PRE-INSULATED NETWORK STATIONARY INDICATOR

(LOGSTOR, STAR PIPE, CWA impulse alarm system)

LPS-2I

USER MANUAL

levr

Ver. 2.6

General Information

The LPS-2I device is used to monitor two pipeline sections of a pre-insulated heat distribution network that is equipped with an impulse alarm system. During the operation cycle the following measurements are performed: resistance of the polyurethane insulation and the sensor loop, as well as auto-calibration of the device. The resistance of the polyurethane insulation is measured by using two different polarizations of the measuring voltage. The accuracy of the measurement is not influenced by changes in the ambient temperature or interference caused by electric phenomena in the carrier pipe. The measurement data is presented on an alphanumeric display as values and text messages. The display is back-lighted and consists of two lines – each with 16 digits. Each display line shows data from one of the measured sections (one sensor loop). Detailed technical information is provided in section **5.Technical data** of this instruction.

1. Notes on the Specifications of the LPS-I device

The specifications of the impulse alarm systems define the lowest acceptable resistance of the polyurethane insulation for the maximal length of the sensor loop (heat distribution network's section). For any shorter loops the minimal resistance should be calculated on the basis of the following equation:

$$R = \frac{R_{min}}{L / L_{max}}$$

Where:

R [MΩ] - lowest acceptable resistance of the polyurethane insulation for a section with the length of $L \leq L_{max}$.

R_{min} [MΩ] - minimal resistance of the polyurethane insulation for a section with the maximal length L_{max} as provided in the specification

L [km] - length of the measured section, $L \leq L\ max = 1km$.

L_{max} [km] - maximal length of a section of the pre-insulated heat distribution network with an impulse alarm system.

The data displayed by the device and the above equation may be used in a possible future development of the heat distribution network. The data allows to determine the resistance of insulation of a new segment in such a way that the resulting resistance of the entire network is higher than the lowest acceptable resistance given in the specifications of the alarm system.

50 meters is the shortest section of a heat distribution network that can be accurately measured by the LPS-2I device with regard to acceptable moistness of the polyurethane insulation. In such a case, the measured resistance of the polyurethane insulation should not be lower than 200MΩ.

The wide range of measured values of the polyurethane insulation allows to trace quite accurately the speed and direction of changes in the moisture existing between the carrier pipe and the casing pipe. Thanks to this, there is a possibility of differentiating between a leak and the residual moistness in the heat distribution network. This also allows for a more accurate prediction of any required maintenance works..

Interpretation of messages $L>L_{max}$ and PRZERWA (BREAK)

The message "$L>L_{max}$" appears, when the measured resistance of the sensor loop is about 70Ω ÷ 100kΩ. The lower limit corresponds to a sensor loop with L = ~2000m and specific resistance of 0,015Ω/m. Sometimes there are faulty connections between sub-sections of the sensor loop. The resistance of the connection increases the resistance of the loop which makes it appear longer. A similar effect has been observed when water was present between the disconnected ends of wires

constituting the sensor loop. These two instances are signaled by the "$L>L_{max}$." message. In the latter case, the device displays relatively low values of resistance.

The **"Przerwa" ("Break")** message indicates lack of electrical contact between the ends of wires constituting the sensor loop.

Reasons for distinguishing between a leak and a short circuit

Both a leak and a direct contact of the sensor loop with the steel pipe (short circuit) are characterized by a relatively low resistance between the carrier pipe and the wires of the sensor loop. Despite this similarity, the maintenance service has important reasons to distinguish between the two possibilities. The reasons range from the need to take different actions, to the assessment of the seriousness of the situation and the speed of reaction required.

2. Working conditions for LPS-2I

The LPS-2I device is intended for use in closed spaces. The device operates properly in the following ambient conditions: temperature from +5°C to +50°C, relative humidity not higher than 80%. When the device is stored the range of allowable temperature is from –40°C to +70°C.

After storing or transporting the device in temperature below +5°C it is recommended to wait at least 3 hours between switching on the device. After this time the device should reach the proper operating temperature.

The device cannot be used in spaces characterized by high dustiness, or containing explosive or highly corrosive gasses.

