

# Guiding

TOOLS

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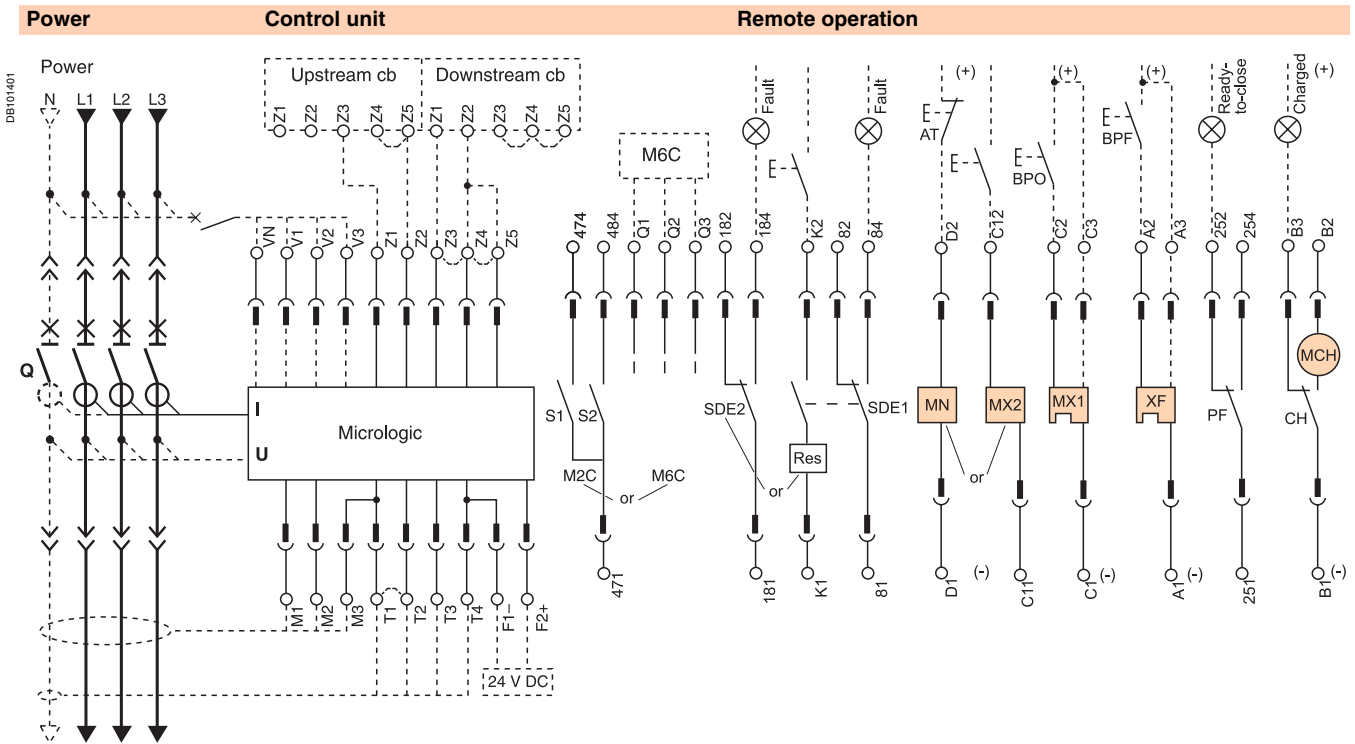
## Training

Training allows you to acquire the Merlin Gerin expertise (installation design, work with power on, etc.) for increased efficiency and a guarantee of improved customer service. The training catalogue includes beginner's courses in electrical distribution, knowledge of MV and LV switchgear, operation and maintenance of installations, design of LV installations to give but a few examples.



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The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.



Terminal block marking	Com	UC1	UC2	UC3	UC4 / M2C / M6C
E5 E6	Z5 M1	M2 M3	F2+	V3 / 484 / Q3	
E3 E4	Z3 Z4	T3 T4	VN	V2 / 474 / Q2	
E1 E2	Z1 Z2	T1 T2	F1-	V1 / 471 / Q1	

Remote operation	SDE2 / Res	SDE1	MN / MX2	MX1	XF	PF	MCH
	184 / K2	84	D2 / C12	C2	A2	254	B2
	182	82		C3	A3	252	B3
	181 / K1	81	D1 / C11	C1	A1	251	B1

