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R.No251 Order No 542

CI8

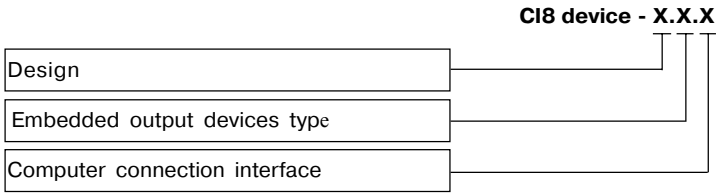
Counter of Impulses

User's Manual

CONTENTS

This user's manual (UM) is intended for operation personnel to get acquainted with the structure, principle of operation, construction, usage and maintenance of the CI8 impulse counter (further in the text called «instrument»).

This user's manual is applied to devices produced according to ТУ 4278-001-46526536-02. CI8 devices are produced in various modifications that differ from each other by housing type, embedded output devices type and availability of computer connection interface. Information about device modification is ciphered in full symbolic notation code:



Design:

P1 - panel 96×96×70 mm

P2 - panel 96×48×100 mm

W - wall 130×105×65 mm м

Embedded output devices type:

R - electromagnetic relays
S - *n-p-n* transistor optocouplers
T - optotriacs

Computer connection interface:

RS - device has computer connection interface.

The example of devices designation used in ordering documentation and in other products documentation:

CI8-P1.R.RS device.

This means CI8 device having panel installation housing with 96×96×70 mm dimensions, electromagnetic relays as control devices and also RS-485 connection interface.

Conformity certificate No 03.009.0103.
Measurement instrumentation assertion certificate RU.C.34.004.A No 20005.

1. DESIGNATION

1.1. Multi-purpose programmable eight-bit pulse counter IC8 is designed to count:

- number of impulses coming to its inputs in direct and opposite direction and further conversion of this number into a physical value (using multiplication by given factor);
- frequency and width of impulses coming to its inputs;
- operating time;
- average and aggregate fluid flow rate (together with impulse or frequency sensors).

1.2. This instrument has two embedded key type output devices, which perform on/off switching of the external technological equipment when preset values are reached.

2. TECHNICAL SPECIFICATION

2.1. Technical specification of the counter is given in table 1.

Table 1

Item	Value
Power supply	
Supply voltage - AC - DC Power consumption	130...265 V 180...310 V no more than 4 VA
Inputs	
Number of control inputs Inputs low (active) voltage level Inputs high voltage level	3 from 0 to 0.8 V from 2.4 to 30 V
Impulse counter specification	
Number of counting bits Maximum frequency of input impulses Minimum width of input impulses Range of predivider values Range of factor values Time constant of input filter	7 8000 Hz 0.1 ms 1...9999 0.000001...9999999 0.1...1000 ms

Flow meter	
Measuring time of average flow rate	1...99 s
Timing device	
Timing discreteness - operating time counting mode - width measurement mode	60 s 0.01 s
Output devices	
Maximum current commutated by relay contacts Maximum current of transistor optocoupler load Maximum current of optotriac load Allowed load peak current of the second channel doubling output	8 A at a voltage of 220 V and $\cos\varphi > 0.4$ 0.2 A at a voltage of +50 V 50 mA at 300 V (constantly open triac) or 1 A (triac at a frequency not exceeding 50 Hz and t_{imp} = 5 ms) 30 mA (at a voltage +30 V)

Housing			
Features	Housing type		
	wall	panel P1	Panel P2
Protection class	IP44	IP54*	IP20*
Overall dimensions, mm	130x 105x 65	96x 96x 70	96x 48x 100
Device mass	no more than 1,0 kg		
* Front panel side			

2.2. This device is designed for operation in the following conditions:
Allowed ambient temperature +1... +50 C°
Relative air humidity (at temperature of +35 C°) no more than 80 %
Air pressure 86...107 kPa

3. CONSTRUCTION AND PRINCIPLE OF OPERATION

3.1. Principle of operation

Functional diagram of the instrument is shown on figure 1. The device has three inputs for external control signals which come to the inputs of data processing unit through input selector.

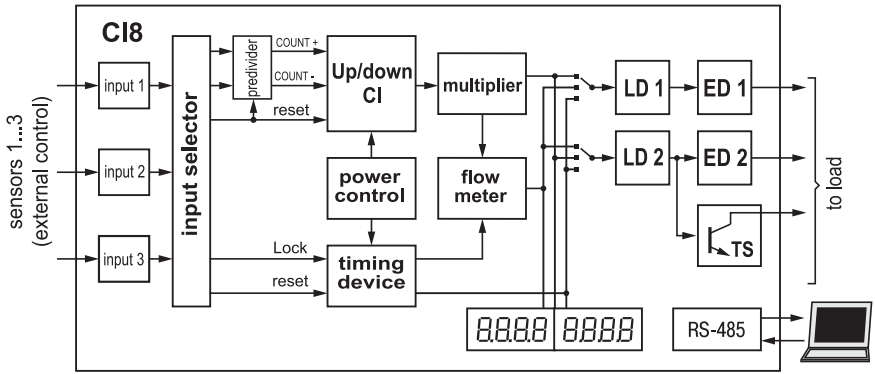


Figure 1

The data processing unit includes up/down impulse counter with a predivider at the input and a multiplier at the output, timing device, average flow rate calculator, and also two logic devices which generate control signals for output devices according to the user-defined algorithm.

3.1.1. The instrument has three inputs for external control signals connection. It's possible to connect to these inputs:

- contacts of buttons, switches, relays, reed switches, etc. (figure 2);
- active sensors with *n-p-n* open collector transistor at the output. To feed such sensors a voltage of +24±3 V (100 mA maximum load current) is provided on a terminal block of the device (figure 3);
- sensors of other types with high level output voltage from 2.4 to +30 V and low level output voltage from 0 to 0.8 V (figure 4). Input current at low level voltage does not exceed 15 mA.

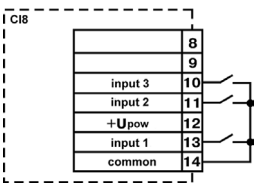


Figure 1

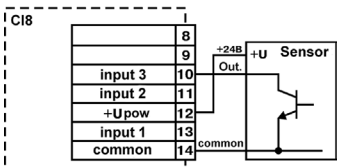


Figure 2

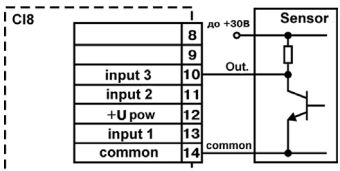


Figure 3

3.1.2. **Counter of impulses** is used to count pulses coming to its inputs.

3.1.2.1. The counter has three inputs with active low level.

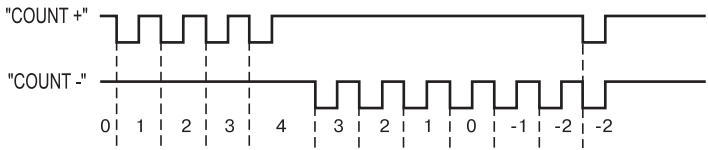


Figure 5.

