Low voltage electrical distribution

Micrologic

Control units
2.0, 5.0 and 6.0

User manual
04/2010

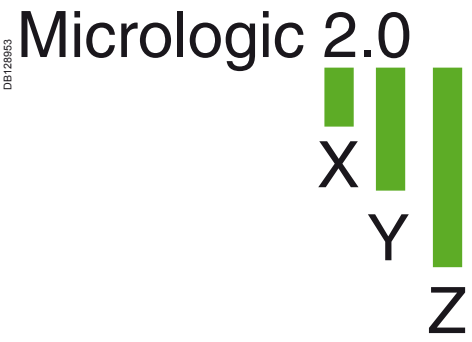
Schneider Electric

Contents

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.

DB128953



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

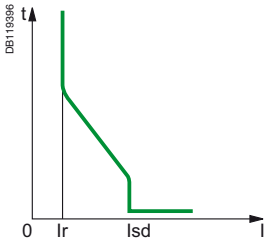
Y: version number
Identification of the control-unit generation.
"0" signifies the first generation.

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

Micrologic 2.0: basic protection

E51266B

DB119396

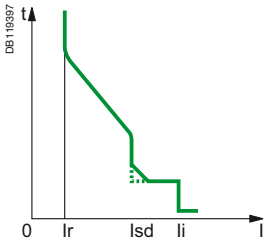


Long time +
Instantaneous

Micrologic 5.0: selective protection

E51353A

DB119397

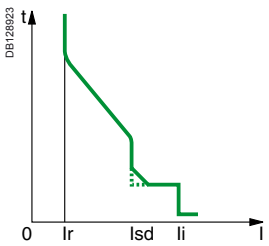


Long time + Short time
+ Instantaneous

Micrologic 6.0: selective + ground-fault protection

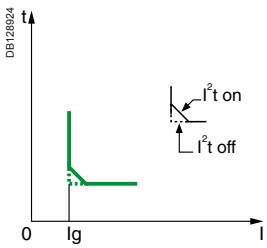
DB128922

DB128923



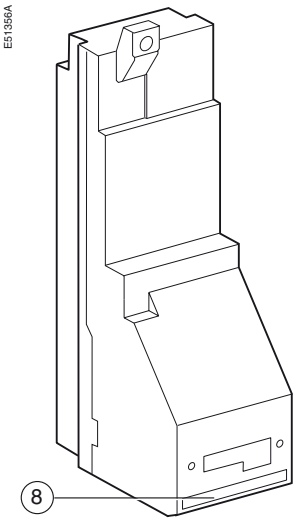
Long time + Short time
+ Instantaneous

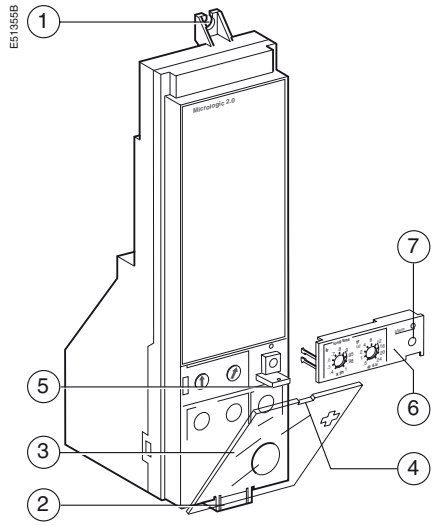
DB128924

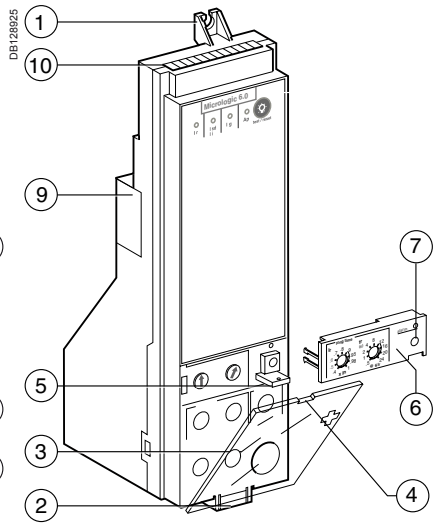


Ground-fault protection

Identifying your control unit
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
9 Housing for battery
10 Terminal block for external connections

Adjustment dials

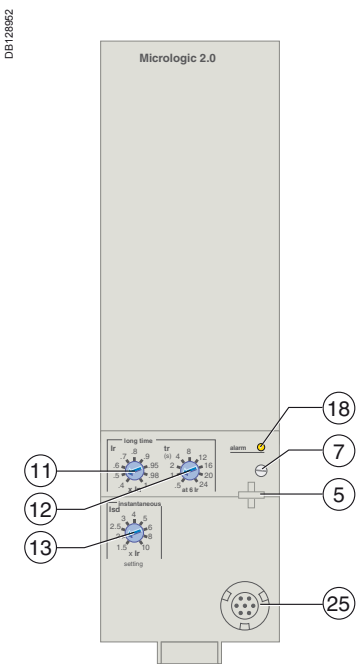
11 Long-time current setting Ir
12 Long-time tripping delay tr
13 Short-time pickup Isd
14 Short-time tripping delay tsd
15 Instantaneous pick-up Ii
16 Ground-fault pick-up Ig
17 Ground-fault tripping delay tg

