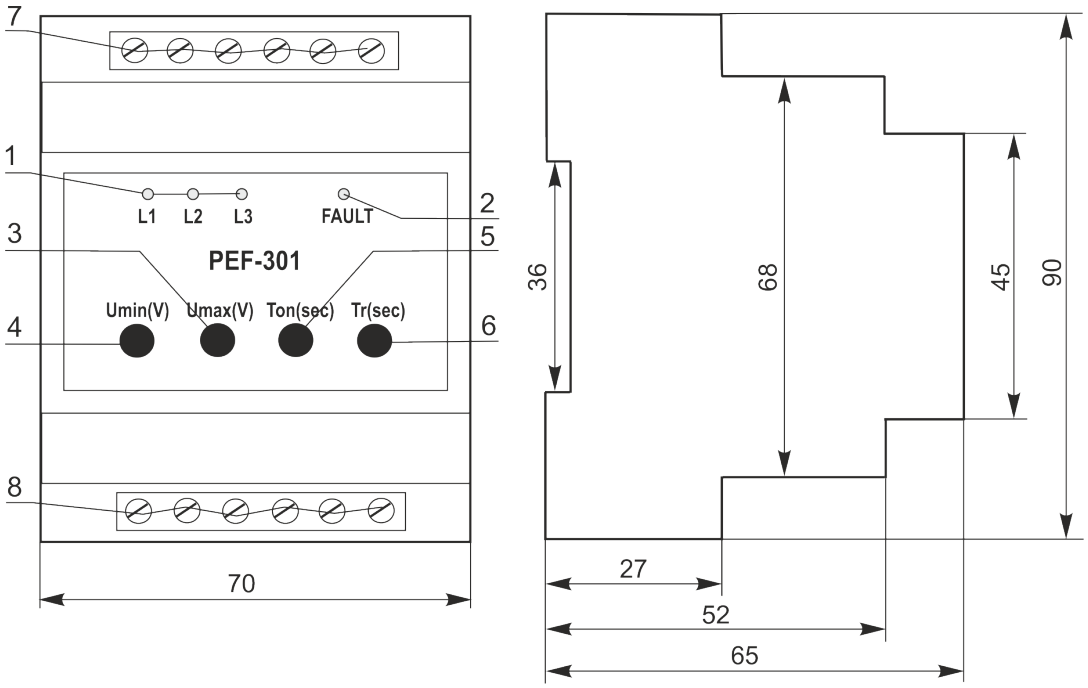
PEF-301

UNIVERSAL AUTOMATIC ELECTRONIC PHASE SWITCH

OPERATING MANUAL

The quality management system of development and production complies with the requirements of ISO 9001:2015



1. green LEDs indicating the phase the load is energized from;
2. red LED indicating fault;
3. control knob for Umax threshold setting, Umax;
4. control knob for Umin threshold setting, Umin;
5. control for autoreclosing time delay, Ton;
6. control for time delay to return to the priority phase, Tr;
7. connection terminals;
8. connection terminals.

Figure 1

If the temperature of the unit after transportation (storage) differs from the operational temperature, keep the unit for two hours under the temperature of operational media before connecting it to the electric power supply (i.e. there can be a moisture condensation on the unit elements).

ATTENTION! The unit is not intended for use:

- in conditions of significant vibration and shocks;
- in high humidity conditions;
- in corrosion environments with content in the air of acids, alkalis, etc., as well as severe contamination (grease, oil, dust, etc.).

NEVER ATTEMPT TO REMOVE AND REPAIR THE UNIT.
NEVER ATTEMPT TO OPERATE THE UNIT WITH THE MECHANICAL DAMAGE OF THE HOUSING.

1 APPLICATIONS

The PEF-301 universal automatic electronic phase switch (further in text as PEF-301 or the unit) is designed to supply an industrial/appliance single-phase 230/240V/50Hz load from three-phase four-wire mains in order to maintain uninterrupted power supply of essential single-phase loads and protect them against unallowable voltage variations in the mains. To this end a single phase load is connected into the three-phase mains with the interposition of the PEF-301. According to voltage presence and voltage quality on phases the PEF-301 will automatically select the optimum phase and switch the single phase load supply to this phase.

Any power load is energized with the interposition of the PEF-301:

- if power is less than 3.6 kW (16 A), the load is energized from the PEF-301 directly;
- if power is more than 3.6 kW (16 A), the PEF-301 controls magnetic starter single phase coils of the corresponding power.

Reset delay to the priority phase, the maximum voltage threshold and the minimum voltage threshold are set by user.