Each impulse coming on input **«Count +»** increments, and each impulse coming on input **«Count -»** decrements counter state by one. In case of impulses present simultaneously on both inputs the counter state remains constant (figure 5). **«Reset»** input is destined to put the counter into initial state.

On reset counter of impulses is loaded with a value set in **Strt** parameter (figure 6). If the count should start from zero, it is necessary to set **Strt** parameter to zero.

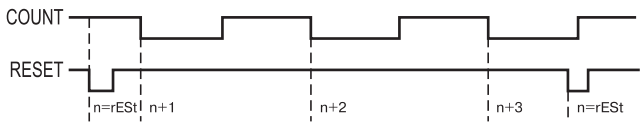


Figure 6.

3.1.2.2. **Fin.L** and **Fin.H** parameters set ow and high limits of the count, at which counter is automatically reloaded with the value set in **Strt** parameter (figure 7). **Fin.L** value should be less and **Fin.H** value should be more than **Strt** value.

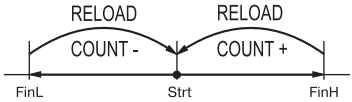


Figure 7.

3.1.3. Predivider at the counter of impulses input is used to divide input impulses frequency by the value set in **P** parameter. The division is carried by means of «resampling down» impulses coming to predivider input, i.e. impulse on predivider output is formed only after the number of impulses coming to its input will reach the value set in **P** parameter.

The P parameter can possess only the integer values from 1 to 9999.

If input impulses come to both inputs of the predivider, then the impulse on its corresponding output is formed at the moment when the difference between number of impulses on input «+» and input «-» reaches **P** value.

Low level at the **«Reset»** input clears the predivider.

3.1.4. Multiplier at the «counter of impulses» output is used for conversion of the cumulative number in the counter into a physical quantity (meters, litres, etc.) by means of multiplication by the value set in **F** parameter. **F** value is set by user within the range from 0,000001 to 9999999. The position of a comma at display of the physical quantity on indicator is defined by the position set in **F** parameter.

3.1.5. **Timing device** is used for time intervals count and can work in one of two modes set in **Ftt** parameter:

- stop watch mode, which allows to measure time intervals from 0.01 s to 9 h 59 m 59.99 s at **Ftt**=0;

- operating time counter mode, which allows to measure the aggregate device operating time up to 99999 h 59 m at **Ftt**=1.

3.1.5.1. To control timing device there are two inputs with active low level: **«Reset»** and **«Lock»**.

Low level at **«Lock»** input pauses time count. Low level on **«Reset»** input stops time count and clears the counter (figure 8).

3.1.5.2. In case of absence of active levels at control inputs time count starts right after switching on the instrument. In case of power breakup the accumulated value is saved in nonvolatile memory that allows to resume the interrupted count at the following switching on.

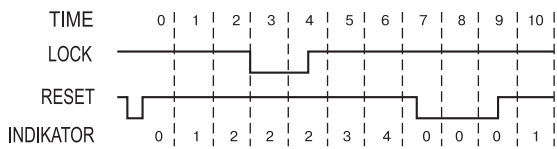


Figure 8.

3.1.6. **Flow meter** computes speed of physical quantity (meters, litres, etc.) variation over a period of time set in **ti** parameter.

If **F**, **P** and **ti** parameters are set to 1 then flow meter shows the number of impulses coming to counter input during 1 second, i.e. frequency.

The state of flow meter is updated in a measuring period **ti**.

In some oscillatory-type transducers some initial frequency corresponds to zero value of the flow rate. Therefore the meter readings correction is required. The correction value can be set by the user in **di** parameter.

3.1.7. Input commutator carries out commutation of instrument inputs to the data processing unit inputs, and also preliminary conversion of signals. The input commutator operation mode is defined by **inP** parameter.

3.1.7.1. **Input filter** is used to protect instrument inputs from contact bounce and from other disturbances with duration less than the width of the friendly signal impulses. Input filter time constant is set in **tc** parameter with discreteness of 0.1 ms. The minimum width of impulses perceived by the instrument can be set from 0.1 to 999.9 ms (figure 9).

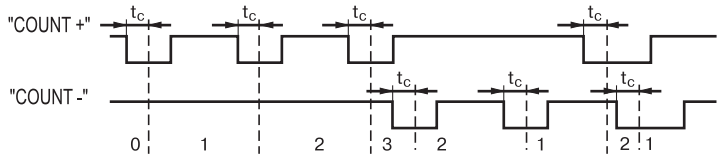


Figure 9.

For example, the highest frequency of input impulses at tc=0.1 equals to 5 kHz because minimum period is 0.2 ms. **Maximum count frequency - 8 kHz can be obtained by setting tc parameter to 0.0.**

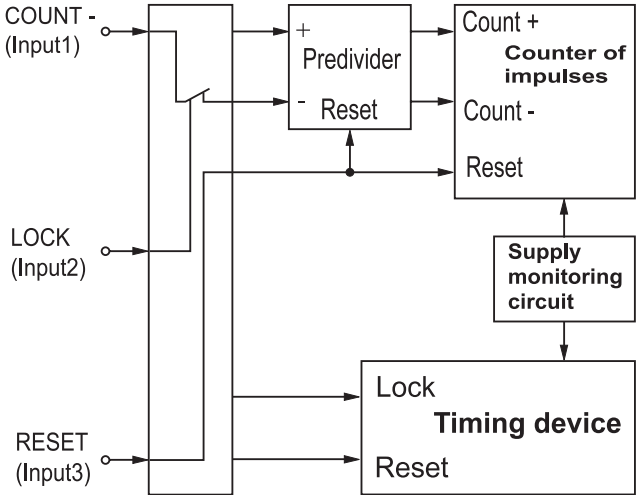


Figure 10. Count-down of impulses with a possibility of lock and reset by separate inputs

3.1.7.2. **Count-down of impulses with a possibility of lock and reset by separate inputs** is set at **inP=1** (figure 10).

3.1.7.3. **Count-up of impulses with a possibility of lock and reset by separate inputs** is set at **inP=2** (figure 11).

