



Phase comparator

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## ***User manual***

Document version: 02i00  
Update: 2015-03-13



## Safety information

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*When the device is in operation some of its parts may be connected to a hazardous live voltage.*



*Improper operation of the device or its application to purposes different from the intended use may pose hazards to operators and /or may lead to the equipment damage.*



*National and local electrical safety regulations must always be followed.*



*The user shall be held fully responsible for any safety risk and possible failures of the equipment that may arise due to such an improper operation or misuse.*



*Exploration of damaged device can result in malfunction of protected object and result in threat to life and health.*



*Reliable and defect-free operation of the device needs appropriate transportation, handling, storage, installation and commissioning as well as correct operation and maintenance.*



*The device can be installed and operated solely by accordingly trained personnel.*

## Attention

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*We reserve the right to modify the device.*



*Device is an industrial monitoring and control instrument.*



*Remaining user documentation can be downloaded from [energetyka.itr.org.pl](http://energetyka.itr.org.pl)*

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## 1. Introduction

### 1.1. Symbols



*Electrical warning symbol indicates the presence of hazardous energy circuits or electric shock hazards.*



*The warning symbol indicates the important information related to the damage or improper operation of the device.*



*The information symbol indicates the clarification of relevant features and parameters of the device.*

## 2. General Information

### 2.1. Destination of the equipment




The SPC-type specific phase comparator serves for verification of the coincidence of adopted phase designations at LRM connector in particular MV bays.

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*Fig. 2.1.1 The view of SF 1*

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When there is no coincidence the following symbol  is displayed on the LCD display. The phase comparator – type SF - satisfies the LRM system requirements - IEC/PN-EN 61243-5 standard.


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## 2.2. Features

### Case

- small dimensions 52 / 46 / 46 mm

### Signalization

- when there is no coincidence or when no voltage is present on one of the ALn, BLn connectors, the  symbol is displayed on the LCD display





## 2.3. Front panel



Fig. 2.3.1. Front panel view

## 2.4. Optical signaling

Tab. 2.4.1. Signaling of operation:

| LCD signaling  | Voltage at the connector |              | Description  |
|--|--------------------------|--------------|--|
|  | ALn                      | BLn          |  |
|  | -                        | -            | no voltage at connectors                                 |
|  TEST | •                        | -            | voltage only at ALn                                      |
|       | -                        | •            | voltage only at BLn                                      |
| TEST   | •                        | •            | voltage at two connectors, phase shift < -40° ... +40° > |
|  TEST | •                        | • ( < -40° ) | voltage at two connectors, phase shift < -40°            |
|  TEST | •                        | • ( > +40° ) | voltage at two connectors, phase shift > +40°            |



In case of a strong solar radiation on the device front panel it might be necessary to manually dim the LCD display in order to make the signalization more readable.



For proper operation the measured voltage difference at the ALn and BLn connectors must be less than 1.5 V rms.



The phase comparator shall not be used as a voltage indicator.

### 3. Operation manual



Proper operating and safety require the device to be correctly inserted into the LRM connector of the voltage indicator. Whilst inserting into the LRM connector hold the device as shown in Fig. 1 and pay special attention so as not to touch metal parts of the ALn, BLn connector and PE where in case of defect (damaged voltage protectors in the LRM connector of the voltage indicator) a dangerous voltage can occur.



Fig. 3.1. How to hold the SF 1

Sequence of connecting the phase comparator to the LRM connector according to the scheme, Fig. 7.1.:

- connect the SF 1 comparator to the line Ln in the LRM connector of the voltage indicator in bay A,
- next connect a measuring cable to the comparator,
- then connect the measuring cable to the line Ln in the LRM connector of the voltage indicator in bay B.



Take special care whilst connecting the measuring cable to the LRM connectors of the voltage indicator and the phase comparator to avoid electric shock.

### 3.1. Checking the operation of the signaller

In order to check the correct operation of the signaller, one has to:

- connect the 50 Hz, 5 V RMS sinusoidal voltage to the ALn and PE connectors,,
- check if the ⚡ symbol and TEST text are lighted on the LCD display,
- short circuit and connect the ALn and BLn connectors,
- check if the TEST text is lighted on the LCD display and the ⚡ symbol is dim,
- If there are no display errors on the LCD display, the signaller is operating correctly.

## 4. List of referred standards

The device described in this manual has been designed and is manufactured for industrial applications.

The engineering and manufacturing processes assume compliance with relevant standards. Adherence to these standards during installation, commissioning and operation of the device by the user is the essential precondition to achieve the desired performance and safety levels.

