**GINEERS**

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1528 Sofia, Bulgaria
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**C3 'Digital input or output'**

| No | Description |
|---|---|
| 1 | Input bit 0 / Output bit 0 (BIN 1, BCD 1) – normally open contact |
| 2 | Input bit 1/ Output bit 1 (BIN 2, BCD 2) – normally open contact |
| 3 | Input bit 2 / Output bit 2 (BIN 4, BCD 4) – normally open contact |
| 4 | Input bit 3 / Output bit 3 (BIN 8, BCD 8) – normally open contact |
| 5 | Input bit 4 / Output bit 4 (BIN 16, BCD 10) – normally open contact |
| 6 | Input bit 5 / Output bit 5 (BIN 32, BCD 20) – normally open contact |
| 7 | Input bit 6 / Output bit 6 (BIN 64, BCD 40) – normally open contact |
| 8 | Common (GND) |

**IMPORTANT: Mounting and setting of SI4080 should be made only from qualified technicians, familiar with this user manual and general safety rules in electrical substations!**

## 4. Warranty

The warranty of the device is limited to 2 years from the date of sale. If the device shows any defect or malfunctions during that period, the manufacturer is obligated to repair the device in its own service for manufacturer's expense, or, if the repair is impossible, to replace the device with new one. The transportation costs to the manufacturer's service are due to the client. The warranty voids if this manual' instructions are not met, warranty seals are removed or the device was opened by unauthorized by the manufacturer personnel.

Serial number:...............................          Date of sale:................................

Signature:................................

.

## 5. The package contains
- SI4080 with mounting brackets - 1 pcs.
- User manual - 1 pcs.

## 6. Manufacturer

Gineers Ltd.
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## 7. Repairs and Troubleshooting table

| # | Date | Problem | Description of repair process | Sign. |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# Step Indicator **SI4080**              **Series 4080**

## User manual

SI4080 is digital measuring, fully programmable device from series 4080, designed on basis of microcontrollers. SI4080 shows the current position of the tap changer of the high-voltage transformer in electrical substations. The unit is part of tap changer-motor drive equipment. The position of the tap changer can be read either analogue (by resistor matrix) or digital (BIN or BCD input). The unit is designed to be mounted on boards in control rooms of electrical substations.

## 1. General technical information
- input – analogue/digital (programmable BIN/BCD)
- input voltage for digital input – 5-48 VDC
- single resistor value if analogue input – 4-12 Ohm (programmable with step 1 Ohm)
- max. resistance if analogue input – 390 Ohm
- maximum steps:
    - analogue input – 39 if 10 Ohm, 48 if 8 Ohm, 64 if 6 Ohm
    - digital input – 79 if BCD-input, 99 if BIN-input
- power supply – 55-270 VAC (80-390 VDC)
- display – super bright red, 4-digit, visible area 75x22mm, purple filter
- menu protection – yes/no
- access code for entering user menu: **1342/**..........
- protection of menu parameters against changing – yes/no
- number of non-potential outputs – 7 – yes/no
- maximum voltage/maximum current of relay contact – 0.1 ADC @ 30 VDC
- max. consumption - < 3 W
- work temperature - 0÷50 ℃
- storage temperature - -50÷+90 ℃
- humidity - 40÷90 %
- dimensions (H/W/D) –48(96)*/96/85 mm (w/o terminal blocks) and 48(96)*/96/95 mm (with TB)
- mounting hole (H/W) – 43(96)*/90 mm, centered, without rounding
- protection class – IP52 front (mounted on board), IP31 back
- own weight – 220 g
* dimensions for version "Q"

## 2. Normal operation of SI4080

SI4080 starts normal operation right after power supply is connected and is valid. The algorithm is as follows:

*Initialization*
- The least significant decimal point lights for around 0.2s
- Dynamic sign "Gineers" passes through the display – for around 3s.
- Display goes dark and then for 1.5s number of programmed steps is displayed
- Device goes in normal mode of operation – shows current step, if option "B" – corresponding relay outputs are on

*Setting the device*
The device can be set through user menu. Entering in this menu is accomplished by pressing and holding for 2 seconds button '**OK**', while device is in normal work mode. **WHEN THE DEVICE IS INITIALIZING IT IS FORBIDDEN TO PRESS ANY OF THE BUTTONS!**. If SI4080 is with option "**C**" (SI4080C), the menu is protected with password. When button "OK" is released sign 'uSEr' will appear on the display, followed by sign 'codE' – device is waiting user to enter 4-digit code to let him to change/set parameters. If code entered is valid then the user is passed to user menu; if not – the device goes in normal mode of operation. Entering the code is done in the same way as modifying parameter

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value – look below in the instruction to see how it is done. If the device is without option "**C**", user code is not required, so first settable parameter is displayed (inP).

