9 Electronic components

Note

The contents have been checked that they conform to the hardware and software. However there could still be differences so a full guarantee of conformance cannot be given.
The details in this manual are regularly checked. Necessary corrections are contained in the next issue.

9.1 Overcurrent release

9.1.1 Overview of functions

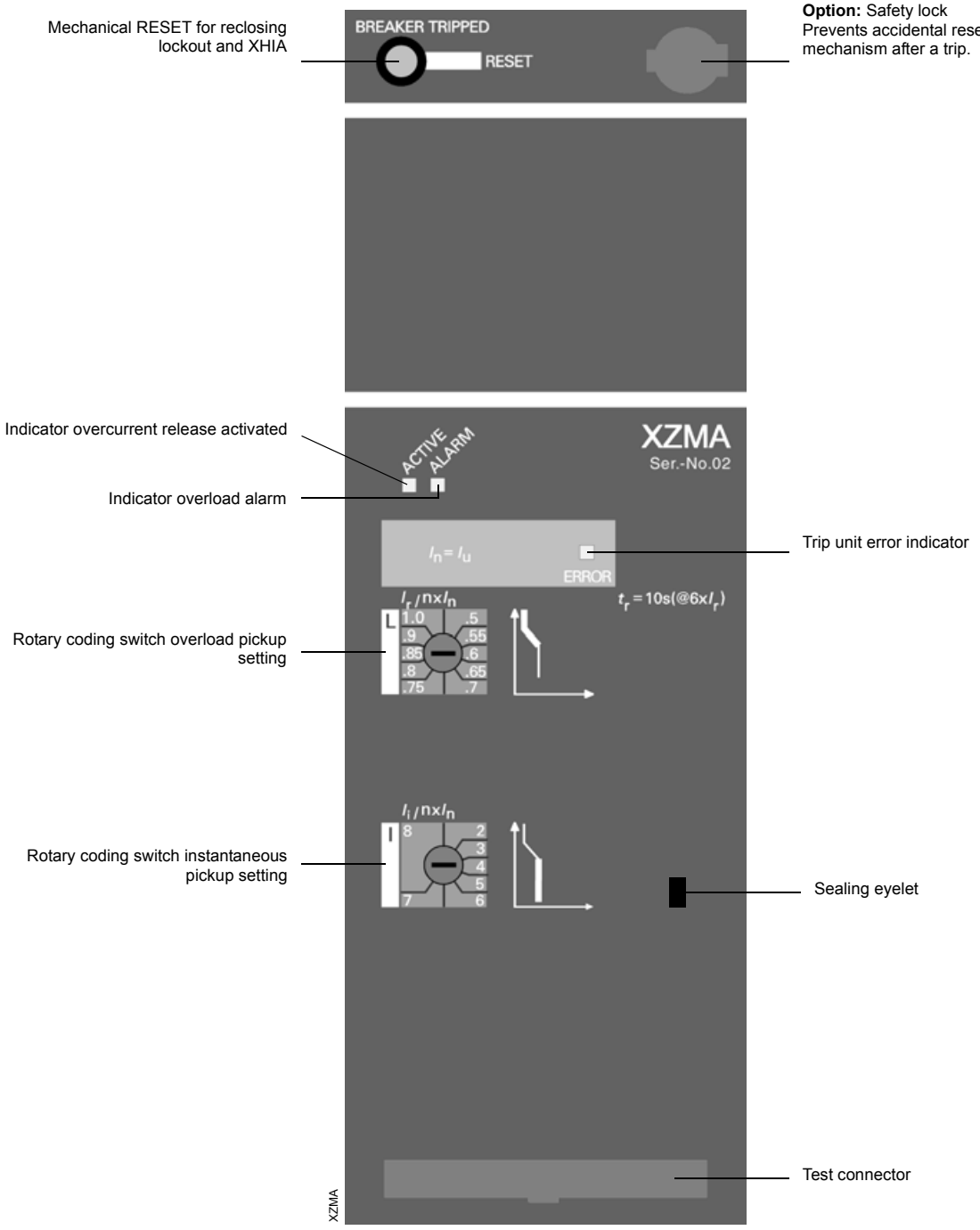
● = standard
○ = optional
1) Fixed at $I_i \geqq 20 \times I_n$, max. 50 kA
2) Increment for setting Menu/Comm

Setting range	Increment
0 – 1	0.1
1 – 100	1
100 – 500	5
500 – 1000	10
1000 – 1600	50
1600 – 10000	100
10000 – max.	1000

		IZM …-A…	**IZM …-V…**	**IZM …-U…**	**IZM…-D…**
		Trip unit for system protection	**Trip unit with selective protection**	**Releases for Universal protection**	**Digit releases**
		630 – 3200 A	630 – 6300 A	630 – 6300 A	630 – 6300 A
Basic protective functions					
Overload protection I_r	L	●	●	●	●
Adjustable delay time t_r		–	–	●	●
Short-time delayed short-circuit protection I_{sd}	S	–	●	●	●
Non-delayed short-circuit protection I_i	I	●	●[1)]	●	●
Neutral conductor protection	N	–	○	●	●
Earth-fault protection	G	–	○	○	○
Additional functions					
N-conductor protection can be switched on/off		–	○	●	●
Short-time delay short-circuit protection can be switched on/off		–	–	●	●
Instantaneous short-circuit protection can be switched on/off		–	–	●	●
Thermal memory can be switched on/off		–	–	●	●
Load monitoring		–	–	●	●
Leading signal “L-tripping” 200 ms		–	–	●	●
Short-time delayed short-circuit protection convertible to I^2t		–	–	●	●
Overload protection convertible to I^4t		–	–	●	●
Overload protection can be switched on/off		–	–	–	●
N-conductor protection adjustable		–	–	●	●
Earth fault switchable to I^2t		–	–	●	○
Earth fault alarm		–	–	○	○
Changeable parameter sets		–	–	–	●
Zone selective interlocking		–	–	○	○
Parameter definition and visualization					
Parameter definition via rotary coding switch		●	●	●	–
Parameter definition via communication (absolute values)		–	–	–	●
Parameter definition via menu (absolute values)		–	–	–	●
Remote parameter definition of the basic functions		–	–	–	●
Remote parameter definition of additional functions		–	–	●	●
Setting via parameter definition device IZM-XEM-PG or PROFIBUS-DP[2)]	**Comm**	–	–	–	●
Menu-assisted setting directly on release[2)]	**Menu**	–	–	–	●
Alphanumeric LCD		–	–	○	–
Graphic LCD		–	–	–	●
Metering function					
“Harmonic” measurement functions		–	–	○	○
Communication					
Internal system bus		–	–	●	●
PROFIBUS-DP communication		–	–	○	○
Communication via Ethernet		–	–	○	○
Other					
Connection possibility for an external 24 V DC power supply		–	–	●	●

9.1.2 Overcurrent release for system protection XZMA (IZM…-A…)

Design



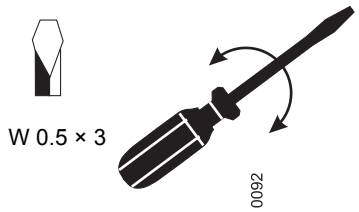
CAUTION

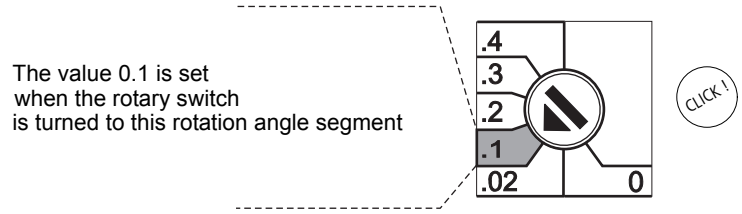
To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector.
Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

Overcurrent protection settings

CAUTION
Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.
With the project engineering and selectivity considerations it must be determined that no more current could flow through the circuit-breaker than it´s switching capacity shown in the catalog. Upstream protection devices must be selected so that this fault can be safely switched off.

The parameter are set using rotary coding switches.





Protective functions

→ Overload protection – L tripping (page 9 – 16)
→ Instantaneous short-circuit tripping – I-tripping (page 9 – 17)

Characteristics

The ranges shown in the following are mere setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

Note

The following characteristics each demonstrate the largest and smallest setting in the respective protective area. In order to get the complete tripping characteristic, the respective characteristic sections have been brought together. The characteristic curves indicate the behaviour of the overcurrent release when it has been activated by one of the currents flowing before the trip. If the overcurrent trip occurs directly after switch on and if the overcurrent release is not activated for this reason, the opening delay may extend by up to 15 ms depending on the level of the overcurrent. To determine the total opening time approx. 15 ms for the arc duration must to the shown opening times.

The shown characteristic curves are valid for an ambient temperature at the circuit-breaker of -5 to +55 °C. The release can be used with an ambient temperature of -20 to +70 °C (with LCD display to 55°C). For these temperatures an extended tolerance band applies.

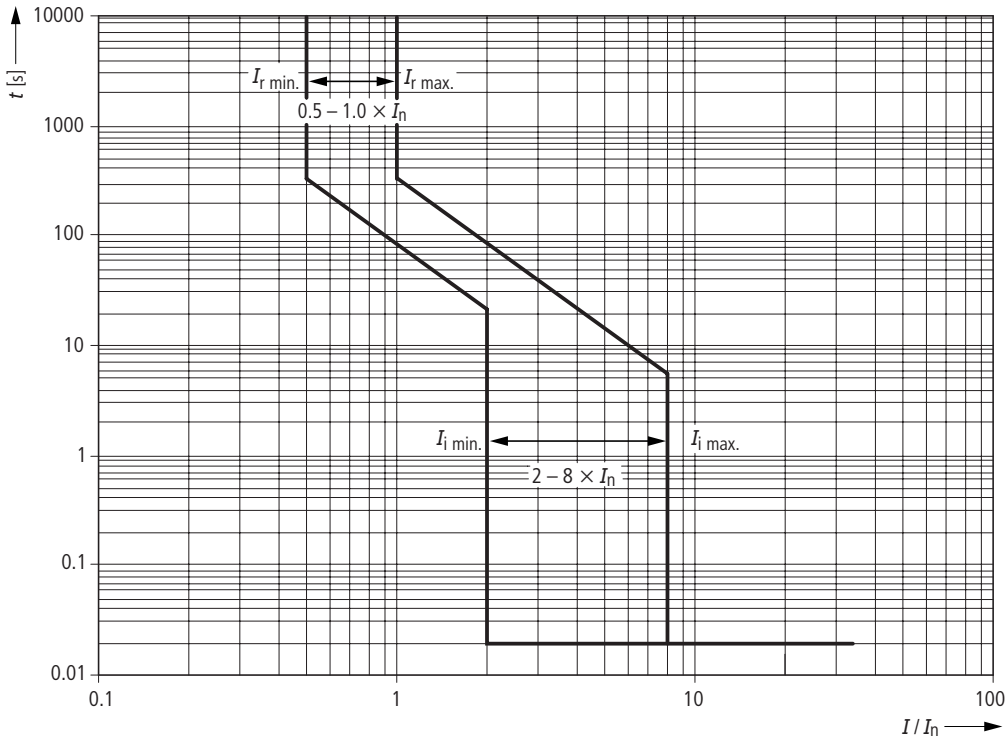
Tolerances with setting currents:

L: trip between 1.05 and 1.2 × I_r
S: -0 %, +20 %
I: -0 %, +20 %
G: -0 %, +20 %

Tolerances with tripping times:

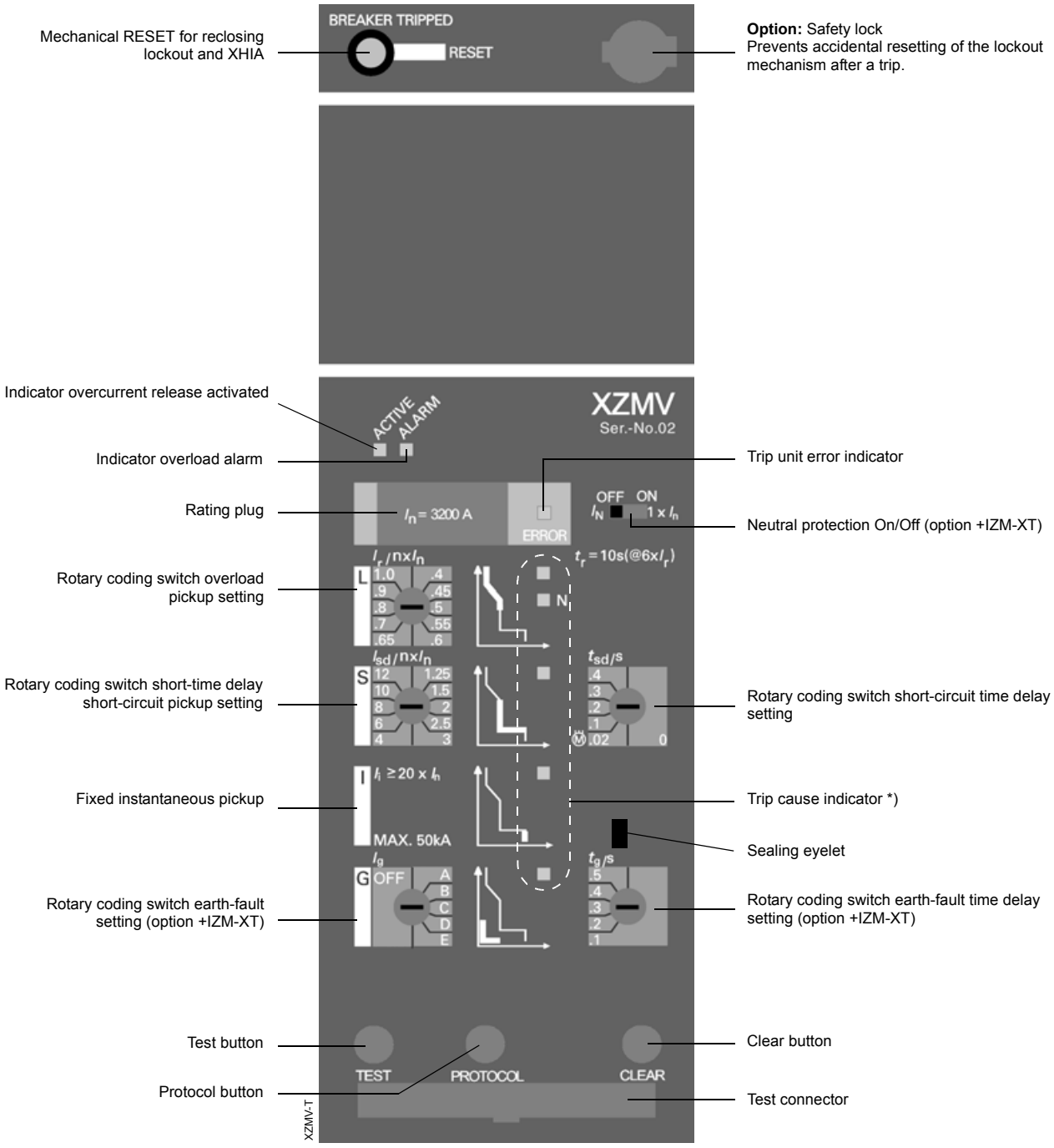
L: -20 %, +0 %
S: -0 %, +60 ms
I: < 50 ms
G: 0 ms, +60 ms

L-, I-trip



9.1.3 Overcurrent release with selective protection XZMV (IZM…-V…)

Design



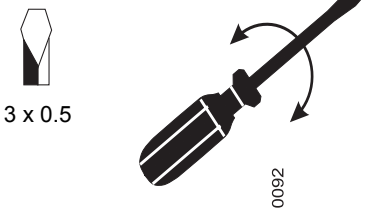
1)The reason for tripping is stored for a minimum of two days when the overcurrent release is activated for at least 10 mins before the trip occurred.

CAUTION
To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector. Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

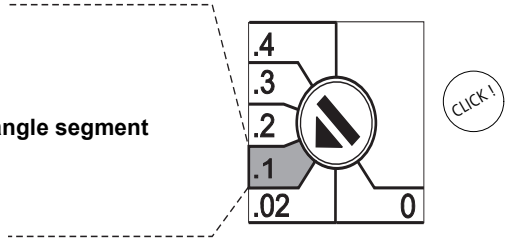
Overcurrent protection settings

CAUTION
Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.
With the project engineering and selectivity considerations it must be determined that no more current could flow through the circuit-breaker than it´s switching capacity shown in the catalog. Upstream protection devices must be selected so that this fault can be safely switched off.

The parameters for the basic functions are adjusted with rotary coding switches.



The value 0.1 is set
when the rotary switch
is turned to this **rotation angle segment**



The neutral conductor protection is switched on/off with a slide switch.

Protective functions

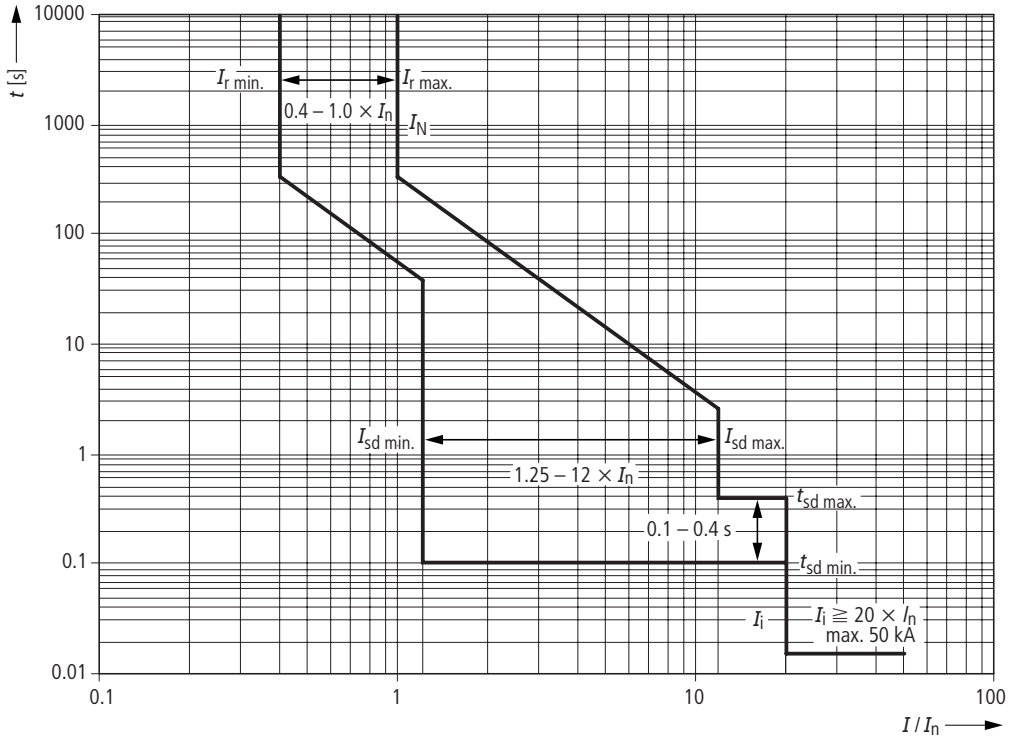
→ Overload protection – L tripping (page 9 – 16)
→ Short-time delayed short-circuit tripping – S-tripping (page 9 – 16)
→ Instantaneous short-circuit tripping – I-tripping (page 9 – 17)
→ Earth-fault tripping – G-tripping (page 9 – 17)
→ Neutral conductor protection – N-tripping (page 9 – 17)

Characteristics

The ranges shown in the following are mere setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

Further information about the characteritic curves page 9 – 4

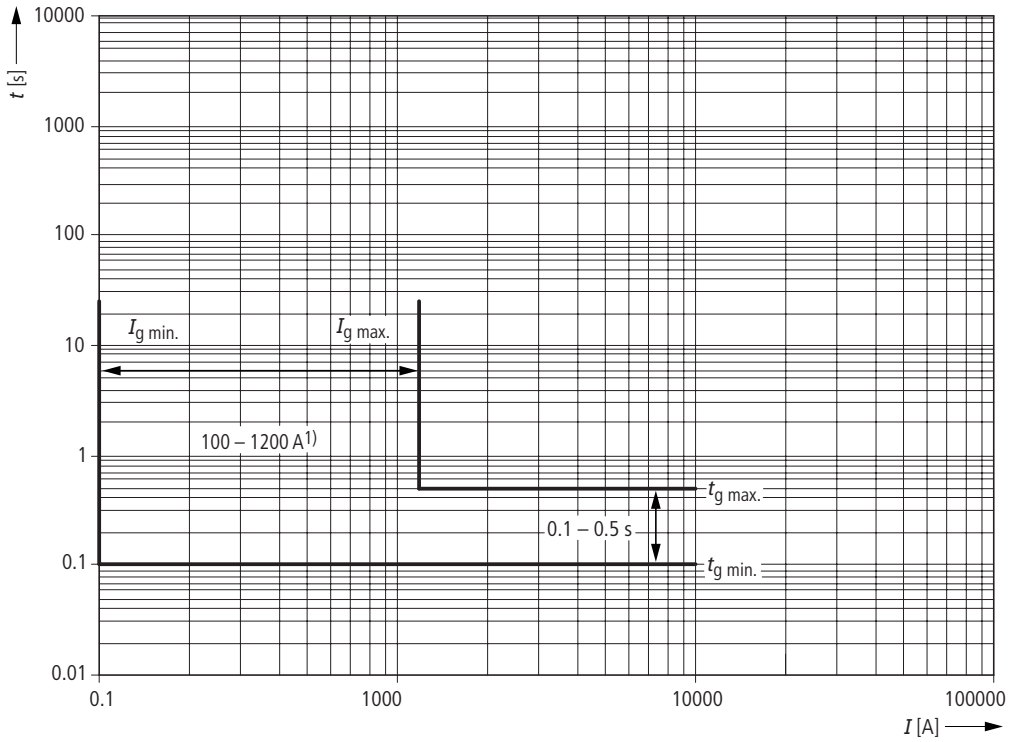
L-, S-, I-, N-tripping



Earth-fault tripping

G tripping

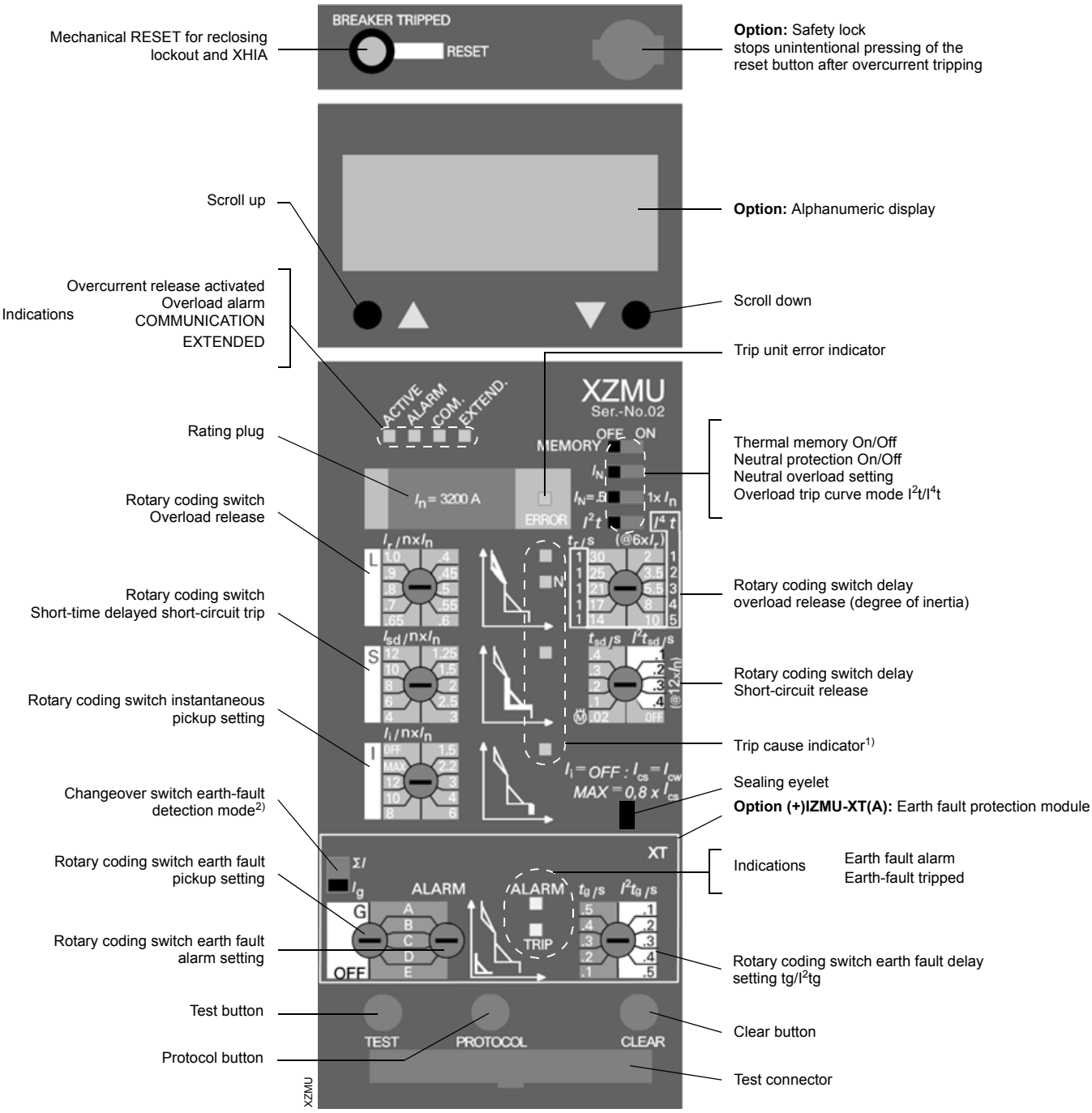
Option +IZM-XT



1) IZM.1-…/IZM.2-…: 100 … 1200 A
IZM.3-… 400 … 1200 A

9.1.4 Overcurrent release for universal protection XZMU (IZM…-U…)

Design



1) The trip cause is stored internally for at least two days, if the overcurrent release had been activated for at least 10 min before tripping (For unlimited time with auxiliary power).

2) Changeover only accessable when module removed.

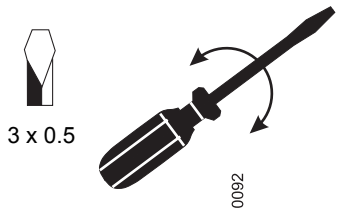
CAUTION

Please observe the notes page 9 – 46!
To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector.
Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

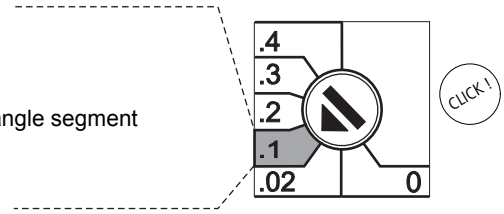
Overcurrent protection settings

CAUTION
Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.
With the project engineering and selectivity considerations it must be determined that no more current could flow through the circuit-breaker than it´s switching capacity shown in the catalog. Upstream protection devices must be selected so that this fault can be safely switched off.

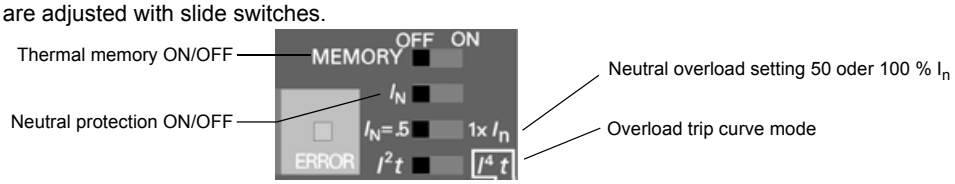
The parameters for the basic functions are adjusted with rotary coding switches.



The value 0.1 is set
when the rotary switch
is turned to this rotation angle segment



Various additional functions are adjusted with slide switches.



The settings for the additional function “load monitoring” can be adjusted through:

– the alphanumeric display (→ page 9 – 20)
– the test socket with the parameter assignment module XEM-PG(E) (→ page 9 – 74)
– the PROFIBUS-DP with a PC and the system-software (→ “Communication manual circuit-breaker IZM”)

Note
These settings can only be adjusted if the overcurrent release is activated, i.e. it must be connected to an external 24 V DC voltage supply.