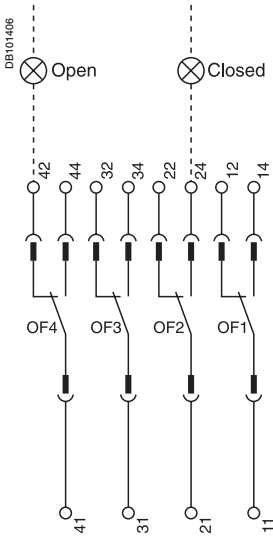
A	P	H	Control unit
■	■	■	<b>Com</b> : E1-E6 communication
■	■	■	<b>UC1</b> : Z1-Z5 zone selective interlocking Z1 = ZSI OUT SOURCE Z2 = ZSI OUT ; Z3 = ZSI IN SOURCE Z4 = ZSI IN ST (short time) Z5 = ZSI IN GF (earth fault)
■	■	■	M1 = Vigi module input (Micrologic 7)
■	■	■	<b>UC2</b> : T1, T2, T3, T4 = external neutral M2, M3 = Vigi module input (Micrologic 7)
■	■	■	<b>UC3</b> : F2+, F1- external 24 V DC power supply VN external voltage connector (must be connected to the neutral with a 3P circuit breaker)
■	■	■	<b>UC4</b> : External Voltage Connector (PTE option) or <b>M2C</b> : 2 programmable contacts (external relay) ext. 24 V DC power supply required. or <b>M6C</b> : 6 programmable contacts to be connected to the external module M6C) ext. 24 V DC power supply required.

Remote operation
<b>SDE2</b> : fault-trip indication contact or <b>Res</b> : remote reset
<b>SDE1</b> : fault-trip indication contact (supplied as standard)
<b>MN</b> : undervoltage release or <b>MX2</b> : shunt release
<b>MX1</b> : shunt release (standard or communicating)
<b>XF</b> : closing release (standard or communicating)
<b>PF</b> : ready-to-close contact
<b>MCH</b> : electric motor

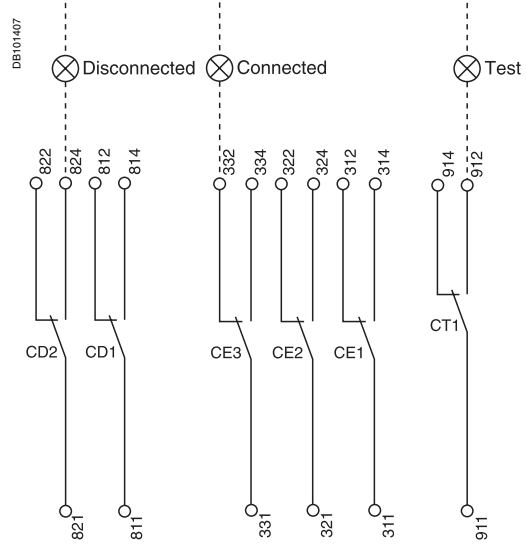
*Note: when communicating MX or XF releases are used, the third wire (C3,A3) must be connected even if the communication module is not installed.*

A : digital ammeter.  
P : A + power meter + additional protection.  
H : P + harmonics.

