# **PacT** Series

## Com**PacT** NS **-** MicroLogic Trip Unit

## User Guide

**PacT** Series offers world-class breakers and switches.

**DOCA0217EN-00**
**01/2022**


www.se.com

# Legal Information

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# Safety Information

## Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

**⚠ DANGER**

**DANGER** indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

**⚠ WARNING**

**WARNING** indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

**⚠ CAUTION**

**CAUTION** indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

***NOTICE***

***NOTICE*** is used to address practices not related to physical injury.

## Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

# About the Book

## Document Scope

The aim of this guide is to provide users, installers, and maintenance personnel with the technical information needed to operate MicroLogic™ trip units in ComPact™ NS circuit breakers.

## Validity Note

This guide applies to ComPacT NS trip units without measurement, named MicroLogic.

## Online Information

The information contained in this guide is likely to be updated at any time. Schneider Electric strongly recommends that you have the most recent and up-to-date version available on www.se.com/ww/en/download.

The technical characteristics of the devices described in this guide also appear online. To access the information online, go to the Schneider Electric home page at www.se.com.

## Related Documents

| Title of documentation | Reference number |
|---|---|
| *ComPacT NS - Circuit Breakers and Switch-Disconnectors - User Guide* | DOCA0221EN |
| *ComPacT NS630b-1600 - Fixed Circuit Breaker or Switch-Disconnector - Instruction Sheet* | JYT6180003 |
| *ComPacT NS630b-1600 - Withdrawable Circuit Breaker or Switch-Disconnector - Instruction Sheet* | JYT6180103 |
| *ComPacT NS1600b-3200 - Fixed Circuit Breaker or Switch-Disconnector - Instruction Sheet* | JYT6180203 |

You can download these technical publications and other technical information from our website at www.se.com/ww/en/download.

# Introduction to MicroLogic Trip Unit

## What's in This Part

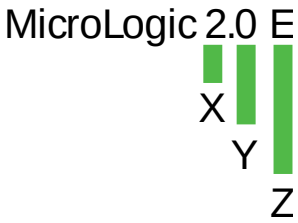
# Presentation

## PacT Series Master Range

Future-proof your installation with Schneider Electric's low-voltage and medium-voltage PacT Series. Built on legendary Schneider Electric innovation, the PacT Series comprises world-class circuit breakers, switches, residual current devices and fuses, for all standard and specific applications. Experience robust performance with PacT Series within the EcoStruxure-ready switchgear, from 16 to 6300 A in low-voltage and up to 40.5 kV in medium-voltage.

## Introduction

ComPacT NS630-3200 circuit breakers are equipped with a MicroLogic trip unit designed to help protect power circuits and connected loads.




**X : Type of protection**

- 2 for basic protection
- 5 for selective selection
- 6 for selective + ground-fault protection

**Y : Version number**

Identification of the trip unit generation (0 is the first generation.)

**Z : Type of measurement**

- A : Ammeter
- E : Energy meter
- P : Power meter
- No indication : No measurements

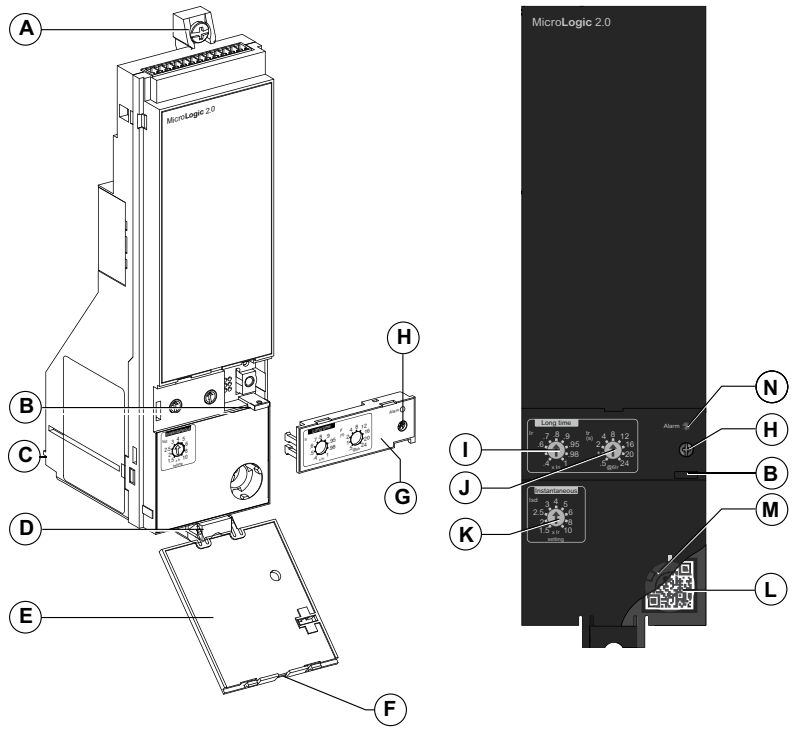
## Range of MicroLogic Trip Units

The following table indicates the functions available on ComPacT NS circuit breakers with MicroLogic trip units:

| | MicroLogic 2.0 | MicroLogic 5.0 | MicroLogic 6.0 |
|---|---|---|---|
| Long-time overcurrent protection (L) | ✓ | ✓ | ✓ |
| Short-time overcurrent protection (S) | – | ✓ | ✓ |
| Instantaneous overcurrent protection (I) | ✓ | ✓ | ✓ |
| Ground-fault protection (G) | – | – | ✓ |
| Neutral protection on 4P circuit breakers | ✓ | ✓ | ✓ |
| Overload LED | ✓ | ✓ | ✓ |
| Trip cause indicators | – | – | ✓ |