Protective functions

→ Overload protection – L tripping (page 9 – 16)
→ Short-time delayed short-circuit tripping – S-tripping (page 9 – 16)
→ Instantaneous short-circuit tripping – I-tripping (page 9 – 17)
→ Earth-fault tripping – G-tripping (page 9 – 17)
→ Neutral conductor protection – N-tripping (page 9 – 17)
→ Load monitoring (“Load restore/load shedding”) (page 9 – 18)
→ Leading signal “L-tripping” (page 9 – 18)
→ Thermal memory can be switched on/off (page 9 – 18)
→ Earth-fault protection modules (page 9 – 36)
→ Further protection functions (page 9 – 15)

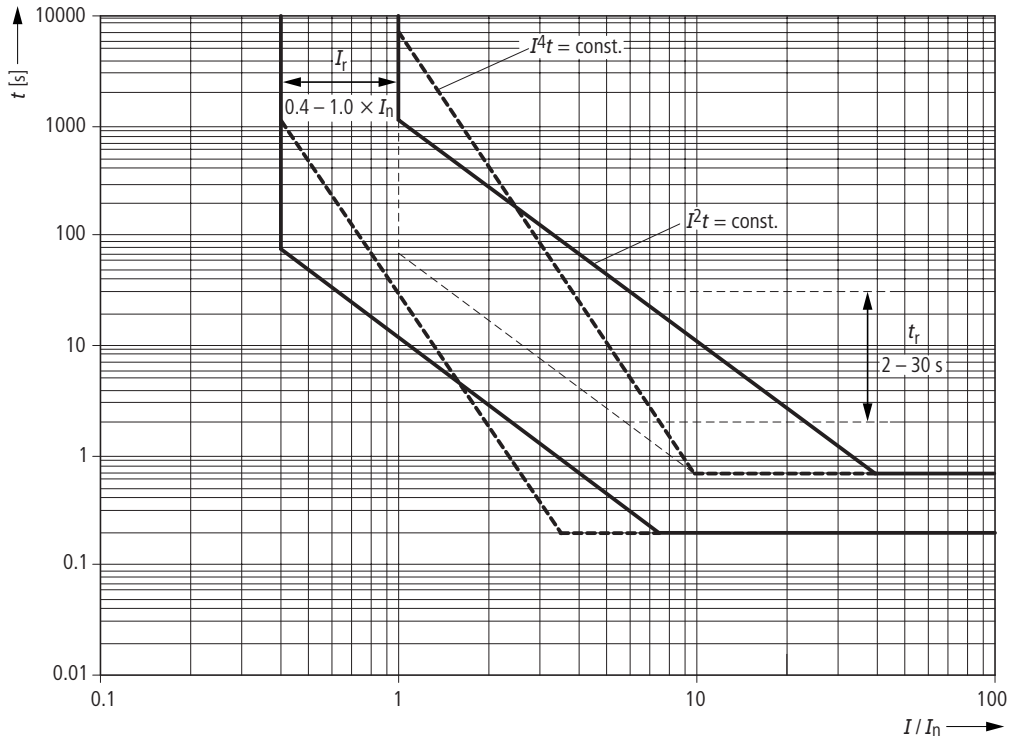
Characteristics

The ranges shown in the following are mere setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

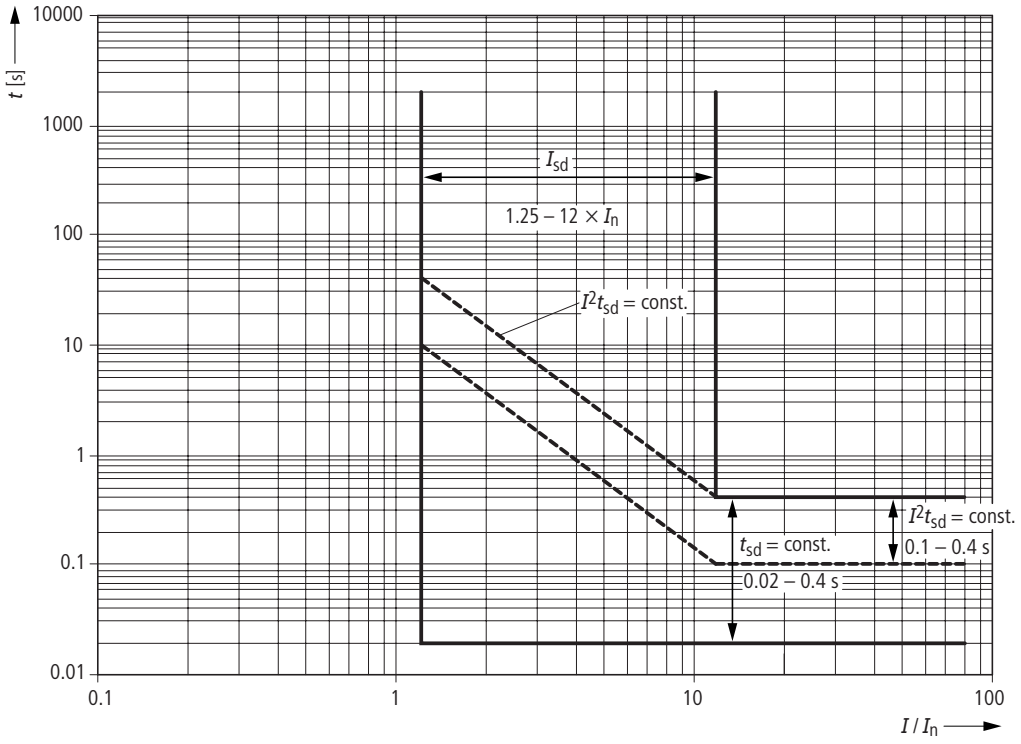
The characteristics apply to the circuit-breaker version IZM…2-…, H-class, at 440 V, with earth-fault protection module.

Further information about the characteritic curves page 9 – 4

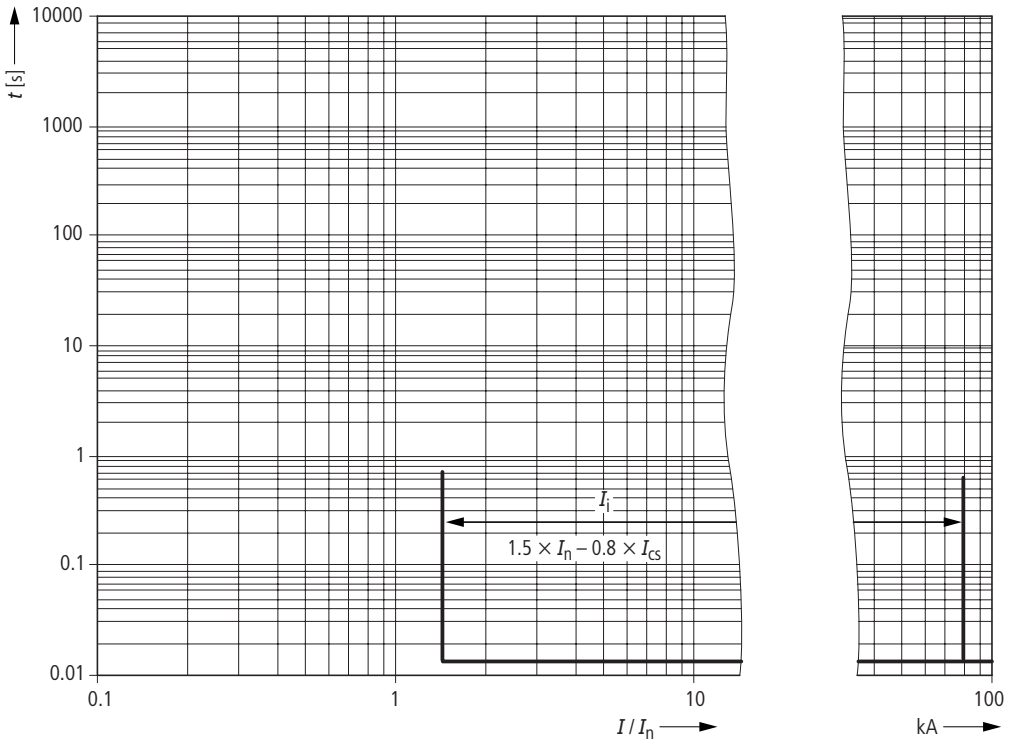
L-trip



S-trip



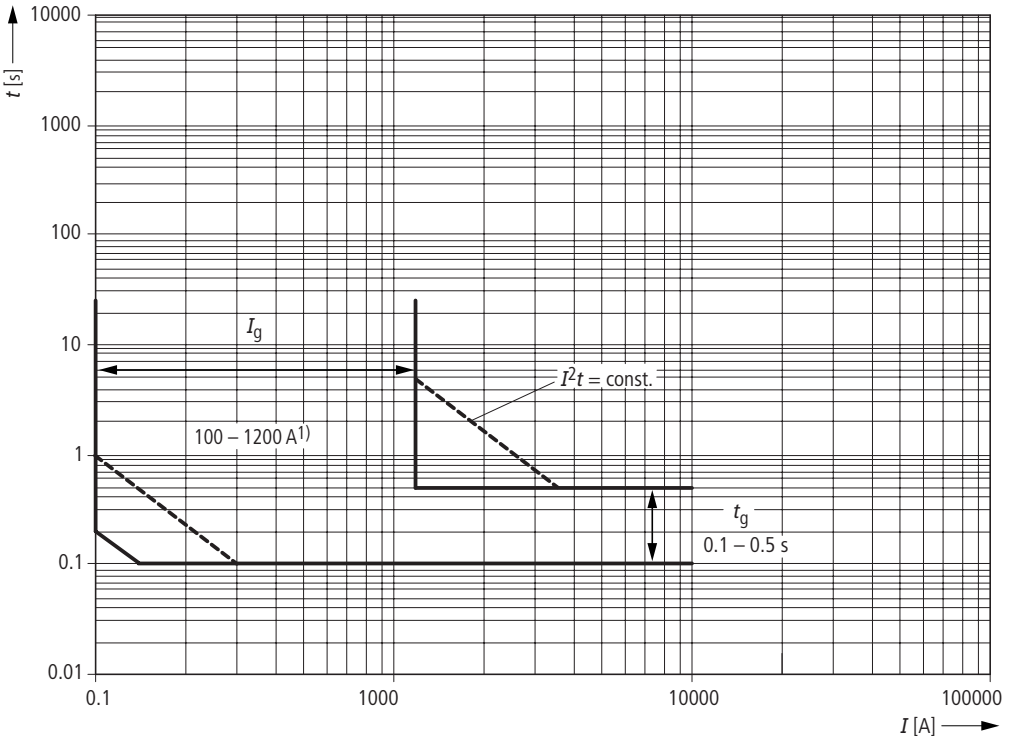
I-trip



Earth-fault trip

G tripping

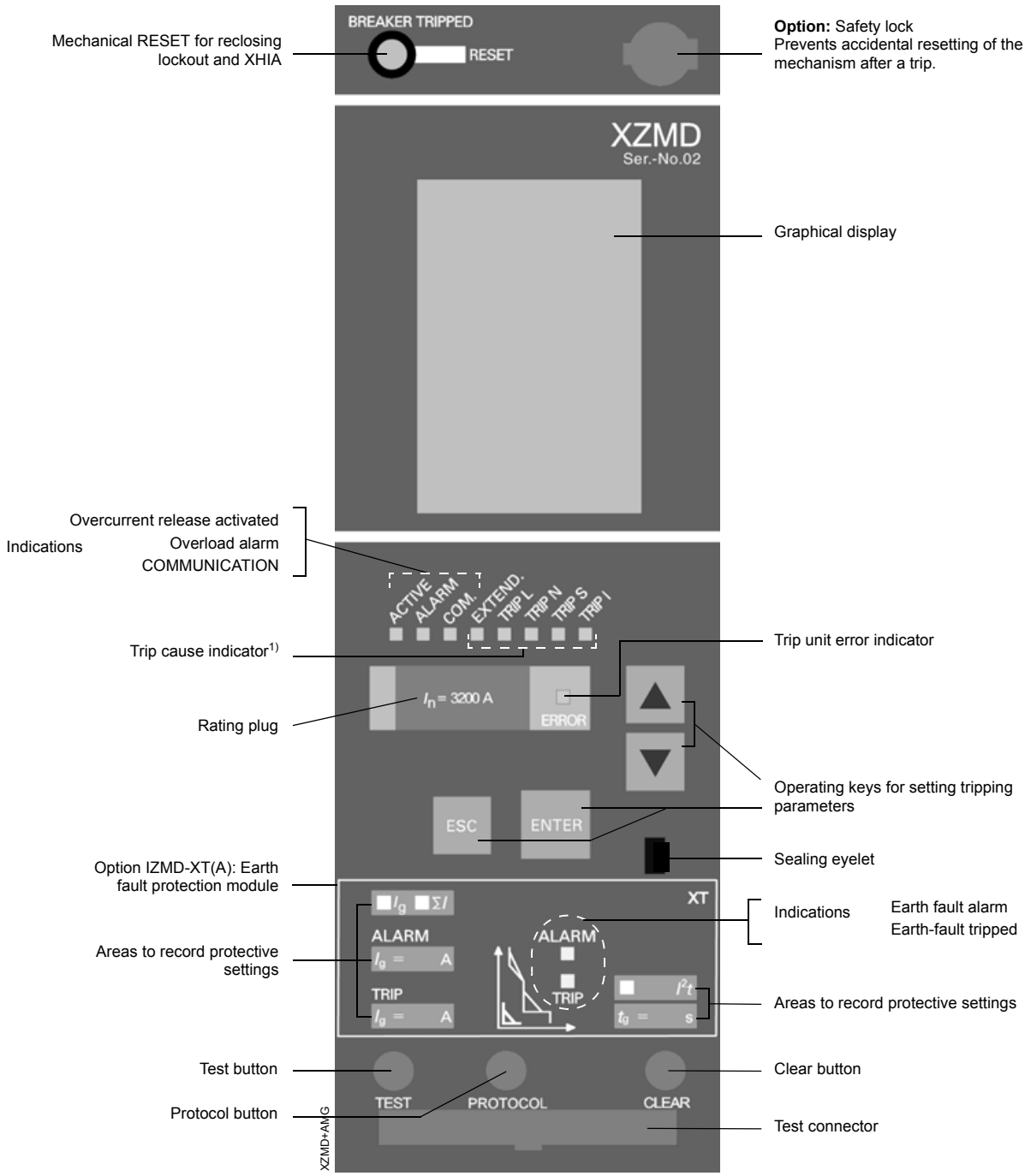
Option (+)IZMU-XT(A)



1) IZM.1-…/IZM.2-…: 100 … 1200 A
IZM.3-… 400 … 1200 A

9.1.5 Digital release XZMD (IZM…-D…)

Design



1) The trip cause is stored internally for at least two days, if the overcurrent release had been activated for at least 10 min before tripping (For unlimited time with auxiliary power).

CAUTION

Please observe the notes page 9 – 46!
To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector.
Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

Overcurrent protection settings

CAUTION
Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.
With the project engineering and selectivity considerations it must be determined that no more current could flow through the circuit-breaker than it´s switching capacity shown in the catalog. Upstream protection devices must be selected so that this fault can be safely switched off.
When switching off the overload function it must be ensured that no overload can occur. A thermal destruction of the circuit-breaker, the system or the load could be the consequence. Occurring overloads can only be switched off in this case by tripping by exceeding the response value of the short-circuit protection function (delayed or undelayed). These response values are to be correspondingly adjusted.

Note

It is also possible during operation with XZMD to switch between parameter set A and parameter set B and vice versa.

After the switchover signal from the systembus the switchover takes 100 ms for the short-circuit parameters and 200 ms for the overload overload parameters.

All parameters for the basic and the additional functions can be adjusted through:

– the graphical display (→ page 9 – 27)
– the test socket with the parameter assignment module XEM-PG(E) (→ page 9 – 74)
– the PROFIBUS-DP with a PC and the system-software (→ “Communication manual circuit-breaker IZM”)

Note

To do this, the overcurrent release must be activated, i.e. it must be connected to an external 24 V DC voltage supply.

Protective functions

→ Overload protection – L tripping (page 9 – 16)
→ Short-time delayed short-circuit tripping – S-tripping (page 9 – 16)
→ Instantaneous short-circuit tripping – I-tripping (page 9 – 17)
→ Earth-fault tripping – G-tripping (page 9 – 17)
→ Neutral conductor protection – N-tripping (page 9 – 17)
→ Load monitoring (“Load restore/load shedding”) (page 9 – 18)
→ Leading signal “L-tripping” (page 9 – 18)
→ Thermal memory can be switched on/off (page 9 – 18)
→ Earth-fault protection modules (page 9 – 36)
→ Further protection functions (page 9 – 15)

Characteristics

The ranges shown in the following are mere setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

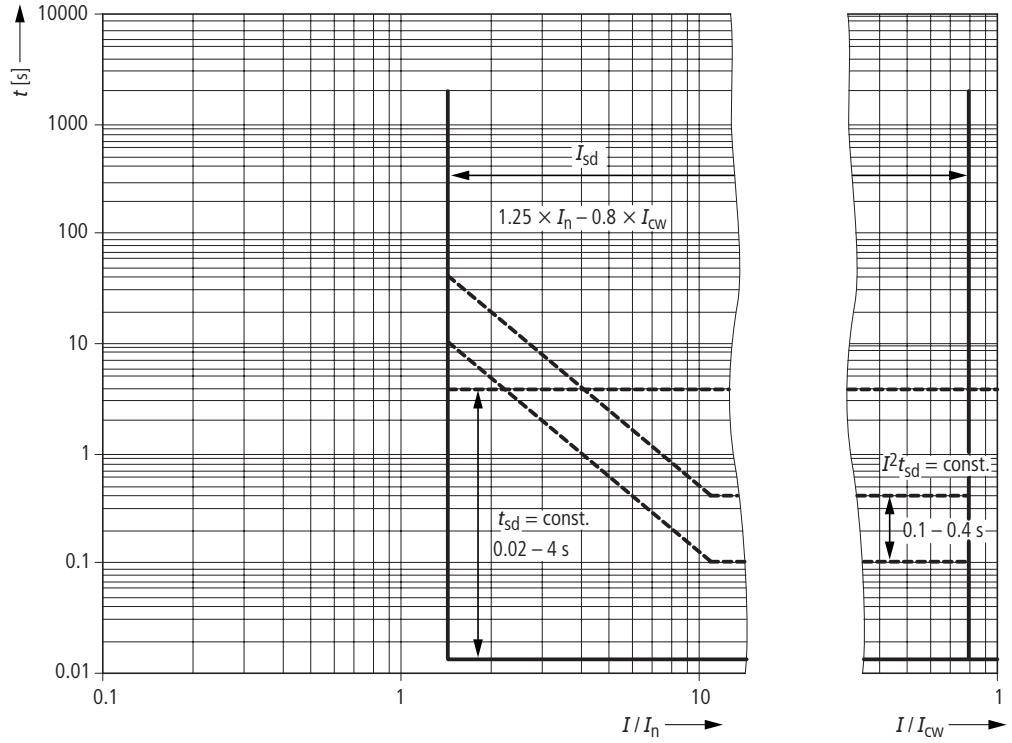
The characteristics apply to the circuit-breaker version IZM…2-…, H-class, at 440 V, with earth-fault protection module.

Further information about the characteritic curves page 9 – 4

L-trip

(→ page 9 – 10)

S-trip



Note

For setting tsd > 0.4 s the maximum possible setting value Isd is reduced automatically with the frame size:
IZM.1-… : 15 kA
IZM.2-… : 20 kA
IZM.3-… : 25 kA

I-trip

(→ page 9 – 11)

Earth-fault tripping

(→ page 9 – 11)

9.1.6 Order numbers

Overcurrent release	Part no.
System protection	IZM-XZMA
Selectivity protection	IZM-XZMV
Selectivity protection with earth-fault protection	IZM-XZMV-XT
Universal	IZM-XZMU
Universal with measuring function “harmonic”	IZM-XZMU-MH
Digital	IZM-XZMD
Digital with measuring function “harmonic”	IZM-XZMD-MH

9.1.7 Indications

Scope of indications depends on the type of overcurrent release.

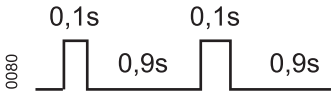
Overcurrent release is activated

$I > I_{min}$

– or when 24 V control voltage is connected

– I_{min}:
60 A for IZM.1-… and IZM.2-…, 150 A for IZM.3-…

Flashing LED



Overcurrent alarm

$I \geqq I_r$

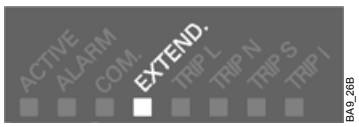
– Steady LED, if

Communication active

– Another participant on the internal systembus is recognised and communication started.

Extended protective function has tripped

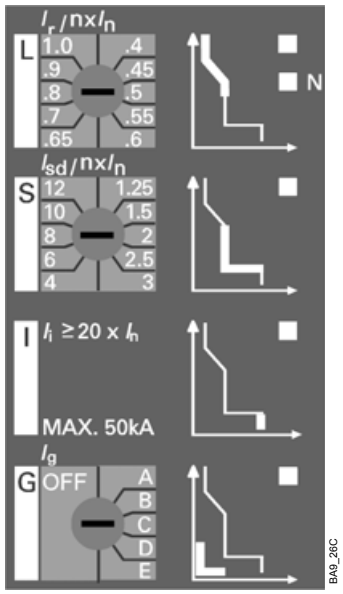
– Due to metering function
– Trip cause saved in event memory
– Trip cause readable through:
  • Parameter determination device XEM-PG(E)
  • PROFIBUS-DP and PC with system-software
  • Graphical display (XZMD)
  • External digital output module (→ page 9 – 54)



Protection function has tripped (overcurrent)

– Indicator is illuminated, if protocol button is pressed
– Only one trip cause is displayed
– Only the last trip cause is displayed

or



LED ERROR

1. Error flashes:

Protection function is restricted. The protection parameters are reset to the minimum value.

Causes:

– The rated current of the rated current module is larger than that of the circuit-breaker.
– Rotary coding switch is in an undefined intermediate position
– Overcurrent release is defective

2. Error shows continously:

Protection function is not guaranteed.

Causes:

– Rated current module and circuit-breaker are not compatible.
– Overcurrent release is defective

9.1.8 Protective functions

9.1.8.1 Basic protective functions

The basic protective functions of the overcurrent release are ensured without additional auxiliary voltage. The required power is supplied by internal transformers of the circuit-breaker.

To evaluate the currents, the electronic system of the overcurrent release calculates the r.m.s. value.

The individual functions are parameterized according to the part no. through:

- Rotary coding switch (XZMA, XZMV, XZMU)
- Electronic data transfer (XZMD) through:
  - The test socket with the parameter assignment module XEM-PG(E)
  - The PROFIBUS-DP with a PC and the system-software
- Control board (XZMD)

Overload protection – L tripping

The setting value I_r determines the maximum continous current the circuit-breaker can carry without tripping. The time-lag t_r determines the duration of an overload without tripping.

Current settings for I_r	
XZMA	I_r = (0.5/0.6/0.7/0.8/0.9/1.0) x I_n
XZMV, XZMU	I_r = (0.4/0.45/0.5/0.55/0.6/0.65/0.7/0.8/ 0.9/1.0) x I_n
XZMD	I_r = (0.4 ... 1.0) x I_n (data in Amps)

Setting for t_r	
XZMA, XZMV	t_r = 10 s (at 6 x I_r)
XZMU	t_r = 2/3.5/5.5/8/10/14/17/21/25/30 s (at 6 x I_r)
XZMD	t_r = 2 … 30 s (at 6 x I_r)

The tripping characteristic is an I^2t-characteristic. Some overcurrent releases can be switched over to an I^4t-characteristic (→ page 9 – 19).

Short-time delayed short-circuit tripping – S-tripping

On overcurrent releases XZMV, XZMU and XZMD, tripping due to the short-circuit current Isd can be delayed by the time tsd.

This provides selectivity for the short-circuit protection in switchgear with several grading levels.

Setting values for I_{sd}	
XZMV, XZMU	I_{sd} = (1.25/1.5/2/2.5/3/4/6/8/10/12) x I_n
XZMD	I_{sd} = 1.25 x I_n … 0.8 x I_{CW} (data in A)

Setting values for t_{sd}	
XZMV	t_{sd} = 0/0.02(M)1)/0.1/0.2/0.3/0.4 s
XZMU	t_{sd} = 0.02(M)1)/0.1/0.2/0.3/0.4 s; OFF
XZMD	t_{sd} = 0.02(M)1)/0.08 … 4 s 2) ; OFF

1) The delay time 0.02 s is not a selected delay time!
In this position, the motor protection function is activated.

2) For setting tsd > 0.4 s the maximum possible setting value Isd is reduced automatically with the frame size:
IZM.1-… : 15 kA
IZM.2-… : 20 kA
IZM.3-… : 25 kA

With the setting t_{sd} = 0 s the overcurrent release XZMV can provide an instantaneous short-circuit protection with an adjustable value that is smaller than the fixed set value. I_i .

The setting “OFF” for the overcurrent releases XZMU and XZMD is provided to deactivate the short-time delay short-circuit protection.

If the zone selective (→ page 9 – 19) is used, however, the setting for the time delay tsd is deactivated. If the circuit-breaker does not receive any blocking signal from a downstream circuit-breaker, it will trip after 50 ms regardless of the setting for t_{sd}.

Some overcurrent releases can be switched over to an I^2t-characteristic (→ page 9 – 19).

Motor protection function

With the switch position t_{sd} = (0.02 s) a special protection function for electromotive drives is switched on. It inhibits the activation of the short-time delayed short-circuit release by the switch-on peaks of electric motors. At the same time, a phase failure protection is activated (→ page 9 – 18) and the time constant for the internally calculated reproduction of the temperature-rise and cooling process is switched over from switchgear protection to motor protection.

Instantaneous short-circuit tripping – I-tripping

If the current setting I_i is exceeded, the circuit-breaker is tripped instantaneously.

Settings for I_i	
XZMA	I_i = (2/3/4/5/6/7/8) x I_n
XZMV	$I_i \geqq 20 \times I_n$ (fixed setting) MAX = 50 kA
XZMU	OFF 1) I_i = (1,5/2,2/3/4/6/8/10/12) × I_n MAX = 0.8 x I_{CS}
XZMD	I_i = 1.5 x In … 0.8 x I_{CS} ; OFF 1) (data in Amps) MAX = 100 kA

1) If the I trip is switched off the breaking capacity of the circuit-breaker is reduced to $I_{CS} = I_{CW}$.

Correspondingly the t_{sd}-setting is the I_{CW} value to be adjusted for 0.5 ... 4 sec

For the overcurrent releases XZMU and XZMD it is not possible to deactivate the short-time delay short-circuit protection, setting tsd = OFF, and the instantaneous short-circuit protection Ii = OFF at the same time! Should by t_{sd} = OFF the setting I_i = OFF be selected, an automatic internal correction takes place to I_i = 1.5 x I_n.

Earth-fault tripping – G-tripping

If the overcurrent release is equipped with an earth-fault protection module, loads can be protected against unpermissibly high earth-fault currents.

The earth-fault release “G” detects fault currents which flow to earth and which can cause a fire in the power distribution system. The adjustable delay time allows multiple circuit-breakers to be connected in series with providing graded selectivity.

For the overcurrent release XZMV with option +IZM-XT the earth-fault protection is integrated fixed, whereas the overcurrent release XZM(U)(D) can be equipped with an earth-fault protection module (→ page 9 – 36) even later on.

Vectorial current summation (XZMV, XZMU, XZMD):
The N conductor current is measured directly and is evaluated for the N conductor overload protection. Using the vectorial current summation of the three phase currents and the N-conductor current, the overcurrent release calculates the earth-fault current.

This method of measurement is suitable for symetrical loads on the main conductors.

Direct measurement of the earth-fault current (XZMU, XZMD):
A current transformer with a ratio of 1200 A/1 A is used for measurement of the earth-fault current. The current transformer can be directly mounted in the earthed star point of the transformer. (→ page 9 – 72)

The response value I_g together with the setting of the time delay t_g determines the shut off of the earth-fault.

Settings for I_g		
	Frame size	
	IZM.1-…/IZM.2-…	IZM.3-…
A	100 A	400 A
B	300 A	600 A
C	600 A	800 A
D	900 A	1000 A
E	1200 A	1200 A
OFF		

Current settings for t_g	
XZMV, XZMU	t_g = 0.1/0.2/0.3/0.4/0.5 s
XZMD	t_g = 0.1…0.5 s

Some overcurrent releases can be switched over to an I^2t-characteristic .(→ page 9 – 19)

Neutral conductor protection – N-tripping

The overcurrent releases XZMV, XZMU and XZMD offer the possibility to protect the neutral conductor against overload, too. This requires a current transformer for the neutral conductor, which can be retrofitted (→ page 9 – 69).

For tripping, the same time-lag class t_r applies as for overload tripping.

Settings for I_N	
XZMV	$I_N = I_n$; OFF
XZMU	I_N = (0.5/1.0) x I_n; OFF
XZMD	I_N = (0.2…2.01)) x I_n; OFF

1) Current settings above 1.0 × In are only available for 3-pole circuit-breakers. The N conductor current is monitored by an external current transformer.

	CAUTION
⚠	Setting $I_N > 1 \times I_n$ may be used only, if the N-conductor has been designed to carry this current!

9.1.8.2 Additional functions

Load monitoring (“Load restore/load shedding”)

The overcurrent releases XZMU and XZMD offer the possibility of additional load monitoring. Two current values, “load shed” and “load restore”, and one time delay t_x can be set.

When the current falls below the set value of the “load restore” and at the same time exceeds the lowest value of current transfer, after the set time delay t_x a signal is generated through the internal system bus. Also when the set value “load shedding” is exceeded, after the set time delay t_x a signal is generated through the internal system bus. These signals can be used to connect or disconnect loads. Therefore overload tripping of incoming circuit-breakers for example can be avoided.

Settings for load monitoring	
“Load shed” and “load restore”	40 A…1.5 x I_r; OFF
Delay time	t_x = 1…15 s

Load monitoring can be adjusted through:

– The alphanumeric display (XZMU)
– The graphical display (XZMD)
– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software

The signals “load restore/load shedding” can be further processed via an expansion module IZM-XEM-6(P)DO-… or the PROFIBUS interface.

Leading signal “L-tripping”

The overcurrent releases XZMU and XZMD provide a leading signal “L-tripping”, which is transmitted through the internal system bus 100 ms before overload tripping. Using this thyristor control devices for example can be actuated.

The leading signal “L-tripping” can be further processed via an expansion module IZM-XEM-6(P)DO-… or the PROFIBUS interface.

Phase failure protection

In overcurrent release XZMD, the phase failure protection can also be activated if the motor protection is not activated.

