



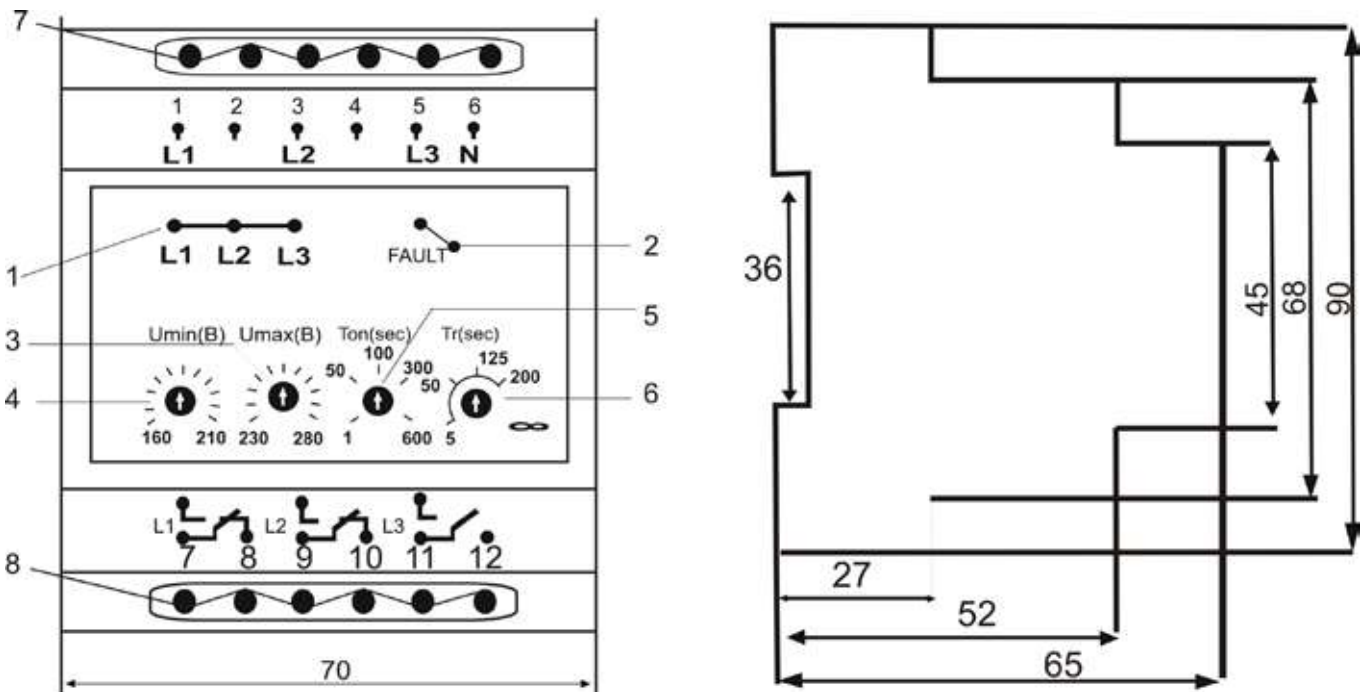
**ELECTRONIC HEALTHY PHASE SELECTOR  
(UNIVERSAL AUTOMATIC ELECTRONIC PHASE SWITCH)**

**TECHNICAL DESCRIPTION AND USERS MANUAL**

**PEF-301**



## CONTROLS DESCRIPTION AND DIMENSIONS DIAGRAM



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

## ELECTRONIC HEALTHY PHASE SELECTOR PEF-301

### APPLICATIONS

The **PEF-301** universal automatic electronic phase switch is designed to supply an industrial/ appliance single-phase 230V/50Hz load from three-phase four-wire mains 3x380+N 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 3,5 kW (16A), the load is energized from the PEF-301 directly;
- if power is more than 3,5 kW (16A), 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.

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## OPERATION

The **PEF-301** is a digital microprocessor - based device. User sets trip thresholds of the **PEF-301**, i. e. the minimum and the maximum voltage thresholds on reaching of which the device 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 device 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  $\leq 0.2\text{sec}$ ) 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-preset reset delay  $T_r$  (5-200 sec) has expired.

- If  $T_r$  is in « $\infty$ » 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  $T_{on}$  has expired

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## PRELIMINARY STARTING PROCEDURE AND SERVICE MANUAL

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 devices 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 arms of potentiometers :

*Trip threshold for **Umin**: 160 – 220V;*

*Trip threshold for **Umax**: 230 – 280V;*

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 device, **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 3-4 min, for other devices **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.

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### **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 devices 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).*

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### **TECHNICAL BRIEF**

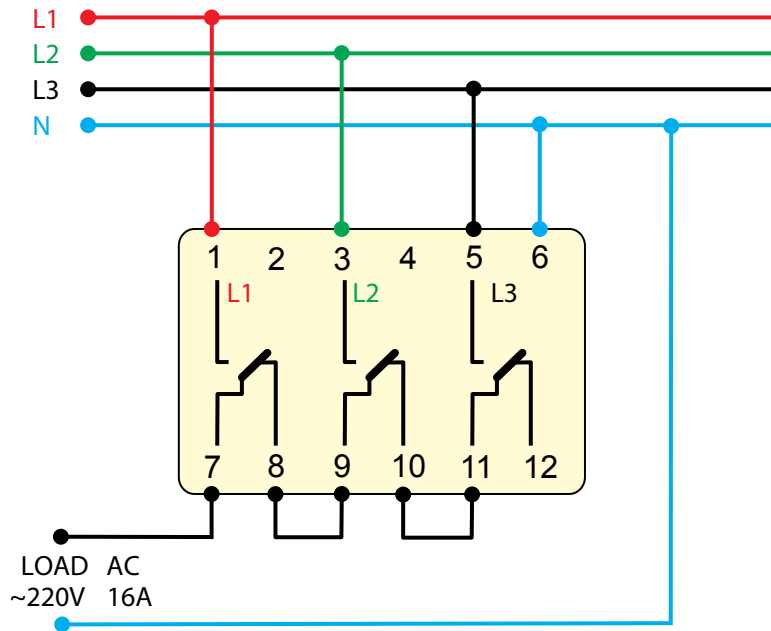
Nominal Phase Voltage, <b>V</b>	230
Mains frequency, <b>Hz</b>	45-55
Trip threshold for <b>Umin</b> , <b>V</b>	160-220
Trip threshold for <b>Umax</b> , <b>V</b>	230-280

