# Circuit breakers and switch-disconnectors characteristics
## NW08 to NW63

PB106363A35.eps

PB106362A65.eps

## Common characteristics

| | | | |
|---|---|---|---|
| Number of poles | | 3/4 | |
| Rated insulation voltage (V) | **Ui** | 1000 | 1250 for H10, HA10 |
| Impulse withstand voltage (kV) | **Uimp** | 12 | 12 |
| Rated operational voltage (V AC 50/60 Hz) | **Ue** | 690 | 1150 for H10, HA10 |
| Suitability for isolation | IEC 60947-2 | | |
| Degree of pollution | IEC 60664-1 | 4 (1000 V) / 3 (1250 V) | |

## Basic circuit-breaker

### Circuit-breaker as per IEC 60947-2

| | | |
|---|---|---|
| Rated current (A) | | at 40 °C / 50 °C (1) |
| Rating of 4th pole (A) | | |
| Sensor ratings (A) | | |
| **Type of circuit breaker** | | |
| Ultimate breaking capacity (kA rms) V AC 50/60 Hz | **Icu** | 220/415/440 V<br>525 V<br>690 V<br>1150 V |
| Rated service breaking capacity (kA rms) | **Ics** | % Icu |
| Utilisation category | | |
| Rated short-time withstand current (kA rms) V AC 50/60 Hz | **Icw** | 1 s<br>3 s |
| Integrated instantaneous protection (kA peak ±10 %) | | |
| Rated making capacity (kA peak) V AC 50/60 Hz | **Icm** | 220/415/440 V<br>525 V<br>690 V<br>1150 V |
| Break time (ms) between tripping order and arc extinction | | |
| Closing time (ms) | | |

### Circuit-breaker as per NEMA AB1

| | | |
|---|---|---|
| Breaking capacity (kA) V AC 50/60 Hz | | 240/480 V<br>600 V |

## Unprotected circuit-breaker

### Tripping by shunt trip as per IEC 60947-2

| | | |
|---|---|---|
| **Type of circuit breaker** | | |
| Ultimate breaking capacity (kA rms) V AC 50/60 Hz | **Icu** | 220...690 V |
| Rated service breaking capacity (kA rms) | **Ics** | % Icu |
| Rated short-time withstand current (kA rms) | **Icw** | 1 s<br>3 s |
| Overload and short-circuit protection<br>External protection relay: short-circuit protection, maximum delay: 350 ms (4) | | |
| Rated making capacity (kA peak) V AC 50/60 Hz | **Icm** | 220...690 V |

## Switch-disconnector as per IEC 60947-3 and Annex A

| | | |
|---|---|---|
| **Type of switch-disconnector** | | |
| Rated making capacity (kA peak) AC23A/AC3 category V AC 50/60 Hz | **Icm** | 220...690 V<br>1150 V |
| Rated short-time withstand current (kA rms) AC23A/AC3 category V AC 50/60 Hz | **Icw** | 1 s<br>3 s |

## Earthing switch

| | | |
|---|---|---|
| Latching capacity (kA peak) | | 135 |
| Rating short time withstand (kA rms) | **Icw** | 1 s<br>3 s |

## Mechanical and electrical durability as per IEC 60947-2/3 at In/Ie

| | | | | |
|---|---|---|---|---|
| Service life | Mechanical | with maintenance | | |
| C/O cycles x 1000 | | without maintenance | | |
| **Type of circuit breaker** | | | | |
| **Rated current** | | | **In (A)** | |
| C/O cycles x 1000 | Electrical | without maintenance | | 440 V (5) |
| IE C 60947-2 | | | | 690 V |
| | | | | 1150 V |
| **Type of circuit breaker or switch-disconnector** | | | | |
| **Rated operational current** | | | **Ie (A)** | **AC23A** |
| C/O cycles x 1000 | Electrical | without maintenance | | 440 V (5) |
| IEC 60947-3 | | | | 690 V |
| **Type of circuit breaker or switch-disconnector** | | | | |
| **Rated operational current** | | | **Ie (A)** | **AC3 (6)** |
| Motor power | | | | 380/415 V (kW) |
| | | | | 440 V (5) (kW) |
| | | | | 690 V (kW) |
| C/O cycles x 1000 | Electrical | without maintenance | | 440/690 V (5) |
| IEC 60947-3 Annex M/IEC 60947-4-1 | | | | |

*(1) 50 °C: rear vertical connected. Refer to temperature derating tables for other connection types.*
*(2) See the current-limiting curves in the "additional characteristics" section.*
*(3) Equipped with a trip unit with a making current of 90 kA peak.*
*(4) External protection must comply with permissible thermal constraints of the circuit breaker (please consult us). No fault-trip indication by the SDE or the reset button.*
*(5) Available for 480 V NEMA.*
*(6) Suitable for motor control (direct-on-line starting).*
*(7) The use of NW08 to NW20 H1 in IT systems is limited to 500 V network voltage.*

