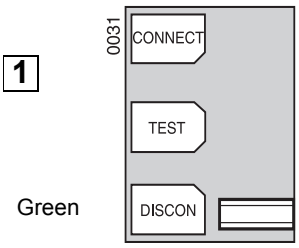
6 Commissioning

6.1 Preparation of withdrawable circuit-breaker

6.1.1 Inserting the circuit-breaker in withdrawable unit

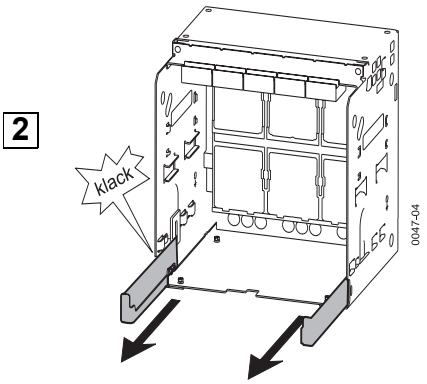
CAUTION
Remove padlocks on the shutter!

Check circuit-breaker position indicator

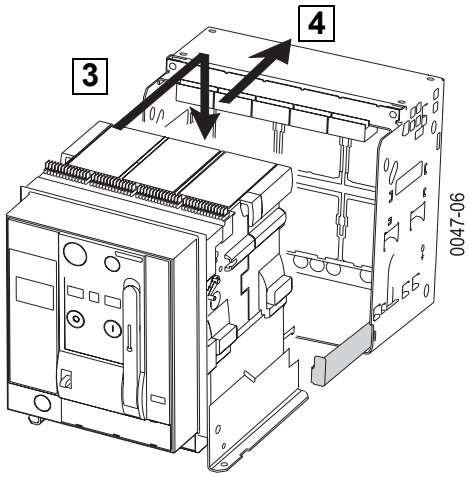


CAUTION
Ensure it shows DISCON. Otherwise the circuit-breaker cannot be inserted.

Pull out guide rails

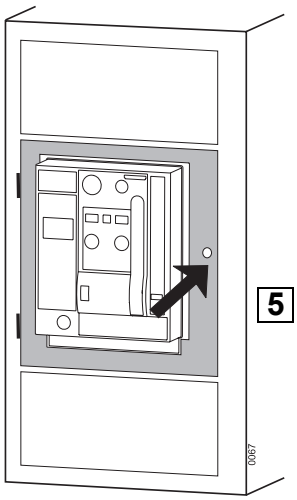


Place the circuit-breaker in the withdrawable unit and push it into disconnected position

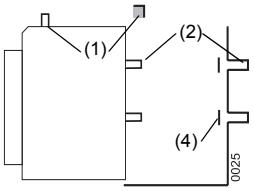
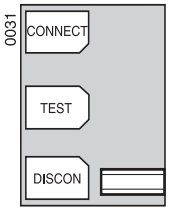
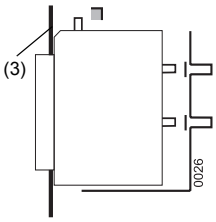
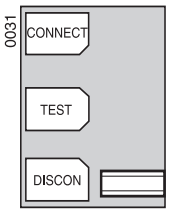
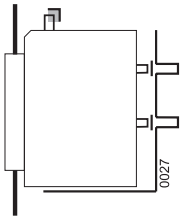
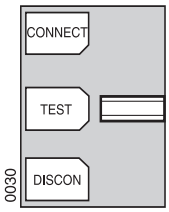
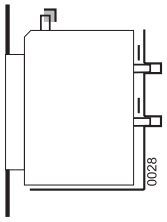
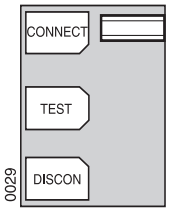


CAUTION
Push circuit-breaker as far as the stop into the disconnected position; the latches at the side must engage!

Close the panel door

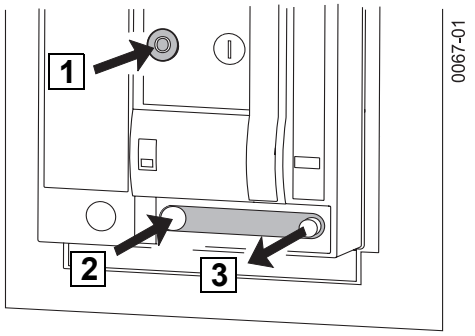


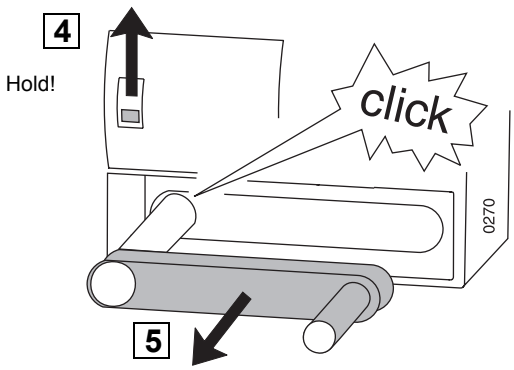
6.1.2 Position of the circuit-breaker in the withdrawable unit

	Diagram	Position indicator	Power circuit (2)	Auxiliary circuit (1)	Panel door (3)	Shutters (4)
Maintenance position		Green 	Disconnected	Disconnected	Open	Closed
Disconnected position		Green 	Disconnected	Disconnected	Closed	Closed
Test position		Blue 	Disconnected	Connected	Closed	Closed
Connected position		Red 	Connected	Connected	Closed	Open

(1) Auxiliary circuit
(2) Power circuit
(3) Panel door
(4) Shutter, optional

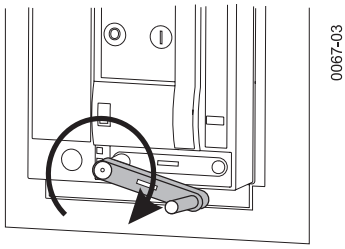
6.1.3 Release racking handle/withdraw racking handle

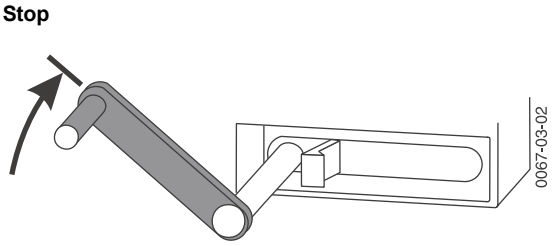




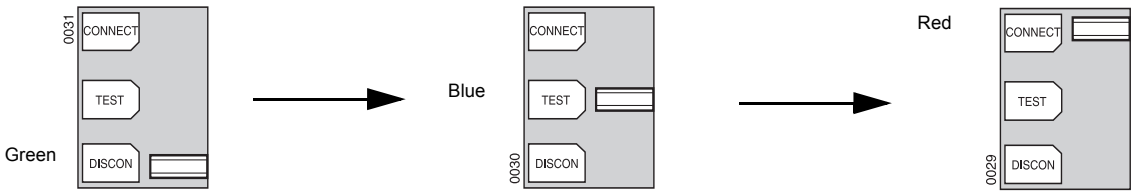
1 Switch off
2 Push in crank
3 Draw out handle
4 Press lever up and hold
5 Pull out crank

6.1.4 Circuit-breaker to connected (CONNECT) position

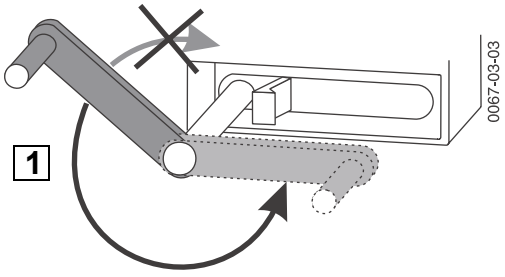


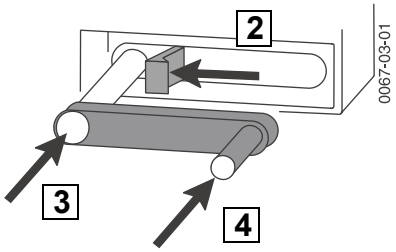


Position indicator



6.1.5 Insert racking handle



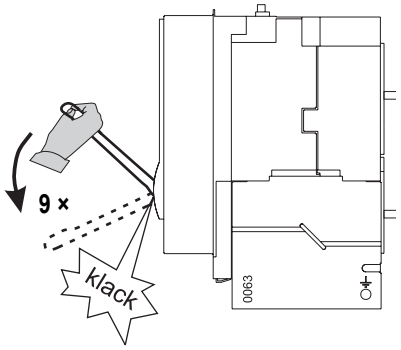


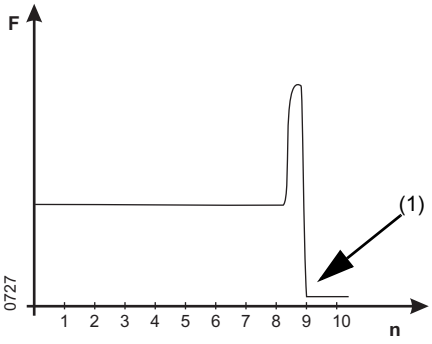
CAUTION
Do not turn the crank handle beyond the stop! Otherwise the racking mechanism will be damaged.

6.2 Charging the spring

Charging by hand

	WARNING
	**Can cause personal injury.** Support a withdrawn, free-standing circuit-breaker properly before charging (e.g. by maintenance work on the work bench).





F Operating force
n Number of strokes
(1) Spring is charged

ATTENTION
To charge the spring, grip the pump handle tightly and make each stroke fully and continuously to the end. The 9th stroke must be carried out exactly as the previous eight although the operating force considerably increases. When the spring is fully charged the lever moves without resistance.

Charging by motor drive

The motor drive starts automatically after connection of power supply. At the end of the charging process the motor automatically switches off.

Directly after the spring is discharged the motor switches on again so that the spring is again charged (after a switch on).

→ Retrofitting the motor operator (page 12 – 1)

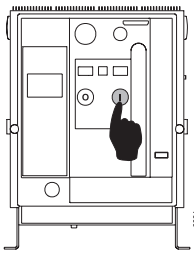
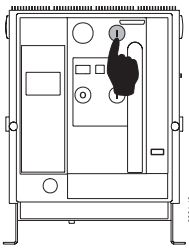
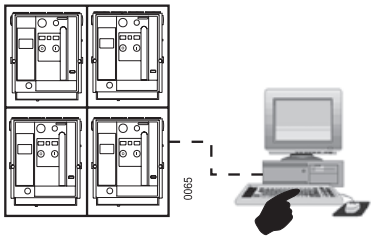
	Danger
	**Hazardous voltage!** **Can cause death or serious personal injury as well as damage to device and equipment.** Before working on this device the system must be switched off.

6.3 Checklist for commissioning

Work to be done		✓
Switch off circuit-breaker		
Move to connected position with withdrawable circuit-breaker		
Insert rating plug → Rated current module (page 9 – 35)		
Press red pin to reset Mechanical reclosing lockout		
Set the overcurrent release to appropriate values → Overcurrent release (page 9 – 1)		
Apply auxiliary and control voltages		
Close the panel door		
Inserting racking handle		
Charging the storage spring		
Conditions (according to version)		
Undervoltage release	Energized	
Shunt release	Not energized	
Electrical closing lockout (→ page 8 – 3)	Not energized	
Electrical interlocking of closing release in the switch board control wiring	Disabled	
Mutual mechanical interlock	Not effective	
Locking devices	Not activated	
Indications		
		

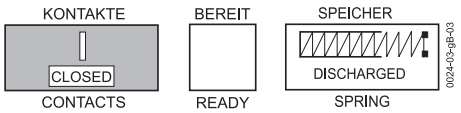
6.4 Closing

Indications

On switch	Electrical ON	Remote operation
 or	 or	

Indications

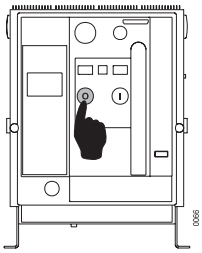
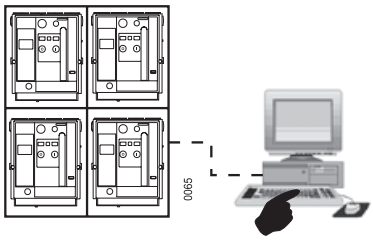
Without motor operating



With motor operating mechanism after 10 s

(The storage spring will be recharged by the motor operating mechanism immediately after the circuit-breaker has closed.)