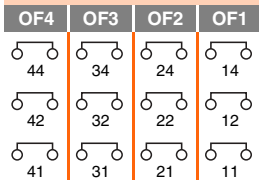
**Indication contacts**



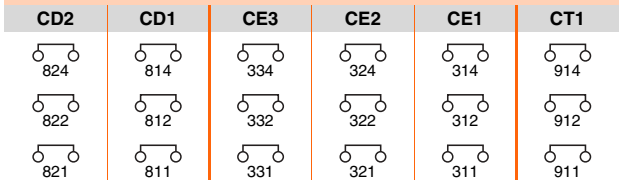
**Chassis contacts**



**Indication contacts**



**Chassis contacts**



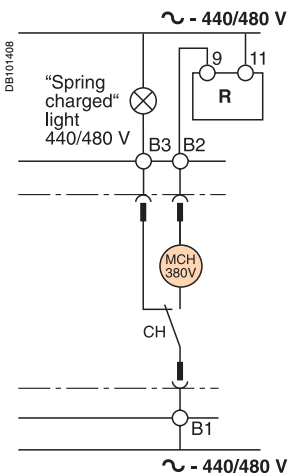
**Indication contacts**

**OF4 / OF3 / OF2 / OF1** : ON/OFF indication contacts.




**(\*) Spring charging motor 440/480 V AC**  
(380 V motor + additional resistor).

**Chassis contacts**

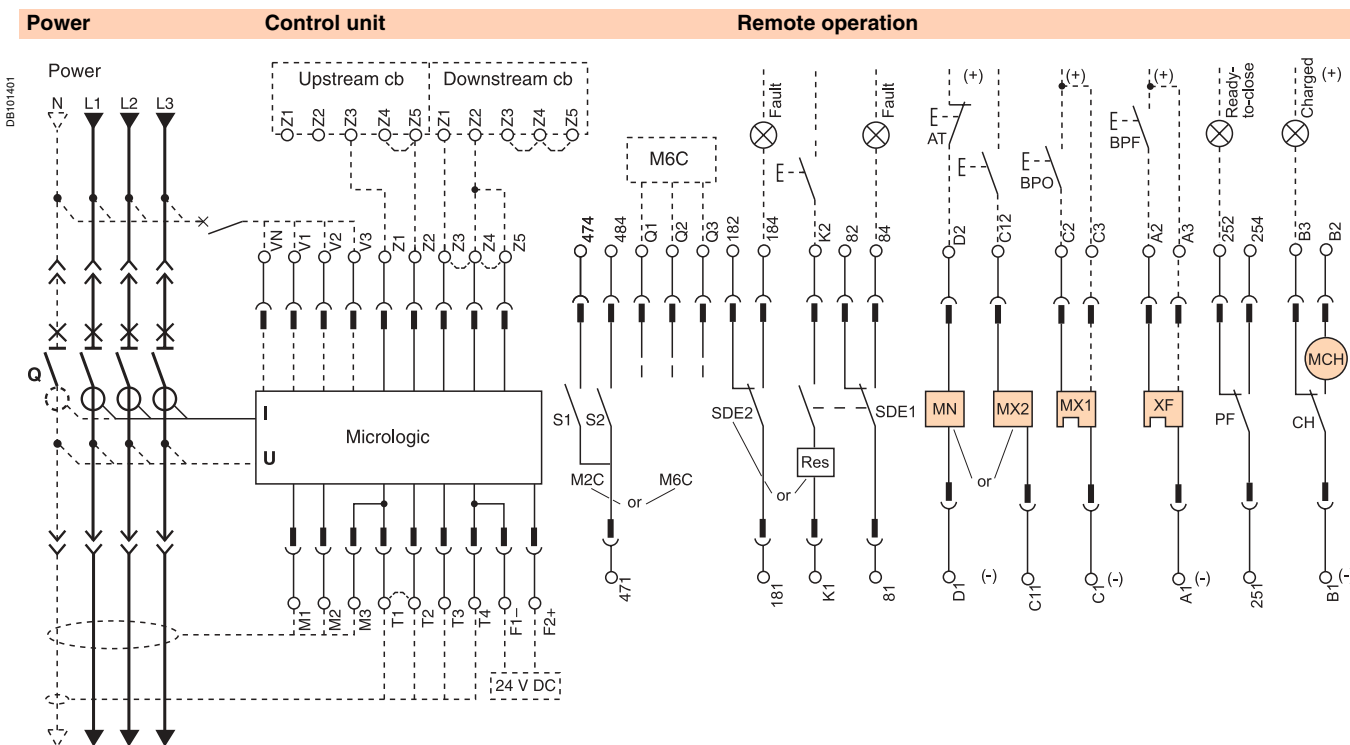
**CD2** : disconnected position contacts  
**CD1** : disconnected position contacts  
**CE3** : connected position contacts  
**CE2** : connected position contacts  
**CE1** : connected position contacts  
**CT1** : test position contacts



Key:

-  drawout device only.
-  SDE1, OF1, OF2, OF3, OF4 supplied as standard.
-  interconnected connections (only one wire per connection point).

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.



Terminal block marking	Control unit													
	Com	UC1	UC2	UC3	UC4	M2C / M6C								
	○ E5	○ E6	○ Z5	○ M1	○ M2	○ M3	○ F2+	○ V3	○ 484	○ Q3				
	○ E3	○ E4	○ Z3	○ Z4	○ T3	○ T4	○ VN	○ V2	○ 474	○ Q2				
	○ E1	○ E2	○ Z1	○ Z2	○ T1	○ T2	○ F1-	○ V1	○ 471	○ Q1				

Remote operation											
SDE2 / Res	SDE1	MN / MX2	MX1	XF	PF	MCH					
○ 184 / ○ K2	○ 84	○ D2 / ○ C12	○ C2	○ A2	○ 254	○ B2					
○ 182	○ 82		○ C3	○ A3	○ 252	○ B3					
○ 181 / ○ K1	○ 81	○ D1 / ○ C11	○ C1	○ A1	○ 251	○ B1					

A	P	H	Control unit
■	■	■	<b>Com</b> : E1-E6 communication
■	■	■	<b>UC1</b> : Z1-Z5 zone selective interlocking Z1 = ZSI OUT SOURCE Z2 = ZSI OUT ; Z3 = ZSI IN SOURCE Z4 = ZSI IN ST (short time) Z5 = ZSI IN GF (earth fault) M1 = Vigi module input (Micrologic 7)
■	■	■	<b>UC2</b> : T1, T2, T3, T4 = external neutral M2, M3 = Vigi module input (Micrologic 7)
■	■	■	<b>UC3</b> : F2+, F1- external 24 V DC power supply VN external voltage connector (must be connected to the neutral with a 3P circuit breaker)
■	■	■	<b>UC4</b> : External Voltage Connector (PTE option)
■	■	■	<b>M2C</b> : 2 programmable contacts (internal relay) ext. 24 V DC power supply required
			or
■	■	■	<b>M6C</b> : 6 programmable contacts (to be connected to the external module M6C) ext. 24 V DC power supply required

