

**STATIONARY FAULT DETECTOR  
FOR PREINSULATED DISTRICT HEATING PIPELINES  
(PULSE ALARM SYSTEM)**

# ACN-2Z



## USER MANUAL

**Elektroniczny Zakład Usługowo-Produkcyjny  
“LEVR”  
03-193 Warsaw  
ul. Krzyżówki 5**

Ver. 17.12

## General

The ACN-2Z stationary detector is designed to monitor the condition of two sections of a preinsulated district heating pipeline with a pulse alarm system. Every section can have a length of up to 2000 m along the sensor wire.

The technical requirements for alarm systems specify the minimum resistance of polyurethane insulation for the maximum length of a preinsulated district heating pipeline. If the measured resistance is lower than the minimum value, this indicates a leak/moisture.

The ACN-2Z instrument identifies and separately indicates three conditions for each monitored section of the district heating pipeline. The names and descriptions of these conditions are provided below.

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• <b>STAN DOBRY (GOOD CONDITION)</b><br/><i>(green LED)</i></li><li>• <b>PRZECIEK (LEAK)</b><br/><i>(red LED)</i></li><li>• <b>PRZERWA (BREAK)</b><br/><i>(red LED)</i></li></ul> | <p>Insulation resistance between the carrier pipe and the copper wire exceeds the minimum level. The alarm system is in good condition.</p> <p>Insulation resistance between the carrier pipe and the copper wire is lower than the minimum value. The alarm system is undamaged.</p> <p>There is an electrical break in the alarm system of the monitored district heating pipeline.</p> |
|---|---|

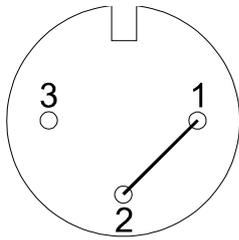
The ACN-2Z instrument can be provided with an ACNMT or ACNRS module to enable digital data transmission. This enables sending information about the condition of the district heating pipeline and the alarm system to data acquisition devices. This information includes the unique number of the module, number of the monitored section of the district heating pipeline and condition code (good, leak, break).

## Operating notes

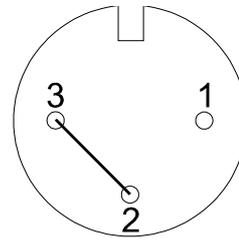
The ACN-2Z instrument has been designed in accordance with the assumption that resistance measured between the copper wire and the carrier pipe is within 50–550  $\Omega$  if there is a leak. This is indicated by the continuous illumination of the red LED reading “PRZECIEK” (LEAK). When the same LED is blinking, this indicates direct contact (short circuit) of the copper wire with the steel pipe. The short circuit resistance range is 0–50  $\Omega$ . A short circuit prevents detection of an electrical break in the alarm system outside of the location of the short circuit.

The ACN-2Z detector can activate an external alarm device (audible or light alarm) in case of a fault (short circuit, leak, break). The actuating component of the device is the relay. Contacts of the relay are connected to an external port marked with the “Alarm” description. The same connector is used for digital data transmission. Only one of the options can be used at the same time.

