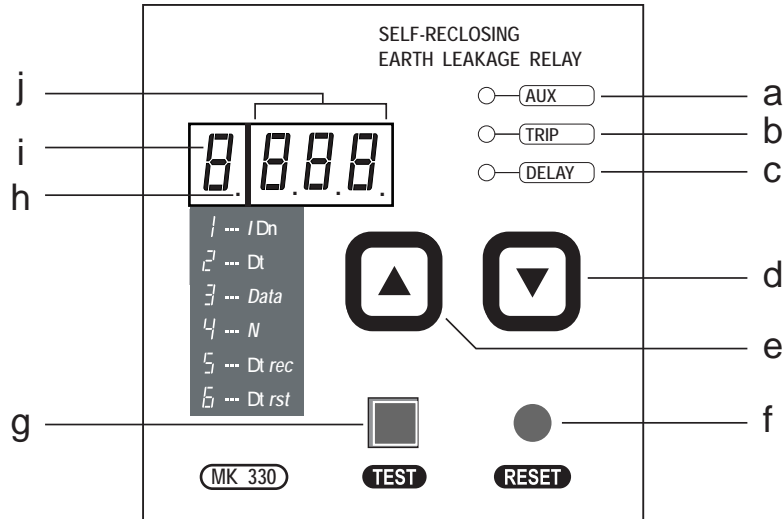


MK330 Self-Reclosing Earth Leakage Relay User's Guide

A BRIEF OVERVIEW



- a - Auxiliary power supply indicator
- b - Relay trip status indicator
- c - Time delay status indicator
- d - Down key
- e - Up key
- f - Reset key
- g - Test key
- h - DP indicator
- i - FUNCTION indicator
- j - VALUE indicator

Symbols

- / Dn* - Sensitivity setting
- Dt* - Time delay setting
- Data* - Previous tripped value
- N* - Number of reclosing attempts
- Dt rec* - Reclosing time delay
- Dt rst* - Automatic reset time

1. DESCRIPTION

The MK330 is a microprocessor based numerical earth leakage relay with built-in automatic self-reclosing feature. With the use of microprocessor technology and digital signal processing technique, the MK330 is equipped with state-of-the-art digital harmonic filter to minimise nuisance tripping.

The MK330 relay can continuously display the leakage current on the front display panel. When the relay trips as a result of a leakage being detected, the leakage current will be recorded. This recorded leakage current and all the settings on the relay can be viewed at by pressing the RESET button on the relay. Two external control inputs are incorporated inside the relay; there are external reset input and external test input.

The self-reclosing system comes with three programmable settings and an alarm contact. The detail operation is explained in Section 6.

2. LIGHT INDICATORS

The indicators display the status of the system as follow:

Indicator					Status
Aux	Trip	Delay	FUNC	VL	
0	0	0	0	0	No auxiliary supply.
1	0	0	0	1	Normal condition, no tripping.
1	0	1	X	X	Leakage current exceeded set limit, time delay countdown started.
1	B	0	X	B	Delay time lapsed and relay tripped
1	0	X	1	1	Scroll through setting.
1	0	X	B	1	Programming mode.

Table 1: System status

1 = ON 0 = OFF X = don't care
B = Blinking VL = VALUE FUNC = FUNCTION

FUNC	DP	VALUE
off	off	Real-time leakage current
1	off	Sensitivity setting
2	off	Delay time setting
3	blink	Previous tripped leakage current
4	off	Number of self-reclosing attempts
5	off	Reclosing time delay
6	off	Automatic reset time

Table 2: Function codes

Message	Description
'E Ct'	Error in ZCT connection
'OFL'	'Overflow'. The measurement exceeded the display range for the respective sensitivity setting range. Display range for sensitivity setting range 1: From 0.00A to 0.22A Display range for sensitivity setting range 2: From 0.00A to 1.10A Display range for sensitivity setting range 3: From 0.00A to 3.10A
'tEst'	Relay tripped under test mode

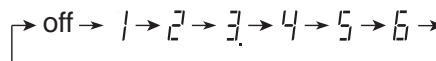
Table 3: Display messages

3. PUSH-BUTTON OPERATIONS

- a) **Trip test**
Press the 'TEST' button to simulate a trip condition.
- b) **Trip reset**
Press the 'RESET' button to reset the relay when tripped and to reset the self-reclosing counter, *N*.

c) View setting

When the relay is not under tripped condition, pressing the 'RESET' button will scroll through the various functions of the relay.



d) Program setting

Only function codes 1, 2, 4, 5 and 6 can be programmed.

Step 1: Press RESET key until the function digit shows the required function.

Step 2: Press the UP and DOWN keys simultaneously to enter programming mode. The function digit blinks to indicate the relay is in programming mode.

Step 3: Use the UP or DOWN key to select the desired value.

Step 4: To save the selected value, press UP and DOWN keys simultaneously. This step will exit the programming mode with the selected setting being saved and the

To exit programming mode without saving the selected setting, press the 'RESET' key once.

4. EXTERNAL CONTROL INPUTS

- a) **External test**
This digital input is similar to the 'TEST' push-button. To test the relay externally, make a connection between terminals 4 and 6 of the relay.
- b) **External reset**
This digital input is used to reset the relay externally when tripped. To reset the relay, make a connection between terminals 4 and 5 of the relay.