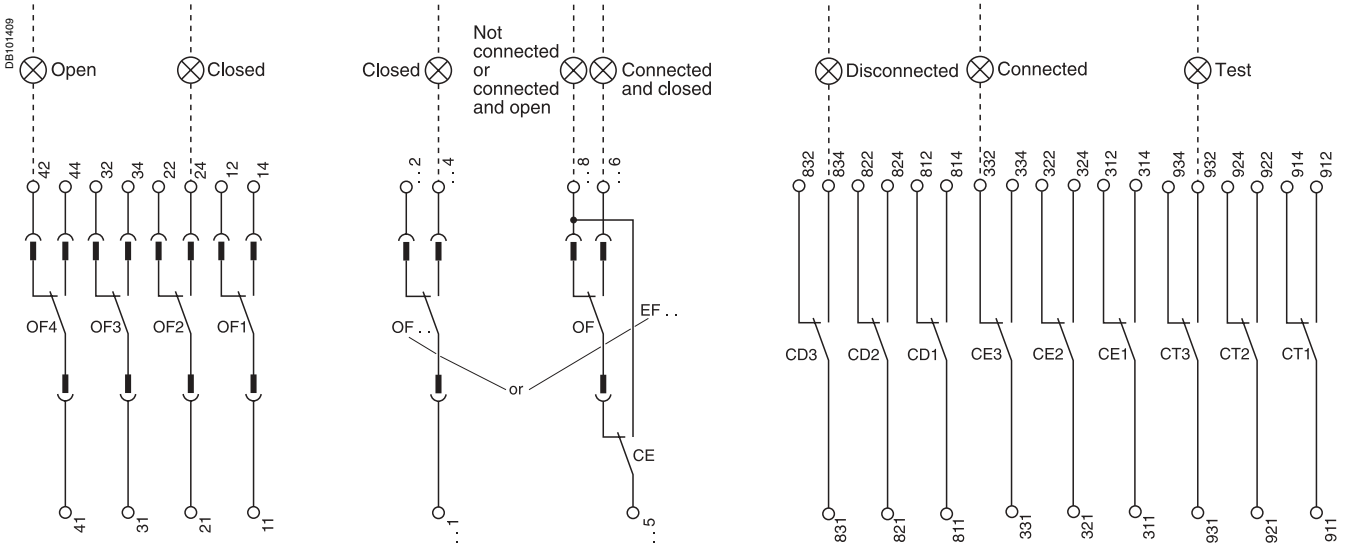
Remote operation											
<b>SDE2</b> : fault-trip indication contact											
or											
<b>Res</b> : remote reset											
<b>SDE1</b> : fault-trip indication contact (supplied as standard)											
<b>MN</b> : undervoltage release											
or											
<b>MX2</b> : shunt release											
<b>MX1</b> : shunt release (standard or communicating)											
<b>XF</b> : closing release (standard or communicating)											
<b>PF</b> : ready-to-close contact											
<b>MCH</b> : electric motor											

*Note: when communicating MX or XF releases are used, the third wire (C3,A3) must be connected even if the communication module is not installed.*

A : digital ammeter.  
P : A + power meter + additional protection.  
H : P + harmonics.

**Indication contacts**

**Chassis contacts**



**Indication contacts**

**Chassis contacts**

OF4	OF3	OF2	OF1	OF24	OF23	OF22	OF21	OF14	OF13	OF12	OF11
44	34	24	14	244	234	224	214	144	134	124	114
42	32	22	12	242	232	222	212	142	132	122	112
41	31	21	11	241	231	221	211	141	131	121	111
				<b>or</b>	<b>or</b>	<b>or</b>	<b>or</b>	<b>or</b>	<b>or</b>	<b>or</b>	<b>or</b>
EF24	EF23	EF22	EF21	EF14	EF13	EF12	EF11				
248	238	228	218	148	138	128	118				
246	236	226	216	146	136	126	116				
245	235	225	215	145	135	125	115				

CD3	CD2	CD1	CE3	CE2	CE1	CT3	CT2	CT1
834	824	814	334	324	314	934	924	914
832	822	812	332	322	312	932	922	912
831	821	811	331	321	311	931	921	911
			<b>or</b>				<b>or</b>	
CE6	CE5	CE4				CE9	CE8	CE7
364	354	344				394	384	374
362	352	342				392	382	372
361	351	341				391	381	371

**Indication contacts**

**Chassis contacts**

<b>OF4 :</b>	ON/OFF indication contacts	<b>OF24 or EF24</b>	Combined "connected-deconnected" indication contacts
<b>OF3</b>		<b>OF23 or EF23</b>	
<b>OF2</b>		<b>OF22 or EF22</b>	
<b>OF1</b>		<b>OF21 or EF21</b>	
		<b>OF14 or EF14</b>	
		<b>OF13 or EF13</b>	
		<b>OF12 or EF12</b>	
		<b>OF11 or EF11</b>	

<b>CD3</b>	disconnected position contacts	<b>CE3</b>	connected position contacts	<b>CT3</b>	test position contacts
<b>CD2</b>		<b>CE2</b>		<b>CT2</b>	
<b>CD1</b>		<b>CE1</b>		<b>CT1</b>	
<b>or</b>				<b>or</b>	
<b>CE6</b>	connected position contacts	<b>CE5</b>		<b>CE9</b>	connected position contacts
<b>CE4</b>				<b>CE8</b>	
				<b>CE7</b>	
				<b>or</b>	
				<b>CD6</b>	disconnected position contacts
				<b>CD5</b>	
				<b>CD4</b>	