## Sensor selection

| Sensor rating (A) | 250 (1) | 400 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3200 | 4000 | 5000 | 6300 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ir threshold setting(A) | 100 to 250 | 160 to 400 | 250 to 630 | 320 to 800 | 400 to 1000 | 500 to 1250 | 630 to 1600 | 800 to 2000 | 1000 to 2500 | 1250 to 3200 | 1600 to 4000 | 2000 to 5000 | 2500 to 6300 |

*(1) For circuit breaker NW02, please consult us.*

| | NW08 | NW10 | NW12 | NW16 | | NW20 | | | | | NW25 | NW32 | NW40 | | NW40b | NW50 | NW63 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 800 | 1000 | 1250 | 1600 | | 2000 | | | | | 2500 | 3200 | 4000 | | 4000 | 5000 | 6300 |
| | 800 | 1000 | 1250 | 1600 | | 2000 | | | | | 2500 | 3200 | 4000 | | 4000 | 5000 | 6300 |
| | 400 to 800 | 400 to 1000 | 630 to 1250 | 800 to 1600 | | 1000 to 2000 | | | | | 1250 to 2500 | 1600 to 3200 | 2000 to 4000 | | 2000 to 4000 | 2500 to 5000 | 3200 to 6300 |
| | N1 | H1 (7) | H2 | L1 (2) | H10 | H1 (7) | H2 | H3 | L1 (2) | H10 | H1 | H2 | H3 | H10 | H1 | H2 | |
| | 42 | 65 | 100 | 150 | - | 65 | 100 | 150 | 150 | - | 65 | 100 | 150 | - | 100 | 150 | |
| | 42 | 65 | 85 | 130 | - | 65 | 85 | 130 | 130 | - | 65 | 85 | 130 | - | 100 | 130 | |
| | 42 | 65 | 85 | 100 | - | 65 | 85 | 100 | 100 | - | 65 | 85 | 100 | - | 100 | 100 | |
| | - | - | - | - | 50 | - | - | - | - | 50 | - | - | - | 50 | - | - | |
| | 100 % | | | | | 100 % | | | | | 100 % | | | | 100 % | | |
| | B | | | | | B | | | | | B | | | | B | | |
| | 42 | 65 | 85 | 30 | 50 | 65 | 85 | 65 | 30 | 50 | 65 | 85 | 65 | 50 | 100 | 100 | |
| | 22 | 36 | 50 | 30 | 50 | 36 | 75 | 65 | 30 | 50 | 65 | 75 | 65 | 50 | 100 | 100 | |
| | - | - | 190 | 80 | - | - | 190 | 150 | 80 | - | - | 190 | 150 | - | - | 270 | |
| | 88 | 143 | 220 | 330 | - | 143 | 220 | 330 | 330 | - | 143 | 220 | 330 | - | 220 | 330 | |
| | 88 | 143 | 187 | 286 | - | 143 | 187 | 286 | 286 | - | 143 | 187 | 286 | - | 220 | 286 | |
| | 88 | 143 | 187 | 220 | - | 143 | 187 | 220 | 220 | - | 143 | 187 | 220 | - | 220 | 220 | |
| | - | - | - | - | 105 | - | - | - | - | 105 | - | - | - | 105 | - | - | |
| | 25 | 25 | 25 | 10 | 25 | 25 | 25 | 25 | 10 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | |
| | < 70 | | | | | < 70 | | | | | < 70 | | | | < 80 | | |
| | 42 | 65 | 100 | 150 | - | 65 | 100 | 150 | 150 | - | 65 | 100 | 150 | - | 100 | 150 | |
| | 42 | 65 | 85 | 100 | - | 65 | 85 | 100 | 100 | - | 65 | 85 | 100 | - | 100 | 100 | |
| | | HA | HF (3) | | | HA | HF (3) | | | | HA | HF (3) | | | HA | | |
| | | 50 | 85 | | | 50 | 85 | | | | 55 | 85 | | | 85 | | |
| | | 100 % | | | | 100 % | | | | | 100 % | | | | 100 % | | |
| | | 50 | 85 | | | 50 | 85 | | | | 55 | 85 | | | 85 | | |
| | | 36 | 50 | | | 36 | 75 | | | | 55 | 75 | | | 85 | | |
| | | - | - | | | - | - | | | | - | - | | | - | | |
| | | 105 | 187 | | | 105 | 187 | | | | 121 | 187 | | | 187 | | |