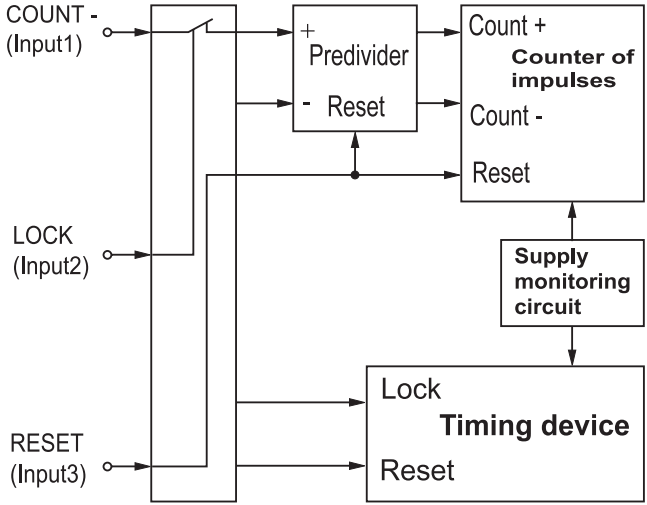


Figure 11. Count-up of impulses with a possibility of lock and reset by separate inputs

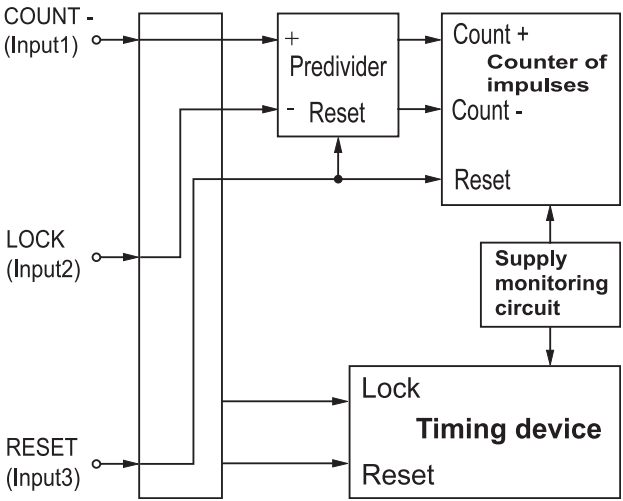


Figure 12. Up/down count with independent count inputs.

3.1.7.4. **Up/down count with independent «count+» and «count-» inputs and external reset** is set at **inP=3** (figure 12).

3.1.7.5. **Up/down count with external reset and direction set by external** signal is set at **inP=4** (figure 13).

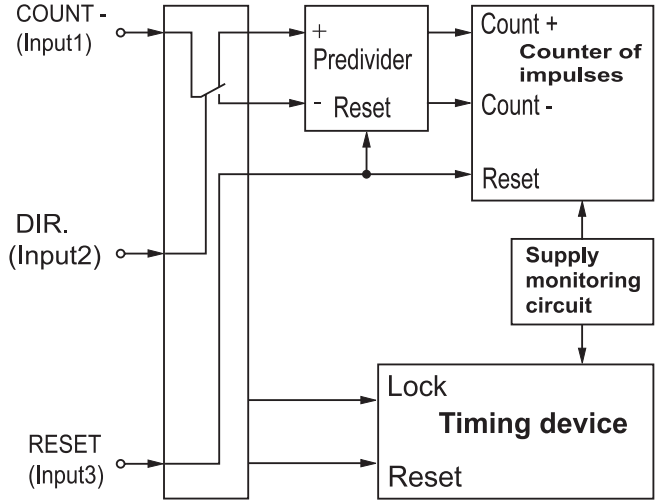


Figure 13. Up/down count with common count input, count direction set by external signal and external reset

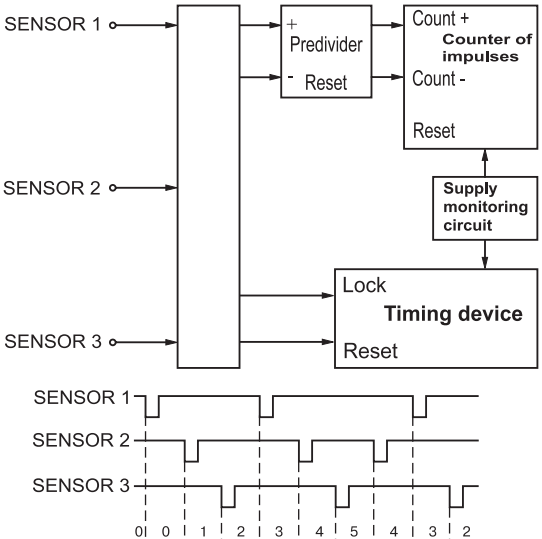


Figure 14. Up/down count with automatic determination of the direction from three sensors

3.1.7.6. Up/down count with automatic determination of the direction from three sensors is set at **inP=5**.

In this mode input commutator automatically sets count direction basing on queue of entering impulses to the counter of impulses inputs (figure 14), therefore impulse count starts from the second impulse after the counter reset. After setting of count direction, commutator transmits all impulses either to «+» or «-» input of the data processing unit. In this mode it is impossible to lock count, and it's necessary to carry out special operating sequence to reset counter of impulses (see 6.1.11).

3.1.7.7. **Count-up with lock and reset of the counters of impulses and timing devices** is set at **inP=6**.

It is the only mode where it is possible to perform external control of the timing device. Input 3 is connected to «Reset» inputs of timing device and counter of impulses simultaneously, and Input2 is connected to «Lock» inputs. Impulses entering Input1 of the instrument are applied to «+» input of data processing unit (figure 15).

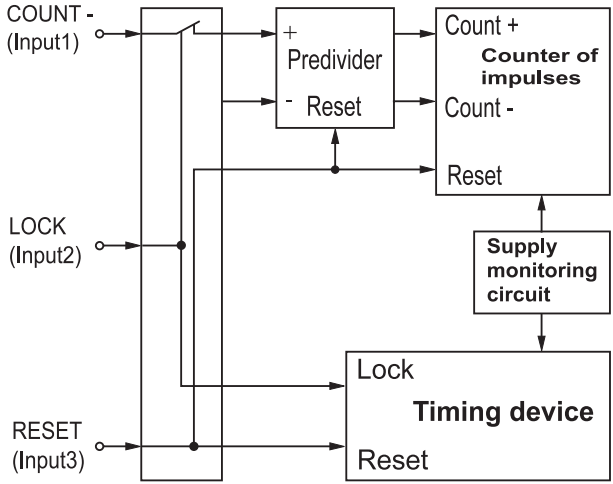


Figure 15. Count-up with lock and reset of the counters of impulses and timing devices

3.1.8. **Power controller** is intended to generate a signal at which the counters save information about their current state in nonvolatile memory.
Owing to this it is possible to continue interrupted process without loss of information at the restoration of supply.

Restoration of impulses counter value may be disabled by setting **init** parameter to 1. Then the counter of impulses will be set to the initial state at restoration of supply.

3.1.9. **Logic devices (LD)** are intended to compare the current value of the controlled parameter with preset values and to generate control signals for output devices according to given algorithm. The instrument is equipped with two logic devices. It's possible to apply to the input of each logic device one of the following:

- current value of a physical quantity,
- flow meter state,
- timing device state.

The source is set in **SEL1** and **SEL2** parameters accordingly:

«1» - value of a physical quantity,
«2» - flow meter state,
«3» - timing device state.

