Micrologic
Control units 2.0 and 5.0
Low Voltage Products

User manual

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Micrologic
Control units 2.0 and 5.0

Identifying your control unit
Designations

All Compact NS800-3200 and Masterpact NT and NW circuit breakers are equipped with a Micrologic control unit that can be changed on site.
Control units are designed to protect power circuits and connected loads.

E51450A

Micrologic 2.0 A

X Y Z

X: type of protection
c 2 for basic protection
c 5 for selective protection
c 6 for selective + earth-fault protection
c 7 for selective + earth-leakage protection.

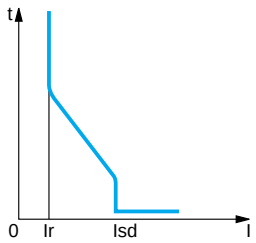
Y: version number
Identification of the control-unit generation.
"0" signifies the first generation.

Z: type of measurement
c A for "ammeter"
c P for "power meter"
c H for "harmonic meter"
c no indication = no measurements.

Micrologic 2.0: basic protection

E51266B

E51352A

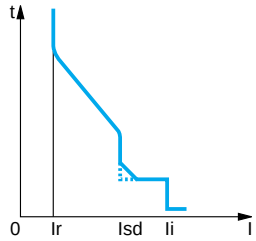


Long time + Instantaneous

Micrologic 5.0: selective protection

E51353A

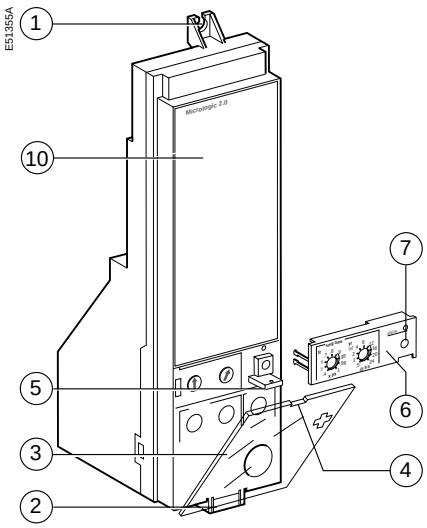
E51354A

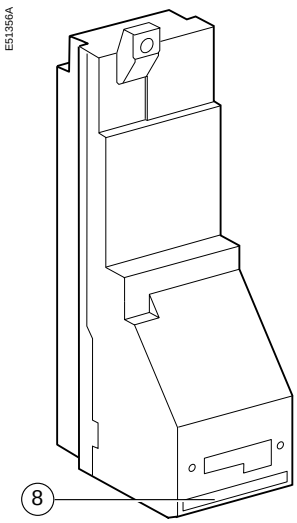


Long time + Short time + Instantaneous

Presentation

1 top fastener
2 bottom fastener
3 protective cover
4 cover opening point
5 lead-seal fixture for protective cover
6 long-time rating plug
7 screw for long-time rating plug
8 connection with circuit breaker