If when phase failure protection is activated the current of the lowest loaded phase is 50% smaller than the current of the highest loaded phase the set value I_r is automatically reduced to 80%. When the phase currents differ by less than 50% the set value I_r is again valid.

Thermal memory can be switched on/off

The overcurrent releases XZMU and XZMD offer the possibility to continue with the internally calculated reproduction of the thermal processes in downstream switchgear and consumers even if the circuit-breaker is open and the electronic system has no external supply. In this way, an effective protection against thermal overload can be guaranteed for frequent closing and opening processes, too.

Behaviour in overload range:

– above 1.125 x I_R occurs a strict linear heating to the characteristic curve.

Behaviour in rated current range:

– below 1.125 x I_R there is no heating

– an exponential cooling takes places with a time constant of 18 x t_R for system protection or 10 x t_R for motor protection

Behaviour with MEMORY = ON:

When the thermal memory is switched on the thermal history is taken into consideration :

– after a trip the thermal memory of the phases is set to 90% equivalent of the warmest phase. (allows re-switch on)

– an exponential cooling with a time constant of 18 x t_R for system protection or 10 x t_R for motor protection

With self-provided tripping the phase of deactivating the cooling with reactivation is software produced for a range of up to 60 mins so that for external and self-provided releases have relatively similar tripping times.

Behaviour with MEMORY = OFF:

When the thermal memory is switched off the thermal history is not taken into consideration :

– The thermal memory of the release always starts at ZERO when activated.

– after tripping the thermal memory of the phases is set to ZERO

The thermal memory can be activated through:

– A slide switch (XZMU)

– The graphical display (XZMD)
– The test socket with the parameter assignment module XEM-PG(E) (XZMD)
– The PROFIBUS-DP with a PC and the system-software (XZMD).

Zone selective interlocking

If the circuit-breaker is combined with a ZSI-module ,(→ page 9 – 62) a short-circuit occurring in systems with several grading levels can be localised precisely.

For this purpose, all circuit-breakers are interconnected through their ZSI-modules.

In case of short-circuit, each circuit-breaker affected by the short-circuit current interrogates its downstream circuit-breaker to determine fault presence at this downstream level. In the direction of the energy flow, only the circuit-breaker nearest to the short-circuit trips. A possible time delay setting for the short-circuit tripping is deactivated. However, tripping will not take place until 50 ms later at the earliest, as a rule it will take 80 –90 ms.

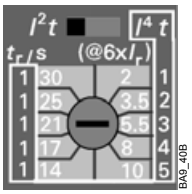
Overload protection can be set I^4t

The overcurrent releases XZMU and XZMD offer the possibility to switch over from the I^2t to an I^4t inverse-time function for the overload protection by means of a slide switch. This improves the selectivity of the overload protection in combination with fuses.

This function is only effective for a set overload current in the range of 320 A ≦ I_r ≦ 2500 A.

In this case, the setting possibilities for the time-lag class t_r change as follows (values in the white frame):

Setting for tr	
XZMU	t_r = 1/2/3/4/5 s (at 6 x I_r)
XZMD	t_r = 1… 5 s (at 6 x I_r)



Switching off overload protection

On overcurrent release XZMD it is possible to switch off the overload protection. This might be necessary e.g. if the system is fed by a generator.

Switching off can be effected through:

– The graphical display (XZMD)
– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software

CAUTION

When switching off the overload function it must be ensured that no overload can occur.
A thermal destruction of the circuit-breaker, the system or the load could be the consequence.
Occurring overloads can only be switched off in this case by tripping by exceeding the response value of the short-circuit protection function (delayed or undelayed). These response values are to be correspondingly adjusted.

Short-time delay short-circuit protection switchable to I^2t

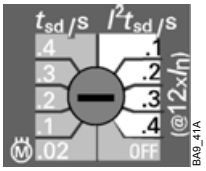
The overcurrent releases XZMU and XZMD offer the possibility to switch over from a constant delay time to a I^2t characteristic. In this way, the time delay depends on the short-circuit current, but with a constant I^2t_{sd}-value, providing a better selectivity with downstream fuses.

In this case, the setting possibilities for the time-lag class change as follows:

Setting values for tsd	
XZMU, XZMD	t_{sd} = 0.1/0.2/0.3/0.4 s (at 12 x I_n)

Switchover to the I^2t_{sd}-characteristic can be made through:

– The t_{sd} rotary coding switch (XZMU), which must be set to a value in the white area.



– The graphical display (XZMD)
– The test socket with the parameter assignment module XEM-PG(E) (XZMD)
– The PROFIBUS-DP with a PC and the system-software (XZMD).

Changeable parameter sets

The overcurrent release XZMD enables the storage of two different parameter sets for protective functions.

This enables changeover to new protection settings whenever there is a transfer to another supply source.

Switchover can be made manually through:

– The graphical display (XZMD)
– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software

Or automatically through:

– The PROFIBUS-DP
– The internal system bus with an input signal at the digital input module

Earth-fault protection switchable to I^2t-characteristic

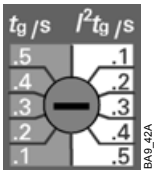
The earth fault module XZMU and XZMD offer the possibility to switch over from a constant delay time to a I^2t characteristic.

This provides an inverse-time tripping characteristic with a constant I^2t_g-value, providing better selectivity of the earth-fault protection in systems with several grading levels.

The setting possibilities for the time delay remain unchanged.

Switchover to the I2tg-characteristic can be made through:

– The tg rotary coding switch (XZMU), which must be set to a value in the white area.



– The graphical display (XZMD)
– The test socket with the parameter assignment module XEM-PG(E) (XZMD)
– The PROFIBUS-DP with a PC and the system-software (XZMD).

Earth fault alarm

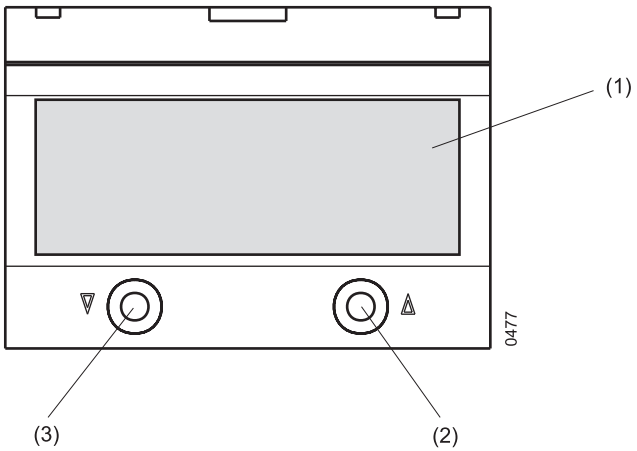
→ Earth-fault protection modules (page 9 – 36)

9.1.9 Displays

9.1.9.1 Alphanumeric display

The alphanumeric display is available as an option for the universal overcurrent release XZMU.

Design



(1) Screen (4 lines with 20 characters each)
(2) Up-key
(3) Down-key

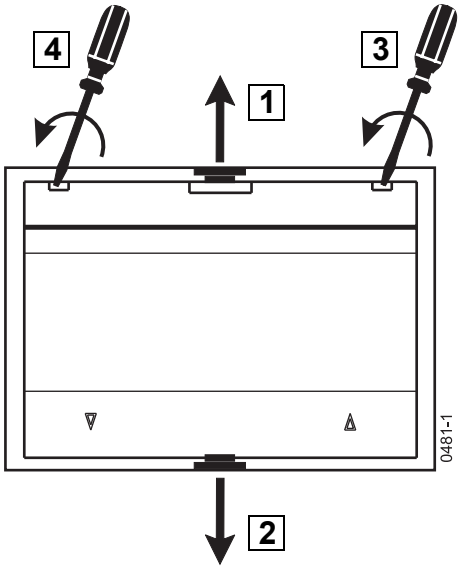
Retrofitting

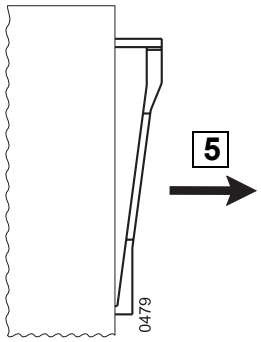
The overcurrent release XZMU, can be retrofitted with an alphanumeric display.

	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.

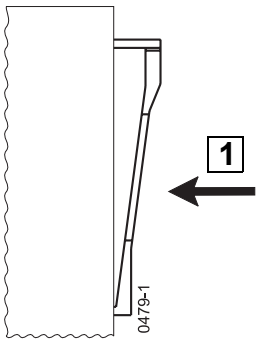
– Switching off and discharging the spring(→ page 24 – 2)
– Switch off external 24 V DC voltage supply, if applicable
– Remove sealing cap of overcurrent release, if applicable (→ page 9 – 45)

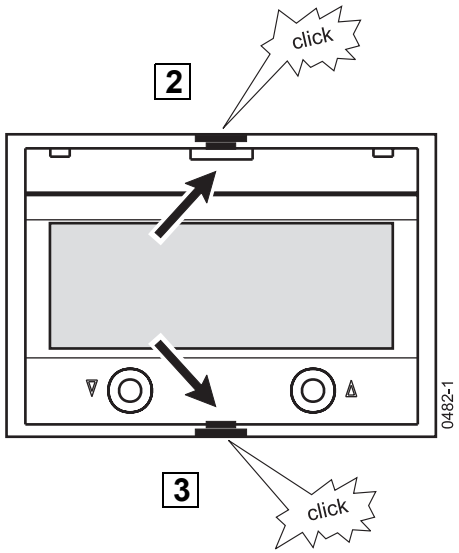
Removing dummy flange





Installing display and latching it tight





– Install and seal sealing cap of overcurrent release, if applicable, (→ page 9 – 45)
– Switch on external 24 V DC voltage supply, if applicable

Modifying the inclination of the display

At the factory, the alphanumeric display is installed with a downward inclination. However, it can be turned in vertical direction by 180°; then, the display is inclined upwards.

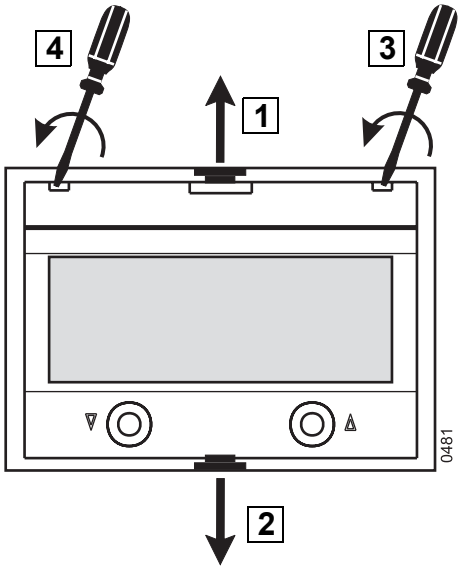
Danger

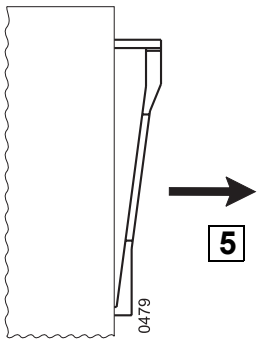
Hazardous voltage!

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.

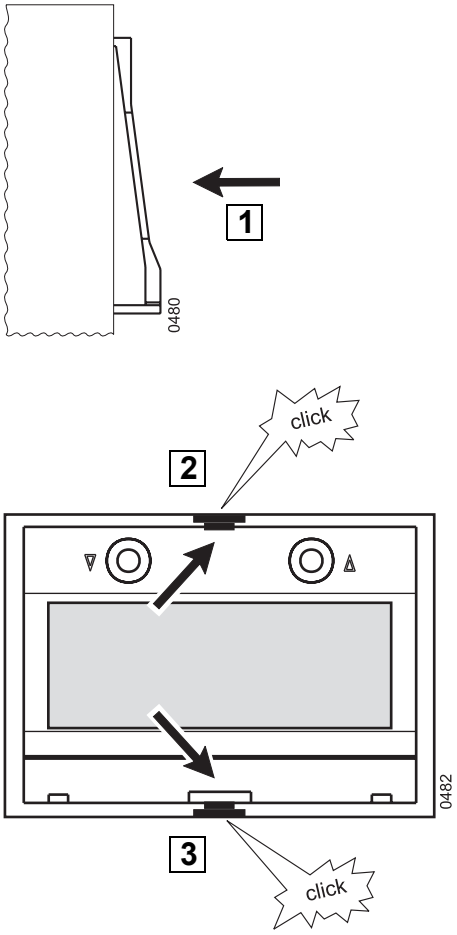
Switching off and discharging the spring(→ page 24 – 2)
– Switch off external 24 V DC voltage supply, if applicable
– Remove sealing cap of overcurrent release, if applicable (→ page 9 – 45)

Removing the display





Installing the display turned by 180° and latching it tight



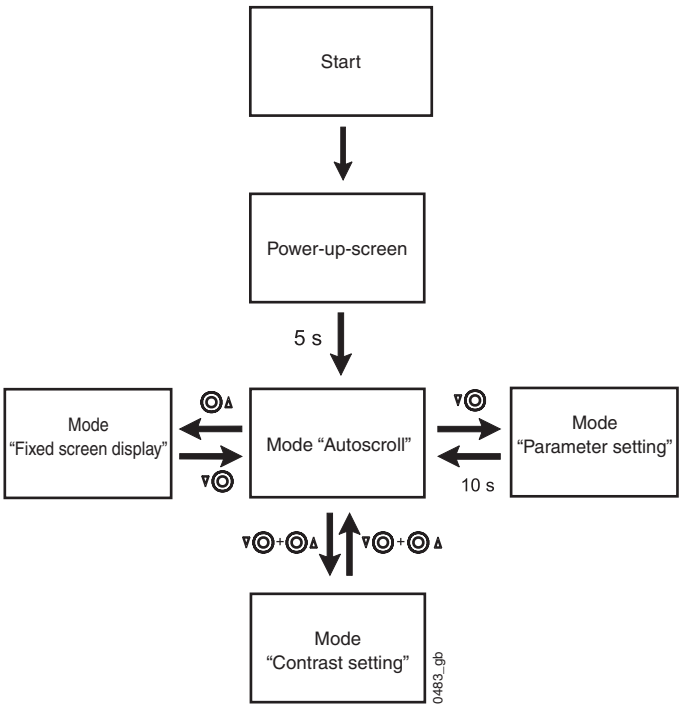
– Install and seal sealing cap of overcurrent release, if applicable, (→ page 9 – 45)
– Switch on external 24 V DC voltage supply, if applicable

	Part no.
Alphanumeric display for XZMU	(+)IZM-XAM

Menu structure XZMU

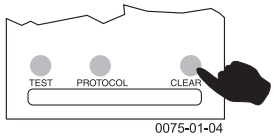
After applying the supply voltage, the display changes from “Power-up screen” to “Autoscroll” mode after about 5 s. From there further modes can be accessed by means of the two buttons.

Overview



Mode “Autoscroll”

During normal operation, the display is in the autoscroll mode.

To get to the “Autoscroll” mode, press the following button(s):	
In the mode “Fixed screen display”	▽ ○
In the mode “Tripping counter reset”	▽ ○ or ○ △
In the mode “Contrast setting”	▽ ○ + ○ △
In the mode “Parameter setting”	Do not press any button for 10 s
In the mode “Tripping info”	

In this mode, there is a change to the next screen every 5 seconds.

If there is no metering module installed, the display changes continuously between the screens 1 and 2.

If there is a metering module available, a total of five screens are displayed in the “Autoscroll” mode.

Screens displayed in the “Autoscroll” mode	
Without metering module	
Screen 1 IL1...=.....00000.A IL2...=.....00000.A IL3...=.....00000.A IN....=.....00000.A	Current I_{L1} Current I_{L2} Current I_{L3} Current I_N
Screen 2 Ig....=.....00000.A	Earth fault current I_g (a value is only shown when an earth fault protection module is installed.)
With metering module installed, additionally	
Screen 3 KW...=.±..00000.kW KVA..=....00000.kVA KVAR.=.±..00000.kVAR PF...=.±..0,000.xxxx	Active power P Apparent power S Reactive power Q Power factor
Screen 4 V12.=.....0000.V V23.=.....0000.V V31.=.....0000.V	Voltage U12 Voltage U_{23} Voltage U_{31}
Screen 5 W.↑.=...00000,00.MWh W.↓.=...00000,00.MWh PowerFlowDir.....↑ f...=.....00,0 Hz	Energy (positive direction) Energy (negative direction) Present direction of energy flow Frequency

Note

The data to be displayed is updated every time the screen page is set up again. There are no updates while a screen page is being displayed.

Button functions in the “Autoscroll” mode	
	Display is frozenSwitchover to the mode “Fixed screen display”
	Change to mode “Parameter setting”
	Change to mode “Contrast setting”

Mode “Fixed screen display”

To get to the mode “Fixed screen display”, press the following button:	
In the “Autoscroll” mode	

In this mode, maintenance information is provided with the number of circuit-breaker tripping and switching operations as well as with maintenance instructions. The information displayed depends on the number of circuit-breaker tripping operations.

The number of trips is only available when the IZM is fitted with IZM-XCOM-DP (incl. IZM-XBSS).

Screen 6 Num.of.Trips...00000 Num.of.Ops.....00000	Number of tripping operations Number of switching operations
Screen 6 Num.of.Trips...00000 Num.of.Ops.....00000 Prepare for contact maintenance	Number of tripping operations Number of switching operations Maintenance instructions

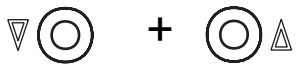
Button functions in the mode “Fixed screen display”	
	Change to next higher screen level
	Change to “Autoscroll” mode
If screen 6 is displayed 	Change to the “tripping counter reset” mode

Submode "Tripping counter reset"

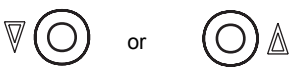
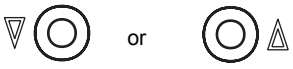
This mode offers the possibility to reset the counter for the tripping and the switching operations to zero.

CAUTION

The counter should only be reset after contact maintenance. If the counter is reset without having performed the contact maintenance, the maintenance instructions displayed will not correspond to the actual condition of the contacts. This can destroy the contacts.

To get to the mode "Tripping counter reset", press the following button(s):	
In the mode "Fixed screen display", when screen 6 is displayed	

Screens displayed in the mode "Tripping counter reset"	
Screen 1 Reset.Trips.and.Ops Counter? yes:.↑+↓ no:.↑.or.↓	This screen is a safety question. Only reset the counter after maintenance of contacts!
Screen 2 Trips.and.Ops Counter.reset continue:.↑.or.	Counter reset for tripping and switching operations confirmed.

Button functions in the mode "Tripping counter reset"	
If screen 1 is displayed	
	Cancelling, no counter reset to zero Change to "Autoscroll" mode
	Counter reset to zero Change to screen 2
If screen 2 is displayed	
	Change to "Autoscroll" mode

Mode "Parameter setting"

CAUTION

Adjust parameters only when the circuit-breaker is switched off.
If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.

In this mode, the following parameters can be adjusted:

– Load shed
– Load restore
– Time delay load shed/load restore
– Language setting for display

To get to the mode "Parameter setting", press the following button:	
In the "Autoscroll" mode	

Screens displayed in the mode "Parameter setting"	
Screen 1 Change Parameters Load.Shed..=.0000.A ↑=+ ↓=- ↑.und.↓=Confirm	Setting Load shed
Screen 2 Change Parameters Load.Restore=.0000.A ↑=+ ↓=- ↑.und.↓=Confirm	Setting Load restore
Screen 3 Change Parameters tx.........=...00.s ↑=+ ↓=- ↑.und.↓=Confirm	Setting Delay time Load shedding/restore
Screen 4 Change Parameters Sprache/Lang=...XXXX ↑=+ ↓=- ↑.und.↓=Confirm	Setting Language display For XXXX can be: ENGL, DEUT
Screen 5 Changed.Parameter being.saved, wait.10s	Parameter settings in process, change to "Autoscroll" mode after 10 s

Note

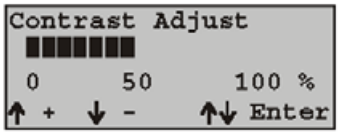
When screen 1, 2, 3 or 4 is displayed and no key is pressed within 10 s, the mode “Parameter setting” is cancelled. Any parameter changes performed are not accepted. Change to “Autoscroll” mode.

Button functions in the mode “Parameter setting”	
	Increases the set value
	Reduces the set value
	Confirms the set value Change to the next screen

Mode “Contrast setting”

In this mode, the contrast of the display can be adjusted.

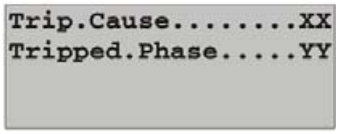
To get to the mode “Contrast setting”, press the following button(s):	
In the “Autoscroll” mode	

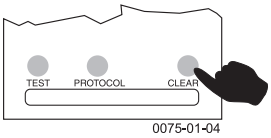
Screens displayed in the mode “Contrast setting”	
Screen 1 	Contrast setting The longer the bar, the higher the contrast

Button functions in the mode “Contrast setting”	
	Increases the contrast
	Reduces the contrast
	Accept the contrast, change to the “Autoscroll” mode

Mode “Tripping info”

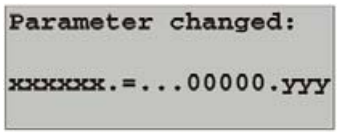
In this mode, there is an automatic change as soon as there is a tripping, provided an external 24 V DC voltage supply has been connected.

Screens displayed in the moce “Tripping info”	
	Type of trip affected phase For XX can be: L, S, I, G, N For YY can be: L1, L2, L3, N

Button functions in the mode “Tripping info”	
	Display of maintenance infomation press again: Return to “Info tripping” mode
	Press CLEAR-button Change to “Autoscroll” mode

Mode “Display parameter changes”

There is an automatic change to this mode if a parameter was changed through the rotary coding switches, provided an external 24 V DC voltage supply has been connected.

Screens displayed in the mode “Display parameter changes”	
	Display of changed values

Technical data with values and units that can be displayed in screen 1

Changed data	Displayed Values	Unit
IR.....=....00000.YY	LT pickup value in primary amperes	A
ISD....=....00000.YY	ST pickup value in primary amperes	A
Ii.....=....00000.YY	IN pickup value in primary amperes	A
Ig.....=.....0000.YY	GF pickup value in primary amperes	A
Ig.ala.=.....0000.YY	GF alarm pickup value in primary amperes	A
tg.....=......000.YY	GF delay: 100 200 300 400 500	ms
I^2tg..=......000.YY	GF I^2t delay: 100 200 300 400 500	ms
I^2tR..=......000.YY	LT I^2t delay: 2 3,5 5,5 8 10 14 17 21 35 30	s
I^4tR..=........0.YY	LT I^4t delay: 1 2 3 4 5	s
tSD....=......000.YY	ST delay: 20 100 200 300 400	ms
I^2tSD.=......000.YY	100 200 300 400	ms
th.mem.=.....000....	ON OFF	..

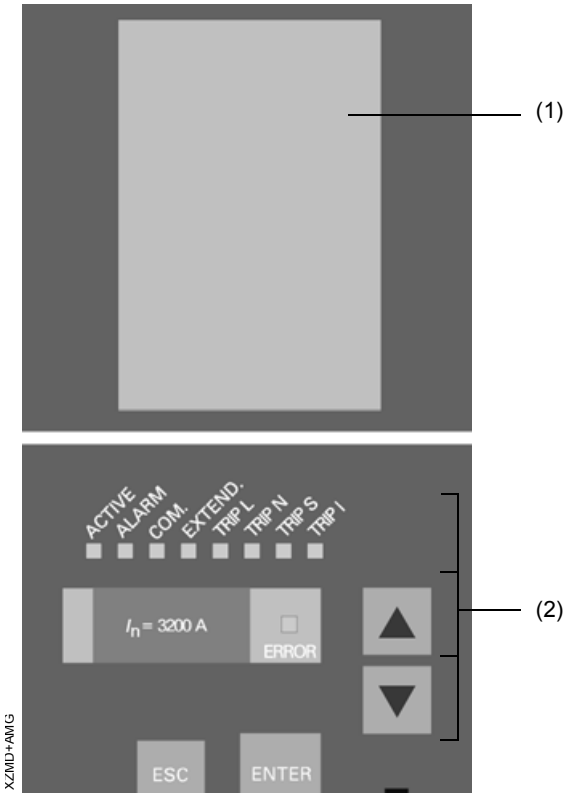
Ir	Current for overload tripping
Isd	Current for short-time delay short-circuit tripping
Ii	Current for instantaneous short-circuit tripping
Ig	Current for earth-fault protection tripping (this is only displayed if there is an earth-fault protection module available)
Ig alarm	Current for alarm display of earth-fault protection (this is only displayed if there is an earth-fault protection module available)
tg	Time delay for the earth-fault protection (this is only displayed if there is an earth-fault protection module available)
I2tg	Inverse-time delay (I^2t-dependant) of earth-fault protection (this is only displayed if there is an earth-fault protection module available)
I2tR	Inverse-time delay (I^2t-dependant) of overload tripping
I4tR	Inverse-time delay (I^4t-dependant) of overload tripping
tsd	Delay time of the short-circuit release
I2tsd	Inverse-time delay (I^2t-dependant) of short-circuit tripping
th mem	Shows whether the thermal memory is switched on/off

Button functions in the mode “Display parameter changes”
The modified value is displayed for 4 seconds. Then the display goes back to the previous mode.

9.1.9.2 Graphic display

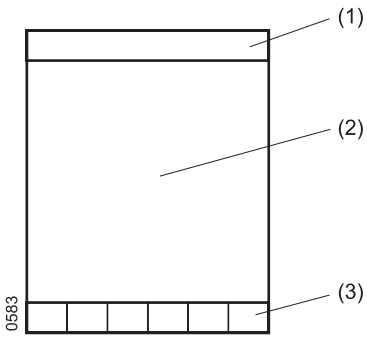
The overcurrent release XZMD is equipped with a fixed-mounted graphical display as standard. This display enables a text output with a maximum of 8 lines or the graphical representation of characteristics.

It is used both to display data and to parameterize the overcurrent release as well as the metering function. The display is operated through the control provided on the overcurrent release.



(1) Graphical display
(2) Control buttons

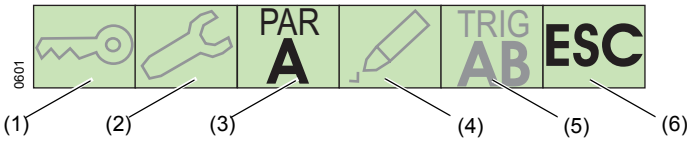
Display design



(1) Menu title
(2) 8-line alphanumeric display or graphical representation
(3) Status line

Status line

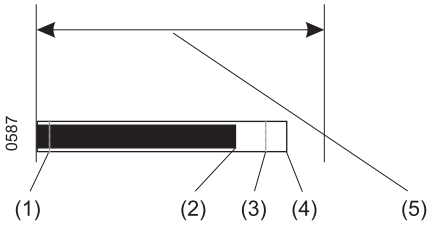
The status line shows, by means of bold symbols, which actions the operator can carry out and which settings are active at this moment.



(1) Access with password only
(2) Maintenance required
(3) Parameter set adjusted for protection functions
(4) Edit feature
(5) Adjusted trigger
(6) Possibilities of action

Representation of bar diagrams

The measured-values for some parameters are displayed both as numerical values and graphically in form of a bar diagram.

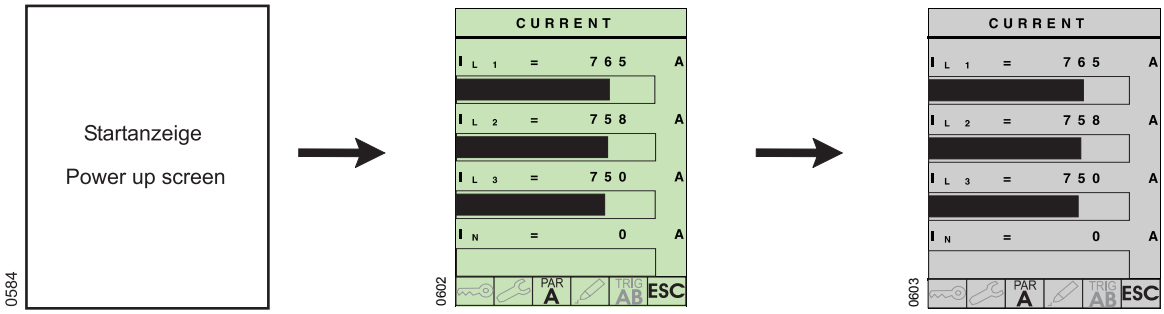


(1) Lowest measured-value
(2) Present measured-value
(3) Highest measured-value
(4) 100 % of the measured parameter
(5) Width of display

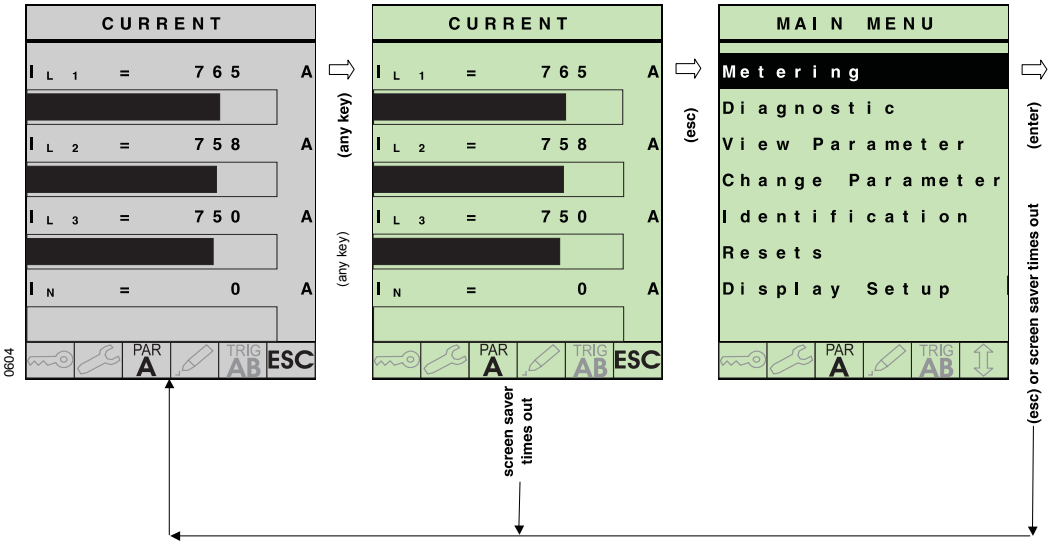
The markings for the lowest and highest measured-value are automatically updated during the measurement.