The device meets essential requirements specified in the applicable EU Directives:

- Electromagnetic compatibility (EMC) 2004/108 / EC
- Low-voltage electrical equipment (LVD) 2006/95 / EC

Tab. 4.1. General and harmonized standards

| No. standards        | Title of the standard   |
|----------------------|---|
| PN-EN 61000-6-2:2008 | Electromagnetic compatibility (EMC).  |
| PN-EN 61010-1:2011   | Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements |
| PN-EN 61243-5:2004   | Live working. Voltage detectors. Voltage detecting systems (VDS)  |
| PN-EN 60529:2003     | Specification for degrees of protection provided by enclosures (IP code).                                       |

## 5. Technical parameters

### 5.1. Input circuits

#### Voltage input circuits

|  |           |
|--|-----------|
| Number of inputs                         | 2         |
| Minimal voltage threshold, LCD signaling | 4.5 V rms |
| Maximal voltage                          | 20 V rms  |
| Frequency                                | 50 Hz     |
| Input capacity                           | 600 pF    |
| Maximum length of the connected cables   | < 3 m     |

### 5.2. Environmental conditions

|                                      |   |
|--------------------------------------|---|
| Operating temperature                | -25°C ... +55°C                           |
| Storage temperature                  | -35°C ... +85°C                           |
| Air humidity                         | lack of condensation and frost deposition |
| Equipment class                      | 0   |
| Overvoltage category                 | III                                       |
| Electrical environment               | B   |
| Pollution degree                     | 2   |
| Mechanical tests                     |   |
| Sinusoidal vibration                 | class 1                                   |
| Single and multiple shocks and bumps | class 1                                   |
| Seismic                              | class 0                                   |

### 5.3. Construction

|                                   |                 |
|-----------------------------------|-----------------|
| Mass                              | < 0,1 kg        |
| Dimensions (width, height, depth) | 52 / 46 / 46 mm |
| <b>Degree of protection</b>       |                 |
| Front panel side                  | IP 54           |
| Connectors side                   | IP 00           |



