



**DIFFERENTIAL AND OVERCURRENT  
PROTECTION SYSTEM  
WITH SELF-RECLOSING FEATURE**



**WRRT-3 SERIES**

**USER'S MANUAL**

**( M 981 207 / 99 B )**

**(c) CIRCUTOR S.A.**

**Differential and overcurrent protection system  
with SELF-RECLOSING feature**

|   | Page |
|---|------|
| 1.- Introduction .....  | 2    |
| 1.1.- Connection warnings  ..... | 2    |
| 2.- WRRT-3 Series models .....  | 2    |
| 3.- Description .....   | 3    |
| 4.- Earth leakage protection systems.....   | 5    |
| 5.- Overcurrent protection systems (from 6 to 63 A ) ....   | 8    |
| 6.- Connection terminals for check and control actions ..   | 11   |
| 7.- WRRT-3 Main features .....  | 12   |
| 8.- Power circuit connection procedure .....  | 13   |
| 9.- Operation mode and maintenance .....  | 13   |
| 9.1.- Circuit elements .....  | 13   |
| 9.2.- Overcurrent circuit breaker.....  | 14   |
| 9.3.- Earth leakage protection relay .....  | 14   |
| 9.4.- Safety warnings  .....   | 14   |
| 10.- WRRT-3 connection drawings .....   | 15   |

## 1.- INTRODUCTION

The **WRRT-3** series provides an overcurrent and earth leakage protection for either single or three phase mains (with or without the neutral wire), with **self-reclosing** ability for an earth leakage and/or overcurrent event.

In case of a trip, the equipment tries a reclosing action:

- up to **10 times** for an earth leakage fault event.
- up to **2 times** whether the overcurrent protection has tripped out.

The **WRRT-3** guaranties the supply mains to be cut either due to an earth leakage or overcurrent fault, so offering a complete protection over the electrical mains.

This system is specially suitable for those installations that due to their location are difficult to be controlled: cooler chambers, facilities at countryside, etc.

### 1.1.- Connection warnings



The manual you hold in your hands contains information and warnings about the **WRRT-3** that the user should respect in order to guarantee a proper operation of all the instrument functions and keep its safety conditions.

## 2.- WRRT-3 SERIES MODELS

Standard available models are following listed ones:

| <i>Single phase equip.<br/>Type</i> | <i>Three phase equip.<br/>Type</i> | <i>Current<br/>(In) A</i> |
|-------------------------------------|------------------------------------|---------------------------|
| WRRT-3- II 06A                      | WRRT-3- IV 06A                     | 6                         |
| WRRT-3- II 10A                      | WRRT-3- IV 10A                     | 10                        |
| WRRT-3- II 16A                      | WRRT-3- IV 16A                     | 16                        |
| WRRT-3- II 20A                      | WRRT-3- IV 20A                     | 20                        |
| WRRT-3- II 25A                      | WRRT-3- IV 25A                     | 25                        |
| WRRT-3- II 32A                      | WRRT-3- IV 32A                     | 32                        |
| WRRT-3- II 40A                      | WRRT-3- IV 40A                     | 40                        |
| WRRT-3- II 50A                      | WRRT-3- IV 50A                     | 50                        |
| WRRT-3- II 63A                      | WRRT-3- IV 63A                     | 63                        |

- Operation voltage: 220 V a.c. / 2 wires or 380 V a.c./ 220 V a.c. (III +N)
- On request:
  - Other rated currents
  - Other power supply voltages

### 3.- DESCRIPTION

The **WRRT-3** is basically formed by following elements:

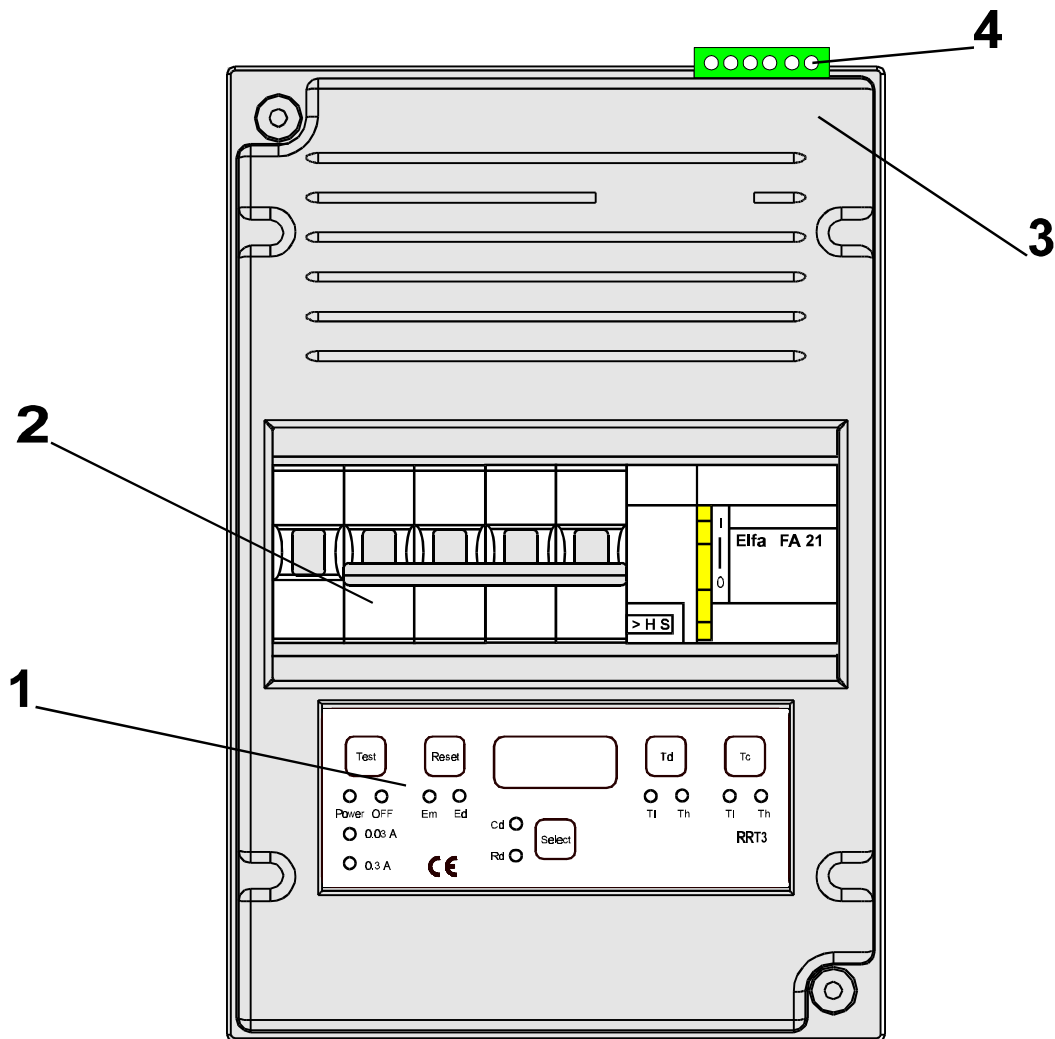
1.- Earth leakage protection system:

- Differential transformer **WKE / RRT3**
- Earth leakage protection relay with self-reclosing feature **RRT3**
  - Indication of number of total reclosing actions (Rd)  
(no reset to zero as per ER.i3.009 specification)
  - Visualization of earth leakage current in mA (Cd)