| | NW08/NW10/NW12/NW16 | | | | NW20 | | | NW25/NW32/NW40 | | | NW40b/NW50/NW63 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NA | HA | HF | HA10 | HA | HF | HA10 | HA | HF | HA10 | HA | |
| | 88 | 105 | 187 | - | 105 | 187 | - | 121 | 187 | - | 187 | |
| | - | - | - | 105 | - | - | 105 | - | - | 105 | - | |
| | 42 | 50 | 85 | 50 | 50 | 85 | 50 | 55 | 85 | 50 | 85 | |
| | - | 36 | 50 | 50 | 36 | 75 | 50 | 55 | 75 | 50 | 85 | |
| | 60 Hz | | | | | | | | | | | |
| | 50 Hz | | | | | | | | | | | |
| | 25 | | | | 20 | | | | | | 10 | |
| | 12.5 | | | | 10 | | | | | | 5 | |
| | N1/H1/H2 | L1 | H10 | | H1/H2 | H3 | L1 | H10 | H1/H2 | H3 | H10 | H1 | H2 |
| | 800/1000/1250/1600 | | | | 2000 | | | | 2500/3200/4000 | | | 4000b/5000/6300 | |
| | 10 | 3 | - | | 8 | 2 | 3 | - | 5 | 1.25 | - | 1.5 | 1.5 |
| | 10 | 3 | - | | 6 | 2 | 3 | - | 2.5 | 1.25 | - | 1.5 | 1.5 |
| | - | - | 0.5 | | - | - | - | 0.5 | - | - | 0.5 | - | - |
| | H1/H2/NA/HA/HF | | | | H1/H2/H3/HA/HF | | | | H1/H2/H3/HA/HF | | | H1/H2/HA | |
| | 800/1000/1250/1600 | | | | 2000 | | | | 2500/3200/4000 | | | 4000b/5000/6300 | |
| | 10 | | | | 8 | | | | 5 | | | 1.5 | |
| | 10 | | | | 6 | | | | 2.5 | | | 1.5 | |
| | H1/H2/NA/HA/HF | | | | H1/H2/H3/HA/HF | | | | | | | | |
| | 800 | 1000 | 1250 | 1600 | 2000 | | | | | | | | |
| | 335 to 450 | 450 to 560 | 560 to 670 | 670 to 900 | 900 to 1150 | | | | | | | | |
| | 400 to 500 | 500 to 630 | 500 to 800 | 800 to 1000 | 1000 to 1300 | | | | | | | | |
| | ≤ 800 | 800 to 1000 | 1000 to 1250 | 1250 to 1600 | 1600 to 2000 | | | | | | | | |
| | 6 | | | | | | | | | | | | |

# Micrologic control units
## Overview of functions

All Masterpact circuit breakers are equipped with a Micrologic control unit that can be changed on site. Control units are designed to protect Power circuits and loads. Alarms may be programmed for remote indications.
Measurements of current, voltage, frequency, power and power quality optimise continuity of service and energy management.

### Dependability
Integration of protection functions in an ASIC electronic component used in all Micrologic control units guarantees a high degree of reliability and immunity to conducted or radiated disturbances.
On Micrologic A, E, P and H control units, advanced functions are managed by an independent microprocessor.

### Accessories
Certain functions require the addition of Micrologic control unit accessories, described on page A-25.
The rules governing the various possible combinations can be found in the documentation accessible via the Products and services menu of the www.schneider-electric.com web site.

## Micrologic name codes

**2.0 E**
**X Y Z**

**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: control-unit generation**
Identification of the control-unit generation.
"0" signifies the first generation.

**Z: type of measurement**
- A for "ammeter"
- E for "energy"
- P for "power meter"
- H for "harmonic meter".

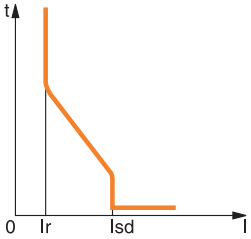
PB100772-32.eps

PB106351A32.eps

## Current protection

### Micrologic 2: basic protection

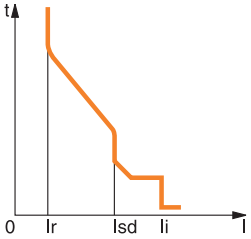
DB101116.eps




***Protection:***
*long time*
*+ instantaneous*

### Micrologic 5: selective protection

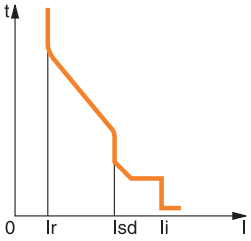
DB101117.eps



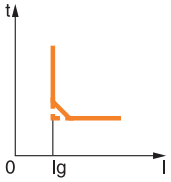

***Protection:***
*long time*
*+ short time*
*+ instantaneous*

### Micrologic 6: selective + earth-fault protection

DB101117.eps



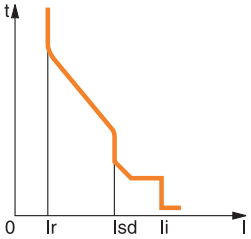

DB101118.eps



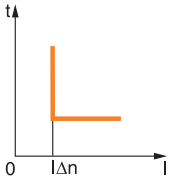

***Protection:***
*long time*
*+ short time*
*+ instantaneous*
*+ earth fault*

### Micrologic 7: selective + earth-leakage protection

DB101117.eps




DB101119.eps




***Protection:***
*long time*
*+ short time*
*+ instantaneous*
*+ earth leakage up to 3200A*

## Measurements and programmable protection

### A: ammeter

- $I_1$, $I_2$, $I_3$, $I_N$, $I_{earth-fault}$, $I_{earth-leakage}$ and maximeter for these measurements
- fault indications
- settings in amperes and in seconds.