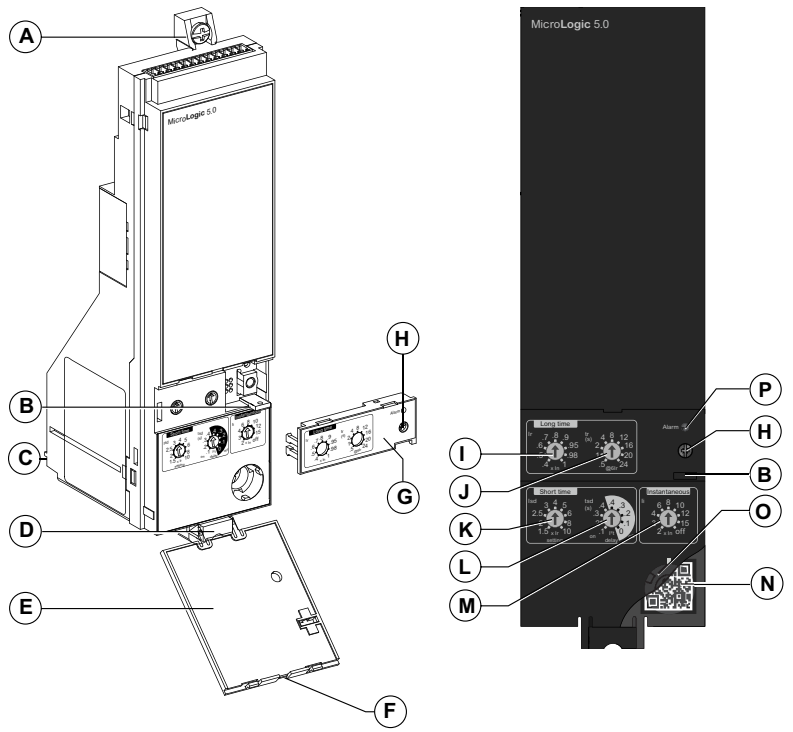
# MicroLogic Trip Unit Description

## MicroLogic 2.0 Trip Unit



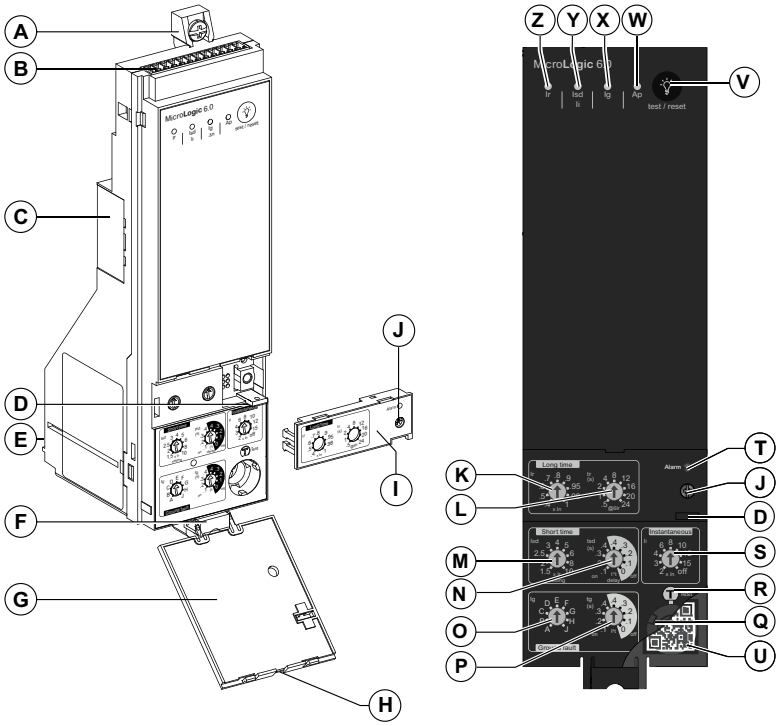

A. Top fastener
B. Lead seal fixture for protective cover
C. Connection with circuit breaker
D. Bottom fastener
E. Protective cover
F. Cover opening point
G. Long-time rating plug
H. Screw for long-time rating plug
I. Long-time current setting Ir
J. Long-time time delay tr
K. Short-time pickup Isd
L. QR code on protective cover, to access product information
M. Test connector
N. Overload indication LED

## MicroLogic 5.0 Trip Unit




A. Top fastener
B. Lead seal fixture for protective cover
C. Connection with circuit breaker
D. Bottom fastener
E. Protective cover
F. Cover opening point
G. Long-time rating plug
H. Screw for long-time rating plug
I. Long-time current setting Ir
J. Long-time time delay tr
K. Short-time pickup Isd
L. Short-time time delay tsd
M. Instantaneous pickup Ii
N. QR code on protective cover, to access product information
O. Test connector
P. Overload indication LED

# MicroLogic 6.0 Trip Unit




A. Top fastener
B. Terminal block for external connections
C. Housing for battery
D. Lead seal fixture for protective cover
E. Connection with circuit breaker
F. Bottom fastener
G. Protective cover
H. Cover opening point
I. Long-time rating plug
J. Screw for long-time rating plug
K. Long-time current setting Ir
L. Long-time time delay tr
M. Short-time pickup Isd
N. Short-time time delay tsd
O. Ground-fault pickup Ig
P. Ground-fault time delay tg
Q. Test connector
R. Test button for ground-fault protection
S. Instantaneous pickup Ii
T. Overload indication LED
U. QR code on protective cover, to access product information
V. Test/Reset button
W. Auto-protection trip cause indication LED
X. Ground-fault trip cause indication LED
Y. Short-time or instantaneous trip cause indication LED
Z. Long-time trip cause indication LED

# Overload Indication LED

| LED | Description |
|---|---|
|  | Overload alarm: the load exceeds 105% of the Ir setting of the long-time protection. |

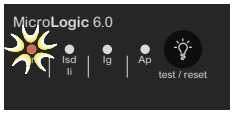
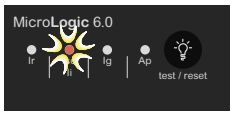
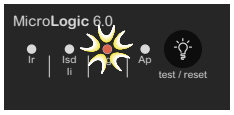
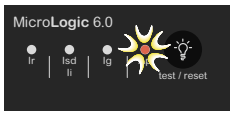
# QR Code

When the QR code on the protective cover of a MicroLogic trip unit is scanned with a smartphone running a QR code reader and connected to the Internet, the Go2SE landing page is displayed, page 12. The landing page displays some information about the device and a list of menus.

# Sensor Plug

The protection ranges depend on the rated current In, defined by the sensor plug, page 14 present below the MicroLogic trip unit.

# Trip Cause Indication LED (MicroLogic 6.0)

| LED | Description |
|---|---|
|  | Trip due to long-time protection |
|  | Trip due to short-time protection or instantaneous protection |
|  | Trip due to ground-fault protection |
|  | Trip due to auto-protection |

When activated, a LED remains ON until it is locally reset.

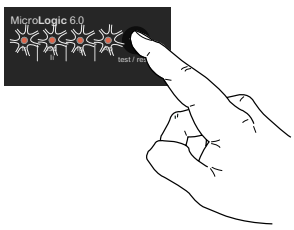
**NOTE:**

- A number of simultaneous causes may result in tripping. The LED signalling the last trip cause chronologically is the only one to remain ON.
- The battery maintains the trip cause indications. If there are no indications, check the battery.