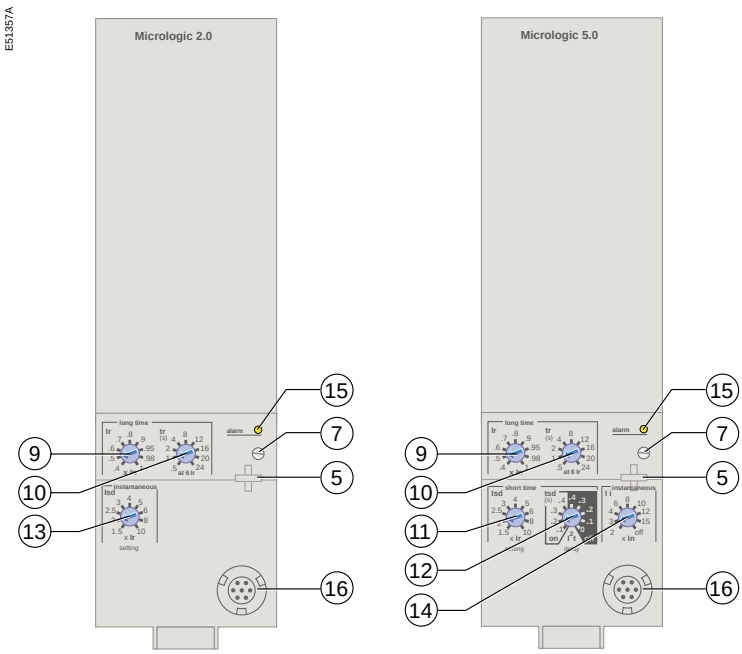




Adjustment dials

9 long-time current setting Ir
10 long-time tripping delay tr
11 short-time pickup Isd
12 short-time tripping delay tsd
13 instantaneous pick-up Isd
14 instantaneous pick-up Ii

15 LED indicating an overload
16 test connector

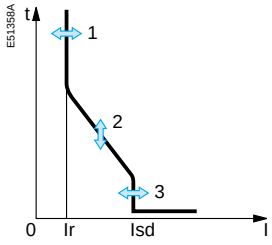


Overview of functions
Current protection

Protection settings

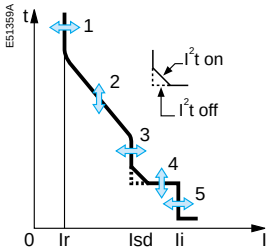
Depending on the type of installation, it is possible to set the tripping curve of your control unit using the parameters presented below.

Micrologic 2.0



1. current setting Ir (long time)
2. tripping delay tr (long time) for 6 x Ir
3. pick-up Isd (instantaneous)

Micrologic 5.0



1. current setting Ir (long time)
2. tripping delay tr (long time) for 6 x Ir
3. pick-up Isd (short time)
4. tripping delay tsd (short time)
5. pick-up Ii (instantaneous)

Long-time protection

The long-time protection function protects cables (phases and neutral) against overloads. This function is based on true rms measurements.

Thermal memory

The thermal memory continuously accounts for the amount of heat in the cables, both before and after tripping, whatever the value of the current (presence of an overload or not). The thermal memory optimises the long-time protection function of the circuit breaker by taking into account the temperature rise in the cables. The thermal memory assumes a cable cooling time of approximately 15 minutes.

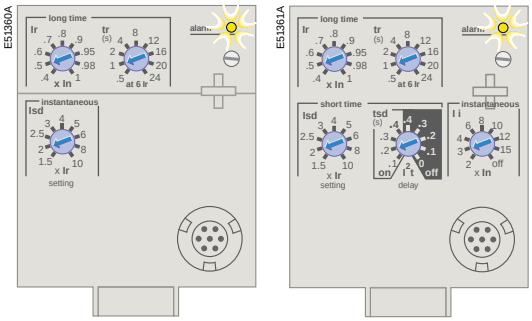
Long-time current setting Ir and standard tripping delay tr

Micrologic control unit		**2.0 and 5.0**								
current setting	Ir = In x …(*)	0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
tripping between 1.05 and 1.20 x Ir		other ranges or disable by changing rating plug								
time delay (s)	tr at 1.5 x Ir	12.5	25	50	100	200	300	400	500	600
accuracy 0 to -20%	tr at 6 x Ir	0.5	1	2	4	8	12	16	20	24
	tr at 7.2 x Ir	0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6

** In: circuit breaker rating*

Setting accuracy of the Ir setting may be enhanced by using a different long-time rating plug.
See the technical appendix "Changing the long-time rating plug".

Overload LED



This LED signals that the long-time current setting Ir has been overrun.

Short-time protection

c the short-time protection function protects the distribution system against impedant short-circuits.
c the short-time tripping delay can be used to ensure discrimination with a downstream circuit breaker.
c this function carries out true rms measurements.

c the I^2t ON and I^2t OFF options enhance discrimination with downstream protection devices.
c use of I^2t curves with short-time protection:
v I^2t OFF selected: the protection function implements a constant time curve;
v I^2t ON selected: the protection function implements an I^2t inverse-time curve up to 10 Ir. Above 10 Ir, the time curve is constant.