Display during operation

After applying the supply voltage, the display representation changes from “Power up screen” to the operational screen after about 5 s. It shows the currents in the three phases and in the neutral conductor as values in form of a bar diagram. After approx. 1 min. the background illumination of the display is automatically switched off. It can be switched on again by pressing any button.



Calling the main menu

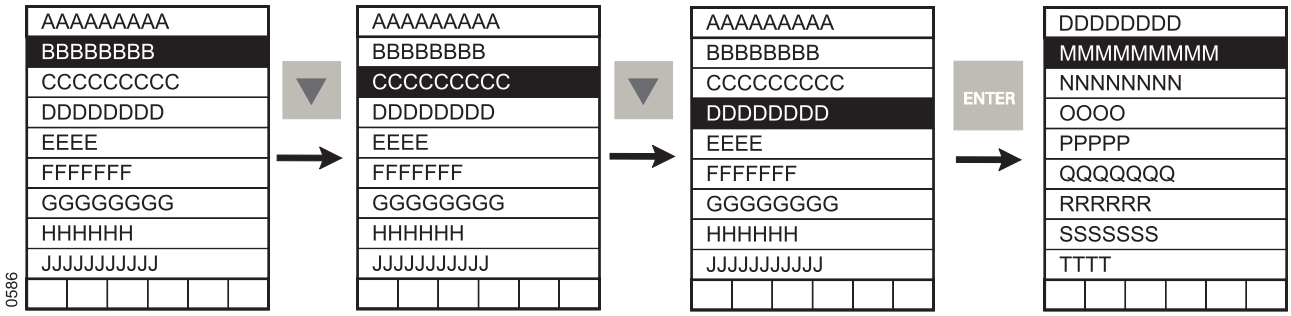


Navigating in the menu structure

To navigate in the menu structure, use the operating keys.

Button functions	
▲ ▼	Shift the marking
ENTER	Select the marked menu item
ESC	Change over to the previous menu

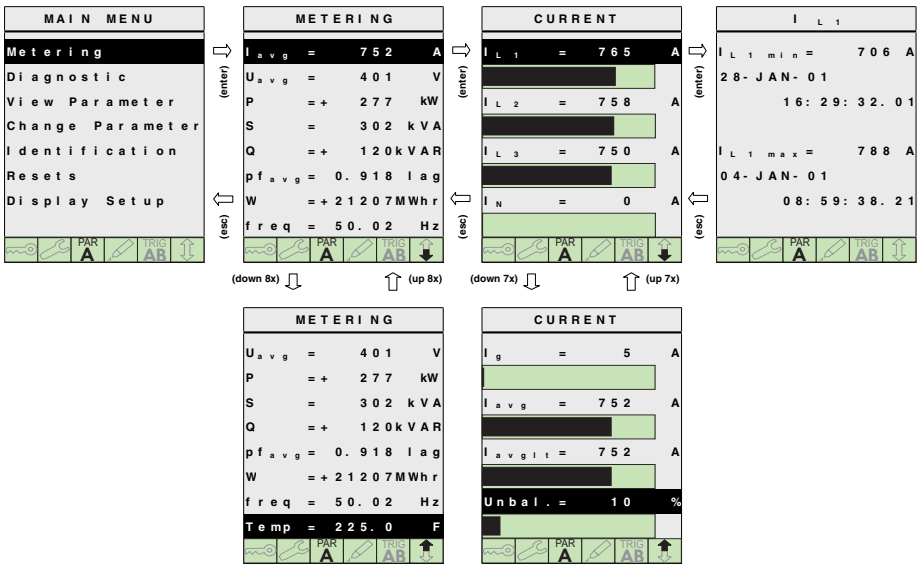
Selection of a menu item



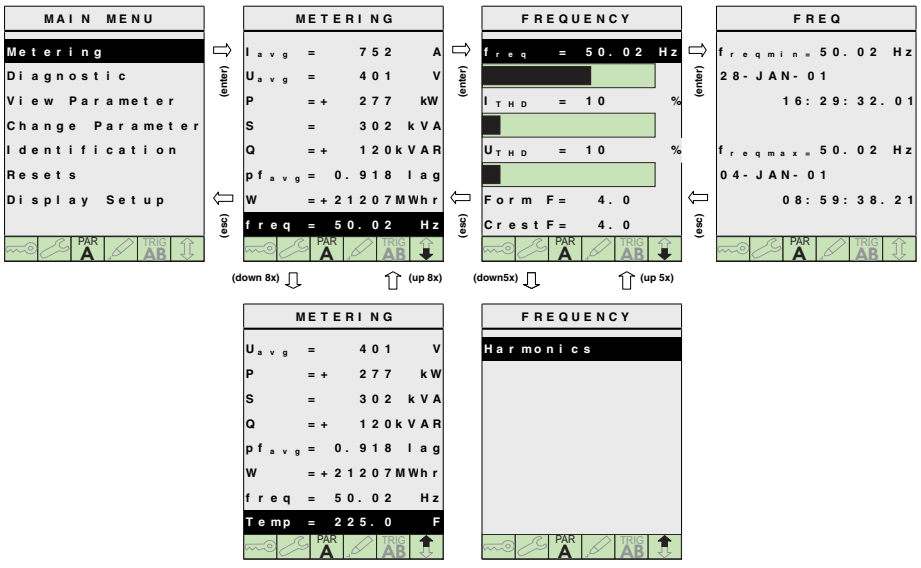
The following pages describe how to display data and how to set parameters.

Displaying measured-values

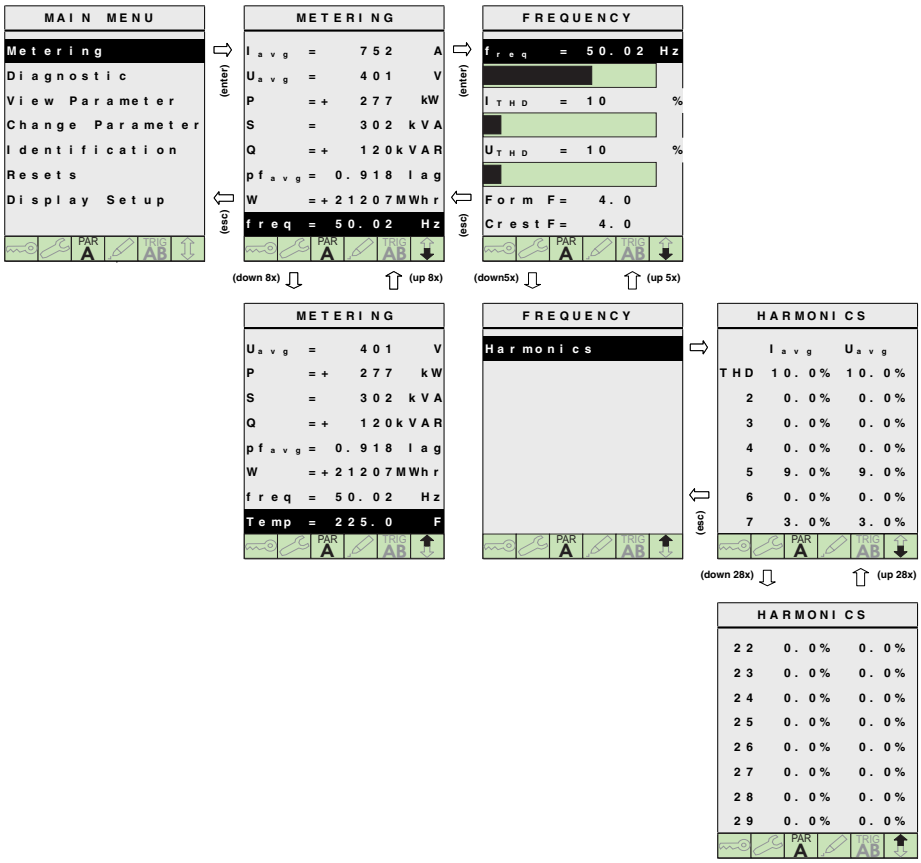
Example 1: Displaying the currents



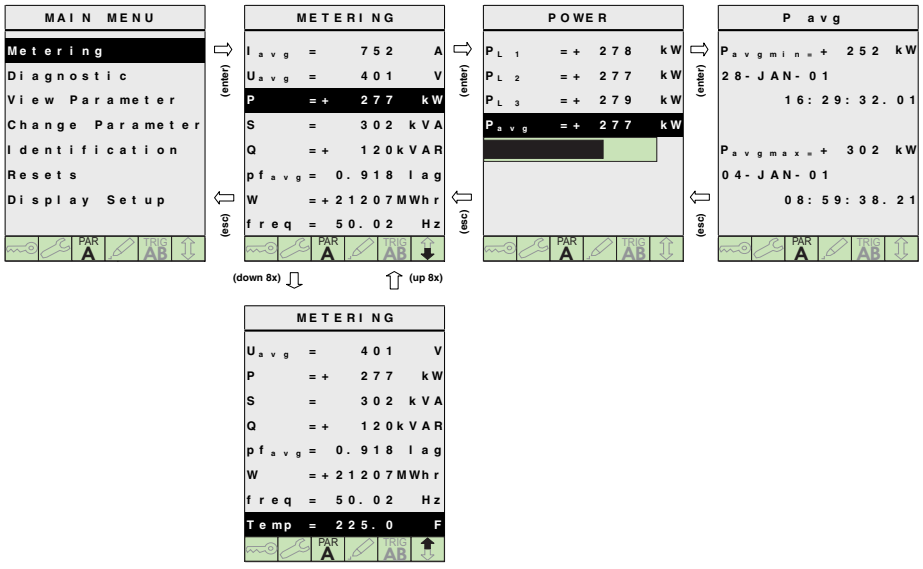
Example 2: Displaying the frequency



Example 3: Display of harmonics

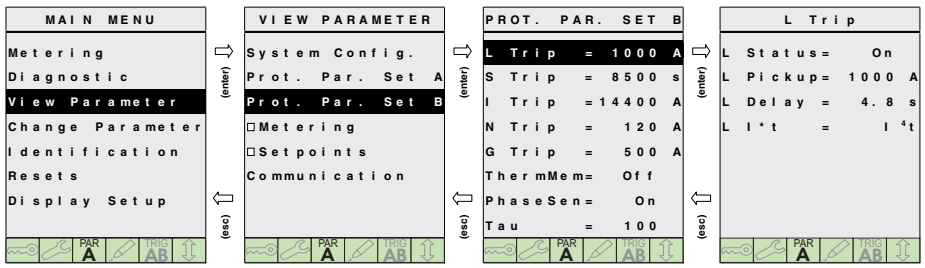


Example 4: Display of power



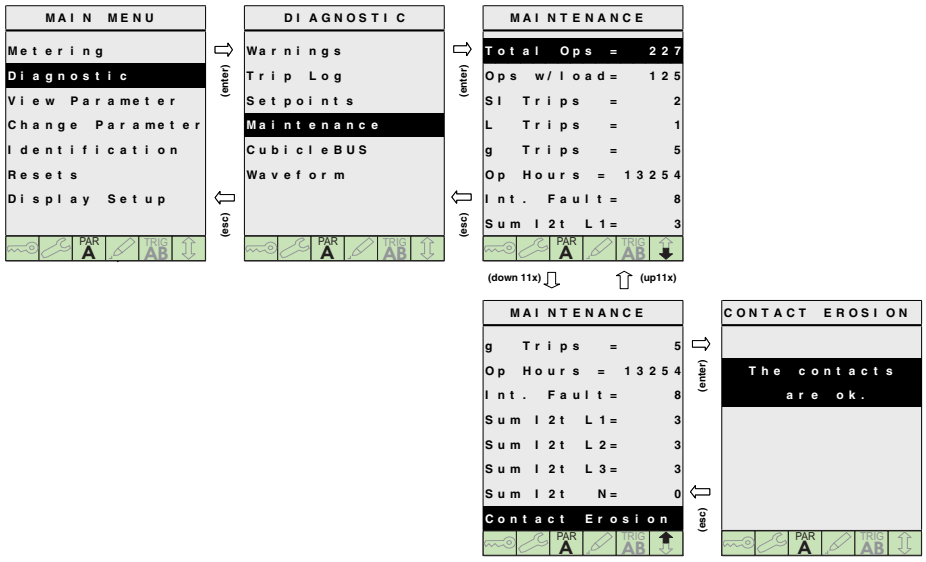
Displaying parameters

Example 5: Displaying settings of protection parameters

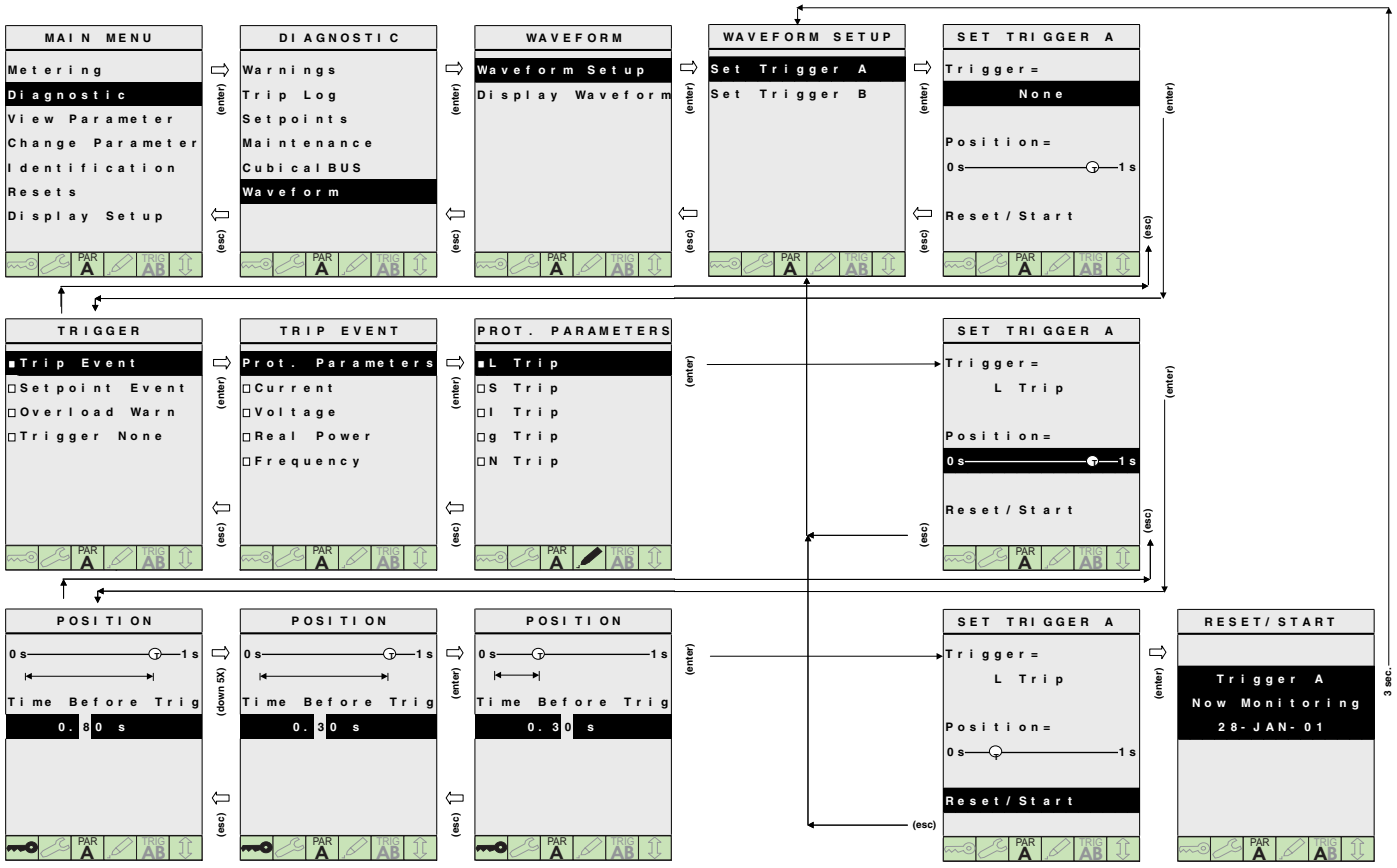


Accessing diagnostics data

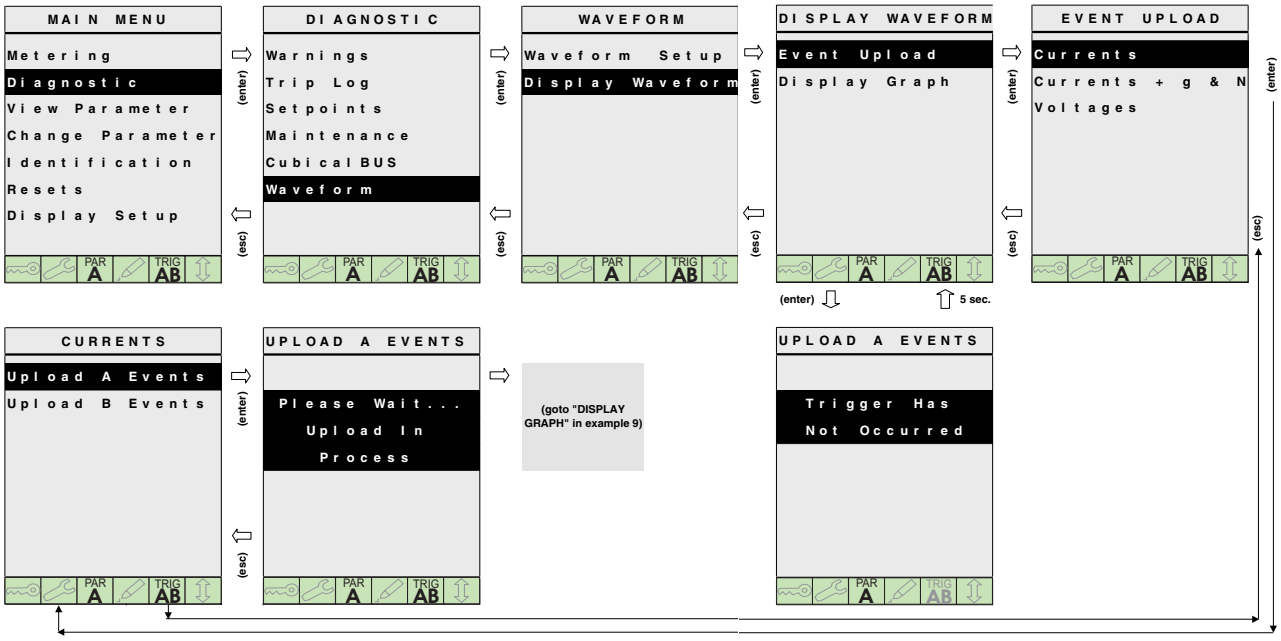
Example 6: Inquiring maintenance information



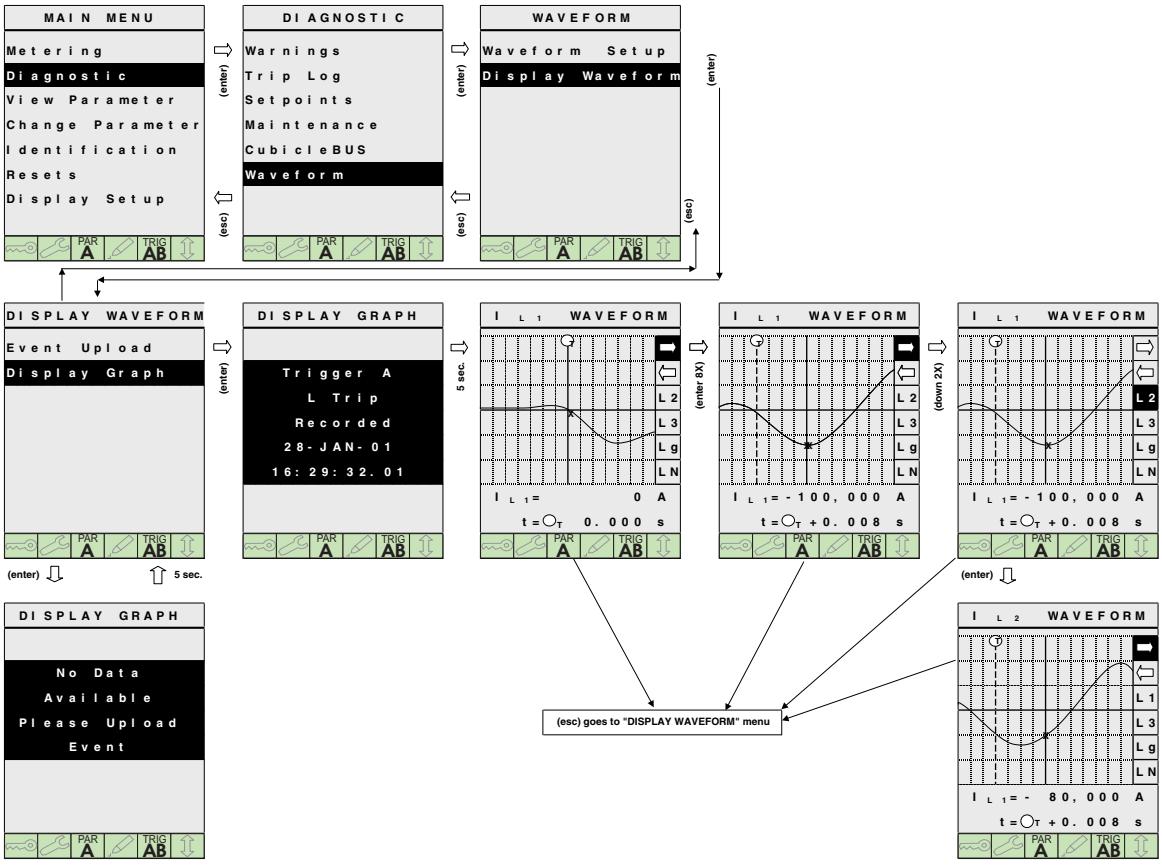
Example 7: Adjusting representation of characteristics



Example 8: Selecting event for displaying characteristics

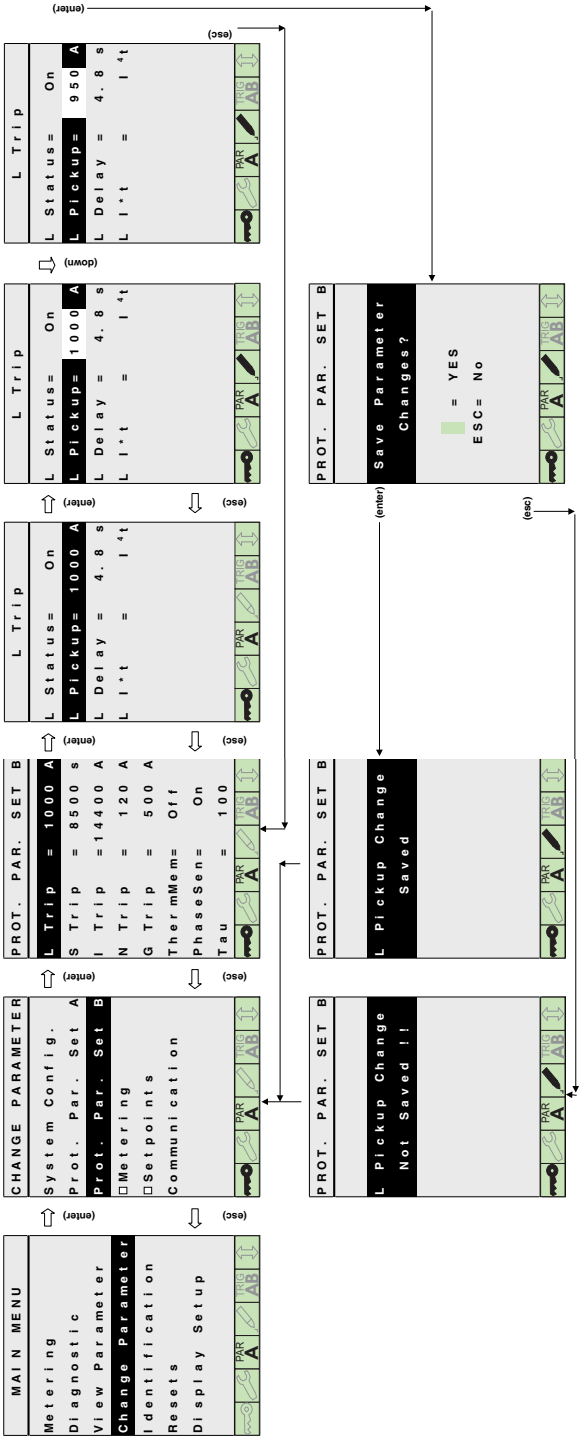


Example 9: Displaying characteristics



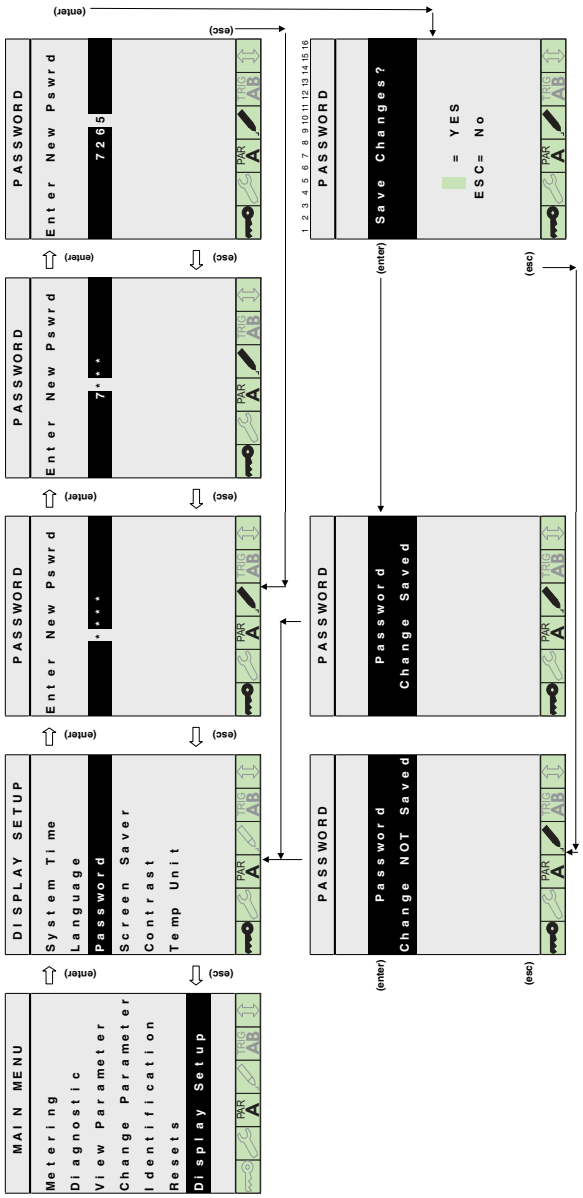
Changing parameters

Example 10: Setting protection parameters



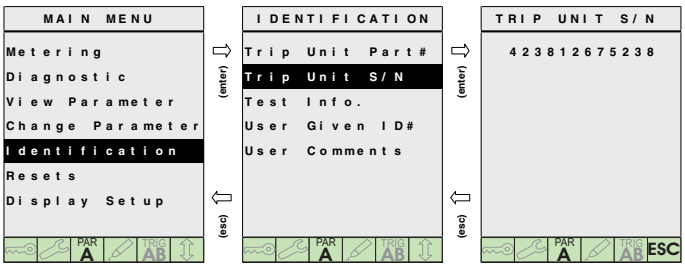
Settings

Example 11: Entering password



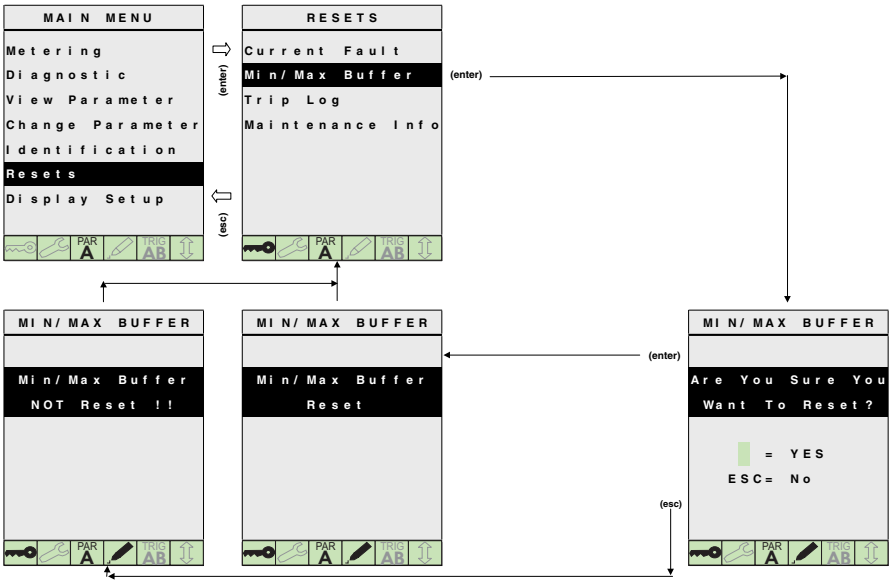
Identifications

Example 12: Identification



Resetting

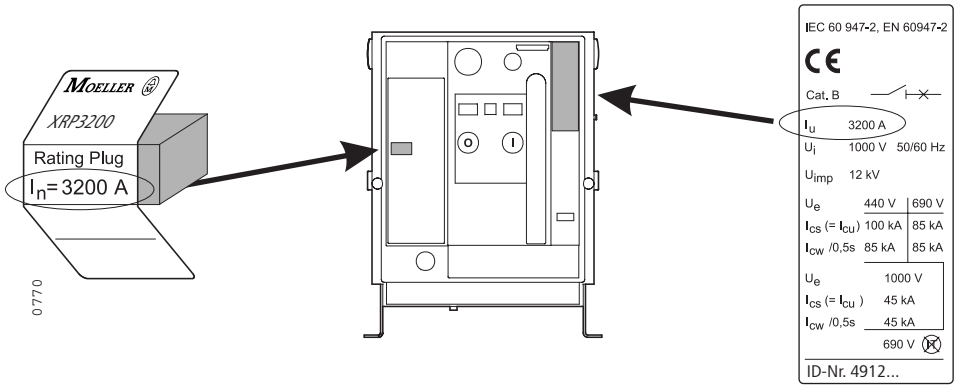
Example 13: Resetting the max. and min. values



9.1.10 Rated current module

CAUTION

When changing the rating plug it must be determined that the rated current In is less or the same as the allowed maximum rated current In max of the circuit-breaker. When not it could cause a thermal overload of the circuit-breaker and perhaps the system.
The smallest allowed rated current for the circuit-breaker IZM.3-… is 1250 A.