Key:

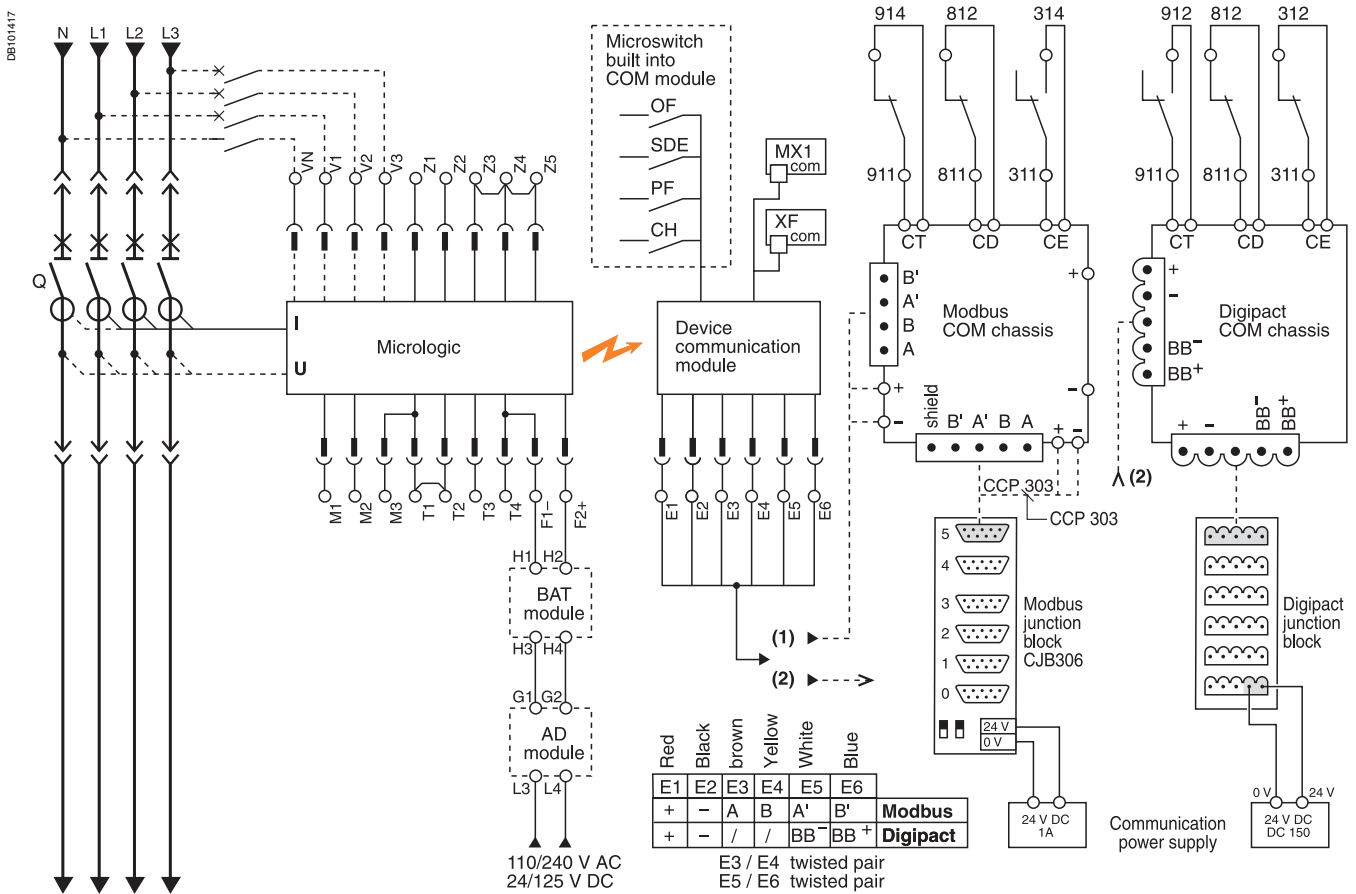
drawout device only.

SDE1, OF1, OF2, OF3, OF4 supplied as standard.

interconnected connections (only one wire per connection point).

# Masterpact NT and NW Communications option 24 V DC external power supply

## Connection of the communications option



None of the control-unit protection functions require an auxiliary source. However, the 24 V DC external power-supply (AD module) is required for certain operating configurations as indicated in the table below.

Circuit breaker	Closed	Open	
Voltage measurement inputs	Powered	Powered	Not powered
M2C, M6C programmable contacts option	Yes	Yes	Yes
Protection function	No	No	No
Display function	No <sup>(3)</sup>	No <sup>(4)</sup>	Yes
Time-stamping function	No	No	Yes <sup>(5)</sup>
Circuit-breaker status indications and control via communications bus	No	No	No
Identification, settings, operation and maintenance aids via communications bus	No <sup>(3)</sup>	No <sup>(4)</sup>	Yes

- (1) Drawout device equipped with Modbus chassis COM.
- (2) Drawout device equipped with Digipact chassis COM.
- (3) Except for Micrologic A control units (if current < 20 % I<sub>n</sub>).
- (4) Except for Micrologic A control units.
- (5) Time setting is manual and can be carried out automatically by the supervisor via the communications bus.

