NOVATEK ELECTRO PEF-301

NOVATEK-ELECTRO Automatic Phase Selector PEF-301 User Manual

Model: PEF-301

1. Overview

The NOVATEK-ELECTRO PEF-301 is an automatic electronic phase selector designed to ensure uninterrupted power supply for single-phase loads (220/230/240 V, 50 Hz) from a three-phase, four-wire mains (3x380+N). It automatically selects the optimal phase based on voltage presence and quality, protecting connected equipment from unacceptable voltage variations.

Key Features:

- Three-phase four-wire system (Line1, Line2, Line3, and Neutral) with switching priority L1 > L2 > L3.
- Fast switching time: 0.02 seconds.
- Adjustable over and under voltage settings.
- Microcontroller-based digital device for precise control.
- Supports direct load connection up to 3.5 kW (16 A).
- Controls external magnetic contactors for loads exceeding 3.5 kW (16 A).

2. Safety Information

Please read and understand all safety instructions before installing, operating, or maintaining the PEF-301. Failure to follow these instructions may result in electric shock, fire, serious injury, or death.

- Installation and maintenance must be performed by qualified personnel only.
- Always disconnect power to the circuit before working on the device or its connections.
- Ensure proper grounding of the electrical system.
- Do not operate the device if it appears damaged.
- Verify all wiring connections are secure and correct before applying power.
- Adhere to all local and national electrical codes.

3. Product Description

The PEF-301 universal automatic electronic phase selector is designed to supply an industrial and domestic single-phase 220/230/240 V, 50 Hz load from a three-phase four-wire mains (3x380+N). Its primary function is to maintain an uninterrupted power supply to essential single-phase loads and protect them from unacceptable voltage variations within the mains.
The device operates by continuously monitoring the voltage presence and quality on all connected phases. Based on these parameters, the PEF-301 automatically selects the optimal phase within user-defined limits and switches the single-phase load supply to this phase.

- **Direct Load Connection:** If the power consumption is less than 3.5 kW (16 A), the load is energized directly from the PEF-301.
- **Contactor Control:** If the power consumption exceeds 3.5 kW (16 A), the PEF-301 controls the single-phase coils of external magnetic contactors (MC). These magnetic contactors are not included in the standard supply package and must be sourced separately.

The maximum and minimum voltage limits for operation are set by the user using potentiometers located on the front panel of the device. The PEF-301 is a microcontroller-based digital device, ensuring precise and reliable operation.
Users must configure the switch threshold limits (Umin(V) and Umax(V)) which define the minimal and maximal voltage values at which the PEF-301 will trip and either switch off the load or switch to an alternative phase.
Phase L1 is designated as having the highest priority. This means that under normal voltage parameters on all connected phases (L1 > L2 > L3), the load will always be supplied from phase L1. If the voltage on L1 falls outside the user-defined limits, the PEF-301 will switch the load to the next available priority phase (L2, then L3) within a maximum of 0.2 seconds, provided that the voltage on the reserve phase is within acceptable limits. If none of the reserve phases meet the voltage requirements, the load will be switched off.
After the load has been switched to a reserve phase and the voltage parameters on the priority phase (L1) are restored, the load will return to the priority phase after a user-set return time (Tr) ranging from 5 to 200 seconds. If the Tr potentiometer is set to the '∞' (infinity) position, the return to the priority phase will only occur if the voltage on the currently active phase goes outside its threshold limits.
In situations where the voltage supplied to the load drops below the minimal threshold limit (Umin(V)), the load switching or switching off will be performed with a time delay of 12 seconds. However, if the voltage rises above the maximal threshold limit (Umax(V)) or drops more than 30 V below the minimal threshold limit, the load switching or switching off will occur with a rapid time delay of 0.2 seconds maximum. During any load switching off event, the PEF-301 continues to monitor voltage on all phases. Once the voltage normalizes within the acceptable range on one of the phases, the device will react accordingly.

4. Setup and Installation

Proper installation is crucial for the safe and effective operation of the PEF-301. Refer to the diagrams below for wiring and dimensions.