### E: Energy

- incorporates all the rms measurements of Micrologic A, plus voltage, power factor, power and energy metering measurements
- calculates the current demand value
- "Quickview" function for the automatic cyclical display of the most useful values (as standard or by selection).

### P: A + power meter + programmable protection

- measurements of V, A, W, VAR, VA, Wh, VARh, VAh, Hz, $V_{peak}$, $A_{peak}$, power factor and maximeters and minimeters
- IDMTL long-time protection, minimum and maximum voltage and frequency, voltage and current imbalance, phase sequence, reverse power
- load shedding and reconnection depending on power or current
- measurements of interrupted currents, differentiated fault indications, maintenance indications, event histories and time-stamping, etc.

### H: P + harmonics

- power quality: fundamentals, distortion, amplitude and phase of harmonics up to the 31st order
- waveform capture after fault, alarm or on request
- enhanced alarm programming: thresholds and actions.

**2.0 A**


**2.0 E**


**5.0 A**


**5.0 E**


**5.0 P**


**5.0 H**


**6.0 A**


**6.0 E**


**6.0 P**


**6.0 H**

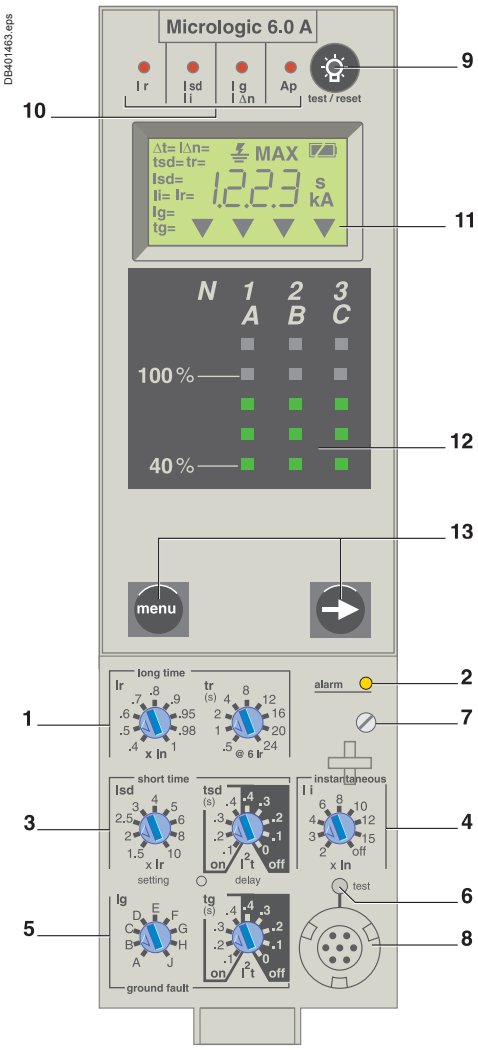

**7.0 A**


**7.0 P**


**7.0 H**

# Micrologic control units
## Micrologic A “ammeter”

Micrologic A control units protect power circuits. They also offer measurements, display, communication and current maximeters. Version 6 provides earth-fault protection, version 7 provides earth-leakage protection.




1 *long-time threshold and tripping delay*
2 *overload alarm (LED) at 1,125 Ir*
3 *short-time pick-up and tripping delay*
4 *instantaneous pick-up*
5 *earth-leakage or earth-fault pick-up and tripping delay*
6 *earth-leakage or earth-fault test button*
7 *long-time rating plug screw*
8 *test connector*
9 *lamp test, reset and battery test*
10 *indication of tripping cause*
11 *digital display*
12 *three-phase bargraph and ammeter*
13 *navigation buttons*

### "Ammeter" measurements
Micrologic A control units measure the true (rms) value of currents.
They provide continuous current measurements from 0.2 to 1.2 In and are accurate to within 1.5 % (including the sensors).
A digital LCD screen continuously displays the most heavily loaded phase (Imax) or displays the I1, I2, I3, IN, Ig,IΔn, stored-current (maximeter) and setting values by successively pressing the navigation button.
The optional external power supply makes it possible to display currents < 20 % In. Below 0.1 In, measurements are not significant. Between 0.1 and 0.2 In, accuracy changes linearly from 4 % to 1.5 %.

### Communication option
In conjunction with the COM communication option, the control unit transmits the following:
- settings
- all “ammeter” measurements
- tripping causes
- maximeter readings.

### Protection
Protection thresholds and delays are set using the adjustment dials.

**Overload protection**
True rms long-time protection.
Thermal memory: thermal image before and after tripping.
Setting accuracy may be enhanced by limiting the setting range using a different long-time rating plug.
Overload protection can be cancelled using a specific LT rating plug "Off".