2 TECHNICAL BRIEF

Nominal Phase Voltage, V	230/240
Mains frequency, Hz	45 – 65
Harmonical configuration (nonsinusoidality) of power supply voltage	EN 50160
Trip threshold for Umin, V	160 – 210
Trip threshold for Umax, V	230 – 280
Adjustable reset delay, Ton, s	1 – 600
Return delay range to the priority phase, Tr, (5 – 200), s	present
Return delay range to the priority phase, Tr, (200 – ∞), s	absent
Fixed switch (de-energization) delay for Umin, s	12
Switch delay to reserve phases, s, not more than	0.2
Voltage hysteresis, V	5 – 7
Accuracy, V	±3
Maximum switched current of output contacts, A, no less than	16
Operating phase voltage, V	400
Transient withstand, V	450
Power consumption (under load), W, not more than	1.0
Protection class against electric shock	II
Permissible contamination level	II
Overvoltage category	II
Nominal impulse withstanding voltage, kV	4
Nominal voltage of isolation, V	450
Life of output contacts: under load 16 A, operations, no less than under load 5 A, operations, not more than	100 000 1 mln.
Cross section of wires of connection terminals, mm²	0.5 – 2
Maximal tightening torque of terminals external screws, N*m	0.4
Climatic version	NF 3.1
Operating temperature, °C	from -35 to +55
Weight, kg, no more than	0.200
Mounting 35 mm DIN-rail	
The unit remains operational capability in any position in space	

PEF-301 complies with requirements: EN 60947-1; EN 60947-6-2; EN 55011; EN 61000-4-2.

No harmful substances in excess of the maximum permissible concentration is available.

ATTENTION! DON'T MAKE EXCESSIVE EFFORTS WHEN PERFORMING ADJUSTING OPERATIONS.

3 OPERATION

The PEF-301 is a digital microprocessor - based unit. User sets trip thresholds of the PEF-301, i. e. the minimum and the maximum voltage thresholds on reaching of which the unit trips and de-energizes a load (switches the load to a reserve phase). The PEF-301 is connected to the three-phase four-wire mains through the 1 (L1), 3 (L2), 5 (L3), 6 (N) input terminals.

The phase L1 is the priority one, i. e. the load will always be energized from the L1 phase if voltage on this phase is present & within user-preset thresholds. The unit performs monitoring of voltage presence & values on each phase and if the voltage value on the L1 goes outside the trip threshold range the PEF-301 effects the high speed (a switch delay is not more than 0.2 s) switching of the load to the phase where voltage value is within trip thresholds. If the voltages on both reserve phases are outside the preset trip voltage thresholds the load will be de-energized. Switching is performed successively from L1 to L2, from L2 to L3 (the corresponding LED indicator glows).

SWITCHING TO THE PHASE WITH UNALLOWABLE PARAMETERS IS NOT PERFORMED.

After the load had been switched to reserve phases the monitoring of voltage presence & voltage value on the priority phase is going on and when the voltage parameters on this phase regenerated the load will be switched to the priority phase after user reset delay Tr (5-200 s) has expired. If Tr is in «∞» position (the priority is excluded) the return to the priority phase is not performed.

If voltage drops below the minimum trip voltage threshold, the load will be switched (de-energized) after the fixed time delay for starting transient drops ignoring (12 sec) has expired.

If voltage exceeds the maximum trip voltage threshold the load will be switched (de-energized) at once.

If the load had been de-energized from all the three phases because of unallowable voltage level on each phase the PEF-301 goes on voltage monitoring on all phases. When voltage parameters regenerate at least on one phase the load will be energized after the reset delay Ton has expired.

4 PRELIMINARY STARTING PROCEDURE AND OPERATING PROCEDURE

The PEF-301 produced is ready for service and needs no special pre-starting procedure measures. Due to the application of digital technology all the settings in the PEF-301 are calibrated quite accurate, so one needs no monitoring units to adjust the settings. Application of the switch according to specifications above and the present service manual, continuous work included, relieves of preventive maintenance during service life.

Before the PEF-301 is plugged - in one needs to set trip threshold values on the front panel by the contact knobs of potentiometers: trip threshold for **Umin**: 160 – 210 V; trip threshold for **Umax**: 230 – 280 V;

Reset delay after the load had been completely de-energized and then voltage parameters regenerated at least on one phase; also this is the initial load energization delay when voltage is applied to the unit, **Ton**: 1 – 600 sec;

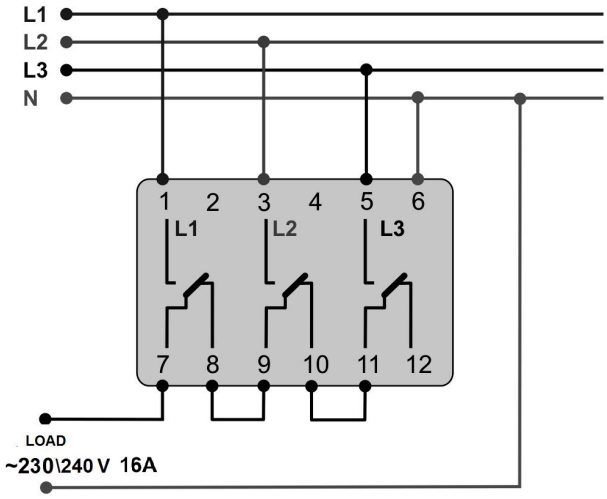
Return delay to the priority phase, **Tr:** it's adjusted in the 5 – 200 sec range; in the position «∞» the phase priority is excluded.

For refrigerators, conditioners and other compressor equipment Ton is recommended to set within 180-240 seconds, for other units Ton is set according to their operating instructions.