*TECHNICAL BRIEF*

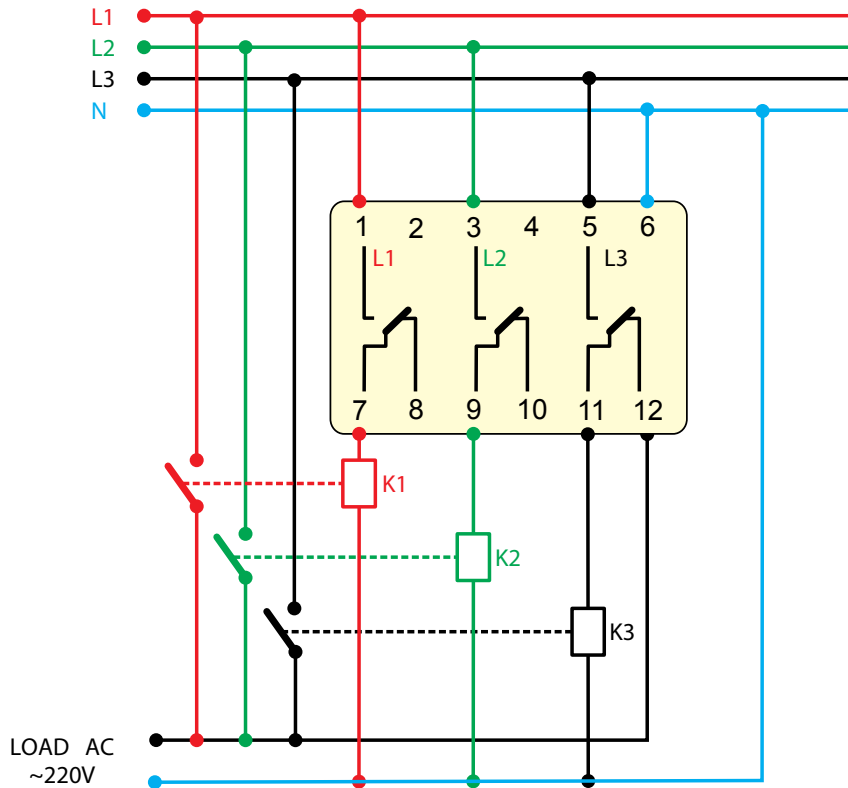
Adjustable reset delay, <b>Ton, sec</b>	1-600
Return delay range to the priority phase, <b>Tr, (5—200), sec</b>	present
Return delay range to the priority phase, <b>Tr, (200 -- ∞), sec</b>	<b>present</b>
Fixed switch (de-energization) delay for <b>Umin, sec</b>	12
Switch delay to reserve phases, <b>≤, sec</b>	0.2
Voltage hysteresis, <b>V</b>	5-7
Accuracy, <b>V</b>	±3
Maximum switched current of output contacts, <b>≥, A</b>	16
Operating phase voltage, <b>V</b>	400
Transient withstand, <b>V</b>	450
Power consumption (under load), <b>≤, VA</b>	1.0
Life of output contacts: <ul style="list-style-type: none"> <li>• under load <b>16 A</b> , <b>≥</b>, operations</li> <li>• under load <b>5 A</b> , <b>≥</b>, operations</li> </ul>	100 000 1 million
Protection degree: <ul style="list-style-type: none"> <li>• apparatus</li> <li>• terminal block</li> </ul>	<b>IP40</b> <b>IP20</b>
Operating temperature, <b>°C</b>	- 35 to + 55
Storage temperature, <b>°C</b>	- 45 to + 70
Weight, no more than, <b>kg</b>	0.200
Case dimension, <b>mm</b>	52*88*65
Mounting 35 mm DIN-rail	
Mounting position arbitrary	

## WIRING DIAGRAM №1

Connection under load  $\leq 16A$  (apply jumper straps between the 8-9 and 10-11 terminals)



Wiring diagram №2 (Magnetic starters-assisted connection under load  $> 16A$  (remove jumper straps between the 8-9 and 10-11))



**K1, K2, K3** – magnetic starters (contactors)

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

## STORAGE AND SHIPPING CONDITIONS

The switch in manufacturer package should be stored in enclosed rooms at **-45° — +70° C** and exposed to no more than 90% 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.

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## WARRANTY

*Novatek-Electro LTD. assures replacement guarantee of the PEF-301 phase switch manufactured by it for 36 months (3 years) from the date of sale, provided:*

- *the proper connection;*
- *the safety of the inspection quality control department seal;*
- *the integrity of the case, no traces of an opening, cracks, spalls etc*

*Production date* \_\_\_\_\_

*Serial No* \_\_\_\_\_

*Quality control department seal* \_\_\_\_\_

*Sale date* \_\_\_\_\_

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