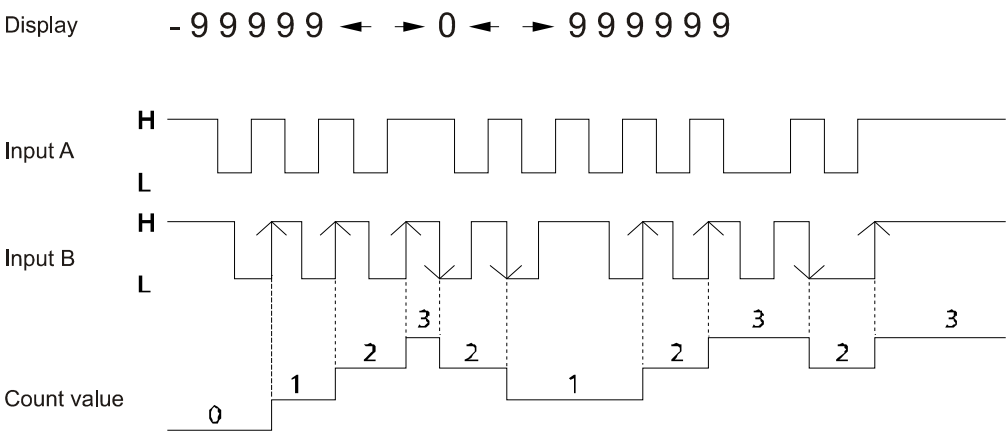
- Add mode (addition of pulses from {**A**} and {**B**} inputs)
- Subtract mode (subtraction of pulses from {**A**} and {**B**} inputs),
- Quadrature input mode (quadrature counting).

a) Add/Subtract mode



The example shown is open collector input mode.

b) Quadrature input mode



The example shown is open collector input mode.

Figure 7.2. The counting principle of the SLN-44 counters:
*a) in "**A+B**", "**A-B**" modes*
b) in quadrature input mode.

7.1.4. DP4, DP5, DP6 Operation mode and output time

		DP5 / Operation mode	
		OFF / Over run	ON / Auto reset
DP4 / Output time	OFF / HOLD	Mode A STANDARD OUTPUT HOLD	Mode D STANDARD OUTPUT HOLD
	ON / ONE SHOT	Mode A STANDARD OUTPUT ONE SHOT	Mode D STANDARD OUTPUT ONE SHOT

Microswitch DP6 activates and deactivates the functionality of DP4 and DP5.

7.1.4. DP7 Reset time

Reset time sets minimum pulse time of remote reset signal. If an active signal is delivered to the rear terminals **{4}** and **{5}** the counter is zeroed, and the result stays zero as long as the signal is active. In this moment the device does not count pulses. Reset time can be set to 2 ms or 20 ms.

At any time the counter can be zeroed by pressing the [**RESET**] button on the front panel.

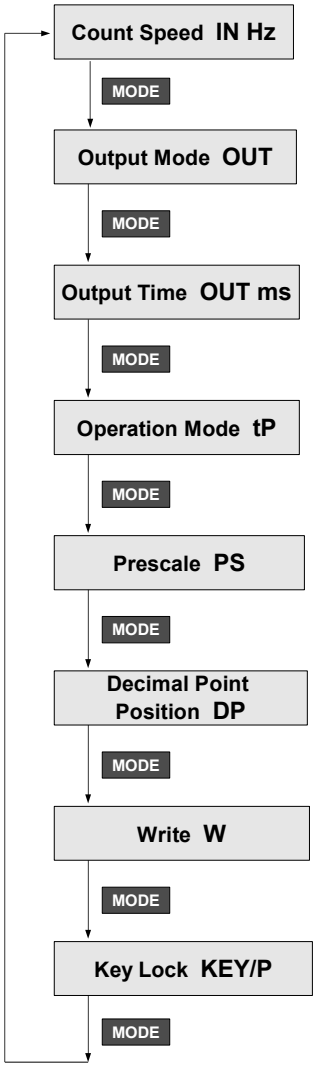
7.1.5. DP8 Key protect

There are 4 protection levels. Default setting is Level 1.