3.1.9.1. The algorithm used by LD to control appropriate output device is set in **SEt1** and **SEt2** parameters. Following variants are possible:

«1» – switched on at values less than U1 set point(U3)
«2» - switched on at values not less than U1 set point(U3)
«3» - switched on at values equal to U1 and U2 set points (U3 and U4), or values between them;
«4» – switched off at values equal to U1 and U2 (U3 and U4) set points, or at values between U1 and U2 (U3 and U4) set points;
«5» - it is switched on for t1 (t2) time on reaching U1 (U3) set point;
«6 *» - it is switched on for preset t1 (t2) time at a number multiple to U1 (U3) set point;
«7 *» - it changes state for opposite at a number multiple to U1 (U3) set point.

* - not available for timing device.

Besides, in **dir1** and **dir2** parameters the direction of controlled value variation is set, at which LD should check conditions, set in parameters SEL1 and SEL2:

«1» - check only at increase of current value
«2» - check only at decrease of current value
«3» - check in any case.

3.1.10. **Types of output devices**

Control output devices connected to the logic may be realized as relays, optocouplers or optotriacs. These devices perform on/off control of the load either directly or through powerful control devices such as starters, solid-state relays, thyristors or triacs. All the output elements are galvanically isolated from the instrument circuitry.

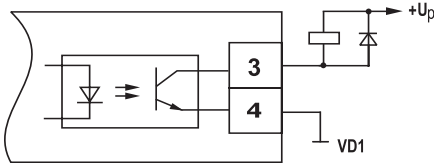


Figure 16.

3.1.10.1. Transistor optocoupler is used, as a rule, to control low-voltage (up to 50 V) relay. Connection diagram is given in figure16.

It is necessary to install diode VD1 (of КД103 type or similar) in parallel with the relay winding to prevent transistor breakdown from high current of self-induction.

3.1.10.2. Optotriac is included in the control circuit of a powerful triac through limiting resistor R1 as shown on figure17. Ohmage of the resistor defines the triac control current.

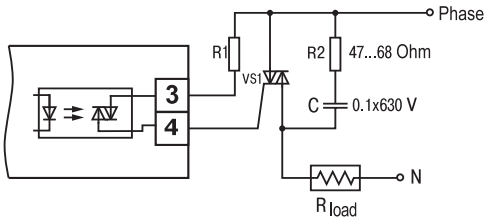


Figure 17.

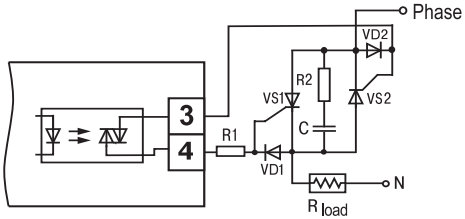


Figure 18.

Optotriac can also control a pair of inverse-parallel connected thyristors (see figure18).

It is recommended to connect filtering RC chains to the terminals of thyristors or triacs to prevent them from breakdown caused by high-voltage surges in the electric mains.

3.1.10.3. The second channel of the instrument has doubling output - transistor optocoupler intended to control other similar devices (for example, the same counters, timing devices, etc.) (figure19).

3.1.11. ***Operation modes of indication***

3.1.11.1. Eight-bit digital indicator constantly displays one of the following values according to the user's choice:

- state of the counter of impulses;
- flow meter state;
- timing device state;
- U1 value;
- U3 value.

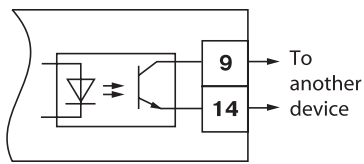


Figure 19.

3.1.11.2. Parameter **ind** is used to select the value to be constantly displayed on the indicator. It is possible to view other two values by pressing and holding of ⩓ or ⩔ button.

Ind	Constantly displayed source	The first shadow source ⩓ button	The second shadow source ⩔ button
1	counter of impulses	flow meter	timing device
2	flow meter	timing device	counter of impulses
3	timing device	counter of impulses	flow meter
4	U1 value	-	-
5	U3 value	-	-

Note At the values of parameter Ind = 4 or Ind = 5 a brief pressing of the PROG. button makes it possible to proceed to changing of the set point displayed on indicator. Repeated pressing of the PROG. button saves new value.

3.1.12. **Connection interface RS-485** is used to monitor instrument indications on a computer. The address of the instrument is set in parameter **Adr**, and its digit capacity is set in **A.LEn** parameter. At **A.LEn** = 8_bit the address is eight-bit and its value is within the range from 0 to 255. At **A.LEn** = 11_bit the address is eleven-bit and its value is within the range from 0 up to 2047.

Data exchange rate (from standard scale) is set in **SPd** parameter and can possess values from 2400 to 57600 bps.

Data format is set in **For** parameter and it can be of the following types:

For	Data digit capacity, bit	Even-odd check	Stop-bit number
7b_nP_2S	**7**	no	**2**
7b_EP_1S	**7**	even	**1**
7b_EP_2S	**7**	even	**2**
7b_OP_1S	**7**	odd	**1**
7b_OP_2S	**7**	odd	**2**
8b_nP_1S	**8**	no	**1**
8b_nP_2S	**8**	no	**2**
8b_EP_1S	**8**	even	**1**
8b_OP_1S	**8**	odd	**1**

3.2. Instrument structure

This instrument is embodied in plastic housing designed for panel or wall mount. Sketches of housings with overall and mounting dimensions are shown in Appendix A.

3.2.1. All parts of the instrument are installed on two printed-circuit boards. There is a control keyboard, digital indicator and light emitting diodes on one board and a power module and connecting terminal on another one.

3.2.2. Fastenings are included in supply for panel mounting of the instrument.

3.2.3. Terminal block for external connections is installed on the back panel. In the instruments designed for the wall installation this terminal is mounted inside the instrument, and rubber gaskets are placed in the holes for external connections

3.2.4. The view of instrument front panel for wall and panel (P1) types of housing is shown on figure 20 and for panel housing (P2) - on figure 21. Indication and control elements are arranged on the front panel.

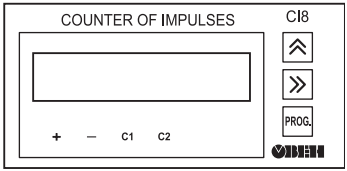


Figure 20.

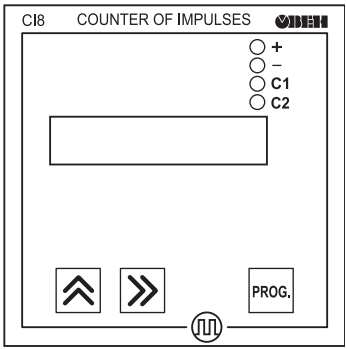


Figure 21.

3.2.4.1. Eight-bit digital indicator is used for display of counting value or instrument functional parameters.

3.2.4.2. Four red light emitting diodes signal about count direction and output devices state:

«+» - count direction is direct;

«-» - count direction is reverse;

«K1» - the first output device is switched on;

«K2» - the second output device is switched on.