6.5 Switch off

OFF button	Remote activation
	or 

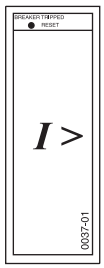
Indications

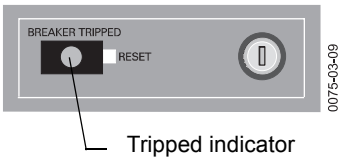
Without motor operating

With motor operating mechanism (storage spring still charged)

6.6 Tripping by overcurrent release

Overcurrent release





Indications

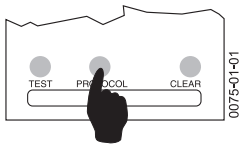
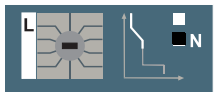
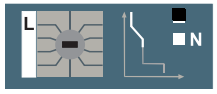
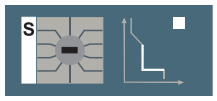
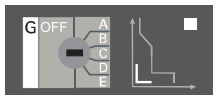
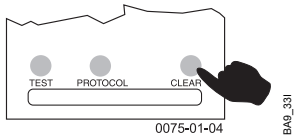
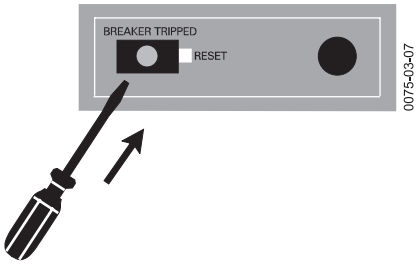
Without motor operating mechanism

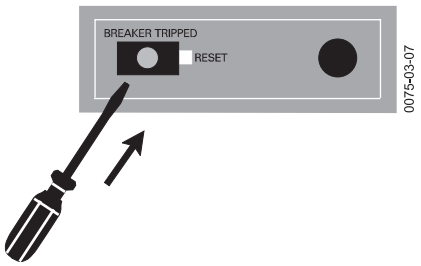
With motor operating mechanism (storage spring still charged)

6.7 Re-starting a tripped circuit-breaker

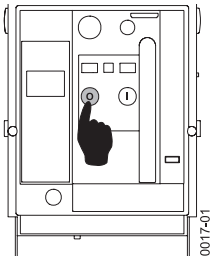
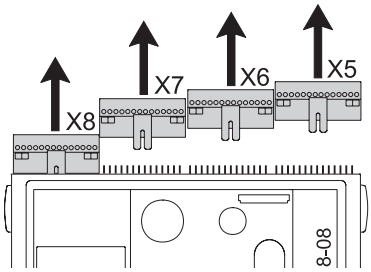
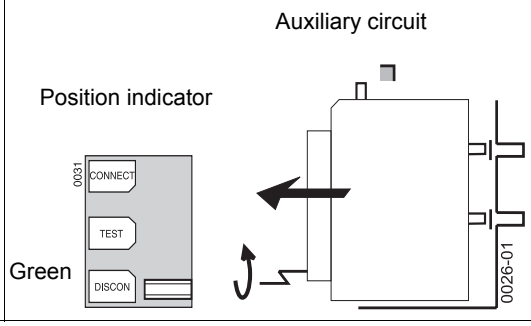
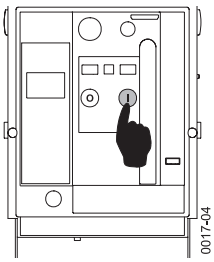
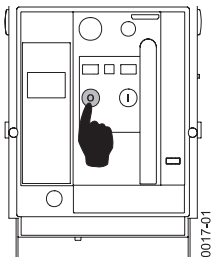
Note

The tripping reason can be inquired with the “PROTOCOL” button on the overcurrent release. It is stored for at least two days when the over current release is activated for at least 10 minutes before the tripping.

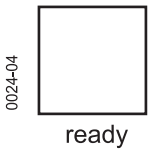
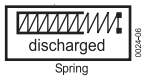
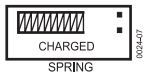
<table>
<tr><td>1
Find trip cause</td><td colspan="5"> 
</td></tr>
<tr><td rowspan="2">2
Indicator</td><td> 
</td><td> 
</td><td> 
</td><td> 
</td><td> 
</td></tr>
<tr><td>Overload in main conductor</td><td>Overcurrent in neutral conductor</td><td>Short-circuit: short-time-delay trip</td><td>Short-circuit: non delayed trip</td><td>Earth-fault trip</td></tr>
<tr><td>3
Find and remedy causes</td><td colspan="2">Check downstream load
Check overcurrent release settings</td><td colspan="3">Inspect panel
Check downstream load</td></tr>
<tr><td>4
Inspect circuit-breaker</td><td colspan="2"></td><td colspan="2">Inspect contact system for possible damage
→ Maintenance (page 24 – 1)</td><td></td></tr>
<tr><td>5
Clear trip cause</td><td colspan="5"> 
</td></tr>
<tr><td>6
Reset reclosing lockout</td><td colspan="3">Standard: Circuit-breaker with mechanical reclosing lockout</td><td colspan="2">Automatic reset reclosing lockout (→ page 10 – 2)</td></tr>
<tr><td>7
Reset tripped indicator</td><td colspan="3"> 

Manual reset reclosing lockout
and the trip message (→ page 10 – 1)</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="2">8
Indications</td><td colspan="5">Without motor operating mechanism
 
</td></tr>
<tr><td colspan="5">With motor operating mechanism (storage spring still charged)
 
</td></tr>
<tr><td>9</td><td colspan="5">→ Charging the spring (page 6 – 4)
→ Closing (page 6 – 5)</td></tr>
</table>

6.8 Switching off and discharging the storage spring

	Fixed-mounted circuit-breaker	Withdrawable units
1 **OFF**		
2 **Disconnect control circuit power**		
3 **ON**		
4 **OFF**		
5 **Indications**		

6.9 Troubleshooting

Fixed-mounted circuit-breaker	Withdrawable circuit-breaker	Disturbance	Cause	Remedy
X	X	Circuit-breaker cannot be closed Circuit-breaker **not** ready to close Ready-to-close indicator shows: 	1. Storage spring not charged 	Charging the storage spring 
X	X		2. Undervoltage release not excited	Energize undervoltage release
X	X		3. Mechanical reclosing lockout effective	Rectify cause of overcurrent tripping and press reset button
X	X		4. Electrical closing interlock effective (→ page 8 – 3)	Shut off control voltage for interlocking[1)]
X	X		5. “Safe OFF” locked off by cylinder lock (accessories)	Unlock[1)]
X	X		6. “Safe OFF” locked off by padlocks (accessories)	Remove padlocks[1)]
X	X		7. “Mechanical OFF” button locked off (accessory)	Unlock the “Mechanical OFF” button[1)]
X	X		8. Emergency-Stop pushbutton engaged in operating position (accessory)	Release Emergency-Stop pushbutton[1)] by rotating it
X	X		9. Lockout against closing with panel door open effective (accessories)	Close the panel door
X	X		10. Mutual mechanical circuit-breaker interlocks effective (accessory)	Open second circuit-breaker or rack into disconnected position[1)]
X	X		11. Electronic overcurrent release missing or incorrectly installed	Fit electronic overcurrent release properly
X	X		12. Voltage release is actuated	Switch off voltage release
X	X		13. Switch on coil is activated	Switch off switch-on coil before re-switch on
	X		14. Racking handle withdrawn	Rack circuit-breaker into disconnected, test or connect position, unlatch crank and push crank fully in

X	X	Circuit-breaker cannot be closed though the circuit-breaker is ready to close Ready-to-close indicator shows: 	1. Closing release not energized or incorrectly energized	Check or apply correct voltage
	X		2. Circuit-breaker in disconnected position in withdrawable unit	Rack circuit-breaker into test or connected position
X			3. control circuit plug unplugged	Plug in control circuit plug

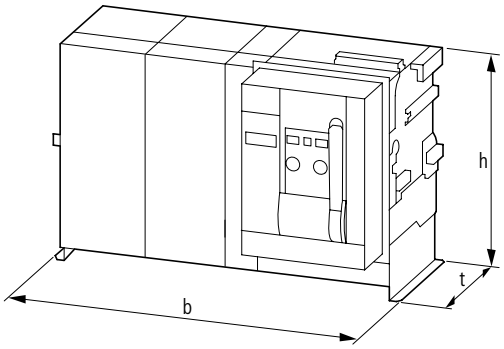
1) Safety feature! This remedy action amounts to a reversal (disabling) of a safety precaution installed earlier. Please do ensure that such disabling is now permissible/authorized!

Fixed-mounted circuit-breaker	Withdrawable circuit-breaker	Disturbance	Cause	Remedy
	X	Circuit-breaker cannot be moved from the maintenance position into the disconnected position	1. Racking mechanism of circuit-breaker not in disconnected position (note circuit-breaker position indicator)	Rack the mechanism into disconnected position (green position indication)
	X	Circuit-breaker cannot be fitted in the guide rails	1. Factory mounted coding of circuit-breaker and withdrawable unit doesn't match	Use circuit-breaker according to withdrawable unit label
	X	When racking from the disconnected into the test position, the circuit-breaker does not move during the first approx. 6 turns	1. Not a fault	Rack further
	X	Racking handle cannot be drawn out	1. Circuit-breaker is closed	Press “Mechanical OFF” button and pull racking handle block out[2)]
	X		2. Panel door not completely closed (locking device as accessory)	Close the panel door
	X	Racking handle cannot be pushed in	1. Racking handle is interlocked	Rack circuit-breaker into disconnected, test or connect position, unlatch crank and push crank fully in
X		Panel door cannot be opened (door interlock as accessory)	1. Closed circuit-breaker is preventing opening of panel door	Open the circuit-breaker[2)]
	X		2. Circuit-breaker in connected position	Rack circuit-breaker into test or disconnected position[2)]

2) Only permissible if the power circuit may be interrupted!

7 Frame sizes, dimension drawings

7.1 Overview external dimensions



3-pole	Fixed mounted			Withdrawable units		
	b	h	t	b	h	t
IZM(IN).1-...	320	434	357	320	460	471
IZM(IN).2-...	460	434	357	460	460	471
IZM(IN).3-...	704	434	357	704	460	471

