

Guiding

TOOLS

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- complete library: technical documents, catalogs, FAQs, brochures...
- selection guides from the e-catalog.
- product discovery sites and their Flash animations.

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The technical guide

These technical guides help you comply with installation standards and rules i.e.: the electrical installation guide, the protection guide, the switchboard implementation guide, the technical booklets and the co-ordination tables all form genuine reference tools for the design of high performance electrical installations.

For example, the LV protection co-ordination guide - discrimination and cascading - optimises choice of protection and connection devices while also increasing markedly continuity of supply in the installations.



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This chapter describes all the functions offered by Masterpact NT and NW devices. The two product families have identical functions implemented using the same or different components depending on the case.

PB100782-60



Circuit breakers and switch-disconnectors page 16

- ratings:
 - Masterpact NT 630 to 1600 A
 - Masterpact NW 800 to 6300 A
- circuit breakers type N1, H1, H2, H3, L1
- switch-disconnectors type NA, HA, HF
- 3 or 4 poles
- fixed or drawout versions
- option with neutral on the right
- protection derating.

Micrologic control units page 22

Ammeter A

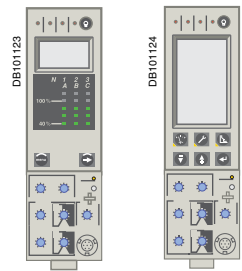
- 2.0 basic protection
- 5.0 selective protection
- 6.0 selective + earth-fault protection
- 7.0 selective + earth-leakage protection

Power meter P

- 5.0 selective protection
- 6.0 selective + earth-fault protection
- 7.0 selective + earth-leakage protection

Harmonic meter H

- 5.0 selective protection
- 6.0 selective + earth-fault protection
- 7.0 selective + earth-leakage protection
- external sensor for earth-fault protection
- rectangular sensor for earth-leakage protection
- setting options (long-time rating plug):
 - low setting 0.4 to 0.8 x I_r
 - high setting 0.8 to 1 x I_r
 - without long-time protection
- external power-supply module
- battery module.

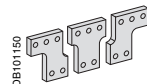
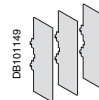
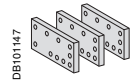
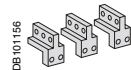


Communication page 34

- COM option in Masterpact
- Masterpact in a communication network
- Masterpact and the Micro Power Server MPS100.

Connections page 40

- rear connection (horizontal or vertical)
- front connection
- mixed connections
- optional accessories
 - bare-cable connectors and connector shields
 - terminal shields
 - vertical-connection adapters
 - cable-lug adapters
 - interphase barriers
 - spreaders
 - disconnectable front-connection adapter
 - safety shutters, shutter locking blocks, shutter position indication and locking.



PB100783-56

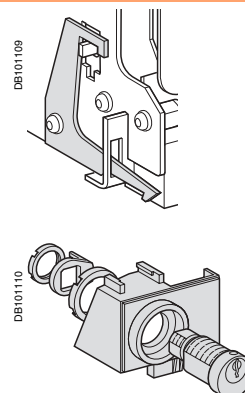




Locking

page 44

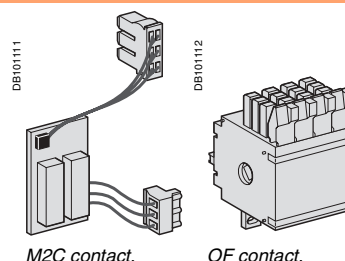
- pushbutton locking by padlockable transparent cover
- OFF-position locking by padlock or keylock
- chassis locking in disconnected position by keylock
- chassis locking in connected, disconnected and test positions
- door interlock (inhibits door opening with breaker in connected position)
- racking interlock (inhibits racking with door open)
- racking interlock between crank and OFF pushbutton
- automatic spring discharge before breaker removal
- mismatch protection.



Indication contacts

page 46

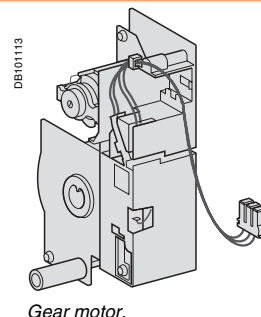
- standard or low-level contacts:
 - ON/OFF indication (OF)
 - "fault trip" indication (SDE)
 - carriage switches for connected (CE) disconnected (CD) and test (CT) positions
- programmable contacts:
 - 2 contacts (M2C)
 - 6 contacts (M6C).



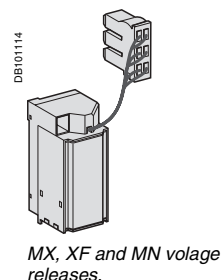
Remote operation

page 48

- remote ON/OFF:
 - gear motor
 - XF closing or MX opening voltage releases
 - PF ready-to-close contact
 - options: RAR automatic or Res electrical remote reset
 - BPF electrical closing pushbutton
- remote tripping function:
 - MN voltage release
 - standard
 - adjustable or non-adjustable delay
 - or second MX voltage release.



Gear motor.

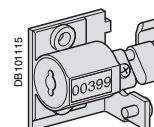


MX, XF and MN voltage releases.

Accessories

page 48

- auxiliary terminal shield
- operation counter
- escutcheon
- transparent cover for escutcheon
- escutcheon blanking plate.



NT and NW selection criteria

	Masterpact NT			Masterpact NW	
	Standard applications			Standard applications	
	NT06, NT08, NT10, NT12, NT16 H1	H2	NT06, NT08, NT10 L1	NW08...NW16 N1	NW08...NW40 H1
Type of application	Standard applications with low short-circuit currents	Applications with medium-level short-circuit currents	Limiting circuit breaker for protection of cable-type feeders or upgraded transformer ratings	Standard applications with low short-circuit currents	Circuit breaker for industrial sites with high short-circuit currents
Icu/lcs at 440 V	42 kA	50 kA	130 kA	42 kA	65 kA
Icu/lcs at 1000 V	-	-	-	-	-
Icu/lcs at 500 V DC L/R < 15 ms	-	-	-	-	-
Position of neutral	Left	Left	Left	Left	Left or right
Fixed	F	F	F	F	F
Drawout	D	D	D	D	D
Switch-disconnector version	Yes	No	No	Yes	Yes
Front connection	Yes	Yes	Yes	Yes	Yes up to 3200 A
Rear connection	Yes	Yes	Yes	Yes	Yes
Type of Micrologic control unit	A, P, H	A, P, H	A, P, H	A, P, H	A, P, H

Masterpact NT06 to NT16 installation characteristics

Circuit breaker		NT06, NT08, NT10			NT12, NT16	
Type		H1	H2	L1	H1	H2
Connection						
Drawout	FC	■	■	■	■	■
	RC	■	■	■	■	■
Fixed	FC	■	■	■	■	■
	RC	■	■	■	■	■
Dimensions (mm) H x W x D						
Drawout	3P	322 x 288 x 277				
	4P	322 x 358 x 277				
Fixed	3P	301 x 276 x 196				
	4P	301 x 346 x 196				
Weight (kg) (approximate)						
Drawout	3P/4P	30/39				
Fixed	3P/4P	14/18				

Masterpact NW08 to NW63 installation characteristics

Circuit breaker		NW08, NW10, NW12, NW16					NW20				
Type		N1	H1	H2	L1	H10	H1	H2	H3	L1	H10
Connection											
Drawout	FC	■	■	■	■	-	■	■	■	■	-
	RC	■	■	■	■	■	■	■	■	■	■
Fixed	FC	■	■	■	-	-	■	■	-	-	-
	RC	■	■	■	-	-	■	■	-	-	-
Dimensions (mm) H x W x D											
Drawout	3P	439 x 441 x 395									
	4P	439 x 556 x 395									
Fixed	3P	352 x 442 x 297									
	4P	352 x 537 x 297									
Weight (kg) (approximate)											
Drawout	3P/4P	90/120									
Fixed	3P/4P	60/80									

(1) Except 4000 A.

			Special applications				
H2	H3	L1	NW H10	NW H2 with anti-corrosion protection	NW10...NW40 N DC	H DC	NW earthing switch
High-performance circuit breaker for heavy industry with high short-circuit currents	Incoming device with very high performance for critical applications	Limiting circuit breaker for protection of cable-type feeders or upgraded transformer ratings	1000 V systems, e.g. mines and wind power	Environments with high sulphur contents	DC system	DC system	Installation earthing
100 kA	150 kA	150 kA	-	100 kA	-	-	-
-	-	-	50 kA	-	-	-	-
-	-	-	-	-	35 kA	85 kA	-
Left or right	Left	Left	Left	Left or right	-	-	-
F	-	-	-	-	F	F	-
D	D	D	D	D	D	D	D
Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Yes up to 3200 A	Yes up to 3200 A	Yes up to 2000 A	No	Yes up to 3200 A	No	No	Yes up to 3200 A
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
A, P, H	A, P, H	A, P, H	A, consult us for P and H	A, P, H	DC Micrologic	DC Micrologic	-

NW25, NW32, NW40				NW40b, NW50, NW63	
H1	H2	H3	H10	H1	H2
■ (1)	■ (1)	■ (1)	-	-	-
■	■	■	■	■	■
■ (1)	■ (1)	-	-	-	-
■	■	-	-	■	■
				479 x 786 x 395	
				479 x 1016 x 395	
				352 x 767 x 297	
				352 x 997 x 297	
				225/300	
				120/160	



PB 100767-48

Common characteristics

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

Basic switchgear

Circuit-breaker as per IEC 60947-2

Rated current (A)	In	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 V 440 V 525 V 690 V 1000 V
Rated service breaking capacity (kA rms)	Ics	% Icu
Utilisation category		
Rated short-time withstand current (kA rms) V AC 50/60 Hz	Icw	0.5 s 1 s 3 s
Integrated instantaneous protection (kA peak ±10 %)		
Rated making capacity (kA peak) V AC 50/60 Hz	Icm	220/415 V 440 V 525 V 690 V 1000 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 V 480 V 600 V
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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 V 440 V 525/690 V 1000 V
Rated short-time withstand current (kA rms) AC23A/AC3 category V AC 50/60 Hz	Icw	0.5 s 1 s 3 s
Ultimate breaking capacity Icu (kA rms) with an external protection relay Maximum time delay: 350 ms		690 V

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

Service life	Mechanical	without maintenance	
C/O cycles x 1000			
Type of circuit breaker			
Rated current		In (A)	
C/O cycles x 1000	Electrical	without maintenance	440 V ⁽⁴⁾ 690 V 1000 V
IEC 60947-2			
Type of circuit breaker or switch-disconnector			
Rated operational current		Ie (A)	AC23A
C/O cycles x 1000	Electrical	without maintenance	440 V ⁽⁴⁾ 690V
IEC 60947-3			
Type of circuit breaker or switch-disconnector			
Rated operational current		Ie (A)	AC3 ⁽⁵⁾
Motor power			380/415 V (kW) 440 V (kW)
C/O cycles x 1000	Electrical	without maintenance	440 V ⁽⁴⁾ 690 V
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) SELLIM system.