Short-time pick-up Isd and tripping delay tsd

Micrologic control unit			2.0 and 5.0								
pick-up accuracy ± 10%	Isd = Ir x …		1.5	2	2.5	3	4	5	6	8	10
time delay (ms) at 10 x Ir	settings	I^2t OFF	0	0.1	0.2	0.3	0.4				
I^2t ON or I^2t OFF		I^2t ON		0.1	0.2	0.3	0.4				
	tsd (max resettable time)		20	80	140	230	350				
	tsd (max break time)		80	140	200	320	500				

Instantaneous protection

c the instantaneous-protection function protects the distribution system against solid short-circuits. Contrary to the short-time protection function, the tripping delay for instantaneous protection is not adjustable.
The tripping order is sent to the circuit breaker as soon as current exceeds the set value, with a fixed time delay of 20 milliseconds.
c this function carries out true rms measurements.

Instantaneous pick-up Isd

Micrologic control unit		2.0								
pick-up accuracy ± 10 %	Isd = Ir x …	1.5	2	2.5	3	4	5	6	8	10

Instantaneous pick-up Ii

Micrologic control unit		5.0								
pick-up accuracy ± 10 %	Ii = In x … (*)	2	3	4	6	8	10	12	15	OFF

** In: circuit-breaker rating*

Protection of the fourth pole on four-pole circuit breakers

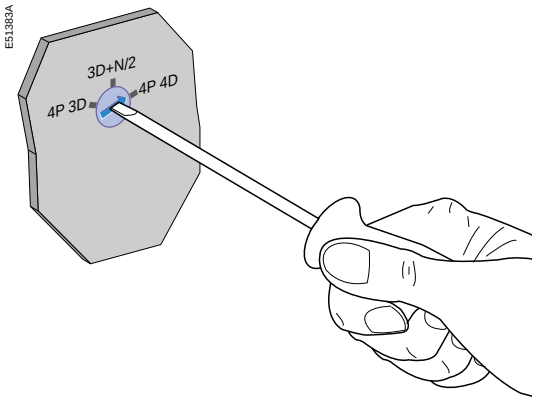
Protection of the neutral conductor depends on the distribution system.
There are three possibilities:

Type of neutral	Description
Neutral unprotected	The distribution system does not require protection of the neutral conductor.
Neutral protection at 0.5 In	The cross-sectional area of the neutral conductor is half that of the phase conductors. c the long-time current setting Ir for the neutral is equal to half the setting value c the short-time pick-up Isd for the neutral is equal to half the setting value c the instantaneous pick-up Isd (Micrologic 2.0) for the neutral is equal to half the setting value c the instantaneous pick-up Ii (Micrologic 5.0) for the neutral is equal to the setting value
Neutral protection at In	The cross-sectional area of the neutral conductor is equal to that of the phase conductors. c the long-time current setting Ir for the neutral is equal to the setting value c the short-time pick-up Isd for the neutral is equal to the setting value c the instantaneous pick-ups Isd and Ii for the neutral are equal to the setting value

Setting procedure

Selecting the type of neutral protection

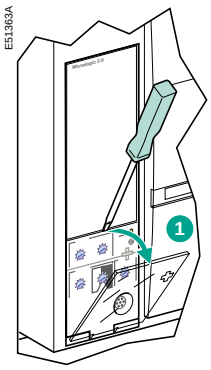
On four-pole circuit breakers, it is possible to select the type of neutral protection using the three-position switch:



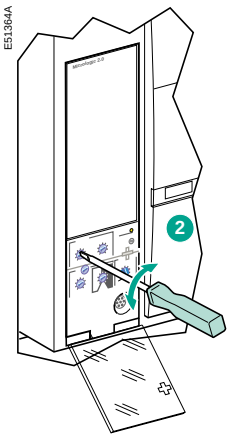
c neutral unprotected (4P 3D);
c neutral protection at 0.5 In (3D + N/2);
c neutral protection at In (4P 4D).

