STATIONARY FAULT DETECTOR FOR PREINSULATED DISTRICT HEATING PIPELINES

(pulse or resistance system)

LPS-2

USER MANUAL

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1. General

The LPS-2 stationary detector is designed to monitor the condition of two sections of a preinsulated district heating pipeline with a pulse or resistance alarm system. The type of the system should be specified in the order. The LPS-2 instrument identifies and indicates the following three conditions of the monitored district heating pipeline sections.

- **STAN DOBRY (GOOD CONDITION)** *(green LED)* — Two sections of the monitored district heating pipeline are in good condition.
- **STAN ZAGROŻENIA (DANGER)** *(yellow LED)* — In at least one of the monitored conditions of the district heating network, the resistance between the alarm wire and the steel pipe is close to the defined leak resistance threshold. Alarm systems of the two monitored district heating pipeline sections are in good condition.
- **AWARIA (FAULT)** *(red LED)* — At least one of the following situations has occurred:
  - leak
  - no electrical contact between the detector and the steel pipe
  - electrical break in the alarm circuit
  - electrical short circuit between the alarm wire and the steel pipe.

Measurement ports located on the side panels of the instrument enable accurate measurements for every section of the monitored district heating pipeline. Measuring instruments should be selected in accordance with the type of the monitored alarm system.

In case of a fault, the LPS-2 detector will activate an external alarm device (audible or light alarm) or communicate information to data acquisition devices. In both cases, the actuating component is the relay whose contacts are connected to the connector with the "ALARM" description.

2. Operating notes

The LPS-2 instrument can be connected directly to the ZPB connector.
To connect the LPS-2 detector, insert the plug of the power cable into the socket of a 230 V 50 Hz system. Then, within approx. 1 min, the instrument will perform internal set-up and conduct the first measurement. During this time, the red LED with the "AWARIA" (FAULT) description will blink. Next, depending on the result of the first measurement, one of the following three LEDs should lit up continuously: green, yellow or red.
The chapter titled TECHNICAL SPECIFICATIONS describes the types of characteristic conditions of the preinsulated district heating pipeline for a resistance and pulse alarm system and methods used by the LPS-2 instrument to indicate these conditions. If the yellow LED lights up, the supervising employee should increase the frequency of observations carried out with the LPS-2 instrument. If a fault is indicated (the red LED lights up), determine the type and location of the fault using suitable instruments. If you connect a measuring instrument to one of the external ports of the detector, the LED indicating the condition of the monitored alarm system will start lighting up in a different fashion. If, for instance, the yellow LED (DANGER) was lit up continuously before connecting the meter, it will start to blink after the

meter is connected. The description indicates that connection of instruments to external measurement ports does not require unplugging of the LPS-2 detector from the 230 V 50 Hz power source.
Figures 3 and 4 depict examples of connections of the LPS-2 detector with a resistance alarm system. The pulse system is connected in a similar fashion. However, the copper wires of the sensor loops are connected to the ports referred to as NiA and NiB.

