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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.

PB100762-60



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

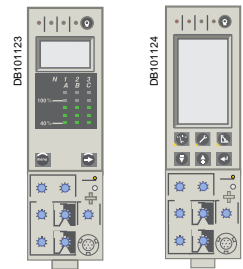
- 2.0 basic protection
- 5.0 selective protection
- 6.0 selective + earth-fault protection
- 7.0 selective + earth-leakage protection

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 Ir
 - high setting 0.8 to 1 x Ir
 - without long-time protection
- external power-supply module
- battery module.

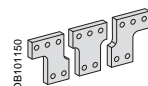
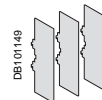
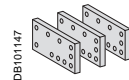
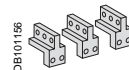


Communication page 34

- 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.



PB100763-56

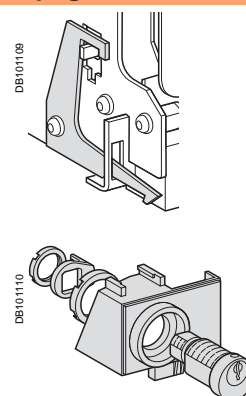




Locking

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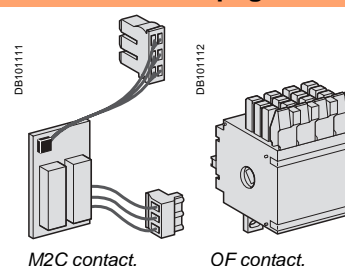
- pushbutton locking by padlockable transparent cover
- OFF-position locking by padlock or keylock
- chassis locking in disconnected position by keylock
- chassis locking in connected, disconnected and test positions
- door interlock (inhibits door opening with breaker in connected position)
- racking 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

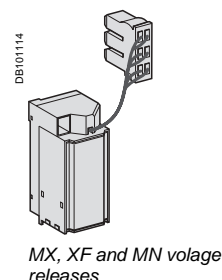
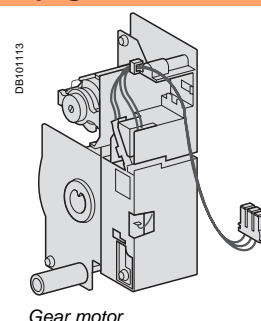
- standard or low-level contacts:
 - ON/OFF indication (OF)
 - "fault trip" indication (SDE)
 - carriage switches for connected (CE) disconnected (CD) and test (CT) positions
- programmable contacts:
 - 2 contacts (M2C)
 - 6 contacts (M6C).



Remote operation

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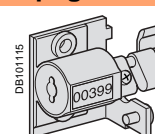
- remote ON/OFF:
 - gear motor
 - XF closing or MX opening voltage releases
 - PF ready-to-close contact
 - options: RAR automatic or Res electrical remote reset
- BPFE electrical closing pushbutton
- remote tripping function:
 - MN voltage release
 - standard
 - adjustable or non-adjustable delay
 -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



Accessories

page 52

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



Circuit breakers and switch-disconnectors

NT06 to NT16 and NW08 to NW63

NT and NW selection criteria

	Masterpact NT				Masterpact NW	
	Standard applications			Special applications	Standard applications	
	NT630-1600 H1	NT630-1600 H2	NT630-1000 L1	NT630-1600 H10	NW800-1600 N1	NW800-4000 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	1000 V systems, e.g. mines and wind power	Standard applications with low short-circuit currents	Circuit breaker for industrial sites with high short-circuit currents
Icu/Ics at 440 V	42 kA	50 kA	130 kA	-	42 kA	65 kA
Icu/Ics at 1000 V	-	-	-	20 kA	-	-
Icu/Ics at 500 V DC L/R < 15 ms	-	-	-	-	-	-
Position of neutral	Left	Left	Left	Left	Left	Left or right
Fixed	F	F	F	F	F	F
Drawout	D	D	D	D	D	D
Switch-disconnector version	Yes	No	No	Yes	Yes	Yes
Front connection	Yes	Yes	Yes	Yes	Yes	Yes up to 3200 A
Rear connection	Yes	Yes	Yes	Yes	Yes	Yes
Type of Micrologic control unit	A, P, H	A, P, H	A, P, H	A, consult us for P and H	A, P, H	A, P, H

Masterpact NT06 to NT16 installation characteristics

Circuit breaker		NT06, NT08, NT10				NT12, NT16		
Type		H1	H2	L1	H10	H1	H2	H10
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					
	NW800-4000 H2	NW2000-4000 H3	NW800-2000 L1	NW H10	NW H2 with anti-corrosion protection	NW1000-4000 DC N	NW1000-4000 DC H	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	Yes	Yes	Yes	Yes	Yes	Yes
	Yes up to 3200 A	Yes up to 3200 A	Yes up to 3200 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	

Circuit breakers and switch-disconnectors NT06 to NT16



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	—X1
Degree of pollution	IEC 60664-1	3

Circuit-breaker characteristics 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 characteristics as per NEMA AB1

Breaking capacity (kA) V AC 50/60 Hz		240 V 480 V 600 V
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Switch-disconnector characteristics 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	with maintenance	
C/O cycles x 1000		without maintenance	
Type of circuit breaker			In (A)
Rated current			
C/O cycles x 1000	Electrical	without maintenance	440 V ⁽⁴⁾
IEC 60947-2			690 V 1000 V
Type of circuit breaker or switch-disconnector			Ie (A)
Rated operational current			AC23A
C/O cycles x 1000	Electrical	without maintenance	440 V ⁽⁴⁾
IEC 60947-3			690V
Type of circuit breaker or switch-disconnector			Ie (A)
Rated operational current			AC3 ⁽⁵⁾
Motor power			380/415 V (kW) 440 V (kW)
C/O cycles x 1000	Electrical	without maintenance	440 V ⁽⁴⁾
IEC 60947-3 Annex M/IEC 60947-4-1			690 V

(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
Ir 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 NT02 rating, 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⁾	H10									H1	H2	H10				
42	50	150	-									42	50	-				
42	50	130	-									42	50	-				
42	42	100	-									42	42	-				
42	42	25	-									42	42	-				
-	-	-	20									-	-	20				
100 %												100 %						
B	B	A	B									B	B	B				
42	36	10	20									42	36	20				
42	36	-	20									-	36	20				
24	20	-	-									24	20	-				
-	90	10 x ln ⁽³⁾	-									-	90	-				
88	105	330	-									88	105	-				
88	105	286	-									88	105	-				
88	88	220	-									88	88	-				
88	88	52	-									88	88	-				
-	-	-	42									-	-	42				
25	25	9	-									25	25	-				
< 50												< 50						
42	50	150	-									42	50	-				
42	50	100	-									42	50	-				
42	42	25	-									42	42	-				
HA	HA10											HA	HA10					
75	-											75	-					
75	-											75	-					
75	-											75	-					
-	42											-	42					
36	20											36	20					
36	20											36	20					
20	20											20	20					
36												36						
25																		
12.5																		
H1	H2	L1	H10	H1	H2	L1	H10	H1	H2	L1	H10	H1	H2	H10	H10	H1	H2	
630				800				1000				1250			1600			
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	
-	-	-	0.5	-	-	-	0.5	-	-	-	0.5	-	-	0.5	0.5	-	-	
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)

Circuit-breaker characteristics 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 characteristics as per NEMA AB1

Breaking capacity (kA) V AC 50/60 Hz	240/480 V 600 V
---	--------------------

Unprotected circuit-breaker characteristics:

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 with 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 characteristics 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		In (A)	
Rated current			
C/O cycles x 1000	Electrical	without maintenance	440 V ⁽⁵⁾ 690 V 1150 V
IEC 60947-2			
Type of circuit breaker or switch-disconnector		Ie (A)	
Rated operational current			AC23A
C/O cycles x 1000	Electrical	without maintenance	440 V ⁽⁵⁾ 690 V
IEC 60947-3			
Type of circuit breaker or switch-disconnector		Ie (A)	
Rated operational current			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 NW02 rating, 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	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	
Without	Without	190	80	Without	Without	190	150	80	Without	Without	190	150	Without	Without	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
Without	Without	Without	Without	Without	Without	Without
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	HF	HA10	HA	
88	105	187	-	105	187	-	105	187	-	121	187	-	187	
-	-	-	105	-	-	105	-	-	105	-	-	105	-	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	
42	50	85	50	50	85	50	50	85	50	55	85	50	85	
-	36	50	50	50	50	50	50	50	50	55	75	50	85	

25				20						10					
12.5				10						5					
N1/H1/H2		L1	H10		H1/H2		L1	H10	H1/H2		H3	H10	H1		H2
800/1000/1250/1600				2000				2500/3200/4000				4000b/5000/6300			
10	3	-		8	3	-		5	1.25	-		1.5	1.5		
10	3	-		6	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/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/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															

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.

Micrologic name codes

2.0 A

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.

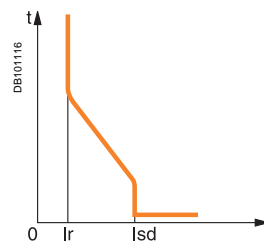
Z: type of measurement

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



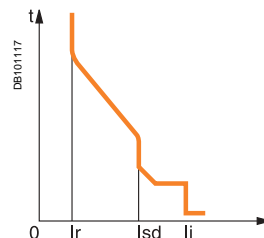
Current protection

Micrologic 2: basic protection



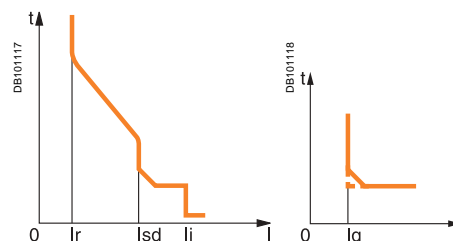
Protection:
long time
+ instantaneous

Micrologic 5: basic protection



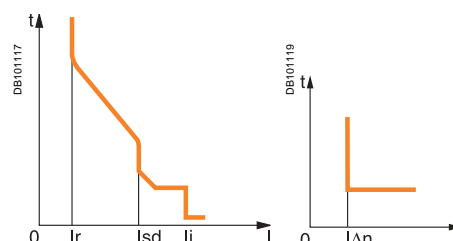
Protection:
long time
+ short time
+ instantaneous

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

Measurements and programmable protection

A: ammeter

- I_1 , I_2 , I_3 , I_N , earth-fault, 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_{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



5.0 A



5.0 P



5.0 H



6.0 A



6.0 P



6.0 H



7.0 A



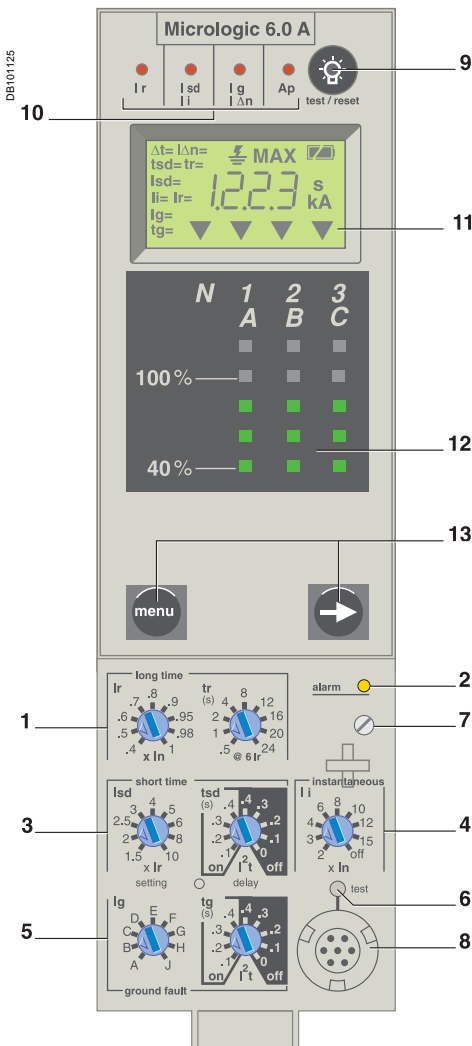
7.0 P



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 I^2t type (ON or OFF) for short-time delay.