Setting procedure

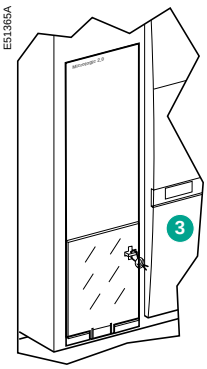
Using the adjustment dials



Open the protective cover.



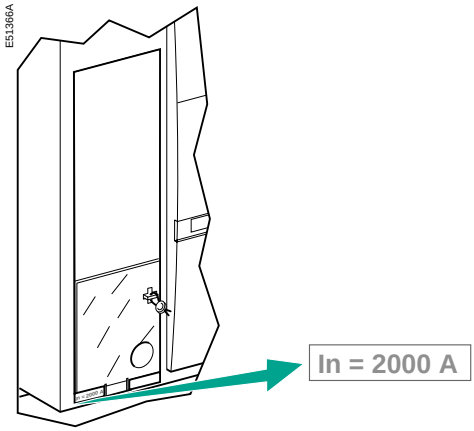
Select the desired setting.



Close the protective cover and, if necessary, install a lead seal to protect the settings.

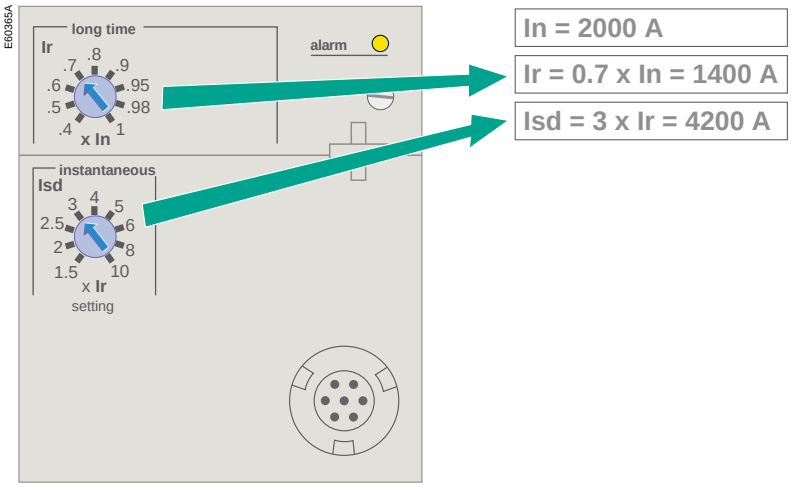
Setting the Micrologic 2.0 control unit

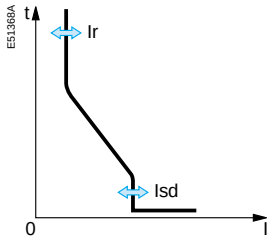
The rating of the circuit breaker in this example is 2000 A.



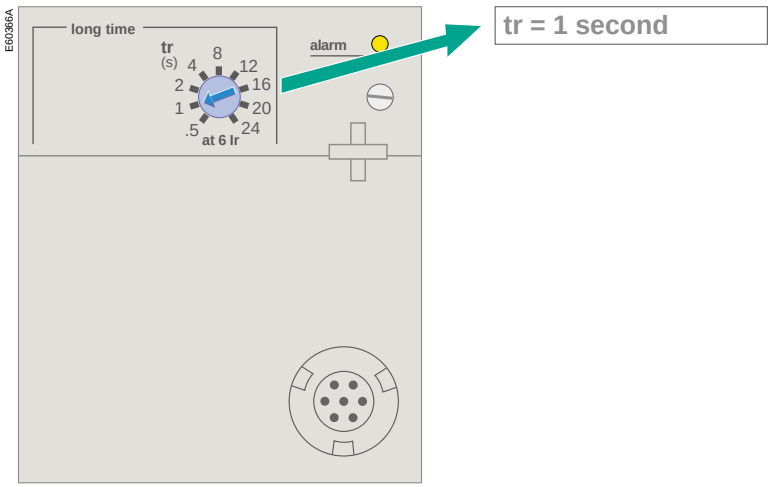
See pages 4 and 5 for information on the available settings.