(4) Available for 480 V NEMA.

(5) Suitable for motor control (direct-on-line starting).

Sensor selection

Sensor rating (A)	250 ⁽¹⁾	400	630	800	1000	1250	1600
I _r threshold setting(A)	100 to 250	160 to 400	250 to 630	320 to 800	400 to 1000	500 to 1250	640 to 1600

(1) For circuit-breaker NT02, please consult us.

NT06			NT08			NT10			NT12		NT16	
630			800			1000			1250		1600	
630			800			1000			1250		1600	
400 to 630			400 to 800			400 to 1000			630 to 1250		800 to 1600	
H1	H2	L1 ⁽²⁾							H1	H2		
42	50	150							42	50		
42	50	130							42	50		
42	42	100							42	42		
42	42	25							42	42		
-	-	-							-	-		
100 %									100 %			
B	B	A							B	B		
42	36	10							42	36		
42	36	-							42	36		
24	20	-							24	20		
-	90	10 x I _n ⁽³⁾							-	90		
88	105	330							88	105		
88	105	286							88	105		
88	88	220							88	88		
88	88	52							88	88		
-	-	-							-	-		
25	25	9							25	25		
< 50									< 50			
42 50 150									42 50			
42 50 100									42 50			
42 42 25									42 42			
HA									HA			
75									75			
75									75			
75									75			
-									-			
36									36			
36									36			
20									20			
36									36			
12.5												
H1	H2	L1	H1	H2	L1	H1	H2	L1	H1	H2	H1	H2
630			800			1000			1250			
6	6	3	6	6	3	6	6	3	6	6	6	6
3	3	2	3	3	2	3	3	2	3	3	3	3
-	-	-	-	-	-	-	-	-	-	-	-	-
H1/H2/HA												
630			800			1000			1250		1600	
6			6			6			6		6	
3			3			3			3		3	
H1/H2/HA												
500			630			800			1000		1000	
≤ 250			250 to 335			335 to 450			450 to 560		450 to 560	
≤ 300			300 to 400			400 to 500			500 to 630		500 to 630	
6												
-												

Circuit breakers and switch-disconnectors NW08 to NW63



Common characteristics

Number of poles		3/4
Rated insulation voltage (V)	Ui	1000/1250
Impulse withstand voltage (kV)	Uimp	12
Rated operational voltage (V AC 50/60 Hz)	Ue	690/1150
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 525 V 690 V 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 3 s

Integrated instantaneous protection (kA peak ±10 %)		
Rated making capacity (kA peak) V AC 50/60 Hz	Icm	220/415/440 V 525 V 690 V 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 600 V
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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 3 s

Overload and short-circuit protection

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
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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 1150 V
Rated short-time withstand current (kA rms) AC23A/AC3 category V AC 50/60 Hz	Icw	0.5 s 1 s 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⁾
IEC 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).

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					H2					L1 ⁽²⁾					H10					H1					H2					H3					L1 ⁽²⁾					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				
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-					-					190					80					-					-					190					150					80					-					-					190					150					-					-					270				
88					143					220					330					-					143					220					330					-					143					220					330					-					220					330									
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42					65					85					100					-					65					85					100					100					-					65					85					100					-					100					100				

NW08/NW10/NW12					NW16					NW20					NW25/NW32/NW40					NW40b/NW50/NW63																																																						
NA					HA					HF					HA10					HA					HF					HA10					HA																																							
88					105					187					-					105					187					-					105					187					-					121					187					-					187									
-					-					-					105					-					-					105					-					-					105					-					-					-					-									
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25					12.5					10					5					20					10					5					10					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					800/1000/1250/1600					2000					2500/3200/4000					4000b/5000/6300					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/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					H1/H2/HA																																		
10					8					5					1.5					10					8					5					1.5					1.5																																		
10					6					2.5					1.5					10					6					2.5					1.5					1.5																																		
H1/H2/HA/HF					H1/H2/H3/HA/HF					H1/H2/H3/HA/HF					H1/H2/HA					800					1000					1250					1600					2000					H1/H2/HA																													
335 to 450					450 to 560					560 to 670					670 to 900					900 to 1150					1150 to 1600					1600 to 2000					2000 to 2500					2500 to 3200					3200 to 4000					4000 to 5000					5000 to 6300																			
400 to 500					500 to 630					630 to 800					800 to 1000					1000 to 1300					1300 to 1600					1600 to 2000					2000 to 2500					2500 to 3200					3200 to 4000					4000 to 5000					5000 to 6300																			
≤ 800					800 to 1000					1000 to 1250					1250 to 1600					1600 to 2000					2000 to 2500					2500 to 3200					3200 to 4000					4000 to 5000					5000 to 6300																													

6

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, 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 32.

The rules governing the various possible combinations can be found in the electronic catalogue (E-catalogue) accessible via the Products menu of the www.merlin-gerin.com web site.

Micrologic name codes



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.

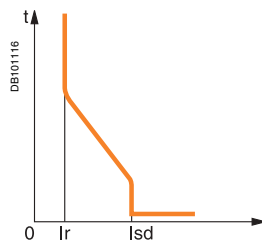
Z: type of measurement

- A for "ammeter"
- P for "power meter"
- H for "harmonic meter".



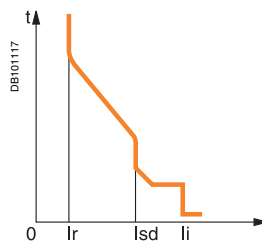
Current protection

Micrologic 2: basic protection



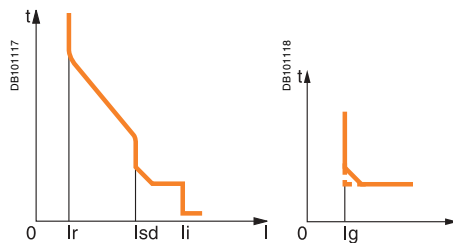
Protection:
long time
+ instantaneous

Micrologic 5: basic protection



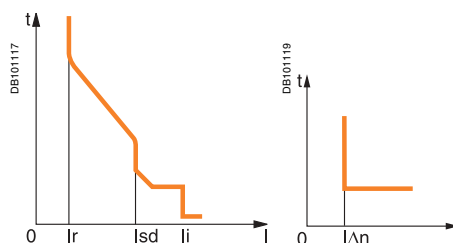
Protection:
long time
+ short time
+ instantaneous

Micrologic 6: selective + earth-fault protection



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

Micrologic 7: selective + earth-leakage protection



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

Measurements and programmable protection

A: ammeter

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

P: A + power meter + programmable protection

- measurements of V, A, W, VAR, VA, Wh, VARh, VAh, Hz, $V_{\text{peak}}, A_{\text{peak}}$, 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



5.0 A



5.0 P



5.0 H



6.0 A



6.0 P



6.0 H



7.0 A



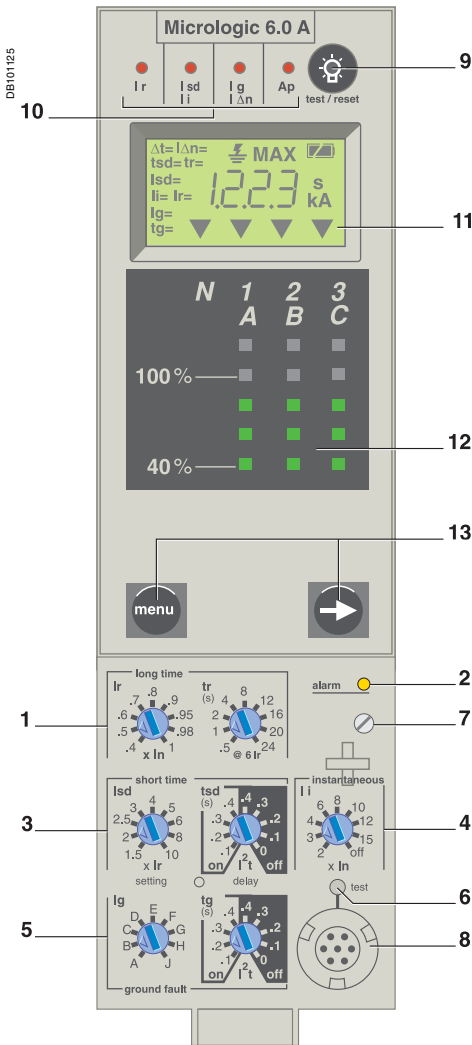
7.0 P



7.0 H



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 current setting and tripping delay.
- 2 Overload signal (LED) at 1.125 I_r.
- 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.

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

Protection settings

Protection thresholds and delays are set using the adjustment dials.
The selected values are momentarily displayed in amperes and in seconds.

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.
The long-time rating plug "OFF" enables to cancel the overload protection.

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.
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 I_r (4P 3d + N/2), neutral protection at I_r (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.