Earth fault protection

Residual or source ground return.
Selection of I^2t 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_n (4P 3d + N/2), neutral protection at I_n (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 I_1 , I_2 , I_3 , I_N , I_g , $I_{\Delta N}$, 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

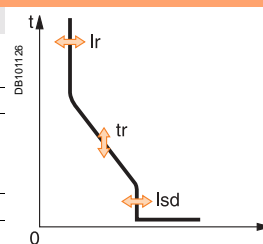
In conjunction with the COM communication option, the control unit transmits the following:

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

Protection

Micrologic 2.0 A

Long time		Micrologic 2.0 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 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 x I_r	12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to -20 %	6 x I_r	0.7 ⁽¹⁾	1	2	4	8	12	16	20	24
	Accuracy: 0 to -20 %	7.2 x I_r	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

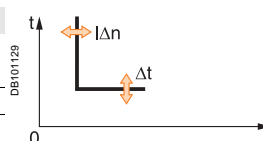
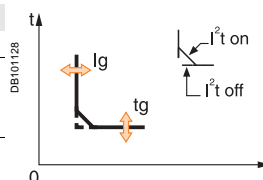
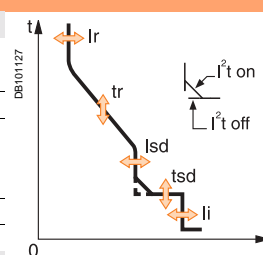
Micrologic 2.0 A

Continuous current measurements		Micrologic 2.0 A			
Display from 20 to 200 % of I_n		I_1	I_2	I_3	I_n
Accuracy: 1.5 % (including sensors)		No auxiliary source (where $I > 20$ % I_n)			
Maximeters		I_1 max	I_2 max	I_3 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 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 x I_r	12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to -20 %	6 x I_r	0.7 ⁽¹⁾	1	2	4	8	12	16	20	24
	Accuracy: 0 to -20 %	7.2 x I_r	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 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: 80 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	
	$400 \text{ A} < I_n < 1250$ 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				



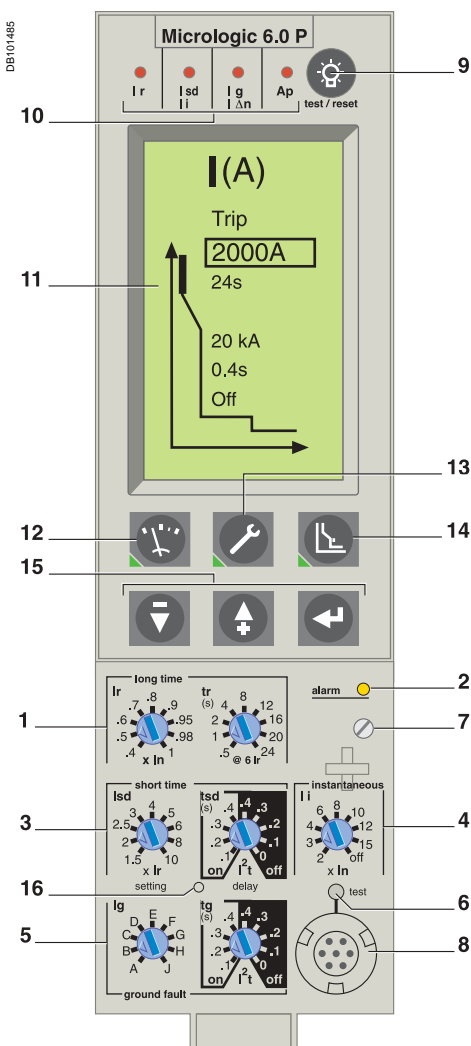
Ammeter

Micrologic 5.0 / 6.0 / 7.0 A

Continuous current measurements		Micrologic 5.0 / 6.0 / 7.0 A					
Display from 20 to 200 % of I_n		I_1	I_2	I_3	I_n	I_g	$I_{\Delta n}$
Accuracy: 1.5 % (including sensors)		No auxiliary source (where $I > 20$ % I_n)					
Maximeters		I_1 max	I_2 max	I_3 max	I_n max	I_g max	$I_{\Delta n}$ max

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 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 $0.5 I_n$ ($4P\ 3d + N/2$), neutral protection at I_n (4P 4d) and neutral protection at $1.6 I_n$ ($4P\ 3d + 1.6N$). Neutral protection at $1.6 I_n$ 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 $0.5 I_n$ ($4P\ 3d + N/2$), neutral protection at I_n (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 crest 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.

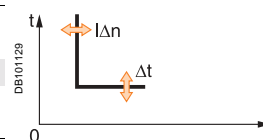
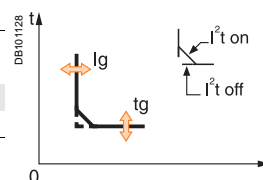
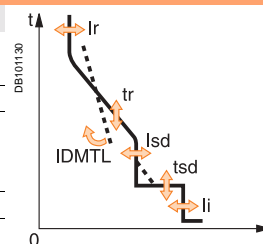
Communication option (COM)

The communication option may be used to:

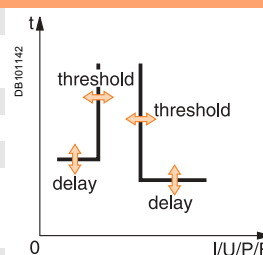
- remotely read and set parameters for the protection functions
- transmit all the calculated indicators and measurements
- signal the causes of tripping and alarms
- consult the history files and the maintenance-indicator register.
- maximeter reset.

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.

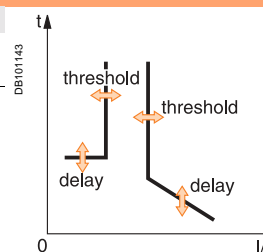
Protection		Micrologic 5.0 / 6.0 / 7.0 P									
Long time (rms)		Micrologic 5.0 / 6.0 / 7.0 P									
Current setting (A)	$I_r = I_n \times \dots$	0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1	
Tripping between 1.05 and 1.20 x I_r		Other ranges or disable by changing long-time rating plug									
Time setting	t_r (s)	0.5	1	2	4	8	12	16	20	24	
Time delay (s)	Accuracy: 0 to -30 %	1.5 x I_r	12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to -20 %	6 x I_r	0.7 ⁽¹⁾	1	2	4	8	12	16	20	24
	Accuracy: 0 to -20 %	7.2 x 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: 80 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	
	$400 \text{ A} < I_n < 1250$ 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				



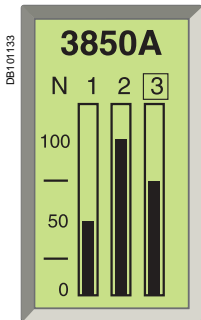
Alarms and other protection		Micrologic 5.0 / 6.0 / 7.0 P	
Current		Seuil	Temporisation
Déséquilibre de courant	Iunbalance	0.05 to 0.6 Iaverage	1 to 40 s
Max. de courant moyen	I_{max demand} : I1, I2, I3, I _N	0.2 I _n to I _n	15 to 1500 s
Earth fault alarm			
	I_{\perp}	20 A to 1200 A	1 to 10 s
Voltage			
Voltage unbalance	Uunbalance	2 to 30 % x Uaverage	1 to 40 s
Minimum voltage	U_{min}	100 to U _{max} between phases 1.2 to 5 s	
Maximum voltage	U_{max}	U _{min} to 1200 between phases 1.2 to 5 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			
Sequense (alarm)	ΔØ	Ø1/2/3 or Ø1/3/2	0.3 s



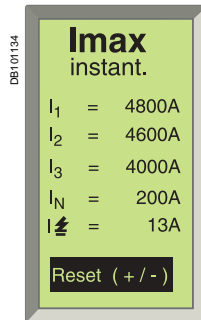
Load shedding and reconnection		Micrologic 5.0 / 6.0 / 7.0 P	
Measured value		Seuil	Temporisation
Current	I	0.5 to 1 I _r per phases	20 % tr to 80 % tr
Power	P	200 kW to 10 MW	10 to 3600 s



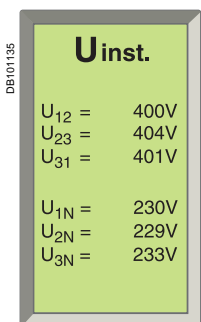
Note: all current-based protection functions require no auxiliary source.
Voltage-based protection functions are connected to AC power via a voltage measurement input built into the circuit breaker.



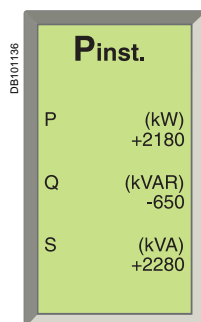
Default display.



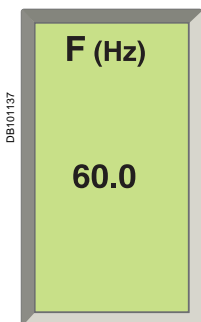
Display of a maximum current.



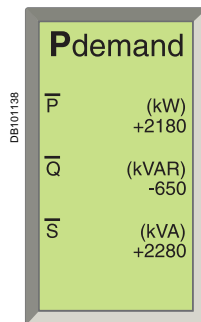
Display of a voltage.



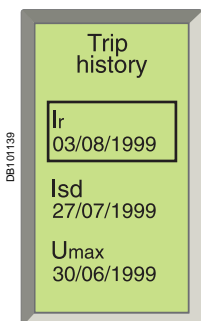
Display of a power.



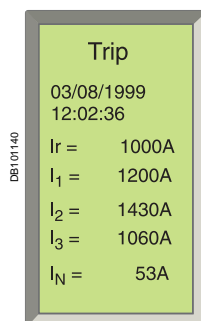
Display of a frequency.



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.)

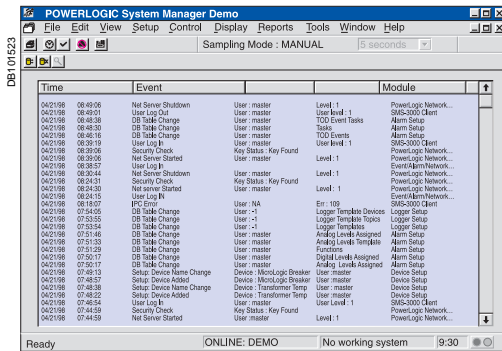
■ alarm history:

- ☐ 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
04/21/98 08:40:06	Net Server Shutdown	User: master
04/21/98 08:40:01	User Log Out	User: master
04/21/98 08:40:38	DB Table Change	User: master
04/21/98 08:40:30	DB Table Change	User: master
04/21/98 08:40:16	DB Table Change	User: master
04/21/98 08:39:19	User Log In	User: master
04/21/98 08:39:06	Security Check	Key Status: Key Found
04/21/98 08:39:05	Net Server Started	User: master
04/21/98 08:38:57	User Log In	User: master
04/21/98 08:30:44	Net Server Shutdown	User: master
04/21/98 08:24:50	Security Check	Key Status: Key Found
04/21/98 08:24:38	Net server Started	User: master
04/21/98 08:24:15	User Log In	User: master
04/21/98 08:18:09	PIC Error	User: M4
04/21/98 07:54:05	DB Table Change	User: -1
04/21/98 07:53:53	DB Table Change	User: -1
04/21/98 07:53:54	DB Table Change	User: -1
04/21/98 07:51:48	DB Table Change	User: master
04/21/98 07:51:33	DB Table Change	User: master
04/21/98 07:51:28	DB Table Change	User: master
04/21/98 07:50:17	DB Table Change	User: master
04/21/98 07:50:11	DB Table Change	User: master
04/21/98 07:48:13	Setup: Device Name Change	Device: MicroLogic Breaker
04/21/98 07:48:07	Setup: Device Added	Device: MicroLogic Breaker
04/21/98 07:48:38	Setup: Device Name Change	Device: Transformer Temp
04/21/98 07:48:22	Setup: Device Added	Device: Transformer Temp
04/21/98 07:48:54	User Log In	User: master
04/21/98 07:44:59	Security Check	Key Status: Key Found
04/21/98 07:44:59	Net Server Started	User: master

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:

- $I_{peak} / \sqrt{2}$, $(I_1 + I_2 + I_3)/3$, $I_{unbalance}$
- 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.