3.2.4.3. PROG. button is used to enter the mode of view and set up of operation parameters, for setting parameter value after its selection, and also for saving the new set value in nonvolatile memory and exit to OPERATION mode.

3.4.2.4. ⩓ button is used:

- in OPERATION mode - to view the first shadow source by holding it;
- in PROGRAMMING mode - to select parameter from the list, change sign of a number or its value by pressing it.

3.4.2.5. ⩔ button is used:

- in OPERATION mode - to view the second shadow source by holding it;
- in PROGRAMMING mode - to go to parameter that carries out return to «Parameters groups menu» or to OPERATION mode, or to go to setting of comma position for factor value or selection of digit position while setting the parameter value.

4. SAFETY MEASURES

4.1. The instrument protection class from electric shock conforms to the class 0 of State Standard (GOST) 12.2.007.0-75.

4.2. The instrument uses dangerous voltage. It is necessary to disconnect the instrument and all devices connected to it from the mains before any repair or maintenance operations.

4.3. Do not allow ingress of moisture on the terminal block output contacts and internal electric parts of the instrument. It is forbidden to use the instrument in hostile environment containing acid, alkali, oil, etc.

4.4. Only qualified personnel who's familiar with the user's manual is allowed to perform connection, adjustment and maintenance of the instrument.

4.5. While use and maintenance it is necessary to comply with demands of State Standard (GOST) 12.3.019-80, «Operation Rules for Consumer's Electrical Installations» («Правил эксплуатации электроустановок потребителей») and «Labor Protection Rules for Using the Consumer's Electric Installations» («Правил охраны труда при эксплуатации электроустановок потребителей»).

ATTENTION! As there is a dangerous voltage on the terminal block, the instruments in housings for panel mounting (P1 and P2 modifications) must be installed in control boards accessible only to qualified personnel.

5. INSTALLATION OF THE INSTRUMENT ON SITE AND PRE-STARTING PROCEDURE

5.1. Install the instrument on a regular place and anchor it using assembly fasteners included in supply. Overall and mounting sizes of the instruments in different housings are given in Appendix A. Schemes of connection are given in Appendix B.

5.2. Install connection links for control signals, connections of the instrument with power network and actuators. It is necessary to use only standard instruments for installation operations.

5.3. While mounting external connections it is necessary to provide reliable contact with instrument terminals, so it is recommended to clean carefully and to tin their contacts.

Conductors cross-section must not exceed 1 mm^2. Connection of wires in all types of housings is carried out by means of screw. To access terminal block of the instrument in the wall mount housing it is necessary to remove its upper cover.

5.4. It is forbidden to merge output 14 (common) of the instrument with equipment grounding. It is not permitted to install control signals wires in one bundle with power cables producing high-frequency or pulse disturbances.

5.6. Switch on the instrument after making all necessary connections. «0» will be displayed on the digital indicator.

5.7. Set all necessary operation parameters following corresponding instructions (see section 6.1).

6. INSTRUMENT OPERATION MODES

The instrument can be used in one of two modes:
OPERATION or PROGRAMMING.

6.1. Programming

6.1.1. PROGRAMMING mode is used to change and save in nonvolatile memory the instrument parameters, necessary for operation.

Preset values are saved in the instrument nonvolatile memory at switching off.

6.1.2. Programmed parameters are divided into groups according to their designation. Parameters list and their description are given in Appendix B.

6.1.3. Each group includes parameters **SEc** and **out**.

SEc parameter is intended to guarantee protection from unauthorized change of parameters value. When **SEc=1**, access to the PROGRAMMING mode is possible only through a special code, corresponding to the current group. If invalid code is entered, only view of preset values is possible. At **SEc=0** change of parameters without entering the code is enabled.

Access to parameter **SEc** irrespective of its value is possible only at the entering the group through the code.

out parameter is used to exit group and to go to top level menu. Selection of desired parameter inside the group is performed with the button , to go to **out** parameter press the button .

To display on the indicator current value of selected parameter press PROG. button.

6.1.4. **Top level menu** contains a list of parameter group names:

«GrouP_A», «GrouP_b», «GrouP_C», «GrouP_d», «GrouP_E», and also the names of operations:

- reset of the counter of impulses **c.rES** and
- reset of the timing device **t.rES**.

6.1.5. To enter top level menu in OPERATION mode press and hold ⩓ button until **c.rES** appears on digital indicator (figure 22).

Select desired group of parameters or operation using ⩔ button. **out** parameter is used to exit from menu back to OPERATION mode. Pressing ⩔ button makes it possible to go to **out** parameter from any menu item.

Press PROG. button. If **out** was selected then the instrument will return to OPERATION mode. Otherwise an invitation appears on the digital indicator to enter access code «PIn_0000».

Enter the code if necessary, and press PROG. button. While entering the code use button ⩔ to select its digit position and ⩓ button to set its value.

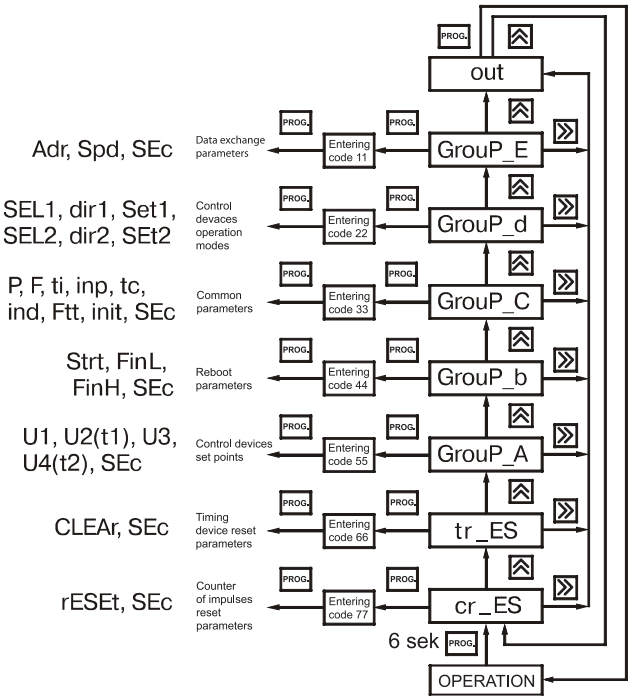

PROG.
out
Adr, Spd, SEc
Data exchange parameters
Entering code 11
GrouP_E
SEL1, dir1, Set1, SEL2, dir2, SEt2
Control devaces operation modes
Entering code 22
GrouP_d
P, F, ti, inp, tc, ind, Ftt, init, SEc
Common parameters
Entering code 33
GrouP_C
Strt, FinL, FinH, SEc
Reboot parameters
Entering code 44
GrouP_b
U1, U2(t1), U3, U4(t2), SEc
Control devices set points
Entering code 55
GrouP_A
CLEAr, SEc
Timing device reset parameters
Entering code 66
tr_ES
rESEt, SEc
Counter of impulses reset parameters
Entering code 77
cr_ES
6 sek
OPERATION

Figure 22.