The communications bus requires its own 24 V DC power source (E1, E2). This source is not the same as the 24 V DC external power-supply module (F1-, F2+).

In case of using the 24 V DC external power supply (AD module), maximum cable length between 24 V DC (G1, G2) and the control unit (F1-, F2+) must not exceed 10 meters.

The BAT battery module, mounted in series upstream of the AD module, ensures an uninterrupted supply of power if the AD module power supply fails.

The voltage measurement inputs are standard equipment on the downstream connectors of the circuit breaker.

External connections are possible using the PTE external voltage measurement input option. With this option, the internal voltage measurement inputs are disconnected and terminals VN, V1, V2, V3 are connected only to the control unit (Micrologic P and H only). The PTE option is required for voltages less than 220 V and greater than 690 V (in which case a voltage transformer is compulsory). For three-pole devices, the system is supplied with terminal VN connected only to the control unit (Micrologic P and H).

When the PTE option is implemented, the voltage measurement input must be protected against short-circuits. Installed as close as possible to the busbars, this protection function is ensured by a P25M circuit breaker (1 A rating) with an auxiliary contact (cat. no. 21104 and 21117). This voltage measurement input is reserved exclusively for the control unit and must not ever be used to supply other circuits outside the switchboard.

# Masterpact NT and NW Communications option 24 V DC external power supply

## Examples using the COM communications option

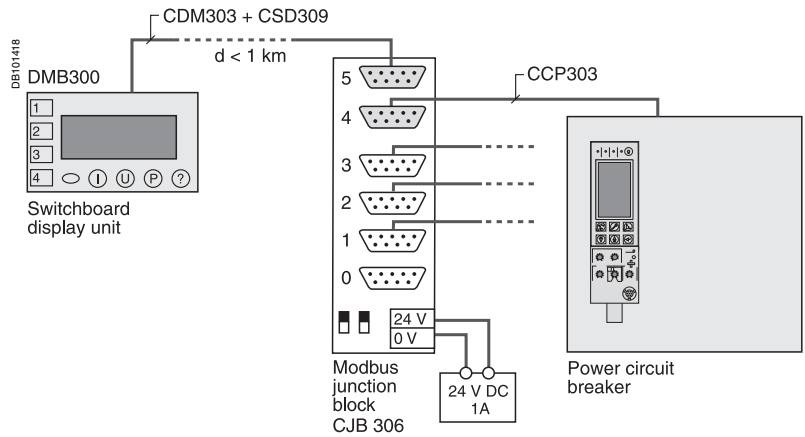
### Switchboard display unit

This architecture provides remote display of the variables managed by Micrologic control units equipped with the eco COM Modbus module.

- I (Micrologic A)
- I, U, P, E (Micrologic P)
- I, U, P, E, THD (Micrologic H)