# Test Button for Ground-Fault Protection (MicroLogic 6.0)

The test button is used to test the ground-fault protection, page 30 for MicroLogic 6.0 trip unit.

# Test/Reset Button (MicroLogic 6.0)



Use the Test/Reset button to:

- Reset the trip cause indications:
  1. Determine why the circuit breaker tripped. The trip cause indication is maintained until it is reset on the trip unit.
  2. Press the Test/Reset button.
  3. Check the parameter settings of the trip unit.
- Check the battery: press the Test/Reset button to check the luminance of the trip cause indication LEDs. If the LEDs are dim, or not lit, change the battery, page 28.

# Go2SE Landing Page

## Presentation

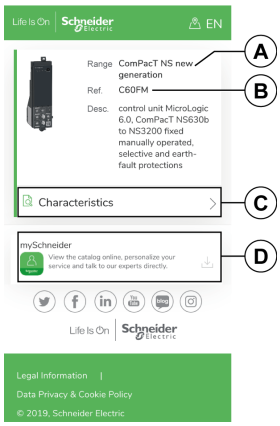
When the QR code on the front face of a ComPacT NS device is scanned with a smartphone running a QR code reader and connected to the Internet, the Go2SE landing page is displayed.

The landing page displays information about the device and a list of menus.

## Landing Page Description

The landing page is accessible from Android and iOS smartphones. It displays the same list of menus with slight differences in presentation.

The following example shows the landing page displayed on an Android smartphone:




A. Commercial reference of MicroLogic trip unit
B. Type of MicroLogic trip unit
C. Landing page menus. See the following menu descriptions for details.
D. Downloadable applications

## Characteristics

Selecting this menu gives access to a product datasheet with detailed information about the MicroLogic trip unit.

## Documentation

Selecting this menu gives access to the MicroLogic technical publications.

## mySchneider App

Selecting this application gives access to the Schneider Electric customer care mobile application **mySchneider** app that can be downloaded on Android and iOS smartphones. For smartphone compatibility, check on your application store. The customer care application offers self-service instructions and easy access to expert support and information.

# Protection Functions of MicroLogic Trip Unit

## What's in This Part

# Electrical Distribution Protection

## Presentation

MicroLogic trip units are designed to provide protection against overcurrents and ground-fault currents.

## Description

When choosing protection characteristics, take into account:

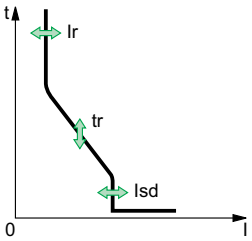
- Overcurrents (overloads and short-circuits) and potential ground-fault currents.
- Conductors that need protection.
- Coordination and selectivity between the devices.
- The presence of harmonic currents.

Protection characteristics can be represented on a trip curve that shows the circuit breaker trip time as a function of the measured current and protection settings. Protection settings are indexed on the rated current In of the MicroLogic trip unit.

## Rated Current In

The protection setting ranges depend on the rated current In, defined by the sensor plug inserted in the MicroLogic trip unit.

## MicroLogic 2.0 Trip Unit

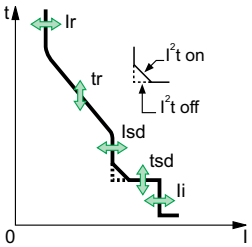



MicroLogic 2.0 trip units provide:

- Long-time overcurrent protection (Ir)
- Instantaneous overcurrent protection (Isd)

The protection functions of MicroLogic 2.0 trip units operate without an auxiliary power supply. The trip unit is powered by the current flowing through the circuit breaker.

## MicroLogic 5.0 Trip Unit

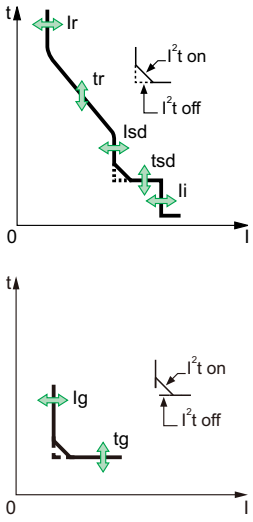



MicroLogic 5.0 trip units provide:

- Long-time overcurrent protection (Ir)
- Short-time overcurrent protection (Isd)
- Instantaneous overcurrent protection (Ii)

The protection functions of MicroLogic 5.0 trip units operate without an auxiliary power supply. The trip unit is powered by the current flowing through the circuit breaker.

# MicroLogic 6.0 Trip Unit







MicroLogic 6.0 trip units provide:

- Long-time overcurrent protection (Ir)
- Short-time overcurrent protection (Isd)
- Instantaneous overcurrent protection (Ii)
- Ground-fault protection (Ig)

The protection functions of MicroLogic 6.0 trip units operate without an auxiliary power supply. The trip unit is powered by the current flowing through the circuit breaker.

# Long-Time Overcurrent Protection

## Presentation

Long-time overcurrent protection helps to protect cables, busbars, and busbar trunking against overloads, based on the true RMS current. It is implemented independently for each phase and for the neutral.

This protection function is an overcurrent time-dependent protection with thermal memory, page 38. It operates as a thermal image, using the heating and cooling model of a conductor. After tripping, the protection continues to integrate the cooling of the conductor.

This protection function can be used also for transformer or generator protection thanks to the wide range of settings offered.

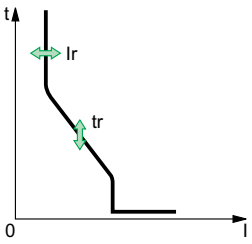
## Availability

Long-time overcurrent protection is available on:

- MicroLogic 2.0, 5.0, and 6.0 trip units
- 3-pole and 4-pole circuit breakers

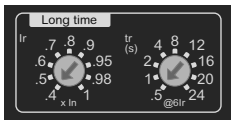
Long-time overcurrent protection is powered by the current flowing through the internal current transformers of the circuit breaker and it does not require additional external power supply.

## Operating Principle




- Long-time overcurrent protection is based on the true RMS current of phases and neutral.
- Long-time overcurrent protection is implemented independently for each phase and for neutral when present, page .

## Setting the Protection




The long-time overcurrent protection settings are:

- Ir: long-time overcurrent protection pickup
- tr: long-time overcurrent protection time delay

They can be set by using the Ir and tr multi-position dials on the front face of the MicroLogic trip unit.