The PEF-301 must be connected subject to the safety regulations. To set settings is recommended in «OFF» state. To set settings alive is permitted following to the safety regulations.

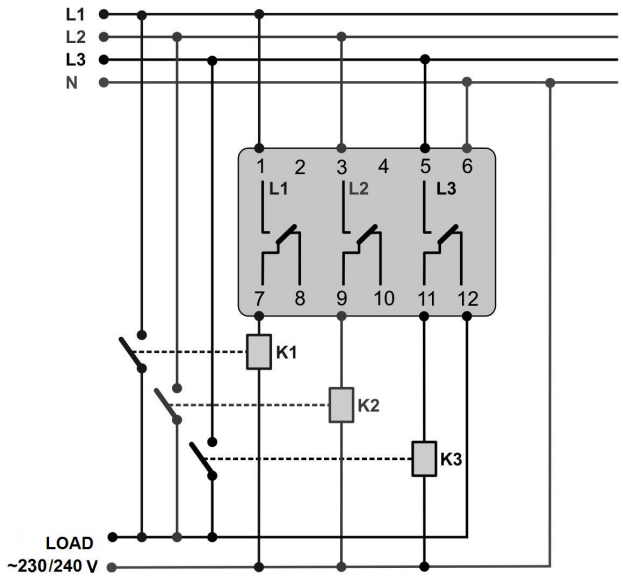
Three green LEDs **L1, L2, L3** on the front panel indicate the phase that energizes the load. The **red «FAULT» LED** indicator glows when the load is de-energized from all three phases.

Connection when load is no more than 16 A (apply jumper straps between the 8-9 and 10-11 terminals).



Wiring diagram №1

Magnetic starters-assisted connection under load more than 16 A (remove jumper straps between the 8-9 and 10-11).



K1, K2 , K3 – magnetic starters

Wiring diagram №2

NOTES AND RECOMENDATIONS:

- to bring-in the phase priority when the PEF-301 backs up the load of considerable value. In this case after the load had been switched to reserve phases and the voltage on the priority phase regenerated the load will return to the priority phase and thus sustained overload of the reserve phase will be excluded;
- not to bring-in (to exclude) the phase priority if the PEF-301 backs up the essential load of inconsiderable value because the switching of this load to reserve phase will not virtually produce an effect on phase loading;

– to select different priority phases for different single-phase loads in order to avoid phase overloads when several units are energized from the one and the same mains.

Internal blocking for sticking of output built-in relay contacts is provided in the PEF-301. Also the PEF-301 performs the monitoring of the magnetic starter power contact position in external circuit and is blocking the power contacts for their sticking (the 12 terminal is used, see WIRING DIAGRAM №2).

ATTENTION! THIS UNIT IS NOT DESIGNED FOR POWER-CUT IN EVENT OF A SHORT CIRCUIT.THE UNIT SHOULD BE OPERATED IN THE ELECTRIC MAINS PROTECTED WITH AUTOMATIC CIRCUIT BREAKER WITH THE BREAKING CURRENT OF 16 A NOT MORE, B CLASS.

NOTE: If the voltage is applied to the 12 terminal the switching is not performed.

5 STORAGE AND SHIPPING CONDITIONS

The switch in manufacturer package should be stored in enclosed rooms at -45 to +60 °C and exposed to no more than 80% of relative humidity when there are no fumes in the air that exert a deleterious effect on package and the switch material. The Buyer must provide the protection of the switch against mechanical damages in transit.

6 SERVICE LIFE, SHELF LIFE AND MANUFACTURER WARRANTY

6.1 The unit service life is 10 years. Upon expiration of the service life you should contact the Manufacturer.

6.2 Shelf life is 3 years.

6.3 Warranty period of the unit operation is 5 years from the date of sale.

During the warranty period the Manufacturer is responsible for free repair of the unit, if the Consumer has complied with the requirements of this Operating Manual.

ATTENTION! IF THE UNIT HAS BEEN OPERATED WITH VIOLATION OF THE REQUIREMENTS OF THIS OPERATION MANUAL, THE USER WILL LOSE THE RIGHT TO WARRANTY MAINTENANCE.

6.4 Warranty service is performed at the place of purchase or by the Manufacturer of the unit.

6.5 Post-warranty service is performed by the Manufacturer at current rates.

6.6 Before sending for repair, the unit should be packed in the original or other packaging excluding mechanical damage.

7 ACCEPTANCE CERTIFICATE

The PEF-301 has been manufactured and accepted according to the requirements of effective technical documentation and is approved to be ready for operation.

Chief of quality department _____

Production date _____

STAMP

8 INFORMATION ON CLAIMS

Earnest request: indicate the reason for return in the notice of faults field at the return of the unit or in case of submitting for warranty service or post-warranty service.

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The Company is grateful to you for the information about the quality of the unit and suggestions for its operation.

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For all questions, please contact the Manufacturer:
"Novatek-Electro" Ltd.
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Odessa, 65007, Ukraine.
Tel: +38 (048) 738-00-28; +38 (0482) 37-48-27;
Tel/Fax (0482) 34-36-73;
www.novatek-electro.com

*Sale date*_____

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