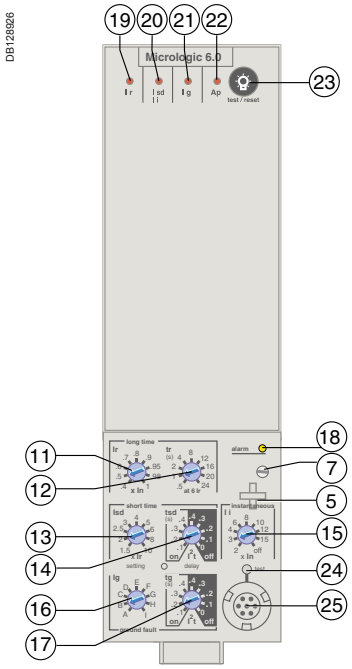
Indications

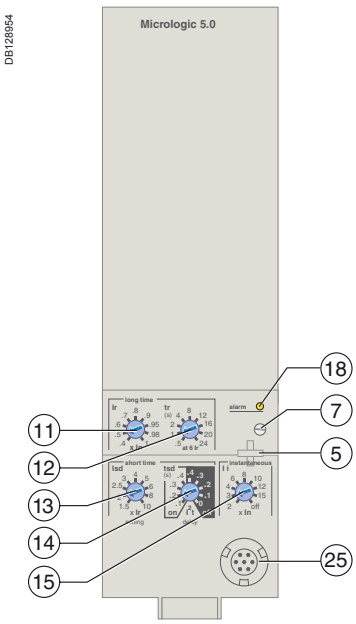
18 LED indicating an overload
19 LED indicating long-time tripping
20 LED indicating short-time tripping
21 LED indicating ground-fault tripping
22 LED indicating auto-protection tripping

Test

23 Button for fault-trip reset and battery test
24 Test button for ground-fault protection
25 Test connector





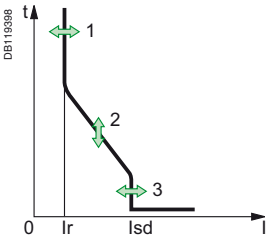


Overview of functions
Current protection

Protection settings

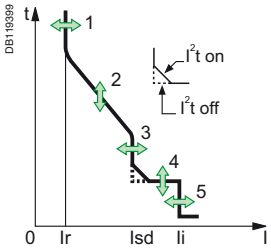
Depending on the type of installation, it is possible to set the tripping curve of your control unit using the parameters presented below.

Micrologic 2.0



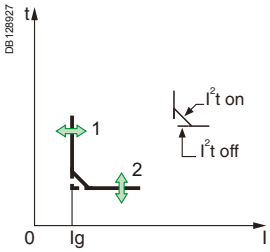
1. Current setting Ir (long time)
2. Tripping delay tr (long time) for 6 x Ir
3. Pick-up Isd (instantaneous)

Micrologic 5.0 and 6.0



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)

Micrologic 6.0



1. Pick-up Ig (ground fault)
2. Delay tg (ground fault)

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.

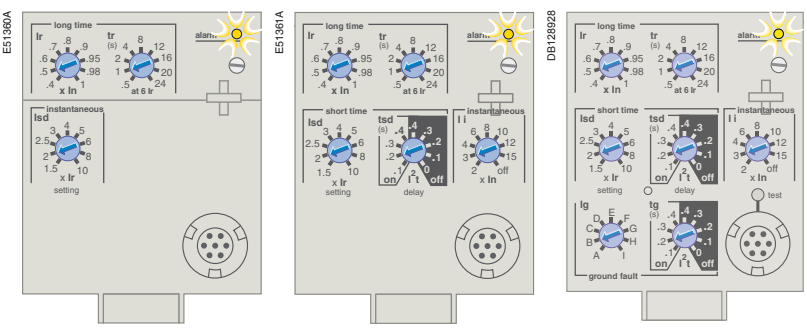
Long-time current setting Ir and standard tripping delay tr

Micrologic control unit		Accuracy	2.0, 5.0 and 6.0								
Current setting	**Ir = In (*) x …**		**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**0.95**	**0.98**	**1**
Tripping betweeen 1.05 and 1.20 Ir			Other ranges or disable by changing rating plug								
Time setting			**0.5**	**1**	**2**	**4**	**8**	**12**	**16**	**20**	**24**
Time delay (s)	tr at 1.5 x Ir	0 to - 30%	12.5	25	50	100	200	300	400	500	600
	tr at 6 x Ir	0 to - 20%	0.7 (1)	1	2	4	8	12	16	20	24
	tr at 7.2 x Ir	0 to - 20	0.7 (2)	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6

(*) In: circuit breaker rating
(1) 0 to - 40%
(2) 0 to - 60%

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.