## Setting the Ir Pickup

The Ir pickup setting values depend on the long-time rating plug inserted in the MicroLogic trip unit. For more information on the long-time rating plug, see detailed topic, page 35.

Ir pickup = setting value x In rated current.

As standard, trip units are equipped with the standard rating plug (0.4–1 x In).

| Rating plug | Setting values | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Standard | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 0.95 | 0.98 | 1 |
| Low-setting option | 0.4 | 0.45 | 0.50 | 0.55 | 0.60 | 0.65 | 0.70 | 0.75 | 0.8 |
| High-setting option | 0.80 | 0.82 | 0.85 | 0.88 | 0.90 | 0.92 | 0.95 | 0.98 | 1 |
| Off-plug | No long-time overcurrent protection (Ir = In for Isd setting) | | | | | | | | |

When the current is higher than Isd or Ii, only short-time overcurrent protection and instantaneous protection are operational.

## Setting the tr Time Delay

The time delay settings indicated on the rating plugs correspond to the tripping times for an overload of 6 x Ir in cold-state conditions.

The table below gives tripping times according to tr time delay.

| tr setting | Accuracy | 0.5 s | 1 s | 2 s | 4 s | 8 s | 12 s | 16 s | 20 s | 24 s |
|---|---|---|---|---|---|---|---|---|---|---|
| Resulting tripping time at 1.5 x Ir | 0 to -30% | 12.5 s | 25 s | 50 s | 100 s | 200 s | 300 s | 400 s | 500 s | 600 s |
| Resulting tripping time at 6 x Ir | 0 to -20% | 0.7 s[1] | 1 s | 2 s | 4 s | 8 s | 12 s | 16 s | 20 s | 24 s |
| Resulting tripping time at 7.2 x Ir | 0 to -20% | 0.7 s[2] | 0.69 s | 1.38 s | 2.7 s | 5.5 s | 8.3 s | 11 s | 13.8 s | 16.6 s |
| 1: Accuracy 0 to -40%<br>2: Accuracy 0 to -60% | | | | | | | | | | |

# Short-Time Overcurrent Protection

## Presentation

Short-time overcurrent protection helps to protect equipment against phase-to-phase, phase-to-neutral and phase-to-ground short circuits with total selectivity. It includes two characteristics, definite time and inverse time, which depend on the status of the I²t setting.

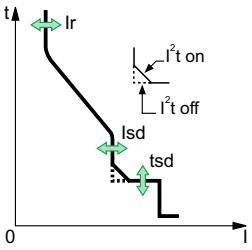
## Availability

Short-time overcurrent protection is available on:

- MicroLogic 5.0 and 6.0 trip units
- 3-pole and 4-pole circuit breakers

Short-time overcurrent protection is powered by the current flowing through the internal current transformers of the circuit breaker and it does not require additional external power supply.

## Operating Principle




The short-time overcurrent pickup Isd sets the level of short-circuit current at which the circuit breaker trips when reaching the short-time overcurrent time delay.

The short-time overcurrent time delay tsd sets the length of time during which the circuit breaker carries a short circuit within the short-time overcurrent pickup range.

The short-time overcurrent time delay can be adjusted to:

- Four setting values with I²t ON.
  - Up to 10 Ir, the tripping curve is an inverse time curve. The time delay decreases as the current increases.
  - Above 10 Ir, the tripping curve is a definite time curve with a constant tripping time.
- Five setting values with I²t OFF. The tripping curve is a definite time curve with a constant tripping time.

Short-time overcurrent protection is based on the true RMS current of phases and neutral.

In order to trip on an intermittent fault, the trip unit accumulates the intermittent currents in the short-time tripping range that do not last long enough to trigger a trip. This accumulation may lead to shorter tripping times than those set.

## Setting the Protection


The short-time overcurrent protection settings are:

- Isd: short-time overcurrent protection pickup
- tsd: short-time overcurrent protection time delay
- I²t (tsd): short-time overcurrent protection curve (I²t ON or I²t OFF)

They can be set by using the Isd and tsd multi-position dials on the front face of the MicroLogic trip unit.

# Protection Settings

Short-time pickup Isd.

| Pickup (accuracy ± 10%) | Isd = Ir x ... | 1.5 | 2 | 2.5 | 3 | 4 | 5 | 6 | 8 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|

Short-time time delay tsd.

| | | | | | | |
|---|---|---|---|---|---|---|
| tsd time delay (s) | $I^2t$ OFF | 0 | 0.1 | 0.2 | 0.3 | 0.4 |
| | $I^2t$ ON | – | 0.1 | 0.2 | 0.3 | 0.4 |
| Tripping time at 10 x Ir (ms) with $I^2t$ ON or $I^2t$ OFF | Maximum resettable time | 20 | 80 | 140 | 230 | 350 |
| | Maximum break time | 80 | 140 | 200 | 320 | 500 |

# Instantaneous Overcurrent Protection

## Presentation

Instantaneous protection helps to protect equipment against phase-to-phase, phase-to-neutral and phase-to-ground short circuits. The protection operates with a definite time characteristic. It trips without additional time delay as soon as the setting current is exceeded.

## Availability

Instantaneous overcurrent protection is available on:

- MicroLogic 2.0, 5.0, and 6.0 trip units
- 3-pole and 4-pole circuit breakers

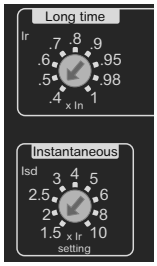
It is powered by the current flowing through the internal current transformers of the circuit breaker and it does not require an additional external power supply.

## Operating Principle

The instantaneous overcurrent protection pickup sets the level of short-circuit current at which the circuit breaker trips with no intentional time delay.

Instantaneous overcurrent protection overrides short-time overcurrent protection when the instantaneous overcurrent pickup is adjusted to the same or a lower setting than the short-time overcurrent pickup.

## Setting Instantaneous Protection for MicroLogic 2.0




The instantaneous protection pickup Isd is set by using the Ir and Isd multi-position dials on the front face of the MicroLogic trip unit.

The setting value is expressed in multiples of Ir.

1. Set the long-time protection first. The setting pickup is Ir.
2. Turn the Isd multi-position dial to the value required.
3. Isd = Isd setting x Ir.

The Isd setting values are: 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10.

Accuracy: +/-10 %

**NOTE:** The tripping time cannot be adjusted. The tripping time characteristics are:

- Maximum resettable time: 20 ms
- Maximum break time: 80 ms

# Setting Instantaneous Protection for MicroLogic 5.0 and 6.0


The instantaneous protection pickup Ii is set by using the Ii multi-position dial on the front face of the MicroLogic trip unit.