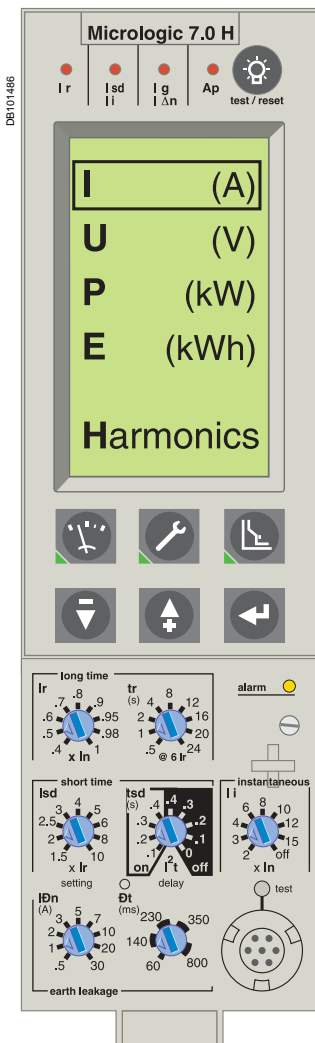
Time-stamping

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				
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.

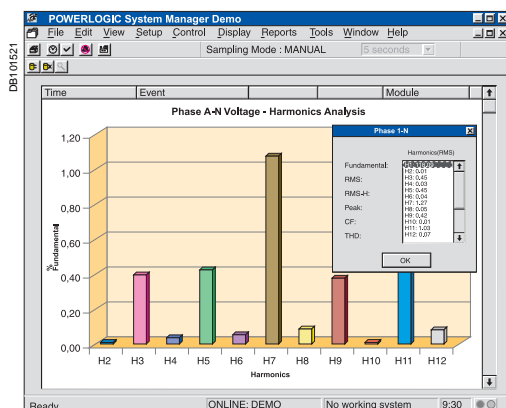
Histories and maintenance indicators

These functions are identical to those of the Micrologic P.

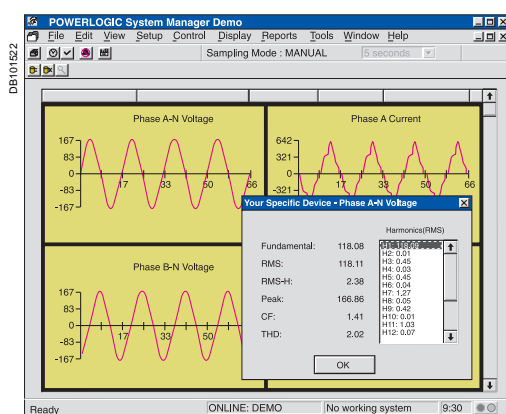
Note: Micrologic H control units come with a non-transparent lead-seal cover as standard.

Micrologic control units

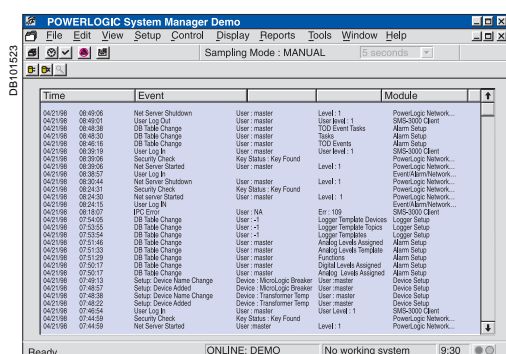
Micrologic H "harmonics"



Display of harmonics up to 21th order.



Waveform capture.



Log.

With the communication option

Additional measurements, maximeters and minimeters

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

- $I_{\text{peak}} / \sqrt{2} (I_1 + I_2 + I_3)/3, I_{\text{unbalance}}$
 - load level in % I_r
 - 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 x In dynamics (20 x In 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

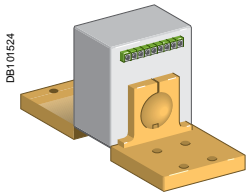
The fine-setting adjustments, the last 100 events and the maintenance register remain in the control-unit memory even when power is lost.

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 4000 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

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 Ir (for further details, see the characteristics on pages 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

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).

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

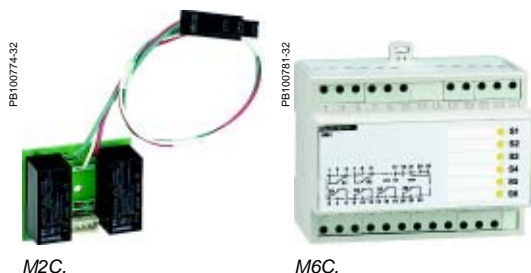
- power supply:
 - 110/130, 200/240, 380/415 V AC (+ 10 % - 15 %)
 - 24/30, 48/60, 100/125 V DC (+20 % -20 %)
- output voltage: 24 V DC ± 5%, 200 mA; towards the end of 2004, the available output current will be increased from 200 mA to 1 A
- ripple < 1 %
- dielectric withstand : 3.5 kV rms between input/output, for 1 minute
- overvoltage category: as per IEC 60947-1 cat. 4.

Battery module

The battery module makes it possible to use the display even if the power supply to the Micrologic control unit is interrupted and still communicating with the supervisor.

Characteristics

- battery run-time: 12 hours (approximately)
- mounted on vertical backplate or symmetrical rail.



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			10 mA/24 V
Breaking capacity (A) p.f.: 0.7	V AC	240	5
		380	
	V DC	24	1.8
		48	1.5
		125	0.4
		250	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).



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.



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 connection to XF and MX1 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.



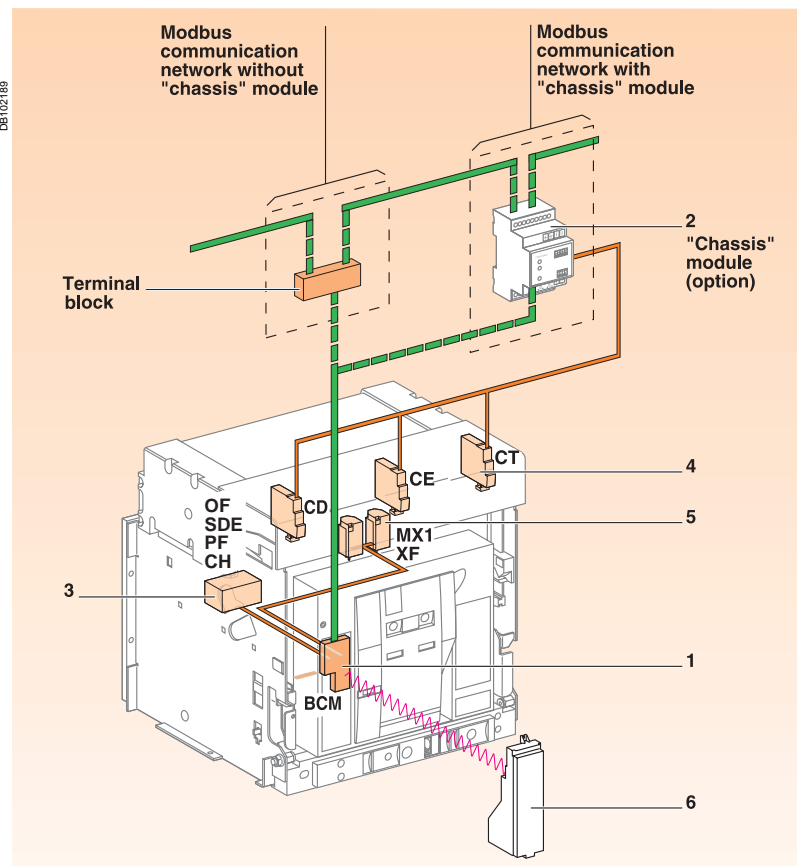
Digipact "device" communication module.

Digipact "chassis" communication module.



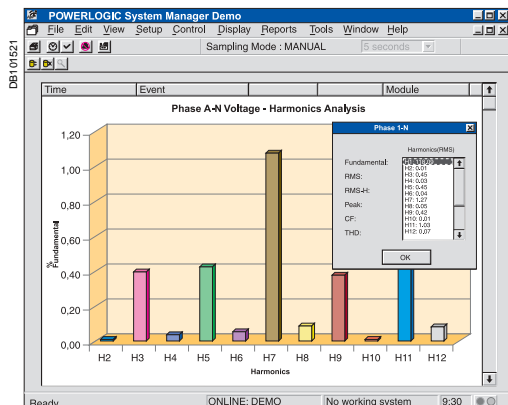
Modbus "device" communication module.

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:

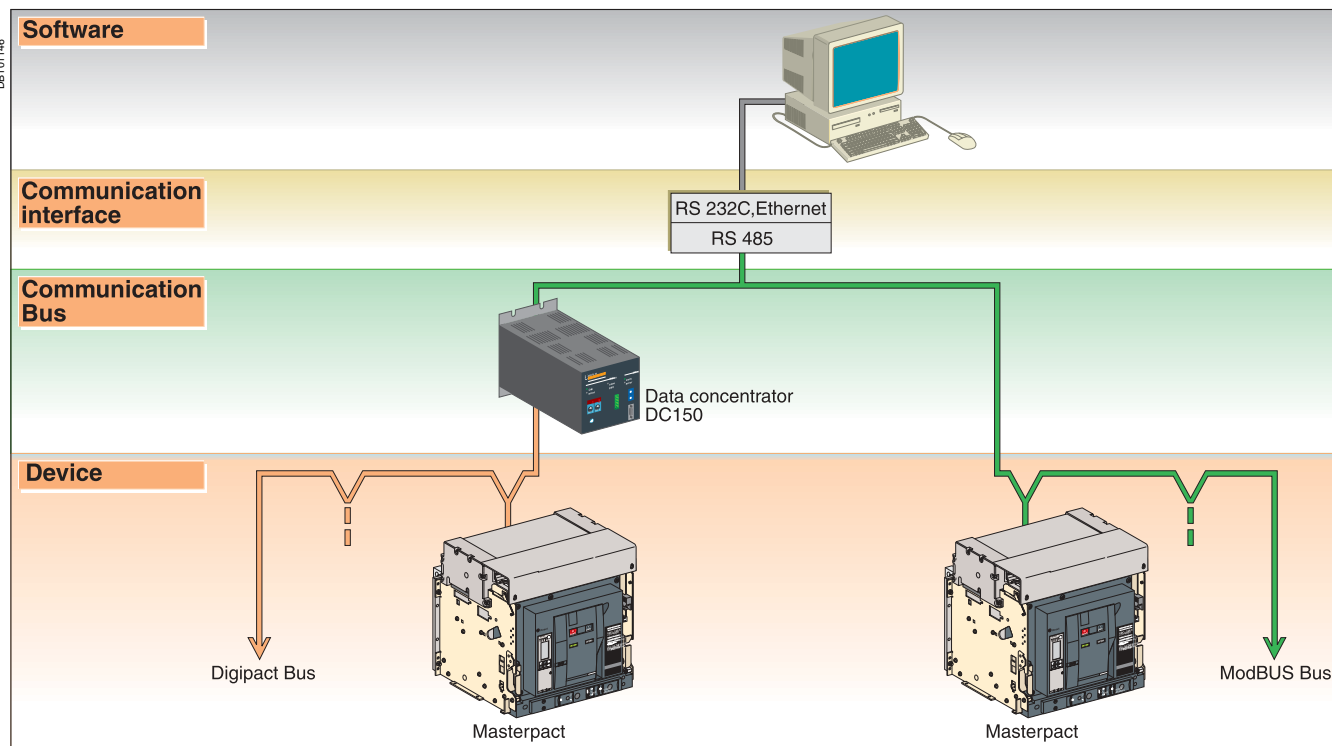
- identify the device
- indicate status conditions
- control the device.