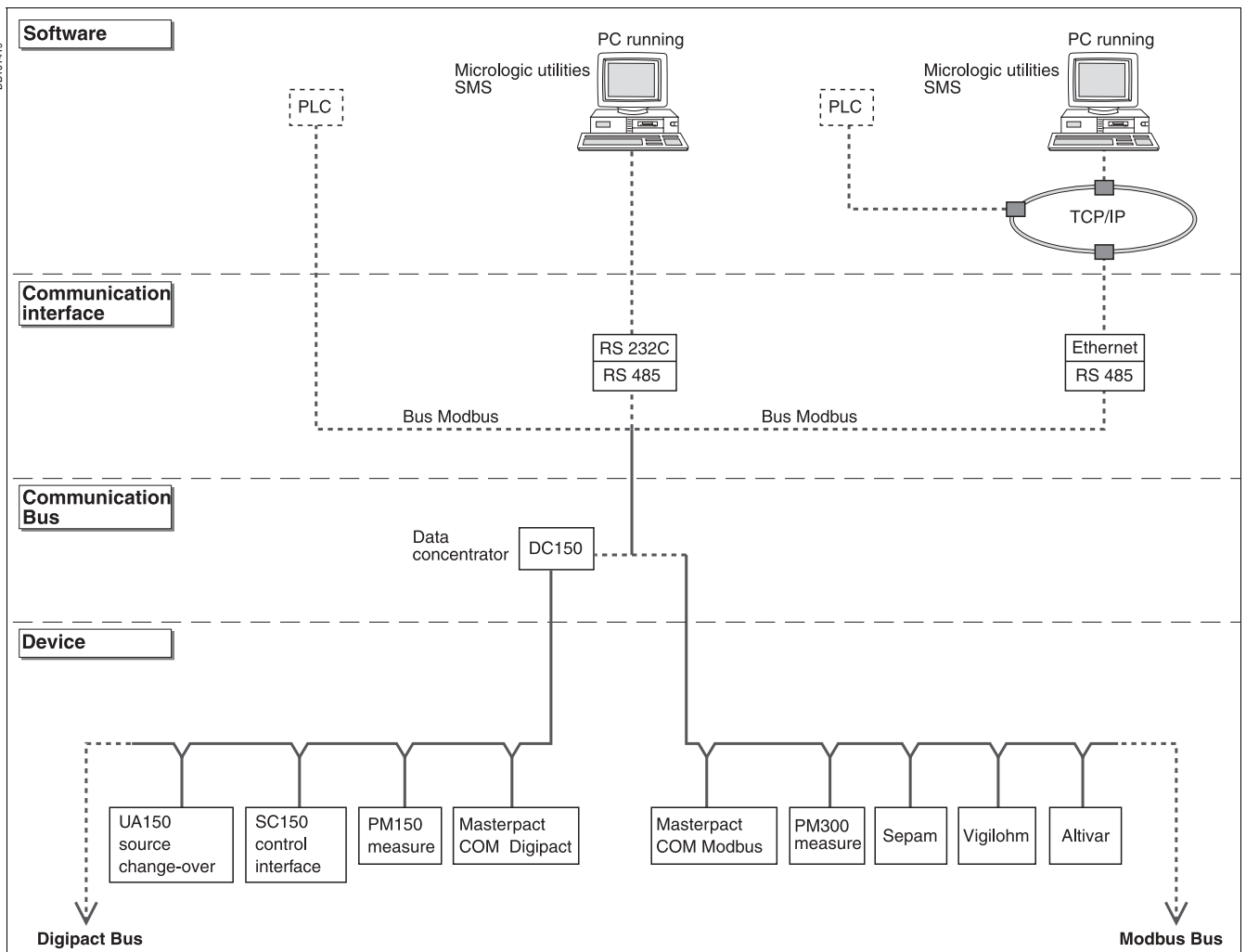
No programming is required.

For Micrologic A control unit (if current < 20 % I<sub>n</sub>), it is recommended to use the 24 V DC external power supply (AD module).



### Communicating switchboard

This configuration provides remote display and control of Masterpacts equipped with the Modbus or Digipact COM module. The Digipact bus can be combined with the Modbus bus.



# Masterpact NT and NW

## Earth-fault and earth-leakage protection

### Neutral protection

### Zone selective interlocking

#### External sensor (CT) for residual earth-fault protection

##### Connection of current-transformer secondary circuit for external neutral

Masterpact equipped with a Micrologic 6 A/P/H:

- shielded cable with 2 twisted pairs
- T1 twisted with T2
- T3 twisted with T4
- shielding connected to GND on one end only
- maximum length 10 meters
- cable cross-sectional area 0.4 to 1.5 mm<sup>2</sup>
- recommended cable: Belden 9552 or equivalent.

If supply is via the top, follow the schematics.

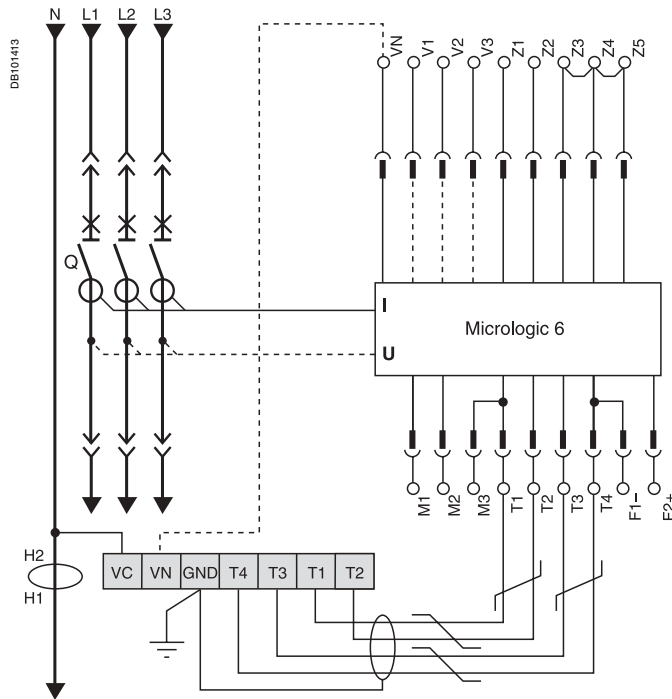
If supply is via the bottom, control wiring is identical; for the power wiring, H1 is connected to the source side, H2 to the load side.

For four-pole versions, for residual earth-fault protection, the current transformer for the external neutral is not necessary.

If the 2000/6300 current transformer is used:

- signals T1 and T2 must be wired in series
- signals T3 and T4 must be wired in parallel.

Connection for signal VN is required only for power measurements (3 Ø, 4 wires, 4CTs).