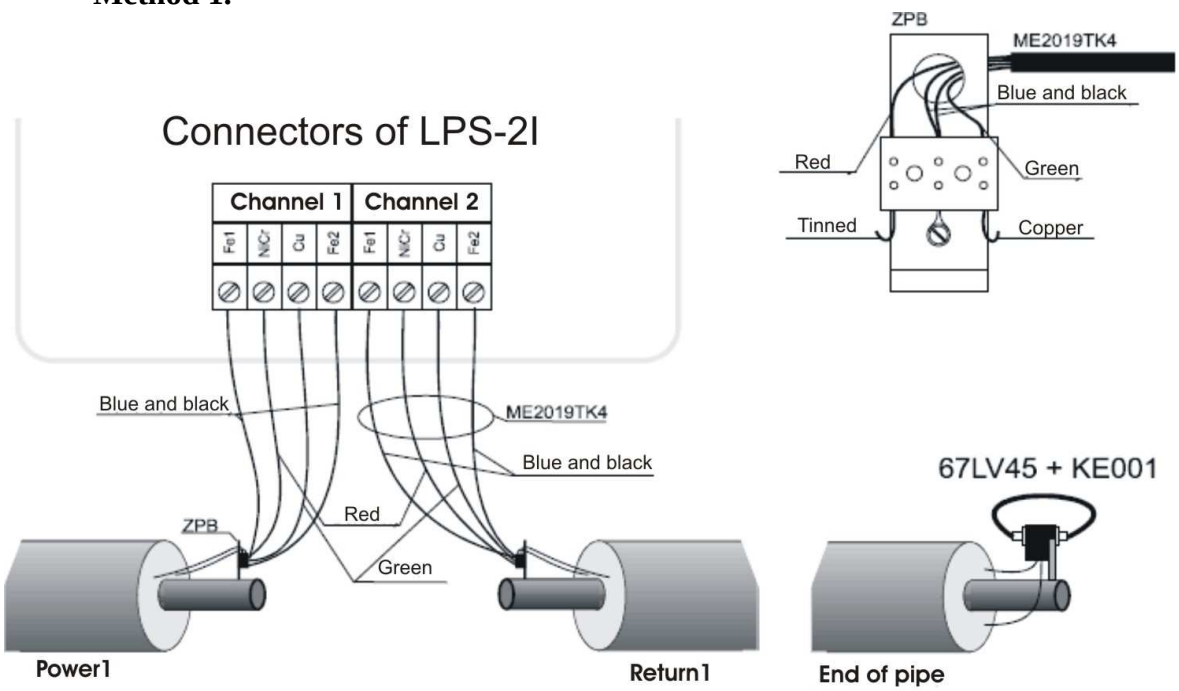
The measurement errors and values given in the specifications are achieved after 30 minutes of operation in proper conditions.