The setting value is expressed in multiples of In.

1. Turn the Ii multi-position dial to the value required.
2. Ii = Ii setting x In.

The Ii setting values are: 2, 3, 4, 5, 6, 8, 10, 12, 15 and off.

Accuracy: +/-10 %

The off setting disables the instantaneous overcurrent protection.

**NOTE:** The tripping time cannot be adjusted. The tripping time characteristics are:

- Maximum resettable time: 20 ms
- Maximum break time: 80 ms

# Ground-Fault Protection

## Presentation

Ground-fault protection provides protection against phase-to-ground fault, which is more sensitive than protection based on phase current only. It is generally used in TN-S systems but could also be used in other earthing systems.

A ground fault in the protection conductors can provoke local temperature rise at the site of the fault or in the conductors.

**NOTE:** Ground-fault protection is also called earth-fault protection.

Ground-fault and neutral protection are independent and can therefore be combined.

There are two types of ground-fault protection:

- Residual ground-fault protection is based on the summation of the phases and neutral current. It detects faults downstream of the circuit breaker.
- Source ground return (SGR) ground-fault protection is based on the signal delivered by an external sensor, source ground return (SGR) current transformer through the MDGF module. It detects faults both upstream and downstream of the circuit breaker.

  The maximum distance between the sensor and the circuit breaker is ten metres.

## Availability

Ground-fault protection is available on:

- MicroLogic 6.0 trip units
- 3-pole and 4-pole circuit breakers

External sensors can be used:

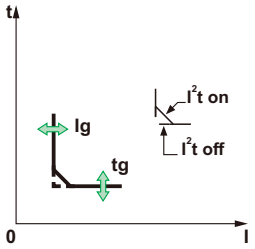
- External Neutral Current Transformer (ENCT): measurement of the current on neutral. For information about the installation of ENCT, consult the ENCT instruction sheet.
- Source ground return protection: including ground-fault protection and an SGR sensor installed around the connection of the transformer neutral point to ground.

Ground-fault protection is powered by the current flowing through the internal current transformers of the circuit breaker and it does not require an additional external power supply.

## Operating Principle

The ground-fault current is calculated or measured according to the circuit breaker configuration, as shown in the following table.

| Circuit breaker configuration | Ig ground-fault current |
|---|---|
| 3P | Ig = I1 + I2 + I3 |
| 4P | Ig = I1 + I2 + I3 + IN |
| 3P + ENCT | Ig = I1 + I2 + I3 + IN (ENCT) |
| 3P or 4P + SGR | Ig = ISGR |




The ground-fault protection pickup Ig sets the level of ground-fault current at which the circuit breaker trips when reaching the ground-fault protection time delay tg.

The time delay tg sets the length of time during which the circuit breaker carries a ground-fault within the ground-fault protection pickup Ig range.

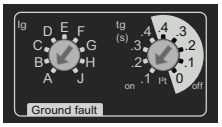
The time delay tg can be adjusted to:

- Four setting values with I²t ON. In this case, the tripping curve is an inverse time curve up to 2 x Ir, meaning that the time delay decreases as the current increases. Above 2 x Ir, the tripping curve is a definite time curve with a constant tripping time.
- Five setting values with I²t OFF. In this case, the tripping curve is a definite time curve with a constant tripping time.

Ground-fault protection is based on the true RMS current of phases and neutral.

In order to trip on an intermittent electrical fault, the trip unit accumulates the intermittent currents in the ground-fault tripping range that do not last long enough to trigger a trip. This accumulation leads to shorter tripping times than those set.

## Setting the Protection




The ground-fault protection settings are:

- Ig: ground-fault protection pickup
- tg: ground-fault protection time delay
- I²t (tg): ground-fault protection curve (I²t ON or I²t OFF)

They can be set by using the Ig and tg multi-position dials on the front face of the MicroLogic trip unit.

## Protection Settings

The ground-fault pickup Ig and time delay tg values can be set independently and are identical for both the residual and source ground return ground-fault protection functions.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ig Pickup (accuracy ± 10%) | | | A | B | C | D | E | F | G | H | J |
| | In ≤ 400 A | Ig = In x... | 0.3 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |
| | 400 A < In ≤ 1200 A | Ig = In x... | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |
| | In > 1200 A | Ig = ... | 500 A | 640 A | 720 A | 800 A | 880 A | 960 A | 1040 A | 1120 A | 1200 A |

| | | | | | | |
|---|---|---|---|---|---|---|
| tg Time delay (s) | I²t OFF | 0 | 0.1 | 0.2 | 0.3 | 0.4 |
| | I²t ON | | 0.1 | 0.2 | 0.3 | 0.4 |
| Tripping time (ms) at In or 1200 A with I²t ON or I²t OFF | Maximum resettable time | 20 | 80 | 140 | 230 | 350 |
| | Maximum break time | 80 | 140 | 200 | 320 | 500 |

# Neutral Protection

## Presentation

A long-time overcurrent protection function is dedicated to the neutral protection.

## Availability

Neutral protection is available on:

- MicroLogic 2.0, 5.0, and 6.0 trip units
- 4-pole circuit breakers

## Description

Where the cross-sectional area of the neutral conductor is at least equivalent to that of the phase conductor, and the current in the neutral is expected not to exceed the value in the phase conductor, it is not necessary to provide overcurrent protection for the neutral conductor.

The neutral conductor must have protection against overcurrent if:

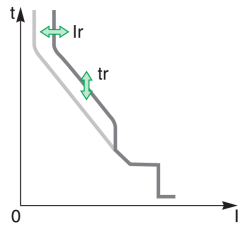
- The cross-sectional area of the neutral conductor is less than the cross-sectional area of the phase conductors
- Non-linear loads generating third order harmonics (or multiples thereof) are installed

MicroLogic trip units are suitable for the following protection types.

| Possible types | Neutral protection |
|---|---|
| 4P, 3D | Off |
| 4P, 3D + N/2 | Half neutral |
| 4P, 4D | Full neutral |
| P: Pole, D: Trip unit, N: Neutral protection | |

**NOTE:** With the 4P 3D setting, the current in the neutral must not exceed the rated current of the circuit breaker.

## Operating Principle




Neutral protection has the same characteristics as phase protection:

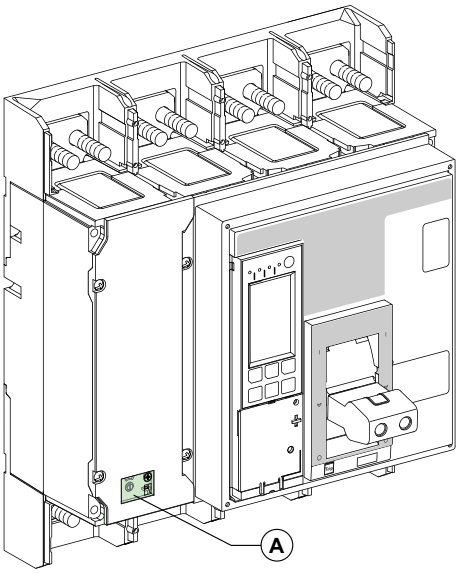
- Its pickup is proportional to the long-time protection pickup Ir.
- It has the same tr time delay values as long-time protection.
- Its short-time and instantaneous protections are identical.