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	
Signalisation d'états						
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.



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).

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:

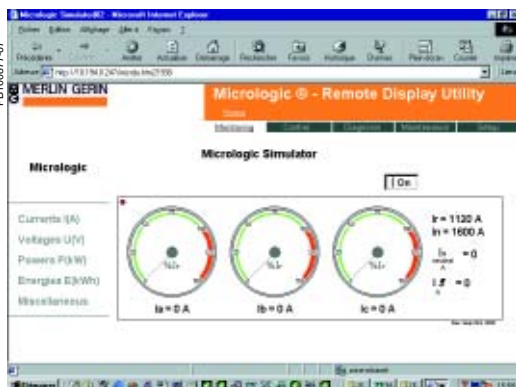
- notifies maintenance staff when any preset alarm or trip is activated by the Micrologic trip unit, automatically sending an e-mail and/or SMS
- data logs are periodically forwarded by e-mail
- the e-mails are sent via an Ethernet local area network (LAN) or remotely via modem.



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.

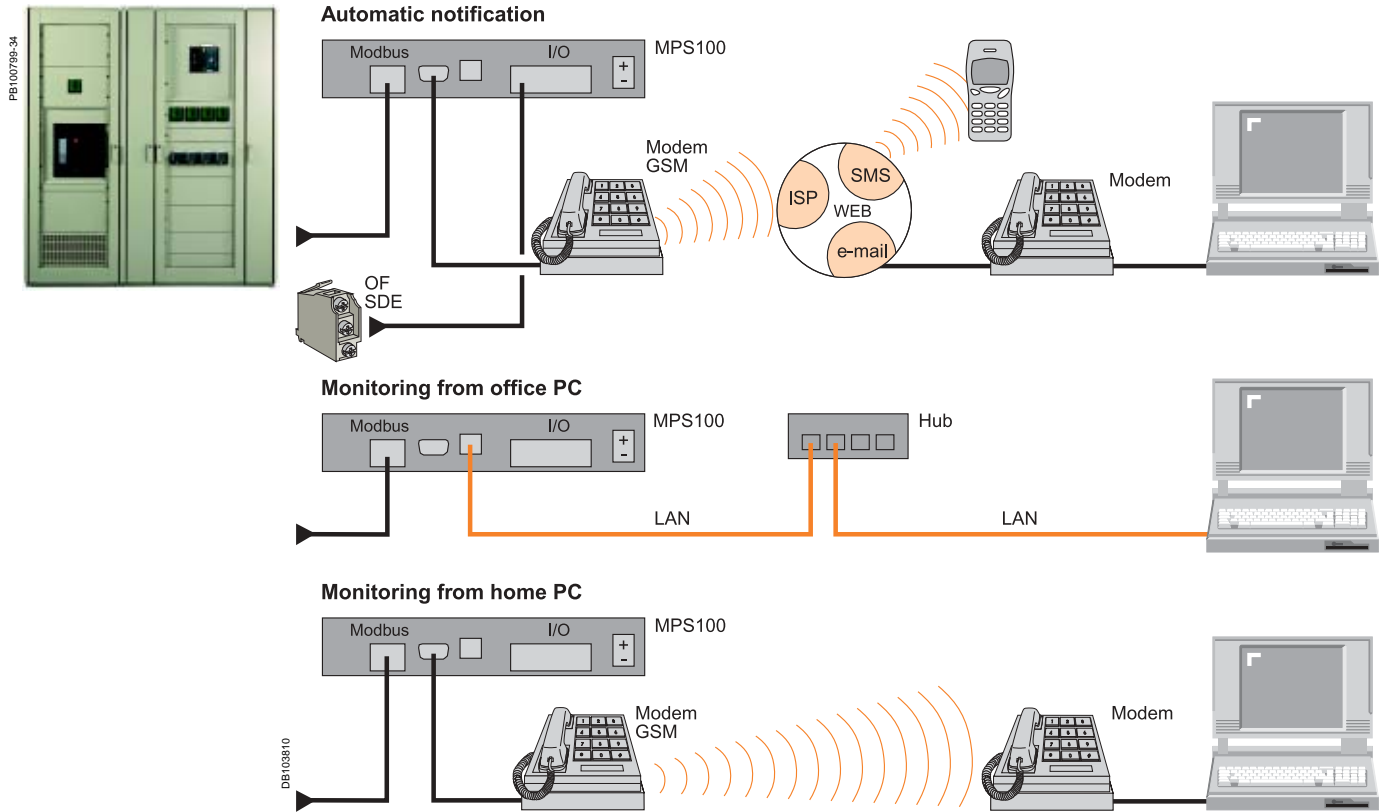
It is used to transfer power system information via a standard web browser over an Ethernet local area network (LAN) or via modem, making it possible to view power system information on a PC with an Ethernet connection.

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.

Typical architecture



It is possible to combine the different types of architecture.

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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Three types of connection are available:

- vertical or horizontal rear connection
- front connection
- mixed connection.

The solutions presented are similar in principle for all Masterpact NT and NW fixed and drawout devices.

Rear connection

Horizontal



Vertical



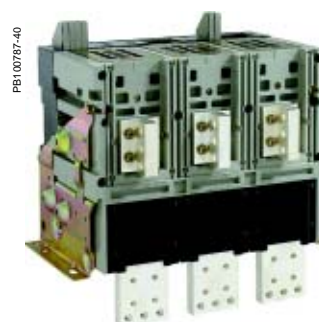
Simply turn a horizontal rear connector 90° to make it a vertical connector. For the 6300 A circuit breaker, only vertical connection is available.

Front connection

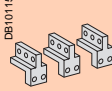
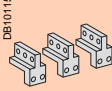
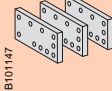
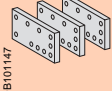
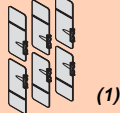
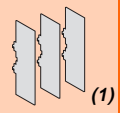
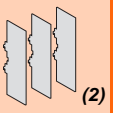
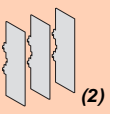
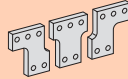
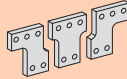
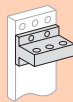
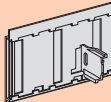
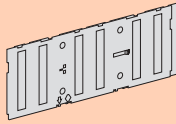
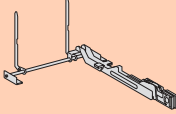
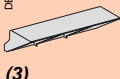
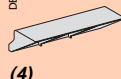


Front connection is available for NW fixed and drawout versions up to 3200 A.

Mixed connection



Note: Masterpact circuit breakers can be connected indifferently with bare-copper, tinned-copper and tinned-aluminium conductors, requiring no particular treatment.

Type of accessory	Masterpact NT06 to NT16				Masterpact NW08 to NW63			
	Fixed Front connection	Rear connection	Drawout Front connection	Rear connection	Fixed Front connection	Rear connection	Drawout Front connection	Rear connection
Vertical connection adapters								
Cable lug adapters								
Interphase barriers	 (1)		 (1)		 (2)		 (2)	
Spreaders								
Disconnectable front-connection adapter								
Safety shutters with padlocking								
Shutter position indication and locking								
Arc chute screen	 (3)	 (4)						

(1) Mandatory for voltages > 500 V.

(2) Except for an NW40 equipped for horizontal rear connection, and for fixed NW40b-NW63.

(3) Mandatory for 1000 V and for fixed NT front-connection versions with vertical-connection adapters oriented towards the front.

(4) Mandatory for 1000 V.

Masterpact M replacement kit

A set of connection parts is available to allow replacement of a Masterpact M08 to M32 circuit breaker by a Masterpact NW without modifying the busbars (please consult us).

Mounting on a switchboard backplate using special brackets

Masterpact NT and NW fixed front-connected circuit breakers can be installed on a backplate without any additional accessories.

Masterpact NW circuit breakers require a set of special brackets.

PB100780-32



Vertical-connection adapters

Mounted on front-connected devices or chassis, the adapters facilitate connection to a set of vertical busbars.

PB100791-32



Cable-lug adapters

Cable-lug adapters are used in conjunction with vertical-connection adapters. They can be used to connect a number of cables fitted with lugs. To ensure adequate mechanical strength, the connectors must be secured together via spacers (**catalogue number 07251**).

PB100779-32



Interphase barriers

These barriers are flexible insulated partitions used to reinforce isolation of connection points in installations with busbars, whether insulated or not. For Masterpact NT/NW devices, they are installed vertically between rear connection terminals. They are mandatory for NT devices at voltages > 500 V.

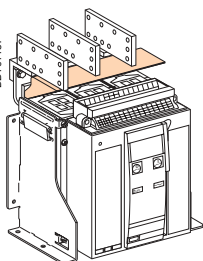
PB100792-32



Spreaders

Mounted on the front or rear connectors, spreaders are used to increase the distance between bars in certain installation configurations.

DB101157



Arc chute screen

For fixed Masterpact NT front-connection versions and with vertical-connection adapters oriented towards the front, an arc chute screen must be installed to respect safety clearances.

For Masterpact NT 1000 V, an arc chute screen must be installed to respect safety clearances.



Disconnectable front-connection adapter

Mounted on a fixed front-connected device, the adapter simplifies replacement of a fixed device by enabling fast disconnection from the front.



Safety shutters

Mounted on the chassis, the safety shutters automatically block access to the disconnecting contact cluster when the device is in the disconnected or test positions (degree of protection IP 20). When the device is removed from its chassis, no live parts are accessible.

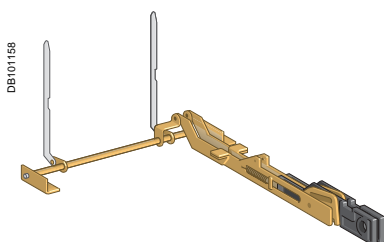
The shutter-locking system is made up of a moving block that can be padlocked (padlock not supplied). The block:

- prevents connection of the device
- locks the shutters in the closed position.

For Masterpact NW08 to NW63

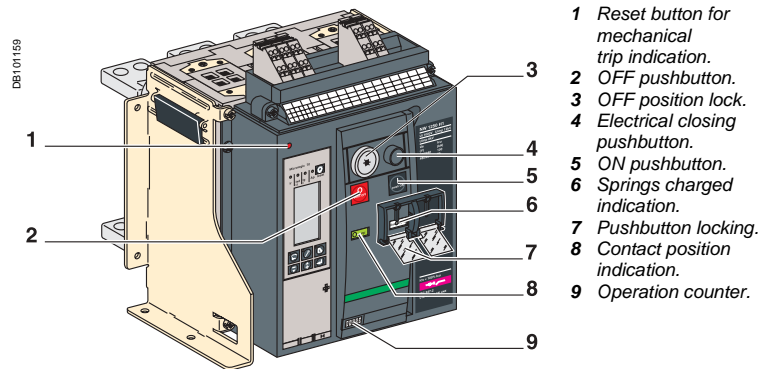
A support at the back of the chassis is used to store the blocks when they are not used:

- 2 blocks for NW08 to NW40
- 4 blocks for NW40b to NW63.



Shutter position indication and locking on front face

This option located on the chassis front plate indicates that the shutters are closed. It is possible to independently or separately padlock the two shutters using one to three padlocks (not supplied).



Access to pushbuttons protected by transparent cover.



Pushbutton locking using a padlock.



OFF position locking using a padlock.



OFF position locking using a keylock.

Pushbutton locking

The transparent cover blocks access to the pushbuttons used to open and close the device.

It is possible to independently lock the opening button and the closing button. The locking device is often combined with a remote operating mechanism.

The pushbuttons may be locked using either:

- three padlocks (not supplied)
- lead seal
- two screws.

Device locking in the OFF position

The circuit breaker is locked in the OFF position by physically maintaining the opening pushbutton pressed down:

- using padlocks (one to three padlocks, not supplied)
- using keylocks (one or two different keylocks, supplied).

Keys may be removed only when locking is effective (Profalux or Ronis type locks).