Overview of functions
Current protection

Short-time protection

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

■ The I^2t ON and I^2t OFF options enhance discrimination with downstream protection devices.
■ Use of I^2t curves with short-time protection:
□ I^2t OFF selected: the protection function implements a constant time curve
□ 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, 5.0 and 6.0								
Pick-up	Isd = Ir x … accuracy ±10 %		1.5	2	2.5	3	4	5	6	8	10
Time delay (ms)	setting	I^2t Off	0	0.1	0.2	0.3	0.4				
at 10 Ir		I^2t On		0.1	0.2	0.3	0.4				
I^2t On or	tsd (max resettable time)		20	80	140	230	350				
I^2t Off	tsd (max break time)		80	140	200	320	500				

Instantaneous protection

■ 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.
■ This function carries out true rms measurements.

Instantaneous pick-up Isd

Micrologic control unit		2.0								
Pick-up	Isd = Ir x … accuracy ±10 %	1.5	2	2.5	3	4	5	6	8	10
Time delay (ms)	tsd (max resettable time)	20								
	tsd (max break time)	80								

Instantaneous pick-up Ii

Micrologic control unit		5.0 and 6.0								
Pick-up	Ii = In (*) x … accuracy ±10 %	2	3	4	6	8	10	12	15	OFF
Time delay (ms)	tsd (max resettable time)	20								
	tsd (max break time)	50								

(*) In: circuit-breaker rating.

Overview of functions
Current protection

Neutral protection 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. ■ The long-time current setting Ir for the neutral is equal to half the setting value ■ The short-time pick-up Isd for the neutral is equal to half the setting value ■ The instantaneous pick-up Isd (Micrologic 2.0) for the neutral is equal to half the setting value ■ The instantaneous pick-up Ii (Micrologic 5.0 and 6.0) 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. ■ The long-time current setting Ir for the neutral is equal to the setting value ■ The short-time pick-up Isd for the neutral is equal to the setting value ■ The instantaneous pick-ups Isd and Ii for the neutral are equal to the setting value

Neutral protection on three-pole devices

Neutral protection is not available on three-pole devices.

Ground-fault protection on Micrologic 6.0

■ A ground fault in the protection conductors can provoke local temperature rise at the site of the fault or in the conductors.
■ Ground-fault and neutral protection are independent and can therefore be combined.
The purpose of the ground-fault protection function is to eliminate this type of fault.
■ There are two types of ground-fault protection.

Type	Description
Residual	■ The function determines the zero-phase sequence current, i.e. the vectorial sum of the phase and neutral currents ■ It detects faults downstream of the circuit breaker.
Source Ground Return	■ Using a special external sensor, this function directly measures the fault current returning to the transformer via the earth cable ■ It detects faults both upstream and downstream of the circuit breaker ■ The maximum distance between the sensor and the circuit breaker is ten metres.

Ground-fault pick-up Ig and tripping delay tg
The pick-up and tripping-delay values can be set independently and are identical for both the residual and "source ground return" ground-fault protection functions.

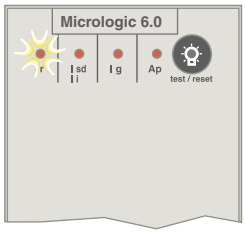
Micrologic control unit			6.0								
Pick-up	Ig = In (*) x … accuracy ±10 %		A	B	C	D	E	F	G	H	I
	In ⩽ 400 A		0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	400 A < In ⩽ 1200 A		0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	In > 1200 A		500 A	640 A	720 A	800 A	880 A	960 A	1040 A	1120 A	1200 A
Time delay (ms) at 10 In (*)	setting	I^2t Off	0	0.1	0.2	0.3	0.4				
		I^2t On		0.1	0.2	0.3	0.4				
I^2t On or I^2t Off	tg (max resettable time)		20	80	140	230	350				
	tg (max break time)		80	140	200	320	500				

** In: circuit-breaker rating.*

Overview of functions
Micrologic 6.0 fault indications

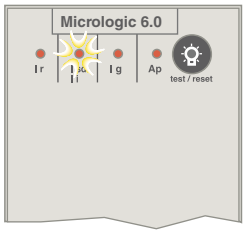
The battery maintains the fault indications.
If there are no indications, check the battery.

DB128929



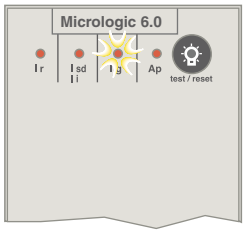
Signals tripping due to an overrun of the long-time current setting Ir.

DB128930



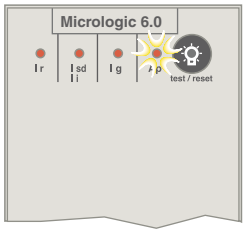
Signals tripping due to an overrun of the short-time pick-up Isd or the instantaneous pick-up Isd / Ii.