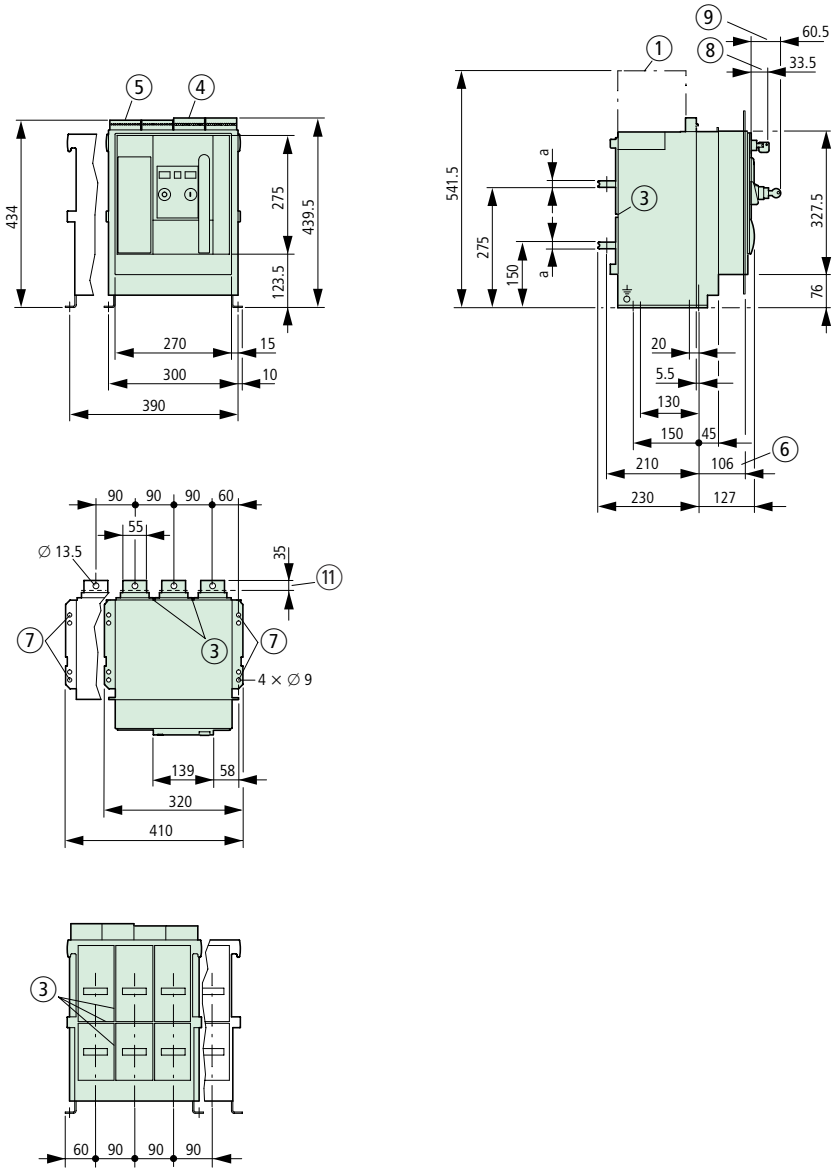
4 pole	Fixed mounted			Withdrawable units		
	b	h	t	b	h	t
IZM(IN).1-4...	410	434	357	410	460	471
IZM(IN).2-4...	590	434	357	590	460	471
IZM(IN).3-4...	914	434	357	914	460	471

Height “h” up to the top edge of the control circuit plug in screw terminal design for circuit-breaker/switch disconnector with $U_e \leqq 690$ V.

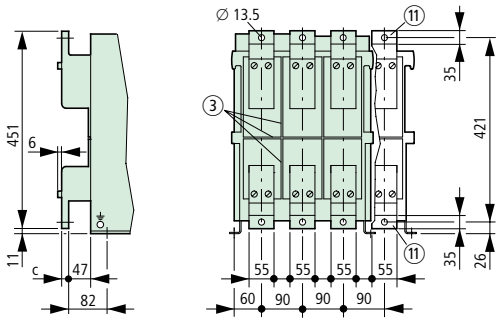
Depth “t” up to end of horizontal connection.

7.2 IZM(IN)...1-..., fixed-mounting, 3- and 4-pole

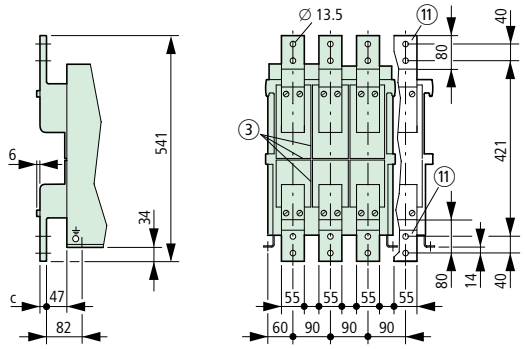
Standard version for horizontal connection



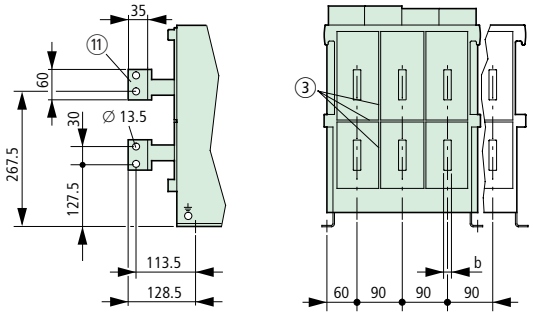
Front connection (single-hole fitting): IZM1-XAT1F...



Front connection (double-hole fitting): IZM1-XATF...



Vertical connection: IZM1-XATV...



Note

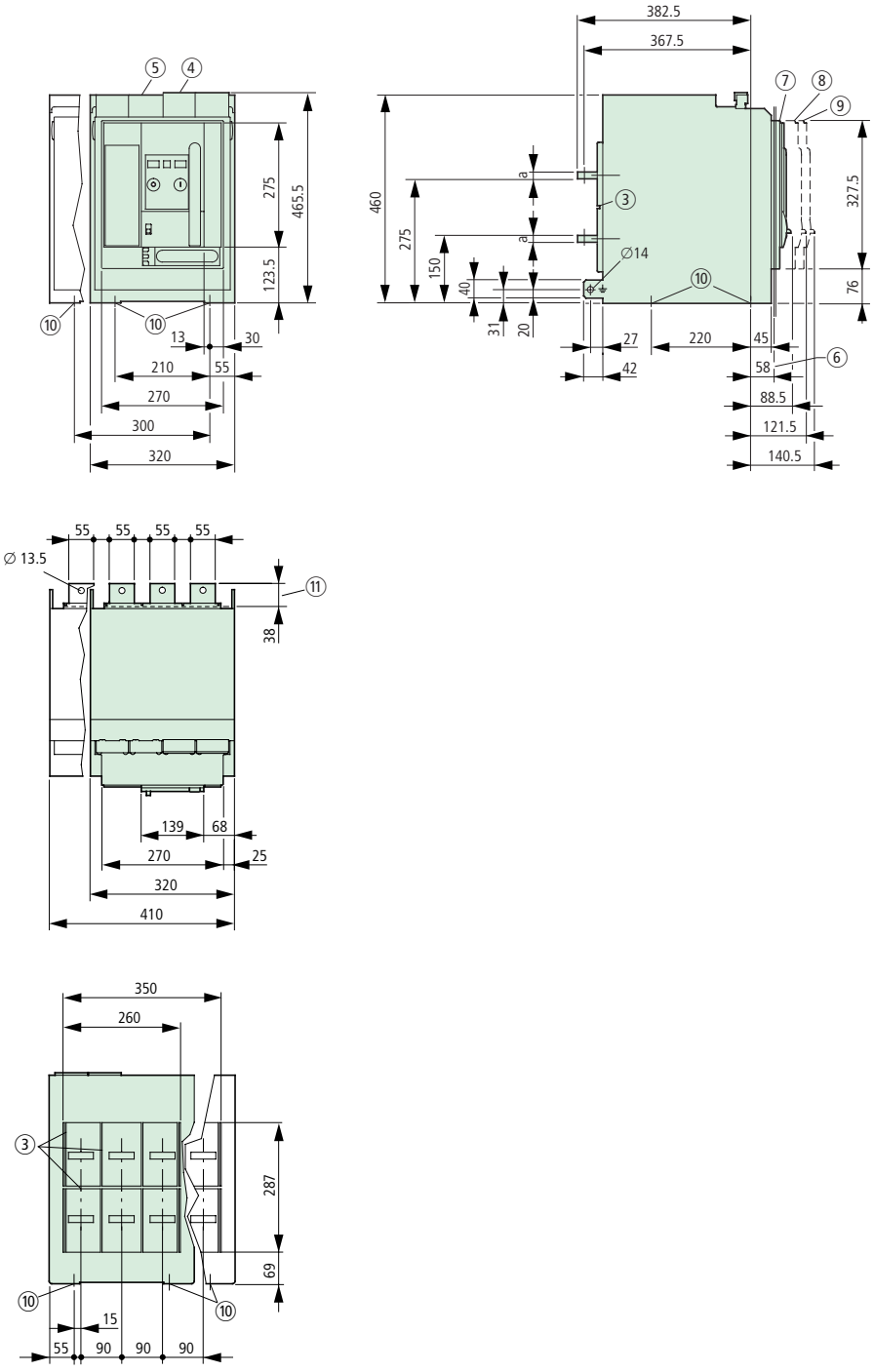
When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

① Mounting space for removal of arcing chamber covers
③ Slots (4 mm wide, 5 mm deep) for supporting phase partions in the system
④ Control circuit plug, screw terminals
⑤ Control circuit plug, spring terminals
⑥ Dimension to inside of closed switchboard door
⑦ Fixing points for the circuit-breaker in the system; 4 × weld nut M8
⑧ Interlock in OFF (optional accessory)
⑨ Key operation (optional accessory)
⑪ Connection area

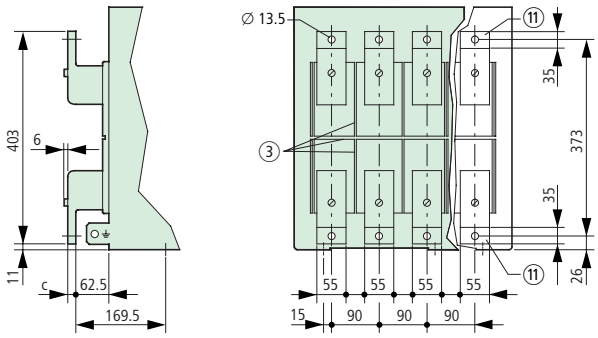
Rated current I_u	a	b	c
	Horizontal	Vertical	Front connection
Up to 1000 A	10	10	10
1250 – 1600 A	15	15	15

7.3 IZM(IN)...1-..., withdrawable, 3- and 4-pole

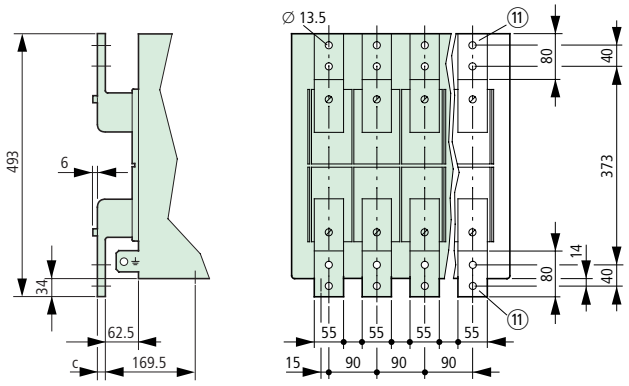
Standard version for horizontal connection



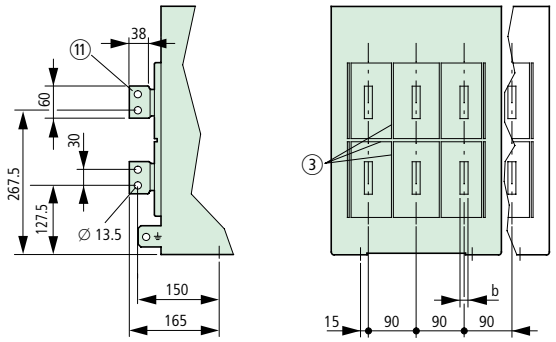
Front connection (single-hole fitting): IZM1-XAT1F...-AV



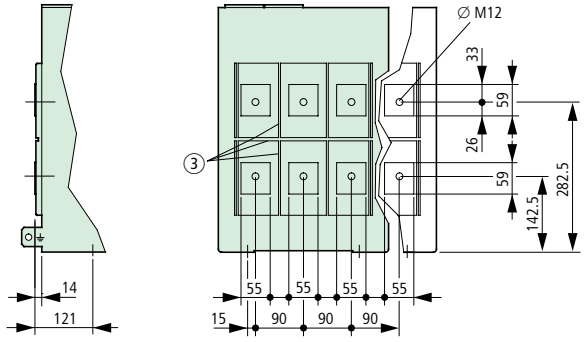
Front connection (double-hole fitting): IZM1-XATF...-AV



Vertical connection: IZM1-XATV...-AV



Flange connection: IZM1-XATA...-AV



Note

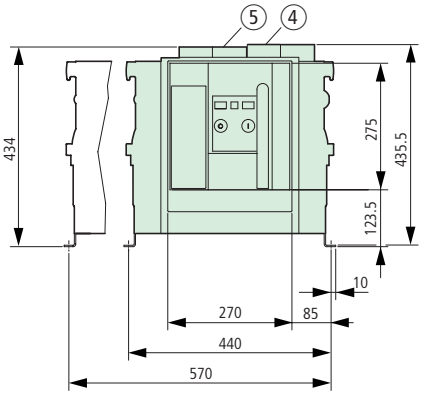
When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

