

INSTALLATION AND OPERATING INSTRUCTION FOR SURGE COUNTER TYPE PROCOUNTER



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Instruction No ProCounter/IMIE/07/EN wydanie 01.2019

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1. SUBJECT OF INSTRUCTION

Subject of this instruction is the surge counter type PROCOUNTER for high and medium voltage surge arresters.

2. APPLICATION

Surge counter type PROCOUNTER is intended to count the number of operations of HV and MV surge arresters for DH, SL, SM, SH acc. IEC 60099-4:2014 (line discharge I, II, III, and IV acc. IEC 60099-4:2009).

3. RATED CHARACTERISTICS

Range of current impulses with wave 8/20 μ s, which cause the operation of counter.....	200 ÷ 40000 A
Range of current impulses with wave 30/60 μ s, which cause the operation of counter.....	200 ÷ 2000 A
Long duration current impulse withstand with rectangular shape 2800 μ s.....	1200 A
High current withstand with wave 4/10 μ s.....	100 kA
Highest voltage on terminals of surge counter with current impulses 10kA, 8/20 μ s.....	3,1 kV
Highest voltage on terminals of surge counter with current impulses 20kA, 8/20 μ s.....	3,4 kV
Weight about.....	2 kg
Dimension:	
Width.....	124 mm
Height.....	237 mm
Lenght.....	238 mm
Work position	horizontal
Level of tightness	IP67
Terminals	stainless steel

4. SERVICE CONDITIONS

Surge counters type PROCOUNTER are designed for operation at the ambient temperature from -40°C (233 K) to +60°C (333), at the altitudes not exceeding 1000m above level sea and at the rated frequency of the power voltage from 48 Hz to 62 Hz.

5. SCOPE OF INSTRUCTION

This instruction includes information regarding design, principle of operation, mounting and maintenance of surge counter, as well as packing and storage.

6. DESIGN

Surge counter is designed with set of the ZnO resistors, electromagnetic counter and electronic module. There are in hermetic aluminium alloy housing all internal parts of surge counter. In the upper wall the bushing type of insulator, with terminal to connect with surge arrester, is located. In the bottom wall of housing there is the earth terminal and special socket to connect the leakage current analyser.

7. PRINCIPLE OF OPERATION

Each of operation of the surge arrester caused by the overvoltage causes the passage of the discharge current through the counter. The passage of the discharge current causes the charging of the capacitor. After the discharge current decay the capacitor is discharged through the winding of the counting mechanism causing the increase of the indication of the counter by „1". The electronic circuit of the counters made in special version has the measuring shunt with the resistance 200 Ω , which is used for the accurate measurements of the leakage current. The voltage from the shunt is leaded to the measuring socket in the lower wall of the housing, which is used for the connection of the leakage current analyzer. (Version F of surge counter allows execution measurement away from place of installation surge arrester. Fig. 5)

8. AVAILABLE VERSIONS

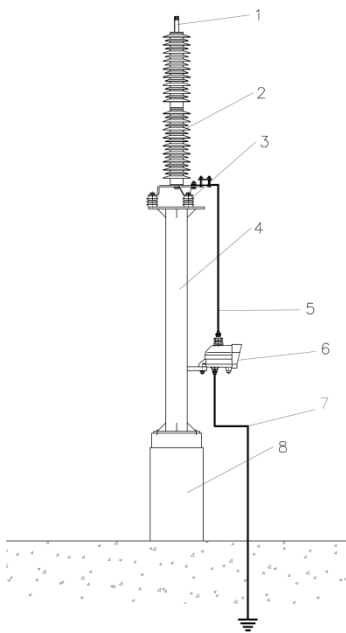
Surge counter type PROCOUNTER is produced in below versions:

- version A – with electromagnetic counter and leakage current meter and measuring socket
- version B – with electromagnetic counter and measuring socket
- version C – with electromagnetic counter
- version D – with electromagnetic counter and leakage current meter
- version E – with electromagnetic counter, leakage current meter, socket to sending with line signal of activation number (maximal length of line 100* meters)
- version F – two modules F/1 and F/2 connected with each other with shielded line to transmission signal to length 30* meters, with hermetical outputs (IP67). F/1 – module of transmitter, F/2 – module of receiver with electromagnetic counter, leakage current meter and measuring socket.