DB128931



Signals tripping due to an overrun of the ground-fault pick-up Ig.

DB128932



Signals tripping due to the auto-protection function of the control unit.
The auto-protection function (excessive temperature or short-circuit higher than circuit breaker capacity) opens the circuit breaker and turns on the Ap LED.

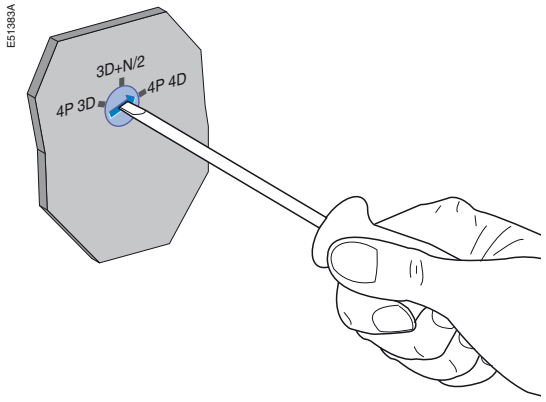
Important remark
If the circuit breaker remains closed and the Ap LED remains on, contact the Schneider after-sales support department.

Setting procedure

Important remark
With the 4P 3D setting, the current in the neutral must not exceed the rated current of the circuit breaker.

Selecting the type of neutral protection

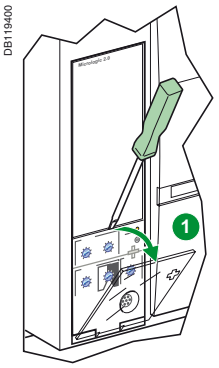
On four-pole circuit breakers, it is possible to select the type of neutral protection using the three-position switch:



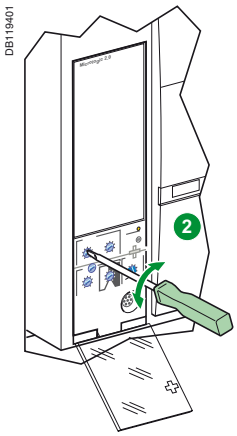
- Neutral unprotected (4P 3D)
- Neutral protection at 0.5 In (3D + N/2)
- Neutral protection at In (4P 4D).

Setting procedure

Using the adjustment dials



Open the protective cover.

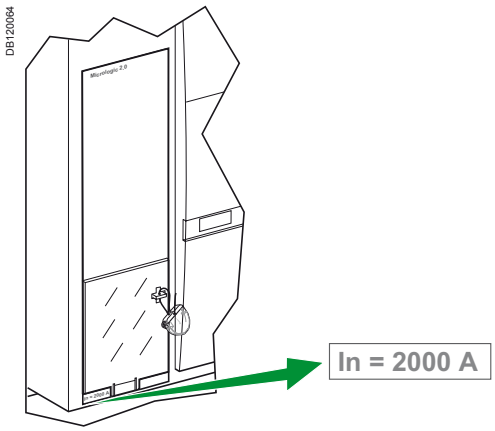


Select the desired setting.

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

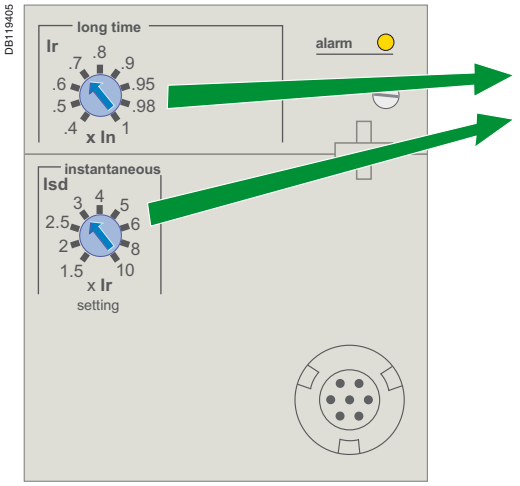
Setting the Micrologic 2.0 control unit

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



See pages 4, 5 and 6 for information on the available settings.