The keylocks are available in any of the following configurations:

- one keylock
- one keylock mounted on the device + one identical keylock supplied separately for interlocking with another device
- two different key locks for double locking.

Profalux and Ronis keylocks are compatible with each other.

A locking kit (without locks) is available for installation of one or two keylocks (Ronis, Profalux, Kirk or Castell).

Accessory-compatibility

For Masterpact NT: 3 padlocks or 1 keylock

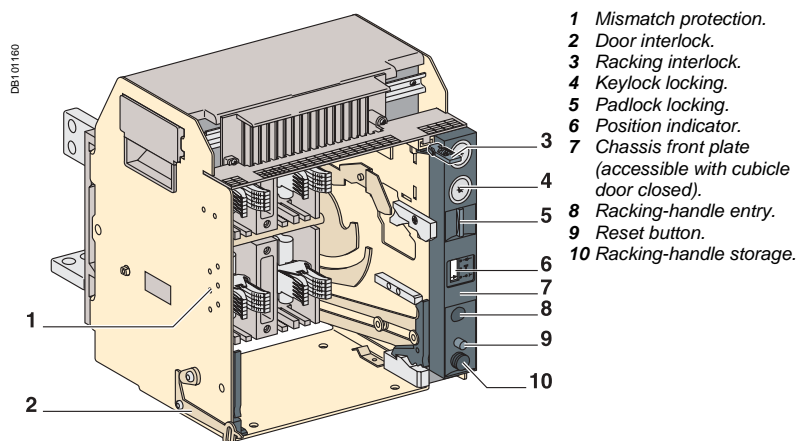
For Masterpact NW: 3 padlocks and/or 2 keylocks

Cable-type door interlock

This option prevents door opening when the circuit breaker is closed and prevents circuit breaker closing when the door is open.

For this, a special plate associated with a lock and a cable is mounted on the right side of the circuit breaker.

With this interlock installed, the source changeover function cannot be implemented.



"Disconnected" position locking by padlocks.



"Disconnected" position locking by keylocks.

"Disconnected" position locking

Mounted on the chassis and accessible with the door closed, these devices lock the circuit breaker in the "disconnected" position in two manners:

- using padlocks (standard), up to three padlocks (not supplied)
- using keylocks (optional), one or two different keylocks are available.

Profalux and Ronis keylocks are available in different options:

- one keylock
- two different keylocks for double locking
- one (or two) keylocks mounted on the device + one (or two) identical keylocks supplied separately for interlocking with another device.

A locking kit (without locks) is available for installation of one or two keylocks (Ronis, Profalux, Kirk or Castell).

"Connected", "disconnected" and "test" position locking

The "connected", "disconnected" and "test" positions are shown by an indicator. The exact position is obtained when the racking handle blocks. A release button is used to free it.

On request, the "disconnected" position locking system may be modified to lock the circuit breaker in any of the three positions, "connected", "disconnected" and "test".

Door interlock catch

Mounted on the right or left-hand side of the chassis, this device inhibits opening of the cubicle door when the circuit breaker is in "connected" or "test" position. If the breaker is put in the "connected" position with the door open, the door may be closed without having to disconnect the circuit breaker.

Racking interlock

This device prevents insertion of the racking handle when the cubicle door is open.

Cable-type door interlock

This option is identical for fixed and drawout versions.

Racking interlock between crank and OFF pushbutton

This option makes it necessary to press the OFF pushbutton in order to insert the racking handle and holds the device open until the handle is removed.

Automatic spring discharge before breaker removal

This option discharges the springs before the breaker is removed from the chassis.

Mismatch protection

Mismatch protection ensures that a circuit breaker is installed only in a chassis with compatible characteristics. It is made up of two parts (one on the chassis and one on the circuit breaker) offering twenty different combinations that the user may select.



Door interlock.



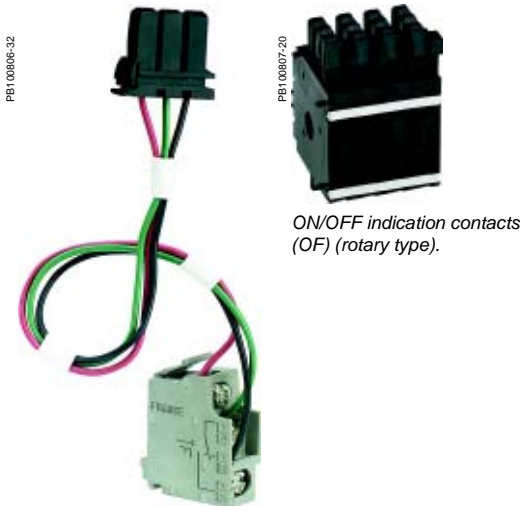
Racking interlock.



Mismatch protection.

Indication contacts are available:

- in the standard version for relay applications
 - in a low-level version for control of PLCs and electronic circuits.
- M2C and M6C contacts may be programmed via the Micrologic P and H control units.



ON/OFF indication contacts (OF) (rotary type).

ON/OFF indication contacts (OF) (microswitch type).



Additional "fault-trip" indication contacts (SDE).



Combined contacts.

ON/OFF indication contacts (OF)

Two types of contacts indicate the ON or OFF position of the circuit breaker:

- microswitch type changeover contacts for Masterpact NT
- rotary type changeover contacts directly driven by the mechanism for Masterpact NW. These contacts trip when the minimum isolation distance between the main circuit-breaker contacts is reached.

OF			NT	NW
Supplied as standard			4	4
Maximum number			4	12
Breaking capacity (A) p.f.: 0.3 AC12/DC12	Standard		Minimum load: 100 mA/24 V	
	V AC	240/380	6	10/6 ⁽¹⁾
		480	6	10/6 ⁽¹⁾
		690	6	6
	V DC	24/48	2.5	10/6 ⁽¹⁾
		125	0.5	10/6 ⁽¹⁾
		250	0.3	3
	Low-level		Minimum load: 2 mA/15 V DC	
	V AC	24/48	5	6
		240	5	6
		380	5	3
	V DC	24/48	5/2.5	6
		125	0.5	6
		250	0.3	3

⁽¹⁾ Standard contacts: 10 A; optional contacts: 6 A.

"Fault-trip" indication contacts (SDE)

Circuit-breaker tripping due to a fault is signalled by:

- a red mechanical fault indicator (reset)
- one changeover contact (SDE).

Following tripping, the mechanical indicator must be reset before the circuit breaker may be closed.

SDE			NT/NW	
Supplied as standard			1	
Maximum number			2	
Breaking capacity (A) p.f.: 0.3 AC12/DC12	Standard		Minimum load: 100 mA/24 V	
		V AC	240/380	5
			480	5
			690	3
	V DC	24/48	3	
			125	0.3
			250	0.15
	Low-level			Minimum load: 2 mA/15 V DC
		V AC	24/48	3
			240	3
			380	3
	V DC	24/48	3	
			125	0.3
			250	0.15

Combined "connected/closed" contacts (EF)

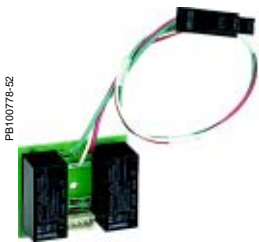
The contact combines the "device connected" and the "device closed" information to produce the "circuit closed" information.

Supplied as an option for Masterpact NW, it is mounted in place of the connector of an additional OF contact.

EF			NW	
Maximum number			8	
Breaking capacity (A) p.f.: 0.3 AC12/DC12	Standard	V AC	240/380	6
			480	6
			690	6
	V DC	24/48	2.5	
			125	0.8
			250	0.3
	Low-level		Minimum load: 2 mA/15 V DC	
	V AC	24/48	5	
			240	5
			380	5
	V DC	24/48	2.5	
			125	0.8
		250	0.3	



CCE, CD and CT "connected/disconnected/test" position carriage switches.



M2C programmable contacts: circuit-breaker internal relay with two contacts.



M6C programmable contacts: circuit-breaker external relay with six independent changeover contacts controlled from the circuit breaker via a three-wire connection.

"Connected", "disconnected" and "test" position carriage switches

Three series of optional auxiliary contacts are available for the chassis:

- changeover contacts to indicate the "connected" position (CE)
- changeover contacts to indicate the "disconnected" position (CD). This position is indicated when the required clearance for isolation of the power and auxiliary circuits is reached
- changeover contacts to indicate the "test" position (CT). In this position, the power circuits are disconnected and the auxiliary circuits are connected.

Additional actuators

A set of additional actuators may be installed on the chassis to change the functions of the carriage switches.

			NT			NW		
Contacts			CE/CD/CT			CE/CD/CT		
Maximum number	Standard with additional actuators		3	2	1	3	3	3
						9	0	0
						6	3	0
						6	0	3
Breaking capacity (A)	Standard	Minimum load: 100 mA/24 V						
p.f.: 0.3 AC12/DC12	V AC	240	8			8		
		380	8			8		
		480	8			8		
		690	6			6		
	V DC	24/48	2.5			2.5		
		125	0.8			0.8		
		250	0.3			0.3		
		Low-level		Minimum load: 2 mA/15 V DC				
	V AC	24/48	5			5		
		240	5			5		
380		5			5			
24/48		2.5			2.5			
V DC	125	0.8			0.8			
	250	0.3			0.3			

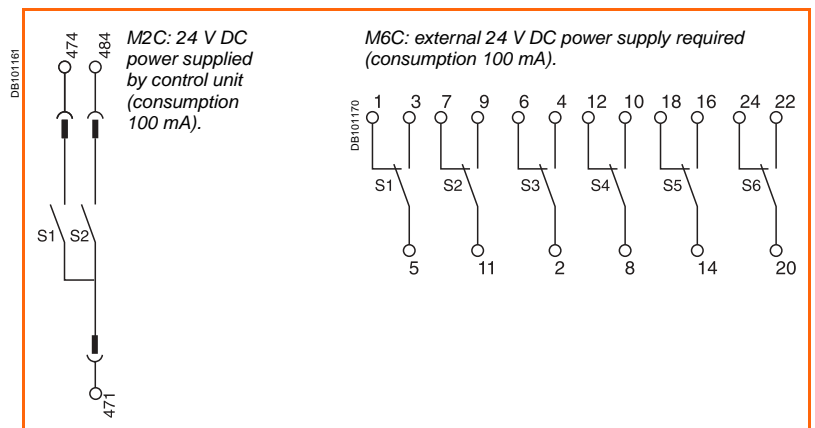
M2C / M6C programmable contacts

These contacts, used with the Micrologic P and H control units, may be programmed via the control unit keypad or via a supervisory station with the COM communication option. They require an external power supply module.

They indicate:

- the type of fault
- instantaneous or delayed threshold overruns.
- They may be programmed:
 - with instantaneous return to the initial state
 - without return to the initial state
 - with return to the initial state following a delay.

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
		1.8
		1.5
		0.4
		0.15



Two solutions are available for remote operation of Masterpact devices:

- a point-to-point solution
- a bus solution with the COM communication option.



Note: an opening order always takes priority over a closing order.

If opening and closing orders occur simultaneously, the mechanism discharges without any movement of the main contacts. The circuit breaker remains in the open position (OFF).

In the event of maintained opening and closing orders, the standard mechanism provides an anti-pumping function by blocking the main contacts in open position.

Anti-pumping function. After fault tripping or intentional opening using the manual or electrical controls, the closing order must first be discontinued, then reactivated to close the circuit breaker.

When the automatic reset after fault trip (RAR) option is installed, to avoid pumping following a fault trip, the automatic control system must take into account the information supplied by the circuit breaker before issuing a new closing order or blocking the circuit breaker in the open position (information on the type of fault, e.g. overload, short-time fault, earth fault, earth leakage, short-circuit, etc.).

Note: MX communicating releases are of the impulse type only and cannot be used to lock a circuit breaker in OFF position. For locking in OFF position, use the remote tripping function (2nd MX or MN).