*) before buying, lenght of the line should be establish with the manufacturer

9. PACKING, TRANSPORT AND STORAGE

Surge Counter is packed in separate carton box additionally packed on palette or wooden box, which ensure the devices against the damage during transportation. During loading and unloading please take care about boxes with surge counters in order not to overturn, knock over and throw off. Wooden boxes must be marked to ensure the proper performance. Surge counters should be stored in clean and dry places. Storage in packing outdoor isn't recommended.



10. ERECTION OF SURGE COUNTER

Before beginning to install, make the visual inspection of delivered surge counters. Don't install damaged surge counters and in this case please contact with supplier, immediately. Please also take into account descriptions on fig.1.

During installation follow step by step:

- check, if surge arrester is mounted on the insulating base
- predict the place of fixing the surge counter in order to have good possibility to read the number of impulses and alternatively indication of leakage meter
- mounting surge counter on the structure by bolt M12 with washer and nut (see on fig. 1) to be immobilised
- connect the earth terminal to solid grounded point (resistance max. 10Ω)
- use the steel tape with cover of zinc, min. $20\text{mm}\times 3\text{mm}$
- connect the line terminal to bottom terminal of surge arrester with conductor min. 16 mm^2 Cu or 25mm^2 Al.

Note the number of impulses before switching on the line voltage. For the ProCounter E after every diagnostic of surge arrester check number of activation in surge counter, control room and note eventually difference – this

situation can be at time when the plug of sending number of activation is disconnected from control room and in this time there is surge which is register through the base counter.

- For version E pay special attention for correct connect line in plug (Fig. 1), which be working with counter socket. Pins no. 1 and 2 are used only to diagnostic surge arrester, to eventually connect the leakage current analyser, multimeter or oscilloscope. Diagnostic could be perform after earlier disconnecting the line with plug connect pins 3 and 4 and mounting new plug on time of diagnostic with connect pins 1 and 2 with line and ending to leakage current analyser, multimeter or oscilloscope.
- After perform diagnostic of surge arrester should again connect plug with line and connection a pins 3 and 4 to them – circuit sending number of activation of counter to control room (1A 24 V DC, minimal current contacts 100mA). There is recommended to use a line with outer diameter in the range of $D=4.5 - 6.5\text{ mm}$ for example type ROBUST 210 $2\times 1.5\text{mm}^2$ (there is recommended for large length of line to use a line with bigger cross-section for example 2.5mm^2) Lapp Kabel company or equivalent replacement suitable to outdoor working condition. Correct mounting of plug and choice of cross-section line guaranteed declared resistance degree IP67.
- Surge counter type ProCounter E was projected to work with out surge counter. In order to config correct cooperate counter please contact the manufacturer.

NOTE: IMPROPER INSTALLATION VOIDS THE WARRANTY ON THIS PRODUCT

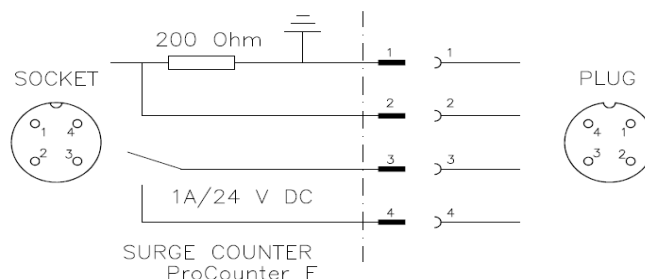


Fig.1 Scheme of connecting socket and plug (view of socket and plug from the connection side – frontside) – ProCounter E