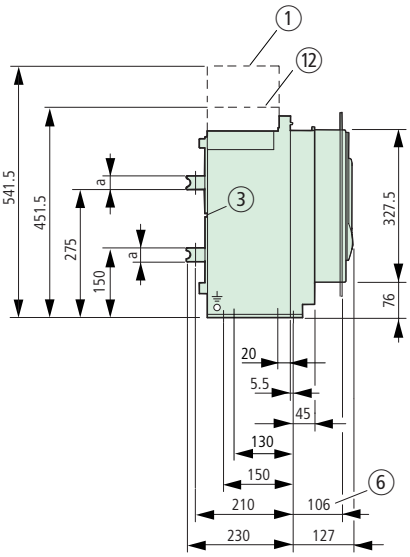
③ Slots (4 mm wide, 5 mm deep) for supporting phase partions in the system
④ Control circuit plug, screw terminals
⑤ Control circuit plug, spring terminals
⑥ Dimension to inside of closed switchboard door
⑦ IZM in connected position
⑧ IZM in test position
⑨ IZM in disconnected position
⑩ Fixing holes, ∅ 10 mm
⑪ Connection area

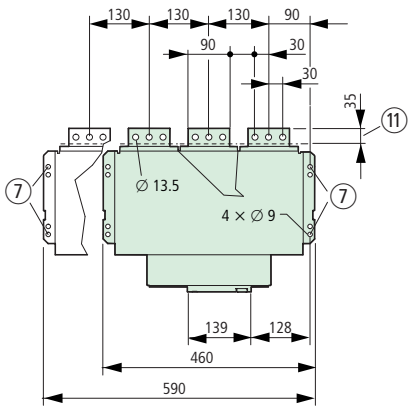
Rated current I_u	a	b	c
	Horizontal	Vertical	Front connection
Up to 1000 A	10	10	10
1250 – 1600 A	15	15	15

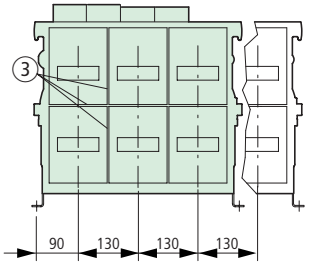
7.4 IZM(IN)...2-..., fixed-mounting, 3 and 4 pole

Standard version for horizontal connection

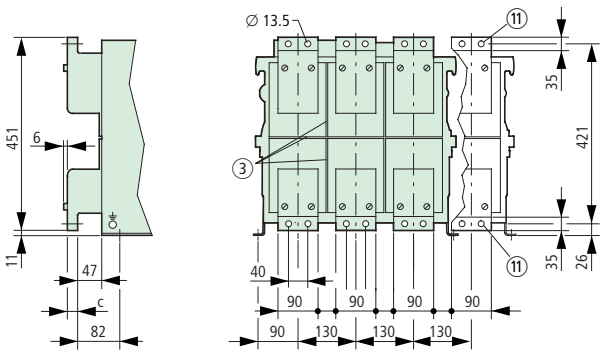




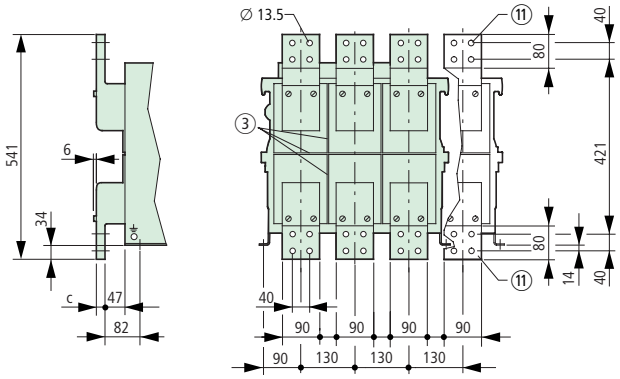




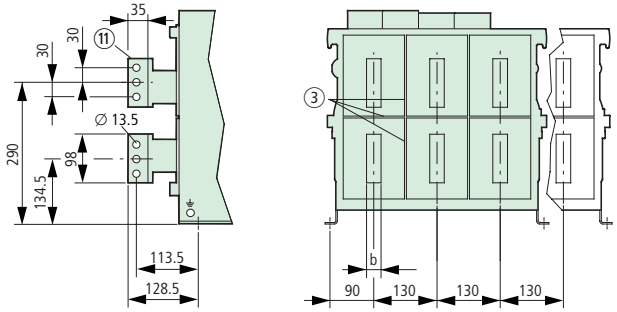
Front connection (single-hole fitting): IZM2-XAT1F...



Front connection (double-hole fitting): IZM2-XATF...



Vertical connection: IZM2-XATV...



Note

When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

① Mounting space for removal of arcing chamber covers
With U_e = 1000 V, 175 mms are required for removal of the arcing chamber.

③ Slots (4 mm wide, 5 mm deep) for supporting phase partions in the system

④ Control circuit plug, screw terminals

⑤ Control circuit plug, spring terminals

⑥ Dimension to inside of closed switchboard door

⑦ Fixing points for the circuit-breaker in the system; 4 × weld nut M8

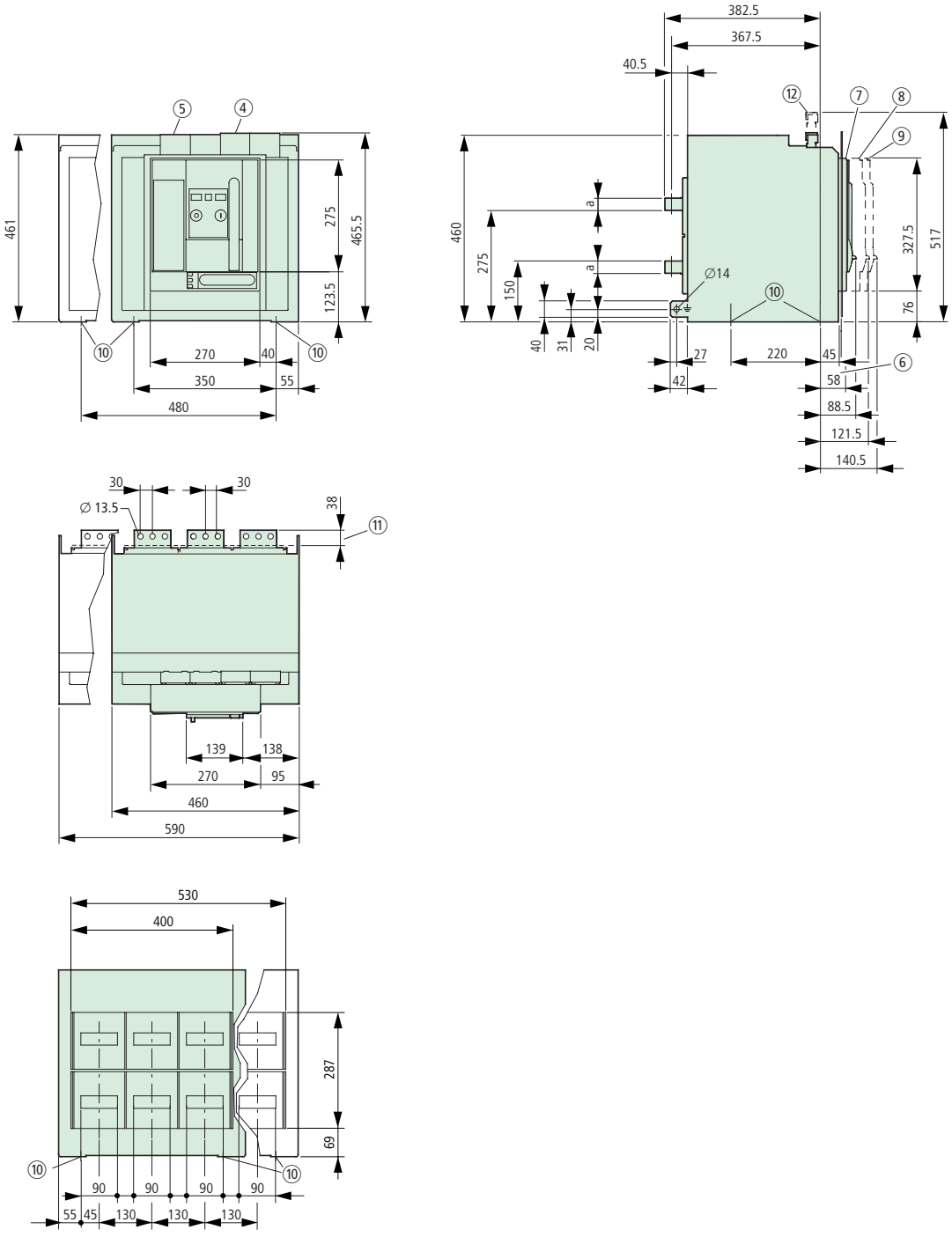
⑪ Connection area

⑫ Circuit-breaker top edge with U_e = 1000 V

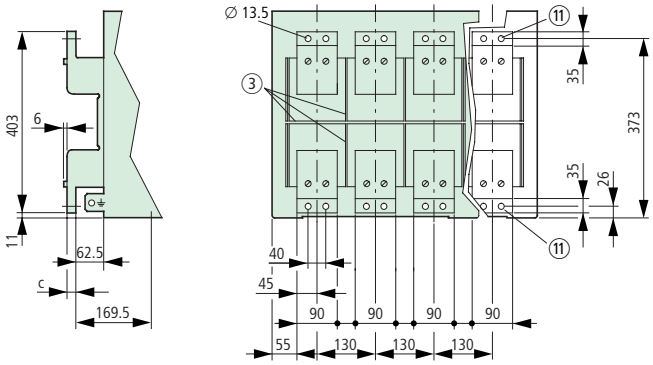
Rated current I_u	a	b	c
	Horizontal	Vertical	Front connection
UP to 2000 A	10	10	10
2500 A	15	15	20
3200 A	30	30	20

7.5 IZM(IN)...2-..., withdrawable, 3 and 4 pole

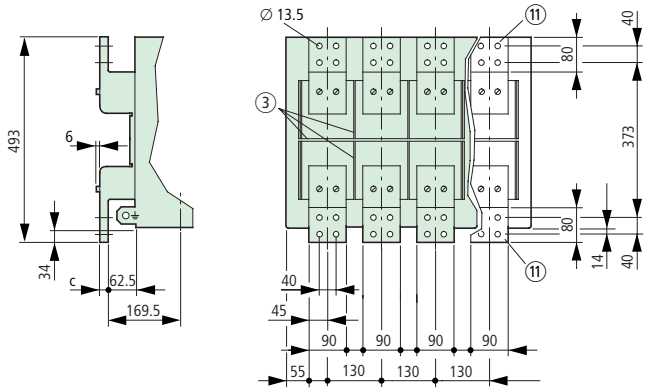
Standard version for horizontal connection



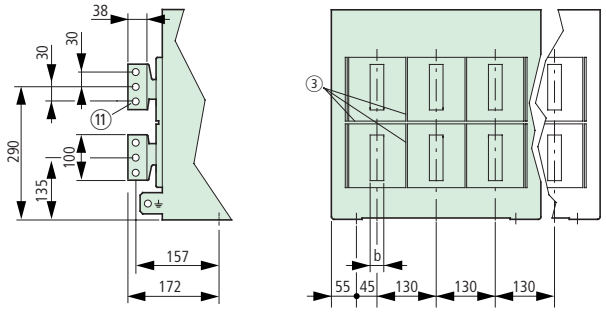
Front connection (single-hole fitting): IZM2-XAT1F...-AV