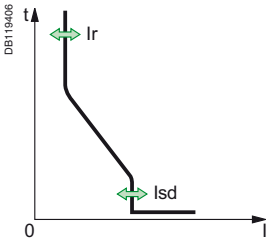
Set the threshold values



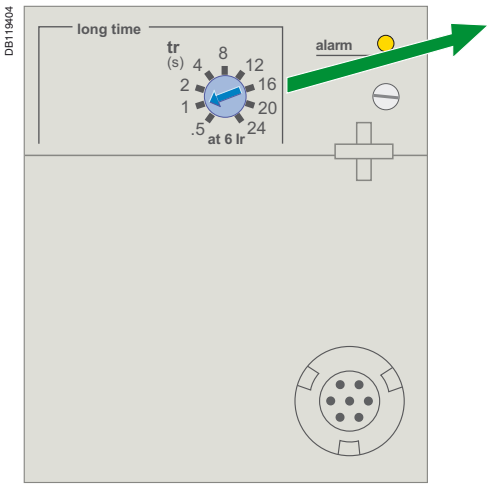
In = 2000 A

Ir = 0.7 x In = 1400 A

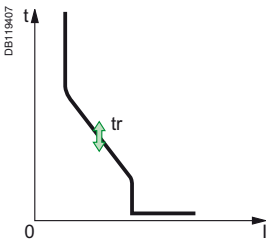
Isd = 3 x Ir = 4200 A



Set the tripping delay



tr = 1 second

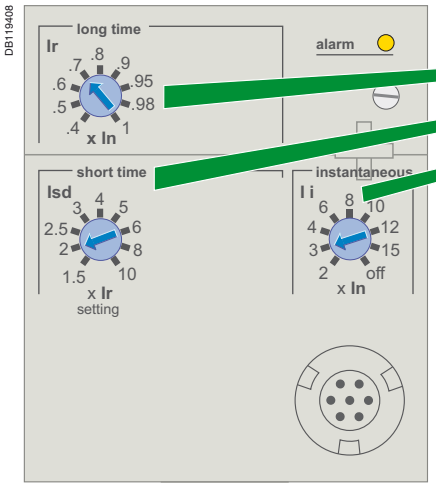


Setting the Micrologic 5.0 control unit

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

See pages 4, 5 and 6 for information on the available settings.

Set the threshold values



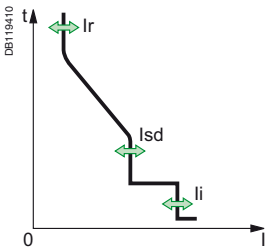
In = 2000 A

Ir = 0.7 x In = 1400 A

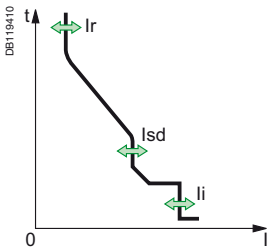
Isd = 2 x Ir = 2800 A

Ii = 3 x In = 6000 A

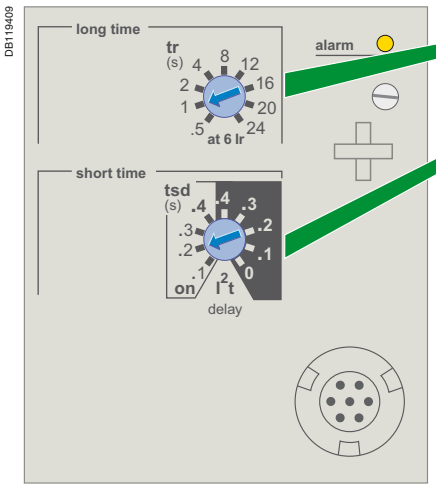
I²t OFF curve



I²t ON curve



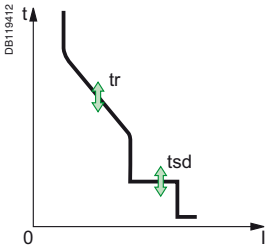
Set the tripping delay



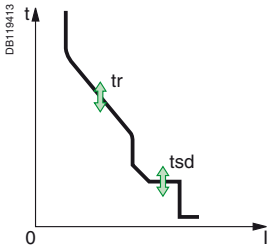
tr = 1 second

tsd = 0.2 seconds

I²t OFF curve



I²t ON curve

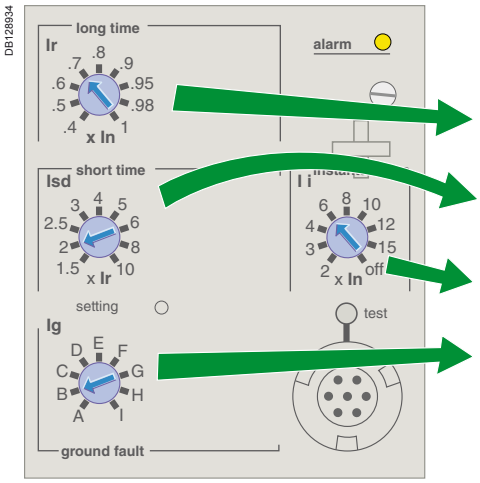


Setting the Micrologic 6.0 control unit

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

See pages 4, 5 and 6 for information on the available settings.