-For the version ProCounter F pay extra attention at effective grounded modules F1 and F2. Both modules should be connected to the same ground place. In case of mounting on energetic steel pole the rule of

connecting to the same ground place is fulfilled because all construction of pole is connecting to the same grounded place. The important thing is to connect modules of counter with signal line. Each line on his ending have a serial number, year of production and lenght. Change the line between counters, in particular when the lenght of the line are diffrent, will cause incorrect work of current leakage meter. Due to the quality and reliability work of surge counter, the manufacturer delivers a line with a diameter $d=8\text{mm}$ to connect modules F1 and F2 with mounting plugs at both side of line. Any interference to connecting between line and plug is prohibited and it may void the warranty. (Client in the moment of place an order for ProCounter F is obligated to give a lenght of line). The line should be mounting to pole structure in a way that ensure him a secure work for many years, while a slight excess of line could leave in the form of loops attached to the closest structure in a way that it wouldn't be a possibility of mechanical damage and no touch to the plugs of modules F1 and F2. The line and plugs connecting modules F1 and F2 are resistant to outdoor working. (resistant for UV and changing temperature). Module F1 of counter mounting as close as possible to surge arrester, while module F2 on structure of pole in a way that a reading a values from the module be easy and connect analyzer, multimeter and oscilloscope be easy to. Example conncting of ProCounter F shows fig.3. Maximal lenght of signal line connecting module F1 with module F2 is 100m. The bracket of module in the form of an angle can rotate at 90° in order to optimal mounting module F2 to grounded structure of pole. General view of recommended configuration connecting surge counter with surge arrester (configuration of primary circuit) shows on Fig.2 below.

Fig. 2. A way to mounting a surge counter type ProCounter (A; B; C; D; E)

1. Line terminal of surge arrester
2. Surge arrester
3. Insulating base
4. Support structure
5. Connecting between surge arrester and surge counter
6. Surge counter
7. Ground
8. Supporting structure

Instalation of surge counter should be compatible with guidelines contained in norm EN 60099-5 pkt. 6.1 i 6.2.