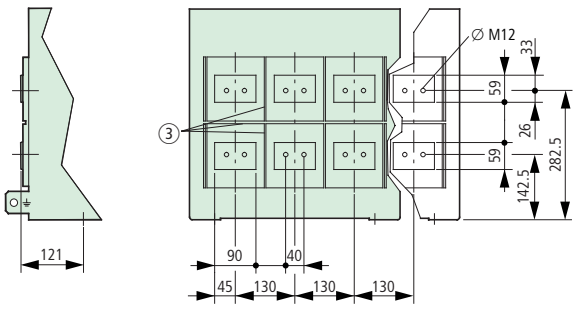
Front connection (double-hole fitting): IZM2-XATF...-AV



Vertical connection: IZM2-XATV...-AV



Flange connection: IZM2-XATA...-AV



Note

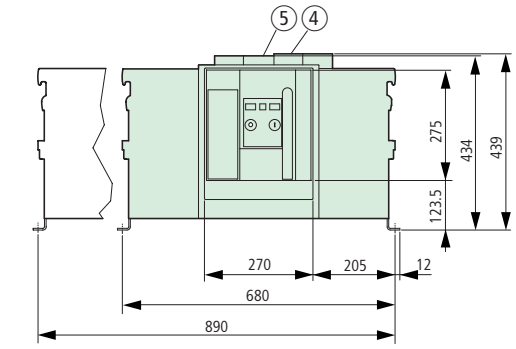
When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

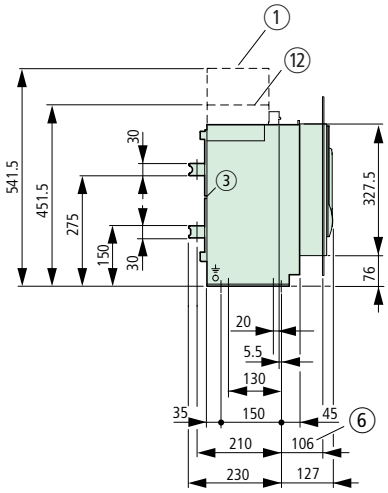
③ Slots (4 mm wide, 5 mm deep) for supporting phase partions in the system
④ Control circuit plug, screw terminals
⑤ Control circuit plug, spring terminals
⑥ Dimension to inside of closed switchboard door
⑦ IZM in connected position
⑧ IZM in test position
⑨ IZM in disconnected position
⑩ Fixing holes, ∅ 10 mm
⑪ Connection area
⑫ Top edge of withdrawable unit with U_e = 1000 V

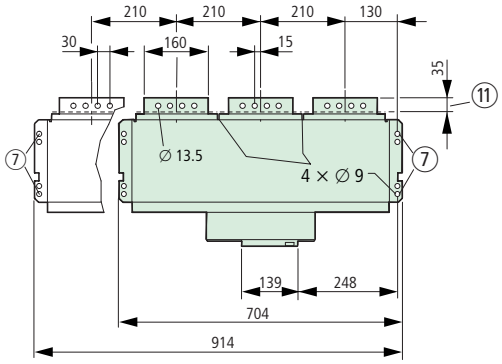
Rated current I_u	a	b	c
	Horizontal	Vertical	Front connection
Up to 2000 A	10	10	10
2500 A	15	15	20
3200 A	30	30	20

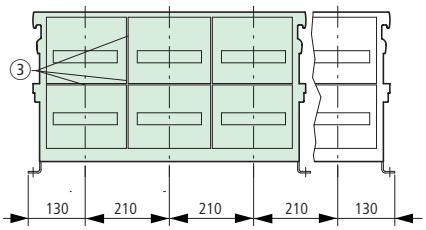
7.6 IZM(IN)...3-..., fixed-mounting, 3- and 4-pole

Horizontal connection, standard ≦ 6300 A

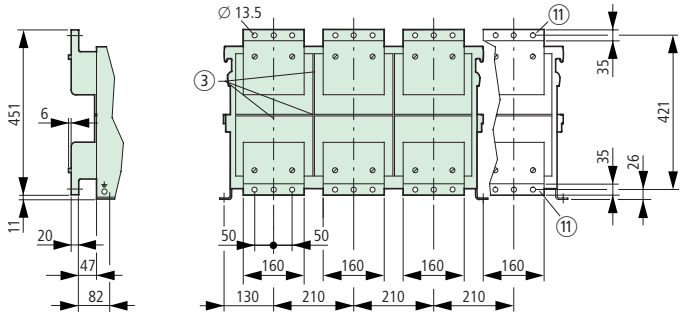








Front connection (single-hole fitting): IZM3-XAT1F...
≦ 4000 A

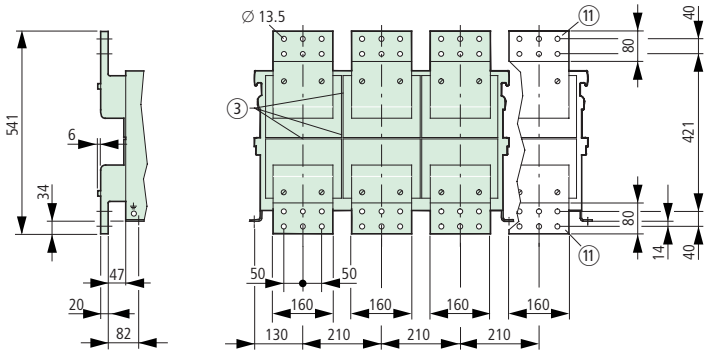


Note

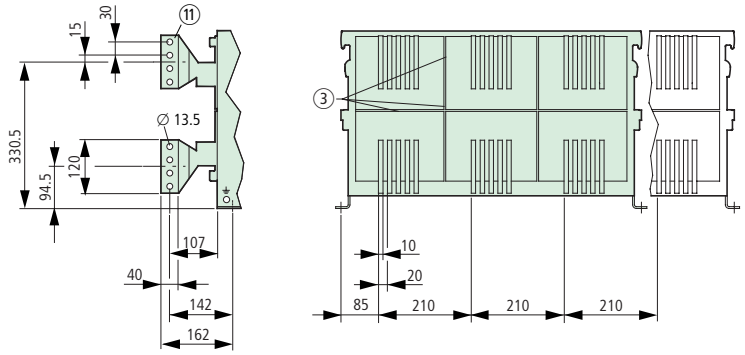
When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

① Mounting space for removal of arcing chamber covers
With U_e = 1000 V, 175 mms are required for removal of the arcing chamber.
③ Slots (4 mm wide, 5 mm deep) for supporting phase partions in the system
④ Control circuit plug, screw terminals
⑤ Control circuit plug, spring terminals
⑥ Dimension to inside of closed switchboard door
⑦ Fixing points for the circuit-breaker in the system; 4 × weld nut M10
⑪ Connection area
⑫ Circuit-breaker top edge with U_e = 1000 V

Front connection (double-hole fitting): IZM3-XATF...
≦ 4000 A

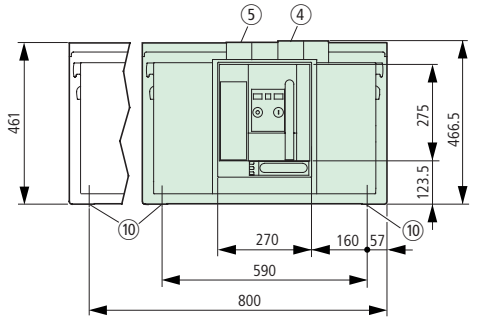


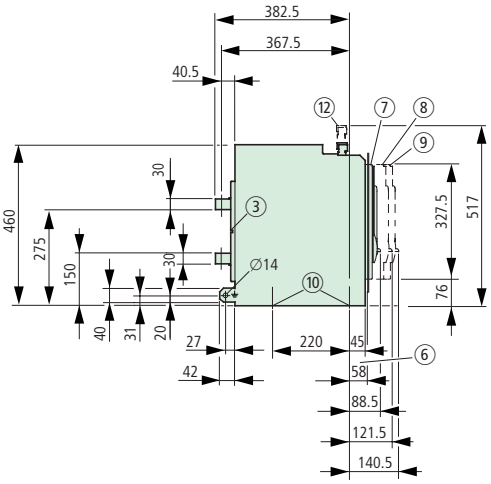
Vertical connection: IZM3-XATV... ≦ 5000 A

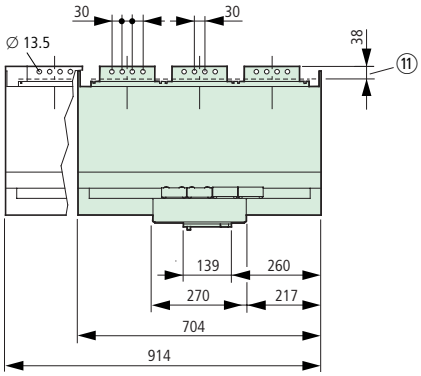


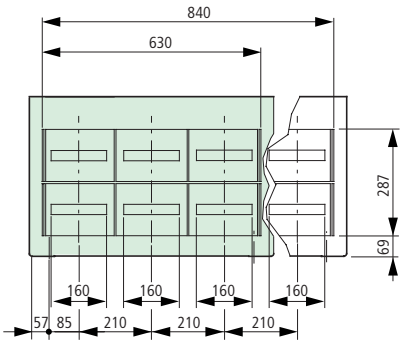
7.7 IZM(IN)...3-..., withdrawable, 3- and 4-pole

Horizontal connection, standard ≦ 5000 A

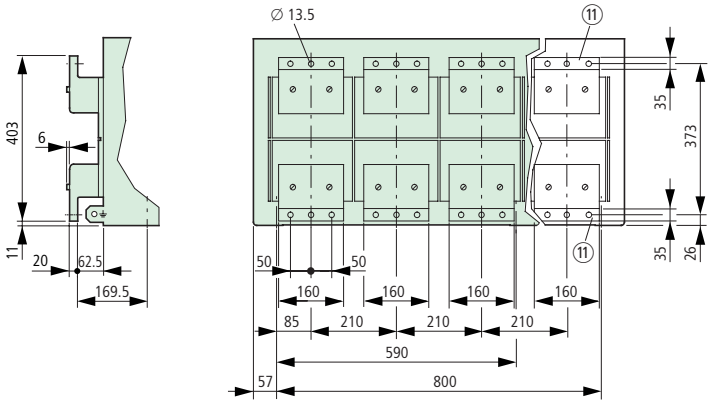




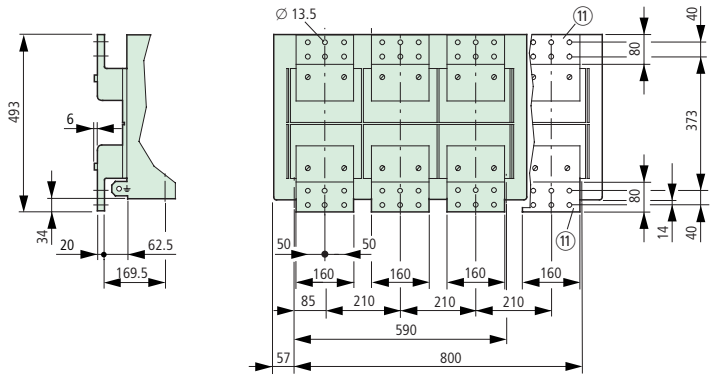




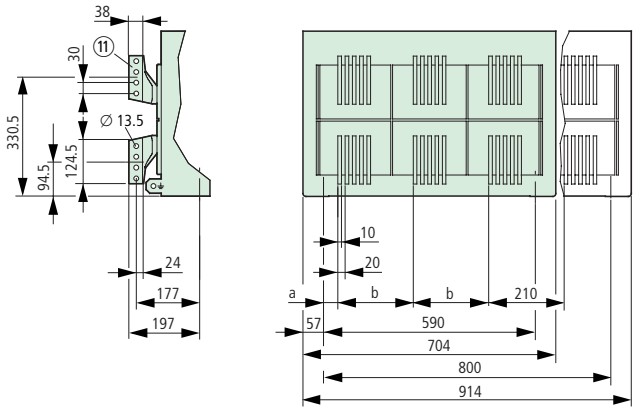
Front connection (single-hole fitting): IZM3-XAT1F...-AV ≦ 4000 A



