

# **ROUV SERIES OVER AND UNDERVOLTAGE RELAYS**

## **INTRODUCTION**

ROUV Series overvoltage and undervoltage relays are designed to be used in MEDIUM VOLTAGE and HIGH VOLTAGE electric installations.

Thanks to Micro Controller technology, relay performance has increased and the dimensions have decreased.

The types ROUV Series over and Undervoltage relay family are as follows:

ROUV-130 3 Phase Over and Under Voltage Relay

ROUV-110 One Phase Over and Under Voltage Relay

These two types of relays are very similar to each other . Therefore the working of the 3 Phase model will be told about in here.

## **STRUCTURE AND THE WORKING PRINCIPLE**

The relay's simplified block diagram is seen in Figure 1.

The relay has 6 main units.

- a) Voltage circuit
- b) Analog circuits
- c) Micro controller
- d) Setting elements
- e) Tripping and signals
- f) Auxiliary DC Supply

### **a) Voltage Circuit**

Auxiliary voltage transformers in the relay transmit the voltage data from the main voltage transformers to the electronic circuits. These auxiliary voltage transformers also provide a galvanic insulation between the electronic circuits and the main voltage transformer.

### **b) Analog Circuits :**

The AC voltage proportional to the line voltage at the output of the voltage circuit is converted into digital data in A/D Converter, and transmitted to the micro controller.

**c) Micro Controller :**

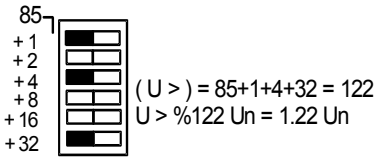
Micro controller compares the digital data proportional to the line voltage from the A/D Converter continuously with the selected over and under voltage values. If it is higher than the over voltage value set, the relay makes the "u > pick-up" Led on, and it also gives start to the over voltage delay circuit in the micro controller. If the voltage is still higher than the over voltage value set at the end of the time delay, the relay energizes the over voltage auxiliary trip relay.

If the line voltage is lower than the voltage value set, the relay makes the "u < pick-up" led on and gives start to the under voltage delay time circuit in the microcontroller. If the voltage is still lower than the value set at the end of the adjusted time delay, the relay energizes the undervoltage auxiliary trip relay at output.

**d) Setting elements:**

On the relay's front panel there are; 1 over voltage (u>) switch, 1 under voltage (u<) switch, 1 under voltage trip time setting dip-switch.

**1. Over voltage setting :**

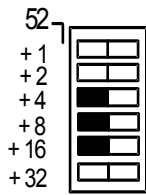


Over voltage setting dip-switch is a 6 step dip-switch, and every step has a fixed value. When the movable bars on the dip-switches are pushed in the direction of the values, that value is added to the total. If the movable bar is pushed in the opposite direction, the value that the movable

bar is pushed toward is subtracted from the total. Even if all of the bars are taken to the "0" position, the relay's working value will not be zero. In this case, the relay's minimum working value will have been selected.

When the over voltage setting dip-switch is adjusted as in the Figure above, the relay is adjusted to 1.22 Un. Over voltage setting element makes it possible to adjust the voltage value from 0.85 Un to 1.48 Un with 0.01 Un steps.

**2. Low voltage setting:**

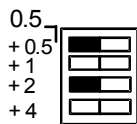


$(U <) = 52 + 4 + 8 + 16 = 80$   
 $U < \% 80 U_n = 0.80 U_n$

Low voltage setting dip-switch is a 6 step dip-switch and its setting is like that of over voltage setting. When the undervoltage setting dip-switch is adjusted as in the figure above, the relay is set to 0.80

$U_n$ . Low voltage setting element makes it possible to adjust the voltage value between 0.52  $U_n$  and 1.15  $U_n$ .

**3. Time setting:**



$t = 0.5 + 0.5 + 2$   
 $t = 3 \text{ sn.}$

On the relay, there are two time delay settings; One is for over voltage and the other is for under voltage. When the time delay setting dip-switch is adjusted as in the

figure above, the relay is adjusted to a time delay of 3 sec.

**e) Tripping and Signals:**

The tripping decisions made by Micro Controller are transmitted by means of optoisolators to the tripping auxiliary relay. Trip command is transmitted to circuit-breaker over the auxiliary relay contacts.

On the front panel, there are two test buttons. One of these is for over voltage, the other is for under voltage. When the test button is pushed, the related pick-up led will be on, and the relay will trip at the end of the time delay set. At the moment of trip, the trip led will get on and continue to do so until reset. Even if it is forgotten to clear these signals after a fault; when a new fault occurs the relay automatically clears the old signals and informs against the new faults.