Set the threshold values



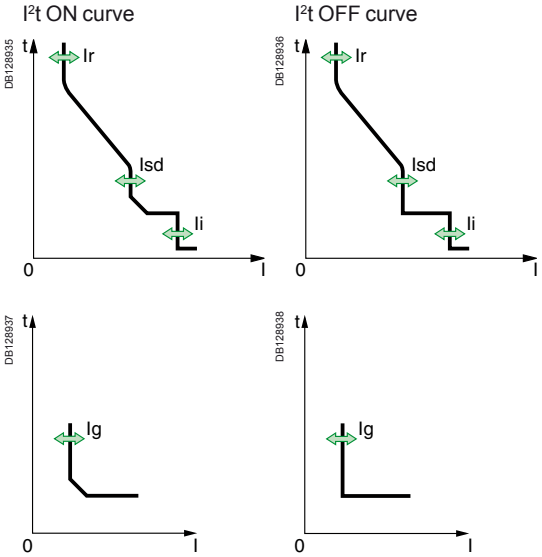
In = 2000 A

Ir = 0.7 x In = 1400 A

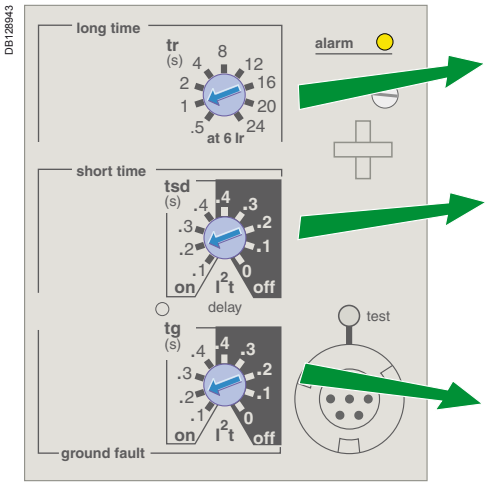
Isd = 2 x Ir = 2800 A

Ii = 3 x In = 6000 A

B ⟶ Ig = 640 A



Set the tripping delay

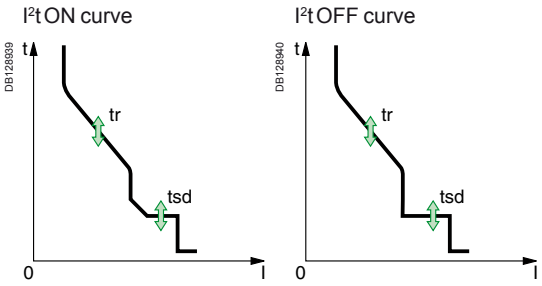


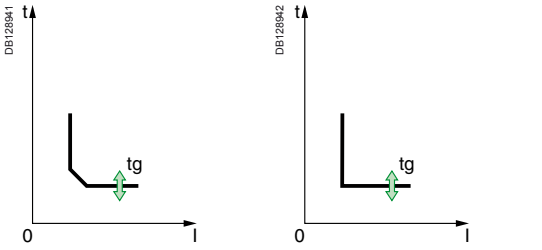
tr = 1 s

tsd = 0.2 s

I²t on I²t off

tg = 0.2 s



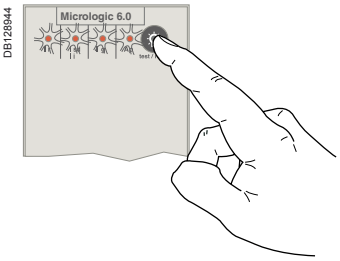


Resetting the fault indications and checking battery status on Micrologic 6.0

The procedure for closing the circuit breaker following a fault trip is presented in the circuit-breaker user manual.

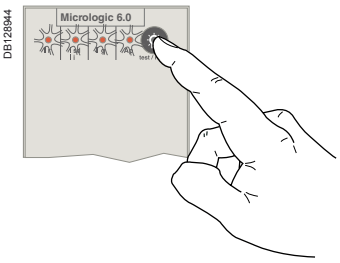
Resetting the fault indications

■ Determine why the circuit breaker tripped. The fault indication is maintained until it is reset on the control unit.
■ Press the fault-trip reset button.



■ Check the parameter settings of the control unit.

Checking the battery

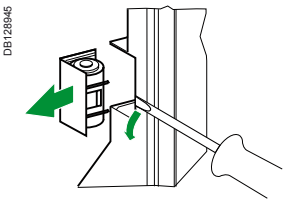


■ Press the battery-test button (which is the same as the fault-trip reset button) to check the luminance of trip indicator light.
■ If trip indicators are dim or there is no luminance, then the battery needs to be changed.

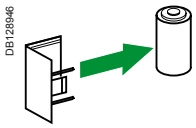
If the battery needs to be changed, order a new battery with the Schneider catalogue number 33593.
■ Lithium battery
■ 1.2 AA, 3.6 V, 850 mA/h
■ SAFT LS3 SONNENSCHEIN TEL-S
■ Service life ten years.

Changing the control-unit battery

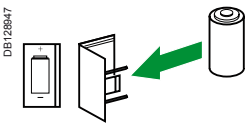
1. Remove the battery cover.



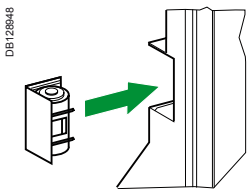
2. Remove the battery.



3.Insert a new battery. Check the polarity.