Level 1	L1	Lock program	Key protection becomes effective when DIP switch (DP8) is ON.
Level 2	L2	Lock program & front key reset	
Level 3	L3	Lock program & preset	
Level 4	L4	Lock program, front key reset & preset	

7.2. MENU STRUCTURE

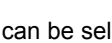
The menu allows to set all parameters of the device. Press and hold [**MODE**] key to select program menu items. After about 2 sec. since last use of the buttons, device exits the Program Mode and returns to the Run Mode (only if no parameters are in editing mode). Press individual digit setting keys to change setting values. The meaning of parameters is described in chapter ***7. DEVICE PROGRAMMING.***

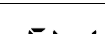
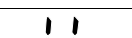
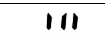
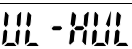


7.2.1. Count speed

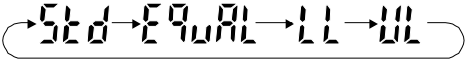
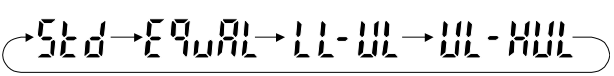
Program Item Display	Setting Values	Setting Key	Default Value
IN Hz	If DP2 is OFF (30 Hz; see: **7.1 DIP SWITCH SETTINGS**, str.12) "**Count Speed**" is not displayed.	Key 1 will select the desired value	

7.2.2. Output mode

One of the following 6 output modes can be selected. Default setting is 

Standard Output		Output occurs when count value reaches preset value. Different output conditions can be set: One-Shot (10-9990 ms), Hold, Hold1, Hold2
Equal Output		Output occurs only when and continues as long as count value is equal to preset value
Lower Limit Output		Output occurs when count value reaches below the set value
Upper Limit Output		Output occurs when count value reaches above the set value
Upper - Lower Limit Output		Output occurs when count value reaches below (Lower) or above (Upper) the set value
Upper 1 - Upper 2 Limit Output		Output occurs when count value reaches above the set value

Output mode programming:

Program Item Display	Setting Values	Setting Key	Default Value
OUT	1 level preset:  2 level preset: 	Key 1 will select the desired value	

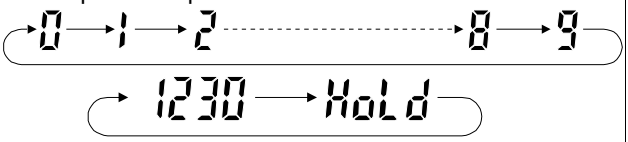
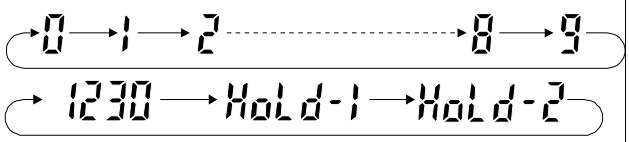
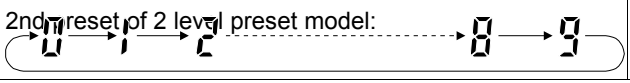
Description of the output modes with time characteristics are described in paragraph ***8. OPERATION MODE AND OUTPUT MODE***.

7.2.3. Output time

For Standard Output Mode, all settings of the output time are available. For other Output Modes other than Standard Output Mode, only HOLD output time is available.

Hold	HoLd	Output is Latched until a Reset signal is sent	1 Level Preset, OUT2 of 2 Level Preset
Hold 1	HoLd-1	Output is Latched until Output 2 goes away	OUT1 of 2 Level Preset
Hold 2	HoLd-2	Output is Latched until a Reset signal is sent, independent from Output 2	
One - Shot	10~9990 ms	Output time can be set from 10-9990 ms (at 10 ms steps)	All Models for all standard output

Output time programming:

Program Item Display	**Setting Values**	**Setting Key**	**Default Value**
OUT ms	1 level preset output:  The output time will automatically become HoLd if the output mode is different than Std	Keys 2 - 4 will change digits Key 1 will select the desired value	HoLd
OUT1 ms	1st preset of 2 level preset model:  The output time will automatically become HoLd if the output mode is different than Std	Keys 2 - 4 will change digits Key 1 will select the desired value	HoLd-1
OUT2	2nd preset of 2 level preset model: 	Keys 2 - 4 will change digits	HoLd

ms	 The output time will automatically become if the output mode is different than If DP6 is ON (see: **7.1 DIP SWITCH SETTINGS**, str.12), "**Count Speed**" is not displayed.	Key 1 will select the desired value	

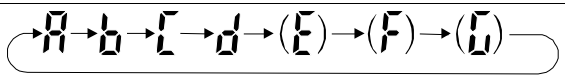
7.2.4. Operation mode

There are 7 Operation Modes available in counters **SLN-44**. The output below refers to the 1 Level Preset model, OUT2 of 2 Level Preset Model. Default setting is Mode A.

Mode A		Unit counts during output signal duration	Overrun (Without Auto-Reset)
Mode B		Unit does not count during output signal duration	
Mode C		Unit does not count during and after output signal duration	
Mode D		Unit resets at rising edge of output signal	Auto-Reset
Mode E		Unit resets at falling edge of output signal (For One-Shot Output time only)	
Mode F		Unit resets at rising edge of output signal, unit display frozen during output signal duration (For One-Shot Output time only)	
Mode G		Unit resets at falling edge of output signal, unit display frozen during output signal duration (For One-Shot Output time only)	

For 24V DC power supply all operation modes refer to output OUT.

Operation mode programming:

Program Item Display	Setting Values	Setting Key	Default Value
	 Only mode A can be set if the output mode is different than . Mode E, F, G, can only be set if OUT or OUT 2 is programmed to one shot output.	Key 1 will select the desired value	 (Mode A)

	If DP6 is ON (see: **7.1 DIP SWITCH SETTINGS**, str.12), "**Count Speed**" is not displayed.		

7.2.5. Prescale

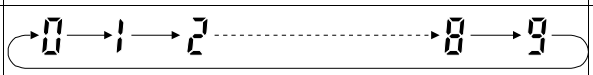
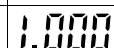
Incoming pulses can be prescaled to display the desired measuring unit. The prescale can be set at any value within the range of 0.001 - 99.999. Default setting is 1.000.

Prescale Formula:

$$PS = \frac{Desired\ Display\ Value\ (per\ unit)}{Pulse\ Number\ (per\ unit)}$$

Examples:
1. To display 1 count per 10 pulses : PS value = 0.1
2. To display 1 count per 5 pulses : PS value = 0.2
3. To display 2 counts per 1 pulse : PS value = 2

Prescale programming:

Program Item Display	**Setting Values**	**Setting Key**	**Default Value**
PS	 Prescaler setting range: 0.001 - 99.999	Keys 1 - 5 will change the corresponding digit	

7.2.6. Decimal Point Position

Decimal point position can be selected from the following settings: 0, 0.0, 0.00, 0.000. Default setting is 0 (value is displayed without decimal point).

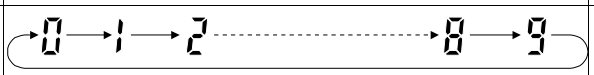
Decimal point position programming:

Program Item Display	**Setting Values**	**Setting Key**	**Default Value**
DP		Key 1 will select decimal point position	

7.2.7. Write

Any desired value can be set on the unit as the starting count value of the counter. The counter will add to or subtract from the set value. Upon every reset, the set value will be displayed. Default setting is 0.

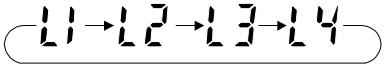
Write programming:

Program Item Display	Setting Values	Setting Key	Default Value
W		Press corresponding numeric keys	0

7.2.8. Key protect

There are 4 protection levels. Default setting is Level 1.