4.1. Device Dimensions

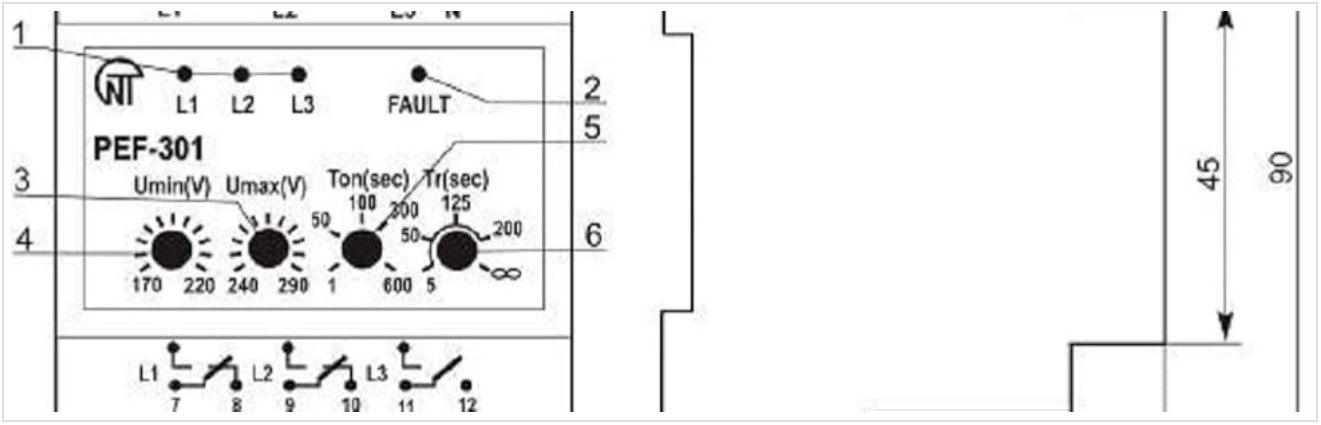

Figure 1: PEF-301 Automatic Phase Selector dimensions. This diagram illustrates the physical dimensions of the device, including width, height, and depth, essential for proper enclosure fitting.

4.2. Wiring Connections

The PEF-301 supports two main wiring configurations depending on the load power. Ensure all connections are tight and correctly terminated.

4.2.1. Direct Connection (Load < 3.5 kW / 16 A)

For loads up to 3.5 kW (16 A), the PEF-301 can directly switch the load. Connect the three phase lines (L1, L2, L3) and Neutral (N) to the corresponding input terminals. The single-phase load is connected to the output terminals as shown in the diagram.

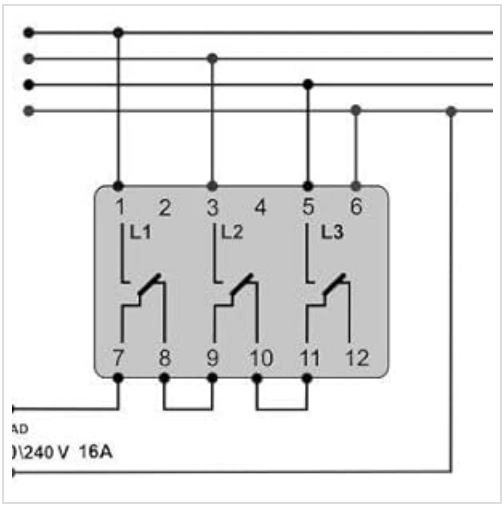

Figure 2: Wiring diagram for direct connection of a single-phase load (up to 16A) to the PEF-301. L1, L2, L3, and Neutral inputs are connected, and the load is directly switched by the device.

4.2.2. Connection with Magnetic Contactors (Load > 3.5 kW / 16 A)

For loads exceeding 3.5 kW (16 A), external magnetic contactors (K1, K2, K3) are required. The PEF-301 controls the coils of these contactors, which then switch the higher power load. Connect the PEF-301's output terminals to the contactor coils as illustrated.

