

3-phase automatic transfer switch controller SZR-1

Description

The SZR-1 controller is a simple-to-use and reliable component of automatic transfer switch systems. In the event of a fault in the three-phase network (e.g., voltage drop, asymmetry, or incorrect phase sequence), it enables, via external contactors, automatic transfer of loads between the primary and backup power sources – and vice versa.

The modular housing (4 DIN modules) is made of self-extinguishing plastic and is designed for mounting on a TH35 rail.

Principle of operation

The SZR-1 controller monitors the parameters of the primary and backup networks. The LEDs and knobs located on the left side of the controller refer to the primary network, while those on the right refer to the backup network. When a phase loss or asymmetry occurs in the primary network, the SZR-1 controller will signal this by turning off the green LED (on the left, "Un") and automatically disconnect the power supply from the primary network (the "K1" LED will turn off). The built-in phase loss sensor's delay prevents unnecessary switching during momentary voltage outages. Then, after the time set with the "T2" knob has elapsed, the backup power supply will be switched on, provided the backup network parameters are correct.

If the primary network parameters improve, the built-in phase loss sensor will respond within 1 second, and the controller will automatically switch the load from the backup network to the primary network after the time set with the "T1" knob has elapsed (the total automatic switch-back time is approximately 1 second plus the "T1" setting). During the "T1" time, the "T1" LED flashes, and during the "T2" time, the "T2" LED flashes. The reaction to incorrect phase sequence is immediate, so in the event of a primary network failure, the controller will not switch the load to the backup network if it has an incorrect phase sequence. This also applies to the primary network upon initial power-up and upon return transfer from the backup network. Incorrect phase sequence is indicated by the appropriate red LED, marked with the phase rotation symbol.

LED signaling

- **Un " LED (left)** – illuminates when the primary network parameters are correct. When it goes out, it indicates a phase failure or asymmetry.
- **Un " LED (right)** – illuminates when the backup network parameters are correct. When it goes out, it indicates a phase failure or asymmetry.
- **"K1" LED** – illuminates when loads are powered from the primary grid. It turns off when the grid is disconnected.
- **"K2" diode** – lights up when the loads are powered from the backup network.
- **"T1" LED** – flashes during the countdown of the time to return to the primary network (setting with the "T1" knob).
- **"T2" LED** – flashes during the countdown of the time for switching to the backup network (setting with the "T2" knob).
- **Red LED with phase rotation symbol** – illuminates when incorrect phase sequence is detected in any network. In this case, switching will not occur.



Cooperation of the SZR-1 controller with a power generator or energy storage

The SZR-1 controller can operate with a generator as a backup power source, provided that the generator is properly matched to the load and has an appropriate power reserve and an AVR (Automatic Voltage Regulator) voltage stabilization system. Regulation), thus keeping the voltage at a stable level.

Why is this so important?

The SZR-1 controller monitors the power source voltage and, provided it is within the acceptable range, allows 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 backup power source connected to the SZR-1 controller 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 controller's measurement systems (e.g., detecting false asymmetry or frequency instability), preventing proper transfer to the secondary source or incorrectly switching to it.

Power sources that do not generate a "clean" sine wave or do not provide a stable voltage value are not suitable for use with the SZR-1 controller, and their use may lead to unexpected switching or a complete power failure.

It's also worth remembering that implementing automation that automatically starts and stops a generator requires the use of additional devices that work in conjunction with the SZR-1 controller. The design of such a system should be performed by an experienced designer or automation technician with the appropriate knowledge and qualifications.

Pollin is not responsible for the selection or operation of generators or other power sources compatible with the SZR-1 controller. Pollin does not provide consulting services regarding generator selection. Selection of the appropriate device should be entrusted to a qualified specialist who will take into account the nature of the load, voltage stability requirements, and compatibility with the SZR-1 controller.