5. OUTPUT CONTACTS

- a) **Trip contact:**
The contact is activated when the relay operates under normal power-up condition with the leakage current less than the sensitivity setting, *I_{Dn}*. The contact is de-activated under following conditions:
 - broken connection between the ZCT and the relay.
 - leakage current exceeded the sensitivity setting.
- b) **Alarm contact:**
This is a latching type contact. It is activated under following condition:
 - broken connection between the ZCT and the relay.
 - the relay tripped and the number of reclosing count reaches the set value.
 It can only be reset by pressing the 'RESET' push-button or through the external reset input.

6. TIMING DIAGRAM

N : Number of reclosing counter.

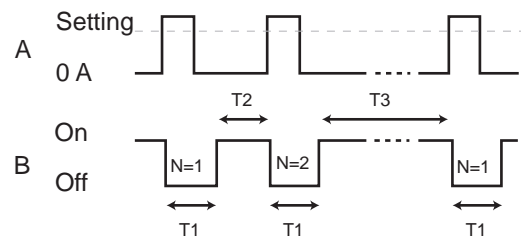
T_1 : Dt_{rec} . This is the reclosing time delay.

T_2 : Time $T_2 < Dt_{rst}$. Time T_2 is shorter than the "Automatic reset time" Dt_{rst} . The reclosing counter N is not reset.

T_3 : Time $T_3 > Dt_{rst}$. Time T_3 is longer than the "Automatic reset time" Dt_{rst} . The reclosing counter N is reset to zero.

A = FAULT CURRENT

B = BREAKER



7. TECHNICAL DATA

Models

MK330-5 : Auxiliary supply rated frequency at 50Hz

MK330-6 : Auxiliary supply rated frequency at 60Hz

Auxiliary Supply

Supply voltage : 240 VAC +/- 10%

Rated frequency : 50Hz / 60Hz

VA rating : 3 VA typical

Setting

Sensitivity adjustment : From 0.03A to 3.00A

Delay time adjustment : From 0.05 to 3.00 sec in step of 0.05 sec

Number of self-reclosing : From 1 to 10 times in step of 1

Reclosing time delay : From 1 to 999 sec in step of 1 sec

Automatic reset time : From 1 to 999 min in step of 1 min

External Test / Reset Inputs : N.O. dry contact

Output

Trip contact:

Rated voltage : 250 VAC

Continuous carry : 6A (cos ϕ = 1.0)

Make and carry for 0.2 s : 30A

Alarm contact:

Rated voltage : 250 VAC

Continuous carry : 5A (cos ϕ = 1.0)

Make and carry for 0.2 s : 10A

Contact specification:

Contact arrangement : change-over

Contact material : Silver alloy

Operating time : 15ms max.

Expected electrical life : 100,000 operations at rated current

Expected mechanical life : 5 million operations

Approval : UL / CSA, VDE, TUV, SEMKO

Indicators

Auxiliary supply : green colour LED indicator

Time delay : red colour LED indicator

Trip : 7-segment LED and red colour LED indicator

Real-time leakage current : 7-segment LED

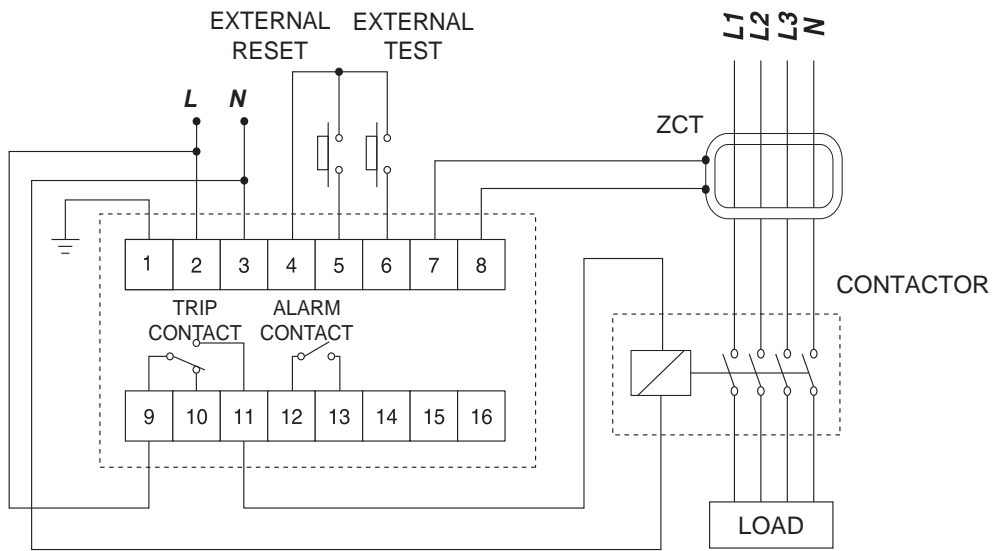
Mechanical

Mounting method : Panel mounting

Front panel : Standard DIN 96mm x 96mm

Approximate weight : 0.8 kg

8. CONNECTION DIAGRAM



9. CASE DIMENSIONS