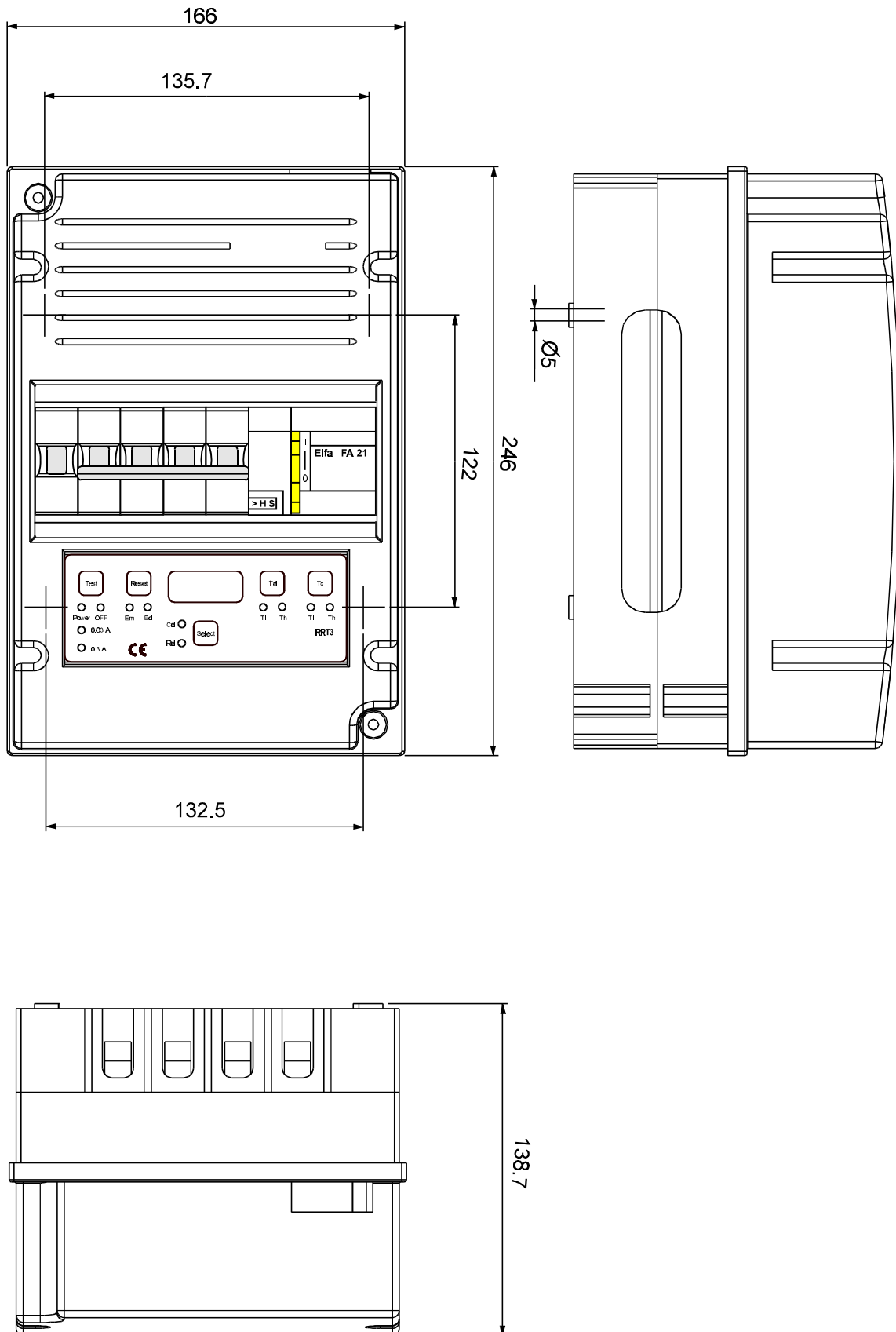
2.- Electrical-motorized overcurrent circuit breaker, from 6 to 63 A

3.- Sensitivity selector, 30 or 300 mA (placed inside the case at the upper right corner).

4.- Connection terminal for check and control actions



Dimensions :



#### 4.- EARTH LEAKAGE PROTECTION SYSTEM

The earth leakage protection system consists of:

- a) Measuring differential transformer type **WKE / RRT3** that sends the signal to the electronic relay.
- b) Electronic earth leakage protection relay with self-reclosing feature type **RRT3**.

Allowable setting actions are:

- Tripping earth leakage current  $I_{fn}$ : 

|                |
|----------------|
| 0.03 or 0.3 A. |
|----------------|

Selection of the tripping earth leakage current (30 / 300 mA) is done by means of a switch placed inside the case.