When MX or XF communicating releases are used, the third wire (C3, A3) must be connected even if the communication module is not installed. When the control voltage (C3-C1 or A3-A1) is applied to the MX or XF releases, it is necessary to wait 1.5 seconds before issuing an order. Consequently, it is advised to use standard MX or XF releases for applications such as source-changeover systems.

The remote ON / OFF function is used to remotely open and close the circuit breaker. It is made up of:

- an electric motor (MCH) equipped with a "springs charged" limit switch contact (CH)
- two voltage releases:
 - a closing release (XF)
 - an opening release (MX).

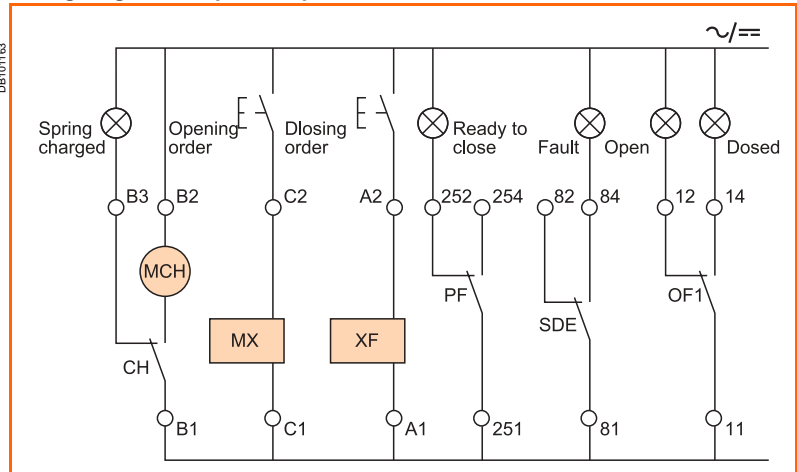
Optionally, other functions may be added:

- a "ready to close" contact (PF)
- an electrical closing pushbutton (BPFE)
- remote reset following a fault.

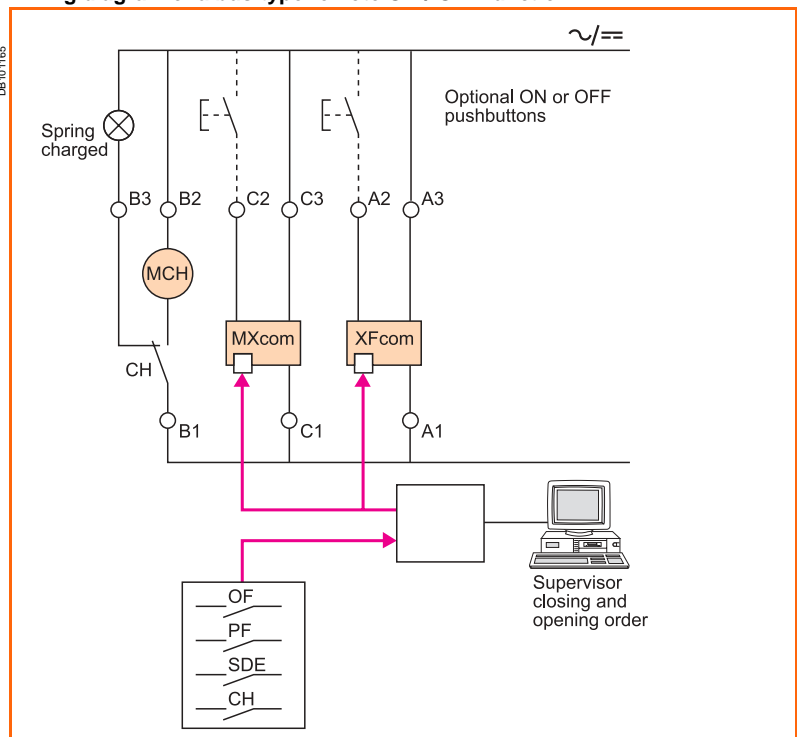
A remote-operation function is generally combined with:

- device ON / OFF indication (OF)
- "fault-trip" indication (SDE).

Wiring diagram of a point-to-point remote ON / OFF function



Wiring diagram of a bus-type remote ON / OFF function



PE100797-23



Electric motor (MCH) for Masterpact NT.

PE100808-32



Electric motor (MCH) for Masterpact NW.

Electric motor (MCH)

The electric motor automatically charges and recharges the spring mechanism when the circuit breaker is closed. Instantaneous reclosing of the breaker is thus possible following opening. The spring-mechanism charging handle is used only as a backup if auxiliary power is absent.

The electric motor (MCH) is equipped as standard with a limit switch contact (CH) that signals the "charged" position of the mechanism (springs charged).

Characteristics

Power supply	V AC 50/60 Hz	48/60 - 100/130 - 200/240 - 277 - 380/415 - 400/440 - 480
	V DC	24/30 - 48/60 - 100/125 - 200/250
Operating threshold	0.85 to 1.1 Un	
Consumption (VA or W)	180	
Motor overcurrent	2 to 3 In for 0.1 s	
Charging time	maximum 3 s for Masterpact NT	
	maximum 4 s for Masterpact NW	
Operating frequency	maximum 3 cycles per minute	
CH contact	10 A at 240 V	

Voltage releases (XF and MX)

Their supply can be maintained or automatically disconnected.

Closing release (XF)

The XF release remotely closes the circuit breaker if the spring mechanism is charged.

Opening release (MX)

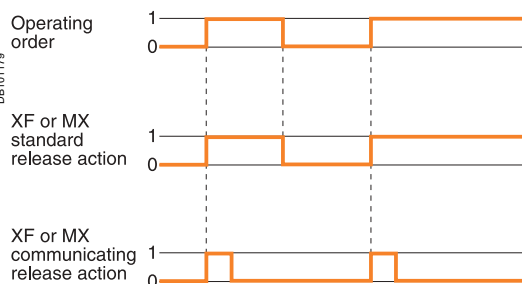
The MX release instantaneously opens the circuit breaker when energised. It locks the circuit breaker in OFF position if the order is maintained (except for MX "communicating" releases).

Note: whether the operating order is maintained or automatically disconnected (pulse-type), XF or MX "communicating" releases ("bus" solution with "COM" communication option) always have an impulse-type action (see diagram).

Characteristics

		XF	MX
Power supply	V AC 50/60 Hz	24 - 48 - 100/130 - 200/250 - 277 - 380/480	
	V DC	12 - 24/30 - 48/60 - 100/130 - 200/250	
Operating threshold		0.85 to 1.1 Un	0.7 to 1.1 Un
Consumption (VA or W)		Hold: 4.5	Hold: 4.5
		Pick-up: 200 (200 ms)	Pick-up: 200 (200 ms)
Circuit-breaker response time at Un		55 ms ±10 (Masterpact NT)	50 ms ±10
		70 ms ±10 (NW ≤ 4000A)	
		80 ms ±10 (NW > 4000A)	

DB101179



PE100809-16



XF and MX voltage releases.

PE100815-16



"Ready to close" contacts (PF).

"Ready to close" contact (PF)

The "ready to close" position of the circuit breaker is indicated by a mechanical indicator and a PF changeover contact. This signal indicates that all the following are valid:

- the circuit breaker is in the OFF position
- the spring mechanism is charged
- a maintained opening order is not present:
- ☐ MX energised
- ☐ fault trip
- ☐ remote tripping (second MX or MN)
- ☐ device not completely racked in
- ☐ device locked in OFF position
- ☐ device interlocked with a second device.

Characteristics

		NT/NW
Maximum number		1
Breaking capacity (A) p.f.: 0.3 AC12/DC12	Standard	Minimum load: 100 mA/24 V
	V AC	240/380
		480
		690
	V DC	24/48
		125
		250
	Low-level	Minimum load: 2 mA/15 V DC
	V AC	24/48
		240
		380
	V DC	24/48
		125
		250



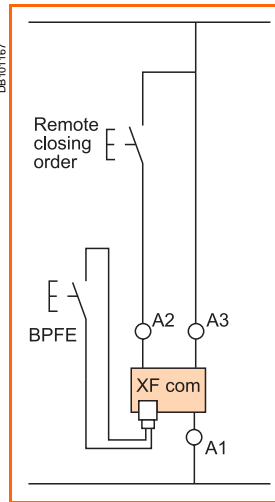
Electrical closing pushbutton (BPFE).

Electrical closing pushbutton (BPFE)

Located on the front panel, this pushbutton carries out electrical closing of the circuit breaker. It is generally associated with the transparent cover that protects access to the closing pushbutton.

Electrical closing via the BPFE pushbutton takes into account all the safety functions that are part of the control/monitoring system of the installation.

The BPFE connects to the closing release (XF) in place of the COM module.

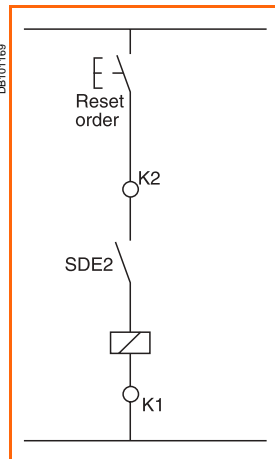


Remote reset after fault trip

Electrical reset after fault trip (Res)

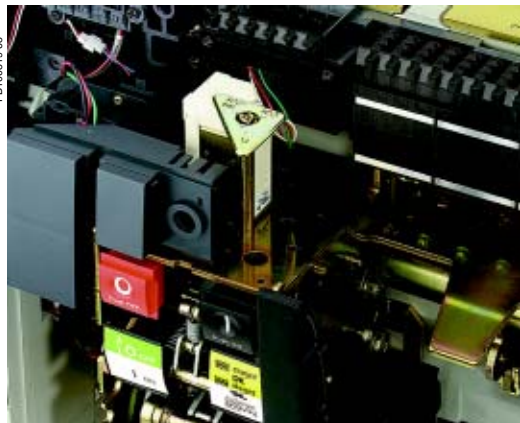
Following tripping, this function resets the "fault trip" indication contacts (SDE) and the mechanical indicator and enables circuit breaker closing.

Power supply: 110 / 130 V AC and 200 / 240 V AC.



Automatic reset after fault trip (RAR)

Following tripping, a reset of the mechanical indicator (reset button) is no longer required to enable circuit-breaker closing. The mechanical (reset button) and electrical (SDE) indications remain in fault position until the reset button is pressed.



PE100319-08



DB100800-16

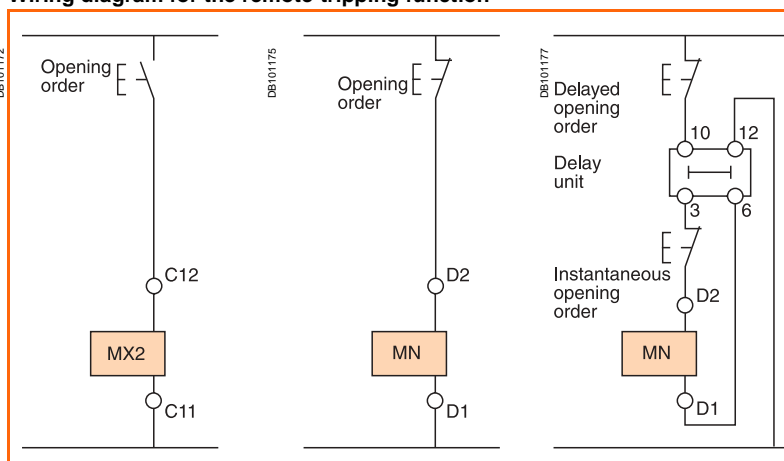
MX or MN voltage release.

This function opens the circuit breaker via an electrical order. It is made up of:

- a shunt release (second MX)
- or an undervoltage release (MN)
- or a delayed undervoltage release (MN + delay unit).

These releases (2nd MX or MN) cannot be operated by the communication bus. The delay unit, installed outside the circuit breaker, may be disabled by an emergency OFF button to obtain instantaneous opening of the circuit breaker.

Wiring diagram for the remote-tripping function



Voltage releases (second MX)

When energised, the MX voltage release instantaneously opens the circuit breaker. A continuous supply of power to the second MX locks the circuit breaker in the OFF position.