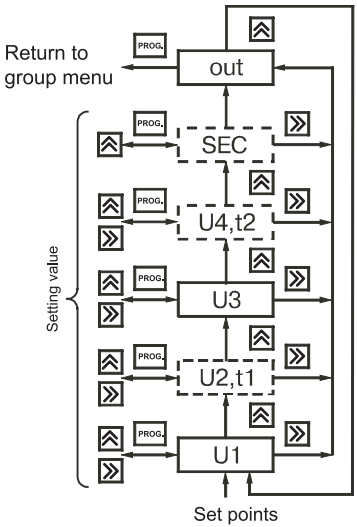


Figure 23.

6.1.6. **«GrouP_A»** group (figure 23) contains set points for logic devices **U1, U2 (t1), U3** and **U4 (t2)**. Decimal point position in parameters **U1, U2, U3** and **U4** is defined by its position in **F** parameter.

To set the values of **U1, U2, U3** and **U4** parameters:

- set parameter sign using ⩓ button (at positive value corresponding digit is blank, at negative value - sign «-» is blinking);
- then select digit for changing using button ⩔ (selected digit is blinking);
- set its value using ⩓ button;
- press PROG. button to return to the group menu.

If LD uses **t1** and **t2** parameters instead of **U2** and **U4**, set their values in the range from 1 to 99 s.

To set **t1** and **t2** parameters values:

- select digit for changing using button [≫] ;
- set its value using [≪] button;
- press [PROG.] button to return to the group menu.

6.1.7. **«GrouP_b»** group (figure 24) contains **Fin. L, Fin. H** parameters that set count limits and **Strt** value loaded in the counter of impulses when these limits are reached. Decimal point position in these parameters is defined by its position in F parameter.

To set **Fin. L, Fin. H** and **Strt** parameters values:

- set parameter sign using [≪] button (at positive value corresponding digit is blank, at negative value - sign «-» is blinking);
- select digit for changing using button [≫] ;
- set its value using [≪] button;
- press [PROG.] button to return to the group menu.

At setting of **Strt** parameter value button [≫] is used not only to select necessary digit, but also to set **oFF** value.

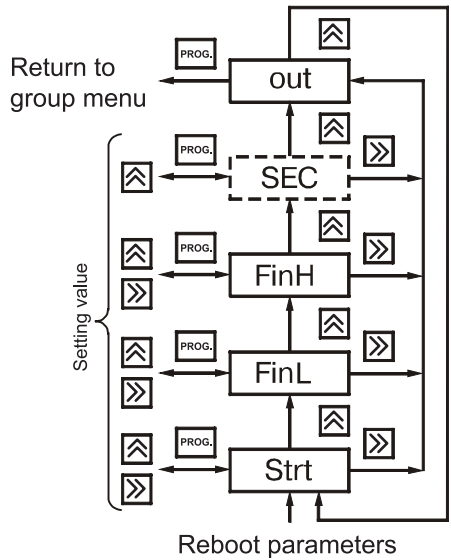


Figure 24.

6.1.8. **«GrouP_C»** group (figure 25) contains **inP** and **tc** parameters that define operation mode of the input commutator, coefficients of predivider **P** and multiplier **F**, measuring time **ti** and initial bias **di** for flow meter, and also operation modes of timing device **Ftt**, indication **ind** and reset of counter of impulses at switching on the instrument **init**.

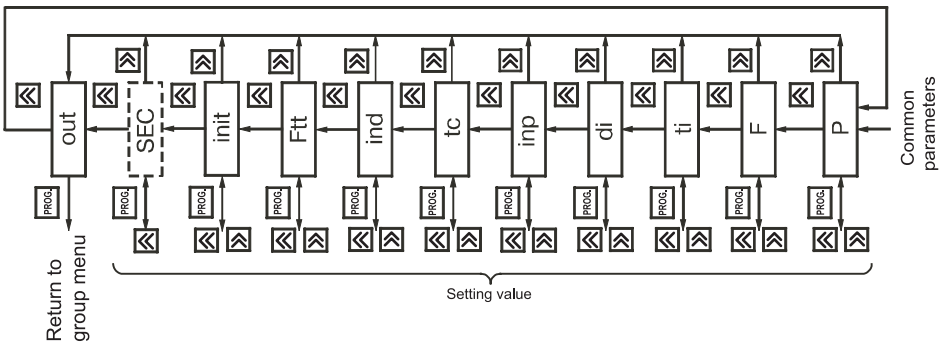


Figure 25.

To set coefficient of predivider **P** value:

- select digit for changing using [≫] button;
- set its value using [≪] button;
- press [PROG.] button to return to the group menu.

To set coefficient of multiplier **F** value:

- set comma position using [≫] button and press [PROG.] button to go to digit-by-digit value setting;
- select digit for changing using [≫] button;
- set its value using [≪] button;
- press [PROG.] button to return to the group menu.

To set flow rate measuring time **ti**:

- select digit for changing using [≫] button;
- set its value using [≪] button;
- press [PROG.] button to return to the group menu.

To set initial bias for flow meter **di**:

- set bias sign using ⩓ button (at positive value corresponding digit is blank, at negative value - sign «-» is blinking);
- select digit for changing using ⩔ button;
- set its value using ⩓ button;
- press PROG. button to return to the group menu.

To set parameters **inP**, **ind** and **Ftt**, **Init** values:.

- set each value using ⩓ button;
- press PROG. button to return to the group menu.

6.1.9. **«GrouP_d»** group (figure 26) contains **SEL1** and **SEL2** parameters that define input values for LD1 and LD2, **SEt1** and **SEt2** parameters that define their operation logic and **dir1**, **dir2** parameters that define count direction at which output devices must act.

To set **SEL1**, **dir1**, **SEt1**, **SEL2**, **dir2** and **SEt2** parameters values:

- set each value using ⩓ button;
- press PROG. button to return to the group menu.

6.1.10. **«GrouP_E»** group (figure 27) is used to set instrument network address **Adr**, its digit capacity **A.LEn**, data exchange rate **SPd** and sending format **For** (if RS-485 interface is present).