# Setting the Neutral Protection

On four-pole circuit breakers, it is possible to select the type of neutral protection for the fourth pole using the three-position dial on the ComPacT NS circuit breaker:

- Neutral unprotected (4P 3D)

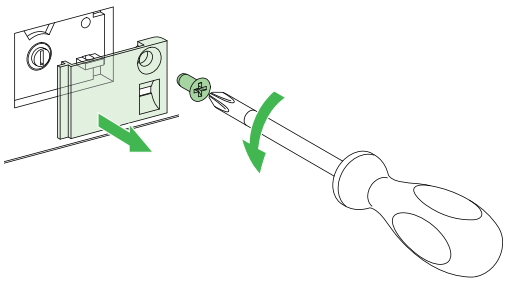
  **NOTE:** With the 4P 3D setting, the current in the neutral must not exceed the rated current of the circuit breaker.
- Neutral protection at 0.5 In (3D + N/2, factory setting)
- Neutral protection at In (4P 4D)



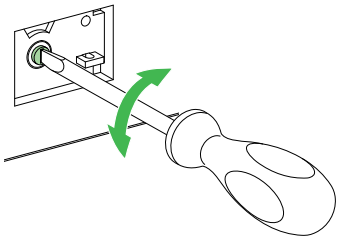

A. Cover for neutral protection three-position dial.

Follow these steps to set the type of neutral protection.

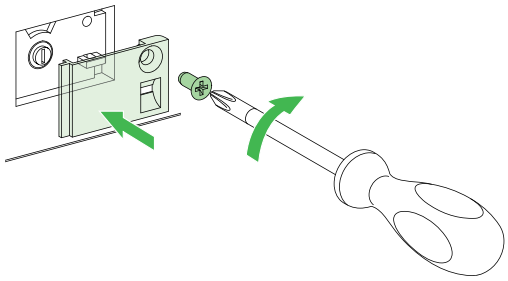
1. Remove the cover of the switch.



2. Select the protection type.



3. Put the cover back in place.



## Setting Values for Neutral Protection

The following table shows the setting values of the neutral long-time protection and pickup for the type of neutral protection selected:

| Neutral protection type | Neutral long-time pickup value |
|---|---|
| OFF | No long-time protection for neutral |
| N/2 (factory setting) | Ir/2 |
| N | Ir |

# Maintenance of MicroLogic Trip Unit

## What’s in This Part

# Replacing the Internal Battery (MicroLogic 6.0)

## Internal Battery

The internal battery powers the trip cause indication LEDs on a MicroLogic 6.0 trip unit.

The internal battery of the MicroLogic trip unit can be replaced on site when discharged.

Order a new battery in its housing cover with the Schneider Electric catalog number 33593.

- Lithium battery
- 1/2 AA, 3.6 V, 900 mA/h
- Ambient temperature: -55 °C to 130 °C (-67 °F to 266 °F)

## Replacing the Internal Battery

**⚠⚠DANGER**

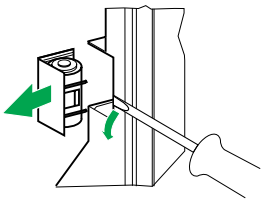
**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462, NOM 029-STPS or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside this equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Put back all devices, doors, and covers before turning on power to this equipment.
- Beware of potential hazards, and carefully inspect the work area for tools and objects that may have been left inside the equipment.

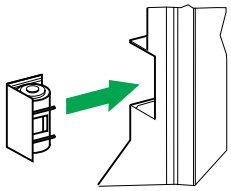
**Failure to follow these instructions will result in death or serious injury.**

Follow this procedure to replace the internal battery:

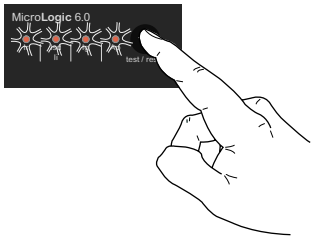
1. Remove the circuit breaker front cover as directed in the circuit breaker instruction sheet.
2. Remove the battery and its housing cover: insert a small screwdriver blade into battery housing cover notch and rotate to slide battery housing cover out of trip unit.



3. Put the new battery and its housing cover back in place.



4. Press the Test/Reset button to check the new battery.




5. Reinstall the circuit breaker front cover as directed in the circuit breaker instruction sheet.

**⚠⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Put back circuit breaker front cover before energizing circuit breaker to help prevent access to live terminals.
- Do not pinch the wires when reinstalling the front cover.