The rating plus defines the rated current within a specific range for a given circuit-breaker size.

If a rating plug with a higher current than the maximum permissible circuit-breaker rated current is plugged in, the electronic system of the overcurrent release recognises this error and signals it with a flashing indication ERROR.

The overcurrent release ignores the default value for the rated current provided by the false rating plug and adjusts it to the value of the smallest rating plug provided for the frame size of the circuit-breaker concerned.

The same happens if a circuit-breaker with IZM.3-... is equipped with a rating plug smaller than 1250 A or no rating plug is fitted at all. All protection parameters set are adjusted accordingly. The display flashes.

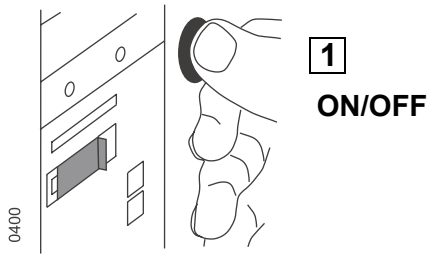
Should a circuit-breaker without rating plug be operated the display flashes ERROR. The overcurrent release sets the rated current to the value of the smallest rating plug provided for the frame size of the circuit-breaker concerned.

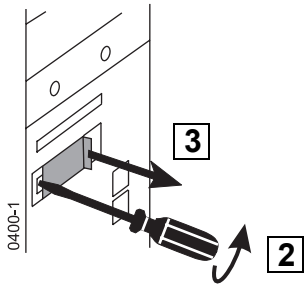
Frame size			Rating plug	Part no.
IZM.1-…	IZM.2-…	IZM.3-…		
			250 A	(+)IZM-XRP250
			315 A	(+)IZM-XRP315
			400 A	(+)IZM-XRP400
			500 A	(+)IZM-XRP500
			630 A	(+)IZM-XRP630
			800 A	(+)IZM-XRP800
			1000 A	(+)IZM-XRP1000
			1250 A	(+)IZM-XRP1250
			1600 A	(+)IZM-XRP1600
			2000 A	(+)IZM-XRP2000
			2500 A	(+)IZM-XRP2500
			3200 A	(+)IZM-XRP3200
			4000 A	(+)IZM-XRP4000
			5000 A	(+)IZM-XRP5000
			6300 A	(+)IZM-XRP6300

Remove

CAUTION

The rating plug may be removed only if:
- The withdawable unit is in the disconnected position
- The fixed circuit-breaker is switched off and the overload release is disconnected from the power supply (remove hand-plug X8)





9.1.11 Earth-fault protection modules

The overcurrent releases XZMU and XZMD can be optionally equipped with earth-fault protection modules. These are used to protect downstream loads against unpermissibly high earth-fault currents.

If the current setting is exceeded, this causes an alarm or – at the same time – the tripping of the overcurrent release, depending on the version of the earth-fault protection module (→ page 9 – 17).

The following variations are possible:

Overcurrent release	Earth-fault module
XZMU	IZMU-XT
XZMD	IZMD-XT

The earth fault can be optionally detected as follows:
- vectorial summation of the currents ΣI = L1+ L2 + L3 + N or
- an external earth-fault current transformer 1200 A : 1 A
- page 9 – 17

ATTENTION

If the earth fault is detected by vectorial summation of the currents, it is imperatively recommended to include the current of the neutral conductor, too. This requires a neutral conductor transformer, which may have to be retrofitted. Otherwise, a corresponding current in the neutral conductor will also activate the earth-fault protection.
With a high level of imbalance the vectorial summation method for earth-fault is not suitable.

Alarm and trip signals can be transmitted through the internal system bus and the PROFIBUS-DP.

Module IZMU-XT

– Earth-fault protection by way of alarm signal and tripping the circuit-breaker
– Tripping function can be switched off, OFF position
– Changeover switch for earth-fault only accessible when front panel removed

Module IZMD-XT

– Earth-fault protection by way of alarm signal and tripping the circuit-breaker
– Tripping function can be switched off
– Module programmable via:
  – The graphical display (XZMD)
  – The test socket with the parameter assignment module XEM-PG(E) (XZMD)
  – The PROFIBUS-DP with a PC and the system-software (XZMD).

Settings for Ig		
	Frame size	
	IZM.1-…/IZM.2-…	IZM.3-…
A	100 A	400 A
B	300 A	600 A
C	600 A	800 A
D	900 A	1000 A
E	1200 A	1200 A
OFF		

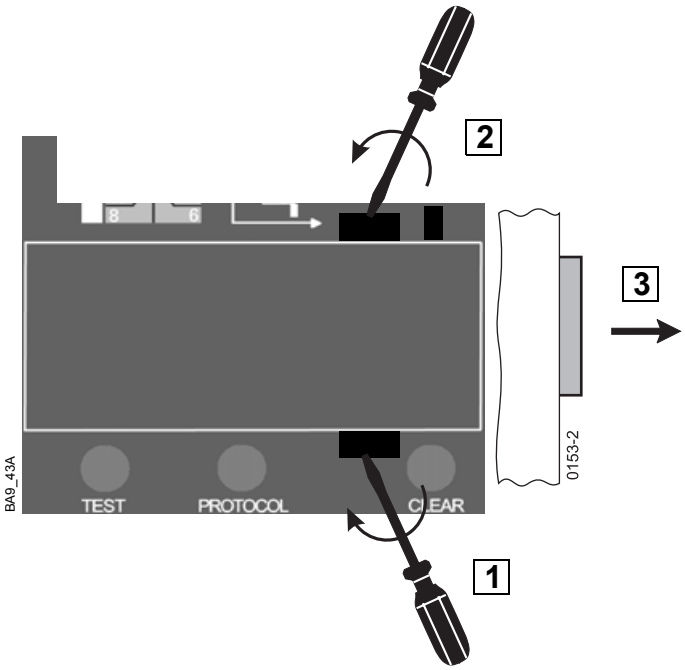
Current settings for t_g	
XZMV, XZMU	t_g = 0.1/0.2/0.3/0.4/0.5 s
XZMD	t_g = 0.1…0.5 s

Retrofitting

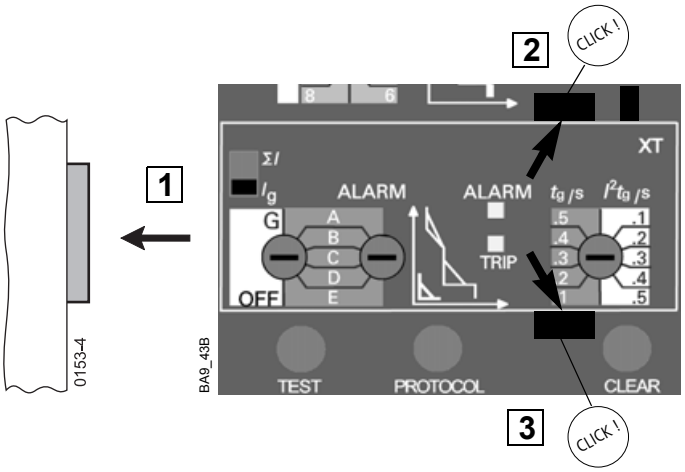
	Danger
	**Dangerous voltage as well as fast, moving parts.** **Can cause death or serious personal injury as well as damage to device and equipment.** Before working on this device the system must be switched off. (→ page 24 – 2) Before removing any covers and the operating panel of the circuit-breaker be sure to discharge the storage spring.

– Switching off and discharging the spring(→ page 24 – 2)
– Switch off external 24 V DC voltage supply, if applicable
– Remove sealing cap of overcurrent release, if applicable (→ page 9 – 45)

Removing dummy module



Installing and latching earth-fault protection module tight



– Switch on external voltage supply 24 V DC, if applicable
– Adjust settings for earth-fault protection
– Test the tripping function with the test unit (→ page 9 – 77)
– Install and seal sealing cap of overcurrent release, if applicable, (→ page 9 – 45)

9.1.12 Removing and replace the overcurrent release

	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.

ATTENTION
Removal only by electrically trained and experienced personnel with special training in the service and assembly of IZM. (→ page 3 – 1)

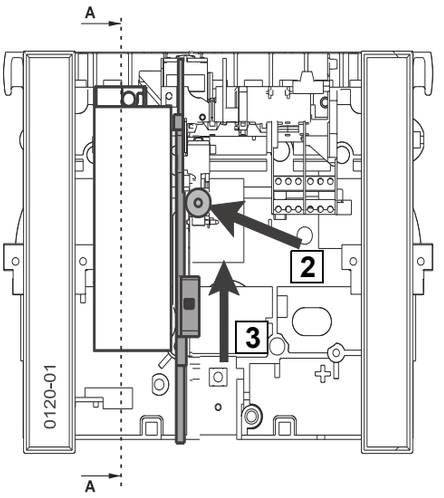
Note

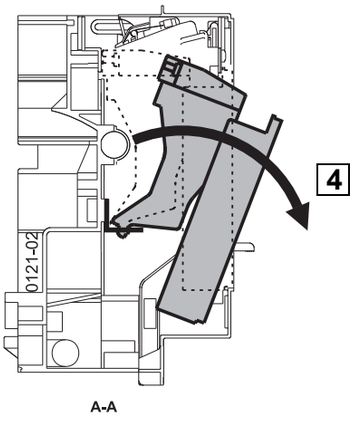
Our After Sales Service personnel are available for refitting of circuit-breakers.

To contact After Sales Service: → Section 26.

In section 26 are also application forms for circuit-breaker changeover.

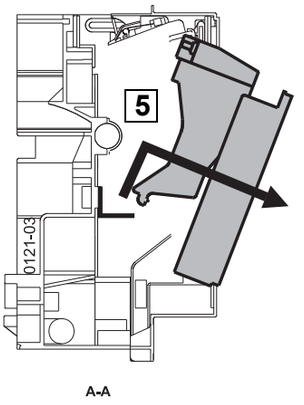
	CAUTION
	Remove overcurrent release only if circuit-breaker is OFF and storage spring is not charged.

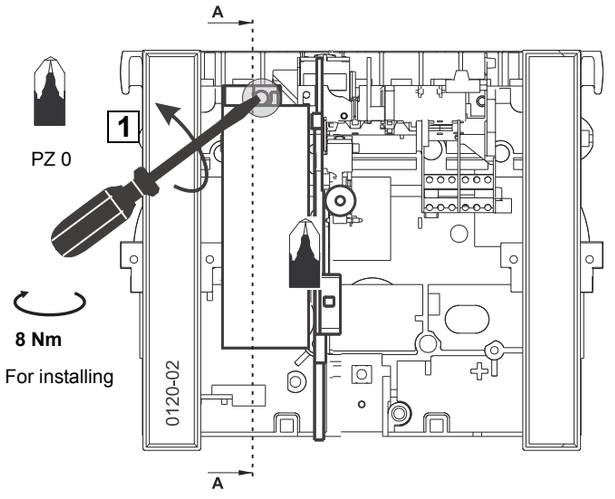


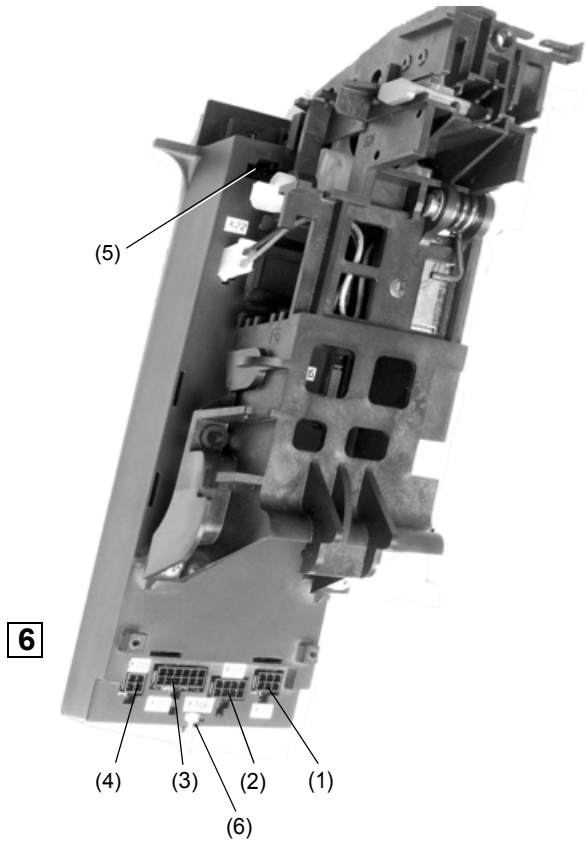


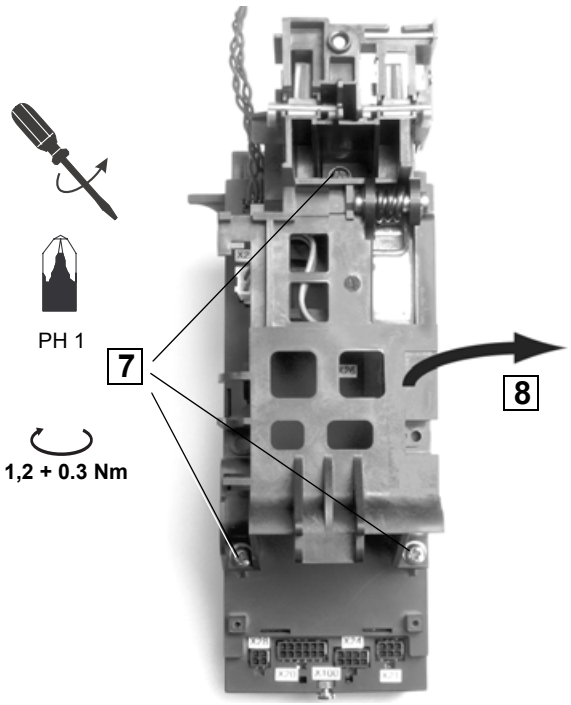
9.1.12.1 Removing

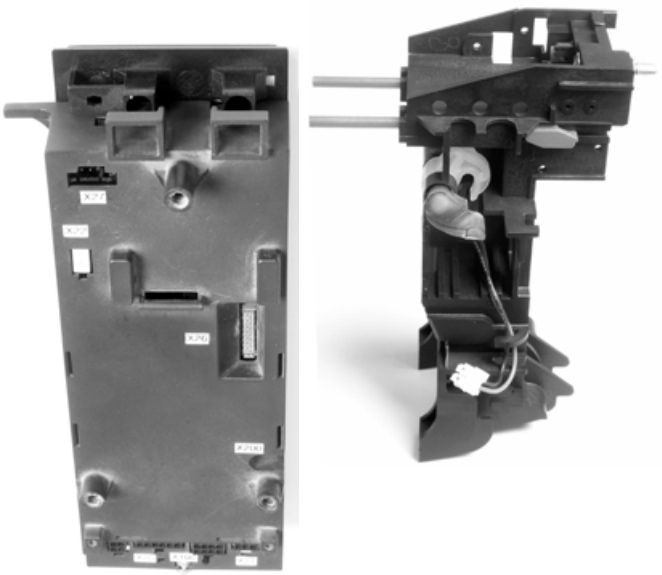
– Switching off and discharging the spring (→ page 24 – 2)
– Remove front panel (→ page 24 – 6)











(1) Energy transformer
(2) N-/g converter
(3) Measurement transducers part 1
(4) Measurement transducers part 2
(5) 5 pole internal system bus
(6) Connection enclosure earth

6 Remove connectors

The connection socket allocation is type dependant

Note

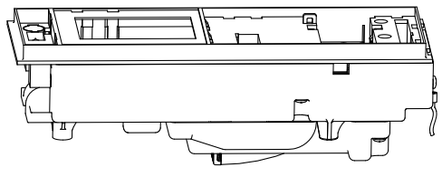
Before removing the plug note the cable positioning. It must be in the same position by assembly to avoid the cables being pinched.

	CAUTION
⚠	Only test the CTs with the approved test unit. Direct measurement on the CT plugs should not be carried out. They could be damaged which can cause a breakdown of the overcurrent release.

9.1.12.2 Overcurrent release exchange

Exchange „Ser.-No. 02“ by „Ser.-No. 02“

Exchange the overcurrent release box.

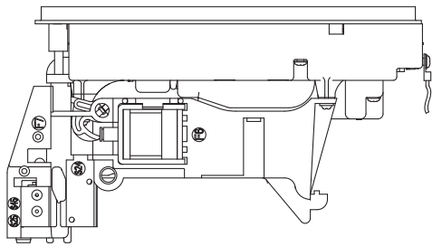


Exchange „Ser.-No. 02“ by “previous version“

Not possible.

9.1.12.3 Replacement for IZM with overcurrent release from release 1 to release 2

Exchange the assembly (overcurrent release box and carrier with accessories, complete article number necessary).



Note

Avoid twisting of the anti-shock mounting. Observe tightening torque.

Installation is done in reverse order.

ATTENTION
After mounting the overcurrent release, always test with the test unit (page 9 – 77)!

The results of the test must be documented. The form “Notification of circuit-breaker modification” must be used. This form can be copied from Chapter 26. So that the tracking of the circuit-breaker equipment can be guaranteed the modifications must be notified on Eaton After Sales Service. The form should be fully filled out and faxed to the given address.

Scope of delivery

– preassembled overcurrent release on equiped carrier
– replacement cable set already connected to overcurrent release
– additional components pre-installed on mounting bracket (e.g. bell switch alarm, etc.) (optional)
– auxiliary conductors (X8) needed for upgrading (optional)

The picture shows one possible delivery version. The delivered version can be different.

Note

For replacement keep in mind, that the replacement kit is only available for an IZM power circuit breaker with a given circuit-breaker ID. The circuit-breaker ID must be given when ordering the new overcurrent release. The circuit-breaker ID can be found on the breaker identification module (label on the black plastic box at the replacement cable set). Use of these replacement kits with another power circuit breaker than an IZM could result in malfunction or loss of protective functions.

Replacement

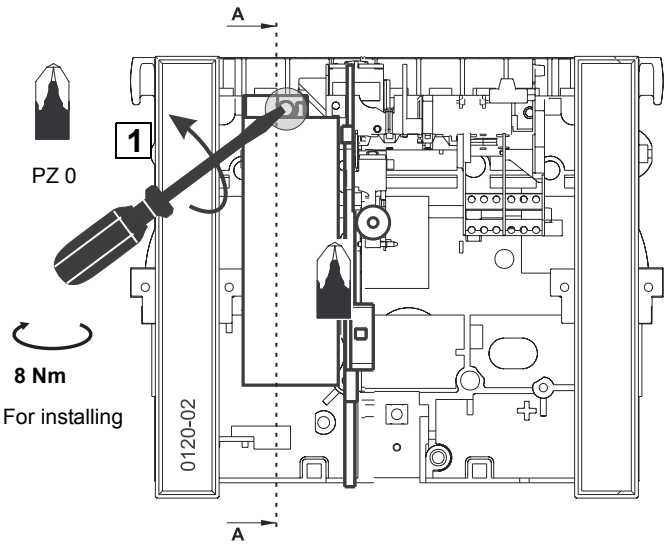
Replace the overcurrent release as follows.

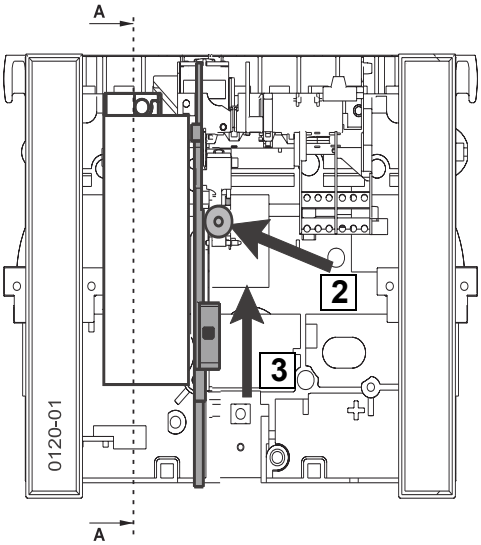
– Switch off and discharge the storage spring (→ page 24 – 2)

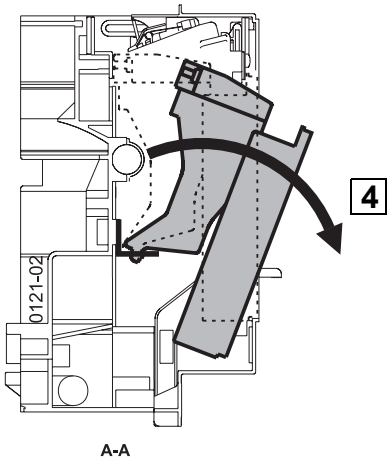
– Crank the circuit-breaker into disconnected position (drawout breakers only) (→ page 24 – 3)

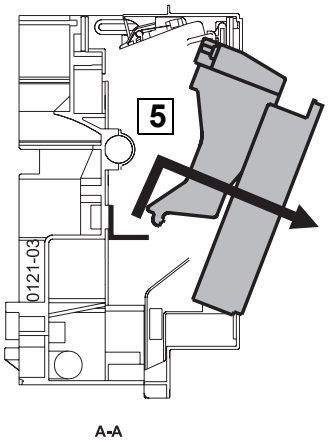
– Remove front panel (→ page 24 – 6)

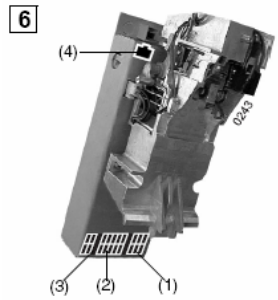
– Remove old overcurrent release





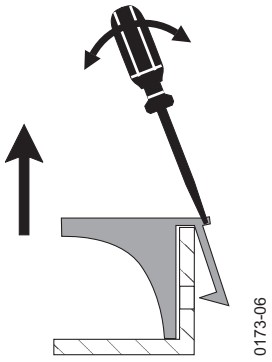






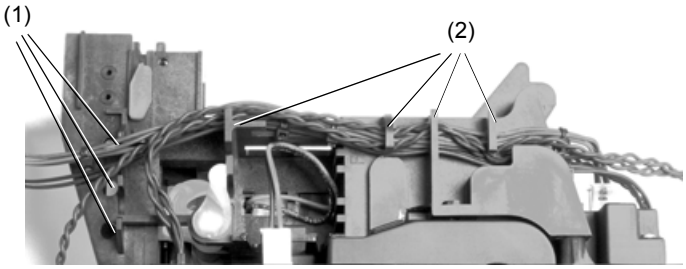
(1) Energy transformer
(2) Current transformer
(3) N-/g converter
(4) 5 pole internal system bus

– Remove installed auxiliary connector X8 (if any)



– If power circuit breaker has an internal neutral current transformer (→ page 9 – 67) remove the cable between the overcurrent release connector X24 (4pole connector) and the auxiliary connector X8 terminal 11, 12.

Integrate the cable in the new part as shown below. Be sure that the cables are not damaged and installed safely.



(1) 3 holes as fixing points
(2) Fixing aids

Note

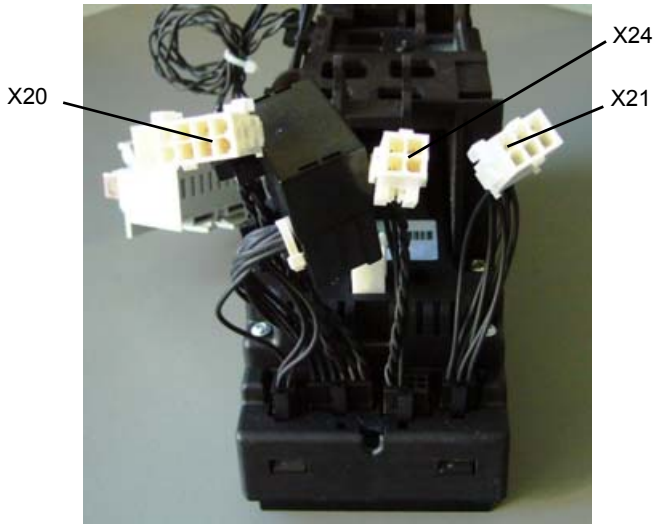
Lay all cables as shown above and fix them with cable straps at the fixing points. Lead the cables around the fixing aids and fix them directly on the left and right of the aids with cable straps.

– Remove the rating plug out of the old overcurrent release and install it in the new one (→ page 9 – 35).

– If existing remove the alphanumeric display out of the old overcurrent release and install it in the new one (→ page 9 – 20).

– If existing remove the earth-fault protection module out of the old overcurrent release and install it in the new one (→ page 9 – 36).

– Install the new overcurrent release Series No.02 in reverse order. Connect the X20 and X21 connectors with the replacement cable set as shown below. If the circuit breaker is equipped with an internal neutral current transformer additionally connect the X24 with the replacement cable set.



– Installation of the breaker is done in reverse order.

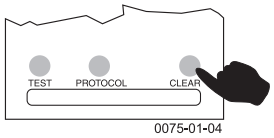
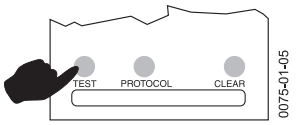
– After replacing always test the power circuit breaker with the hand-held tester IZM-XPH (226018) (→ page 9 – 77).