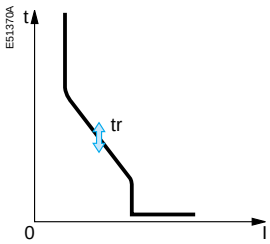
Set the threshold values





Set the tripping delay

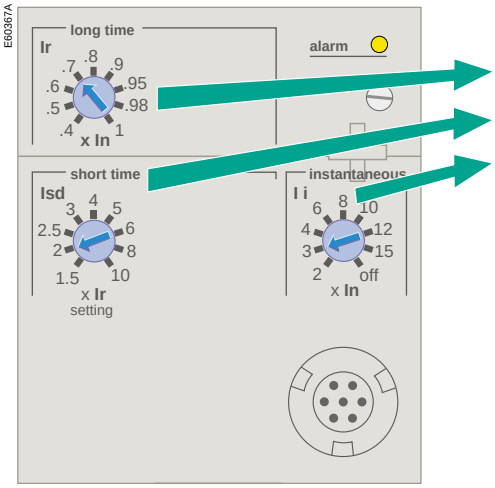




Setting the Micrologic 5.0 control unit

See pages 4 and 5 for information on the available settings.

Set the threshold values



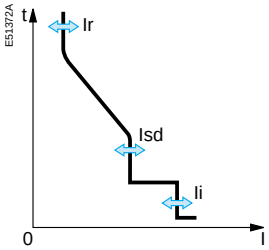
In = 2000 A

Ir = 0.7 x In = 1400 A

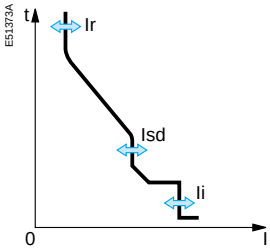
Isd = 2 x Ir = 2800 A

Ii = 3 x In = 6000 A

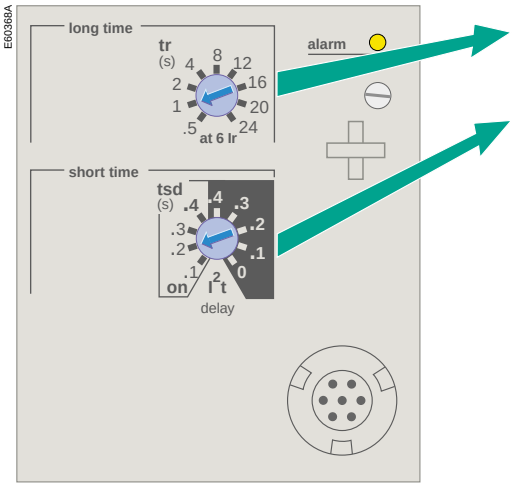
I^2t OFF curve



I^2t ON curve



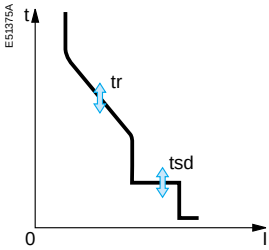
Set the tripping delay



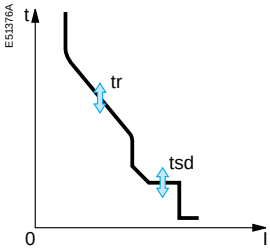
tr = 1 second

tsd = 0.2 seconds

I^2t OFF curve



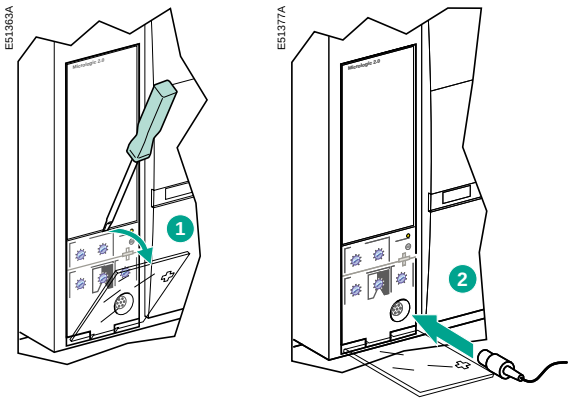
I^2t ON curve



Testing the control unit

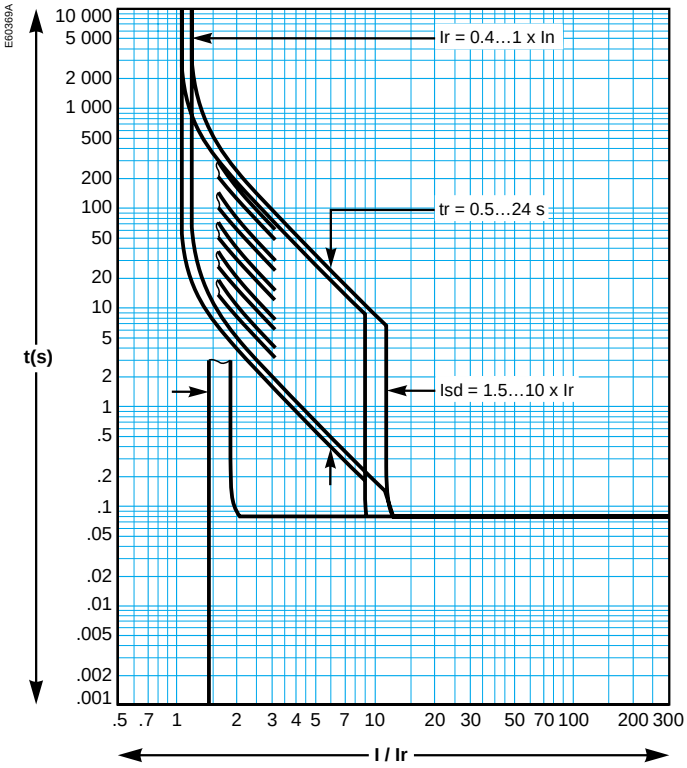
See the user manual for the portable test kit.

