Micrologic 4 Electronic Trip Units

Introduction

The Micrologic 4 electronic trip unit is designed to protect:
- Conductors in commercial and industrial electrical distribution.
- Goods and people in commercial and industrial electrical distribution.

On 4-pole circuit breakers, neutral protection is set on the Micrologic trip unit by using a three-position dial:
- 4P 3D: neutral unprotected
- 4P 3D + N/2: neutral protection at half the value of the phase pickup, 0.5 x Ir (not available on Micrologic trip unit with In ≤ 40 A)
- 4P 4D: neutral fully protected at Ir

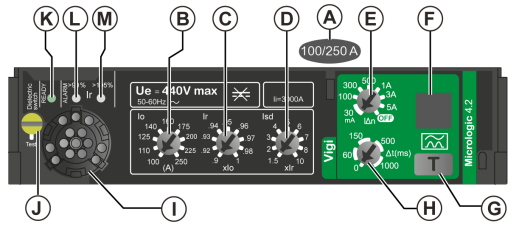
The Micrologic 4 electronic trip unit is available in two versions for earth-leakage detection:
- The Trip version trips when earth-leakage is detected.
- The Alarm version measures the earth-leakage current and indicates an earth-leakage fault on the front face with the earth-leakage fault indicator, which changes from gray to yellow.

When the SDx indication contact is present, it signals an earth-leakage fault remotely.

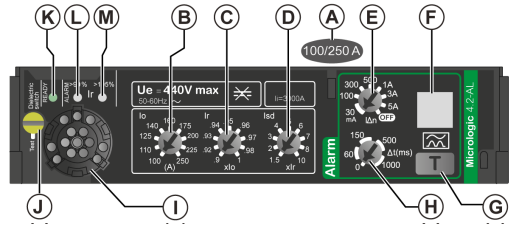
Description

The adjustment dials and indications are on the front face.

Micrologic 4.2 3P Trip version



Micrologic 4.2AL 3P Alarm version



A Micrologic electronic trip unit setting range
B Adjustment dial for the long-time protection pickup Io
C Fine-tuning dial for the long-time protection pickup Ir
D Adjustment dial for the short-time protection pickup Isd
E Adjustment dial for the earth-leakage current pickup IΔn
F Earth-leakage fault indicator: yellow when earth-leakage fault is detected
G Test button (T) for periodic earth-leakage function test
H Adjustment dial for the earth-leakage time delay Δt
I Test port
J Switch to disconnect the trip unit supply from the phases, used when performing a panel dielectric test
K Ready LED (green)
L Overload alarm LED (orange): 90% Ir
M Overload alarm LED (red): 105% Ir

The trip unit rating In corresponds to the maximum value of the setting range.

Setting the Long-Time Protection

The long-time protection pickup Ir is set by using two multi-position dials.
- The preset dial allows the pickup to be preset to the value Io (displayed in amperes on the dial). The maximum preset value (maximum setting on preset dial) equals the trip unit rating value In.
- The adjustment dial can be used to fine-tune the pickup Ir (value displayed in multiples of Io on the dial).

Step	Action
1	Set both adjustment dials to maximum (for Io: to the value In (A); for Ir: to 1).
2	Turn the Io adjustment dial higher than the value required. The Ir setting value is: Io setting (A).
3	Turn the fine-tuning dial to specify the value of Ir from 0.9 Io to Io.
4	The Ir setting value is: Io (A) setting x fine tuning.

The time delay tr for long-time protection cannot be adjusted.

The following table shows the value of the time delay tr for long-time protection (in seconds) according to the overload current (in multiples of Ir)

at 1.5 x Ir	at 6 x Ir	at 7.2 x Ir
tr = 400 s	tr = 16 s	tr = 11 s

The precision range is -20%, +0%.

Setting the Short-Time Protection

The short-time protection pickup Isd is set by using a multi-position dial.

The setting value is expressed in multiples of Ir.

Step	Action
1	Set the long-time protection first: the setting pickup is Ir.
2	Turn the Isd adjustment dial to the value required. The Isd value is adjustable from 1.5 x Ir to 10 x Ir.
3	Isd = Isd setting x Ir.

The precision range is +/- 15%.

The time delay tr for short-time protection cannot be adjusted:
- Non-trip time: 20 ms
- Maximum breaking time: 80 ms.

Setting the Instantaneous Protection

The pickup Ii for instantaneous protection cannot be adjusted.

The following table shows the value of the pickup Ii for instantaneous protection (in amperes) according to the trip unit rating In:

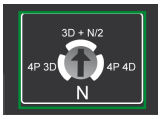
Trip unit rating In (A)	40	100	160	250	400	630
Pickup Ii (A) +/- 15%	600	1500	2400	3000	4800	6930

The time delay for instantaneous protection cannot be adjusted:
- Non-trip time: 0 ms
- Maximum breaking time: 50 ms.

Setting the Neutral Protection (4P Only)

The neutral selection dial gives a choice of three values for the neutral long-time and short-time protection pickups.

The following table shows the values of the pickup for neutral long-time protection (in multiples of Ir) and neutral short-time protection (in multiples of Isd) according to the dial position:

Trip unit rating In (A)	Dial	Dial position	Long-time pickup value for neutral protection	Short-time pickup value for neutral protection
40		4P 3D	no pickup	no pickup
		4P 4D	Ir	Isd
100 - 160 - 250		4P 3D	no pickup	no pickup
		4P 3D + N/2	Ir/2	Isd/2
		4P 4D	Ir	Isd

The time delay for the neutral long-time protection and short-time protection is the same as that for the phases.