The "Ready" led indicates that DC Supply is connected correctly and the micro controller is active. If the "Ready" led isn't flashing, the relay will not function. If the voltage on any phase of the relay reaches a value higher or lower than the adjusted values, the related Pick-up LED gets on. If the fault is still continuing at the end of the time delay set, the relay will trip.

**f) Auxiliary DC Supply:**

ROUV Series over and low voltage relays are manufactured as to function in one of the voltages of 24V, 48V, 110V, 220V DC. It is shown on the back label what DC voltage the relay has been manufactured to operate.

**CONNECTION AND TAKING INTO OPERATION**

The relay's connection schematics is seen in Figure 2.

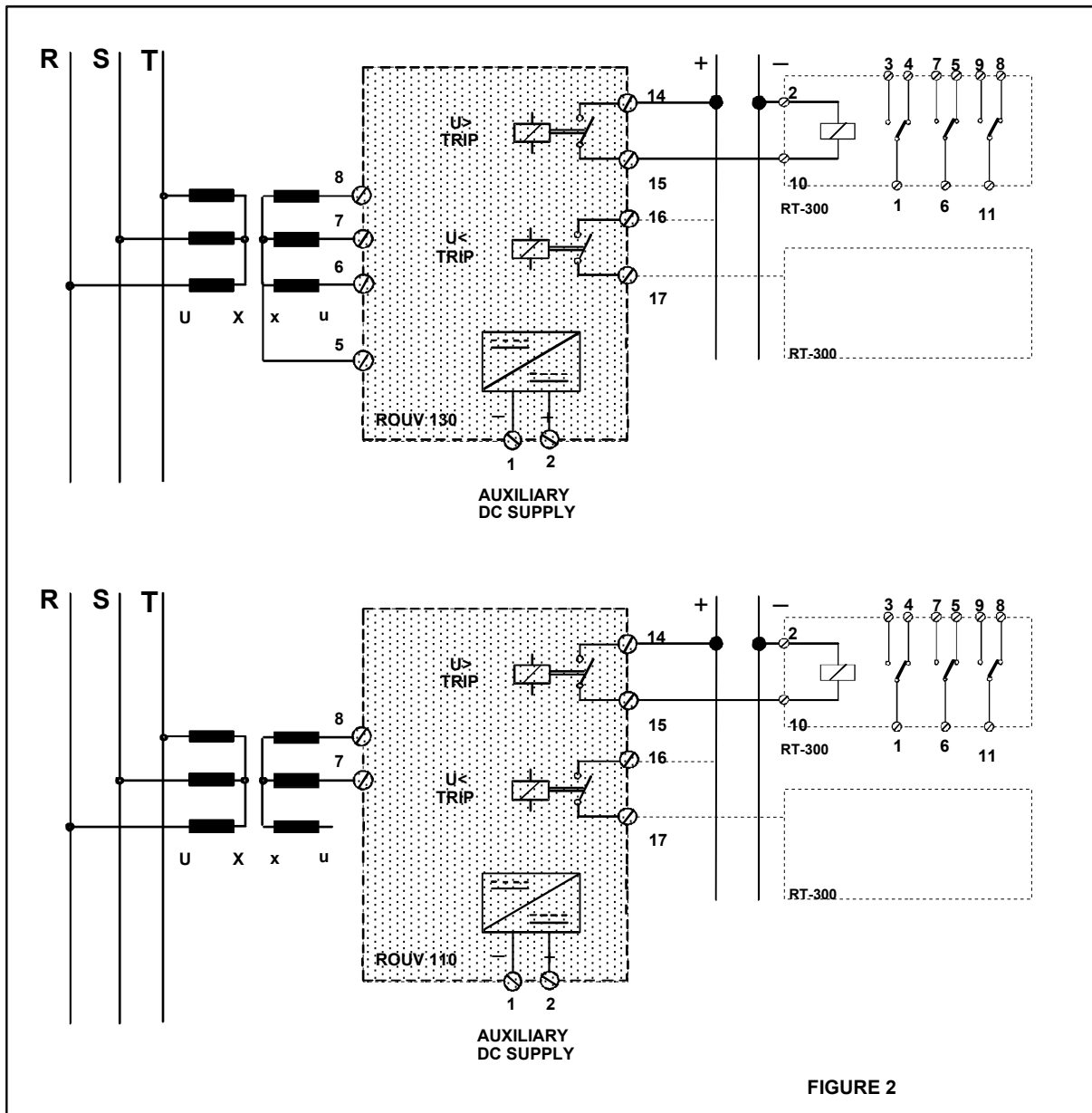


FIGURE 2

After the mechanical and electrical assemblies of the relay are completed:

- a. The relay is given the auxiliary feeding voltage. If there is not a polarity error in DC feeding voltage, the "Ready" signal on the front panel will flash: If the "Ready" signal is not flashing, there is either a polarity problem or DC feeding voltage isn't coming to the relay.
  