"Ammeter" measurements

Micrologic A control units measure the true rms value of currents.
They provide continuous current measurements from 0.2 to 20 I_n and are accurate to within 1.5% (including the sensors).
A digital LCD screen continuously displays the most heavily loaded phase (I_{max}) or displays the I₁, I₂, I₃, I_N, I_g, I_{Δn}, stored-current (maximeter) and setting values by successively pressing the navigation button.
The optional external power supply makes it possible to display currents < 20 % I_n. Below 0.05 I_n, measurements are not significant. Between 0.05 and 0.2 I_n, accuracy is to within 0.5% I_n + 1.5% of the reading.

Communication option

In conjunction with the COM communication option, the control unit transmits the following:

- setting values
- all "ammeter" measurements
- tripping causes
- maximeter reset.

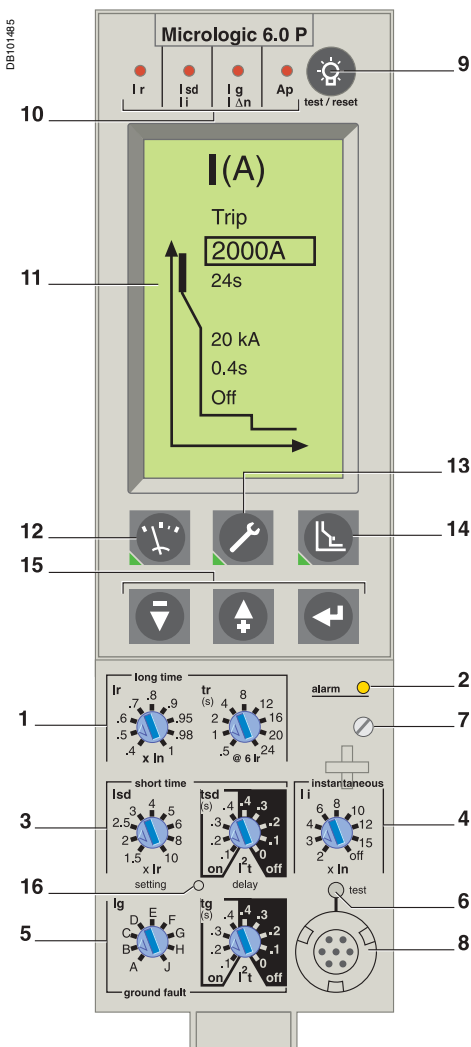
Protection		Micrologic 2.0 A										
Long time												
Current setting (A)	$I_r = I_n \times \dots$	0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1		
Tripping between 1.05 and 1.20 x Ir		Other ranges or disable by changing long-time rating plug										
Time setting	t_r (s)	0.5	1	2	4	8	12	16	20	24		
Time 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)	$I_{sd} = I_r \times \dots$	1.5	2	2.5	3	4	5	6	8	10		
Accuracy: ±10 %												
Time delay		Max resettable time: 20 ms Max break time: 80 ms										

Ammeter		Micrologic 2.0 A			
Continuous current measurements					
Display from 20 to 200 % of I_n		I1	I2	I3	I_n
Accuracy: 1.5 % (including sensors)		No auxiliary source (where $I > 20 \% I_n$)			
Maximeters		I1 max	I2 max	I3 max	I_n max

Protection		Micrologic 5.0 / 6.0 / 7.0 A										
Long time												
		Micrologic 5.0 / 6.0 / 7.0 A										
Current setting (A)	$I_r = I_n \times \dots$	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	t_r (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)	$I_{sd} = I_r \times \dots$	1.5	2	2.5	3	4	5	6	8	10		
Accuracy: ±10 %												
Time setting t_{sd} (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 (I^2t Off or I^2t On)	t_{sd} (max resettable time)	20	80	140	230	350						
		t_{sd} (max break time)	80	140	200	320	500					
Instantaneous												
Pick-up (A)	$I_i = I_n \times \dots$	2	3	4	6	8	10	12	15	off		
Accuracy: ±10 %												
Time delay		Max resettable time: 20 ms Max break time: 50 ms										
Earth fault												
		Micrologic 6.0 A										
Pick-up (A)	$I_g = I_n \times \dots$	A	B	C	D	E	F	G	H	J		
Accuracy: ±10 %	$I_n \leq 400$ A	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1		
	400 A < I_n < 1250 A	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1		
	$I_n \geq 1250$ A	500	640	720	800	880	960	1040	1120	1200		
Time setting t_g (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)	t_g (max resettable time)	20	80	140	230	350						
		t_g (max break time)	80	140	200	320	500					
Residual earth leakage (Vigi)												
		Micrologic 7.0 A										
Sensitivity (A)	$I_{\Delta n}$	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 5.0 / 6.0 / 7.0 A					
Continuous current measurements							
Display from 20 to 200 % of I_n		I1	I2	I3	I_n	I_g	$I_{\Delta n}$
Accuracy: 1.5 % (including sensors)		No auxiliary source (where $I > 20 \% I_n$)					
Maximeters		I1 max	I2 max	I3 max	I_n max	I_g max	$I_{\Delta n}$ max
<i>Note: All current-based protection functions require no auxiliary source. The test / reset button resets maximeters, clears the tripping indication and tests the battery.</i>							

Micrologic P control units include all the functions offered by Micrologic A. In addition, they measure voltages and calculate power and energy values. They also offer new protection functions based on currents, voltages, frequency and power reinforce load protection.



- 1 Long-time current setting and tripping delay.
- 2 Overload signal (LED).
- 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 + battery test and indications reset.
- 10 Indication of tripping cause.
- 11 High-resolution screen.
- 12 Measurement display.
- 13 Maintenance indicators.
- 14 Protection settings.
- 15 Navigation buttons.
- 16 Hole for settings lockout pin on cover.

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

Protection settings

The adjustable protection functions are identical to those of Micrologic A (overloads, short-circuits, earth-fault and earth-leakage protection).

Fine adjustment

Within the range determined by the adjustment dial, fine adjustment of thresholds (to within one ampere) and time delays (to within one second) is possible on the keypad or remotely using the COM option.

IDMTL (Inverse Definite Minimum Time lag) setting

Coordination with fuse-type or medium-voltage protection systems is optimised by adjusting the slope of the overload-protection curve. This setting also ensures better operation of this protection function with certain loads.

Neutral protection

On three-pole circuit breakers, neutral protection may be set using the keypad or remotely using the COM option, to one of four positions: neutral unprotected (4P 3d), neutral protection at 0.5 Ir (4P 3d + N/2), neutral protection at Ir (4P 4d) and neutral protection at 1,6 Ir (4P 3d + 1,6N). Neutral protection at 1,6 Ir is used when the neutral conductor is twice the size of the phase conductors (major load imbalance, high level of third order harmonics).

On four-pole circuit breakers, neutral protection may be set using a three-position switch or the keypad: neutral unprotected (4P 3d), neutral protection at 0.5 Ir (4P 3d + N/2), neutral protection at Ir (4P 4d). Neutral protection produces no effect if the long-time curve is set to one of the IDMTL protection settings.

Programmable alarms and other protection

Depending on the thresholds and time delays set using the keypad or remotely using the COM option, the Micrologic P control unit monitors currents and voltage, power, frequency and the phase sequence. Each threshold overrun is signalled remotely via the COM option. Each threshold overrun may be combined with tripping (protection) or an indication carried out by an optional M2C or M6C programmable contact (alarm), or both (protection and alarm).

Load shedding and reconnection

Load shedding and reconnection parameters may be set according to the power or the current flowing through the circuit breaker. Load shedding is carried out by a supervisor via the COM option or by an M2C or M6C programmable contact.

Measurements

The Micrologic P control unit calculates in real time all the electrical values (V, A, W, VAR, VA, Wh, VARh, VAh, Hz), power factors and cosφ factors.

The Micrologic P control unit also calculates demand current and demand power over an adjustable time period. Each measurement is associated with a minimeter and a maximeter.

In the event of tripping on a fault, the interrupted current is stored. The optional external power supply makes it possible to display the value with the circuit breaker open or not supplied.

Histories and maintenance indicators

The last ten trips and alarms are recorded in two separate history files. Maintenance indications (contact wear, operation cycles, etc.) are recorded for local access.

Indication option via programmable contacts

The M2C (two contacts) and M6C (six contacts) auxiliary contacts may be used to signal threshold overruns or status changes. They can be programmed using the keypad on the Micrologic P control unit or remotely using the COM option.

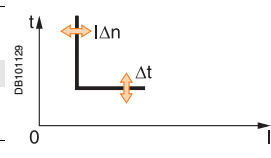
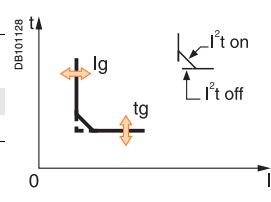
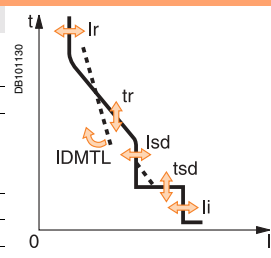
Communication option (COM)

The communication option may be used to:

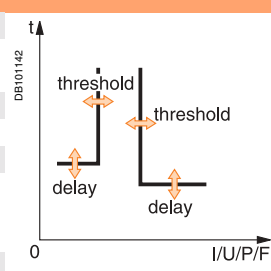
- remotely read and set parameters for the protection functions
- transmit all the calculated indicators and measurements
- signal the causes of tripping and alarms
- consult the history files and the maintenance-indicator register.
- maximeter reset.

An event log and a maintenance register, stored in control-unit memory but not available locally, may be accessed in addition via the COM option.