- Time between two successive reclosing attempts (**Time delay**) :

|      |         |
|------|---------|
| Td l | 1 min   |
| Td h | 1.5 min |

Time period to be waited before the internal counter of reclosing actions is reset to zero once the power supply has been restored and no other earth leakage or overcurrent fault occurs (**Time clear**): 30 or 60 min user-selectable.

|      |        |
|------|--------|
| Tc l | 30 min |
| Tc h | 60 min |

The RRT-3 relay is similar for all types, regardless those are single or three phase models, and their rated currents.

*NOTE : All above times can only be modified provided no trip has occurred.*

#### **RRT-3 relay mains elements:**

##### **A.- 3 digits LED DISPLAY**

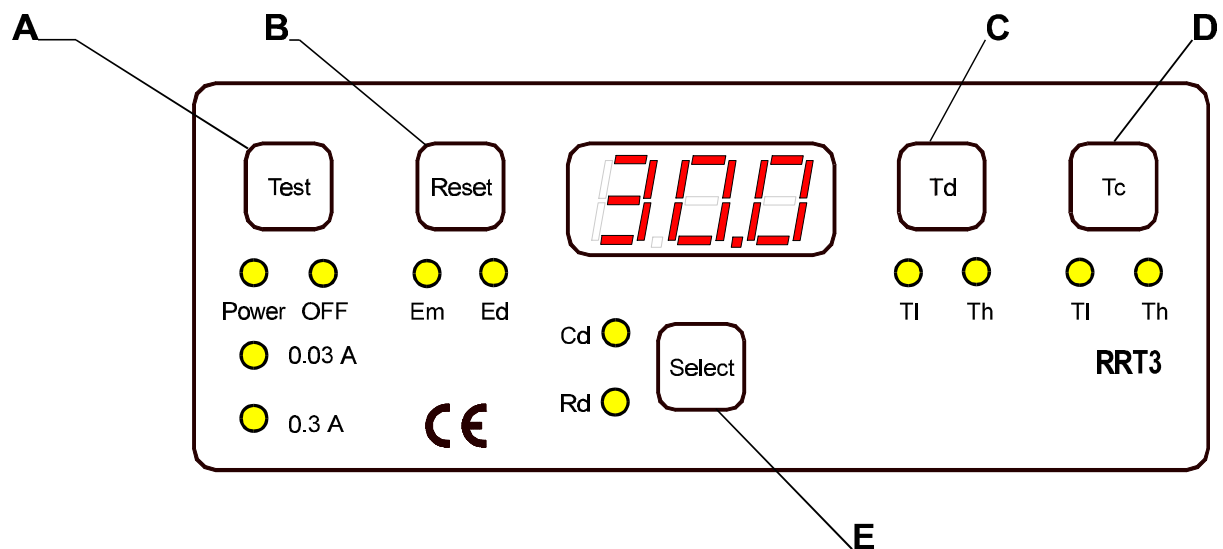
This display, placed at the front of the RRT-3 relay, permits the user to visualize these parameters:

- Number of total reclosing actions (Rd)  
(no reset to zero as per ER.i3.009 specification)
- Earth leakage current in mA (Cd )

**B.- PUSH-BUTTONS (5 push-buttons)**

All previous setting actions are carried out through the 5 available push-buttons in the **RRT-3**:

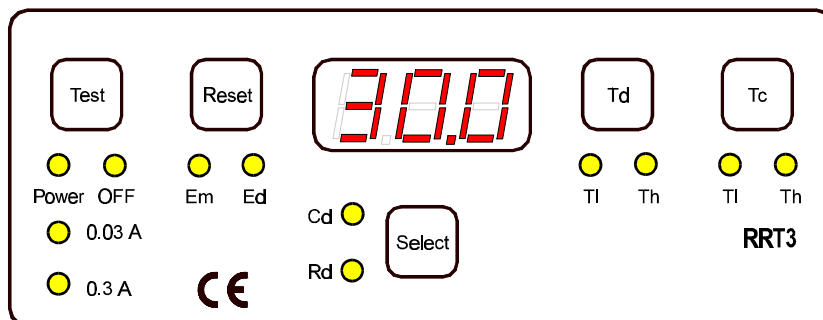
| No | Butto<br>n    | Push-button description   |
|----|---------------|---|
| A  | <b>Test</b>   | Test to check the earth leakage protection system out   |
| B  | <b>Reset</b>  | Reclosing of the WRRT-3 and reset to zero of RRT-3 internal counters of total reclosing actions.  |
| C  | <b>Td</b>     | Choice of delay time between successive reclosing actions (TI & Th )  |
| D  | <b>Tc</b>     | Choice of waiting time to reset to zero the internal counters of total reclosing actions (TI & Th)  |
| E  | <b>Select</b> | Choice of display mode: <ul style="list-style-type: none"> <li>• Indication of total reclosing actions (Rd)</li> <li>• Visualization of earth leakage current in mA (Cd)</li> </ul> |