**Short-circuit protection**
Short-time (rms) and instantaneous protection.
Selection of I2t type (ON or OFF) for short-time delay.

**Earth-fault protection**
Residual or source ground return earth fault protection.
Selection of I2t type (ON or OFF) for delay.

**Residual earth-leakage protection (Vigi).**
Operation without an external power supply.
⎍ Protected against nuisance tripping.
⏦ DC-component withstand class A up to 10 A.

**Neutral protection**
On three-pole circuit breakers, neutral protection is not possible.
On four-pole circuit breakers, neutral protection may be set using a three-position switch: neutral unprotected (4P 3d), neutral protection at 0.5 Ir (4P 3d + N/2), neutral protection at Ir (4P 4d).

**Zone selective interlocking (ZSI)**
A ZSI terminal block may be used to interconnect a number of control units to provide total discrimination for short-time and earth-fault protection, without a delay before tripping.

### Overload alarm
A yellow alarm LED goes on when the current exceeds the long-time trip threshold.

### Fault indications
LEDs indicate the type of fault:
- overload (long-time protection Ir)
- short-circuit (short-time Isd or instantaneous Ii protection)
- earth fault or earth leakage (Ig or IΔn)
- internal fault (Ap).

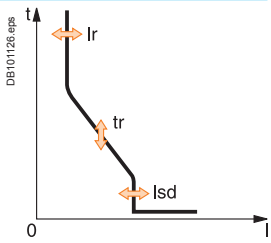
**Battery power**
The fault indication LEDs remain on until the test/reset button is pressed. Under normal operating conditions, the battery supplying the LEDs has a service life of approximately 10 years.

### Test
A mini test kit or a portable test kit may be connected to the test connector on the front to check circuit-breaker operation. For Micrologic 6.0 A and 7.0 A control units, the operation of earth-fault or earth-leakage protection can be checked by pressing the test button located above the test connector.

***Note:*** *Micrologic A control units come with a transparent lead-seal cover as standard.*

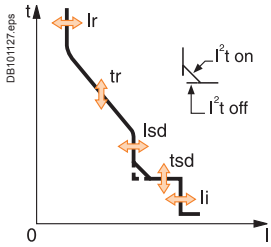
## Protection — Micrologic 2.0 A

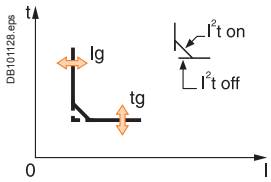
| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Long time** | | | | | | | | | | | |
| Current setting (A) | | | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 0.95 | 0.98 | 1 |
| Tripping between 1.05 and 1.20 x Ir | | | Other ranges or disable by changing long-time rating plug | | | | | | | | |
| Time setting | | **tr (s)** | 0.5 | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |
| Time delay (s) | Accuracy: 0 to -30 % | 1.5 x Ir | 12.5 | 25 | 50 | 100 | 200 | 300 | 400 | 500 | 600 |
| | Accuracy: 0 to -20 % | 6 x Ir | 0.7(1) | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |
| | Accuracy: 0 to -20 % | 7.2 x Ir | 0.7(2) | 0.69 | 1.38 | 2.7 | 5.5 | 8.3 | 11 | 13.8 | 16.6 |
| Thermal memory | | | 20 minutes before and after tripping | | | | | | | | |
| *(1) 0 to -40 % - (2) 0 to -60 %* | | | | | | | | | | | |
| **Instantaneous** | | | | | | | | | | | |
| Pick-up (A) | **Isd** = Ir x … | | 1.5 | 2 | 2.5 | 3 | 4 | 5 | 6 | 8 | 10 |
| Accuracy: ±10 % | | | | | | | | | | | |
| Time delay | | | Max resettable time: 20 ms<br>Max break time: 80 ms | | | | | | | | |