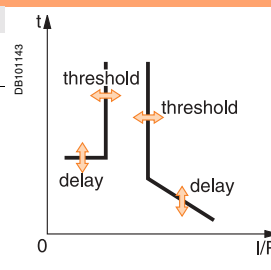
Protection		Micrologic 5.0 / 6.0 / 7.0 P										
Long time (rms)		Micrologic 5.0 / 6.0 / 7.0 P										
Current setting (A)	$I_r = I_n \times \dots$	0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1		
Tripping between 1.05 and 1.20 x I_r		Other ranges or disable by changing long-time rating plug										
Time setting	t_r (s)	0.5	1	2	4	8	12	16	20	24		
Time delay (s)	Accuracy: 0 to -30 %	$1.5 \times I_r$	12.5	25	50	100	200	300	400	500	600	
	Accuracy: 0 to -20 %	$6 \times I_r$	0.7 ⁽¹⁾	1	2	4	8	12	16	20	24	
	Accuracy: 0 to -20 %	$7.2 \times I_r$	0.7 ⁽²⁾	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6	
IDMTL setting	Curve slope	SIT	VIT	EIT	HVFuse	DT						
Thermal memory	20 minutes before and after tripping											
(1) 0 to -40 % - (2) 0 to -60 %												
Short time (rms)												
Pick-up (A)	$I_{sd} = I_r \times \dots$	1.5	2	2.5	3	4	5	6	8	10		
Accuracy: ±10 %												
Time setting t_{sd} (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 I_r (I^2t Off or I^2t On)	t_{sd} (max resettable time)		20	80	140	230	350					
	t_{sd} (max break time)		80	140	200	320	500					
Instantaneous												
Pick-up (A)	$I_i = I_n \times \dots$	2	3	4	6	8	10	12	15	off		
Accuracy: ±10 %												
Time delay	Max resettable time: 20 ms Max break time: 50 ms											
Earth fault		Micrologic 6.0 P										
Pick-up (A)	$I_g = I_n \times \dots$	A	B	C	D	E	F	G	H	J		
Accuracy: ±10 %	$I_n \leq 400$ A	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1		
	400 A < I_n < 1250 A	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1		
	$I_n \geq 1250$ A	500	640	720	800	880	960	1040	1120	1200		
Time setting t_g (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 I_n or 1200 A (I^2t Off or I^2t On)	t_g (max resettable time)		20	80	140	230	350					
	t_g (max break time)		80	140	200	320	500					
Residual earth leakage (Vigi)		Micrologic 7.0 P										
Sensitivity (A)	$I_{\Delta n}$	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					



Alarms and other protection		Micrologic 5.0 / 6.0 / 7.0 P	
Current		Threshold	Delay
Current unbalance	$I_{unbalance}$	0.05 to 0.6 leverage	1 to 40 s
Max. demand current	$I_{max\ demand}$: I_1, I_2, I_3, I_N	0.2 I_n to I_n	15 to 1500 s
Earth fault alarm			
	I_{\perp}	10 to 100 % I_n ⁽¹⁾	1 to 10 s
Voltage			
Voltage unbalance	$U_{unbalance}$	2 to 30 % x $U_{average}$	1 to 40 s
Minimum voltage	U_{min}	100 to U_{max} between phases 1.2 to 10 s	
Maximum voltage	U_{max}	U_{min} to 1200 between phases 1.2 to 10 s	
Power			
Reverse power	rP	5 to 500 kW	0.2 to 20 s
Frequency			
Minimum frequency	F_{min}	45 to F_{max}	1.2 to 5 s
Maximum frequency	F_{max}	F_{min} to 440 Hz	1.2 to 5 s
Phase sequence			
Sequence (alarm)	$\Delta\theta$	$\theta_1/2/3$ or $\theta_1/3/2$	0.3 s

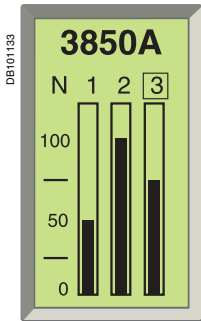


Load shedding and reconnection		Micrologic 5.0 / 6.0 / 7.0 P	
Measured value		Threshold	Delay
Current	I	0.5 to 1 I_r per phases	20 % t_r to 80 % t_r
Power	P	200 kW to 10 MW	10 to 3600 s

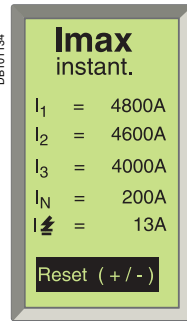


1) $I_n \leq 400$ A 30 %
400 A < I_n < 1250 A 20 %
 $I_n \geq 1250$ A 10 %

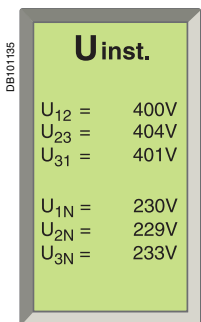
Note: all current-based protection functions require no auxiliary source.
Voltage-based protection functions are connected to AC power via a voltage measurement input built into the circuit breaker.



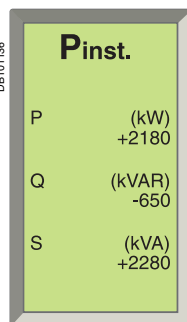
Default display.



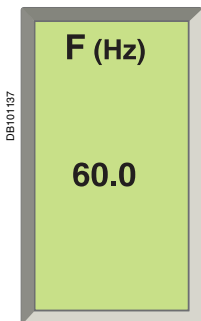
Display of a maximum current.



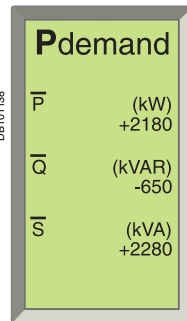
Display of a voltage.



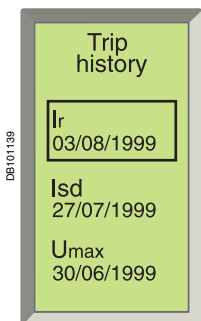
Display of a power.



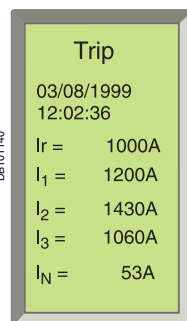
Display of a frequency.



Display of a demand power.



Display of a tripping history.



Display after tripping.

Navigation from one display to another is intuitive. The six buttons on the keypad provide access to the menus and easy selection of values. When the setting cover is closed, the keypad may no longer be used to access the protection settings, but still provides access to the displays for measurements, histories, indicators, etc.

Measurements.....

Instantaneous values

The value displayed on the screen is refreshed every second.

Minimum and maximum values of measurements are stored in memory (minimeters and maximeters).

Currents

I rms	A	1	2	3	N
	A	E-fault		E-leakage	
I max rms	A	1	2	3	N
	A	E-fault		E-leakage	

Voltages

U rms	V	12	23	31
V rms	V	1N	2N	3N
U average rms	V	(U12 + U23 + U31) / 3		
U unbalance	%			

Power, energy

P active, Q reactive, S apparent	W, Var, VA	Totals
E active, E reactive, E apparent	Wh, VARh, VAh	Totals consumed - supplied
		Totals consumed
		Totals supplied
Power factor	PF	Total

Frequencies

F	Hz
---	----

Demand metering

The demand is calculated over a fixed or sliding time window that may be programmed from 5 to 60 minutes. According to the contract signed with the power supplier, an indicator associated with a load shedding function makes it possible to avoid or minimise the costs of overrunning the subscribed power. Maximum demand values are systematically stored and time stamped (maximeter).

Currents

I demand	A	1	2	3	N
	A	E-fault		E-leakage	
I max demand	A	1	2	3	N
	A	E-fault		E-leakage	

Power

P, Q, S demand	W, Var, VA	Totals
P, Q, S max demand	W, Var, VA	Totals

Minimeters and maximeters

Only the current and power maximeters may be displayed on the screen.

Histories

The last ten trips and alarms are recorded in two separate history files that may be displayed on the screen.

■ tripping history:

- type of fault
- date and time
- values measured at the time of tripping (interrupted current, etc.)

■ alarm history:

- type of alarm
- date and time
- values measured at the time of the alarm.

Maintenance indicators (with COM option).....

A number of maintenance indicators may be called up on the screen:

■ contact wear

■ operation counter:

- cumulative total
- total since last reset.

Time	Event	Module
042198 08:49:56	Net Server Shutdown	User: master Level: 1 PowerLog-Network...
042198 08:49:57	User Log Out	User: master Level: 1 SRS-3000 Client
042198 08:49:58	DB Table Change	User: master TSD Event Tests Alarm Setup
042198 08:49:59	DB Table Change	User: master TSD Events Alarm Setup
042198 08:50:00	DB Table Change	User: master TSD Events Alarm Setup
042198 08:50:01	User Log In	User: master SRS-3000 Client
042198 08:50:02	Security Check	User: master PowerLog-Network...
042198 08:50:03	Key Status: Key Found	User: master EventAlarmNetwork...
042198 08:50:04	User Log In	User: master Level: 1 PowerLog-Network...
042198 08:50:05	Net Server Shutdown	User: master Level: 1 PowerLog-Network...
042198 08:50:06	Security Check	User: master Key Status: Key Found PowerLog-Network...
042198 08:50:07	Net Server Started	User: master Level: 1 PowerLog-Network...
042198 08:50:08	User Log In	User: master Level: 1 EventAlarmNetwork...
042198 08:50:09	DB Table Change	User: master En: 100 SRS-3000 Client
042198 08:50:10	DB Table Change	User: master Logger Template Devices Logger Setup
042198 08:50:11	DB Table Change	User: master Logger Template Devices Logger Setup
042198 08:50:12	DB Table Change	User: master Logger Template Devices Logger Setup
042198 08:50:13	DB Table Change	User: master Analog Levels Assigned Alarm Setup
042198 08:50:14	DB Table Change	User: master Analog Levels Assigned Alarm Setup
042198 08:50:15	DB Table Change	User: master Functions Alarm Setup
042198 08:50:16	DB Table Change	User: master Digital Levels Assigned Alarm Setup
042198 08:50:17	DB Table Change	User: master Analog Levels Assigned Alarm Setup
042198 08:50:18	Setup Device Name Change	Device: MicroLogic Breaker User: master Device Setup
042198 08:50:19	Setup Device Address	Device: MicroLogic Breaker User: master Device Setup
042198 08:50:20	Setup Device Name Change	Device: Transformer Temp User: master Device Setup
042198 08:50:21	Setup Device Address	Device: Transformer Temp User: master Device Setup
042198 08:50:22	User Log In	User: master SRS-3000 Client
042198 08:50:23	Security Check	User: master Level: 1 PowerLog-Network...
042198 08:50:24	Net Server Started	User: master Level: 1 PowerLog-Network...