### C.- LIGHTING INDICATIONS (12 Leds)

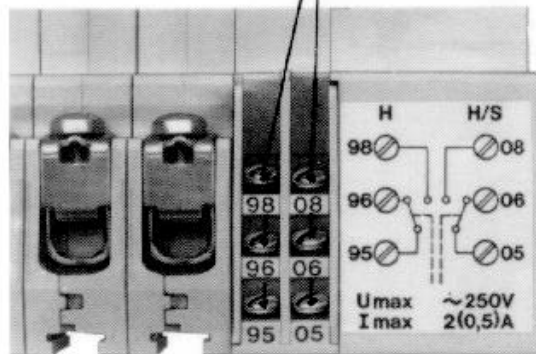
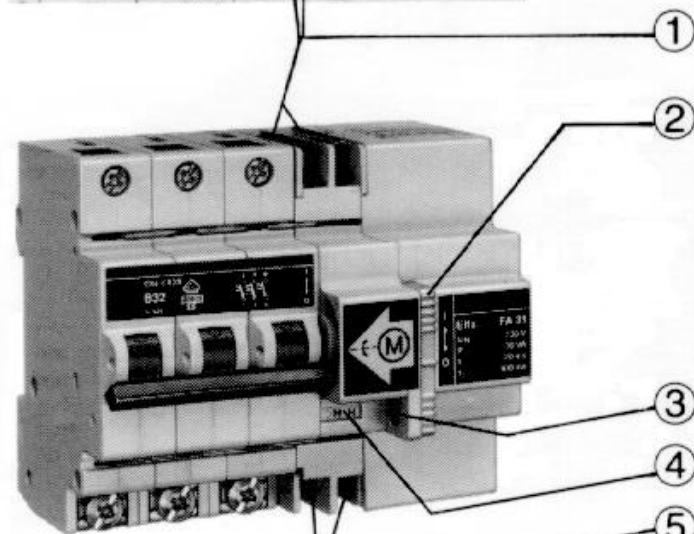
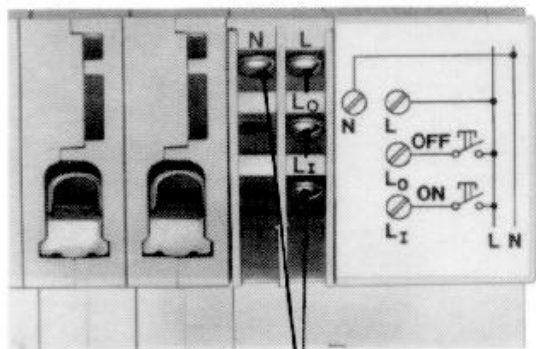
The RRT-3 is equipped with several lighting indicators and push-buttons to perform control and check actions over the installation.

| No | Indication | Led description  |
|----|------------|--|
| ①  | Power      | Power supply   |
| ②  | OFF        | Earth leakage &/or overload &/or short-circuit fault   |
| ③  | Em         | Indication of lock due to overload &/or short-circuit fault: <b>2 attempts</b>                         |
| ④  | Ed         | Indication of lock due to earth leakage fault: <b>10 attempts</b>                                      |
| ⑤  | T I (Td)   | Indication of low waiting time between successive reclosing attempts: <b>1 min</b>                     |
| ⑥  | T h (Td)   | Indication of long waiting time between successive reclosing attempts: <b>1.5 min</b>                  |
| ⑦  | T I (Tc)   | Indication of low waiting time to reset to zero internal counters of reclosing actions: <b>30 min</b>  |
| ⑧  | T h (Tc)   | Indication of long waiting time to reset to zero internal counters of reclosing actions: <b>60 min</b> |
| ⑨  | 0.03       | Indication of the earth leakage protection relay sensitivity setting: $I_n = 30 \text{ mA}$            |
| ⑩  | 0.3        | Indication of the earth leakage protection relay sensitivity setting: $I_n = 300 \text{ mA}$           |
| 11 | Cd         | Indication of visualization on display of the earth leakage current in mA                              |
| 12 | Rd         | Indication of visualization on display of the total number of reclosing actions                        |