**Fig. 1.** Status of “Alarm” connector contacts



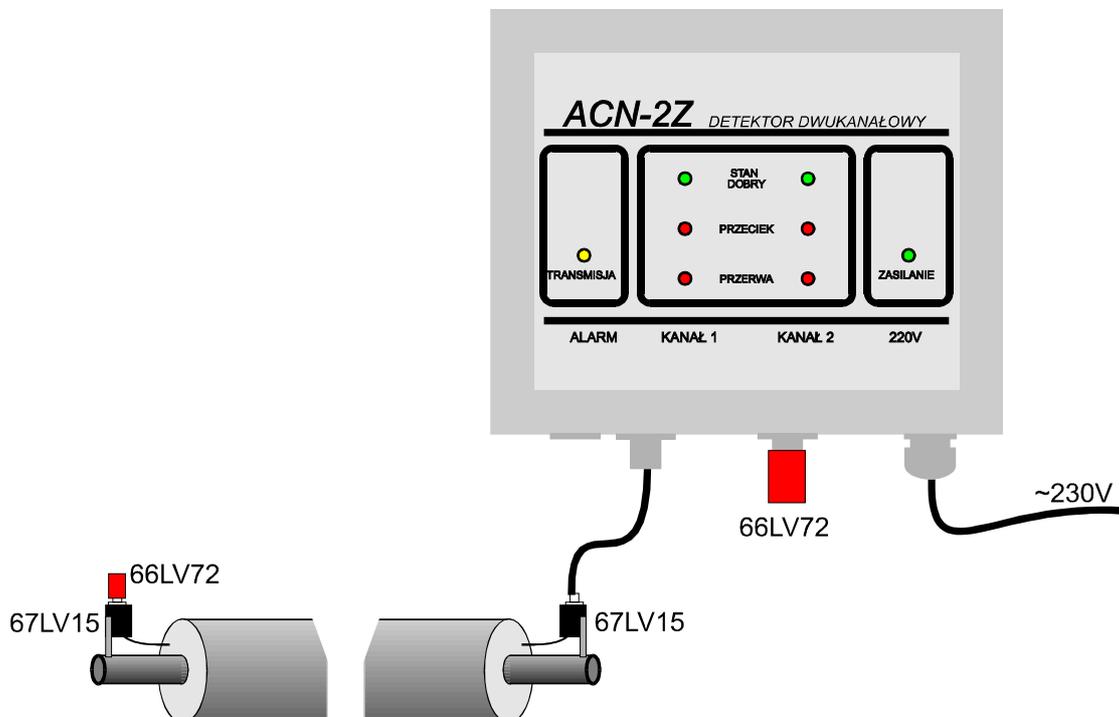
Status of relay contacts  
for the GOOD CONDITION signal  
(Two green LEDs are lit)



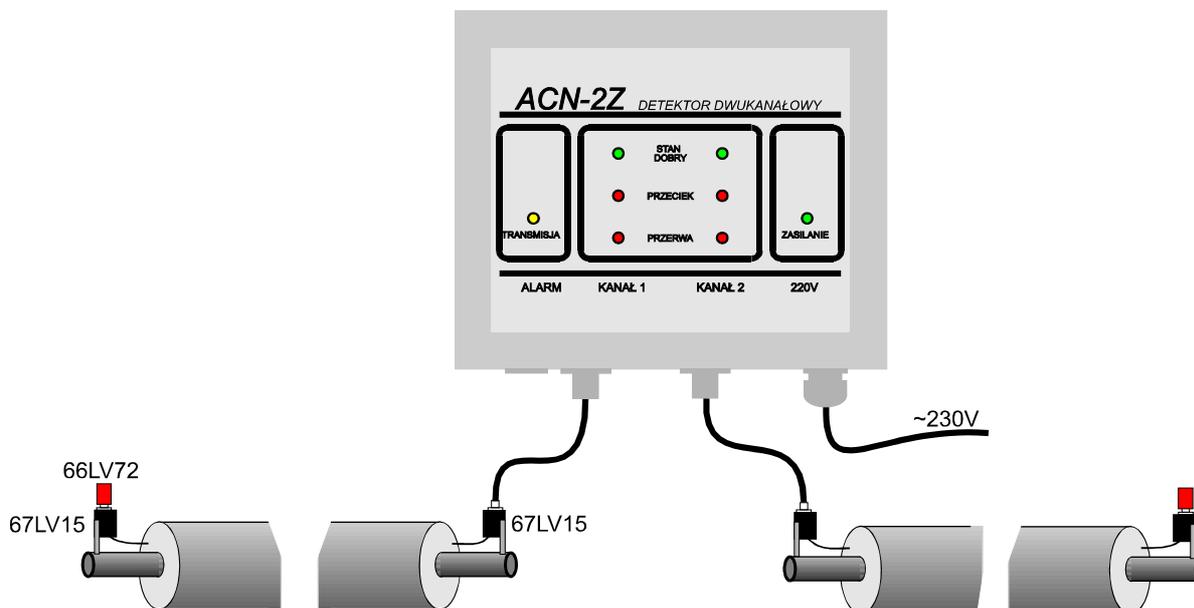
Status of relay contacts  
for the FAULT signal  
(At least one red LED is lit)

The ACN-2Z detector is a two-channel device. If only one measurement channel is used, the measurement input of the other channel should be closed with a special port plug (No. 66LV72).