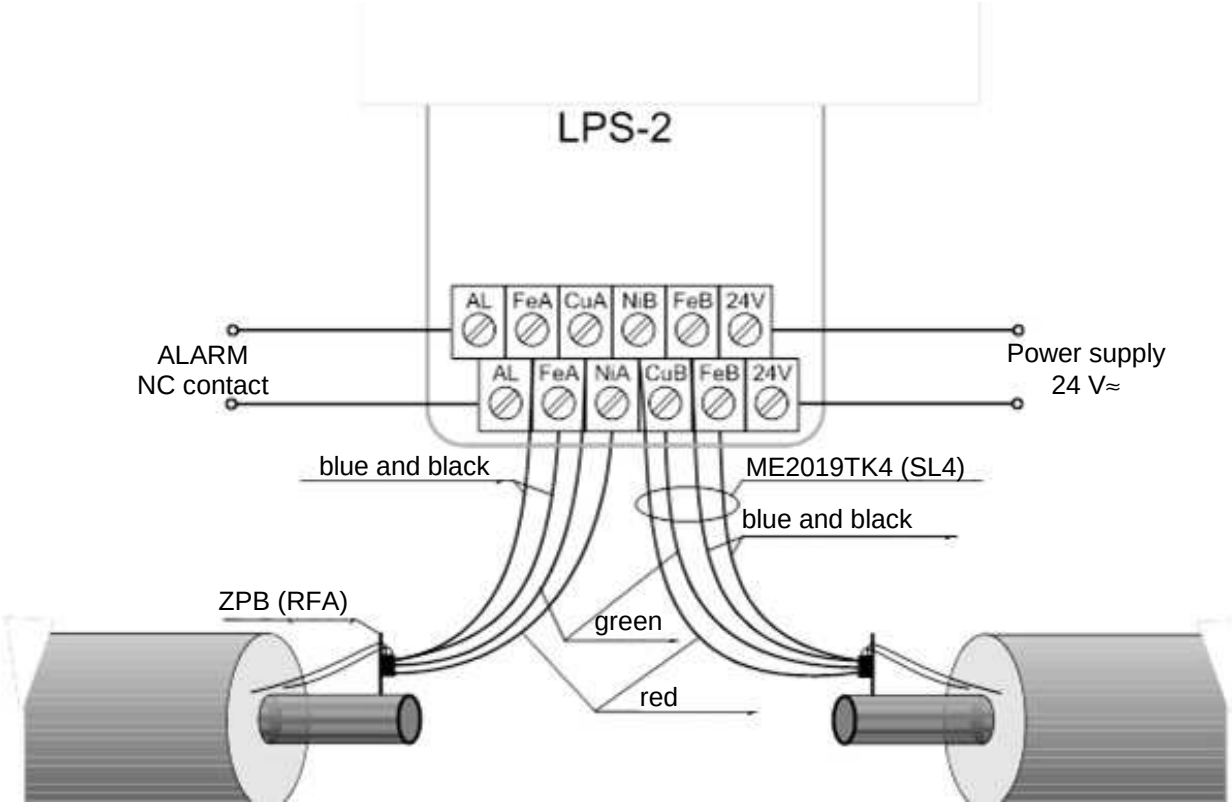

Fig. 3. Method of connecting wires of two alarm loops with a total length of up to 1000 m