**5.- OVERCURRENT PROTECTION SYSTEMS (FROM 6 TO 63 A )**



**a.- Functional elements**

- ① Terminal for control wiring
- ② Manual switch
- ③ Hole for padlock .  
Locking possible in O and I
- ④ Display of supplementary switch functions  
H : auxiliary switches  
S : fault signalling switches
- ⑤ Terminals for supplementary switches

**b.- Installation**

Snap onto support rail DIN-EN 50022/05.78 : 35 mm wide

**c.- FA21 electrical connection**

- ( a ) Terminals for motor drive control wiring and mcb output terminal.
- ( b ) Terminals for auxiliary and fault signalling switches and mcb input terminal .

The electrical-motorized automatic circuit breaker, **FA21-T** model, provides the overcurrent or thermal protection of the facility (**10 kA DIN VDE**).

The **FA21-T** can be either for single phase or three phase plus neutral operation mode.

The automatic circuit breaker can be closed or open either directly in the own circuit breaker or by means of a command given by the **RRT-3** relay.

After a trip due to an overload or a short-circuit event, the circuit breaker will automatically try to restore to its closing position (up to **2 attempts**) whether the fault in the installation has disappear once passed the set time (1 or 1.5 min).

The circuit breaker can be reclosed at any time just pressing the button RESET in the **RRT-3** relay.

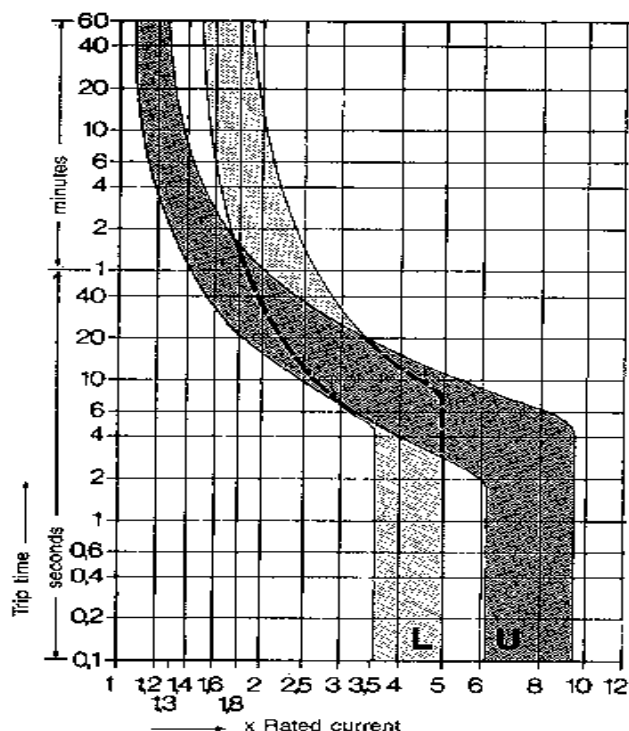
The **FA21-T** circuit breaker incorporates a device (yellow stick) that permits the circuit breaker to be locked once it has been open, in order to avoid this could be neither mechanically or manually manipulated. The circuit breaker can also be locked at the open position with a padlock (6 mm  $\varnothing$  passing hole).

The assembly system of the **FA21-T** into the **WRRT-3** set is done on a DIN 50.022, 53 mm width, rail.