Display of an event log on a supervisor.

With the communication option

Additional measurements, maximeters and minimeters

Certain measured or calculated values are only accessible with the COM communication option:

- I peak / $\sqrt{2}$, $(I_1 + I_2 + I_3)/3$, I imbalance
- load level in % Ir
- total power factor.

The maximeters and minimeters are available only via the COM option for use with a supervisor.

Event log

All events are time stamped.

- trips
- beginning and end of alarms
- modifications to settings and parameters
- counter resets
- system faults:
- fallback position
- thermal self-protection
- loss of time
- overrun of wear indicators
- test-kit connections
- etc.

Maintenance register

Used as an aid in troubleshooting and to better plan for device maintenance operations.

- highest current measured
- operation counter
- number of test-kit connections
- number of trips in operating mode and in test mode
- contact-wear indicator.

Additional technical characteristics

Setting the display language

System messages may be displayed in six different languages. The desired language is selected via the keypad.

Protection functions

All current-based protection functions require no auxiliary source. Voltage-based protection functions are connected to AC power via a voltage measurement input built into the circuit breaker.

Measurement functions

Measurement functions are independent of the protection functions.

The high-accuracy measurement module operates independently of the protection module, while remaining synchronised with protection events.

Measurement-calculation mode

■ measurement functions implement the new "zero blind time" concept which consists in continuously measuring signals at a high sampling rate. The traditional "blind window" used to process samples no longer exists. This method ensures accurate energy calculations even for highly variable loads (welding machines, robots, etc.)

■ energies are calculated on the basis of the instantaneous power values, in two manners:

- the traditional mode where only positive (consumed) energies are considered
- the signed mode where the positive (consumed) and negative (supplied) energies are considered separately.

Accuracy of measurements (including sensors)

- voltage (V) 0.5 %
- current (A) 1.5 %
- frequency (Hz) 0.1 %
- power (W) and energy (Wh) 2 %.

Stored information

The fine setting adjustments, the last 100 events and the maintenance register remain in the control-unit memory even when power is lost.

Time-stamping

Time-stamping is activated as soon as time is set manually or by a supervisor. No external power supply module is required (max. drift of 1 hour per year).

Reset

An individual reset, via the keypad or remotely, acts on alarms, minimum and maximum data, peak values, the counters and the indicators.

Micrologic H control units include all the functions offered by Micrologic P. Integrating significantly enhanced calculation and memory functions, the Micrologic H control unit offers in-depth analysis of power quality and detailed event diagnostics. It is intended for operation with a supervisor.

In addition to the Micrologic P functions, the Micrologic H control unit offers:

- in-depth analysis of power quality including calculation of harmonics and the fundamentals
- diagnostics aid and event analysis through waveform capture
- enhanced alarm programming to analyse and track down a disturbance on the AC power system.

Measurements.....

The Micrologic H control unit offers all the measurements carried out by Micrologic P, with in addition:

- phase by phase measurements of:
 - power, energy
 - power factors
 - calculation of:
 - current and voltage total harmonic distortion (THD)
 - current, voltage and power fundamentals
 - current and voltage harmonics up to the 31st order.

Instantaneous values displayed on the screen

Currents

I rms	A	1	2	3	N
	A	E-fault		E-leakage	
I max rms	A	1	2	3	N
	A	E-fault		E-leakage	

Voltages

U rms	V	12	23	31
V rms	V	1N	2N	3N
U average rms	V	(U12 + U23 + U31) / 3		
U unbalance	%			

Power, energy

P active, Q reactive, S apparent	W, Var, VA	Totals	1	2	3
E active, E reactive, E apparent	Wh, VARh, VAh	Totals consumed - supplied			
		Totals consumed			
		Totals supplied			
Power factor	PF	Total	1	2	3

Frequencies

F	Hz
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Power-quality indicators

Total fundamentals		U	I	P	Q	S	
THD	%	U	I				
U and I harmonics	Amplitude	3	5	7	9	11	13

Harmonics 3, 5, 7, 9, 11 and 13, monitored by electrical utilities, are displayed on the screen.

Demand measurements

Similar to the Micrologic P control unit, the demand values are calculated over a fixed or sliding time window that may be set from 5 to 60 minutes.

Currents

I demand	A	1	2	3	N
	A	E-fault		E-leakage	
I max demand	A	1	2	3	N
	A	E-fault		E-leakage	

Power

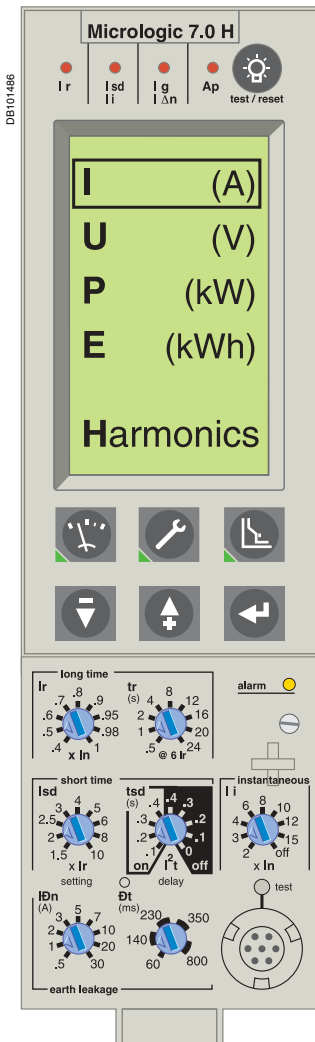
P, Q, S demand	W, Var, VA	Totals
P, Q, S max demand	W, Var, VA	Totals

Maximeters

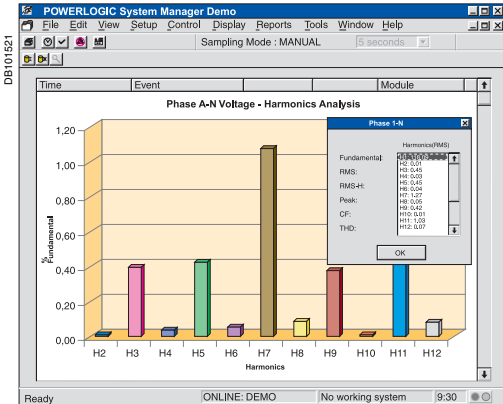
Only the current maximeters may be displayed on the screen.

Histories and maintenance indicators

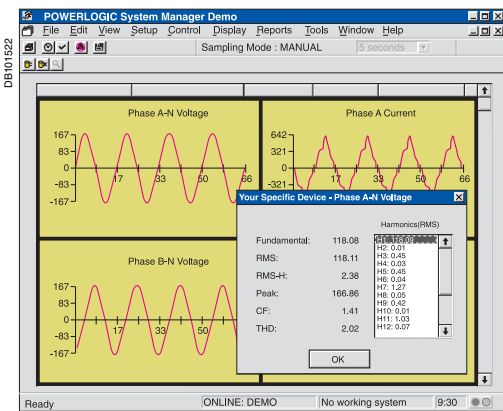
These functions are identical to those of the Micrologic P.



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



Display of harmonics up to 21th order.



Waveform capture.

Time	Event	User	Module
04:21:08	08:49:06	User: master	Level: 1
04:21:08	08:49:01	User: master	User: master
04:21:08	08:48:38	User: master	Level: 1
04:21:08	08:48:20	User: master	Level: 1
04:21:08	08:46:15	User: master	Level: 1
04:21:08	08:39:15	User: master	Level: 1
04:21:08	08:39:05	User: master	Level: 1
04:21:08	08:35:33	User: master	Level: 1
04:21:08	08:30:44	User: master	Level: 1
04:21:08	08:24:31	User: master	Level: 1
04:21:08	08:24:30	User: master	Level: 1
04:21:08	08:24:15	User: master	Level: 1
04:21:08	08:19:07	User: master	Level: 1
04:21:08	07:54:05	User: master	Level: 1
04:21:08	07:53:55	User: master	Level: 1
04:21:08	07:53:44	User: master	Level: 1
04:21:08	07:51:46	User: master	Level: 1
04:21:08	07:51:33	User: master	Level: 1
04:21:08	07:51:29	User: master	Level: 1
04:21:08	07:50:17	User: master	Level: 1
04:21:08	07:49:13	User: master	Level: 1
04:21:08	07:48:29	User: master	Level: 1
04:21:08	07:48:22	User: master	Level: 1
04:21:08	07:46:54	User: master	Level: 1
04:21:08	07:44:59	User: master	Level: 1
04:21:08	07:44:59	User: master	Level: 1

Log.

With the communication option

Additional measurements, maximeters and minimeters

Certain measured or calculated values are only accessible with the COM communication option:

- $I_{peak} / \sqrt{2} (I_1 + I_2 + I_3) / 3$, $I_{unbalance}$
 - load level in % Ir
 - power factor (total and per phase)
 - voltage and current THD
 - K factors of currents and average K factor
 - crest factors of currents and voltages
 - all the fundamentals per phase
 - fundamental current and voltage phase displacement
 - distortion power and distortion factor phase by phase
 - amplitude and displacement of current and voltage harmonics 3 to 31.
- The maximeters and minimeters are available only via the COM option for use with a supervisor.