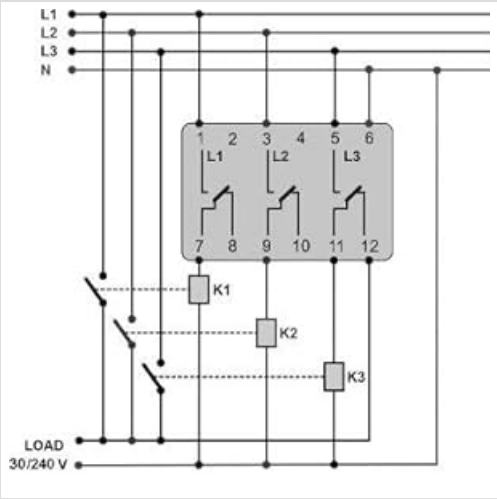

Figure 3: Wiring diagram for connecting the PEF-301 with external magnetic contactors (K1, K2, K3) for loads exceeding 16A. The PEF-301 controls the contactor coils, which then switch the main load.

4.3. Front Panel Overview

Familiarize yourself with the front panel controls and indicators before operation.

Figure 4: Front panel of the PEF-301 showing LED indicators for L1, L2, L3, and FAULT, along with potentiometers for Umin(V), Umax(V), Ton(sec), and Tr(sec).

- **L1, L2, L3 LEDs:** Indicate which phase is currently active and supplying power.
- **FAULT LED:** Illuminates when a fault condition (e.g., voltage outside limits on all phases) is detected.
- **Umin(V) Potentiometer:** Sets the minimum allowable voltage threshold.
- **Umax(V) Potentiometer:** Sets the maximum allowable voltage threshold.
- **Ton(sec) Potentiometer:** Sets the turn-on delay time (time before load is reconnected after a fault clears).
- **Tr(sec) Potentiometer:** Sets the return time to the priority phase (L1) after it has stabilized.

5. Operating Instructions

Once installed, the PEF-301 operates automatically. However, understanding its settings and behavior is essential.

5.1. Setting Voltage Thresholds

Use a small screwdriver to adjust the potentiometers on the front panel:

- **Umin(V):** Rotate to set the minimum voltage level (e.g., 170V, 220V). If the voltage on an active phase drops below this, the device will react.

- **Umax(V):** Rotate to set the maximum voltage level (e.g., 240V, 290V). If the voltage on an active phase exceeds this, the device will react.

5.2. Setting Time Delays

Configure the time delays for optimal system response:

- **Ton(sec):** This is the delay before the load is reconnected after a voltage fault clears. Set this to allow the system to stabilize (e.g., 1 to 600 seconds).
- **Tr(sec):** This is the return time to the priority phase (L1) once its voltage parameters are restored. Set this between 5 and 200 seconds. If set to '∞', the device will only return to L1 if the currently active phase experiences a fault.

5.3. Phase Priority and Switching Logic

The PEF-301 operates with a fixed phase priority: L1 > L2 > L3.

- Under normal conditions, the load is supplied by L1.
- If L1 voltage goes outside set limits, the device switches to L2 (if L2 is within limits) within 0.2 seconds.
- If L2 also goes out of limits, it switches to L3 (if L3 is within limits) within 0.2 seconds.
- If all phases are outside limits, the load is disconnected, and the FAULT LED illuminates.
- When voltage on a previously faulty phase returns to normal, the device will switch back according to the Tr(sec) setting and priority.

5.4. Voltage Fluctuation Response Times

- **Under-voltage (below Umin(V)):** Load switching or disconnection occurs with a 12-second delay.
- **Over-voltage (above Umax(V)) or Severe Under-voltage (30V below Umin(V)):** Load switching or disconnection occurs rapidly, with a maximum delay of 0.2 seconds.

6. Maintenance

The NOVATEK-ELECTRO PEF-301 is designed for reliable, long-term operation with minimal maintenance. However, periodic checks are recommended to ensure optimal performance and safety.