- b. When the test button on the relay's front panel is pushed, the relay is tested functionally. If there isn't a connection error: When the button is pushed the relay will command the circuit-breaker trip at the end of the time delay set.

## **TECHNICAL CHARACTERISTICS**

### **Voltage Circuit:**

Un	: 100V, 220V, 380V AC
Power Consumption	: 0.5 VA/Ph (U = Un )
Voltage setting range	: 0.85 Un - 1.48 Un (over voltage) : 0.52 Un - 1.15 Un (under voltage)
Consistency	: ± %1
Fall-Back ratic	: %95
Voltage setting accuracy	: % 5
Over voltage	: continous 2 Un, 3 Un 1 sn

### **Delay Time Settings:**

Over voltage time delay setting	: 0.5 - 8 sec. (With 0.5 sec.steps)
Low voltage time delay setting	: 0.5 - 8 sec. (With 0.5 sec. steps)
Consistency	: ± %2
Delay setting accuracy	: ± %3

### **Contacts:**

over voltage	: 1 NO (*)
under voltage	: 1 NO (*)

\* when more contacts are required, the auxiliary relay with two sockets and 3 inverter contacts is given, thus the number of contacts is increased.

### **Contact Capacity:**

Continuous current	: 5A
0.5 sec. (trip contact)	: 30 A
3 sec. (trip contact)	: 15 A
Auxlilary voltage	: 24, 48, 110, 220 VDC

Operation range : (0.8 - 1.15) Udc

Operating temperature : -5 °C, +50 °C

**Testing Voltage (According to IEC 255)**

1. Dielectric strength : 2kV AC 50 Hz 1 min.

2. Impulse strength : ± 5kV 1,2/50 microsec 0,5 joule

3. Noise strength (H.F.D.)

a) Logitudinal mode : 2,5 kV 1 MHz ve 400 Hz

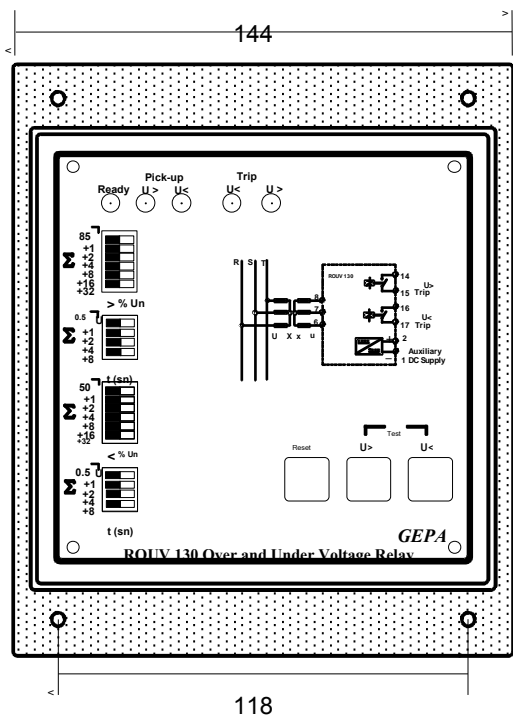
b) Transverse mode : 1 kV 1 MHz ve 400 Hz

**Dimension:**

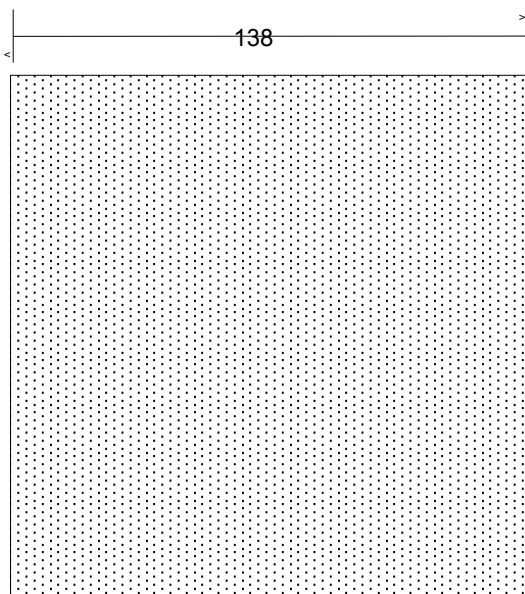
WidthxHeightxDepth : 144x171x110

Weight : 2 Kg.

Panel window width : 138x138 mm



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PANEL WINDOW WIDTH