Waveform capture

The Micrologic H control unit stores the last 4 cycles of each instantaneous current or voltage measurement. On request or automatically on programmed events, the control unit stores the waveforms. The waveforms may be displayed in the form of oscillograms by a supervisor via the COM option. Definition is 64 points per cycle.

Pre-defined analogue alarms (1 to 53)

Each alarm can be compared to user-set high and low thresholds. Overrun of a threshold generates an alarm. An alarm or combinations of alarms can be linked to programmable action such as selective recording of measurements in a log, waveform capture, etc.

Event log and maintenance registers

The Micrologic H offers the same event log and maintenance register functions as the Micrologic P. In addition, it produces a log of the minimums and maximums for each "real-time" value.

Additional technical characteristics

Setting the display language

System messages may be displayed in six different languages. The desired language is selected via the keypad.

Protection functions

All current-based protection functions require no auxiliary source. Voltage-based protection functions are connected to AC power via a voltage measurement input built into the circuit breaker.

Measurement functions

Measurement functions are independent of the protection functions. The high-accuracy measurement module operates independently of the protection module, while remaining synchronised with protection events.

Measurement-calculation mode

An analogue calculation function dedicated to measurements enhances the accuracy of harmonic calculations and the power-quality indicators. The Micrologic H control unit calculates electrical magnitudes using $1.5 \times I_n$ dynamics ($20 \times I_n$ for Micrologic P).

Measurement functions implement the new "zero blind time" concept. Energies are calculated on the basis of the instantaneous power values, in the traditional and signed modes.

Harmonic components are calculated using the discrete Fourier transform (DFT).

Accuracy of measurements (including sensors)

- voltage (V) 0.5 %
- current (A) 1.5 %
- frequency (Hz) 0.1 %
- power (W) and energy (Wh) 2 %
- total harmonic distortion 1 %

Stored information

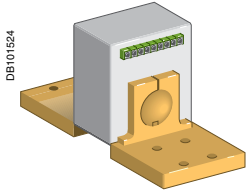
The fine-setting adjustments, the last 100 events and the maintenance register remain in the control-unit memory even when power is lost.

Time-stamping

Time-stamping is activated as soon as time is set manually or by a supervisor no external power supply module is required (max. drift of 1 hour per year).

Reset

An individual reset, via the keypad or remotely, acts on alarms, minimum and maximum data, peak values, the counters and the indicators.



External sensor (CT).



Rectangular sensor.



External sensor for source ground return protection.

External sensors

External sensor for earth-fault and neutral protection

The sensors, used with the 3P circuit breakers, are installed on the neutral conductor for:

- neutral protection (with Micrologic P and H)
- residual type earth-fault protection (with Micrologic A, P and H)..

The rating of the sensor (CT) must be compatible with the rating of the circuit breaker:

- NT06 to NT16: TC 400/1600
- NW08 to NW20: TC 400/2000
- NW25 to NW40: TC 1000/4000
- NW40b to NW63: TC 2000/6300.

For oversized neutral protection the sensor rating must be compatible with the measurement range: 1.6 x I_N (available up to NW 40 and NT 16).

Rectangular sensor for earth-leakage protection

The sensor is installed around the busbars (phases + neutral) to detect the zero-phase sequence current required for the earth-leakage protection. Rectangular sensors are available in two sizes.

Inside dimensions (mm)

- 280 x 115 up to 1600 A for Masterpact NT and NW
- 470 x 160 up to 3200 A for Masterpact NW.

External sensor for source ground return protection

The sensor is installed around the connection of the transformer neutral point to earth and connects to the Micrologic 6.0 control unit via an MDGF module to provide the source ground return (SGR) protection.

Voltage measurement inputs

Voltage measurement inputs are required for power measurements (Micrologic P or H) and for earth-leakage protection (Micrologic 7...).

As standard, the control unit is supplied by internal voltage measurement inputs placed downstream of the pole for voltages between 220 and 690 V AC. On request, it is possible to replace the internal voltage measurement inputs by an external voltage input (PTE option) which enables the control unit to draw power directly from the distribution system upstream of the circuit breaker. An 3 m cable with ferrite comes with this PTE option.



Long-time rating plug.

Long-time rating plug

Four interchangeable plugs may be used to limit the long-time threshold setting range for higher accuracy.

The time delay settings indicated on the plugs are for an overload of 6 I_r (for further details, see the characteristics on pages 207E2200_Ver7.3.fm/25 and 27).

As standard, control units are equipped with the 0.4 to 1 plug.

Setting ranges

Standard	I _r = I _n x...	0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
Low-setting option	I _r = I _n x...	0.4	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.8
High-setting option	I _r = I _n x...	0.80	0.82	0.85	0.88	0.90	0.92	0.95	0.98	1
Off plug	No long-time protection (I _r = I _n for I _{sd} setting)									

Important: long-time rating plugs must always be removed before carrying out insulation or dielectric withstand tests.



External 24 V DC power-supply module.

External 24 V DC power-supply module

The external power-supply module makes it possible to use the display even if the circuit breaker is open or not supplied (for the exact conditions of use, see the "electrical diagrams" part of this catalogue).

This module powers both the control unit (100 mA) and the M2C and M6C programmable contacts (100 mA).

If the COM communication option is used, the communication bus requires its own 24 V DC power supply, independent with respect to that of the Micrologic control unit. With the Micrologic A control unit, this module makes it possible to display currents of less than 20 % of I_n.

With the Micrologic P and H, it can be used to display fault currents after tripping.

Characteristics

- power supply:
 - 110/130, 200/240, 380/415 V AC (+10 % -15 %)
 - 24/30, 48/60, 100/125 V DC (+20 % -20 %)
- output voltage: 24 V DC ±5 %, 200 mA.
- ripple < 1 %
- dielectric withstand : 3.5 kV rms between input/output, for 1 minute
- overvoltage category: as per IEC 60947-1 cat. 4.



PB100771-24

Battery module

The battery module maintains display operation and communication with the supervisor if the power supply to the Micrologic control unit is interrupted. It is installed in series between the Micrologic control unit and the AD module.

Characteristics

- battery run-time: 4 hours (approximately)
- mounted on vertical backplate or symmetrical rail.



PB100774-32

M2C.



PB100781-32

M6C.

M2C, M6C programmable contacts

These contacts are optional equipment for the Micrologic P and H control units. They are described with the indication contacts for the circuit breakers.

Characteristics		M2C/M6C
Minimum load		100 mA/24 V
Breaking capacity (A) p.f.: 0.7	V AC	240 380
	V DC	24 48 125 250
		5 3 1.8 1.5 0.4 0.15

M2C: 24 V DC power supplied by control unit (consumption 100 mA).
M6C: external 24 V DC power supply required (consumption 100 mA).



PB100775-32

Lead-seal cover.

Spare parts

Lead-seal covers

A lead-seal cover controls access to the adjustment dials.

When the cover is closed:

- it is impossible to modify settings using the keypad unless the settings lockout pin on the cover is removed
- the test connector remains accessible
- the test button for the earth-fault and earth-leakage protection function remains accessible.

Characteristics

- transparent cover for basic Micrologic and Micrologic A control units
- non-transparent cover for Micrologic P and H control units.

Spare battery

A battery supplies power to the LEDs identifying the tripping causes. Battery service life is approximately ten years.

A test button on the front of the control unit is used to check the battery condition. The battery may be replaced on site when discharged.



PB100837-68

Portable test kit.

Test equipment

Hand-held test kit

The hand-held mini test kit may be used to:

- check operation of the control unit and the tripping and pole-opening system by sending a signal simulating a short-circuit
- supply power to the control units for settings via the keypad when the circuit-breaker is open (Micrologic P and H control units).

Power source: standard LR6-AA battery.

Full function test kit

The test kit can be used alone or with a supporting personal computer.

The test kit without PC may be used to check:

- the mechanical operation of the circuit breaker
- the electrical continuity of the connection between the circuit breaker and the control unit
- operation of the control unit:
 - display of settings
 - automatic and manual tests on protection functions
 - test on the zone-selective interlocking (ZSI) function
 - inhibition of the earth-fault protection
 - inhibition of the thermal memory.

The test kit with PC offers in addition:

- the test report (software available on request).

The COM option is required for integration of the circuit breaker or switch-disconnector in a supervision system.

Masterpact uses the Digipact or Modbus communications protocol for full compatibility with the SMS PowerLogic electrical-installation management systems. An external gateway is available for communication on other networks:

- Profibus
- Ethernet...

Eco COM is limited to the transmission of metering data and does not allow the control of the circuit breaker.

For fixed devices, the COM option is made up of:

- a "device" communication module, installed behind the Micrologic control unit and supplied with its set of sensors (OF, SDE, PF and CH micro-contacts) and its kit for connection to XF and MX1 communicating voltage releases.

For drawout devices, the COM option is made up of:

- a "device" communication module, installed behind the Micrologic control unit and supplied with its set of sensors (OF, SDE, PF and CH micro-contacts) and its kit for communicating voltage releases
- a "chassis" communication module supplied separately with its set of sensors (CE, CD and CT contacts).

Status indication by the COM option is independent of the device indication contacts. These contacts remain available for conventional uses.

Digipact or Modbus "Device" communication module

This module is independent of the control unit. It receives and transmits information on the communication network. An infra-red link transmits data between the control unit and the communication module.

Consumption: 30 mA, 24 V.

Digipact or Modbus "chassis" communication module

This module is independent of the control unit. With Modbus "chassis" communication module, this module makes it possible to address the chassis and to maintain the address when the circuit breaker is in the disconnected position.

Consumption: 30 mA, 24 V.

XF and MX1 communicating voltage releases

The XF and MX1 communicating voltage releases are equipped for connection to the "device" communication module.

The remote-tripping function (MX2 or MN) are independent of the communication option. They are not equipped for connection to the "device" communication module.