4. Put the cover back in place. Press the battery-test button to check the new battery.

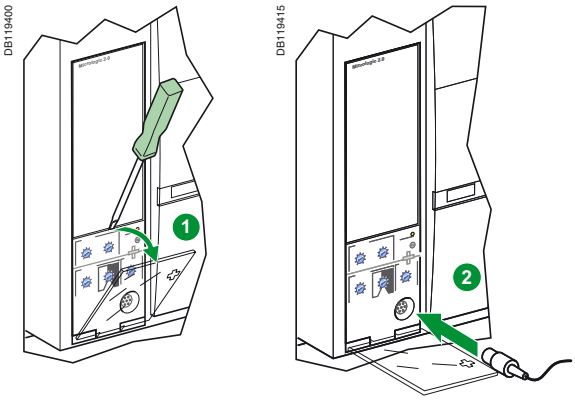


Testing the control unit

See the user manual for the portable test kit.

Testing the control unit

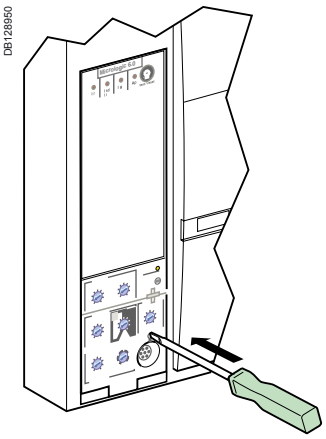
To test the control unit, connect the portable test kit via the test connector



Testing the ground-fault protection on Micrologic 6.0

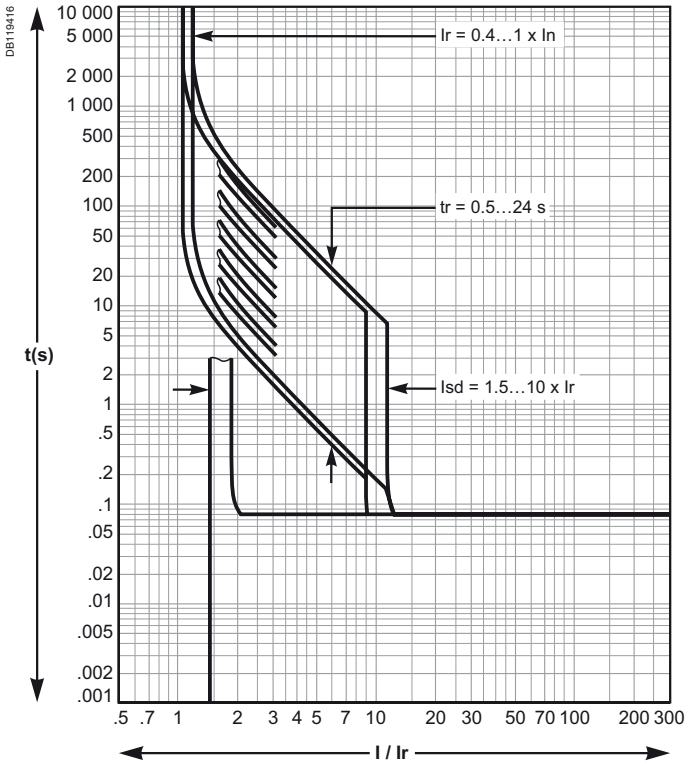
1. Charge and close the circuit breaker.
2. Using a screwdriver, press the test button for ground-fault protection.
The circuit breaker should open.

Important remark
If the circuit breaker does not open, contact the Schneider after-sales support department.