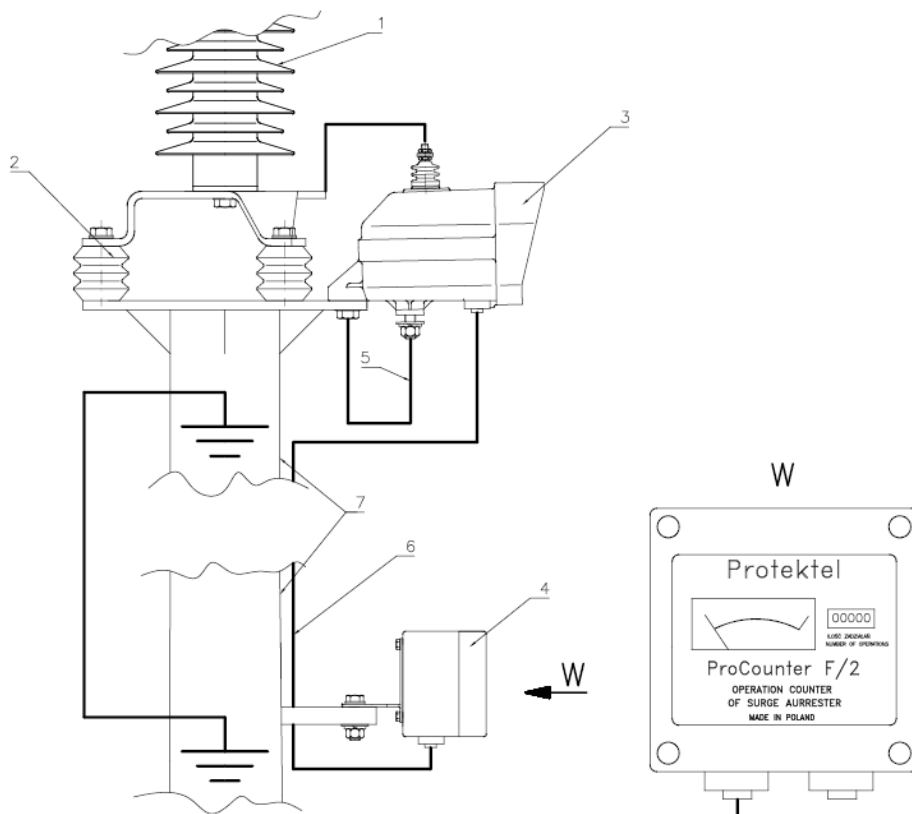


Fig.3. A way to mounting a surge counter type ProCounter F

1. Surge arrester
2. Insulating base
3. Module F1
4. Module F2
5. Grounded line of module F1

6. Signal line
7. Pole, grounded structure

11. MOUNTING DATA

- Line terminal clamp – stainless steel bolt M12 with maximum torque 25 Nm
- Ground terminal clamp - stainless steel bolt M12 with maximum torque 25 Nm
- Max. torque for bolt M12 in order to mount surge counter on the structure – 25 Nm
- Max. height – 201,5 mm
- Max. width – 124,0 mm
- Max. length – 238,0 mm
- Position of work – horizontal
- Mass – 2,5 kg.

Module F2

- Maximal torque of screw module to supporting structure with stainless steel bolt M12 – 50Nm
- Height – 120 mm
- Width – 122 mm
- Length – 95 mm
- Working position - Horizontal
- Weight – 1,3 kg.

12. MAINTENANCE

After installing of surge counter, note the number of operations on the counter. Measurements and readings should be lead with rules of safety works under high voltage. These actions should be performed by two-persons groups with special knowledge and experience in works with high voltage equipment.

Don't make measurements during:

- snowing and raining
- storm
- switching operations on substation
- high humidity, above 80%

During visual inspection surge counters, pay attention on:

- number of operations,
- condition of bushing insulator,
- condition on terminals (line and earth).

In case any changes or damages replace the surge counter to new. Slack terminals should be screwed according with mentioned torque in section 11. All performances must be according to local regulations in this range.

13. SPARE PARTS

Spare parts aren't foreseen. Surge counter type ProCounter is non-repaired equipment.

NOTE: IN ANY CASES OF IMPROPER OPERATIONS OF SURGE COUNTERS PLEASE CONTACT WITH SUPPLIER, IMMEDIATELY.