Key lock programming:

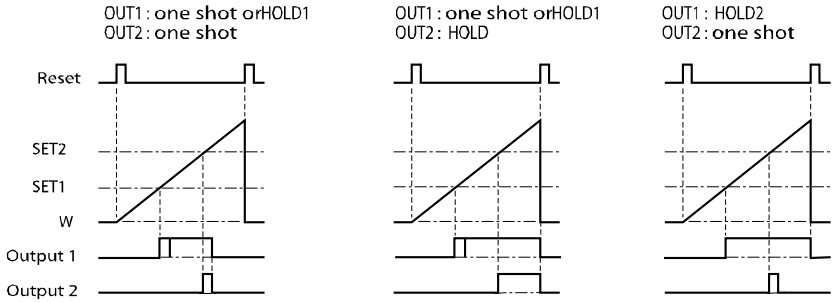
Program Item Display	Setting Values	Setting Key	Default Value
KEY/P		Key 1 will select the desired protection level	L1 (Level 1)

8. OPERATION MODE AND OUTPUT MODE

The control of the external devices (based on the counter state) is realized via relay outputs. Front panel indicators „**OUT**", „**1**" i „**2**" indicate the state of particular relay output. One of the following operation modes and output modes **OUT** can be selected.

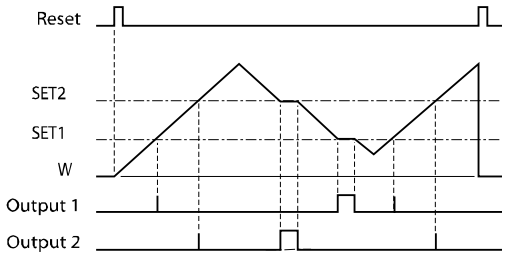
8.1. OPERATION MODE: A

a) Standard output mode Std



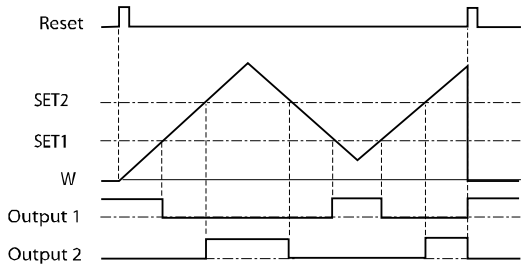
In case of 1 level preset models operation is the same as OUT 2 operation.

b) Equal output mode EqUAL



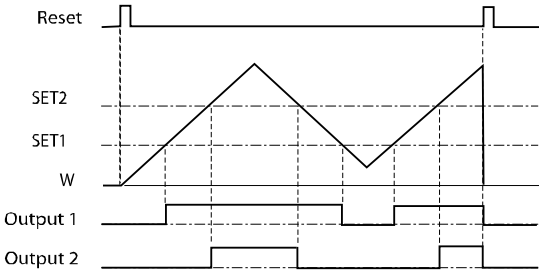
In case of 1 level preset models operation is the same as OUT 2 operation.

c) Upper and lower limit outputs LL-UL (LL)



In case of 1 level preset models operation is the same as OUT 1 operation.

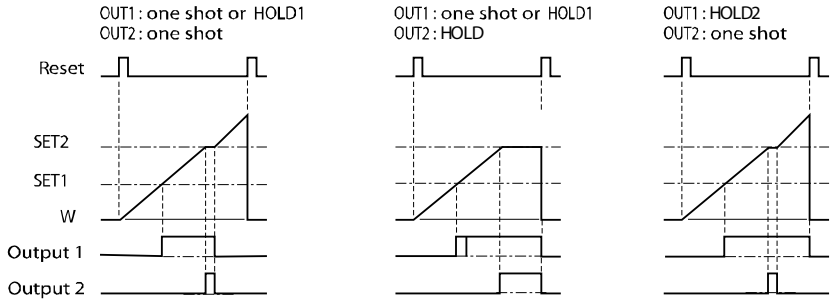
d) Upper limit outputs 1 & 2 UL - HUL (UL)



In case of 1 level preset models operation is the same as OUT 1 operation.