The **FA21-T** circuit breaker provides a set of auxiliary contacts to inform about its status: (terminals 3-4 in the **WRRT-3**): a closed contact means the circuit breaker is open (short-circuit or overload event; or manual disconnection).

| <b>FA21-T Main features</b> |   |
|-----------------------------|---|
| - Rated currents $I_n$ (A)  | 6 - 10 - 16 - 20 - 25 - 32 - 40 - 50 - 63   |
| - Rated voltage $U_n$       | 240 V / 415 V a.c.  |
| - Rated breaking capacity   | 10.000 A (DIN VDE 0641/6.78)  |
| - No. of poles              | 1/ 2/ 3/ 4  |
| - Characteristic            | a) <b>Type U</b> (as per DIN VDE 0660 part 101/09.82) :<br>Magnetic trip: between 6 & 9 $I_n$<br>( $t < 0.1$ s) |
|                             | b) <b>Type D</b> ( DIN VDE 0641 - EN60898 ) :<br>Magnetic trip: between 5 & 10 $I_n$<br>( $t < 0.1$ s)          |
| - Frequency                 | 50/60 Hz  |
| - Protection class          | IP-40 (DIN 40050)   |
| - Storage temperature       | - 55 °C to +65 °C   |
| - Operation temperature     | - 25 °C to +55 °C   |
| - Case colour               | RAL 7035  |

FA21-T tripping characteristic:  
50/60 Hz current & 20 °C



## 6.- CONNECTION TERMINALS FOR CHECK AND CONTROL ACTIONS

The **WRRT3** is equipped with a connection terminal placed at the right top to perform following functions:

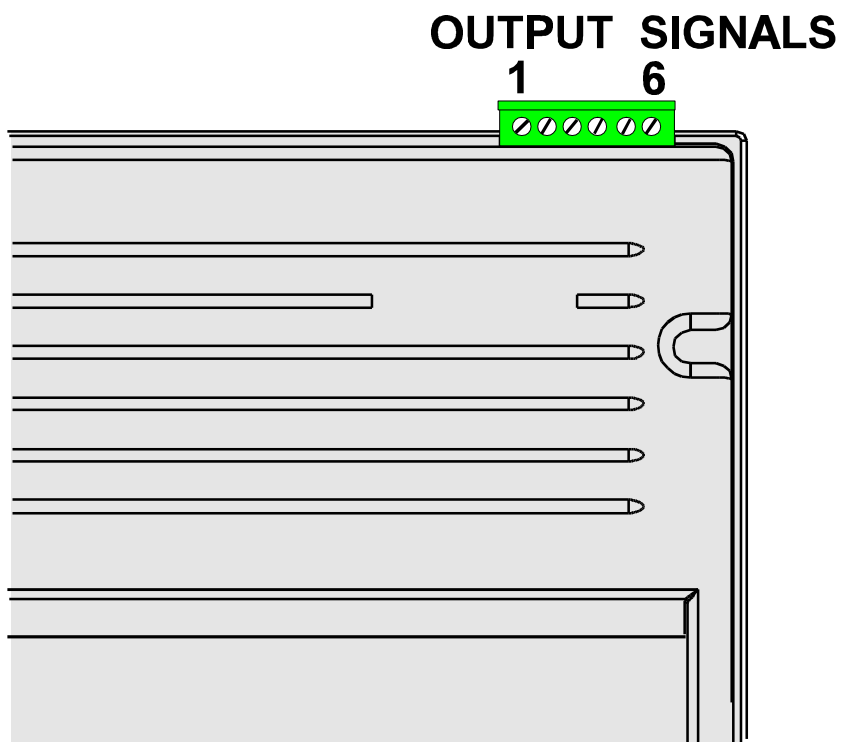
a.- The system is provided with a circuit to measure the earth leakage current: this output provides a voltage signal with a **1mV/ mA** ratio (A.C.). This signal can be either directly measured over the own connection terminals, **terminals 1-2**, or remotely trough a measuring network. This signal is not related with the voltage supply and so can be even measured when the relay is not powered.

b.- Besides, two free-voltage contacts are available in the **WRRT-3** to inform about the status of the equipment:

- **terminals 3-4** : Trip indicating signal. Free-voltage normally open contact.
- **terminals 5-6** : Latch indicating signal. This indicates that the equipment is latched as the fault persists after all reclosing attempts. Free-voltage normally open contact.