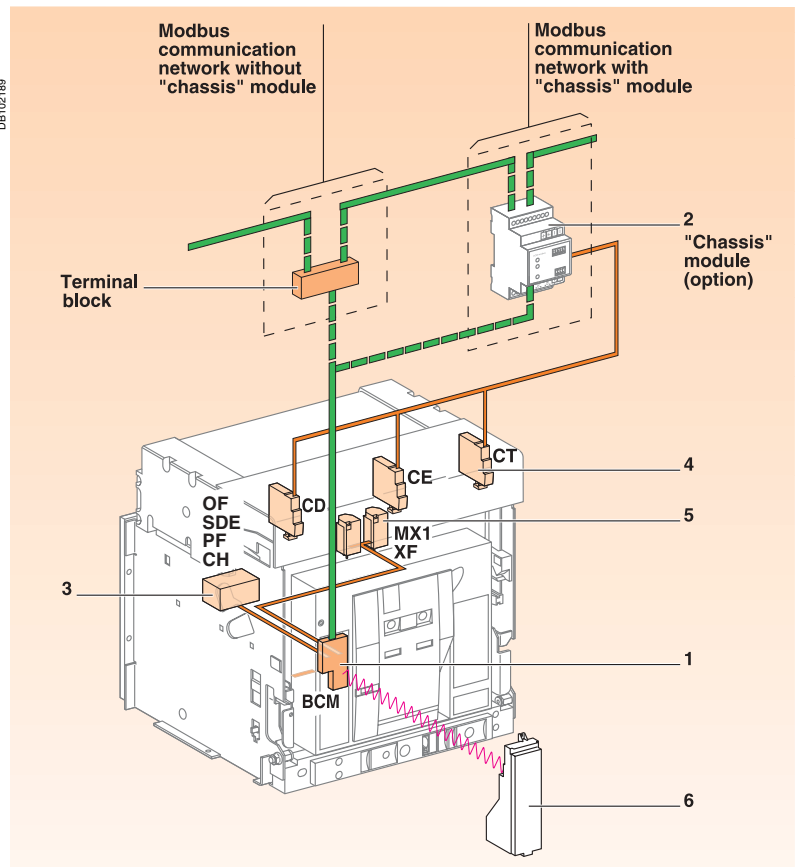
Digipact "device" communication module.

Digipact "chassis" communication module.



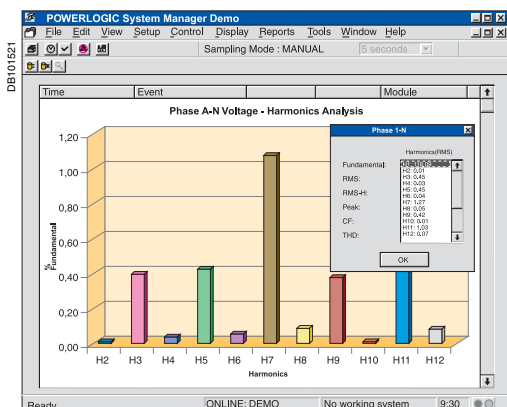
Modbus "device" communication module.

Modbus "chassis" communication module.



- 1 "Device" communication module.
- 2 "Chassis" communication module (option).
- 3 OF, SDE, PF and CH communicating "device" sensors.
- 4 CE, CD and CT communicating "chassis" sensors.
- 5 MX1 and XF communicating release.
- 6 Control unit.

— : Hard wire.
— : Communication bus.



The Masterpact circuit breakers and switch-disconnectors are compatible with the Digipact or Modbus COM option.

The COM option may be used to:

- identify the device
- indicate status conditions
- control the device.

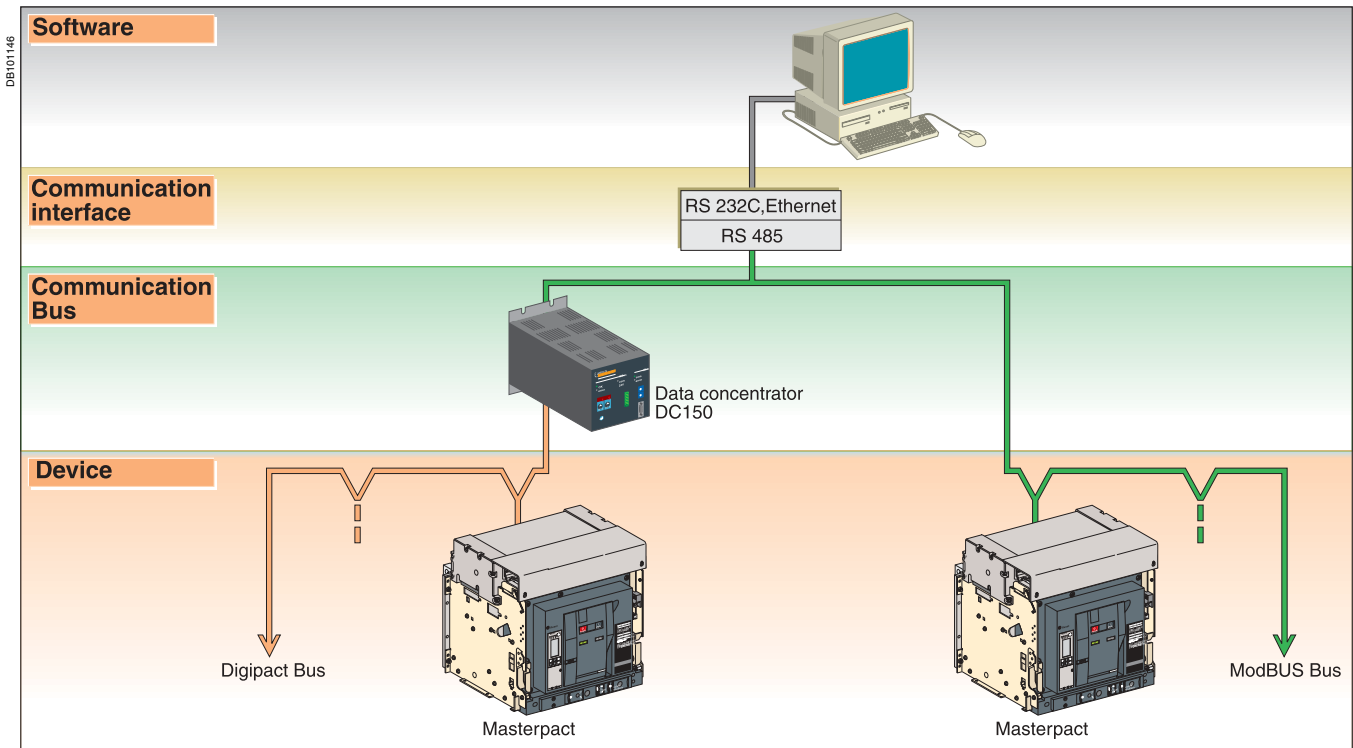
Depending on the different types of Micrologic (A, P, H) control units, the COM option also offers:

- setting of the protection and alarms functions
- analysis of the AC-power parameters for operating-assistance and maintenance purposes.

	Switch-disconnector with communication bus		Circuit breaker with communication bus	
	Digipact	Modbus	Digipact	Modbus
Device identification				
Address	■	■	A P H	A P H
Rating	-	-	A P H	A P H
Type of device	-	-		P H
Type of control unit	-	-	A P H	A P H
Type of long-time rating plug	-	-	A P H	A P H
Status indications				
ON/OFF OF	■	■	A P H	A P H
Spring charged CH	■	■	A P H	A P H
Ready to close PF	■	■	A P H	A P H
Fault-trip SDE	-	-	A P H	A P H
Connected/disconnected/ test position CE/CD/CT	■	■	A P H	A P H
Controls				
ON/OFF MX/XF	■	■	A P H	A P H
Spring charging	-	-		
Reset of the mechanical indicator	-	-		
Protections and alarms settings				
Reading of protections settings			A P H	A P H
Writing of fine settings in the range imposed by the adjustment dials				P H
Reading/writing of alarms (load shedding and reconnect, M2C, etc.)				P H
Reading/writing of custom alarms				H
Operating and maintenance aids				
Measurement				
Current			A P H	A P H
Voltages, frequency, power, etc.			P H	P H
Power quality: fundamental, harmonics				H
Programming of demand metering				P H
Fault readings				
Type of fault				A P H
Interrupted current				P H
Waveform capture				
On faults				H
On demand or programmed				H
Histories and logs				
Trip history				P H
Alarm history				P H
Event logs				P H
Indicators				
Counter operation			A P H	A P H
Contact wear				P H
Maintenance register				P H

Note: see the description of the Micrologic control units for further details on protection and alarms, measurements, waveform capture, histories, logs and maintenance indicators.

Communication Masterpact in a communication network



Devices

Circuit breakers equipped with Micrologic control units may be connected to either a Digipact or Modbus communication bus. The information made available depends on the type of Micrologic control unit (A, P or H) and on the type of communication bus (Digipact or Modbus).

Switch-disconnectors can be connected to the Digipact or Modbus communication bus. The information made available is the status of the switch-disconnector.

Communication bus

Digipact bus

The Digipact bus is the internal bus of the low-voltage switchboard in which the Digipact communicating devices are installed (Masterpact with Digipact COM, PM150, SC150, UA150, etc.). This bus must be equipped with a DC150 data concentrator (see the Powerlogic System catalogue).

Addresses

Addressing is carried out by the DC150 data concentrator.

Number of devices

The maximum number of devices that may be connected to the Digipact bus is calculated in terms of "communication points". These points correspond to the amount of traffic the bus can handle. The total number of points for the various devices connected to a single bus must not exceed 100.

If the required devices represent more than 100 points, add a second Digipact internal bus.

Communicating device	Number of points
DC150 data concentrator	4
Micrologic + Digipact COM	4
PM150	4
SC150	4
UA150	4

Length of bus

The maximum recommended length for the Digipact internal bus is 200 meters.

Bus power source

Power is supplied by the DC150 data concentrator (24 V).