To test the control unit, connect the portable test kit via the test connector

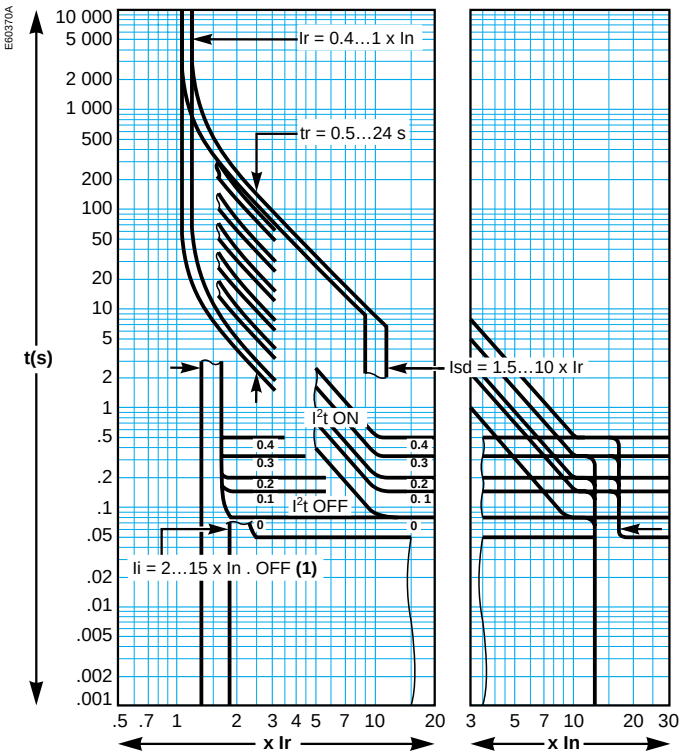


Tripping curves

Long-time and instantaneous protection - Micrologic 2.0



Long-time, short-time and instantaneous protection - Micrologic 5.0



Changing the long-time rating plug

Select the long-time rating plug

A number of setting ranges for the long-time current setting are available on Micrologic 2.0 and 5.0 control units by changing the long-time rating plug. The available rating plugs are listed below:

Part number	Setting range for the Ir value	
33542	standard	0.4 to 1 x Ir
33543	low setting	0.4 to 0.8 x Ir
33544	high setting	0.8 to 1 x Ir
33545	without long-time protection	

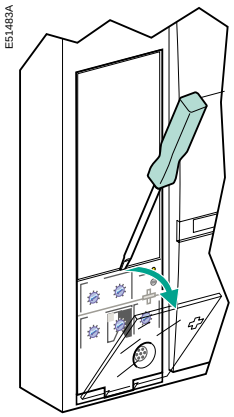
Caution.
Following any modifications to the long-time rating plug, all control-unit protection parameters must be checked.