Characteristics

Power supply	V AC 50/60Hz	24 - 48 - 100/130 - 200/250 - 277- 380/480
	V DC	12 - 24/30 - 48/60 - 100/130 - 200/250
Operating threshold	0.7 to 1.1 Un	
Permanent locking function	0.85 to 1.1 Un	
Consumption (VA or W)	Pick-up: 200 (200 ms)	Hold: 4.5
Circuit-breaker response time at Un	50 ms ±10	

Instantaneous voltage releases (MN)

The MN release instantaneously opens the circuit breaker when its supply voltage drops to a value between 35 % and 70 % of its rated voltage. If there is no supply on the release, it is impossible to close the circuit breaker, either manually or electrically. Any attempt to close the circuit breaker has no effect on the main contacts. Circuit-breaker closing is enabled again when the supply voltage of the release returns to 85 % of its rated value.

Characteristics

Power supply	V AC 50/60 Hz	24 - 48 - 100/130 - 200/250 - 380/480
	V DC	24/30 - 48/60 - 100/130 - 200/250
Operating threshold	Opening	0.35 to 0.7 Un
	Closing	0.85 Un
Consumption (VA or W)	Pick-up: 200 (200 ms)	Hold: 4.5
MN consumption	Pick-up: 200 (200 ms)	Hold: 4.5
MN consumption with delay unit (VA or W)		
Circuit-breaker response time at Un	40 ms ±5 for NT	
	90 ms ±5 for NW	

MN delay units

To eliminate circuit-breaker nuisance tripping during short voltage dips, operation of the MN release can be delayed. This function is achieved by adding an external delay unit in the MN voltage-release circuit. Two versions are available, adjustable and non-adjustable.

Characteristics

Power supply	Non-adjustable	100/130 - 200/250
	Adjustable	48/60 - 100/130 - 200/250 - 380/480
Operating threshold	Opening	0.35 to 0.7 Un
	Closing	0.85 Un
Consommation du retardateur	Pick-up: 200 (200 ms)	Hold: 4.5
Circuit-breaker response time at Un	Non-adjustable	0.25 s
	Adjustable	0.5 s - 0.9 s - 1.5 s - 3 s

PB100821-68



Auxiliary terminal shield (CB)

Optional equipment mounted on the chassis, the shield prevents access to the terminal block of the electrical auxiliaries.

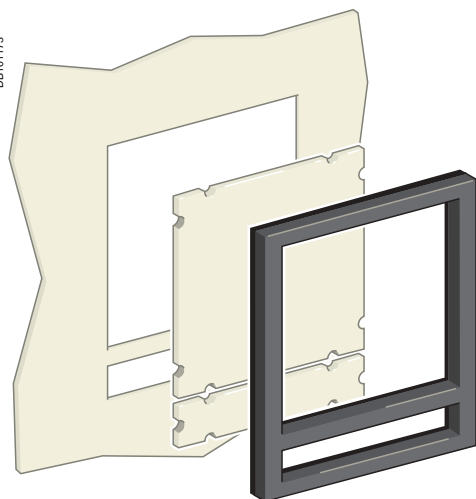
PB100822-32



Operation counter (CDM)

The operation counter sums the number of operating cycles and is visible on the front panel. It is compatible with manual and electrical control functions.

DB101173



Escutcheon (CDP)

Optional equipment mounted on the door of the cubicle, the escutcheon increases the degree of protection to IP 40 (circuit breaker installed free standing: IP30) . It is available in fixed and drawout versions.

Blanking plate (OP) for escutcheon

Used with the escutcheon, this option closes off the door cut-out of a cubicle not yet equipped with a device. It may be used with the escutcheon for both fixed and drawout devices.

Transparent cover (CP) for escutcheon

Optional equipment mounted on the escutcheon, the cover is hinged and secured by a screw. It increases the degree of protection to IP54, IK10. It adapts to drawout devices.

Escutcheon (CDP) with blanking plate.

PB100776-42



Transparent cover (CP) for escutcheon.



PB100843

Manual source-changeover systems

A manual source-changeover system is made up of:

- 2 devices (for connecting rod systems) or 2 to 3 devices (for cable systems)
- a connecting-rod or cable type mechanical interlocking system.

Remote-operated source-changeover systems

This is the most commonly employed system. No intervention by human operators is required. The switch from the normal to the replacement source is controlled electrically.

A remote-operated source-changeover system is made up of two or three circuit breakers or switch-disconnectors linked by:

- an electrical interlocking system implemented in a number of manners
- a mechanical interlocking system that protects against the consequences of an electrical malfunction and inhibits incorrect manual operation.

Automatic source-changeover systems

An automatic controller may be added to a remote-operated source-changeover system for automatic source control according to programmable operating modes. This solution provides optimal energy management:

- switching to a replacement source depending on any external conditions
- management of power sources
- regulation
- emergency source replacement, etc.

A communications function for dialogue with a supervisor is available for the automatic controller.

Communication option

The communication option must not be used to control the opening or closing of source-changeover system circuit breakers. It should be used only to transmit measurement data or circuit-breaker status.

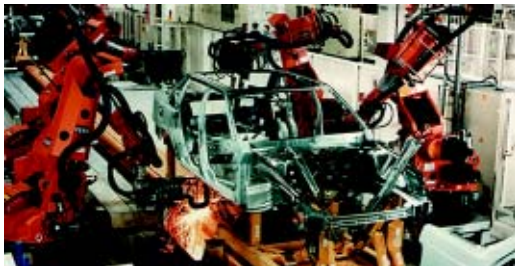
The eco COM option is perfectly suited to these equipments.



PB100844

Service sector:

- hospital operating rooms
- safety systems for tall buildings
- computer rooms (banks, insurance companies, etc.)
- lighting systems in shopping centres.



PB100845

Industry:

- assembly lines
- propulsion systems on ships
- essential auxiliaries in thermal power stations...



PB100846



PB100847

Infrastructure:

- port and railway installations
- runway lighting systems
- control systems for military installations...

Electrical interlocking of two or three devices is used to create a remote-operated source-changeover system.

A basic mechanical interlocking system enhances the reliability of system operation.



Interlocking of two devices using cables.

Interlocking of two devices using cables

To ensure a continuous supply of power, certain electrical installations are connected to two power sources:

- a normal source N
- a replacement source R which supplies the installation when source N is not available.

A source-changeover system switches between the two sources. The system may include an automatic controller which manages switching according to external conditions. A source-changeover system may comprise two or three circuit breakers or switch-disconnectors.

Interlocking of two devices using connecting rods

The two devices must be stack mounted.

This function requires:

- an adaptation fixture on the right side of each device
- a set of connecting rods with no-slip adjustments.

The complete interlock kit is supplied for assembly by the customer.

Maximum vertical distance between the fixing planes: 900 mm.

Combinations of Masterpact Normal and Replacement source devices

Devices to be interlocked		NT		NW	
		Fixed	Drawout	Fixed	Drawout
NT	Fixed	■	-	-	-
	Drawout	-	■	-	-
NW	Fixed	-	-	■	■
	Drawout	-	-	■	■

Interlocking of two or three devices using cables

Using cables, the devices may be stack mounted or installed side-by-side.

Interlocking of two devices (Masterpact NT or NW)

This function requires:

- an adaptation fixture on the right side of each device
- a set of cables with no-slip adjustments.

Maximum distance between the fixing planes (vertical or horizontal): 2000 mm with a radius greater or equal to 100 mm.

For cases requiring greater distances between fixing planes, please consult us.

Interlocking of three devices (only Masterpact NW)

This function requires:

- an adaptation fixture (different for each type of interlocking) on the right side of each device
- two or three sets of cables with no-slip adjustments.

Maximum distance between the fixing planes (vertical or horizontal): 1000 mm with a radius greater or equal to 100 mm.

For cases requiring greater distances between fixing planes, please consult us.

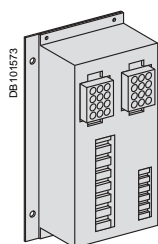
Installation

The complete interlock kit is supplied for assembly by the customer.

Combinations of Masterpact Normal and Replacement source devices

All combinations of Masterpact NT and NW devices may be used together in a source-changeover system. Interlocked devices may be fixed or drawout, three or four pole, with different ratings and sizes.

Electrical interlocking is used with the mechanical interlocking system. It controls switching between sources. An automatic controller may be added to take into account information from the distribution system.



IVE unit.

Electrical interlocking requires an electrical control device.

This function can be implemented in one of two ways:

- using the IVE electrical interlocking unit
- by an electrician using the electrical systems presented in the diagrams in the "Source-changeover systems" section of this catalogue.

Characteristics of the IVE unit

- external connection terminal block:
 - inputs: control of devices
 - outputs: status of the SDE contacts on the Normal and Replacement source devices
- connector to the two Normal and Replacement source devices:
 - inputs:
 - status of the OF contacts on each device (ON or OFF)
 - status of the SDE contacts on the Normal and Replacement source devices
 - outputs: power supply for motor mechanisms
- control voltage:
 - 24 to 250 V DC
 - 48 to 415 V 50/60 Hz
 - 440 V 60 Hz.

The control voltage for the IVE electrical interlocking unit must be identical to that of the operating mechanism.

Necessary equipment

Each device must be equipped with:

- a remote-operation system made up of:
 - MCH gear motor
 - MX or MN opening release
 - XF closing release
 - PF "ready to close" contact
- an available OF contact
- one to three CE connected-position contacts for drawout devices.

Types of mechanical interlocking	Possible combinations	Typical electrical diagrams	Diagram no.																					
2 devices																								
	<table><tr><th>QN</th><th>QR</th></tr><tr><td>0</td><td>0</td></tr><tr><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td></tr></table>	QN	QR	0	0	1	0	0	1	<ul style="list-style-type: none">■ electrical interlocking with lockout after fault:■ automatic control with lockout after fault:<input type="checkbox"/> permanent replacement source (with IVE)<input type="checkbox"/> engine generator set (with IVE)■ BA/UA controller (with IVE)■ electrical interlocking with lockout after fault:	<p>51156904</p> <p>51156905</p> <p>51156903</p>													
QN	QR																							
0	0																							
1	0																							
0	1																							
3 devices: 2 "Normal" sources and 1 "Replacement" source																								
	<table><tr><th>QN1</th><th>QN2</th><th>QR</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td></tr></table>	QN1	QN2	QR	0	0	0	1	1	0	0	0	1	<ul style="list-style-type: none">■ electrical interlocking:<input type="checkbox"/> without lockout after fault<input type="checkbox"/> with lockout after fault	<p>51156906</p> <p>51156907</p>									
QN1	QN2	QR																						
0	0	0																						
1	1	0																						
0	0	1																						
3 devices: 2 "Normal" sources and 1 "Replacement" source with source selection																								
	<table><tr><th>QN1</th><th>QN2</th><th>QR</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td></tr></table>	QN1	QN2	QR	0	0	0	1	0	0	0	0	1	1	1	0	0	1	0	<ul style="list-style-type: none">■ automatic control with engine generator set:<input type="checkbox"/> without lockout after fault (with MN)<input type="checkbox"/> with lockout after fault (with MN)	<p>51156908</p> <p>51156909</p>			
QN1	QN2	QR																						
0	0	0																						
1	0	0																						
0	0	1																						
1	1	0																						
0	1	0																						
3 devices: 3 sources, only one device																								
	<table><tr><th>QS1</th><th>QS2</th><th>QS3</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td></tr></table>	QS1	QS2	QS3	0	0	0	1	0	0	0	1	0	0	0	1	<ul style="list-style-type: none">■ electrical interlocking:<input type="checkbox"/> without lockout after fault<input type="checkbox"/> with lockout after fault	<p>51156910</p> <p>51156911</p>						
QS1	QS2	QS3																						
0	0	0																						
1	0	0																						
0	1	0																						
0	0	1																						
3 devices: 2 sources + 1 coupling																								
	<table><tr><th>QS1</th><th>QC</th><th>QS2</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td></tr></table> <p>(1) possible by forcing operation</p>	QS1	QC	QS2	0	0	0	1	0	1	1	1	0	0	1	1	1	0	0	0	0	1	<ul style="list-style-type: none">■ electrical interlocking:<input type="checkbox"/> without lockout after fault<input type="checkbox"/> with lockout after fault■ automatic control with lockout after fault	<p>51156912</p> <p>51156913</p> <p>51156914</p>
QS1	QC	QS2																						
0	0	0																						
1	0	1																						
1	1	0																						
0	1	1																						
1	0	0																						
0	0	1																						

"Lockout after fault" option. This option makes it necessary to manually reset the device following fault tripping.