## 6. Description of connectors

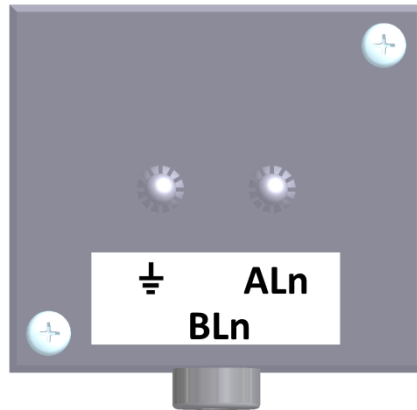


Fig. 6.1. The view of connectors side

## 7. Connection diagram

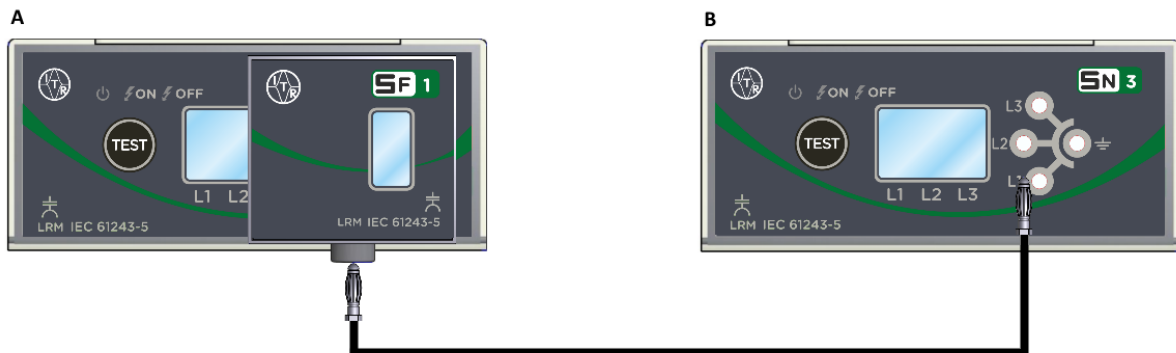


Fig. 7.1. Connection diagram

## 8. Dimensions

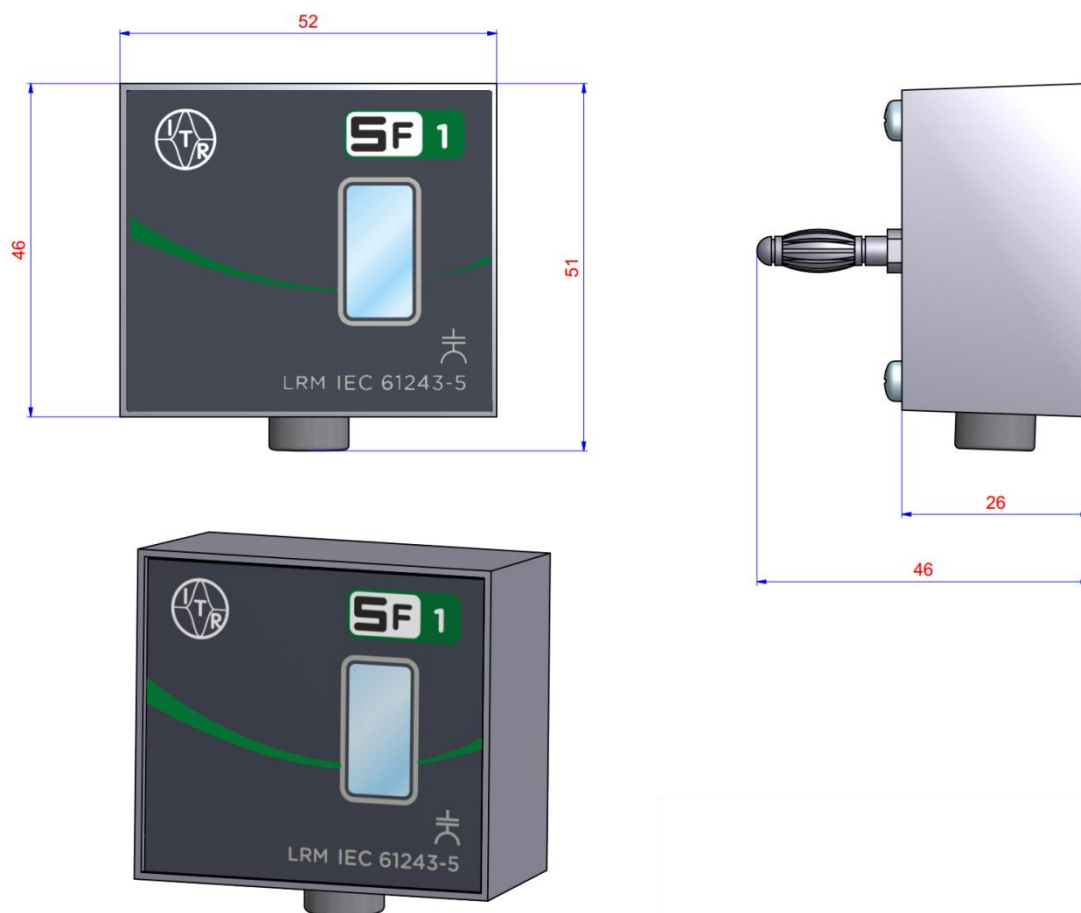


Fig. 8.1. Dimensions

## 9. Manufacturer remarks

### 9.1. Maintenance, inspections, repairs



The manufacturer recommends that correctness of device operation is verified:

- a) each time - during commissioning,
- b) at least once a year - in mine face installations,
- c) at least once every 5 years in installations other than front face.

Also inspections resulting from branch regulations should be undertaken.

### 9.2. Storage and transportation



Devices are packed in transportation packages and secured against damage during transportation and storage. Devices should be stored in transportation packages, indoors, in places free from vibrations and direct effects of weather conditions, dry, well ventilated, free from harmful vapors and gases. Ambient air temperature should be between  $-35^{\circ}\text{C}$  and  $+85^{\circ}\text{C}$ , and relative humidity should not exceed 80%. All shipped devices are attached with complete set of connectors, grounding braid, warranty card and quality certificate.

### 9.3. Disposal



Devices are made mostly from recyclable materials, or materials that can be processed again or disposed of in environmentally sound manner. Decommissioned devices can be collected for recycling, provided that their condition is that of normal wear and tear. All components that are not recyclable shall be disposed of in environmentally sound manner.

### 9.4. Warranty and service



Regular 36-month guarantee period; may be extended to 60 or 120 months. Had the sale been preceded by execution of an Agreement between the Buyer and the Seller, provisions of such Agreement shall apply. Guarantee covers remedying of defects, free of charge, provided that instructions specified in the Warranty Card are adhered to. Detailed guarantee conditions may be found at [energetyka.itr.org.pl](http://energetyka.itr.org.pl) in the „Sale Regulations”.

- The guarantee period is counted from the date of sale.
- The warranty is extended by a period of residence of the product in the repair.
- Unauthorized tampering with the product will void the warranty.
- Warranty does not cover damage resulting from improper use of the product.

## 10. Contact



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