### Contact characteristics:

- Rated voltage: 250 V a.c.
- Rated current  $I_n$ : 2 A ( $\cos \varphi = 0.5$  ind.)



**7.- WRRT-3 MAIN FEATURES**

|  |   |
|--|---|
| - Operation voltage  | - 220 V a.c. - 2 wires<br>- 380 / 220 V III+N a.c.  |
| - Rated currents (In) A a.c.   | 6 - 10 - 16 - 20 -25 -32 - 40 - 63  |
| - Earth leakage residual current (Ifn)   | 30 - 300 mA. User-selectable (indication by led at frontal side)                                    |
| - Counter of reclosing attempts  | Led display (three digits: 999)   |
| - No. of reclosing attempts when earth leakage failure event   | <b>10 reclosing attempts</b>  |
| - No. of reclosing attempts when overcurrent failure event   | <b>2 reclosing attempts</b>   |
| - Delay time between successive reclosing attempts   | 1 min or 1.5 min. User-selectable through the push-button Td (Tdl or Tdh)                           |
| - Time period to be waited before the internal counter of reclosing actions is reset to zero once the power supply has been restored and no other fault event occurs | 30 - 60 min User-selectable through the push-button Tc ( Tcl or Tch)                                |
| - TEST push-button   | To test the earth leakage protection system   |
| - RESET push-button  | To reset to zero the internal counter of reclosing actions.   |
| - Measuring differential transformer   | It sends the signal to the RRT-3 electronic relay   |
| - Electrical-motorized automatic circuit breaker   | It permits to be remotely closed or open.   |
| - Connection terminals   | For signaling actions, measurement of earth leakage current and checking of circuit breaker status. |
| - Operation temperature  | 0° to 45° C   |
| - Storage temperature  | - 15° to + 60° C  |
| - Dimensions   | 166 x 246 x 138 mm (w x h x d)  |

## **8.- POWER CIRCUIT CONNECTION PROCEDURE**

Cable entrance to the WRRT-3 power circuit is at the top of the case. The cable exit is done through the bottom of the case.

Before any adjustment, replacement, maintenance or repairing operation is carried out, the instrument must be disconnected from any power supply source.

## **9.- OPERATION MODE AND MAINTENANCE**

Any maintenance or repairing action can be performed by not-specialized operators must thanks to friendly-use design.

### **9.1.- Circuit elements**

- Electrical-motorized automatic circuit breaker, **FA21-T** model
- Earth leakage protection relay with self-reclosing feature **RRT3**
- Differential transformer **WKE / RRT3**
- Connection terminal
- Sensitivity selector ( 30 / 300 mA )
- Enclosure for WRRT-3 set

All elements can suffer either mechanic ageing or an electric damage, and have been designed for an easy replacement.

### **9.2.- Overcurrent circuit breaker**

In case of failure, the circuit breaker can be easily replaced. This must be disconnected from the power system and removed from the DIN EN 50.022. rail.

Precautions to consider are:

- Repetitive connection-disconnection actions may provoke a high heating level, and even, a damage of the remote control system.

- After all reclosing attempts are completed, the fault in the installation must be solved before the circuit breaker is again manually connected.

### **9.3.- Earth leakage protection relay**

The RRT-3 relay is similar for all types, regardless those are single or three phase models, and their rated currents.

All necessary elements to perform control and setting actions over the EI **WRRT-3** are placed at its own front plate.

- The TEST push-button permits the user to check the correct operation of both the relay and the circuit-breaker.

- EI RESET push-button permits the user:

- To reset to zero the RRT-3 internal counter of total reclosing actions.

- To reclose at any time the overcurrent-earth leakage protection system.

### **9.4.- Safety warnings**

The user should take into account all installation instructions referred in this manual as well as the equipment main features.

Note that with the instrument powered on, the terminals could be dangerous to touching, and cover opening or elements removal actions may allow accessing dangerous parts. The equipment is factory-shipped in proper operation conditions.

**10.- WRRT-3 CONNECTION DRAWINGS**