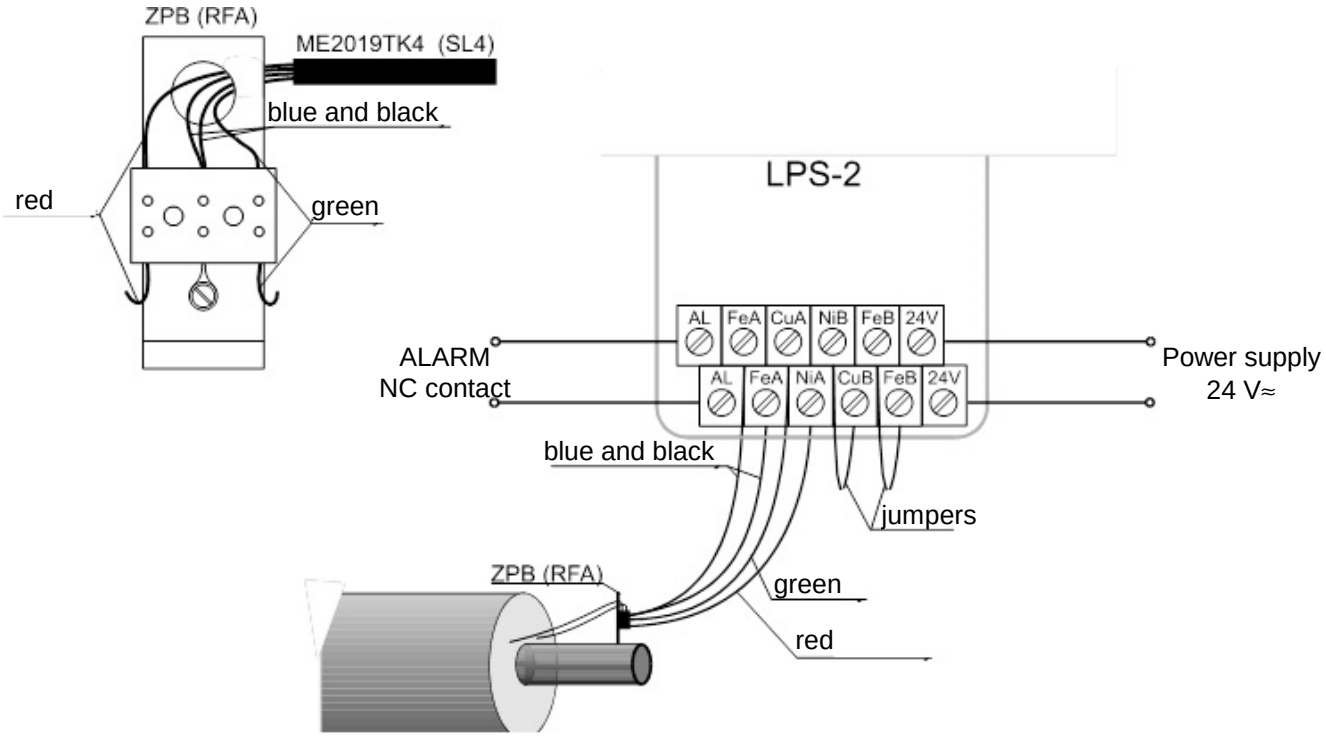

Fig. 4. Method of connecting alarm loop wires with a length of up to 1000 m

3. Description of the operating environment of the LPS-2 instrument

The instrument is designed for indoor operation. The instrument operates correctly within an ambient temperature range of +5°C to +50°C, and relative humidity should not exceed 80%. During storage of the instrument, the ambient temperature should be within the range of -40°C to +70°C.

If the instrument was stored or transported at a temperature of less than +5°C, it should not be connected to power supply for at least 3 hours. After this time, the instrument should reach the operating temperature.

The instrument cannot be used in dusty areas and in atmospheres containing explosive or corrosive gases.

The accuracy of measurements of parameters and quantities indicated in the technical specifications is reached after 30 minutes of instrument operation in suitable environmental conditions.

4. Maintenance of the LPS-2 instrument

A clean, dry cloth should be used to remove dust from the housing of the instrument. Other dirt should be removed with a cloth dampened with a 1% detergent solution. Greasy impurities can be removed with special products used to clean computer hardware. Transparent parts of the housing should be washed with soft cloths or with dedicated cloths for washing computer screens. Using spirit, petroleum naphtha or other solvents is not allowed. Such cleaning agents may cause surface damage to the housing of the instrument. After cleaning, the instrument should be wiped dry with a soft cloth.

Care should be taken during cleaning to prevent large amounts of the cleaning liquids from getting inside the instrument.

5. Periodic inspections of the LPS-2 instrument

The instrument is designed for continuous operation. In order to verify correct operation of the instrument, conduct test measurements of the monitored district heating pipeline with a portable tester connected to the external measurement ports of the LPS-2 instrument at least once a year. The condition indicated by the LEDs should be confirmed by the results of the measurements.

6. Disposal of the LPS-2 instrument

In accordance with the Act of 29/7/2005 on waste electrical and electronic equipment (Journal of Laws, item 1495), the following symbol has been placed on the instrument:

This symbol means that it is prohibited to discard waste equipment together with any other waste. Users of equipment marked with this symbol are obliged to transfer it to dedicated companies that collect waste equipment. These obligations arise from Articles 35 and 36 of the above-mentioned act.

LPS-2

(resistance or pulse alarm system)

7. TECHNICAL SPECIFICATIONS:

1. Total length of the monitored district heating pipeline..... ≤ 2000 m
2. Signal description:
   - polyurethane insulation resistance:..... LED, green
     — resistance system: R_i > 3 MΩ Description: STAN NORMALNY (NORMAL)
     — pulse system: R_i > 300 kΩ)
     alarm systems are undamaged
   - polyurethane insulation resistance:.....LED, yellow
     — resistance system: R_i = 1–3 MΩ Description: STAN ZAGROŻENIA (DANGER)
     — pulse system: R_i = 65–300 kΩ)
     alarm systems are undamaged
   - polyurethane insulation resistance:..... LED, red
     — resistance system: R_i < 1 MΩ Description: AWARIA (FAULT)
     — pulse system: R_i > 65 kΩ)
     and/or no electrical contact between the detector and the steel pipe
     and/or electrical break in the sensor loop
     and/or electrical short circuit between the sensor wire and the steel pipe.

3. Polyurethane insulation resistance measurement error..... ± 10%
4. Description of the "ALARM" output used to control an external alarm device:
   - contacts are open in case of the "*AWARIA*" (FAULT) status or power outage.
   - acceptable contact voltage:
     – AC 30 V
     – DC 24 V
   - connection power ..... 30 W (DC); 60 VA (AC)
   - maximum continuous load current ..... 1 A (DC); 0.5 A (AC)

5. Power supply..... 24 V 4 VA
6. Housing protection rating..... IP65
7. Operating temperature range..... +5 to 50°C
8. Relative humidity ..... up to 80%
9. Dimensions..... 170x80x55
10. Weight..... approx. 520 g

Note:

Descriptions on the front panel of the LPS-2 instrument may be provided in a different language upon request.