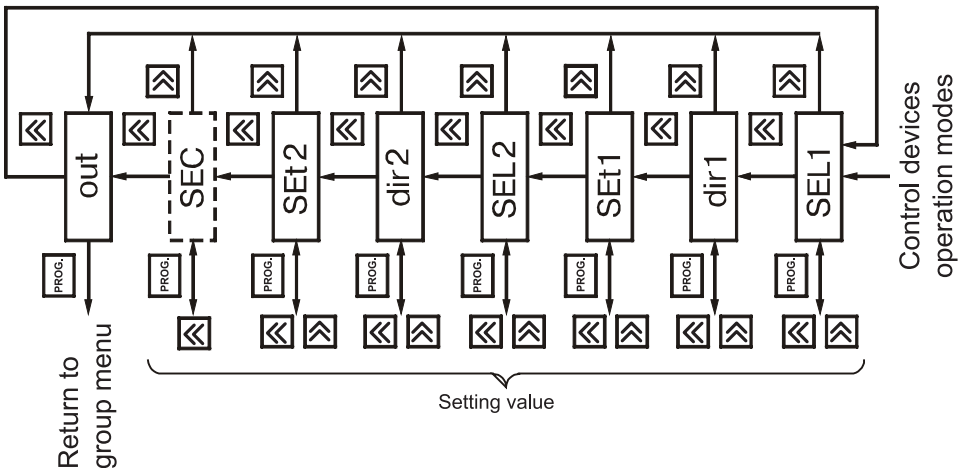


Figure 26.

To set **A.Len** parameter value:

- set its value using ⩓ button;
- press PROG. button to return to the group menu.

To set **Adr** parameter value:

- select digit for changing using ⩔ button;
- set its value using ⩓ button;
- press PROG. button to return to the group menu.

To set **SPd** parameter value:
For this purpose:

- set its value using ⩓ button;
- press PROG. button to return to the group menu.

To set **For** parameter value:
For this purpose:

- select format using ⩓ button;
- press PROG. button to return to the group menu.

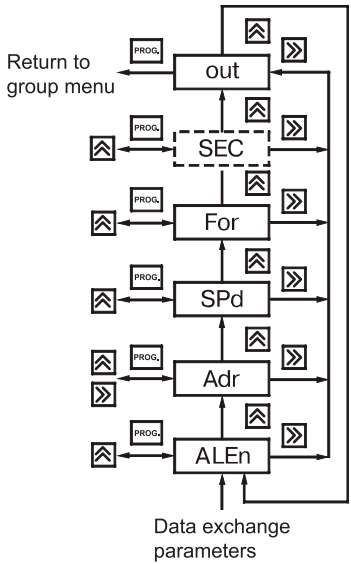


Figure 27.

6.1.11. **c.rES** group (figure 28) is used to reset counter of impulses (the predivider thus is zeroed).

On entering the group parameter **rESEt** appears. To reset the counter press PROG. button.

Reset progress is accompanied by consecutive flare of points on the indicator.

If protection against unauthorized reset is used (parameter **SEc=1**) then **rESEt** parameter is accessible only after entering the code. Otherwise parameter **out**, which will be the only one in the group, is displayed on the indicator.

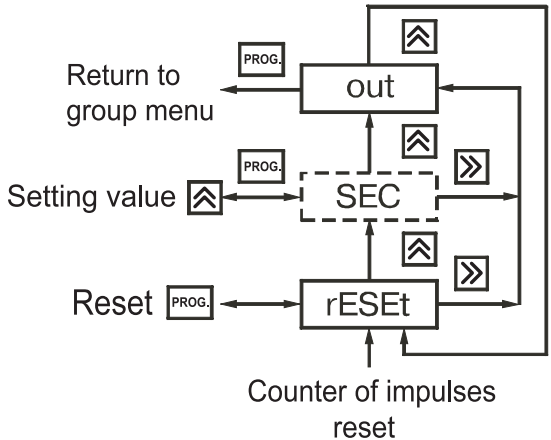


Figure 28.

6.1.12. **«t.rES»** group (figure 29) is used to reset timing device, for example in case of use of the instrument as the operating time counter.

On entering the group parameter **CLEAr** appears. To reset the counter press PROG. button. Reset progress is accompanied by consecutive flare of points on the indicator.

If protection against unauthorized reset is used (parameter **SEc=1**) then **CLEAr** parameter is accessible only after entering the code. Otherwise parameter **out**, which will be the only one in the group, is displayed on the indicator.

6.2. OPERATION Mode

In OPERATION mode the instrument displays measured value, which represents the result of input actions and generates signals according to the algorithm preset at programming.

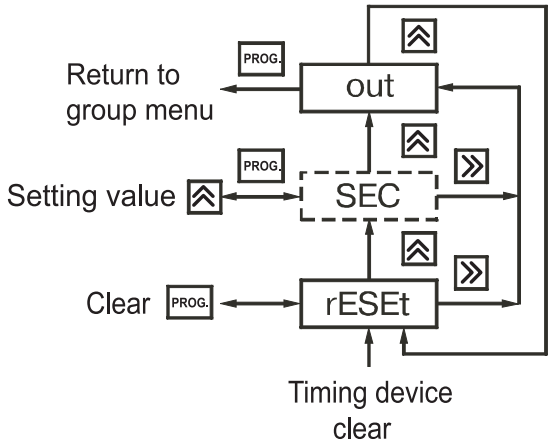


Figure 29.

7. MAINTENANCE

Maintenance of the instrument should be carried out at least once in six months and includes instrument fastening check, electric connections check, and also removal of the dust and debris from instrument terminal.

8. MARKING

8.1. The instrument is marked with:

- symbolic notation code of instrument type and modification;
- trade mark of the manufacturer;
- serial No;
- year of manufacturing.

9. PACKING

9.1. Instrument packing is carried out in accordance with State Standard (GOST) 9181-74 using market container made from corrugated board.

9.2. Products packing for mail delivery is carried out in accordance with State Standard (GOST) 9181-74.

10. STORAGE

10.1. The instrument is to be stored in closed heated rooms in cardboard boxes under following conditions:

- ambient temperature 0...+60 єC.
- relative air humidity no more than 95 % at temperature 35єC.

Air indoors should not contain dust, acids and alkalis vapor, and also corrosive gases.

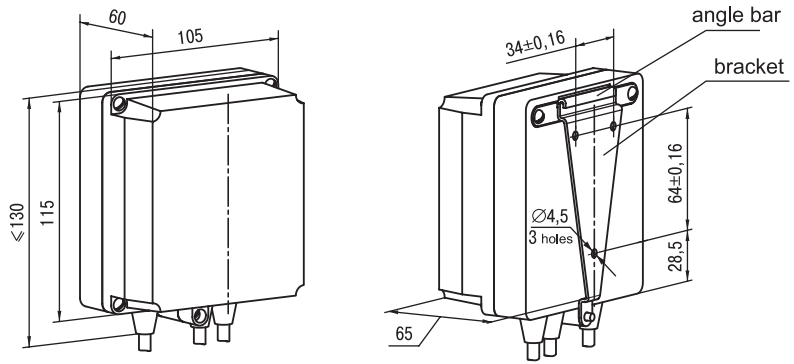
11. TRANSPORTATION

11.1. Transport the packed instrument at temperature from -25 ˚C to +55 ˚C and relative air humidity no more than 95 % at temperature 35 ˚C.