3. Maintenance of LPS-2I device

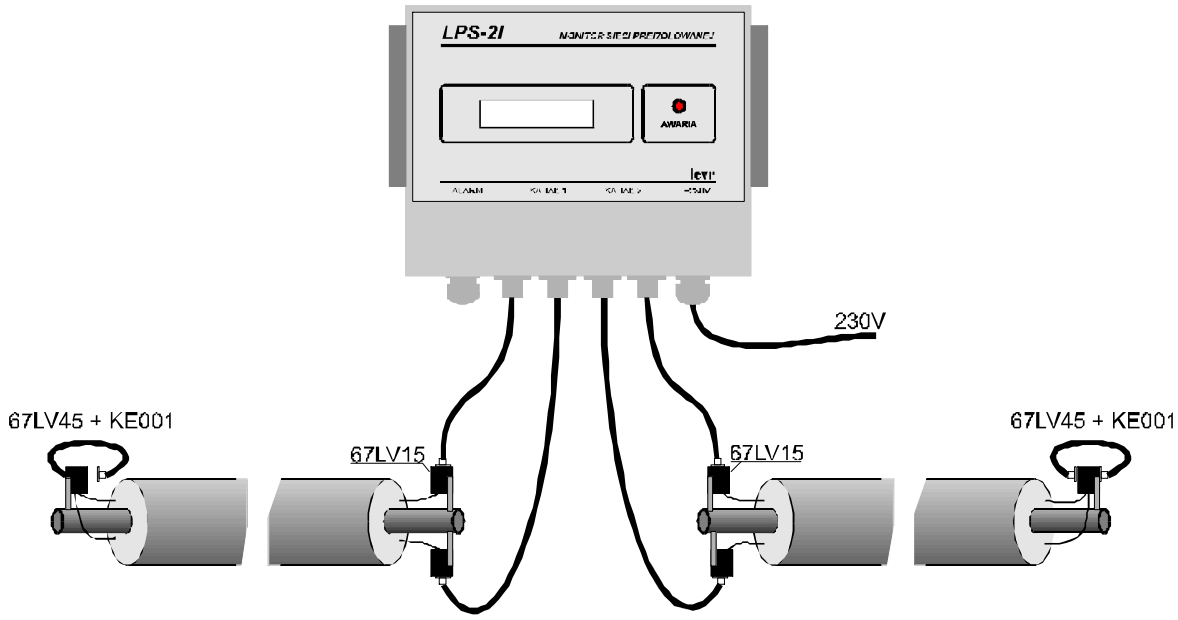
To remove dust from the device's casing use a clean, dry cloth. The remaining stains or dirt is to be removed by using a cloth soaked in 1% solution of a cleaning agent for electronic parts. The transparent part of the casing should be cleaned using a soft cloth or special tissues used to clean computer screens. Using white spirit, naphtha, or other solvents to clean the device is prohibited. Using such agents may result in damage to the device's casing. When the device has been cleaned, it should be wiped dry using a soft cloth. When performing cleaning activities, one cannot allow a significant amount of cleaning liquids to get inside the device.

4. Methods of connecting the LPS-2I device to the sensor loop of the pre-insulated heat distribution network.

Method 1.



Method 2.



All the connections should be made with concentric cables type: 67LVxx and junction boxes 67LV15 and 67LV45. Under extreme circumstances the ends of the copper wires of the sensor loop can be connected directly.

LPS-2I

(Logstor, Star Pipe, and CWA impulse alarm system)

5. SPECIFICATION

1. Number of monitored sections of a heat distribution network 2
2. Maximal length of the section ..... 2000m)[1]
3. Display of measurement data .....alphanumeric display 2x16 digits; red LED light with description AWARIA (FAILURE)
4. Measurement voltage ..... ±15V
5. Range of resistance measurement ..... 0.2kΩ ÷ 200MΩ
   Accuracy of the resistance measurement: ..... ±5% of value. ±3digits
6. Range of insulation resistance.....0 ÷ 70Ω)[1]
7. Length of sensor loop..... 0 ÷ 2000m)[1]
8. Range of measurements indicated by red LED light with FAILURE description:
   Range of leak resistance ..... 0,1kΩ ÷ 1MΩ)[1]
   Range of direct short circuit (pipe – loop) resistance.....1Ω ÷ 0,45MΩ
   Maximal value of sensor loop resistance for the L>Lmax message ..... <100kΩ
   Minimal value of sensor loop resistance for the BREAK message ..... ≥100kΩ
9. Messages and symbols displayed:
   Symbols of the measurement channels (heat distribution segments)..... 1;2
   Insulation resistance higher than 200MΩ .....Sucho (Dry)
   Symbol of the length of a section..... L
   Symbol of a short circuit (sensor loop touching the pipe) .....*
   Symbol of resistance units .....Ω, kΩ, MΩ
   No connection between the pipe and the carrier pipe .....Dołącz Rurę (Connect pipe)
   Length of section greater than maximal acceptable length .....L>Lmax
   Electric break in the sensor loop .....Przerwa (Break)
10. Connections with data logging system:
    Alarm terminal state (closed/open)
    LPS -RS communications module;
    LPS -GSM radio-communication module.
11. Power supply..... 230V 50Hz
12. Temperature range ..... 0 ÷ 50°C
13. Housing class IP65
14. Dimensions.....210x200x120

)[1] Default settings. Settings can be changed in accordance to specifications provided by the pipe manufacturer. These settings concern the maximal length of a segment (length of a sensor loop), and the allowable minimal resistance of the polyurethane insulation.

Default setting of leakage resistance …….