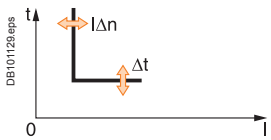



## Protection — Micrologic 5.0 / 6.0 / 7.0 A

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Long time** | | | **Micrologic 5.0 / 6.0 / 7.0 A** | | | | | | | | |
| Current setting (A) | **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 long-time rating plug | | | | | | | | |
| Time setting | | **tr (s)** | 0.5 | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |
| Time delay (s) | Accuracy: 0 to -30 % | 1.5 x Ir | 12.5 | 25 | 50 | 100 | 200 | 300 | 400 | 500 | 600 |
| | Accuracy: 0 to -20 % | 6 x Ir | 0.7(1) | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |
| | Accuracy: 0 to -20 % | 7.2 x Ir | 0.7(2) | 0.69 | 1.38 | 2.7 | 5.5 | 8.3 | 11 | 13.8 | 16.6 |
| Thermal memory | | | 20 minutes before and after tripping | | | | | | | | |
| *(1) 0 to -40 % - (2) 0 to -60 %* | | | | | | | | | | | |
| **Short time** | | | | | | | | | | | |
| Pick-up (A) | **Isd** = Ir x … | | 1.5 | 2 | 2.5 | 3 | 4 | 5 | 6 | 8 | 10 |
| Accuracy: ±10 % | | | | | | | | | | | |
| Time setting tsd (s) | Settings | I²t Off | 0 | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | | I²t On | - | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| Time delay (ms) at 10 x Ir | **tsd** (max resettable time) | | 20 | 80 | 140 | 230 | 350 | | | | |
| (I²t Off or I²t On) | **tsd** (max break time) | | 80 | 140 | 200 | 320 | 500 | | | | |
| **Instantaneous** | | | | | | | | | | | |
| Pick-up (A) | **Ii** = In x … | | 2 | 3 | 4 | 6 | 8 | 10 | 12 | 15 | off |
| Accuracy: ±10 % | | | | | | | | | | | |
| Time delay | | | Max resettable time: 20 ms<br>Max break time: 50 ms | | | | | | | | |
| **Earth fault** | | | **Micrologic 6.0 A** | | | | | | | | |
| Pick-up (A) | **Ig** = In x … | | A | B | C | D | E | F | G | H | J |
| Accuracy: ±10 % | In ⩽ 400 A | | 0.3 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |
| | 400 A < In < 1250 A | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |
| | In ⩾ 1250 A | | 500 | 640 | 720 | 800 | 880 | 960 | 1040 | 1120 | 1200 |
| Time setting tg (s) | Settings | I²t Off | 0 | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | | I²t On | - | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| Time delay (ms) | **tg** (max resettable time) | | 20 | 80 | 140 | 230 | 350 | | | | |
| at In or 1200 A (I²t Off or I²t On) | **tg** (max break time) | | 80 | 140 | 200 | 320 | 500 | | | | |
| **Residual earth leakage (Vigi)** | | | **Micrologic 7.0 A** | | | | | | | | |
| Sensitivity (A) | **IΔn** | | 0.5 | 1 | 2 | 3 | 5 | 7 | 10 | 20 | 30 |
| Accuracy: 0 to -20 % | | | | | | | | | | | |
| Time delay Δt (ms) | Settings | | 60 | 140 | 230 | 350 | 800 | | | | |
| | **Δt** (max resettable time) | | 60 | 140 | 230 | 350 | 800 | | | | |
| | **Δt** (max break time) | | 140 | 200 | 320 | 500 | 1000 | | | | |



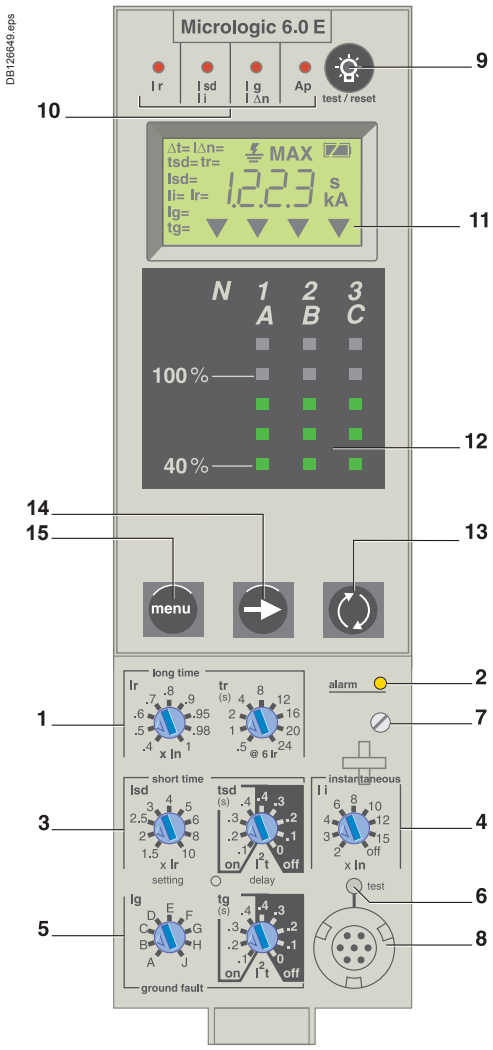

## Ammeter — Micrologic 2.0 / 5.0 / 6.0 / 7.0 A

| **Type of measurements** | | **Range** | **Accuracy** |
|---|---|---|---|
| Instantaneous currents | I1, I2, I3, IN | 0.2 x In to 1.2 x In | ±1.5 % |
| | Ig (6.0 A) | 0.2 x In to In | ±10 % |
| | IΔn (7.0 A) | 0 to 30 A | ±1.5 % |
| Current maximeters of | I1, I2, I3, IN | 0.2 x In to 1.2 x In | ±1.5 % |

***Note:*** *all current-based protection functions require no auxiliary source.*
*The test / reset button resets maximeters, clears the tripping indication and tests the battery.*

# Micrologic control units
## Micrologic E "energy"

Micrologic E control units protect power circuits. They also offer measurements, display, communication and current maximeters. Version 6 provides earth-fault protection.