9.1.13 Internal self-test of the overcurrent tripping function(XZMV, XZMU, XZMD)

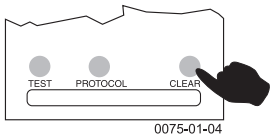
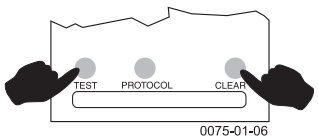
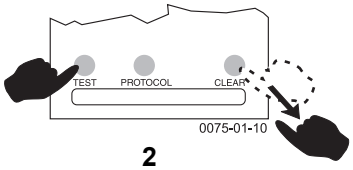
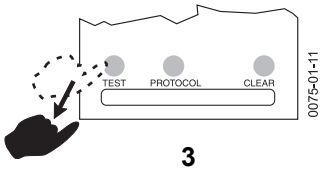
For commissioning and function testing

Conditions

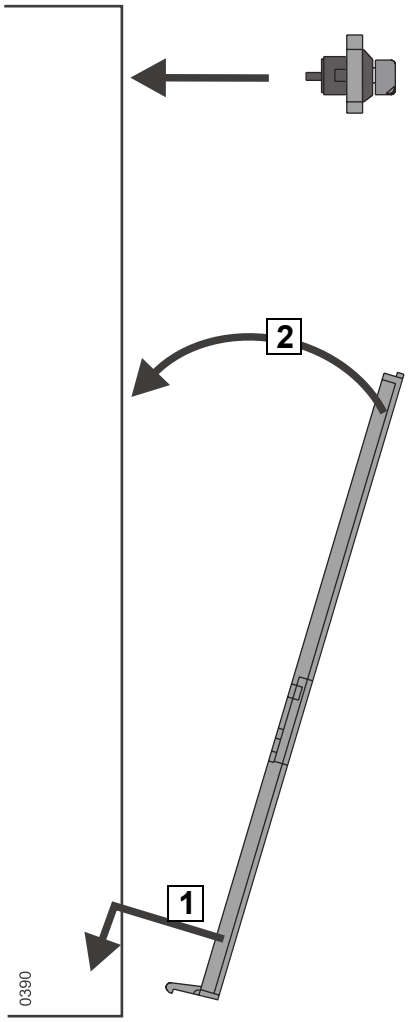
– Release is activated by:
  • Operating current[1)] or
  • External voltage supply (possible only with XZMU and XZMD)
– Current not in overload range → Indications (page 9 – 15)

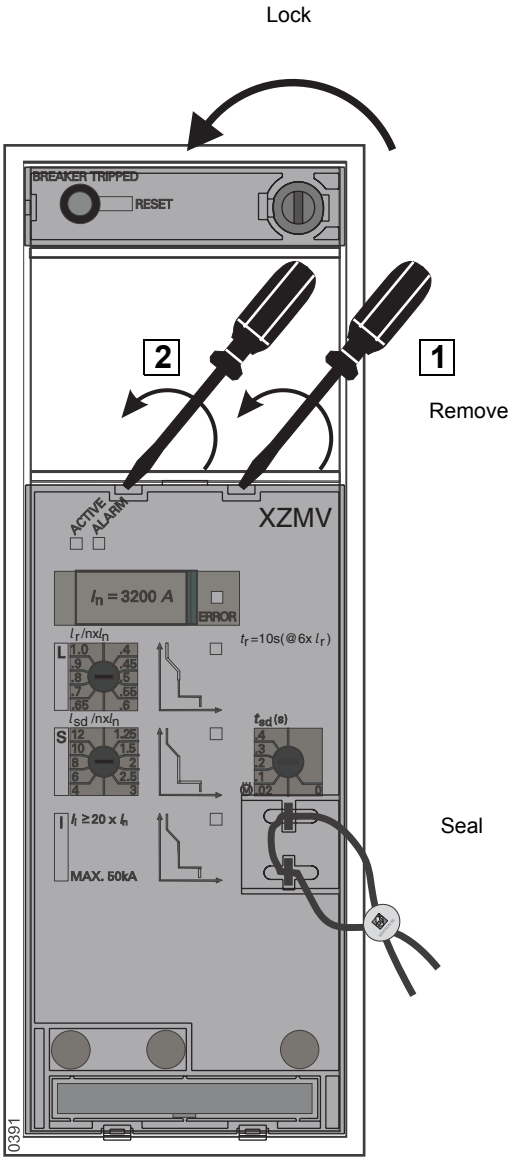
	Internal self test of the circuit-breaker without tripping		
	Normal operation of the circuit-breaker is not impaired		
	The test can be interrupted at any time by pressing CLEAR 		
1			
2	**Lighting sequence from top to bottom** (All indicators will light up one after other)		
3	The flash time corresponds to the time-lag class t_r		The flash time deviates from the set time-lag class t_r more than 10 %
4	LED L-tripping lights up Test OK:	LED ERROR lights up Test not OK:	Test not OK Overcurrent release is defective, even if LED L-tripping lights up
5	– Indication goes out after 30 s – End of the self-test – Abort test with CLEAR		
6	Overload release OK	Please carry out a comprehensive test with test unit	

1) Minimum current → page 9 – 15.

	Internal self test of the circuit-breaker with tripping		
	Internal self test with tripping should only be performed if downstream circuits are allowed to be safety disconnected!		
	The test can be interrupted at any time by pressing CLEAR 		
1	 **1**  **2**  **3**		
2	**Lighting sequence from top to bottom** (All indicators will light up one after other)		
3	The flash time corresponds to the time-lag class t_r		The flash time deviates from the set time-lag class t_r more than 10 %
4	Circuit-breaker tripped Test OK	Circuit-breaker not tripped Test not OK	Test not OK Overcurrent release is defective, even if the circuit-breaker trips
5	→ Re-starting a tripped circuit-breaker (page 6 – 7)	– Testing with hand tester – check wiring release – release coil – check release coil	

9.1.14 Sealing and locking equipment





Note

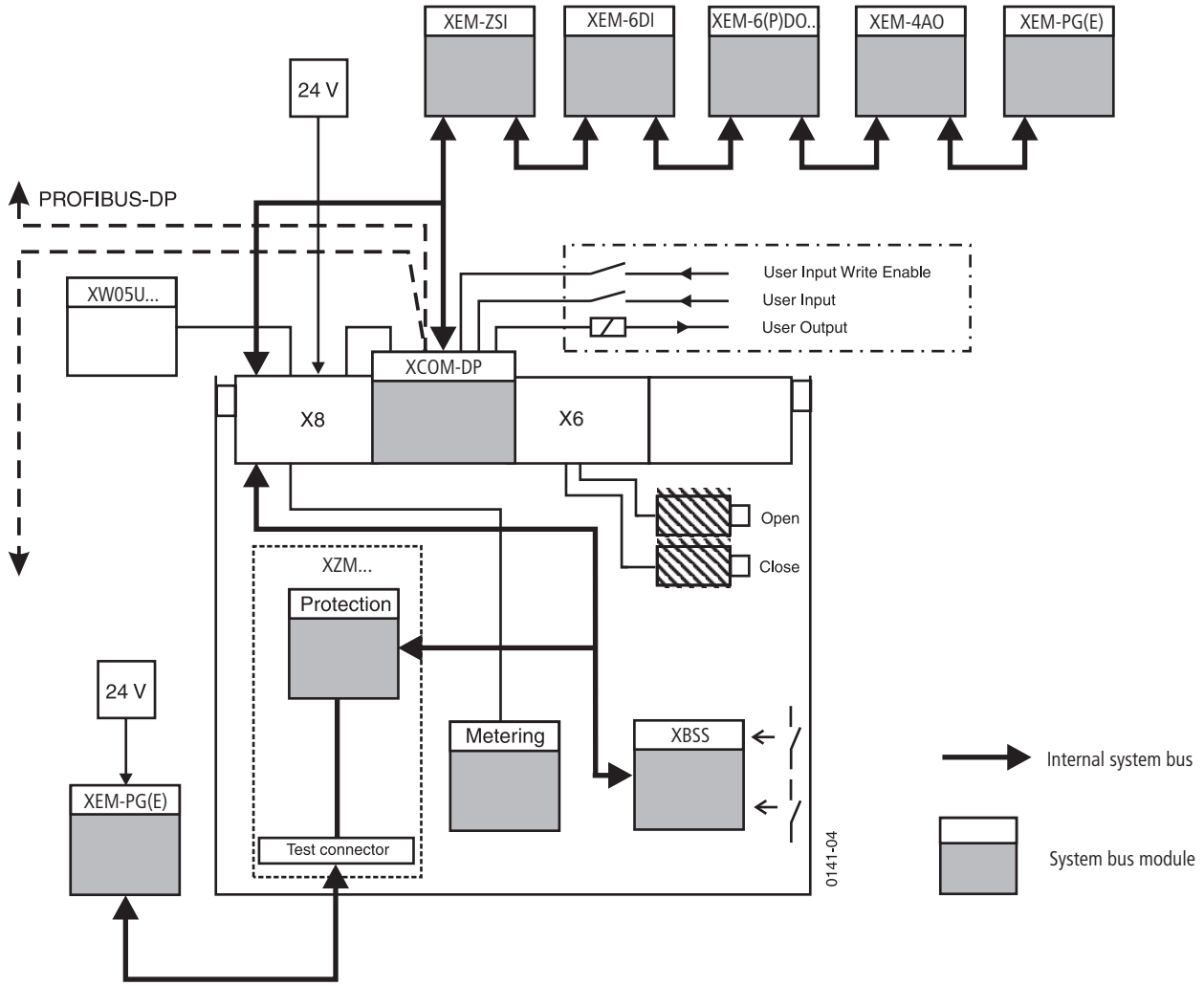
Keep sealing wire as short as possible!

	Part no.
IZM...-A..., IZM...-V..., IZM...-U...	IZM-XHB
IZM…-D…	IZM-XHBG

Additional information (→ page 15 – 5).

9.2 Additional communication features

9.2.1 System architecture



– **Internal system bus:** Internal bus system for interconnection of circuit-breaker components and for connection of external system bus modules
– **PROFIBUS-DP:** Field bus for connection of automation components
– XCOM-DP: Communication module for interconnection of internal system bus and PROFIBUS-DP
– **Protection:** Protection module
– **XBSS:** Breaker Status Sensor for acquisition of signals about the circuit-breaker status
– **XZM…**: Electronic overcurrent release
– **XEM-ZSI**: Module for zone selective interlocking, must always be connected as the first module
– **XEM-6DI**: Digital input modules for potential-free input signals – “0/1”-signals; two modules with different configurations connectable as a maximum
– **XEM-6(P)DO…:** Digital output modules with 6 outputs each; three modules with different configurations or versions connectable as a maximum
– **XEM-PG(E):** Device for parameterizing, testing, operating and monitoring the circuit-breaker via any input/output unit with browser features; connection through test socket of overcurrent release or western socket (RJ45) of the last external system bus module
– **XEM-4AO**: Analog output module
– **VT**: Voltage transformer
– **Metering**: metering function harmonic XMH

Note

The bus cable must be terminated with a 120 Ω resistor at the last participant on the internal system bus.
On external expansion modules, it is installed directly on the module. If an external module is not connected a terminal resistor must be connected between terminals X8-1 and X8-2 on the circuit-breaker
The basic functions of the electronic overcurrent releases do not require auxiliary power supply.
Should further functions of the overcurrent release be used that require a data exchange over the internal system bus, an external 24 V DC power supply must be connected.
(→ page 9 – 73).

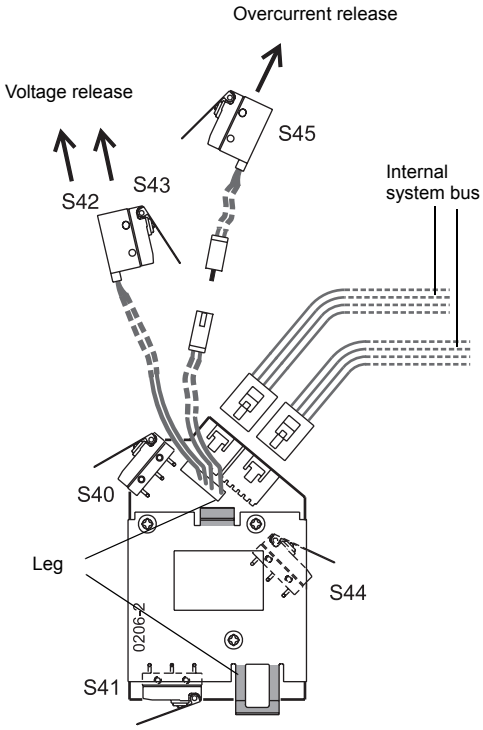
Maximum assignment configuration of the internal system bus (13 participants):

– Overcurrent release XZMU(R)(D)
– Measurement function “harmonic” XMH
– Breaker Status Sensor XBSS
– Communication module XCOM-DP
– Parameter assignment module XEM-PG or XEM-PGE
– Zone selective interlocking module XEM-ZSI
– Digital output module XEM-6DOwith left switch position
– Digital output module XEM-6DOwith right switch position
– Digital configurable output module XEM-6PDO
– Digital input module XEM-6DIwith left switch position
– Digital input module XEM-6DIwith right switch position
– Analog output module XEM-4AO with left switch position
– Analog output module XEM-4AOwith right switch position

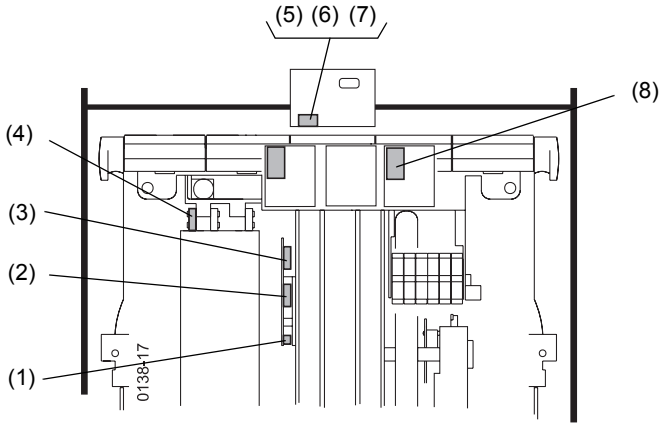
9.2.2 Internal modules

9.2.2.1 Breaker Status Sensor (XBSS)

For collecting circuit-breaker status information via signaling switches and transmitting these data on the internal system bus.



Status signals for the communication



(1) Signalling switch spring charged S41
(2) Signalling switch ON-OFF position S44
(3) Signalling switch ready-to-close S40
(4) Trip signalling switch S45
(5) Signalling switch connected position S46
(6) Signalling switch test position S47
(7) Signalling switch disconnected position S48
(8) Signaling switch S42/S43 on second shunt trip or on undervoltage trip

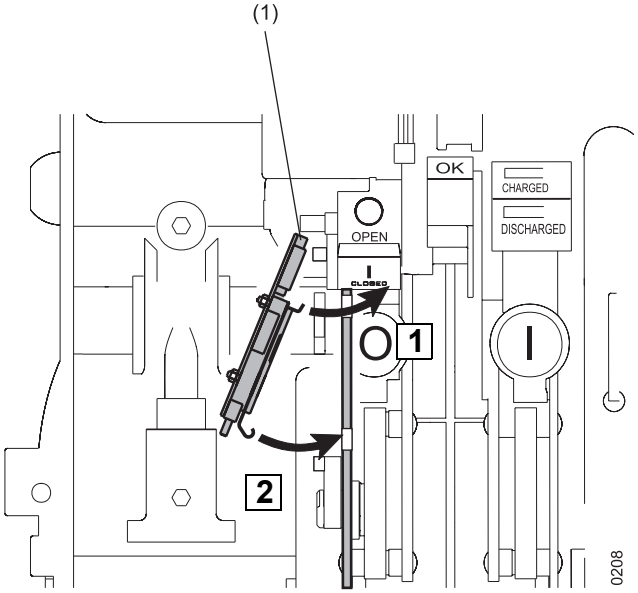
Note

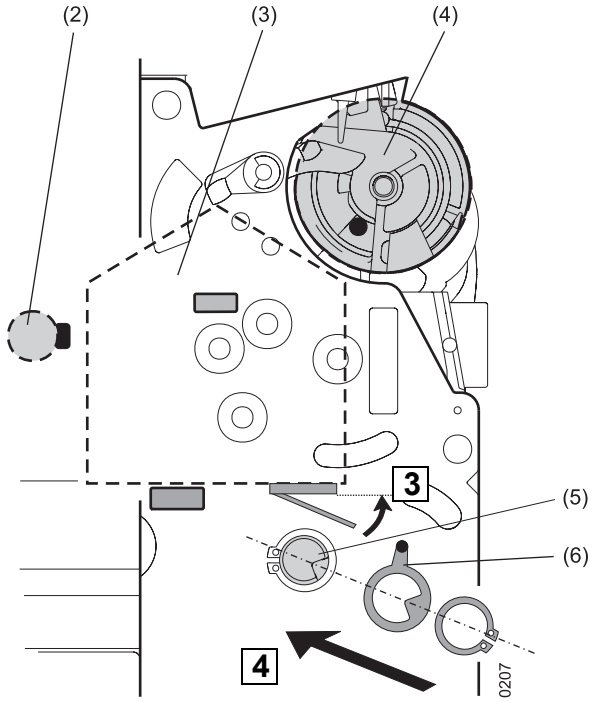
Signalling switches (6) – (8) on the communication module XCOM-DP only active in combination with withdrawable technique.

Installing the Breaker Status Sensor

	Danger
	Before working on the device be sure to switch off the switchboard and earth the device.

– Switching off and discharging the spring(→ page 24 – 2)
– Remove front panel (→ page 24 – 6)
– Remove overcurrent release (→ page 9 – 39)

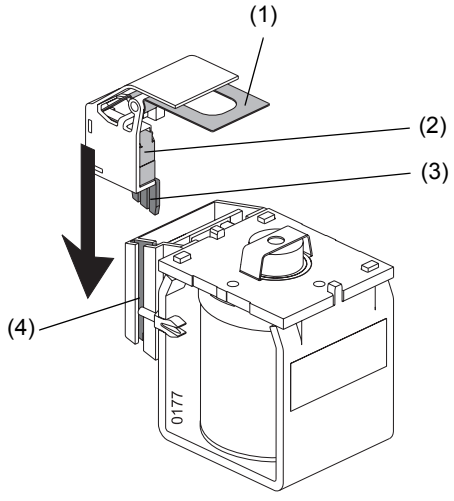




(1) Breaker Status Sensor XBSS
(2) Switching shaft
(3) XBSS
(4) Ready-to-close indicator
(5) Operating shaft
(6) Driver

Fitting signalling switch on the voltage release

1st voltage release: signalling switch S42
2nd voltage release: signalling switch S43

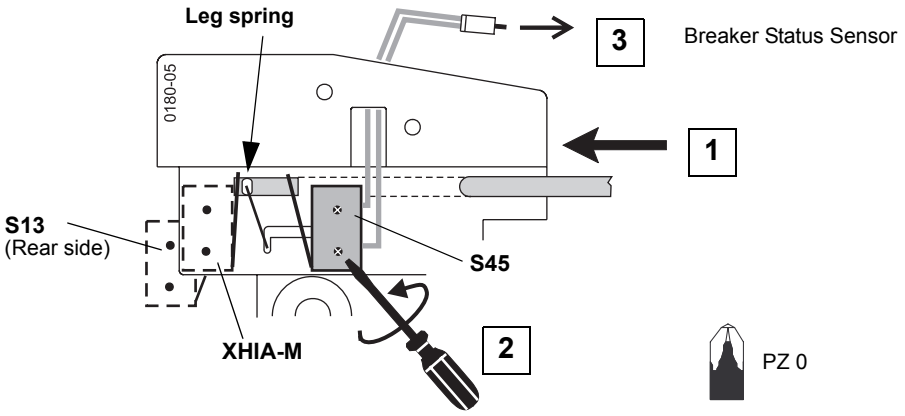


(1) See-saw
(2) Signalling switch
(3) Guide
(4) Groove

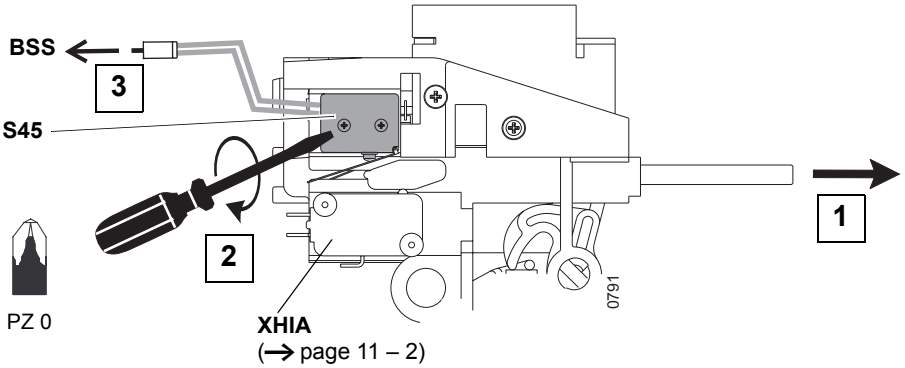
Fitting signalling switch on the protection module (rear side overcurrent release)

CAUTION
Tighten self-tapping screws carefully. The signalling switch must not be deformed during installation.

Metal bracket for overcurrent release (silver):



Plastic bracket for overcurrent release (black):



Connecting the Breaker Status Sensor

	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.

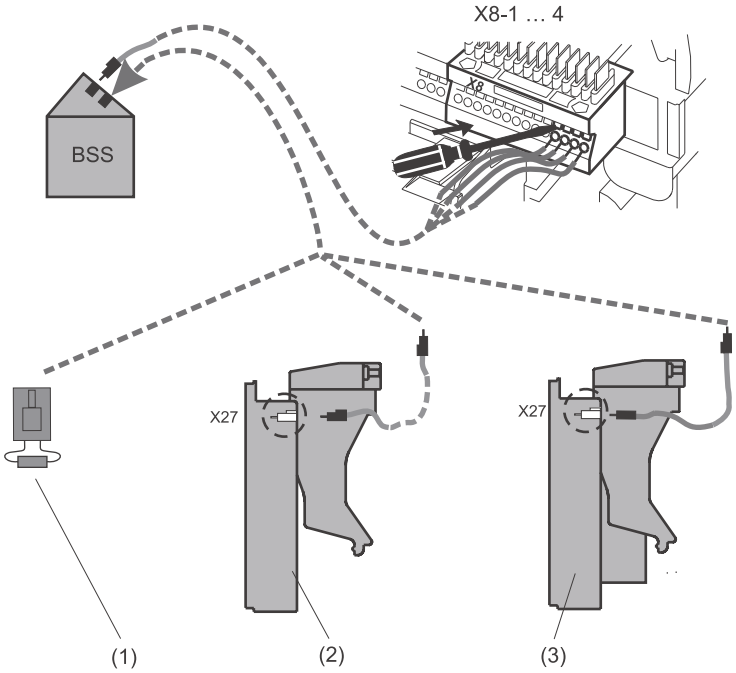
The first connection of the internal system bus is on the connector X8. The second connection is depandant upon the circuit-breaker features.

→ Circuit diagrams (page 8 – 1)

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area). (→ page 5 – 19)

Connection XBSS → page 9 – 57.



(1) Termination resistor after change to a trip unit without communication capability
(2) XZMU and XZMD without metering function
(3) XZMU and XZMD with metering function

9.2.2.2 Communication module XCOM-DP

Interface adapter for:

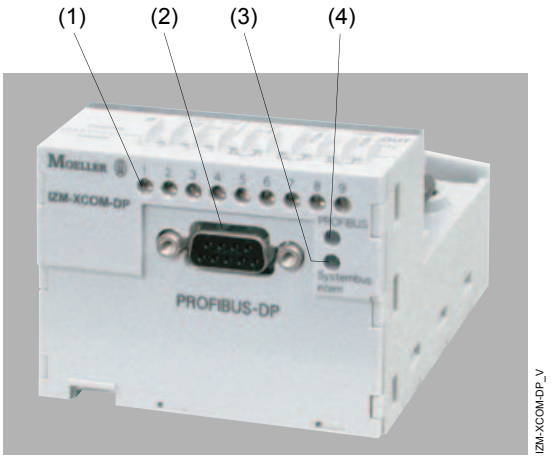
– Converting the signals of the internal system bus to PROFIBUS-DP signals and vice versa

– On withdrawable circuit-breakers:Detecting the circuit-breaker position in the withdrawable unit with the auxiliary switches S46, S47 and S48, and emitting the corresponding signals on the internal system bus and the PROFIBUS-DP.

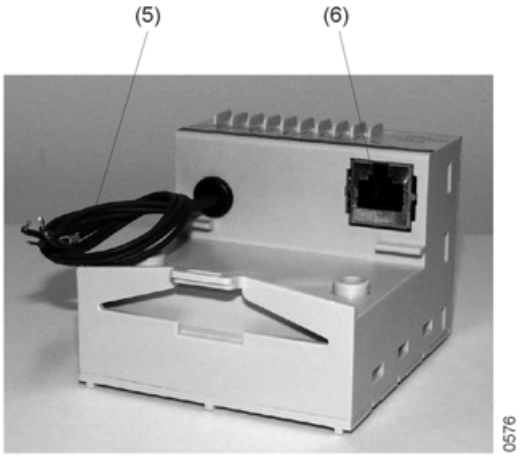
– Providing special functions through additional inputs and outputs (e.g. to control the circuit-breaker and for parameterization)

Further information is given in the “Communication manual circuit-breaker IZM”.

Design



(1) Connection terminals for additional inputs and outputs to provide special functions
(2) SUB-D plug, 9-pole, for PROFIBUS-DP connection
(3) Internal system bus LED
(4) PROFIBUS-DP LED



(5) Connecting cables to hand plug X8
(6) Connection of the internal system bus for external expansion modules or for the termination resistor

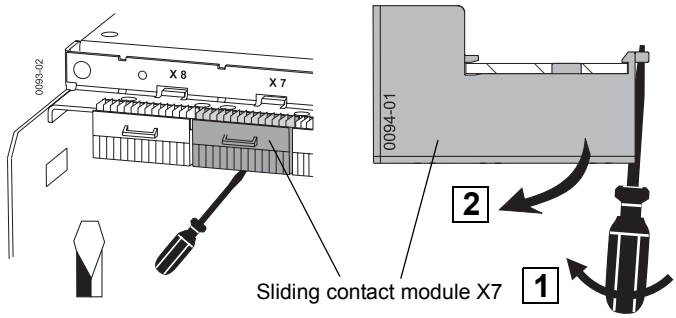
Indications

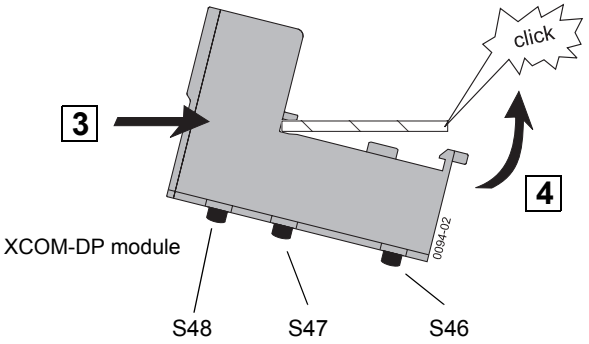
LED	Indicator	Significance
PROFIBUS-DP	Off	No voltage at XCOM-DP
	Green	PROFIBUS-DP communication operating
	Red	Bus fault or bus does not respond
Internal system bus	Off	No modules at the internal system bus found
	Green	Communication via internal system bus operating
	GreenFlashing	Participant at the internal system bus found, but connection inside circuit-breaker disturbed
	Red	Internal system bus fault

Fitting XCOM-DP module on the withdrawable unit

– Switching off and discharging the spring(→ page 24 – 2)

– Pull the circuit-breaker into maintenance position (→ page 24 – 3)



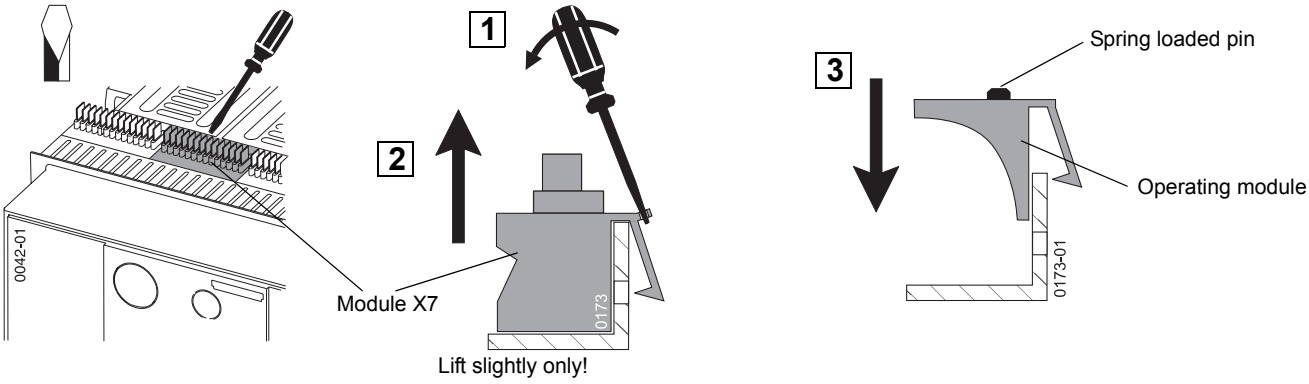


S46, S47 and S48:

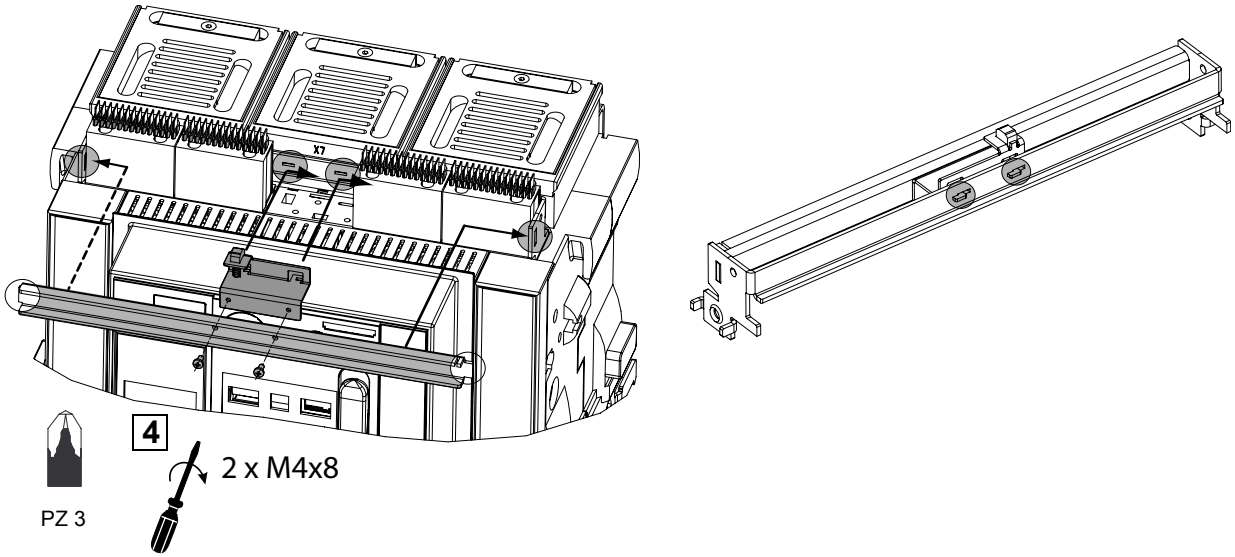
Signalling switches for detecting the circuit-breaker position in the withdrawable unit and transfer to PROFIBUS-DP and internal system bus.