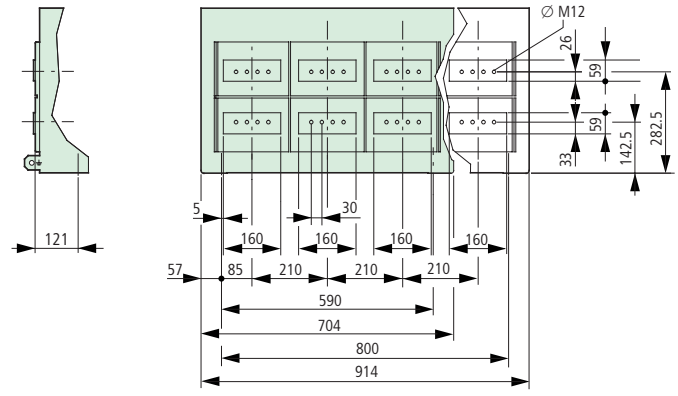
Front connection (double-hole fitting): IZM3-XATF...-AV ≦ 4000 A



Vertical connection: IZM3-XATV...-AV ≦ 6300 A



Flange connection: IZM3-XATA...-AV ≦ 4000 A



Note

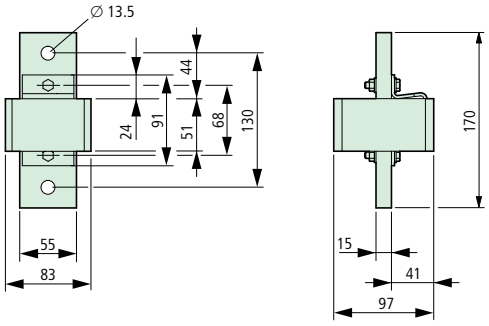
When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

③ Slots (4 mm wide, 5 mm deep) for supporting phase partions in the system
④ Control circuit plug, screw terminals
⑤ Control circuit plug, spring terminals
⑥ Dimension to inside of closed switchboard door
⑦ IZM in connected position
⑧ IZM in test position
⑨ IZM in disconnected position
⑩ Fixing holes, ∅ 10 mm
⑪ Connection area
⑫ Top edge of withdrawable unit with U_e = 1000 V

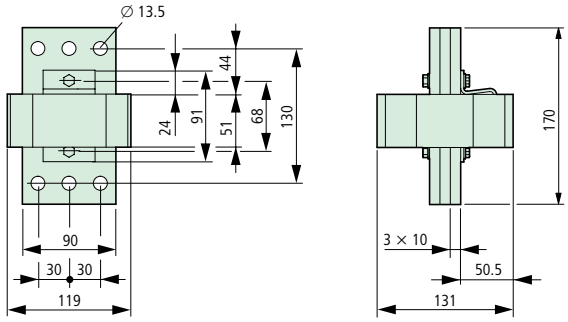
Rated current I_u	a	b
4000 A	40	210
5000 A	40	210
6300 A	5	245

7.8 External current transformer for N-conductor

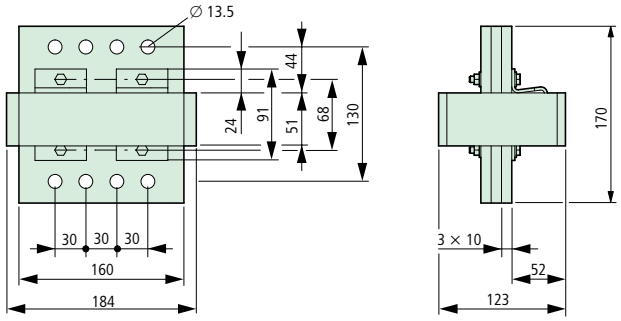
IZM.1-...



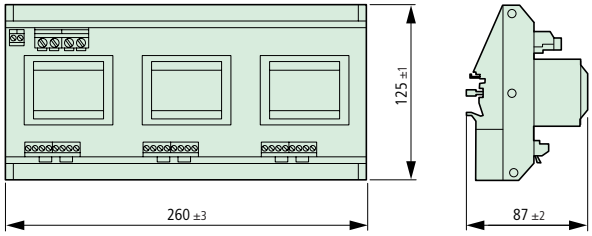
IZM.2-...



IZM.3-...



7.9 Voltage transformers



7.10 Further dimension drawings

– Mounting brackets for mounting on vertical surface (→ page 5 – 2)

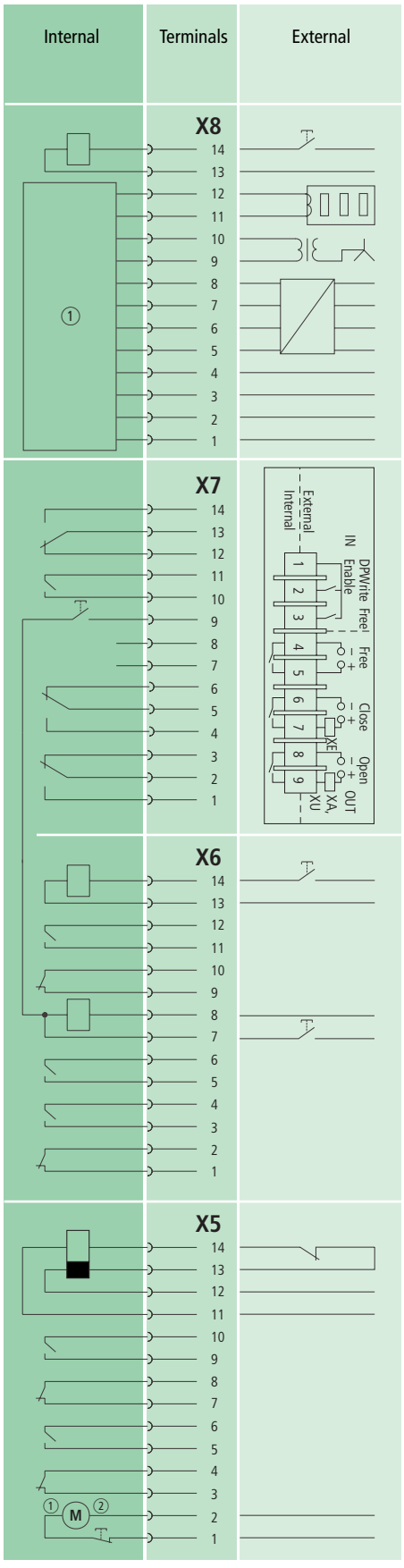
– Door sealing frame IP40 (→ page 22 – 1)

– Cover IP55 (→ page 23 – 1)

8 Circuit diagrams

8.1 Terminal assignment, accessories

Control circuit plug IZM-XKL(-AV) for customer connection
Control circuit plug X8, X7, X6, X5 are identical in construction



X8: optional control circuit plug (Standard for IZM...-U... and IZM...-D...)

Remote reset XFR

① electronic overload release

G transformer S2
G transformer S1
IZM-XW(C) N current transformer S2
IZM-XW(C) N current transformer S1
external voltage transformer, star
External voltage transformer L3
External voltage transformer L2
External voltage transformer L1
0 V DC
24 V DC
Internal system bus +
Internal system bus –

L/L+ Us
N/L-
e.g. current transformer in transformer's star point or summation current transformer 1200 A/1 A

bridge, when no N current transformer

L1, L2, L3, (N)

24 V DC external power supply

Termination resistor, when no external system bus module 120 Ω 0.5 W
(→ page 9 – 60)

X7: optional control circuit plug
Not available with IZM-XCOM-DP communication function.
The communications module is at position X7.

Trip signalling switch XHIA

"Spring charged" signal XHIF

electrical "on" XEE

XHIS signalling switch on first voltage release

Signalling switch on second release XHIS

IZM-XCOM-DP

L/L+ U_s

X6: standard control circuit plug

first shunt release XE/A

Standard auxiliary switch XHI: S1 "N/O"

Standard auxiliary switch XHI: S1 "N/C"

Closing release XE/A

"Ready to close" signal XHIB

Standard auxiliary switch XHI: S2 "N/O"

Standard auxiliary switch XHI: S2 "N/C"

L/L+ U_s
N/L-

N/L- U_s
L/L+

X5: optional **control circuit plug**

Only XUV "non-delayed release"

XU, XUV or second voltage release XA1

Standard auxiliary contact XHI11/XHI22/XHI31: S3 "NO", XHI40: S7

Standard auxiliary contact XHI11/XHI22/XHI31: S3 "NC", XHI40: S7

Standard auxiliary contact XHI22: S4 "NO", XHI31/XHI40: S8 "NO"

Auxiliary switch XHI22: S4 "N/C", XHI31/XHI40: S8 "N/O"

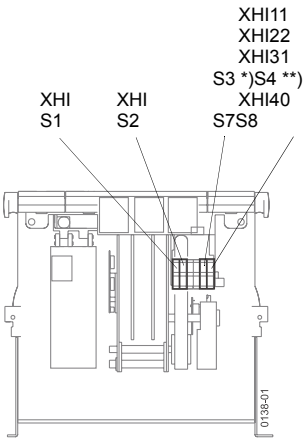
Motor operator
Optional motor cut-off switch XMS

① black-white
② brown

Emergency-Stop or short terminals
L/L+ U_s
N/L-

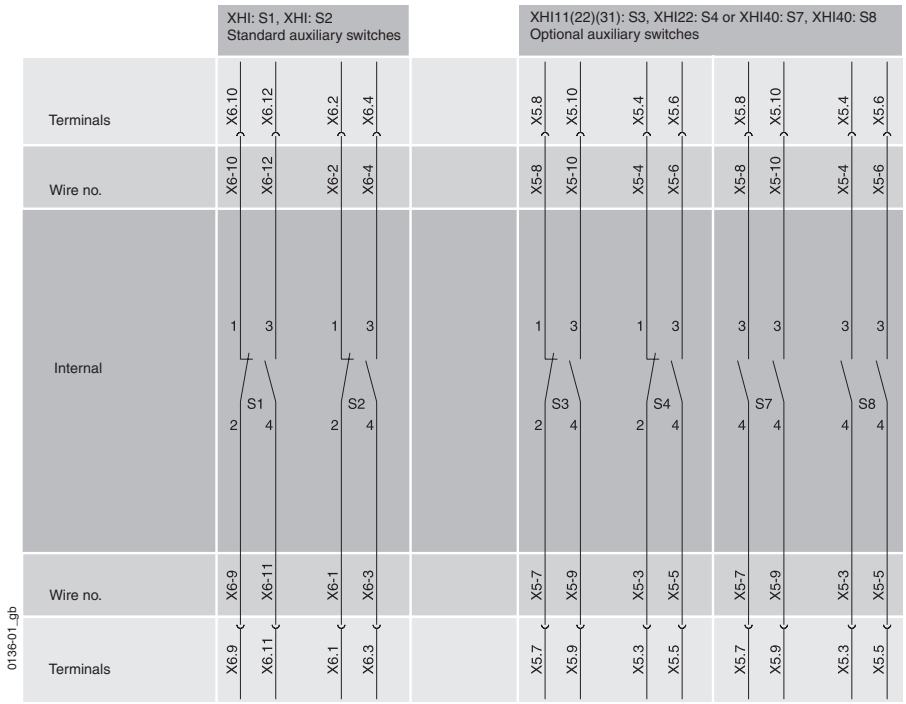
L/L+ U_s
N/L-

8.2 Auxiliary and control switches



*) same location as S7

**) same location as S8

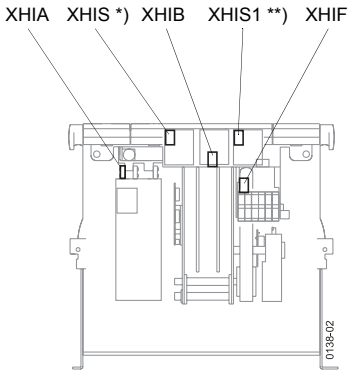


Part number suffix when ordered with basic device	Fitting with auxilliary contacts					
	S1	S2	S3	S4	S7	S8
Standard	X	X				
+IZM-XHI22	X	X	X	X		
+IZM-XHI40	X	X			X	X
+IZM-XHI31	X	X	X			X