**Failure to follow these instructions will result in death or serious injury.**

# Testing the Ground-Fault Protection

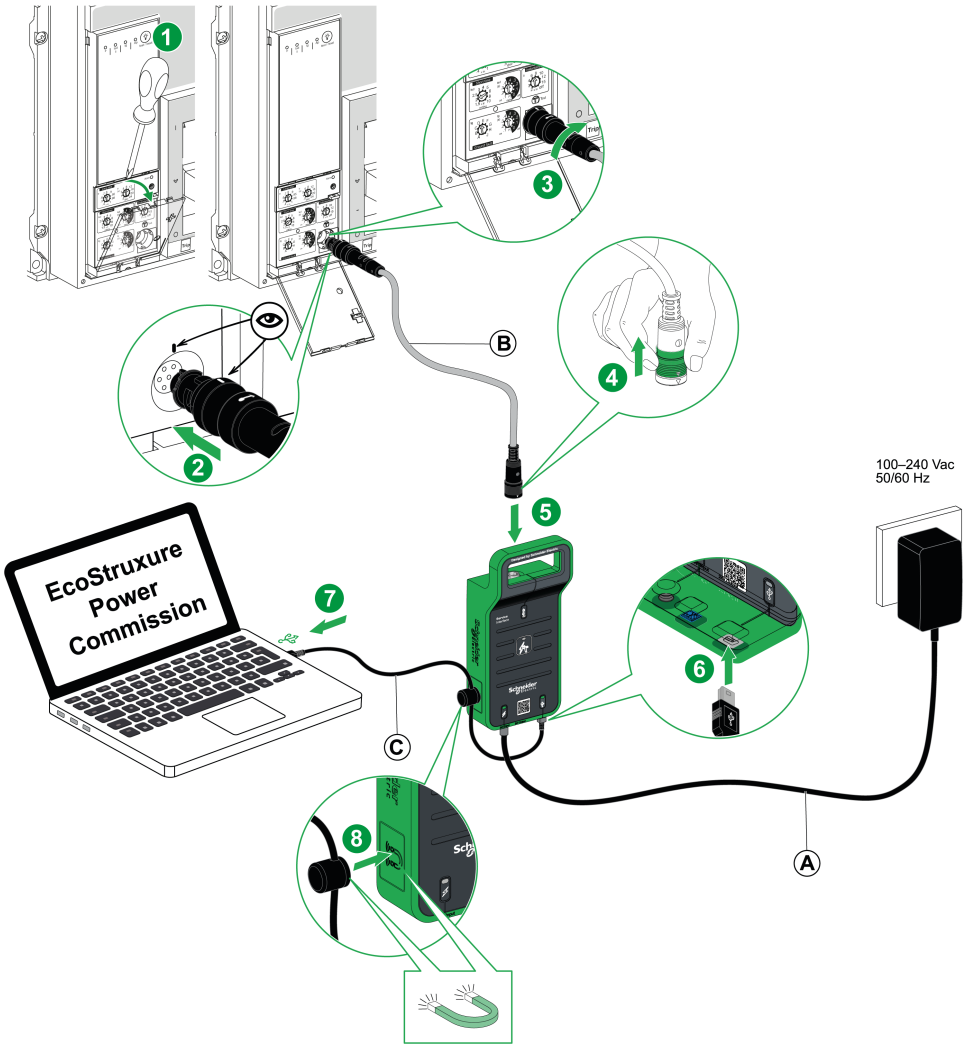
Test the operation of ground-fault protection as follows:

1. Check that the circuit breaker is closed.
2. Use a thin screwdriver to briefly push in (< 1 s) the **TEST** button on the front face of the MicroLogic trip unit.
3. The circuit breaker trips.
4. If the circuit breaker does not trip, contact your field service representative.

# Testing the MicroLogic Trip Unit

Test the trip unit using EcoStruxure Power Commission software installed on a PC and connected to the MicroLogic trip unit through the Service Interface.

## Testing Architecture




A. AC/DC power supply
B. 7-pin cable for ComPacT NS trip units
C. USB cable with magnet

For more information, refer to GDE78167 *Service Interface - Instruction Sheet*.

## Test Functions with EcoStruxure Power Commission Software

EcoStruxure Power Commission software allows you to perform the following actions on a MicroLogic trip unit through the Service Interface:

- Automatic trip curve tests
- Device check up (Force trip test)

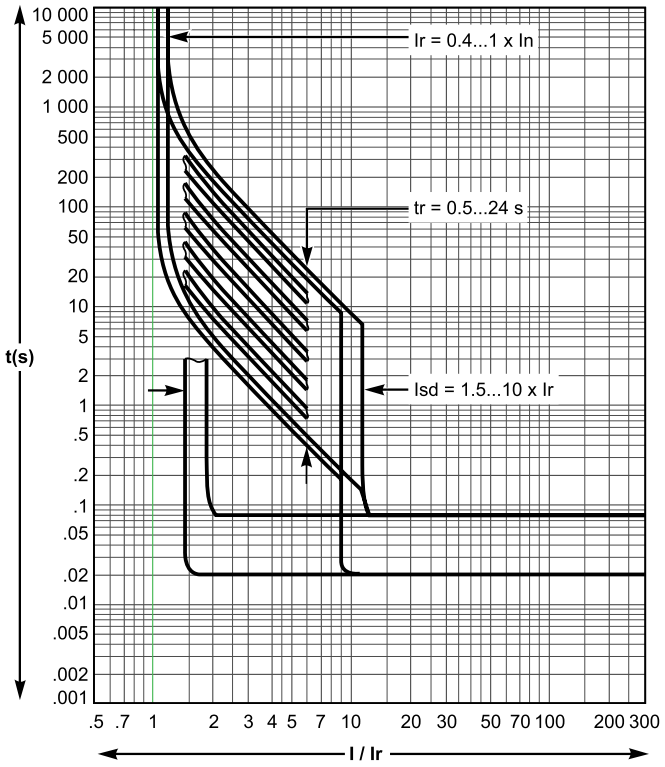
For more information, refer to DOCA0170EN *Service Interface - User Guide*.