8.2. OPERATION MODE: B

Standard output mode Std

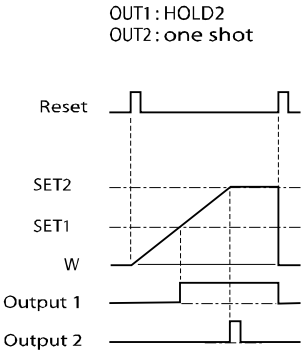


In case of 1 level preset models operation is the same as OUT 2 operation.

Unit does not count during output signal duration

8.3. OPERATION MODE: C

Standard output mode Std

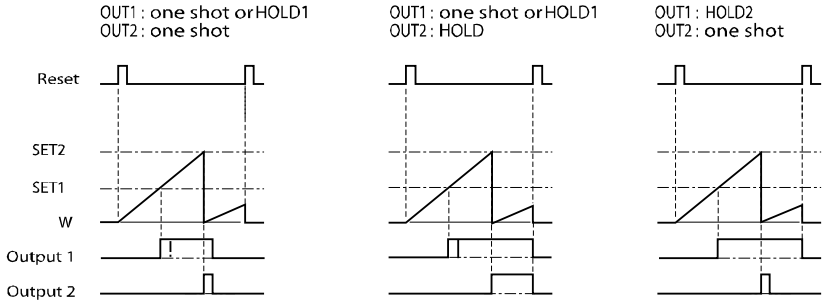


In case of 1 level preset models operation is the same as OUT 2 operation.

Unit does not count during and after output signal duration

8.4. OPERATION MODE: D

Standard output mode

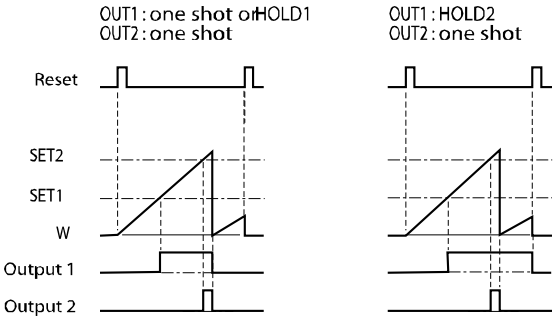


In case of 1 level preset models operation is the same as OUT 2 operation.

Auto-reset at rising edge of output OUT2

8.5. OPERATION MODE: E

Standard output mode

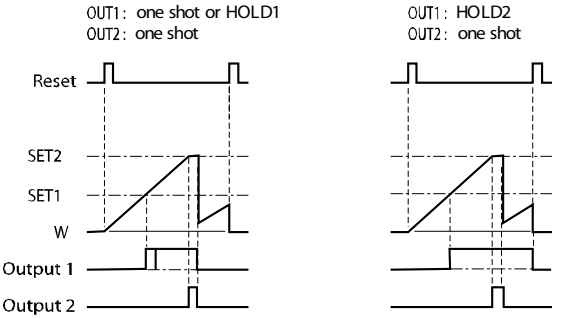


In case of 1 level preset models operation is the same as OUT 2 operation.

Auto-reset at falling edge of output OUT2

8.6. OPERATION MODE: F

Standard output mode Std

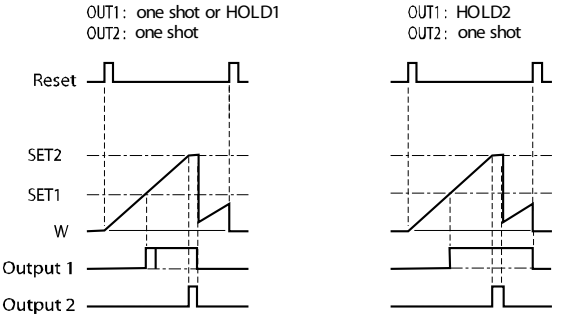


In case of 1 level preset models operation is the same as OUT 2 operation.

Auto-reset at rising edge of output, display "frozen" during output

8.7. OPERATION MODE: G

Standard output mode Std



In case of 1 level preset models operation is the same as OUT 2 operation.

Auto-reset at falling edge of output, display "frozen" during output

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