Communication

Masterpact in a communication network

Modbus bus

The Modbus RS485 (RTU protocol) system is an open bus on which communicating Modbus devices (Masterpact with Modbus COM, PM300, Sepam, VigiloHM, etc.) are installed. All types of PLCs and microcomputers may be connected to the bus.

Addresses

The Modbus parameters (address, baud rate, parity) are entered using the keypad on the Micrologic A, P or H. For a switch-disconnector, it is necessary to use the RSU (Remote Setting Utility) Micrologic utility.

The software layer of the Modbus protocol can manage up to 255 addresses (1 to 255).

The "device" communication module comprises three addresses linked to:

- circuit-breaker manager
- measurement manager
- protection manager.

The "chassis" communication module comprises one address linked to the chassis manager.

The division of the system into four managers secures data exchange with the supervision system and the circuit-breaker actuators.

The manager addresses are automatically derived from the circuit-breaker address @xx entered via the Micrologic control unit (the default address is 47).

Logic addresses

@xx	Circuit-breaker manager	(1 to 47)
@xx + 50	Chassis manager	(51 to 97)
@xx + 200	Measurement managers	(201 to 247)
@xx + 100	Protection manager	(101 to 147)

Number of devices

The maximum number of devices that may be connected to the Modbus bus depends on the type of device (Masterpact with Modbus COM, PM500, Sepam, VigiloHM, etc.), the baud rate (19200 is recommended), the volume of data exchanged and the desired response time. The RS485 physical layer offers up to 32 connection points on the bus (1 master, 31 slaves).

A fixed device requires only one connection point (communication module on the device).

A drawout device uses two connection points (communication modules on the device and on the chassis).

The number must never exceed 31 fixed devices or 15 drawout devices.

Length of bus

The maximum recommended length for the Modbus bus is 1200 meters.

Bus power source

A 24 V DC power supply is required (less than 20 % ripple, insulation class II).

Communication interface

The Modbus bus may be connected to the central processing device in any of three manners:

- direct link to a PLC. The communication interface is not required if the PLC is equipped with a Modbus port
- direct link to a computer. The Modbus (RS485) / Serial port (RS232) communication interface is required
- connection to a TCP/IP (Ethernet) network. The Modbus (RS485) / TCP/IP (Ethernet) communication interface is required.

Software

To make use of the information provided by the communicating devices, software with a Modbus driver must be used.

Micrologic utilities

This is a set of software that may be used with a PC to:

- display the variables (I, U, P, E, etc.) with the RDU (Remote Display Utility)
- read/write the settings with the RSU (Remote Setting Utility)
- remotely control (ON / OFF) the device with the RCU (Remote Control Utility).

Micrologic utilities are available upon request

SMS (System Manager Software)

SMS is a software to monitor LV and/or MV electrical energy.

The SMS family includes a software range depending on the application and function, from single product monitoring to the management of a multiple building:

- Power Meter and Circuit Monitor units
- LV devices
- Sepam units.

The MPS100 Micro Power Server:

- notifies maintenance staff when any preset alarm or trip is activated by the Micrologic trip unit, automatically sending an e-mail and/or SMS
- data logs are periodically forwarded by e-mail
- the e-mails are sent via an Ethernet local area network (LAN) or remotely via modem.



MPS100 Micro Power Server.



Main LV switchboard.



Monitoring of your main LV switchboard via embedded web pages in the MPS100 accessible with a standard web browser.

Micro Power Server makes data collection easy for monitoring Masterpact/Compact circuit breakers

Now, more than ever, there is a need to monitor electrical distribution systems in industrial and large commercial applications. The key to managing all equipment, maximising efficiencies, reducing costs and increasing up time is having the right tools.

Micro Power Server MPS100 is designed to withstand harsh electrical environments and provide a consistent flow of easy to interpret information.

Micro Power Server is designed for unattended operation within the main LV switchboard

The MPS100 is a self-contained facility information server that serves as a stand-alone device for power system monitoring. It is used to transfer power system information via a standard web browser over an Ethernet local area network (LAN) or via modem, making it possible to view power system information on a PC with an Ethernet connection. In either capacity, the Micro Power Server functions as a web server for Micrologic trip unit and Power Meter (PM500) supervision, automatically notifying (e-mail and/or SMS) maintenance staff when any preset alarm or trip is activated in the Micrologic trip unit.

Benefits

- view your main LV switchboard without installing software on your local PC, eliminating the need for a dedicated PC with specific software
- Micro Power Server allows centralised monitoring, so you no longer waste precious time walking around the facility to collect data
- view your main LV switchboard via a modem connection (GSM or switched network), avoiding the need for a LAN
- maintenance people are automatically notified at any time, wherever they are, so you do not have to stay in front of a monitor all day long
- data logs can be periodically forwarded by sending e-mails to the relevant people (maintenance, accounting, application service provider) automatically
- possibility to monitor/notify six external events (limit switches, auxiliary switches...)
- back-up of Micrologic trip unit settings in the memory of the MPS100, so you know where to retrieve it when necessary.

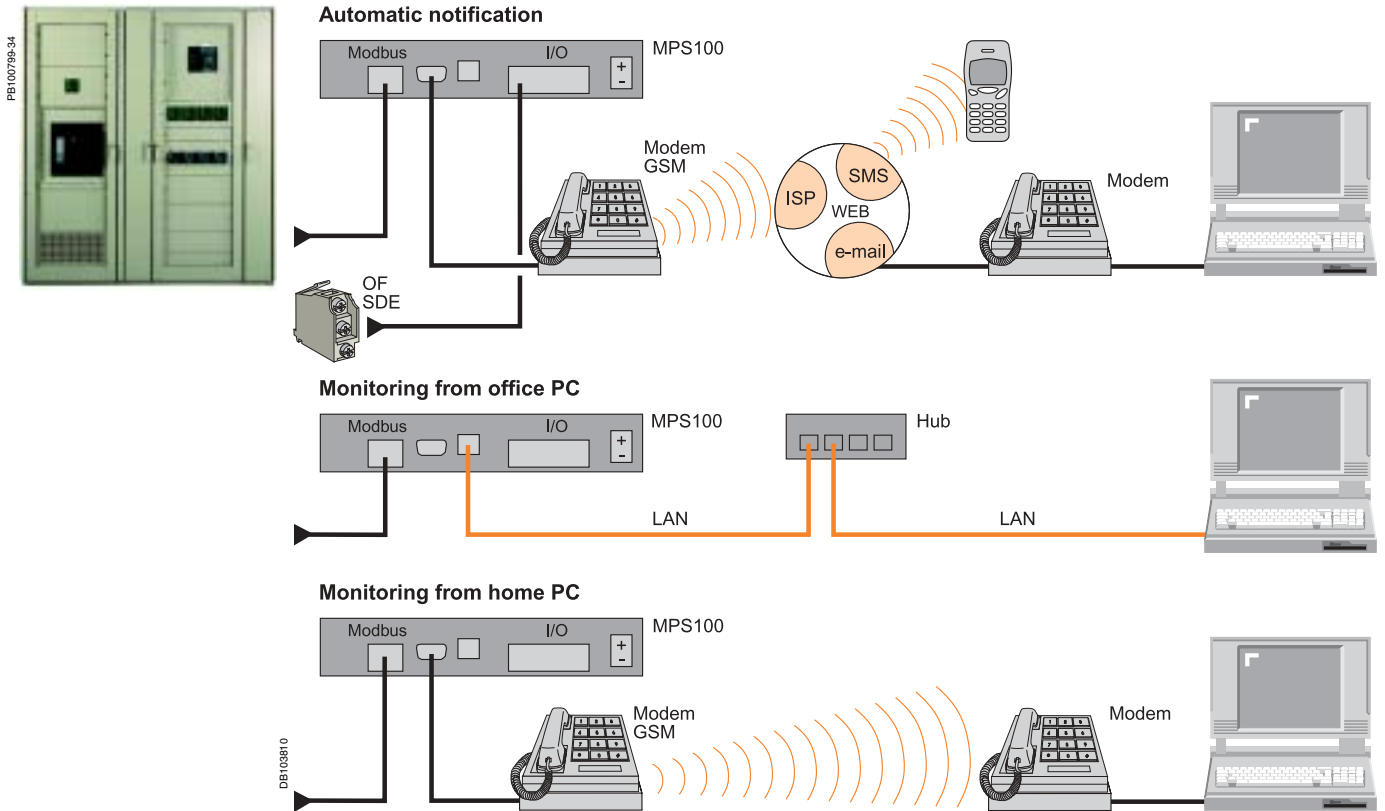
PB100823-42

PB100804-60

PB100799-68

PB100877-67

Typical architecture



It is possible to combine the different types of architecture.



Micrologic trip unit.



Power Meter PM500.



Main switchboard at Plaza hotel.
Air conditioning breaker tripped on ground fault
I_g = 350 A.
06:37 on 10/12/2002

Short Message Service (SMS).

Supported Modbus devices

- Micrologic trip units
 - Power Meters (PM500, PM700, PM800...).
- Maximum recommended connected devices is 10.

Features

- access to the power system via a standard PC web browser
- real-time data displayed with an intuitive and user friendly interface (dashboard)
- Ethernet Modbus TCP/IP connectivity directly to the LAN or via modem (Point to Point Protocol services)
- SMTP (Simple Mail Transfer Protocol) client (capacity to send e-mail)
- local logging of data such as energy, power, current...
- set-up and system configuration through MPS100 embedded HTML pages
- user interface translatable in any language, factory settings in English and French
- 6 inputs/2 outputs (no-volt contact)
- DHCP (Dynamic Host Configuration Protocol) client.

Technical characteristics

Power supply	24 V DC $\pm 15\%$, consumption = 250 mA
Operating temperature	0 to +50 °C
Rugged compact metal housing	35 x 218 x 115 mm (H x W x D)
Additional information available at: http://194.2.245.4/mkt/microser.nsf	
User name: MPS, Password: MPS100	

Part numbers

MPS100 Micro Power Server	33507
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