# Technical Appendix

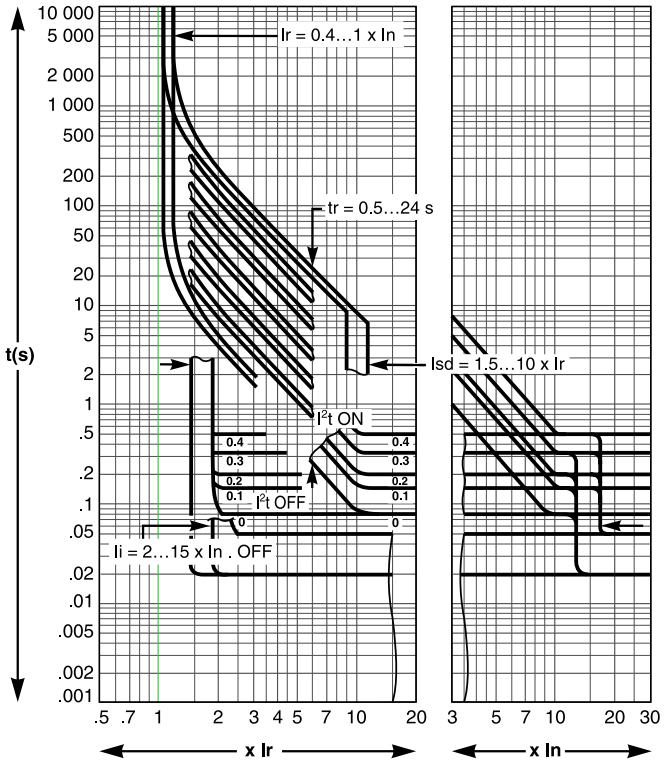
## What’s in This Part

# Tripping Curves

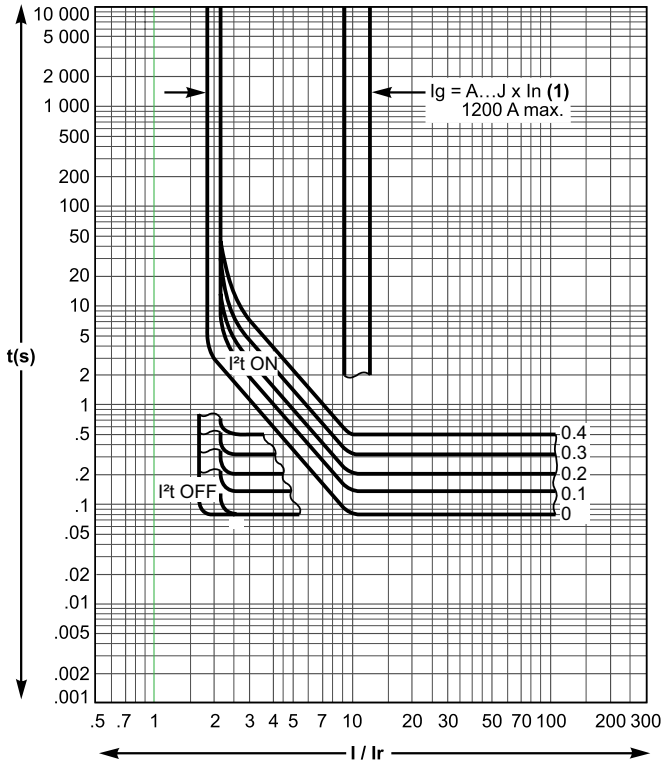
## Long-Time and Instantaneous Protection (MicroLogic 2.0)




## Long-Time, Short-Time, and Instantaneous Protection (MicroLogic 5.0 and 6.0)



# Ground-Fault Protection (MicroLogic 6.0)



# Long-Time Rating Plug

One of four interchangeable long-time rating plugs can be used to limit the long-time pickup setting range for higher accuracy of the long-time overcurrent protection, page 16.

## Selecting the Long-Time Rating Plug

The setting range for the long-time current setting on MicroLogic trip units is defined by the long-time rating plug.

The available rating plugs are listed in the following table:

| Part number | Setting range for the Ir value | |
|---|---|---|
| C33542 | Standard | 0.4–1 x Ir |
| C33543 | Low setting | 0.4–0.8 x Ir |
| C33544 | High setting | 0.8–1 x Ir |
| C33545 | Without long-time protection, Ir = In for short-time protection setting | |

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

- The long-time current setting Ir is 0.4.
- The long-time time delay tr corresponds to the value indicated by the adjustment dial.

# Replacement Procedure

**⚠⚠DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462, NOM 029-STPS or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside this equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Put back all devices, doors, and covers before turning on power to this equipment.
- Beware of potential hazards, and carefully inspect the work area for tools and objects that may have been left inside the equipment.

**Failure to follow these instructions will result in death or serious injury.**

***NOTICE***

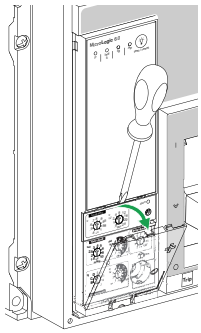
**HAZARD OF TRIP UNIT DETERIORATION**

Prior to running dielectric strength tests, it is mandatory to disconnect all electrical auxiliaries (for example, MX or MN voltage releases) connected to the device.

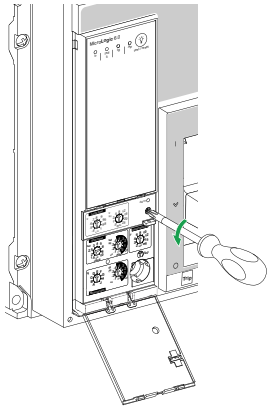
**Failure to follow these instructions can result in equipment damage.**

Follow this procedure to change or remove the rating plug.

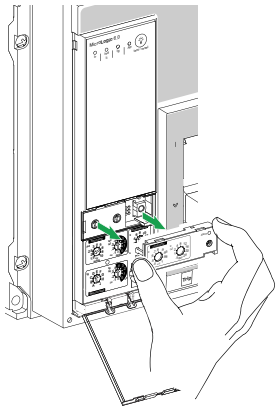
1. Open the circuit breaker.
2. Open the protective cover of the trip unit.



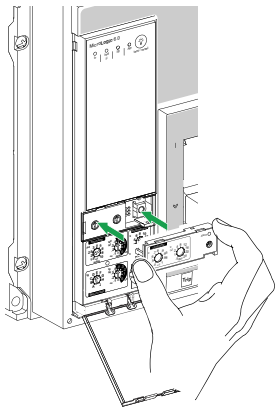
3. Record switch settings.
4. Unscrew the long-time rating plug mounting screw.



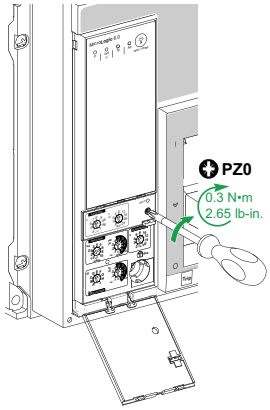
5. Remove the adjustable rating plug.



6. Inspect mounting area for debris and contamination.
7. Take out the replacement rating plug.
8. Gently push in the replacement rating plug.



9. Tighten the long-time rating plug mounting screw.




10. Set trip unit settings to values recorded previously or modify settings.

# Thermal Memory

## Presentation

The thermal memory is the means to take into account 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 long-time protection settings
- Repeated circuit-breaker closing on a fault.

Trip 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.

Trip units with a thermal memory record the temperature rise caused by each overload, even those that are very short. This information stored in the thermal memory reduces the tripping time.

## MicroLogic Trip Units and Thermal Memory

All MicroLogic trip 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 tr time delay:

- If the time delay is short, the time constant is low.
- If the time delay is long, the time constant is high.

For long-time protection, following tripping, the cooling curve is simulated by the trip 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 time delay for the short-time protection.

Following a trip, the short-time tsd time 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 intermittent fault function as the short-time protection.

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