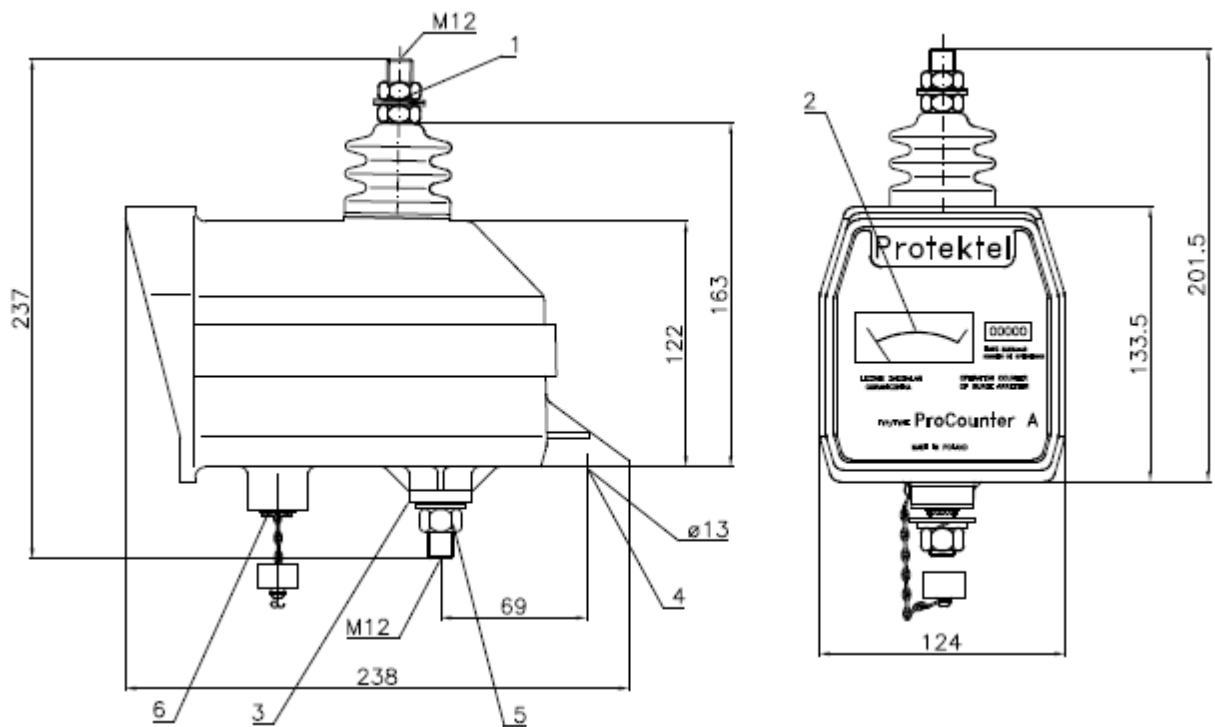


Fig.4. Dimensional drawing of surge counter ProCounter (A; B; C; D; E; module F1) with assembly notes

1. Line terminal. The upper M12 nut is designed to tighten the cable end. Do not exceed the torque of 25 Nm. The lower nut is only for holding with the key.
2. Leakage current meter
3. Year of production and serial number
4. Mounting hole of the counter for installation on the supporting structure by means of M12 screws *. Do not exceed the tightening torque 50 Nm.
5. Ground terminal. Do not exceed the tightening torque 35 Nm.
6. Measuring socket / Socket for transferring the number of operations

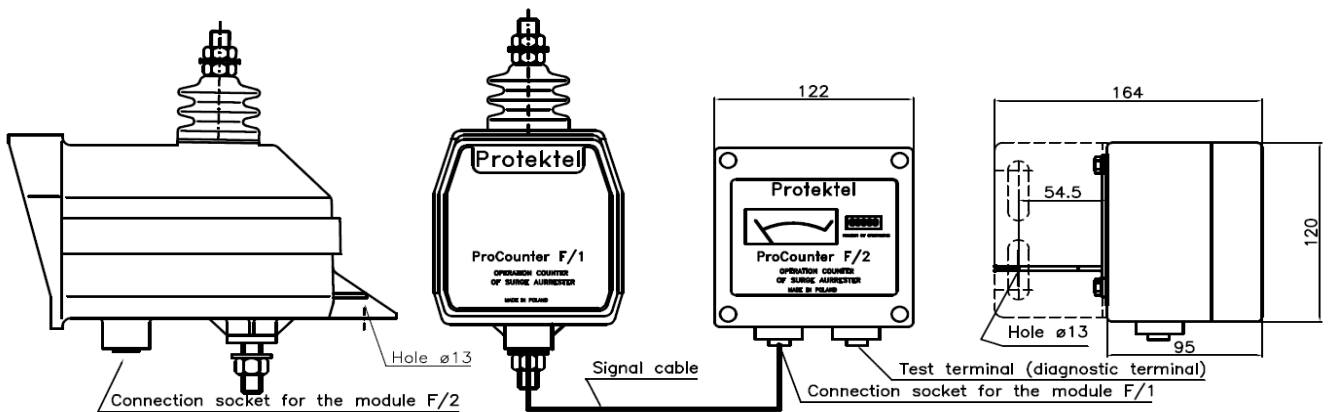


Fig. 5 Dimensional drawing of the ProCounter F surge counter

*) M12 screw, washer and nut to install the counter on the support structure are not supplied. At the client's request, however, they can be included in the delivery.

14. DISPOSAL OF WASTE PRODUCT

Surge counter type ProCounter are environmentally friendly, but must be disposed of in accordance with local requirements in an environmentally friendly manner. Materials as far as possible should be recycled.

List of materials included in the arrester:

1. Aluminium
2. Ceramics
3. PA 6.6 (Poliamid)
4. Steel

The materials used for the production of the surge arresters does not pose a threat to human life and health.

15. AFTER-SALES SERVICE

In case the product is not delivered in good condition or would cause problems with the installation or during operation, please contact:

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ATTENTION:

The manufacturer reserves the right to change technical data or designee without prior notice.