

Phase loss and asymmetry sensor MKF-2PM

Description

The MKF - 2PM relay is used to protect three-phase installations ($3 \times 400 / 230 \text{ V AC} + \text{N}$, 50 Hz) against the effects of operating in abnormal conditions.

The device detects:

- phase loss,
- phase asymmetry,
- voltage drop in the phase below the set threshold (adjustable 170 - 190 V),
- incorrect phase sequence,
- break in the circuit after the contactor.

It is widely used in automation systems requiring the correct condition of the three-phase network, but is most often used to protect three-phase motors.

It is equipped with signaling diodes and a changeover contact (NO / NC), with a maximum load current of 5 A 250 V AC AC-1 (0.8 A 250 V AC AC-15).

The modular housing (1 DIN module) is made of self-extinguishing plastic and is designed for mounting on a TH35 rail.



Principle of operation

The MKF - 2PM monitors voltages, phase sequence, and contactor contact status. Phase loss or a voltage drop below a user-set threshold (ranging from 170 to 190 V), lasting for a user-defined delay time (from 0 to 6 s), triggers the relay.

In the event of an incorrect phase sequence, the contacts switch immediately.

Once the parameters return to normal, the device automatically restores normal operation in $< 1 \text{ s}$, however, in the event of a break behind the contactor, the motor remains switched off until the fault is removed.

LED signaling

- **The first one from the top (green)** – informs about the power supply and signals phase loss or asymmetry (it goes out in the event of a network failure);
- **The second, middle (red)** – indicates incorrect phase sequence;
- **The third, lower (red)** – indicates a break behind the contactor.

What is contactor contact inspection?

The sensor monitors the presence of voltage upstream and downstream of the contactor to detect malfunctions in its contacts. If it detects a lack of voltage downstream of the contactor during an attempt to turn it on, or the presence of voltage during an attempt to turn it off, it recognizes a fault and causes the built-in relay to open.

The system ignores short-term changes typical of starting high-power engines to avoid false alarms.

Operation of the MKF device with control of the contactor contacts in emergency situations.

If an abnormality occurs upstream of the contactor, such as a phase failure or voltage imbalance, the green LED turns off and the built-in relay contact disconnects the contactor coil (the contactor is turned off). When the system voltage parameters return to normal, the green LED lights up again and the MKF resumes normal operation and re-connects the contactor coil.

If the fault occurs only downstream of the contactor, meaning the MKF registers correct voltage values upstream of the contactor but incorrect values downstream of the contactor, for example, a phase failure, voltage asymmetry, or voltage appearing in one of the phases after the contactor is disconnected (indicating contact sticking), then the contactor, if currently engaged, is disconnected. The red LED illuminates, and the contactor coil remains permanently disconnected until the MKF device is restarted (power is disconnected and reconnected).

If the failure does not occur after restarting, the red LED will remain off and the green LED will light up, indicating that the MKF has returned to normal operation.

If the problem persists after restarting, the red LED will light up again after approximately 3 seconds and the contactor coil will remain permanently blocked and cannot be switched on until the fault is removed and the MKF is restarted again.

How to proceed in practice?

The user must manually check the situation:

- Turn off the power for about 15 seconds (device reset).
- Turn the power back on and start the engine.
- If after approximately 3 seconds the motor turns off and the red LED lights up, this indicates a break behind the contactor or the contactor contacts are stuck together - it is probably necessary to replace the contacts or the entire contactor.

The system automatically resumes normal operation only after the correct voltage downstream of the contactor is restored and the fault is removed.

Cooperation of the MKF series with a generator or energy storage

MKF series sensors can operate with a generator as a power source, provided that the generator is properly matched to the load and has an adequate power reserve and an AVR (Automatic Voltage Regulator) voltage stabilization system. Regulation), thanks to which it maintains the voltage at a stable level and the entire system has been properly tested after startup.

Why is this so important?