Change the long-time rating plug

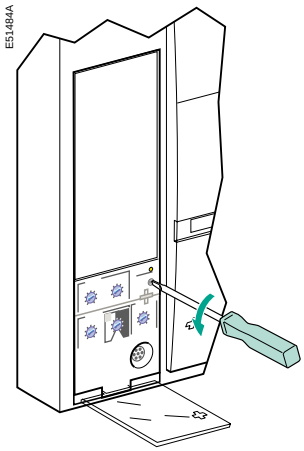
Proceed in the following manner.

1. Open the circuit breaker.

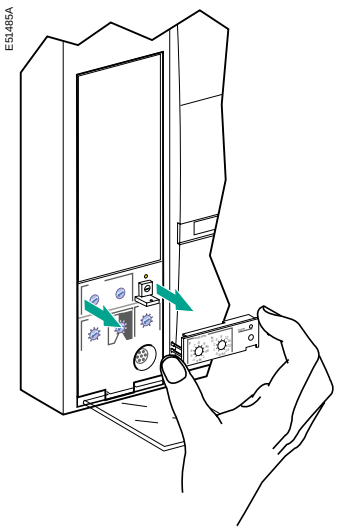
2. Open the protective cover of the control unit.



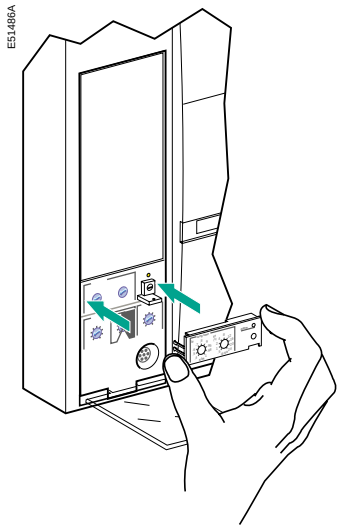
3. Completely remove the long-time rating plug screw.



4. Snap out the rating plug.



5. Clip in the new rating plug.



6. Refit the screw for the long-time rating plug.

7. Check and/or modify the control-unit settings

If no long-time rating plug is installed, the control unit continues to operate under the following downgraded conditions:
- *the long-time current setting Ir is 0.4, whatever the position of the adjustment dial;*
- *the long-time tripping delay tr corresponds to the value indicated by the adjustment dial.*

Thermal memory

Thermal memory

The thermal memory is a means to simulate temperature rise and cooling caused by changes in the flow of current in the conductors.

These changes may be caused by:
- repetitive motor starting;
- loads fluctuating near the protection settings;
- repeated circuit-breaker closing on a fault.

Control units without a thermal memory (contrary to bimetal strip thermal protection) do not react to the above types of overloads because they do not last long enough to cause tripping.
However, each overload produces a temperature rise and the cumulative effect can lead to dangerous overheating.

Control units with a thermal memory record the temperature rise caused by each overload. Even very short overloads produce a temperature rise that is stored in the memory.
This information stored in the thermal memory reduces the tripping time.

Micrologic control units and thermal memory

All Micrologic control units are equipped as standard with a thermal memory.

- for all protection functions, prior to tripping, the temperature-rise and cooling time constants are equal and depend on the tripping delay in question:
  - if the tripping delay is short, the time constant is low;
  - if the tripping delay is long, the time constant is high.

- for long-time protection, following tripping, the cooling curve is simulated by the control unit. Closing of the circuit breaker prior to the end of the time constant (approximately 15 minutes) reduces the tripping time indicated in the tripping curves.

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