- **Visual Inspection:** Periodically inspect the device for any signs of physical damage, discoloration, or loose connections.
- **Terminal Tightness:** Ensure all wiring terminals remain tight. Loose connections can lead to overheating and malfunction.
- **Cleanliness:** Keep the device free from dust and debris. Use a dry, soft cloth for cleaning. Do not use liquid cleaners.
- **Environmental Conditions:** Ensure the operating environment remains within the specified temperature and humidity ranges to prevent premature failure.

Any repairs or internal servicing should only be performed by authorized service personnel.

7. Troubleshooting

If the PEF-301 is not functioning as expected, refer to the following common issues and solutions. Always disconnect power before attempting any troubleshooting steps involving physical inspection or wiring.

Problem	Possible Cause	Solution
Load not receiving power.	All phases are outside set voltage limits.	Check input voltage on all three phases. Wait for voltage to normalize.

Problem	Possible Cause	Solution
FAULT LED is illuminated.	Voltage on all available phases is outside the set Umin/Umax range.	Verify incoming line voltages. Adjust Umin(V) and Umax(V) settings if necessary, ensuring they match your system's requirements.
Device switches phases too frequently.	Voltage thresholds (Umin/Umax) are set too narrowly.	Widen the Umin(V) and Umax(V) range slightly to accommodate minor fluctuations.
Load does not return to L1 after it stabilizes.	Tr(sec) potentiometer is set to '∞'.	Adjust Tr(sec) to a desired time delay (e.g., 5-200 seconds) if automatic return to L1 is desired.
Load is not switched off immediately during severe over/under voltage.	Incorrect understanding of delay times.	Note that only severe voltage deviations (over Umax or 30V below Umin) trigger a 0.2s response. Minor under-voltage has a 12s delay.
No LEDs are lit.	No power supply to the device or internal fault.	Check all input phase and neutral connections. Ensure power is present at the input terminals. If power is present and no LEDs light up, the device may be faulty.

If the problem persists after attempting these solutions, contact qualified technical support.

8. Specifications

Technical specifications for the NOVATEK-ELECTRO PEF-301 Automatic Phase Selector.

Parameter	Value
Operation Mode	Automatic
Current Rating (Direct Load)	16 Amps
Max Power (Direct Load)	3.5 kW (3680 Watts)
Contact Type	Normally Open
Connector Type	Screw Terminals
Terminal Material	Copper
Circuit Type	3-way
International Protection Rating	IP00
Switching Time	0.02 seconds
Phase Priority	L1 > L2 > L3
Under-voltage Trip Delay (< Umin)	12 seconds
Over-voltage Trip Delay (> Umax)	0.2 seconds max
Severe Under-voltage Trip Delay (< Umin - 30V)	0.2 seconds max
Adjustable Umin(V) Range	User-settable (e.g., 160V-230V)

Parameter	Value
Adjustable Umax(V) Range	User-settable (e.g., 210V-280V)
Adjustable Ton(sec) Range	User-settable (e.g., 1-600 seconds)
Adjustable Tr(sec) Range	User-settable (e.g., 5-200 seconds or ∞)
Item Weight	200 g
Manufacturer	Novatek Electro India Pvt Ltd
Country of Origin	India

9. Warranty and Support

9.1. Manufacturer's Warranty

For specific warranty terms and conditions provided by NOVATEK ELECTRO, please refer to the documentation included with your product or contact the manufacturer directly. Warranty coverage typically addresses defects in materials and workmanship under normal use.

9.2. Extended Warranty Options

Extended warranty plans may be available from third-party providers. For example, options such as a 1-Year or 2-Year Extended Warranty plan by OneAssist might be offered at the point of purchase. These plans are separate from the manufacturer's warranty and provide additional coverage as per their terms.

9.3. Technical Support

If you encounter issues that cannot be resolved using the troubleshooting guide, or require further technical assistance, please contact NOVATEK ELECTRO customer support or your authorized distributor. Have your product model (PEF-301) and purchase information ready when contacting support.