*1 long-time threshold and tripping delay*
*2 overload alarm (LED) at 1,125 Ir*
*3 short-time pick-up and tripping delay*
*4 instantaneous pick-up*
*5 earth-leakage or earth-fault pick-up and tripping delay*
*6 earth-leakage or earth-fault test button*
*7 long-time rating plug screw*
*8 test connector*
*9 lamp test, reset and battery test*
*10 indication of tripping cause*
*11 digital display*
*12 three-phase bargraph and ammeter*
*13 navigation button "quick View" (only with Micrologic E)*
*14 navigation button to view menu contents*
*15 navigation button to change menu*

*(1) Display on FDM121 only.*

***Note:** Micrologic E control units come with a transparent lead-seal cover as standard.*

## "Energy meter" measurements

**In addition to the ammeter measurements of Micrologic A**
Micrologic E control units measure and display:
- current demand
- voltages: phase to phase, phase to neutral, average (1) and unbalanced (1)
- instantaneous power: P, Q, S
- power factor: PF
- power demand: P demand
- energy: Ep, Eq (1), Es (1).

Accuracy of active energy Ep is 2 % (including the sensors). The range of measurement is the same as current with Micrologic A, depending of an external power supply module (24 V DC).

## Communication option

In conjunction with the COM communication option, the control unit transmits the following:
- settings
- all "ammeter" and "energy" measurements
- enable connection to FDM121
- tripping causes
- maximeter / minimeter readings.

## Protection

Protection thresholds and delays are set using the adjustment dials.

**Overload protection**
True rms long-time protection.
Thermal memory: thermal image before and after tripping.
Setting accuracy may be enhanced by limiting the setting range using a different long-time rating plug. Overload protection can be cancelled using a specific LT rating plug "Off".

**Short-circuit protection**
Short-time (rms) and instantaneous protection.
Selection of $I^2t$ type (ON or OFF) for short-time delay.

**Earth-fault protection**
Source ground return earth fault protection.
Selection of $I^2t$ type (ON or OFF) for delay.

**Neutral protection**
On three-pole circuit breakers, neutral protection is not possible.
On four-pole circuit breakers, neutral protection may be set using a three-position switch: neutral unprotected (4P 3d), neutral protection at 0.5 Ir (4P 3d + N/2), neutral protection at Ir (4P 4d).

**Zone selective interlocking (ZSI)**
A ZSI terminal block may be used to interconnect a number of control units to provide total discrimination for short-time and earth-fault protection, without a delay before tripping.

## Overload alarm

A yellow alarm LED goes on when the current exceeds the long-time trip threshold.

## M2C programmable contacts

The M2C (two contacts) programmable contacts may be used to signal envents (Ir, Isd, Alarm Ir, Alarm Ig, Ig). They can be programmed using the keypad on the Micrologic E control unit or remotely using the COM option (BCM ULP).

## Fault indications

LEDs indicate the type of fault:
- overload (long-time protection Ir)
- short-circuit (short-time Isd or instantaneous Ii protection)
- earth fault (Ig)
- internal fault (Ap).

**Trip history**
The trip history displays the list of the last 10 trips. For each trip, the following indications are recorded and displayed:
- the tripping cause: Ir, Isd, Ii, Ig or Auto-protection (Ap) trips
- the date and time of the trip (requires communication option).

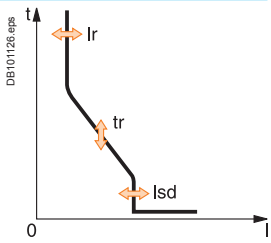
**Battery power**
The fault indication LEDs remain on until the test/reset button is pressed. Under normal operating conditions, the battery supplying the LEDs has a service life of approximately 10 years.

## Test

A mini test kit or a portable test kit may be connected to the test connector on the front to check circuit-breaker operation. For Micrologic 6.0 E control units, the operation of earth-fault or earth-leakage protection can be checked by pressing the test button located above the test connector.

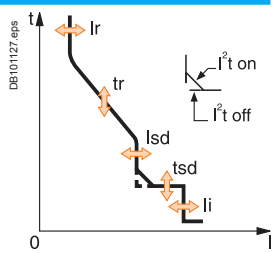
## Protection — Micrologic 2.0 E

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Long time** | | | | | | | | | | | |
| Current setting (A) | | | 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 long-time rating plug | | | | | | | | |
| Time setting | | **tr (s)** | 0.5 | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |
| Time delay (s) | Accuracy: 0 to -30 % | 1.5 x Ir | 12.5 | 25 | 50 | 100 | 200 | 300 | 400 | 500 | 600 |
| | Accuracy: 0 to -20 % | 6 x Ir | 0.7 (1) | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |
| | Accuracy: 0 to -20 % | 7.2 x Ir | 0.7 (2) | 0.69 | 1.38 | 2.7 | 5.5 | 8.3 | 11 | 13.8 | 16.6 |
| Thermal memory | | | 20 minutes before and after tripping | | | | | | | | |
| *(1) 0 to -40 % - (2) 0 to -60 %* | | | | | | | | | | | |
| **Instantaneous** | | | | | | | | | | | |
| Pick-up (A) | **Isd** = Ir x … | | 1.5 | 2 | 2.5 | 3 | 4 | 5 | 6 | 8 | 10 |
| Accuracy: ±10 % | | | | | | | | | | | |
| Time delay | | | Max resettable time: 20 ms<br>Max break time: 80 ms | | | | | | | | |