MKF series sensors monitor the power source voltage and, provided it is within the acceptable range, allow the load circuits to be powered from that source. However, if the voltage exceeds the limit values (either over or under), the controller recognizes it as abnormal. This can occur when the generator is unable to maintain stable speed, causing the voltage to become unstable. The controller interprets this as an anomaly and shuts down the unstable power source. In such a situation, the controller operates correctly, but a user (unaware of its operating principles) may mistakenly consider it to be faulty.

A similar situation can occur when the power source connected to the MKF sensor is an emergency power supply system with an inverter (e.g., energy storage, UPS). The quality of the voltage generated by the inverter is crucial – a waveform with low harmonic distortion (THD < 3 %, full sine wave) is required.

Some inverters generate voltages with significant distortion, which results in higher harmonics. This can lead to misinterpretation of power supply parameters by the sensor's measurement systems (e.g., detecting false asymmetry or frequency instability), preventing proper operation.

The design of the MKF sensor cooperation system with a voltage source other than the power grid should be carried out by an experienced designer or automation engineer with the appropriate knowledge and authorizations.

Pollin is not responsible for the selection or operation of generators or other power sources used with MKF series sensors. Pollin does not provide consulting services regarding generator selection. Selection of the appropriate device should be entrusted to a qualified specialist who will consider the nature of the load, voltage stability requirements, and compatibility with the controller and the requirements of the MKF series sensors.

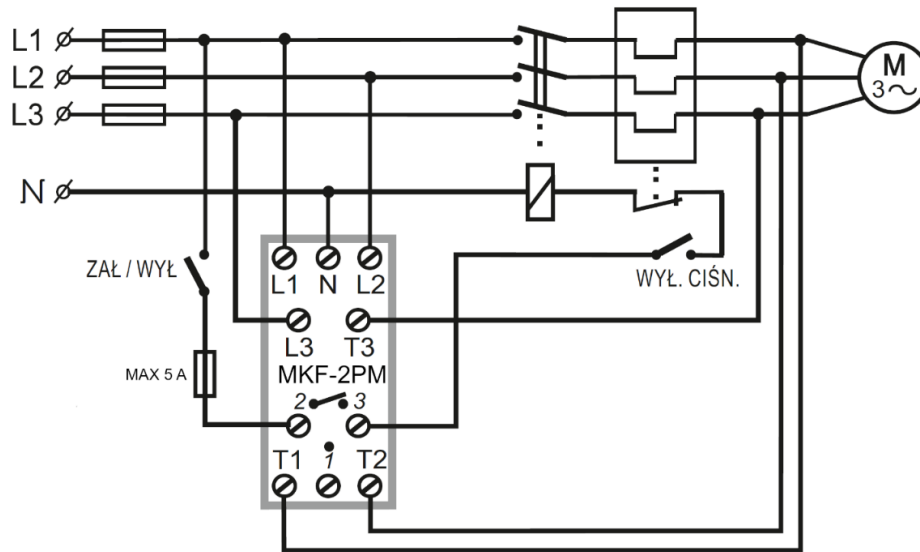
Technical data

Parameter name	Value
Rated supply voltage	3 x 400 / 230 V AC + N
Operating supply voltages	170 to 253 VAC
Rated power supply frequency	50 Hz
Power supply operating frequency	47 to 52 Hz
Operating temperature range	-25 to 50 °C
Max power consumption	7.4 VA
Cooperation with power generators	Yes
Executive element	Relay
Number of relay outputs	1
Contact arrangement	NO / NC
Maximum load current AC-1	5A / 250V AC
Maximum load current AC-15	0.8 A / 250 V AC
Lower threshold	Regulated: 170 to 190 VAC ± 5 V
Voltage hysteresis	8V ± 2V