Part number suffix when ordered seperately (mounting position as required)	Number	
	Normally open contact	Normally closed contact
IZM-XHI20	2	–
IZM-XHI11	1	1
IZM-XHI22	2	2

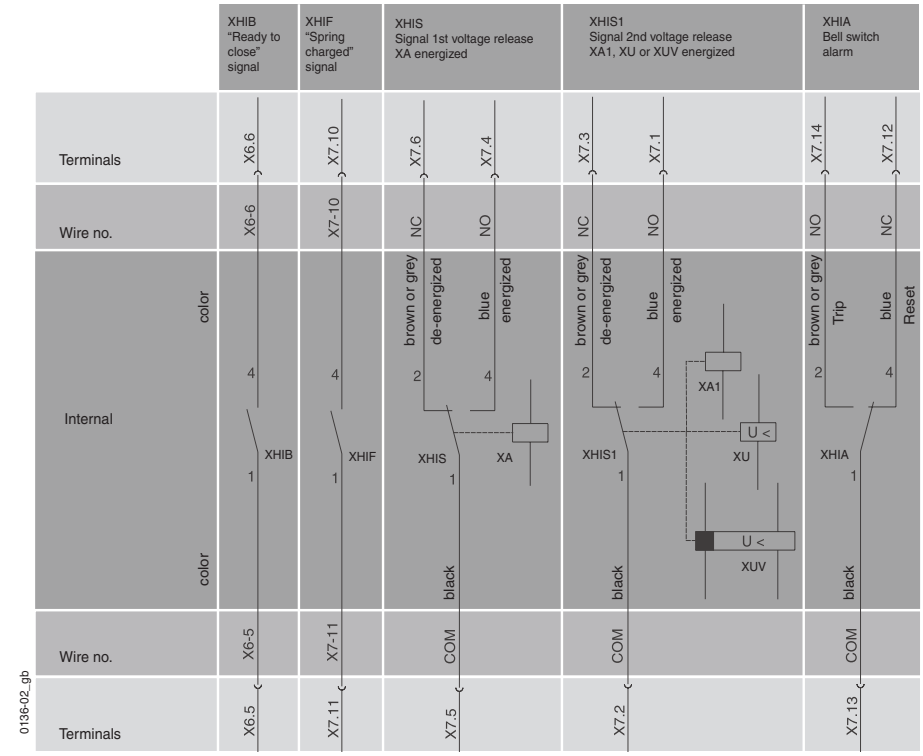
8.3 Signal switch

XHIA, XHIS, XHIS1 and XHIF cannot be combined with (+)IZM-XCOM-DP.
XHIA, XHIS and XHIS1 cannot be combined with (+)IZM-XBSS.



*) Same location as S42
(→ page 9 – 47)

**) Same location as S43
(→ page 9 – 47)



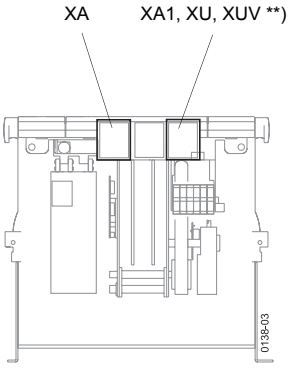
XHIS, XHIS1:

– N/O contact closed means undervoltage release activated or shunt release not activated– switch-on possible.

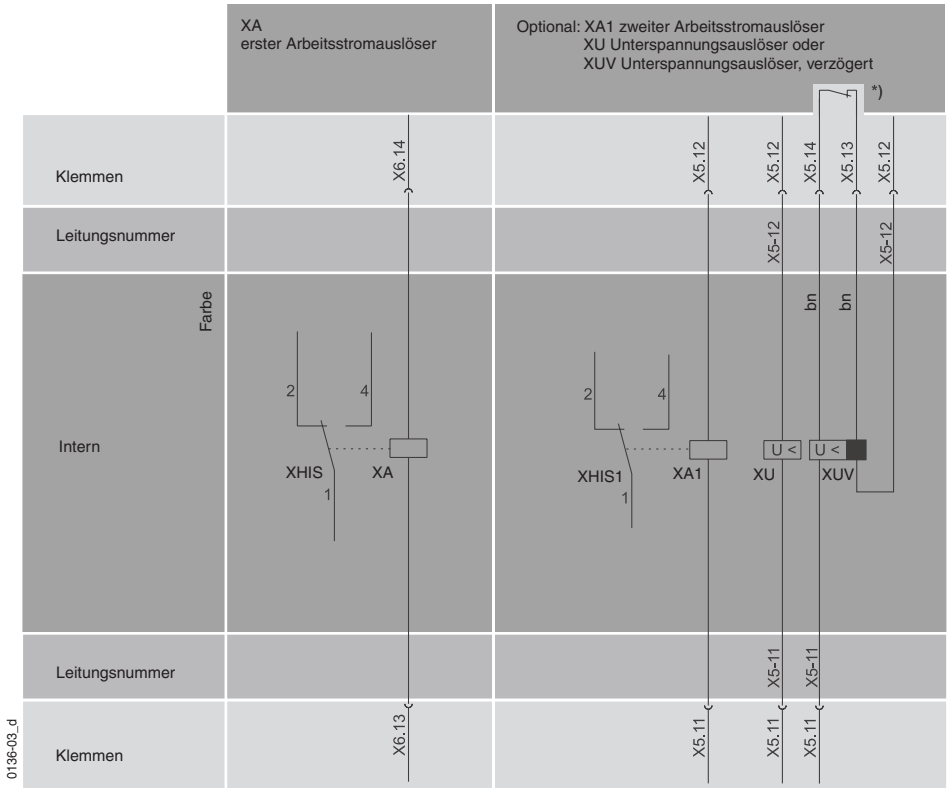
– N/O contact open means, undervoltage release deactivated or shunt release activated – not possible to switch circuit-breaker on.

8.4 Voltage release/electrical switch-on inhibit

XA, XA1 and XE have the same construction, an individual type is always designated XE/A.



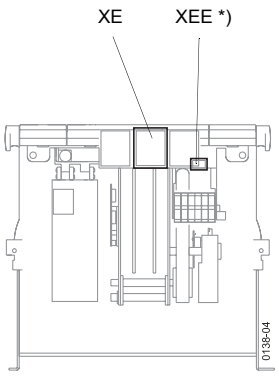
**) same location



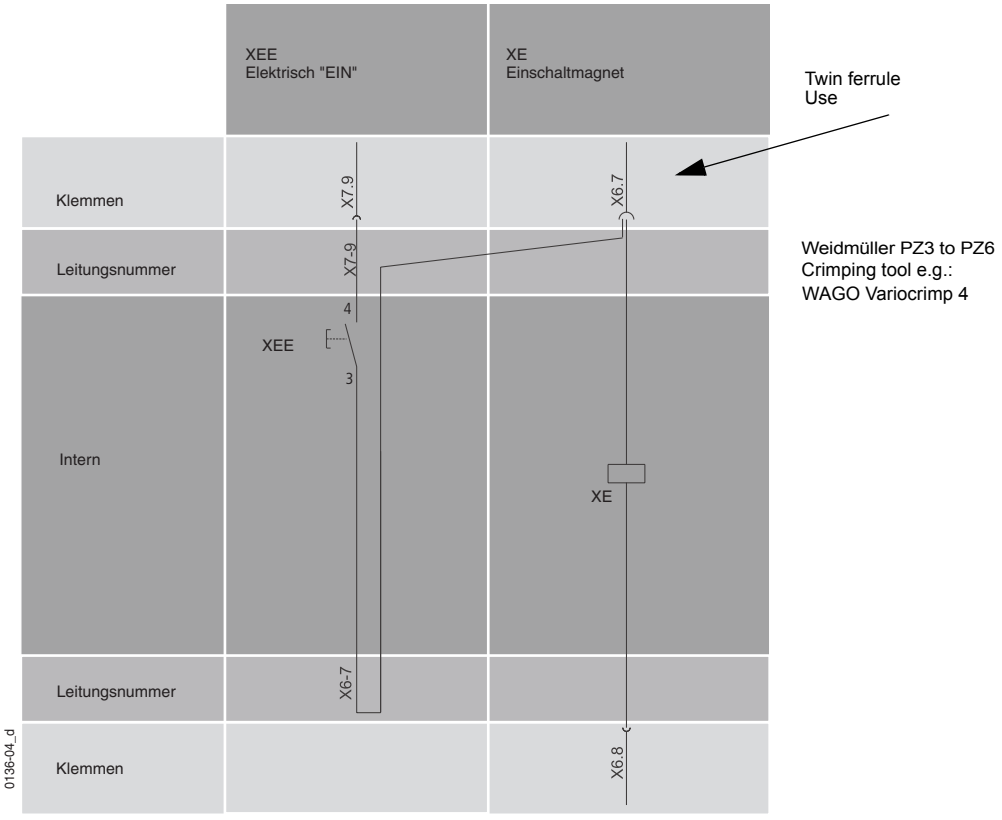
*) emergency stop or bridge

Voltage trips with 100 % DF may act as an electrical closing lockout.