By combining a remote-operated source-changeover system with an integrated BA or UA automatic controller, it is possible to automatically control source transfer according to user-selected sequences. These controllers can be used on source-changeover systems comprising 2 circuit breakers.

For source-changeover systems comprising 3 circuit breakers, the automatic control diagram must be prepared by the installer as a complement to diagrams provided in the "electrical diagrams" section of this catalogue.



BA controller.



UA controller.

Controller		BA	UA
Compatible circuit breakers		All Compact NS and Masterpact circuit breakers	
4-position switch			
Automatic operation		■	■
Forced operation on "Normal" source		■	■
Forced operation on "Replacement" source		■	■
Stop (both "Normal" and "Replacement" sources off)		■	■
Automatic operation			
Monitoring of the "Normal" source and automatic changeover		■	■
Generator set startup control			■
Generator set shutdown control			■
Load shedding and reconnection of non-priority circuits			■
Changeover to the "Replacement" source if one of the phases of the "Normal" phase is absent			■
Test			
By opening the P25M circuit breaker supplying the controller		■	
By pressing the test button on the front of the controller			■
Indications			
Circuit breaker status indication on the front of the controller: on, off, fault trip		■	■
Automatic mode indicating contact		■	■
Other functions			
Selection of type of "Normal" source (single-phase or three-phase)			■
Voluntary transfer to "Replacement" source (e.g. energy management commands)		■	■
During peak-tariff periods (energy management commands), forced operation on "Normal" source if "Replacement" source not operational			■
Additional contact (not part of controller). Transfer to "Replacement" source only if contact is closed (e.g. used to test the frequency of UR).		■	■
Setting of maximum startup time for the replacement source			■
Options			
Communication option		■	
Power supply			
Control voltages ⁽¹⁾	220 to 240 V 50/60 Hz	■	■
	380 to 415 V 50/60 Hz	■	■
	440 V 60 Hz	■	■
Operating thresholds			
Undervoltage	0.35 Un ≤ voltage ≤ 0.7 Un	■	■
Phase failure	0.5 Un ≤ voltage ≤ 0.7 Un		■
Voltage presence/voltage	voltage ≥ 0.85 Un	■	■
Characteristics of output contacts			
Rated thermal current (A)	8		
Minimum load	10 mA at 12 V		
		DC	
		AC12	AC13
		AC14	AC15
		DC12	
		DC13	
Utilisation category (IEC 60947-5-1)		8	7
Operational current (A)	24 V	8	7
	48 V	8	7
	110 V	8	6
	220/240 V	8	6
	250 V	-	-
	380/415 V	5	-
	440 V	4	-
	660/690 V	-	-

(1) The controller is powered by the ACP auxiliaries control plate. The same voltage must be used for the ACP plate, the IVE unit and the circuit breaker motor mechanisms. If this voltage is the same as the source voltage, then the "Normal" and "Replacement" sources can be used directly for the power supply. If not, a BC type or equivalent isolation transformer must be used.

Perfectly integrated in the Compact and Masterpact ranges, Display modules are designed for use with Micrologic control units to provide instant and highly intuitive access to all the information provided by the circuit breakers, including device status, current, voltage and power values, etc.



DMB300 display module: basic and harmonic measurements.



DMC300 display module: measurements, harmonic analysis, diagnosis.

DMB300 and DMC300 display modules use the power and communications capabilities of the Micrologic control units to centralise the display of electrical values, status conditions and alarms of one or more Compact or Masterpact circuit breakers.

The mounting and cabling system for the display modules ensures fast, easy and reliable installation.

Start-up is immediate with no configuration or programming required.

Display modules are high-performance devices combining:

- simple and easy-to-read dials
- powerful and accurate digital processing.

Their small size and extensive communications capabilities make for easy and flexible installation and operation.

Display modules	DMB300	DMC300
Associated circuit breakers		
Type	Compact or Masterpact equipped with Micrologic control units	
Number	1 to 4	1 to 16
Display		
Screen type	Black and white	Colour, touch screen
Screen size	240 x 64 pixels	5", 320 x 240 pixels
Entry	5 buttons	Touch screen
Information displayed		
Currents (per phase)		
Currents I1, I2, I3, IN	A P H	A P H
Maximum current	A P H	A P H
Earth-fault and earth-leakage currents	A P H	A P H
Demand current	P H	P H
Maximum demand current	P H	P H
Total harmonic distortion (THD)	H	H
Maximum total harmonic distortion	H	H
Amplitudes of individual harmonics		H
Voltages		
Phase-to-phase voltages (U ₁₋₂ , U ₂₋₃ , U ₃₋₁)	P H	P H
Minimum/maximum phase-to-phase voltages	P H	P H
Phase-to-neutral voltages (V _{1-N} , V _{2-N} , V _{3-N})	P H	P H
Minimum/maximum phase-to-neutral voltages		P H
Frequency	P H	P H
Voltage imbalance (% per phase)	P H	P H
Total harmonic distortion (% per phase)	H	H
Maximum total harmonic distortion (% per phase)	H	H
Amplitudes of individual harmonics	H	H
Power		
Active (P), reactive (Q) and apparent (S) power	P H	P H
Power factor and cosφ	P H	P H
Maximum power (P, Q, S)	P H	P H
Demand power (P, Q, S)	P H	P H
Maximum demand power	P H	P H
Metering		
Active, reactive and apparent energy	P H	P H
On-line help		
	On-line help is available for each type of information supplied by the module	
Circuit-breaker diagnostics		
Identification of control units	A P H	A P H
Reading of protections	A P H	A P H
Circuit-breaker status	A P H	A P H
Type of trip	A P H	A P H
Current alarms	P H	P H
Maintenance indicator		P H
Installation diagnosis		
Indication of faulty devices		A P H
Fault log		A P H
Installation and start-up		
Mounting	Mounted through door, without tools, using 6 spring-clips supplied with the mod.	
Connection	Prefabricated wiring systems	

Associated Micrologic control unit

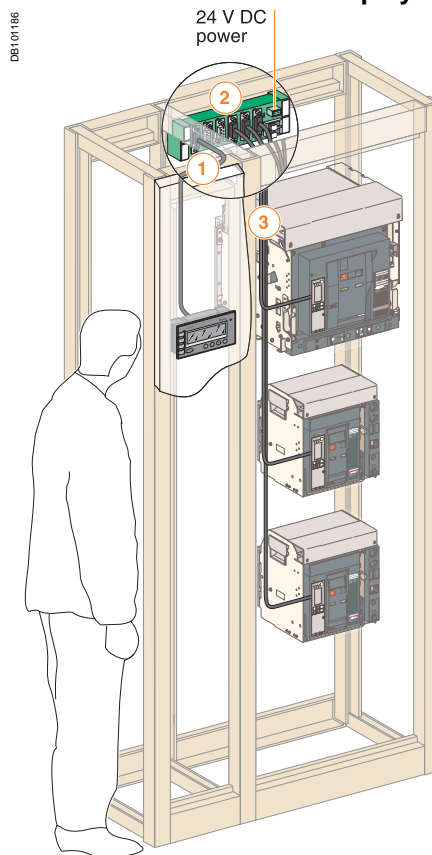
A = Micrologic A
P = Micrologic P
H = Micrologic H

Wiring system

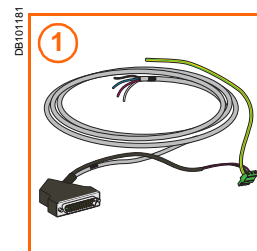
The wiring system is designed for low-voltage power switchboards. Installation requires no tools or special skills.

The prefabricated wiring ensures both data transmission (ModBus protocol) and 24 V DC power distribution for the display module and the communications modules on the Micrologic control units.

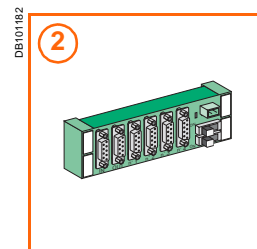
Connection of DMC300 display module



Masterpact circuit breakers equipped with Micrologic control units and the ModBus COM option.



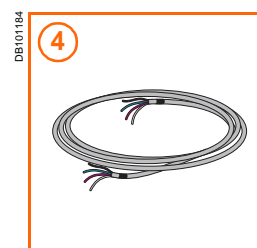
CDM 303:
Connection cable between
display module and junction
block.



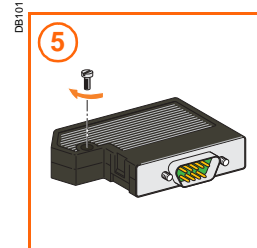
CJB 306 junction block.



CCP 303:
Connection cable between
Masterpact or Compact and
junction block.



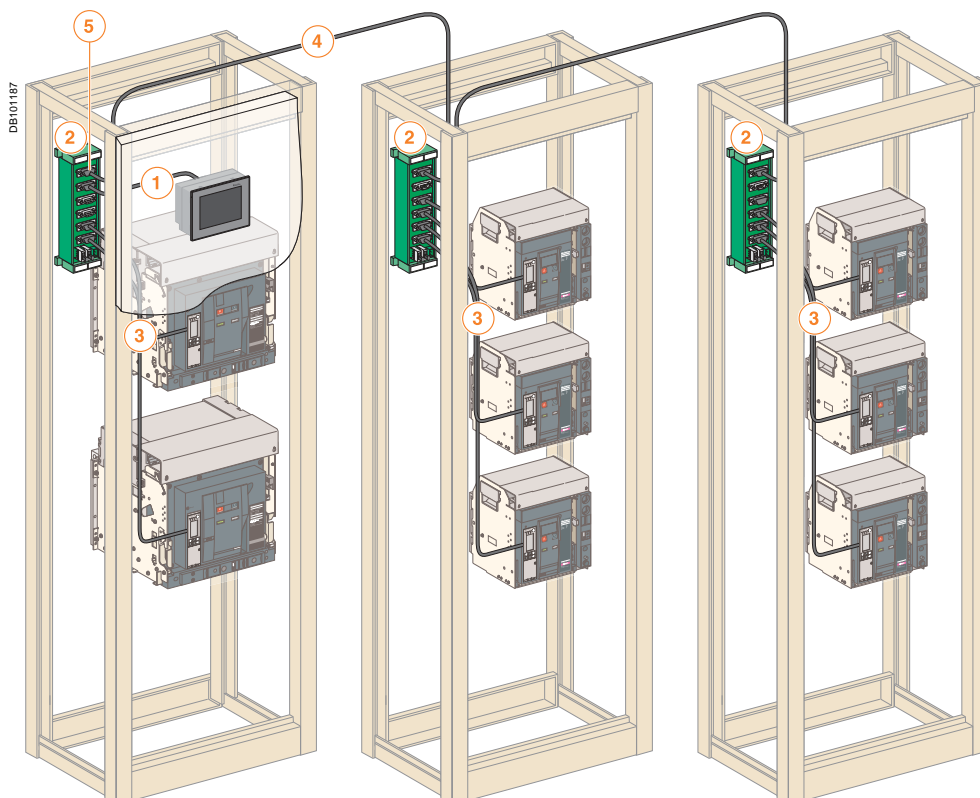
CCR 301:
Roll of RS 485 cable
(2 RS 485 wires + 2 power
supply wires).



CSD 309:
SubD 9-pin connector for
colour-coded connection of
wires to screw terminals.

Connection of DMB300 display module

Maximum distance between module and circuit breaker: 1200 m.



Masterpact circuit breakers equipped with Micrologic control units and the ModBus eco COM option.