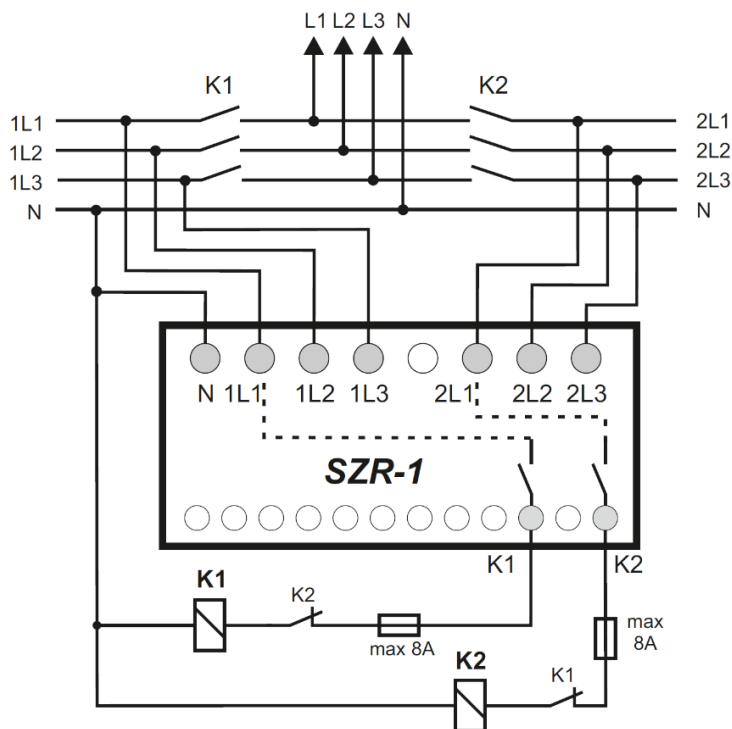
Technical data

Parameter name	Value
Rated supply voltage	3 x 400 / 230 V AC + N
Operating supply voltages	170 to 253 VAC
Power supply operating frequency	47 to 52 Hz
Operating temperature range	-20 to 50 °C
Max power consumption	8.5 VA
Operating mode	Primary network power supply priority (1L1, 1L2, 1L3)
Cooperation with power generators	Yes
Number of relay outputs	2
Contact arrangement	Voltage output
Maximum load current AC-1	2 x 8 A / 250 V AC
Maximum load current AC-15	2 x 1.2A / 250V AC
Measurement of U power supply from 47 to 52 Hz	-
Upper threshold U of the power switch L1 L2 L3	-
Lower threshold U of the power switch L1 L2 L3	175V AC ± 5V
Hysteresis U when switching power supply	10V ± 3V

Parameter name	Value
Measurement accuracy	±2%
Delay in response to "<" / ">" U power supply	3 sec ± 0.5 sec
Switch return response delay	< 1 sec
Case	Modular housing (4 DIN modules)
Degree of protection	IP20
Installation	TH35 rail
Delayed response to power asymmetry	3 sec ± 0.5 sec
Switching break time	Adjustable for each power source 0 to 10 s (T)
Reaction to incorrect phase sequence	Immediately
Clamp type	Elevator
Wire stripping length	8 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	0.5 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 SZR-1 controller 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. **Wiring** - Connections should be made according to the wiring diagram provided by the manufacturer. Ensure that the 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. NOTE! The bottom of the SZR-1 controller contains two output terminals marked "K1" and "K2" – these terminals carry 230 V AC.
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 assembly, check the correct operation of the device.

Sequence of assembly steps :

1. Turn off the power to both power sources.
2. Attach the SZR-1 controller.
3. Connect the wires according to the diagram. NOTE: **The neutral wire N is common to both networks.**
4. Turn on the power.
5. Check the correct operation of the controller (the following steps should be performed separately for each phase):
 - Step No. 1 - Turn off the phase connected to terminal 1L2 - switching to the backup network should occur;
 - Step No. 2 - Re-enable phase 1L2 - a switch back from the backup network to the primary network should occur.

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.



Pollin Automation – Technology That Works for You

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