Parameter name	Value
Measurement accuracy	±2%
Phase failure and phase asymmetry delay	Adjustable: 0 to 6 sec
Delay when threshold exceeded	Adjustable: 0 to 6 sec
Reaction to incorrect phase sequence	Immediately
Case	Modular housing (1 DIN module)
Degree of protection	IP20
Installation	TH35 rail
Time to return	< 1 sec
Clamp type	Elevator
Wire stripping length	7 mm
Single-wire conductor	0.5 to 2.5 mm ²
Multi-stranded conductor (stranded wire) without ferrule	0.5 to 2.5 mm ²
Stranded wire with square crimp sleeve	0.5 to 2.5 mm ²
Tighten to maximum torque	0.4 Nm

Full technical specifications are available on the website www.pollin.pl/do-pobrania or by scanning the QR code provided in the warranty and guarantee section.

Connection diagram



Installation

The MKF-2PM relay must be installed in accordance with applicable electrical installation standards and regulations. The following guidelines are intended to ensure the installer's safety and the proper operation of the device:

1. **Authorizations** - The device may only be installed by a person with appropriate qualifications and authorizations to work on electrical installations.
2. **Disconnecting the power supply** - Before starting any work, it is essential to disconnect the power supply at the distribution board and make sure that the circuit is voltage-free (e.g. using a voltage indicator).
3. **Personal Protection** - The installer should use personal protective equipment such as electrically insulating gloves and safety glasses.
4. **Mechanical installation** - The device should be mounted on a standard TH35 rail in the distribution board, ensuring stable mounting and adequate ventilation space.
5. **Connecting Wires** - Connections should be made according to the wiring diagram provided by the manufacturer. Ensure that terminals are tightened with the correct torque and that wires of the appropriate cross-section are used. Only one wire may be inserted into each terminal – regardless of whether it is solid or stranded with a crimped ferrule.
6. **Checking the connections** - After completing the installation, carefully check the correctness of all connections, make sure that the terminals are securely tightened and that there are no exposed wires that could cause a short circuit or a shock hazard.
7. **Restoring Power** - After completing the installation and inspection, turn on the power and check the operation of the device according to the instructions.
8. **Tests** - After completing the installation, check the correct operation of the device, e.g. by simulating the failure of individual phases.

No Modifications - Any modifications to the device or its components are prohibited. This may result in malfunctions and a safety hazard.

Warranty and guarantee – short information

The warranty applies to every purchaser, including consumers. Warranty claims should be directed to the seller from whom the purchase was made.

If a defect is found in the device, the customer has the right to choose: he or she can use the statutory warranty (in accordance with the provisions of the Civil Code) or the manufacturer's warranty.



Pollin Guarantee



Pollin devices are covered by a 10-year manufacturer's warranty – Zakład Elektroniczny POLLIN Wojciech Polak. The warranty applies only to devices purchased by businesses and covers material and manufacturing defects.

Warranty claims should be submitted by e-mail to: pollin@pollin.pl, in accordance with the procedure described in the full version of the document.

The warranty does not cover, among other things, mechanical damage, unauthorized modifications, installation by unqualified persons and natural wear and tear of consumables.

The full text of the warranty terms is available at: <https://pollin.pl/do-pobrania> or via the attached QR code.

Markings



This symbol on a device indicates that the used equipment should not be disposed of with other household waste. Used equipment should be taken to one of the designated electronic waste collection points or returned to the store when purchasing new equipment. Improper disposal of electronic waste poses a threat to the environment and human health.



The CE marking confirms that the product meets the essential requirements of all applicable European Union directives and regulations.



This marking indicates that installation, connection and all servicing of the device may only be performed by qualified personnel with electrical qualifications.

Technical support – the fastest help from Pollin experts

If you have any questions regarding the operation, configuration or installation of the device, **please contact us by email – this is the fastest way to obtain technical support**.

Send a message to: support@pollin.pl, describe the problem in detail and leave your contact number and the hours when we can call you.

Our engineers will review your request and make every effort to provide you with professional assistance as quickly as possible.



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