Fitting operating module with reset pin on the circuit-breaker

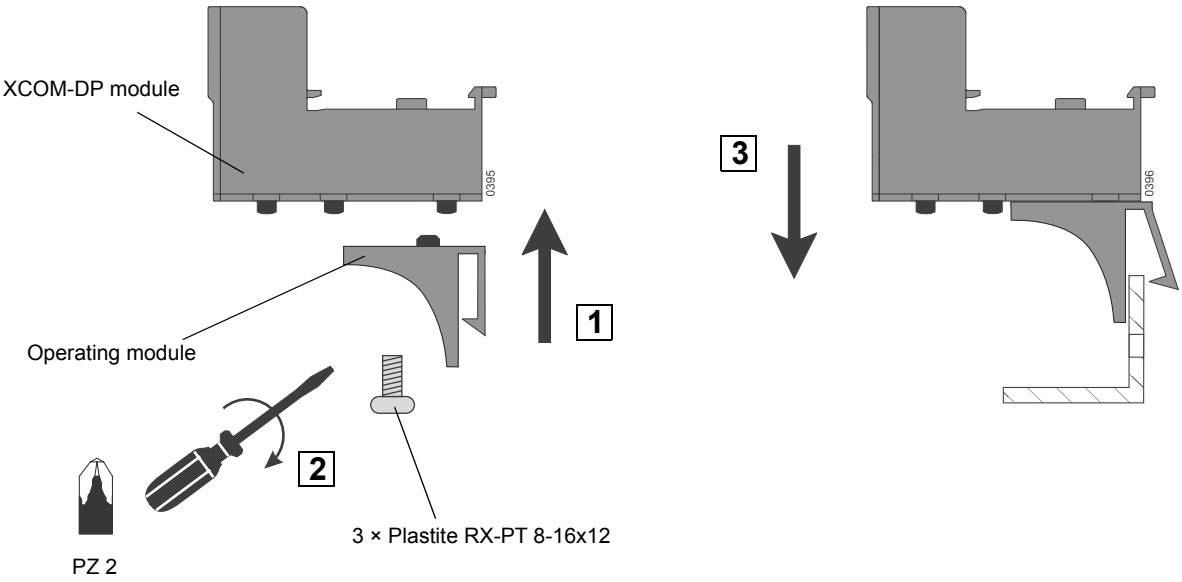
For actuating signalling switches S46, S47 and S48



For circuit-breakers with 1000 V rated voltage:



Fitting XCOM-DP module on the fixed-mounted circuit-breaker

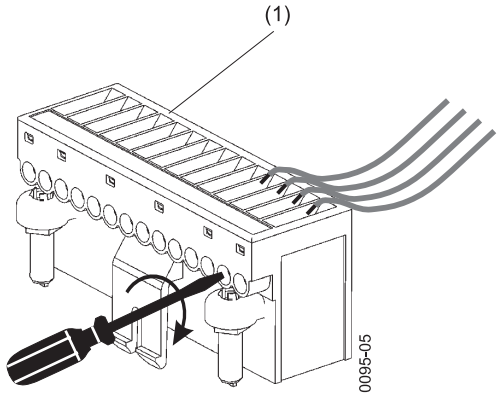


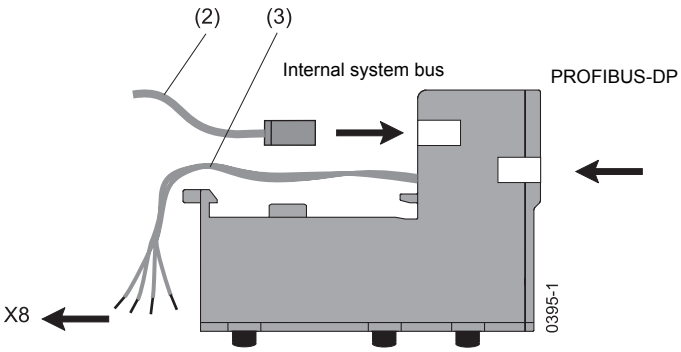
Connecting wires

→ Circuit diagrams (page 8 – 1)

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area).
→ (page 5 – 16).





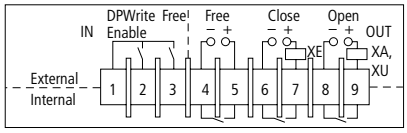
(1) Hand plug X8
(2) Connecting cable to first external expansion module or termination resistor
(3) Connecting cable to hand plug X8

Designation	Assignment	Terminal
X8-1	Internal system bus –	X8.1
X8-2	Internal system bus +	X8.2
X8-3	24 V DC +	X8.3
X8-4	24 V DC GND	X8.4

ATTENTION

If no external expansion modules are connected to the XCOM-DP module, the termination resistor has to be plugged in the terminal for internal system bus.
Otherwise there may be malfunctions in the electronic system.

Connections for additional inputs and outputs



DP Write Enable

Write protection: Without bridge at this input all activities which could change the circuit-breaker status are blocked.

“Free”

Free operator input, e.g. for the control of the remote reset XFR

“Close”

24 V DC contact for the remote control of the closing release

“Open”

24 V DC contact for the remote control of the shunt or undervoltage release

Further information about the application of these inputs and outputs is given in the “Communication manual circuit-breaker IZM”.

9.2.2.3 "Harmonic" measurement functions

Overcurrent releases XZMU and XZMD can be equipped with a metering function. This, however, requires external voltage transformers providing a three-phase metering voltage .(→ page 9 – 69).

In addition to the values for the currents, the metering function provides data on voltages, powers, energy values, power factors and frequency through the internal system bus, for further processing.

This data can be shown on the display of the overcurrent releases, transmitted to the PROFIBUS-DP through the XCOM-DP module and transferred to the outputs of external expansion modules. Based on this data, conclusions can be drawn about the condition of the power system.

A separate 24 V supply voltage is needed for applications where the full measurement functions are requiered when communication function is not selected.

Metering function – accuracy

Measured parameter	Accuracy[1)]
Currents I_{L1}, I_{L2}, I_{L3}, I_N	±1 %
Earth-fault current I_g (measurement with external earth-fault transformer class 1)	±5 %
Line voltages U_{L12}, U_{L23}, U_{L31}	±1 %
Phase voltages U_{L1N}, U_{L2N}, U_{L3N}	±1 %
Current average of line voltages $U_{avg\Delta}$	±1 %
Current average of phase voltages U_{avgY}	±1 %
Apparent power S_{L1}, S_{L2}, S_{L3}	±2 %
Total apparent power	±2 %
Active power P_{L1}, P_{L2}, P_{L3}	±3 % @ cos φ >0.6
Total active power	±3 % @ cos φ >0.6
Reactive power Q_{L1}, Q_{L2}, Q_{L3}	±4 % @ cos φ >0.6
Total reactive power	±4 % @ cos φ >0.6
Power factor cos φ_{L1}, cos φ_{L2}, cos φ_{L3}	±0.04
Power factor total cos φ_{avg}	±0.04
Long term average of currents L1, L2, L3	±1 %
Long term average of 3-phase current	±1 %
Long term average of active power in L1, L2, L_3	±3 % @ cos φ >0.6
Long term average of active power 3-phase	±3 % @ cos φ >0.6
Long term average of apparent power in L1, L2, L_3	±2 %
Long term average of apparent power 3-phase	±2 %
Long term average of reactive power 3-phase	±4 % @ cos φ >0.6
Energy consumed	±3 %
Energy delivered	±3 %
Reactive energy consumed	±4 %
Reactive energy delivered	±4 %
Frequency	±0.1 Hz
Distortion factor of current and voltage	±3 % upto 29. Harmonic
Phase unbalance of current and voltage[2)]	±1 %

The necessary configuration (input of current transformer primary and secondary voltage, phase rotation, positive energy direction and primary switching of the current transformers) can be carried out via:

– The test socket with the parameter assignment module XEM-PG(E)
– The graphical display (XZMD) (→ page 9 – 72)

Current on the display of the overcurrent release XZMU

Measured parameter	Accuracy[1)]
Currents I_{L1}, I_{L2}, I_{L3}, I_N	±10 %
Earth-fault current Ig (measurement with external earth-fault transformer)	±5 % + 16 LSD

1) **Definition of accuracy:**
g (x % w.r.t. upper limit + 2 LSD (Least Significant Digit)) for one year after calibration

Reference condition:

Input current I	$I_{n\ max}$ ±1 %
Input voltage U	U_n ±1 %
Frequency f	50 Hz
Power factor	cos φ = 1
Waveform	Sine, harmonic distortion ≦5 %, sysmetrical load
Ambient temperature	35 °C ±5 °C
Auxilliary voltage	DC 24 V according to DIN 19240/EN 61131
Warm-up time	2 hours
Relative humidity	up to 90 %
External fields	none

Metering range:

Current	0.2 … 1.2 $I_{n\ max}$
Voltage	0.8… 1.2 U_n

2) **IEC Definition:**
Ratio of the largest difference between the phases to the most heavily loaded phase.

Further protection functions

The metering function is used to implement extended protective functions beyond the functionality of the overcurrent releases.

Parameter	Setting range	Delay
Under voltage	100 – 1100 V	0 – 15 s
Over voltage	200 – 1200 V	0 – 15 s
Active power in normal direction	1…12000 kW	0 – 15 s
Active power in reverse direction	1…12000 kW	0 – 15 s
Over frequency	40 – 70 Hz	0 – 15 s
Under frequency	40 – 70 Hz	0 – 15 s
Phase current unbalance[1)]	5…50 %	0 – 15 s
Phase voltage unbalance[1)]	5…50 %	0 – 15 s
Phase rotation		
Distortion factor of current	3…50 %	5 – 15 s
Distortion factor of voltage	3…50 %	5 – 15 s

1) **IEC definition:**
The ratio of the largest difference between the phases to the most heavily loaded phase.

If one of these parameters exceeds or falls below its default settings, the overcurrent release is tripped after the adjusted delay through the internal system bus.

The parameters can be adjusted through:

– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software
– The graphical display (XZMD)

Setpoints

With the setpoint function it is possible to signal or record special events in the power system.

Parameter	Range	Delay
Phase overcurrent	30 – 10000 A	0 – 255 s
Ground overcurrent	30 – 1200 A	0 – 255 s
Neutral overcurrent	30 – 10000 A	0 – 255 s
Phase current unbalance[1)]	5…50 %	0 – 255 s
Current demand	30 – 10000 A	0 – 255 s
Under voltage	100 – 1100 V	0 – 255 s
Phase voltage unbalance[1)]	5…50 %	0 – 255 s
Over voltage	100 – 1100 V	0 – 255 s
Over power in normal direction	1 – 12000 kW	0 – 255 s
Reverse active power exceeded	1 – 12000 kW	0 – 255 s
Long term average active power exceeded	1 – 12000 kW	0 – 255 s
Long term average apparent power exceeded	1 – 12000 kVA	0 – 255 s
Long term average reactive power exceeded	1 – 12000 kVar	0 – 255 s
KVAR consumed	1 – 12000 kVar	0 – 255 s
Reactive power exceeded negative feeder	1 – 12000 kVar	0 – 255 s
KVA	1 – 12000 kVA	0 – 255 s
Over frequency	40 – 70 Hz	0 – 255 s
Under frequency	40 – 70 Hz	0 – 255 s
Under power factor (PF)	–0.001…0.001	0 – 255 s
Over power factor (PF)	–0.001…0.001	0 – 255 s
Current THD	3…50 %	0 – 255 s
Distortion factor voltage exceeded	3…50 %	0 – 255 s
Crest factor	1…2.55	0 – 255 s
Form factor	1…2.55	0 – 255 s

1) **IEC definition:**
The ratio of the largest difference between the phases to the most heavily loaded phase.

When one of these parameters exceeds or falls below the set value a signal is given via the internal system bus after the set time delay.

The parameters can be adjusted through:

– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software
– The graphical display (XZMD)

Additional functions

– Two independent waveform memories
– Harmonic analysis

The two independent waveform memories can be used to analyse the current and voltage values at the time of the event.

If the waveform memories are programmed to “recording” (standard setting), there is continuous recording until a previously defined event occurs. Then, the recording is stopped, and the current or voltage waveforms at the time of the event can be observed through a visual display (graphical LCD, laptop or PC). The time window is one second. The resolution is 1649 values/second

The values that can be selected for one of the waveform memories are:

Settings for waveform memory	
Currents	I_{L1}, I_{L2}, I_{L3}, I_{LN}, I_g
Voltages	U_{L1}, U_{L2}, U_{L3}

The waveform memories can also be started or stopped individually through the communication channels (PROFIBUS-DP, internal system bus).

The waveform memories can be parameterized through:

– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software
– The graphical display (XZMD)

Retrifitting the “harmonic” measuring function

Danger

Before working on the device be sure to switch off the switchboard and earth the device.

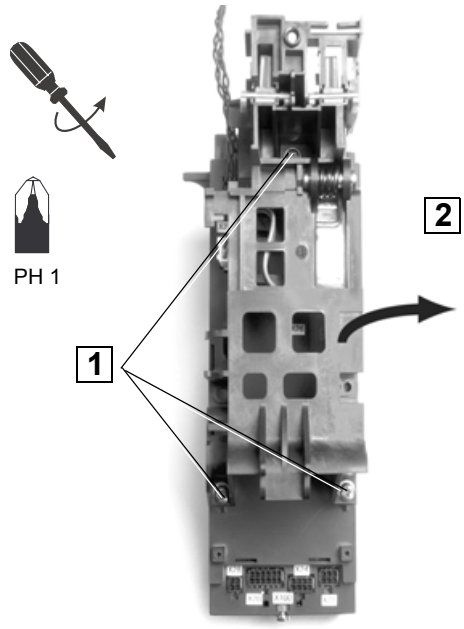
– Switching off and discharging the spring (→ page 24 – 2)
– Put the drawer switch to maintenance position (→ page 24 – 3)
– Remove front panel (→ page 24 – 6)
– Remove overcurrent release (→ page 9 – 39)

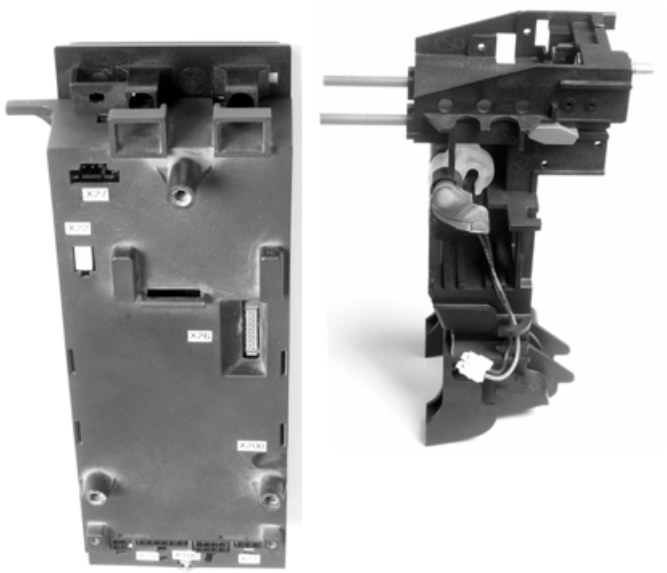
Note

If the metering function metering function “harmonic” is retrofitted, the metering function for current and voltage values is 3 %. The accuracy of the measured values alter correspondingly. If an accuracy of 1 % is required, the overcurrent release must be submitted to the manufacturer for calibration together with the metering function “power”/metering function “harmonic”.

Removing tripping mechanism from electronic overcurrent release

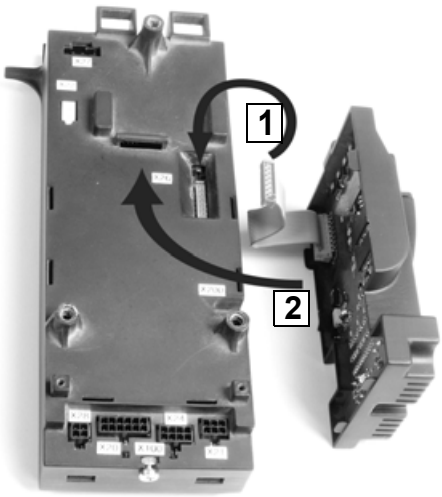
If applicable, undo existing cable fixings and unplug connector of tripping magnet.

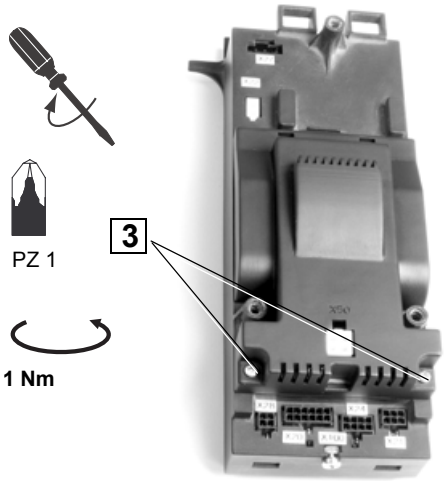




Installing metering function and screwing tight

CAUTION
Tighten self-tapping screws carefully!

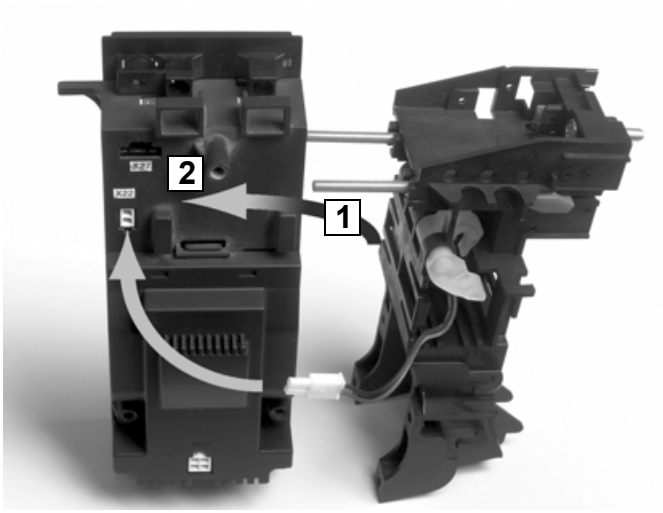


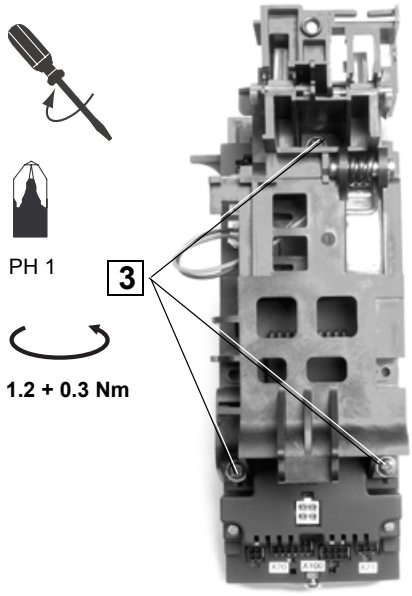


Installing mechanism and plugging connector for tripping coil

CAUTION

Avoid twisting of the anti-shock mounting! Observe tightening torque.



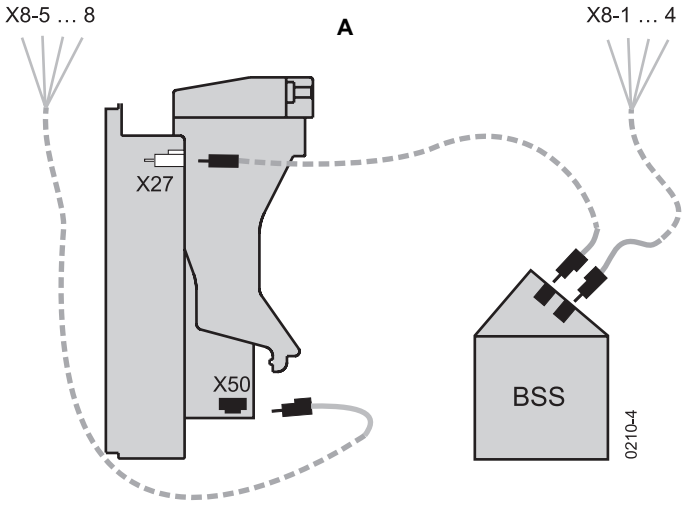


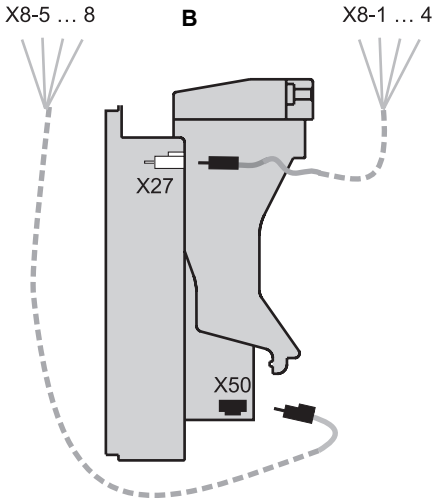
Connecting pre-assembled cables

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area)(→ page 5 – 19).

Connection variant A: with XBSS
Connection variant B: without XBSS



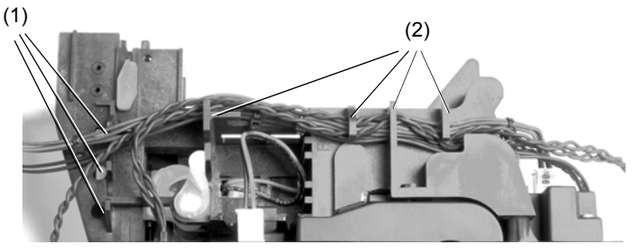


Terminal assignment	
X50	External voltage transformer
X27	System bus

Note

If no external expansion modules are connected to X8-1 and X8-2, this terminals must be equipped with the end resistor.
Otherwise there may be malfunctions in the electronic system.

Laying and fixing the cables



(1) 3 holes as fixing points
(2) Fixing aids

Lay all cables carefully as shown above and fix them with cable straps at the fixing points. Lead the cables around the fixing mandrel and fix them directly on the left and to the right of it with cable straps.

Then:

- Mount overcurrent trip in reverse order to removal (→ page 9 – 39)
- Connect cables to X8
- Fit front panel (→ page 24 – 13)

9.2.2.4 Retrofitting the PROFIBUS-communication connection

The circuit-breaker can be retrofitted using the “PROFIBUS retrofit kit” so that it is capable to transfer data via the PROFIBUS-DP.

- Mounting of the Breaker Status Sensors (XBSS) (→ page 9 – 47)
- Mounting of the XCOM-DP-Modules (→ page 9 – 61)
- Exchange of the overcurrent releases XZMA, XZMV or XZMV+XT for XZMU or XZMD (→ page 9 – 1)

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area) (→ page 5 – 19)

Ordering references

	Part no.
Electronic overcurrent release	
– System protection	IZM-XZMA
– Selectivity protection	IZM-XZMV
– Selectively-opening circuit-breakers with earth-fault protection and neutral conductor protection	IZM-XZMV-XT
– Universal	IZM-XZMU
– Universal with measuring function “harmonic”	IZM-XZMU-MH
– Digital	IZM-XZMD
– Digital with measuring function “harmonic”	IZM-XZMD-MH
Internal wiring for retrofit (necessary with release upgrade) (→ page 9 – 39)	
– For upgrade from release XZMA(V) to release XZMU(D)	IZM-XZM-VLIS[1)]
– For the connection of external N and/or G current transformer to release XZMU(D)	IZM-XZM-VLEW[2)]
Metering function “harmonic” (without voltage transformer)	+ IZM - XMH
Communication switch-on PROFIBUS-DP (COM-DP and BSS module)	(+) IZM - XCOM - DP[3)]
Separate Breaker Status Sensor (BSS)	(+) IZM - XBSS[3)]
COM-DP module (without BSS module)	IZM - XCOM - DP[3)]

1) With release upgrade, the necessary wiring “Internal system bus” between release and X8 (→ X8: 1-4), when communication function or external 24 V DC power supply is used.

2) With release upgrade, the necessary wiring between release and X8 (→ X8: 9-12), when neutral conductor protection or earth-fault protection is required.

3) With the use of the communication module there is no possibility to install the auxilliary contacts IZM XHIA, XHIF, XHIS and XHIS1. The corresponding signals can be seen internally by the Breaker Status Sensor and can be read with the parameter device, via the extention module or PROFIBUS.

Note

The above ordering references are for single ordering for replacement purposes. When ordering give the Ident Number of the circuit-breaker!

The internal wiring IZM-XZM-VLIS(-VLEW) must, when required, be ordered seperately.

The upgrading of a switch-disconnector is possible using the Eaton After Sales Service.

For the releases IZM-XZMU(...) and IZM-XZMD(...) the auxilliary plug X8 is necessary. When not present, the auxilliary plug IZM-XKL(Z)(-AV) must also be ordered. Terminal assignment (→ page 8 – 1)

The release accessories (incl. IZM-XRP...) must be separately ordered.

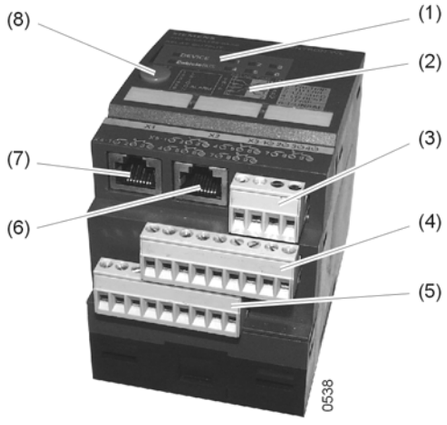
The release upgrade from 4 pole IZM with XZMA(V) to XZMV(U)(D) with neutral conductor or earth-fault protection an additional external measurement transformer IZM...-XW... must be used. (→ page 9 – 67)

9.2.3 External expansion modules

9.2.3.1 General

Application

External expansion modules are used for communication between the circuit-breaker IZM and the secondary equipment in the circuit-breaker panel. They are provided to control analog indications, transmit the circuit-breaker tripping status and the tripping reason, and to read additional control signals. Furthermore, with one of these modules it is possible to implement a zone selective interlocking for short-circuit protection.



(1) Indication LED
(2) Rotary coding switch
(3) Connection X3: internal system bus
(4) Connection X5: inputs or outputs
(5) Connection X4: inputs or outputs
(6) Connection X2: internal system bus
(7) Connection X1: internal system bus
(8) “TEST” button

Connection allocation X3	
X3-1	24 V DC GND
X3-2	System bus -
X3-3	System bus +
X3-4	24 V DC +

Mounting

The external expansion modules are snapped on a standard 35-mm DIN-rail inside the switchgear panel. Please observe that the length of the connecting cable from the first module to the circuit-breaker does not exceed 2 m.

Connection establishment

To connect expansion modules between each other and to the circuit-breaker, the supplied pre-assembled cables must be used. These cables are also used for the 24 V DC voltage supply of expansion modules.

Should more than 2 system bus modules be connected they must be supplied with 24 V DC with a seperate cable connection from module to module.

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area).
(→ page 5 – 16).

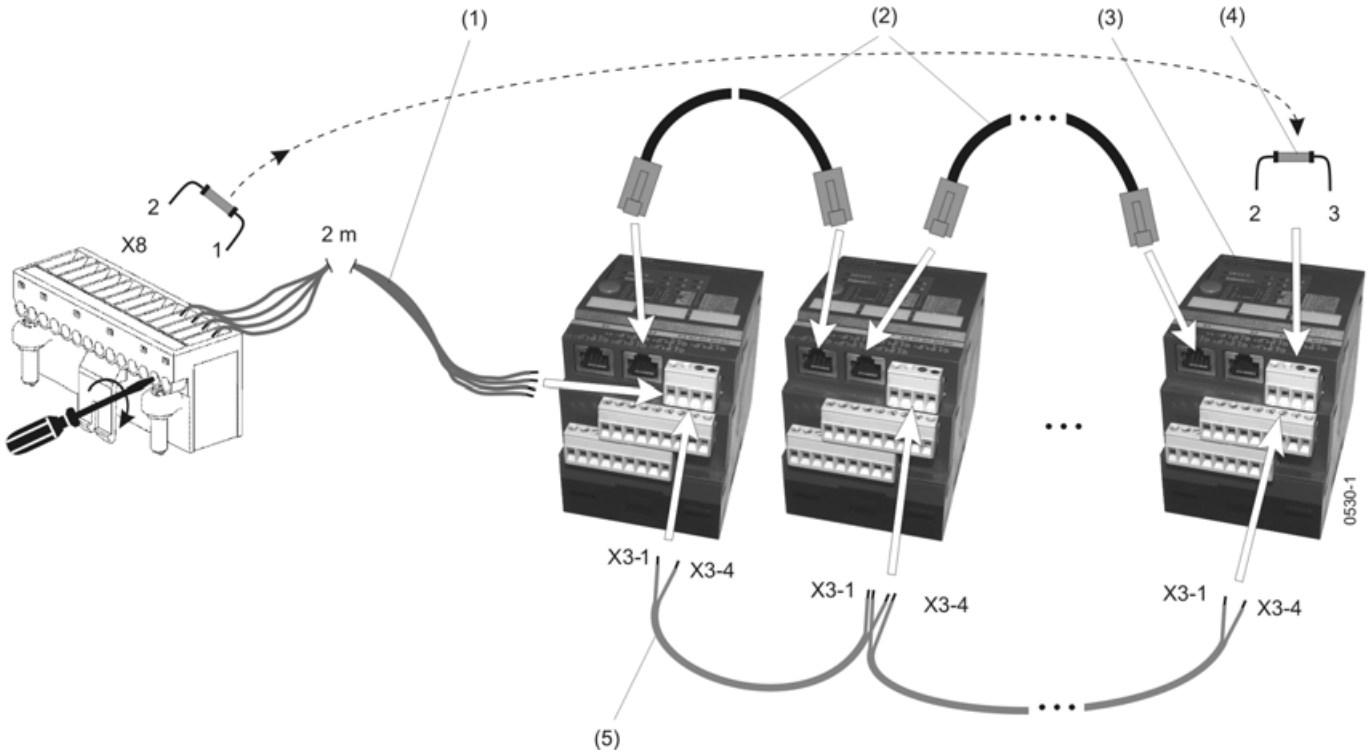
Only one expansion module can be connected directly to a circuit-breaker. Further modules have to be connected from module to module. Radial cables are not permissible!