11.2. Transportation by all kindss of closed transport is allowed.

11.3. Transportation by air should be carried out in heated pressurized modules.

OUTLINE DRAWING



1. Operating position – no matter
2. Undercut barrels in accordance with entrance cable diameter

Figure A.1. W Type Wall Housing

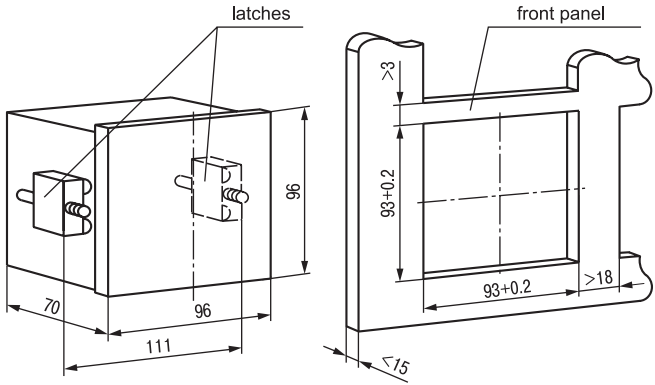


Figure A.2. P1 Type Panel Housing

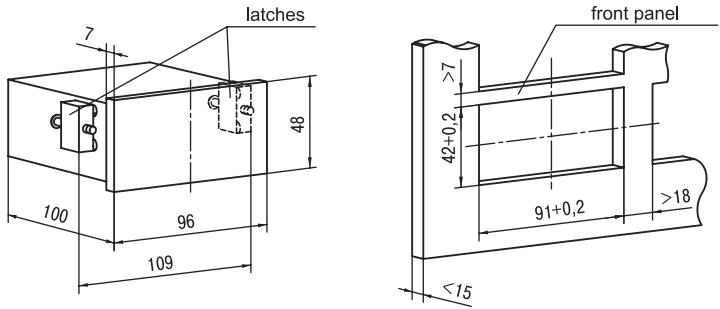


Figure A.3. P2 Type Panel Housing

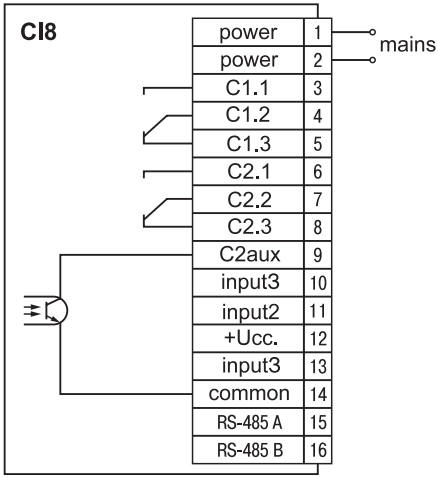


Figure B.1. Connection of the CI8 instrument with relay output

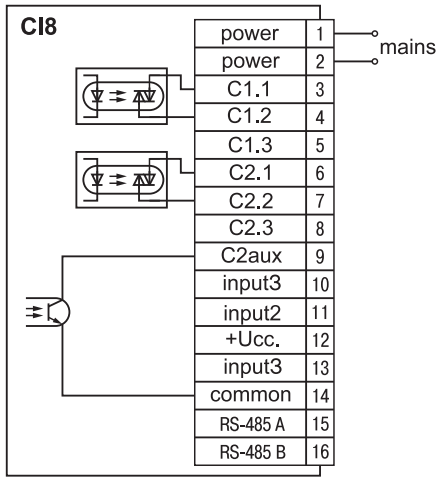


Figure B.2. Connection of the CI8 instrument with optotriac output

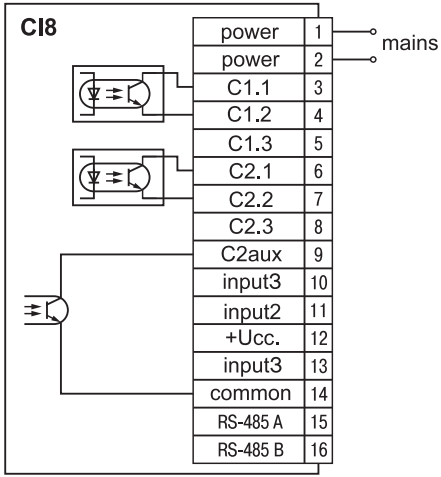


Figure B.3. Connection of the CI8 instrument with optical transistor output

Programmable parameters

Parameter		Values	Default valu	User's value
Name	Description			
General parameters (present in each group)				
out	Return to main menu from parameters group in programming mode	PROG. button [command]	-	
SEc	Possibility of parameters change	0 or 1		
rESEt	Counter of impulses reset	PROG. button [command]	-	
CLEAr	Сброс счетчика времени		-	
Group_A. LD settings				
U1	LD1 first setting	-9999999...9999999	0	
U2	LD1 second setting	-9999999...9999999	-	
U3	LD2 first setting	-9999999...9999999	0	
U4	LD2 second setting	-9999999...9999999	-	
* «User's value» column is filled in during instrument programming				

1	2	3	4	5
t1	First output device on state time	1...99 s	-	
t2	Second output device on state time	1...99 s	-	
Group_b. Counter of impulses load parameters				
Strt	Counter of impulses initial value	-9999999...9999999	0	
FinL	Low bound of count, at which ounter of impulses is reloaded	-9999999...Strt-1	-10	
FinH	Upper bound of count, at which counter of impulses is reloaded	Strt+1... 9999999	10	
Group_C. Counter of impulses load parameters				
P	Divider (coefficient needed for predivider operation)	1...9999	1	
F	Factor (coefficient needed for multiplier operation)	0.0000001...9999999	1	
Ti	Consumption measuring time	1...99 s	0.75	

1	2	3	4	5
di	Flow meter indication bias	0.0000001...9999999	0	
inp	Instrument inputs designation	1...6	4	
tc	Input filter time constant	0.1...999.9 ms	20.0	
ind	Parameter displayed on indicator	1...5	1	
Ftt	Format of time displayed on indicator	0 or 1	1	
init	Counter of impulses reload with Strt parameter value at instrument switching on	0 - no 1 - yes	0	
Group_d. Logic devices operation parameters				
SEL1	Input value for LD1	1...3	1	
dir1	Count direction when LD1 functions	1...3	1	

1	2	3	4	5
SEt1	Control algorithm for the first output device			
SEL2	Input value for LD2	1...3	1	
dir2	Count direction when LD2 functions	1...3	2	
SEt2	Control algorithm for the second output device	1...7	1	
Group_E. PC connection parameters				
A.Len	Instrument address length	8_bit or 11_bit	8_bit	
Adr	Instrument network address	0...256 or 0...2048	0	
Spd	Data rate	2400...57600 bps	9600	
For	Data format	see 3.1.12	7b_nP_2S	

LIST FOR CHANGES REGISTRATION

Change No	List No (pages)				Lists total (pages)	Date of change	Signature
	changed	substituted	new	annuled			
1	2	3	4	5	6	7	8