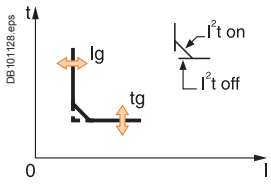



## Protection — Micrologic 5.0 / 6.0 E

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Long time** | | | **Micrologic 5.0 / 6.0 E** | | | | | | | | |
| Current setting (A) | **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 long-time rating plug | | | | | | | | |
| Time setting | | **tr (s)** | 0.5 | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |
| Time delay (s) | Accuracy: 0 to -30 % | 1.5 x Ir | 12.5 | 25 | 50 | 100 | 200 | 300 | 400 | 500 | 600 |
| | Accuracy: 0 to -20 % | 6 x Ir | 0.7 (1) | 1 | 2 | 4 | 8 | 12 | 16 | 20 | 24 |
| | Accuracy: 0 to -20 % | 7.2 x Ir | 0.7 (2) | 0.69 | 1.38 | 2.7 | 5.5 | 8.3 | 11 | 13.8 | 16.6 |
| Thermal memory | | | 20 minutes before and after tripping | | | | | | | | |
| *(1) 0 to -40 % - (2) 0 to -60 %* | | | | | | | | | | | |
| **Short time** | | | | | | | | | | | |
| Pick-up (A) | **Isd** = Ir x … | | 1.5 | 2 | 2.5 | 3 | 4 | 5 | 6 | 8 | 10 |
| Accuracy: ±10 % | | | | | | | | | | | |
| Time setting tsd (s) | Settings | $I^2t$ Off | 0 | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | | $I^2t$ On | - | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| Time delay (ms) at 10 x Ir | **tsd** (max resettable time) | | 20 | 80 | 140 | 230 | 350 | | | | |
| ($I^2t$ Off or $I^2t$ On) | **tsd** (max break time) | | 80 | 140 | 200 | 320 | 500 | | | | |
| **Instantaneous** | | | | | | | | | | | |
| Pick-up (A) | **Ii** = In x … | | 2 | 3 | 4 | 6 | 8 | 10 | 12 | 15 | off |
| Accuracy: ±10 % | | | | | | | | | | | |
| Time delay | | | Max resettable time: 20 ms<br>Max break time: 50 ms | | | | | | | | |




| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Earth fault** | | | **Micrologic 6.0 E** | | | | | | | | |
| Pick-up (A) | **Ig** = In x … | | A | B | C | D | E | F | G | H | J |
| Accuracy: ±10 % | In ⩽ 400 A | | 0.3 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |
| | 400 A < In < 1250 A | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |
| | In ⩾ 1250 A | | 500 | 640 | 720 | 800 | 880 | 960 | 1040 | 1120 | 1200 |
| Time setting tg (s) | Settings | $I^2t$ Off | 0 | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| | | $I^2t$ On | - | 0.1 | 0.2 | 0.3 | 0.4 | | | | |
| Time delay (ms) | tg (max resettable time) | | 20 | 80 | 140 | 230 | 350 | | | | |
| at In or 1200 A ($I^2t$ Off or $I^2t$ On) | tg (max break time) | | 80 | 140 | 200 | 320 | 500 | | | | |




## Energy — Micrologic 2.0 / 5.0 / 6.0 E

| **Type of measurements** | | **Range** | **Accuracy** |
|---|---|---|---|
| Instantaneous currents | I1, I2, I3, IN | 0.2 x In to 1.2 x In | ±1.5 % |
| | Ig (6.0 E) | 0.05 x In to In | ±10 % |
| Current maximeters of | I1, I2, I3, IN | 0.2 x In to 1.2 x In | ±1.5 % |
| Demand currents of I1, I2, I3, Ig | | 0.2 x In to 1.2 x In | ±1.5 % |
| Voltages | V12, V23, V31, V1N, V2N, V3N | 100 to 690 V | ±0.5 % |
| Active power | P | 30 to 2000 kW | ±2 % |
| Power factor | PF | 0 to 1 | ±2 % |
| Demand power | P demand | 30 to 2000 kW | ±2 % |
| Active energy | Ep | $-10^{10}$ GWh to $10^{10}$ GWh | ±2 % |

***Note:*** *all current-based protection functions require no auxiliary source.*
*The test / reset button resets maximeters, clears the tripping indication and tests the battery.*