**Fig. 2.** Connection of the ACN-2Z detector with a single alarm loop  
The connections are made using 67LVxx coaxial cables.



**Fig. 3.** Connection of the ACN-2Z detector with two alarm loops  
The connections are made using 67LVxx coaxial cables.



## **Description of the operating environment of the ACN-2Z 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.

## **Cleaning the ACN-2Z 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.

## **Periodic inspections of the ACN-2Z instrument**

Verification tests should be conducted every 2 years to check if the instrument operates correctly. The tests should be carried out as follows:

1. Disconnect the measurement cables from the ports of the instrument marked: “KANAL 1” (CHANNEL 1) and “KANAL 2=” (CHANNEL 2).
2. Screw 66LV72 port plugs (2 pieces) into the ports marked: “KANAL 1” (CHANNEL 1) and “KANAL 2” (CHANNEL 2). Two green LEDs should turn on within three minutes to indicate good condition. The contacts of the “Alarm” connector should have the status depicted in figure 1 on page 3.
3. Screw 66LV72T port plug (2 pieces) into the ports marked: “KANAL 1” (CHANNEL 1) and “KANAL 2” (CHANNEL 2). Four red LEDs should turn on within three minutes to indicate a leak and a break. The contacts of the “Alarm” connector should have the status depicted in figure 1 on page 3.

After the measurement, connect the cables connecting “KANAL 1” (CHANNEL 1) and “KANAL 2” (CHANNEL 2) measurement ports of the instrument with the alarm system of the district heating pipeline.

## **Disposal of the ACN-2Z 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.

## ACN-2Z

(pulse alarm system)

### TECHNICAL SPECIFICATIONS:

1. Number of monitored sections of the district heating pipeline.....	2
2. Maximum length of monitored sections of the district heating pipeline.....	2000 m
3. Minimum polyurethane insulation resistance.....	preset: 100 Ω–550 Ω at 50-Ω increments*)
4. Polyurethane insulation resistance measuring accuracy.....	±10%
5. Signal description:	
● Polyurethane insulation resistance between the copper wire and the carrier pipe exceeds 550 Ω.....description: “STAN DOBRY” (GOOD CONDITION) The alarm system is in good condition.....	LEDs, green continuously lit
● Polyurethane insulation resistance between the copper wire and the carrier pipe does not exceed 550 Ω.....description: “PRZECIEK” (LEAK) The alarm system is in good condition.....	LEDs, red continuously lit
● Direct contact of the copper wire with the carrier pipe Measured resistance is lower than 50 Ω.....description: “PRZECIEK” (LEAK)	LEDs, red blinking
● There is an electrical break in the alarm system of the monitored district heating pipeline.....description: “PRZERWA” (BREAK)	LEDs, red continuously lit
6. 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.....	120 V
– DC.....	24 V
● Connection power.....	24 W (DC); 60 VA (AC)
● Maximum continuous load current.....	1 A (DC); 0.5 A (AC)
7. Method of communication with data acquisition systems:	
● Status of relay contacts (NC; NO; COM).....	ALARM port
8. Current draw.....	0.75 VA
9. Power supply.....	230 V 50 Hz
10. Operating temperature range.....	5 to +50°C
11. Relative humidity.....	up to 80%
12. Housing protection rating.....	IP54
13. Appliance class.....	B
14. Dimensions.....	180x160x60
15. Instrument weight.....	850 g

\*) Factory setting: 550 Ω