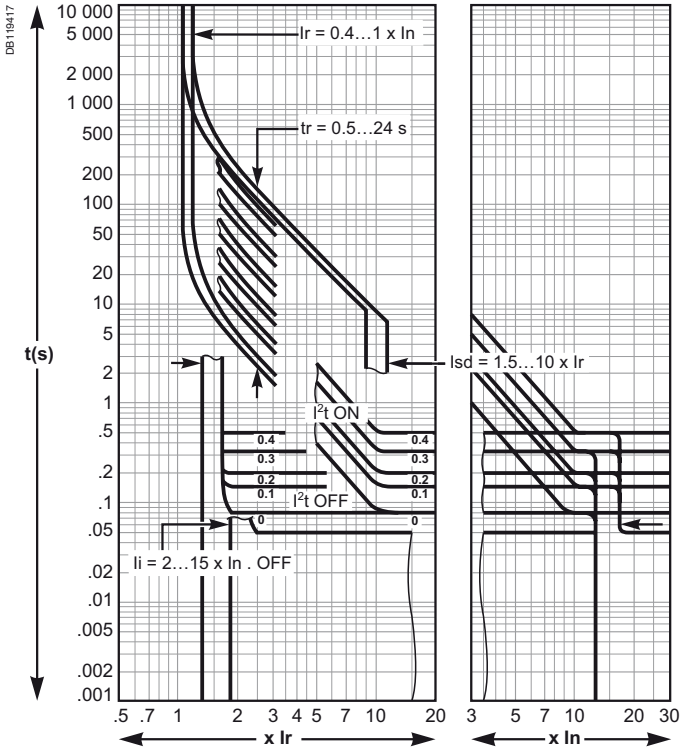


Tripping curves

Long-time and instantaneous protection - Micrologic 2.0

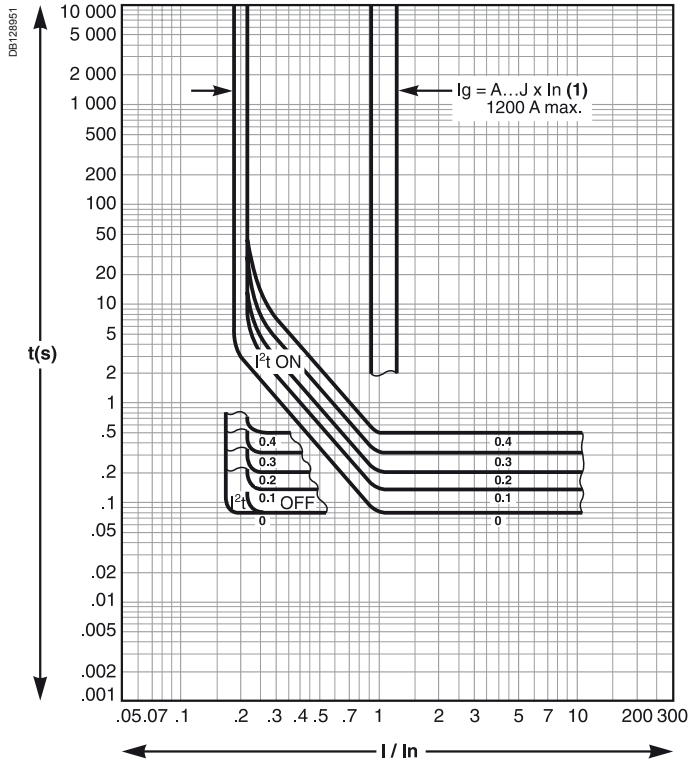


Long-time, short-time and instantaneous protection - Micrologic 5.0 and 6.0



Tripping curves

Ground-fault protection - Micrologic 6.0



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, 5.0 and 6.0 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 Ir = In for the short-time protection setting	

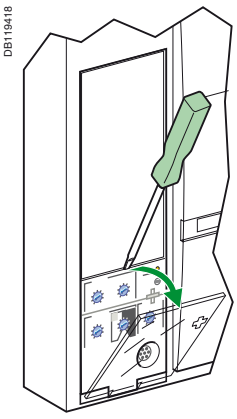
Important remark

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

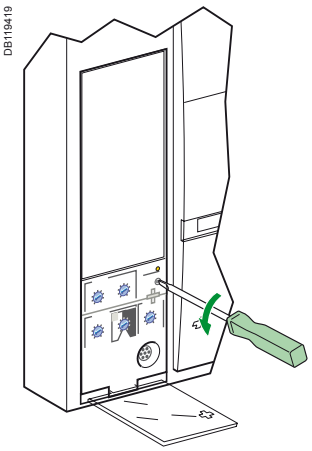
Change the long-time rating plug

Proceed in the following manner.

1. Open the circuit breaker.
2. Open the protective cover of the control unit.



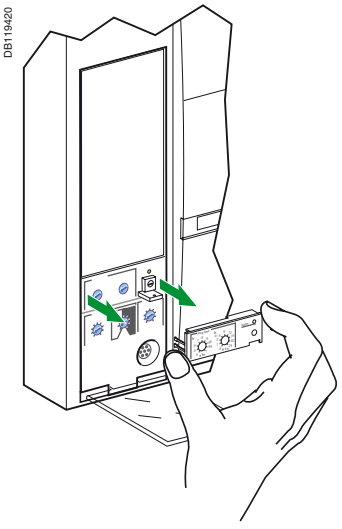
3. Completely remove the long-time rating plug screw.



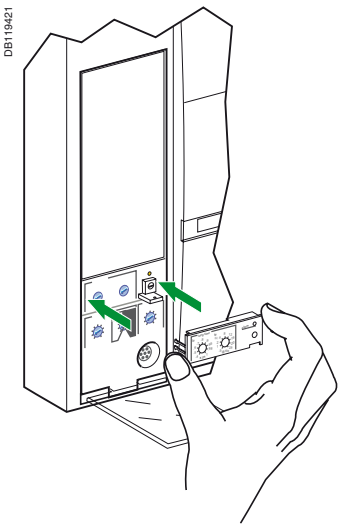
If no long-time rating plug is installed, the control unit continues to operate under the following downgraded conditions:

- 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.

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

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.

Short-time protection and intermittent faults

For the short-time protection function, intermittent currents that do no provoke tripping are stored in the Micrologic memory.
This information is equivalent to the long-time thermal memory and reduces the tripping delay for the short-time protection.
Following a trip, the short-time tsd tripping delay is reduced to the value of the minimum setting for 20 seconds.

Ground-fault protection and intermittent faults

The ground-fault protection implements the same function as the short-time protection.

Notes

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Notes

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