Setting the Earth-Leakage Protection

The earth-leakage protection IΔn, type A, is set by using a multi-position dial.

The following table shows the value of the pickup IΔn for earth-leakage protection according to the trip unit rating In:

Trip unit rating In (A)	Pickup IΔn								
40, 100, 160, and 250 A	30 mA	30 mA	100 mA	300 mA	500 mA	1 A	3 A	5 A	OFF

400 and 570 A (1)	300 mA	300 mA	500 mA	1 A	3 A	5 A	10 A	10 A	OFF
(1) Maximum setting at 570 A for thermal reasons, to be adapted with breaking block up to 630 A									

The OFF setting annuls any earth-leakage protection and the circuit breaker behaves as a standard circuit breaker for cable protection.

Setting the earth-leakage protection to OFF can be used to inhibit earth-leakage protection during periods of setting, commissioning, testing and maintenance.

Setting the Earth-Leakage Protection Time Delay

The time delay of the earth-leakage protection is set by using a multi-position dial.

When IΔn is set to 30 mA, the time delay Δt is always 0 ms regardless of the position of the dial (instantaneous tripping).

When IΔn is set above 30 mA, the time delay Δt can be adjusted to the following values:
- 0 ms
- 60 ms
- 150 ms
- 500 ms
- 1000 ms

Testing the Earth-Leakage Protection

The earth-leakage protection must be tested regularly by using the test button (**T**). Pressing the test button simulates a real leakage current passing through the toroid, and the earth-leakage fault indicator displays the following symbol:

When the earth-leakage protection pickup IΔn is set to the **OFF** position, pressing the test button has no effect.

In the case of the Trip version of Micrologic 4, pressing the test button trips the circuit breaker.

In the case of the Alarm version of Micrologic 4, pressing the test button causes the earth-leakage indicator to change to yellow.

If the circuit breaker does not trip, or the earth-leakage indicator does not change to yellow, check that the circuit breaker is energized. If the circuit breaker is energized correctly, and has not tripped or indicated the earth-leakage fault, replace the Micrologic 4 trip unit.

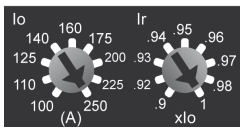
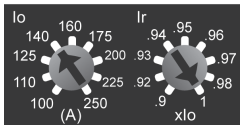
Resetting the Circuit Breaker After an Earth-leakage Fault Trip

Resetting the circuit breaker after an earth-leakage fault trip depends on the version:
- For the Trip version, reset the circuit breaker by moving the handle from **Trip** to **O (OFF)** position, and then to **I (ON)** position.
- For the Alarm version, press the test button (**T**) for three seconds.

For Trip and Alarm versions, the earth-leakage fault indicator changes back to gray after the reset.

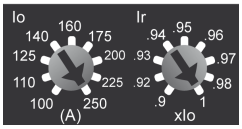
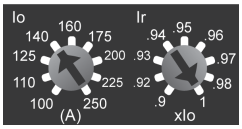
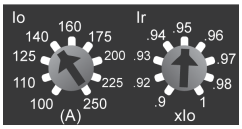
Examples of Setting the Long-Time Protection

Example 1: Setting the long-time protection pickup Ir to 140 A on a Micrologic 4.2 trip unit rated In 250 A:

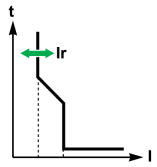
Step		Action
1		Io is positioned on 250 A and Ir on 1 (x Io) (factory setting).
2		Set Io to 140 A.
3	–	Ir fine-tuning stays at setting 1 and Ir is set to 140 A x 1

Example 2: Setting the long-time protection pickup Ir to 133 A on a Micrologic 4.2 trip unit rated In 250 A:

Step		Action

1		Io is positioned on 250 A and Ir on 1 (x Io) (factory setting).
2		Set Io to 140 A.
3		Setting calculation: 133 A = 0.95 x 140 A Fine-tune Ir on setting 0.95.
4	–	Ir is set to 140 A x 0.95 = 133 A.

The actions in steps (2) and (3) on the adjustment dials modify the trip curves as shown:

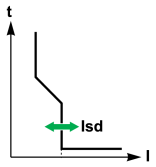


Example of Setting the Short-Time Protection

Setting the short-time protection pickup Isd to 400 A on a Micrologic 4.2 rated In 250 A on a 133 A feed:

Step		Action
1	–	The setting pickup Ir for long-time protection is equal to the feeder operating current, that is, Ir = 133 A.
2		Setting calculation: 399 A = 3 x 133 A Position the Isd adjustment dial on setting 3.
3	–	Isd is set to 133 A x 3 = 399 A.

The action in step (2) on the adjustment dial modifies the trip curve as shown:



Example of Setting the Earth-Leakage Protection

Setting the earth-leakage protection pickup IΔn to 1 A with a tripping time delay of 500 ms on a Micrologic 4.2 rated In 250 A:

Step	Action
1	Set the adjustment dial for the earth-leakage current protection IΔn to 1 A.
2	Set the adjustment dial for the earth-leakage time delay Δt to 500 ms.