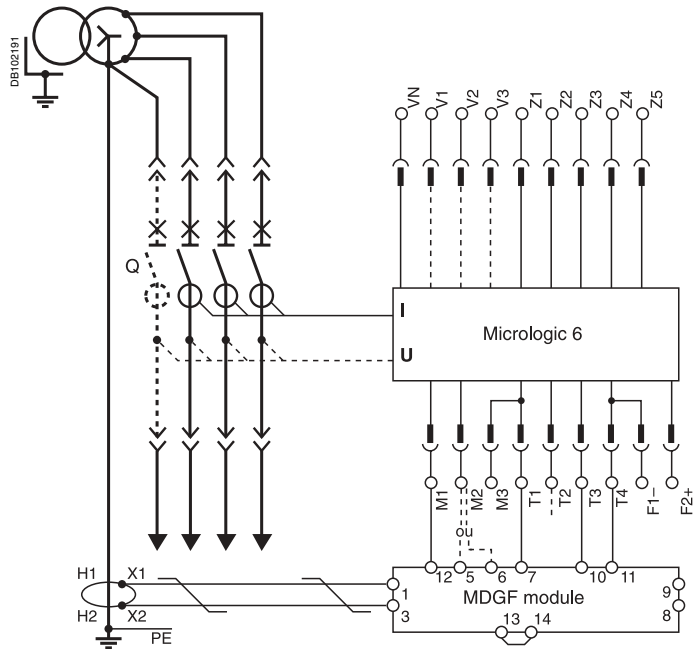


#### External transformer for source ground return (SGR) earth-fault protection

##### Connection of the secondary circuit

Masterpact equipped with a Micrologic 6 A/P/H:

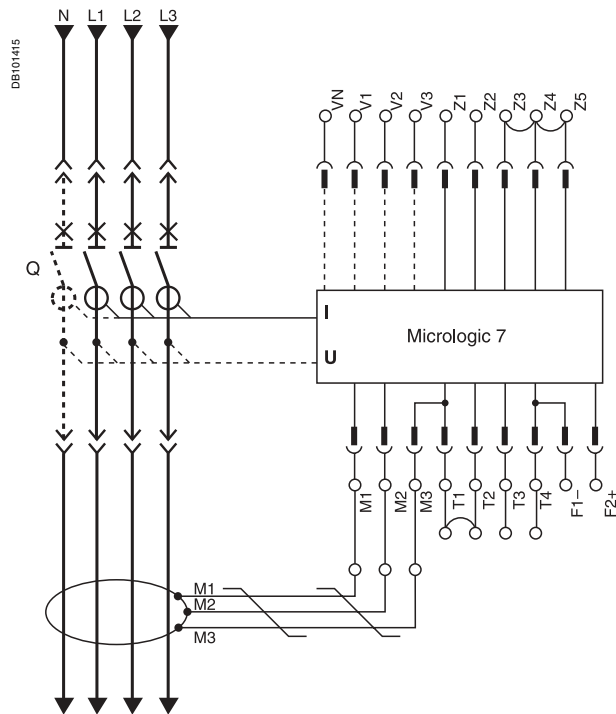
- unshielded cable with 1 twisted pair
- maximum length 150 meters
- cable cross-sectional area 0.4 to 1.5 mm<sup>2</sup>
- terminals 5 and 6 may not be used at the same time
- use terminal 5 for NW08 to 40
- use terminal 6 for NW40b to 63
- recommended cable: Belden 9409 or equivalent.



#### Earth-leakage protection

##### Connection of the rectangular-sensor secondary circuit

Use the cable shipped with the rectangular sensor.



#### Neutral protection

- three pole circuit breaker:
  - Masterpact equipped with Micrologic P or H
  - the current transformer for external neutral is necessary (the wiring diagram is identical to the one used for the residual earth-fault protection)
- four pole circuit breaker:
  - Masterpact equipped with Micrologic A, P or H
  - the current transformer for external neutral is not necessary.

#### Zone selective interlocking

Zone-selective interlocking is used to reduce the electrodynamic forces exerted on the installation by shortening the time required to clear faults, while maintaining time discrimination between the various devices. A pilot wire interconnects a number of circuit breakers equipped with Micrologic A/P/H control units, as illustrated in the diagram above.

The control unit detecting a fault sends a signal upstream and checks for a signal arriving from downstream. If there is a signal from downstream, the circuit breaker remains closed for the full duration of its tripping delay. If there is no signal from downstream, the circuit breaker opens immediately, regardless of the tripping-delay setting.

**Fault 1.**  
Only circuit breaker A detects the fault. Because it receives no signal from downstream, it opens immediately, regardless of its tripping delay set to 0.3.

**Fault 2.**  
Circuit breakers A and B detect the fault. Circuit breaker A receives a signal from B and remains closed for the full duration of its tripping delay set to 0.3. Circuit breaker B does not receive a signal from downstream and opens immediately, in spite of its tripping delay set to 0.2.

**Note:** the maximum permissible distance between two devices is 3000 m. A downstream circuit breaker can "control" up to ten upstream circuit breakers.