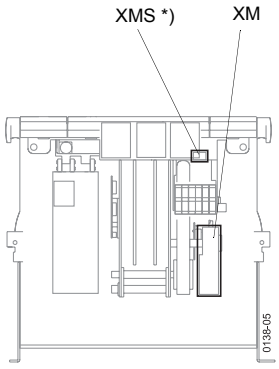
8.5 Closing release/electrical ON



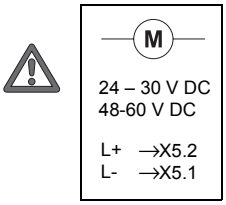
Same location as XMS

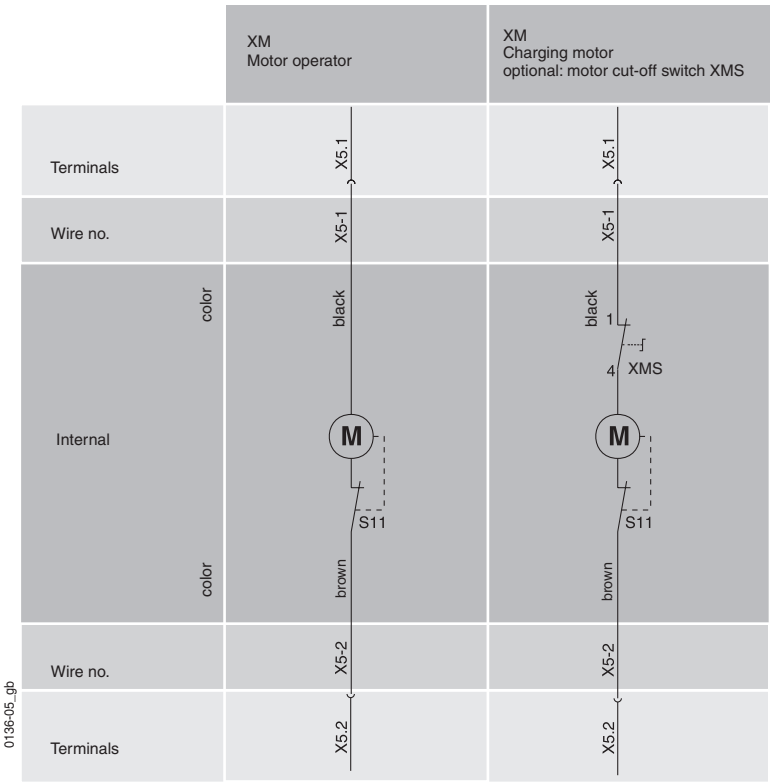


8.6 Motor operator

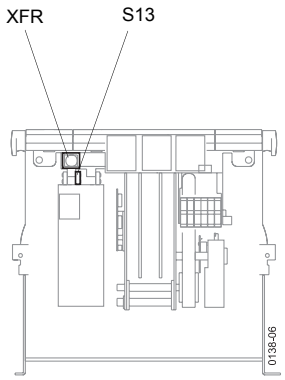


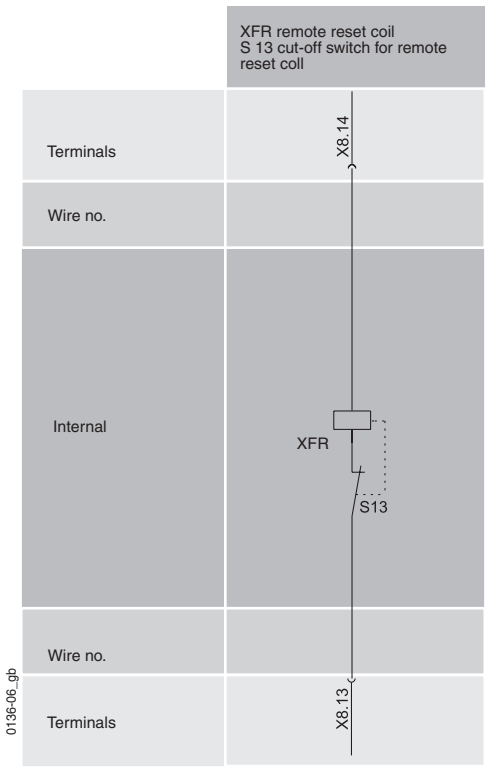
*) same location as XEE





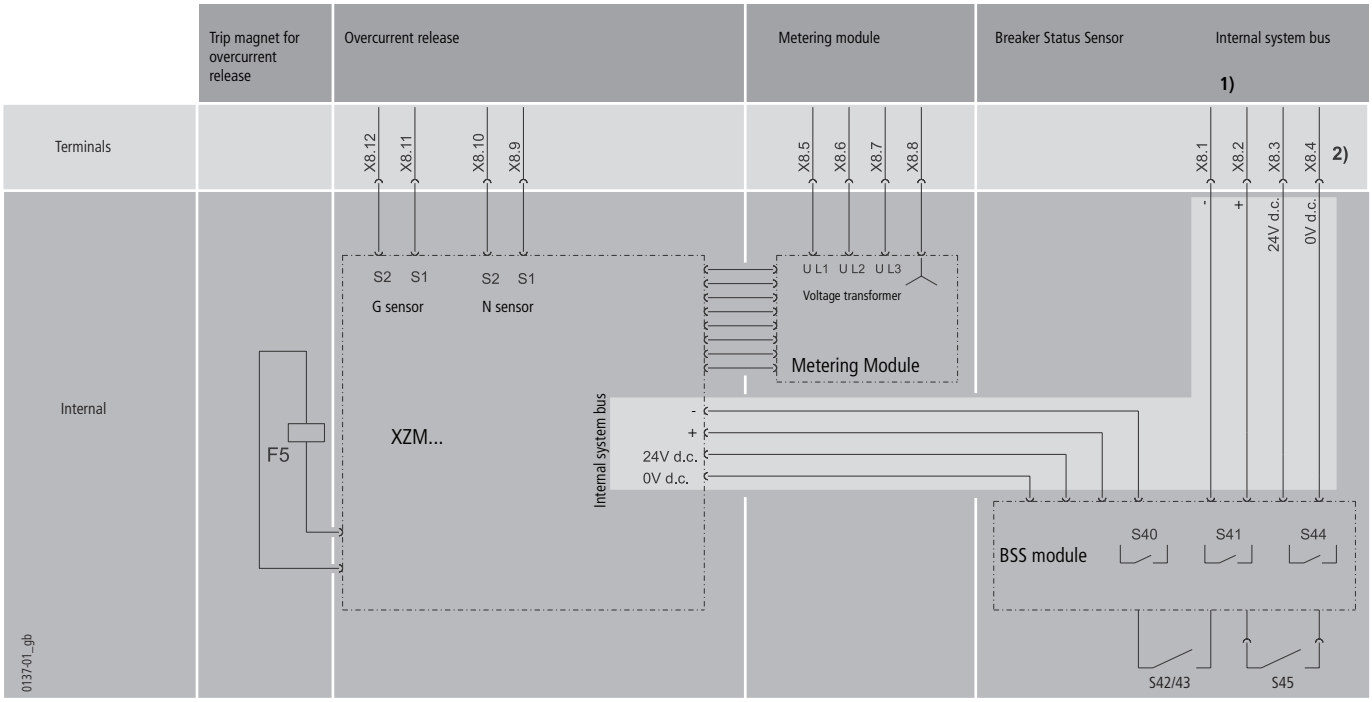
8.7 Remote reset coil





8.8 Protection circuit for overcurrent release XZMU, XZMD

8.8.1 With Breaker Status Sensor (XBSS) and metering module XMH



1) Terminating resistor on X8-1 / X8-2, when no external systembus module.

2) When no metering module and also no BSS module is used: direct connection X8 to XZM...

– BSS module: Breaker Status Sensor

– Internal system bus: Bus system for interconnection of circuit-breaker components to each other and to the field-bus (PROFIBUS-DP)

– XZM...: Overcurrent release

– S40 Signalling switch ready-to-close

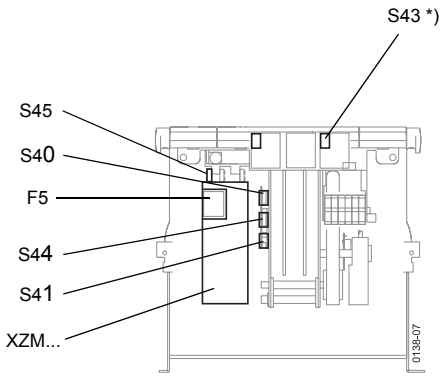
– S41 Signalling switch spring charged

– S42 Signalling switch on first release XA...

– S43 Signalling switch on second release XA1 or XU or XUV

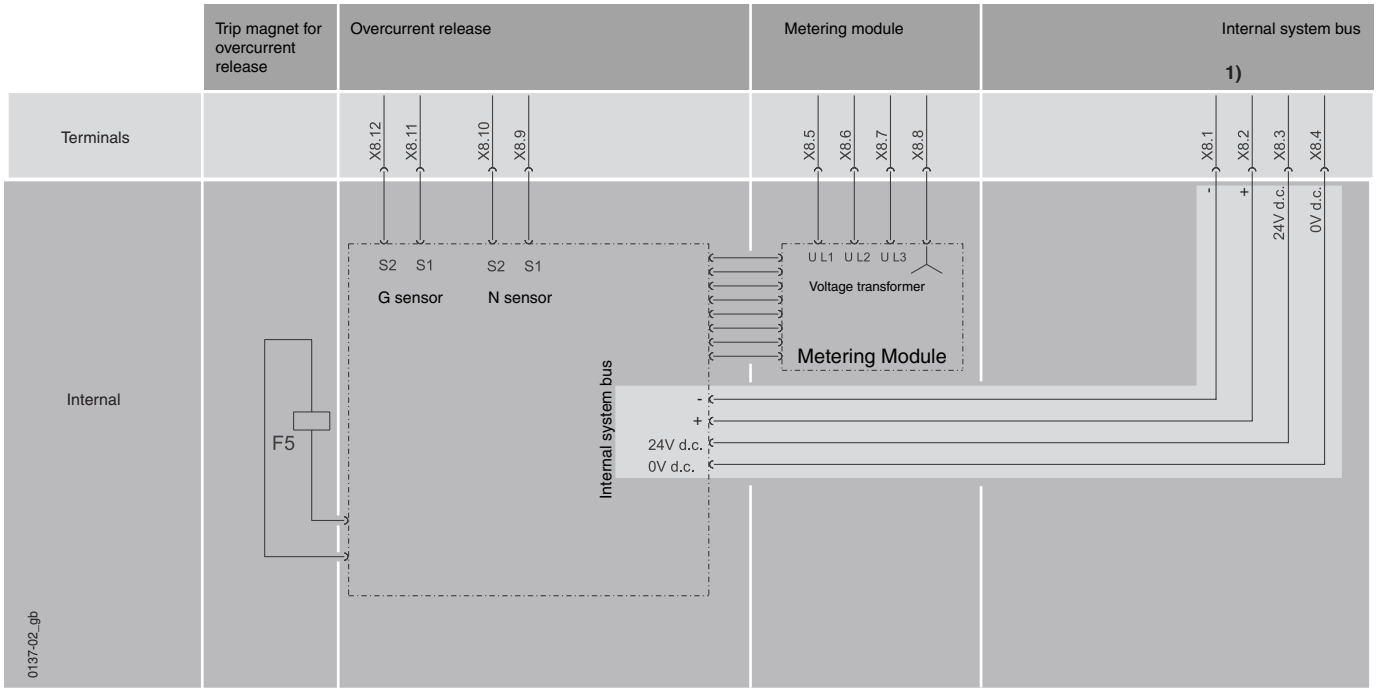
– S44 Signalling switch ON-OFF position

– S45 Trip signalling switch



*) same location as XHIS1

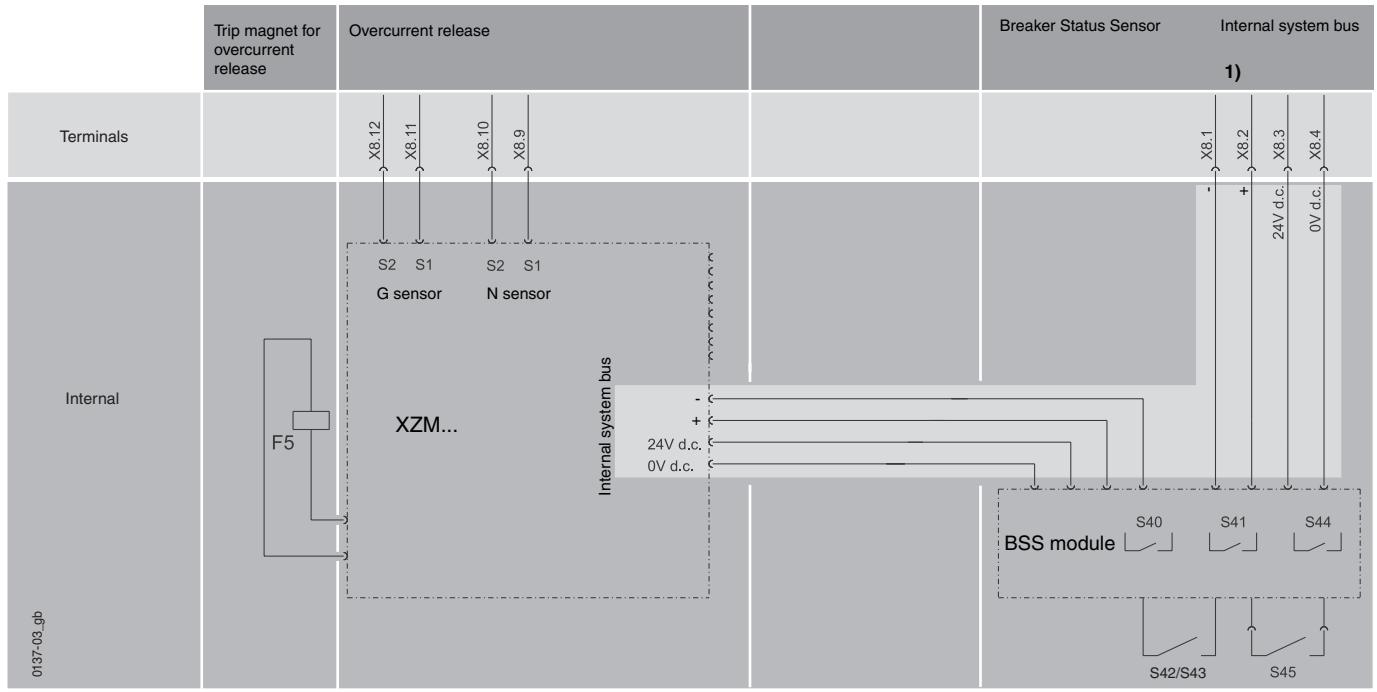
8.8.2 Only metering module XMH



1)Terminating resistor on X8-1 / X8-2, when no external systembus module.

(→ page 9 – 60)

8.8.3 Breaker Status Sensor (XBSS) only



1)Terminating resistor on X8-1 / X8-2, when no external systembus module.

(→ page 9 – 60)