### *Through user menu one can set the following parameters:*

– Input (inP)
*In this menu the type of input is set – analogue (AnL), binary (bin) or binary-decimal (bcd).*
– Output (outP)
*In this menu the type of digital input for remote sensing is set - binary (bin) or binary-decimal (bcd). Not applicable, if device is not with option "B".*
– Number of steps (StEP)
*Maximum number of steps is set*
– delay (dLY)
*This is delay in seconds when the device will show the new step when changed. It is set with precision of 0.1s.*
– single resistor value when analogue input (r)
*Sets value of the single resistor, if the device is with analogue input. Not applicable, if digital input.*
– Number of resistor in the matrix if analogue input (rn)
*Sets number of single resistor in the matrix, if analogue input. Not applicable, if digital input.*
– Programming of individual indication for each step (PrOG)
*Through this menu individual indication for each step can be set. With first digit (most left) decimal sign is programmed (-/blank), middle two digits shows the number of the step, with most right digit additional info is programmed (blank, A, B, C, D, E, F)*

When menu is entered first editable parameter is displayed - "inP". Selecting other parameters for setting is made with pressing button '↗'. Editing selected parameter can be made, if button '**OK**' is pressed. One can exit user menu only if a parameter is chosen – i.e. if we are not in mode of changing parameter value, with pressing and holding down button '↗', and then pressing button '**OK**' (still pressing button '↗'). After exiting user menu the device continues normal mode of operation as described in paragraph 2 "Normal operation of SI4080".

**IMPORTANT: When device is in user menu mode, it does not measure input signal and DOES NOT show changes in it! Relay condition and signalization are the same as they were when the user entered in the menu to change parameters!**

**Editing a parameter** – when the user wants to change some parameter value, he must do the following:
- select parameter for editing by pressing button '↗'
- enter in mode of changing parameter value by pressing button '**OK**'

When the parameter is a numeric value (these are all parameters except single resistor value), editing is made with the two device buttons. The highest digit of the parameter value is blinking (usually most left). When some of the digits is blinking pressing button '↗' is incrementing its value. When digit '9' is blinking and user presses the button, this is a roll-over and digit becomes '0'. Saving some digit value is done by pressing button '**OK**' and the next digit starts blinking. After the last digit is saved (usually most right digit) the parameter value is saved in non-volatile memory and the user is sent back to the main menu. All saved values becomes valid immediately, there is no need to restart the device.

When selected parameters are not a numeric value then with button '↗' user is changing different options for this parameter. Pressing button '**OK**' saves selected value and then device goes one step back – in the main menu for selecting parameter to change. This is the way that single resistor value is set (r = 6/8/10).

If the device is ordered with option "**X**" editing and saving of parameter value is not allowed by the user – all settings are saved at the factory and can only be read/seen by the user.

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The following table shows different parameters, which can be set, limits for each setting and default value:

| Parameter (submenu) | Indication | Limits | Default value |
|---|---|---|---|
| Input | inP | AnL/bin/bcd | AnL |
| Output | outP | bin/bcd | bcd |
| Steps | StEP | 0000-0099 | 19 |
| Delay, in seconds | dLY | 000.0-009.9 | 000.8 |
| Single resistor, Ohm | r | 0004-0012 | 0010 |
| Number of resistors | rn | 0000-0099 | 0018 |
| Programming steps | PrOG | -/+ 00-99 A-F | Number of the step |

Possible error codes (if analogue input):

| Error code | Meaning |
|---|---|
| Err1 | Error in programming (wrong number of steps, single resistor, etc.) |
| Err2 | Either indicator or resistive matrix are broken, contact manufacturer |
| Err3 | Прекъсване на проводници към входове (1) и (N) или към вход (P) |
| Err4 | Not connected on inout (1), possible cable damage |
| Err5 | Not connected on input (N), possible cable damage |
| Err9 | Unknown error, contact manufacturer |

## 3. Mounting and electrical connections

SI4080 is mounted on panel/board with mounting hole 43x90mm with special brackets, included in the package. All connections should be made with isolated multi-wire cables with cross section $0.75mm^2 \div 2.5mm^2$. All the connections are shown in the figure and the tables below:
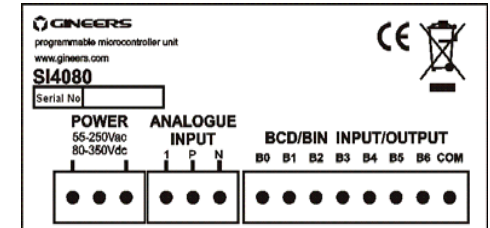


**C1 'Power supply'**

| No | Description |
|---|---|
| 1, 3 | Input power supply |
| 2 | Not used |

**C2 'Analogue input'**

| No | Description |
|---|---|
| 1 | Input step one |
| 2 | Potenciometrical input (middle point) |
| 3 | Input last step |