If provided, the ZSI-module is always the first module, and it must be connected directly to the circuit-breaker.

On the last module, the system bus cable must be connected to X3 with a 120 Ω resistor, which is integrated in a western plug and is supplied with each module.

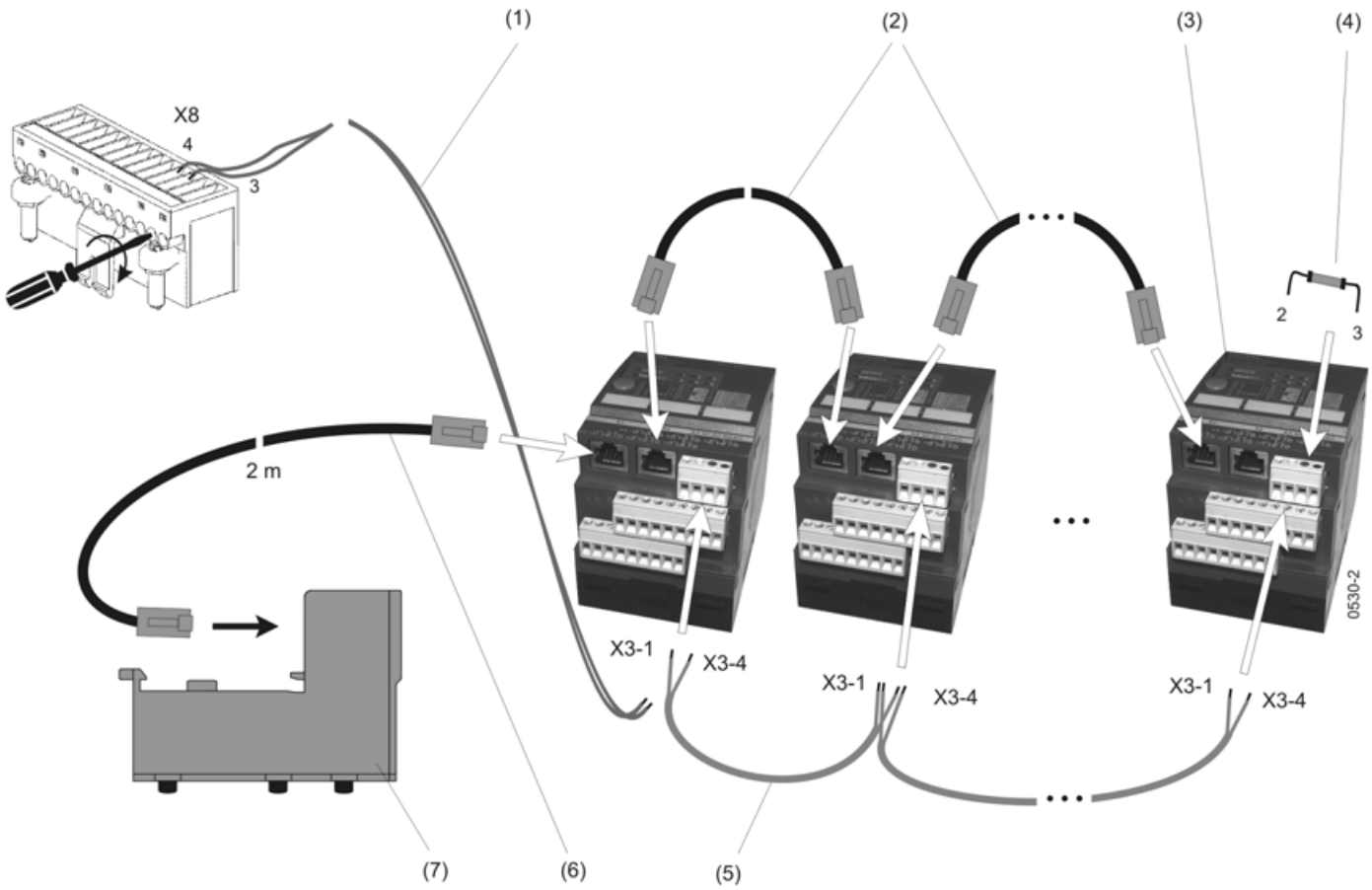
The total length of the systembus conductor must not exceed 9 m from the circuit-breaker auxiliary plug X8 to the last expansion module.

Circuit-breaker without XCOM-DP-module



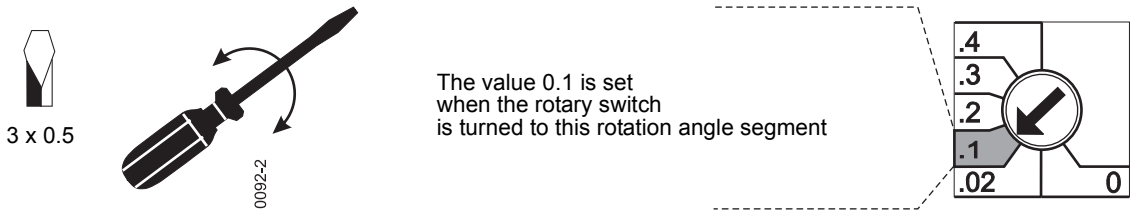
(1) Connecting cable to 1st module (4-core, cores X8-4/X3-1 twisted with X8-3/X3-4 and X8-1/X3-2 twisted with X8-2/X3-3)
(2) Connecting cables between modules
(3) System bus module
(4) Terminating resistor 120 Ω 0.5 W on last module
(5) Cable connection for power supply with 24 V DC

Circuit-breaker with XCOM-DP-module



(1) **Only for more than 2 system bus modules:**
Connection cable between X8 and the first system bus module with 24 V DC power supply.
(2) Connecting cables between system bus modules
(3) System bus module
(4) Terminating resistor 120 Ω 0.5 W on last module
(5) Connection cable between the system bus modules with 24 V DC power supply
(6) Connection cable between COM-DP and 1st systembus module (with two Western plugs)
(7) COM-DP

Setting principle



Indications

LED	Indicator	Significance
DEVICE	Green	Module in operation
	Yellow	Module in test mode
	Red	Module faulty
Internal system bus	Green	Connection to internal system bus present
	Off	No connection to internal system bus
All other LEDs	Yellow	Option set or signal available
	Off	Option not set or no signal available

Module test

CAUTION

To avoid malfunctions of the circuit-breaker or one of its components, perform the test before commissioning only.

The perfect operation of the expansion modules can be verified in the test mode.

The test mode is started by pressing the “TEST” button once.

All outputs and the associated LEDs are switched off. The colour of the DEVICE LED changes from green to yellow.

Testing inputs and outputs

Pressing the “TEST” button	Reaction
Twice short one after the other	– LED 1 on – in/output 1 on
After a pause, Twice short one after the other	– LED 1 and in/output 1 off, LED 2 on – in/output 2 on
After a pause, Twice short one after the other	– LED 2 and in/output 2 off, LED 3 on – in/output 3 on
…	…
After a pause, Twice short one after the other	– LED 5 and in/output 5 off, LED 6 on – in/output 6 on
After pause once	in/output 6 off, all LEDs on
1 x	Test mode starts again from beginning, all inputs/outputs and the associated LED's are off

If the “TEST” button is pressed quickly and successively several times with the LED on, this will switch the corresponding input/ output on and off alternately.

Testing LEDs only

If the “TEST” button is pressed several times with pauses in-between, the LEDs are only switched on one after the other. After the last LED, all LEDs are switched on.

Repeated pushing of the button “TEST” starts the test mode again, and all LEDs as well as inputs/outputs are off.

Quitting the test mode

Do not press the “TEST” button for about 30 s.

If all LEDs are on, the test mode is already quitted after about 1 s.

9.2.3.2 ZSI module

Function

If the circuit-breaker is combined with a ZSI-module, a short-circuit occurring in systems with several grading levels can be localised precisely.

For this purpose, all circuit-breakers are interconnected through their ZSI-modules.

In case of short-circuit, each circuit-breaker affected by the short-circuit current interrogates its downstream circuit-breaker to determine fault presence at this downstream level. In the direction of the energy flow, only the circuit-breaker nearest to the short-circuit trips. A possible time delay setting for the short-circuit tripping is deactivated. However, tripping will not take place until 50 ms later at the earliest, as a rule it will take 80 –90 ms.

Mounting

(→ page 9 – 59)

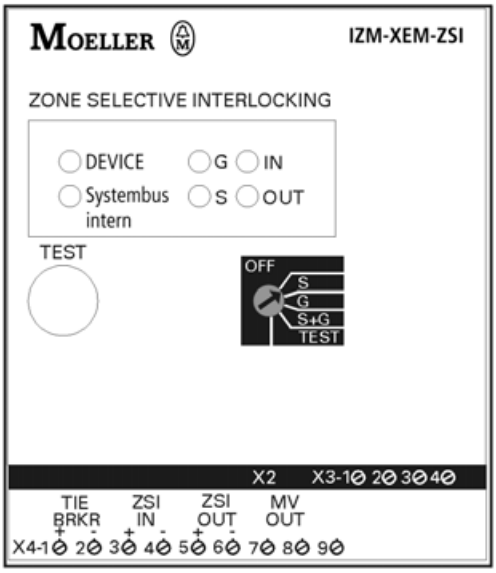
Connection

→ Connection establishment (page 9 – 59)

Only one ZSI-module can be connected per circuit-breaker.

If the ZSI-module is used together with other expansion modules, the ZSI-module must be connected directly to the XCOM-DP-module or the hand plug X8.

Connection assignment



Terminal	Connection
TIE BRKR	Only for special applications;Allows complete ZSI function in systems with bus-couplers without additional components.
ZSI IN	ZSI-modules of lower-level circuit-breakers
ZSI OUT	ZSI-modules of higher-level circuit-breakers
MV OUT	Signal to the medium-voltage level

Observe the specified polarity when connecting: plus to plus and minus to minus!

The maximum length of cable for the ZSI wiring, for a cross-section of 0.75 mm2 (2 wires), is max. 400 m. With ZSI connection exclusively between WL switches and with an increase in cross-section to 2.5 mm2 a cable length of up to 1000 m is permissable.

The ZSI must be either with twisted pair cable or with screened cable.

The ZSI-module allows connection of up to:

– 8 circuit-breakers at the ZSI IN input and
– 20 circuit-breakers at the ZSI OUT output

Settings

→ Setting principle (page 9 – 61)

Settings ZSI-module	
OFF	ZSI-function deactivated
S	ZSI-module effective only for short-time delay short-circuit
G	ZSI-module effective only for earth-fault protection
S+G	ZSI-module effective only for short-time delay short-circuit and earth-fault
TEST	Test position for checking the ZSI functionality

Indications, tests

(→ page 9 – 62)

9.2.3.3 Digital input module

Function

With the digital input module, up to 6 additional binary signals (24 V DC) can be connected to the system.

These input signals are transferred to the PROFIBUS-DP via the internal system bus and can be evaluated accordingly.

For the overcurrent release XZMD, it is alternatively possible to use such an input signal at the input 1 to switch over between two different protection parameter sets that may have been provided.

Mounting

(→ page 9 – 59)

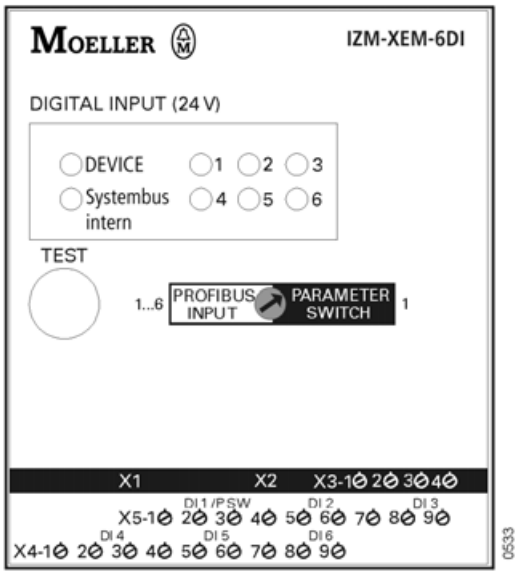
Connection

→ Connection establishment (page 9 – 59)

A maximum of two digital input modules can be operated on the internal system bus at the same time

– 1 module with the setting “PROFIBUS-DP INPUT”
– 1 module with the setting “PARAMETER SWITCH”

Connection assignment



Terminal assignment of digital input module	
X5	Inputs 1 – 3
X5 – 2.3	Input DI1
X5 – 5.6	Input DI3
X5 – 8.9	Input DI3
X4	Inputs 4 – 6
X4 – 2.3	Input DI4
X4 – 5.6	Input DI5
X4 – 8.9	Input DI6

The polarity of the input is not important.

Settings

→ Setting principle (page 9 – 61)

Settings of digital input module	
PROFIBUS-DP INPUT	Inputs 1 – 6 are active. If an input signal is present, a respective signal is output on the PROFIBUS-DP via the XCOM-DP module.
PARAMETER SWITCH	Input 1 is used for parameter switchover, all other inputs can be freely used. No input signal (LED 1 not on): Parameter set A activated Input signal available (LED 1 on): Parameter set B activated

Note

The parameter changeover command can be given by a command via the bus communication, the XEM-PG or via the graphic display.

For further details see “IZM communication solutions” manual.

Indications

(→ page 9 – 62)

Testing

(→ page 9 – 62)

9.2.3.4 Digital output modules

Function

With digital output modules, up to 6 signals can be transmitted.

If the overcurrent release signals an event, the associated LED lights up after the adjusted time delay has elapsed, and the module sets a signal at the corresponding output.

Digital output modules are available in the following versions:

– With rotary coding switch and relay outputs
– Configurable and with relay outputs

Mounting

(→ page 9 – 59)

Connection

→ Connection establishment (page 9 – 59)

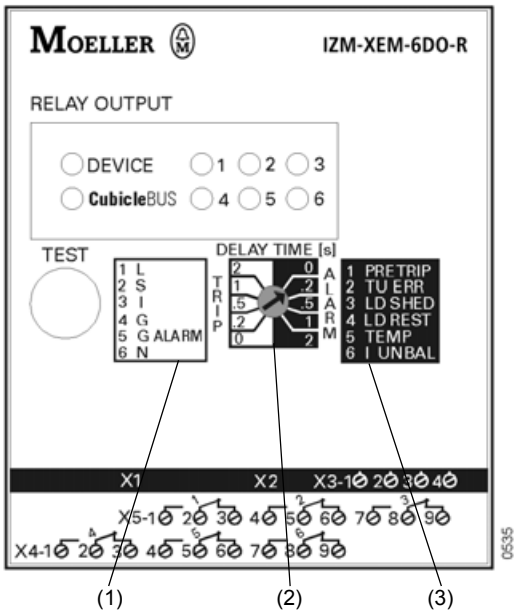
If a combination of digital output modules with rotary coding switch and configurable digital outputs has to be connected to a circuit-breaker, the following can be connected per circuit-breaker:

– 1 digital output module with rotary coding switch and output assignment 1
– 1 digital output module with rotary coding switch and output assignment 2
– 1 configurable digital output module

A mixed application of digital output modules with relay outputs and optocoupler outputs is possible.

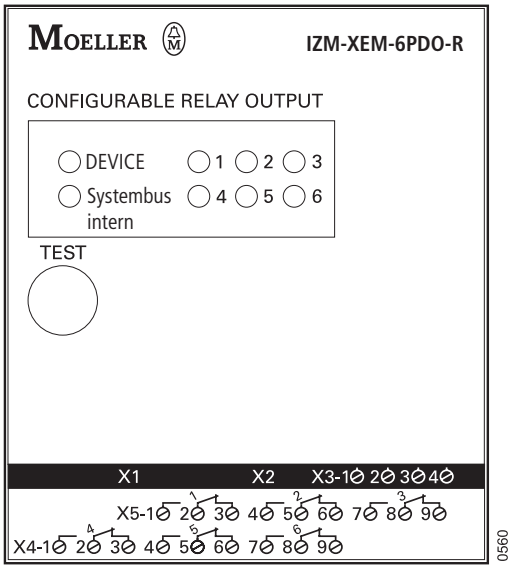
Terminal assignment

Digital output module with rotary coding switch



(1) Output assignment 1
(2) Time delay setting
(3) Output assignment 2

Configurable digital output module



Terminal assignment of digital output module	
X4	Outputs 4 – 6
X5	Outputs 1 – 3

Digital output modules with relay output provide changeover contacts at their outputs.

Current carrying capacity of the outputs	
Relay output	AC15: 250 V AC, 6 A DC13: 24 V DC, 2 A DC13: 250 V DC, 0.2 A

Settings

Digital output modules with rotary coding switch

→ Setting principle (page 9 – 61)

Terminal assignment 1 (TRIP)	
L	Signalling contact overload tripping
S	Signalling contact short-time delay short-circuit tripping
I	Signalling contact instantaneous short-circuit tripping
G	Signalling contact earth-fault tripping
G ALARM	Signalling contact earth-fault alarm
N	Signalling contact neutral conductor tripping

Time delay setting	
TRIP	0 – 2 s
ALARM	0 – 2 s

The time delay setting determines how long a signal of the overcurrent release must be available until the associated LED lights up and the signal is set at the corresponding output.

Output assignment 2 (ALARM)	
PRE TRIP	Signalling contact leading signal overload tripping(time delay 0 s)
TU ERR	Signalling contact trip unit error

Output assignment 2 (ALARM)	
LD SHED	Signalling contact load shed(time delay 0 s)
LD REST	Signalling contact load restore(time delay 0 s)
TEMP	Signalling contact temperature alarm
I UNBAL	Signalling contact phase unbalance current

Configurable digital output modules

Configurable digital output modules can be adjusted through:

– The test socket of the overcurrent release with the parameter assignment module XEM-PG(E)
– 13 the PROFIBUS-DP with data set DS 69 Bytepos.

Indications

(→ page 9 – 62)

Testing

(→ page 9 – 62)

9.2.3.5 Analog output module

Function

With the analog output module, analog measured-values can be transmitted, which can be shown on the cubicle door by means of moving-coil instruments. There are a total of 4 outputs available.

For the output signal, two different formats can be selected:

– 4...20 mA, output via plug X5
– 0...10 V, Output via plug X4.

Mounting

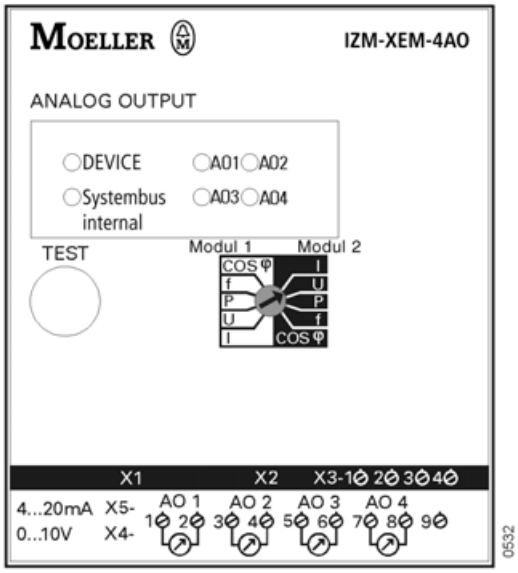
(→ page 9 – 59)

Connection

→ Connection establishment (page 9 – 59)

A maximum of 2 analog output modules can be connected, whose rotary coding switches, however, must have a different setting (module 1 or module 2).

Terminal assignment



Settings

→ Setting principle (page 9 – 61)

The measured-values to be signalled are adjusted with the rotary coding switch. They are always available at the two terminal strips in the corresponding format.

The following values are available at the outputs:

Output assignment				
Position	**AO 1**	**AO 2**	**AO 3**	**AO 4**
I	I_{L1}	I_{L2}	I_{L3}	I_N
U	U_{L12}	U_{L23}	U_{L31}	U_{L1N}
P	P_{L1}	P_{L2}	P_{L3}	S_{total}
f	f	U_{LLavg}	P_{total}	cos φ_{avg}
cos φ	cos φ_{L1}	cos φ_{L2}	cos φ_{L3}	Phase unbalanced current in %

Indications

(→ page 9 – 62)

Testing

(→ page 9 – 62)

9.2.3.6 Article numbers

Each expansion module is supplied with a termination resistor 120 Ω, integrated in a western plug, and with a connecting cable 0.2 m for connection to the internal system bus.

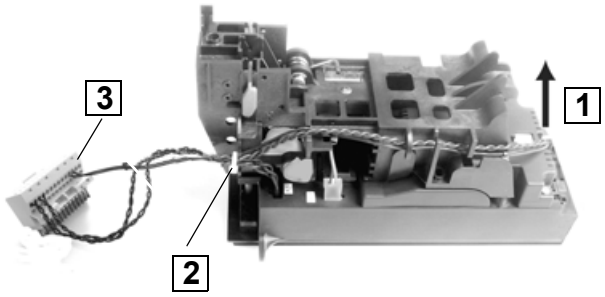
Expansion module	Part no.
ZSI-module	IZM-XEM-ZSI
Analog output module	IZM-XEM-4AO
Digital output module with relay output	IZM-XEM-6DO-R
Digital output module with relay output, programmable	IZM-XEM-6PDO-R
Digital input module	IZM-XEM-6DI
Pre-assembled cable 1 m	IZM-XEM-VL1
Pre-assembled cable 2 m	IZM-XEM-VL2
Pre-assembled cable 0.2 m	IZM-XEM-VL05

9.3 Current transformer

9.3.1 Retrofitting the internal neutral CT

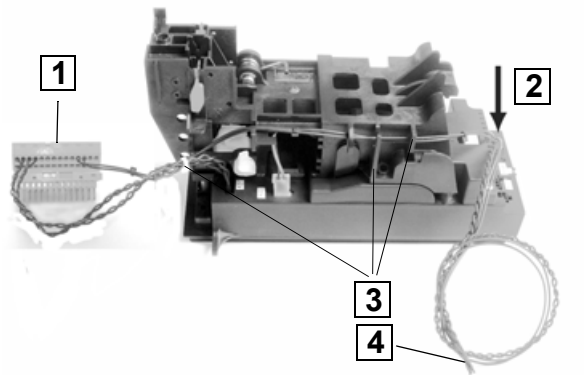
– Switching off and discharging the spring(→ page 24 – 2)
– Dismount the fixed-mounted circuit-breaker (→ page 5 – 1) or remove the circuit-breaker from the withdrawable unit (→ page 24 – 3)
– Remove front panel (→ page 24 – 6)
– Remove overcurrent release (→ page 9 – 39)

Disconnecting the cable harness from the overcurrent release



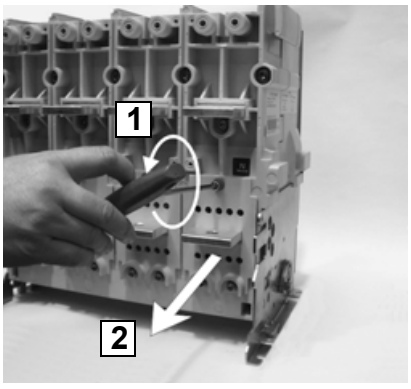
1 Unplug connector from X24
2 Remove cable binders
3 Disconnect cables from terminals 9 to 12 on the connector X8

Connecting new cable harness to the overcurrent release



1 Connect cable terminals X8-11 and X8-12 to terminals 11 and 12 on the connector X8
2 Plug connector to X24
3 Fasten the cables with the cable ties (→ page 9 – 57)
4 Connect plug with N CT in circuit-breaker

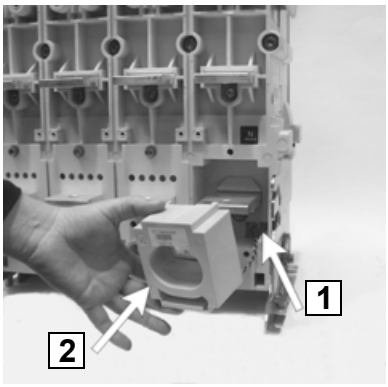
Removing rear cover of neutral CT compartment

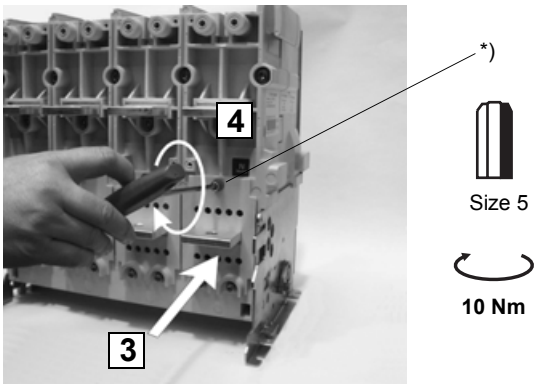



Size 5

1 Remove screws
2 Take off the rear cover

Inserting neutral CT





1 Push the CT terminal plug into the cable duct
2 Insert CT
3 Replace rear cover of CT compartment
4 Fasten the screws

***) Self-tapping screw only 5 Nm**

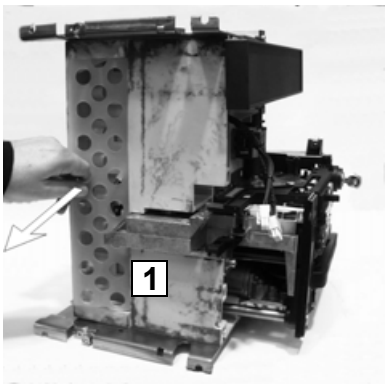
CAUTION

When using self-tapping screws don´t damage the screw thread!

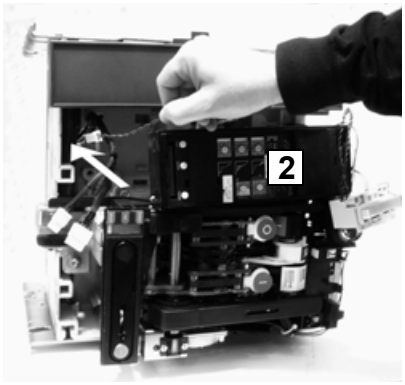
Insert the screws as follows:
– Insert screw
– turn by hand anti-clockwise until the screw-thread is found
– screw in
– using torque wrench fix to 5 Nm.

Connecting the neutral CT

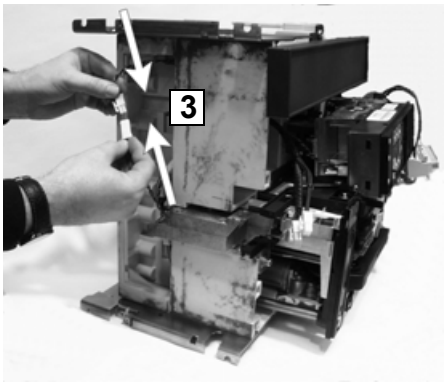
Lay the circuit-breaker on its right side



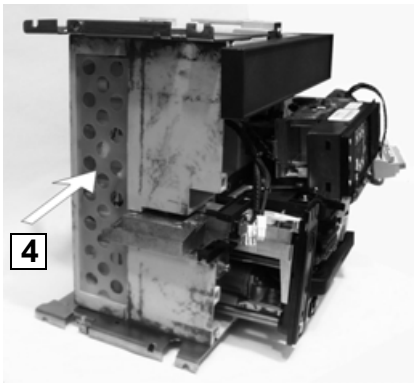
1 Remove cover of cable duct



2 Place the overcurrent release suitably and push the free connector of the cable harness into the cable duct



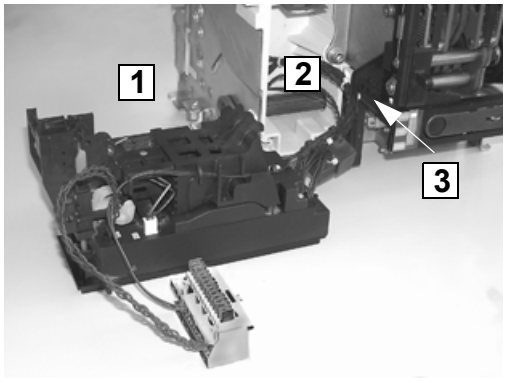
3 Plug the connector of the cable harness into the connector of the neutral CT



4 Place the joined connectors in the cable duct and replace the cover on the cable duct

Connection on overcurrent trip plug

Fix the overcurrent release and place the circuit-breaker upright



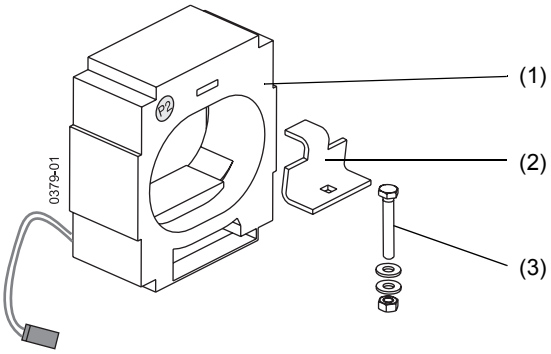
1 Place the overcurrent release in front of the circuit-breaker as shown
2 Plug the connectors to X20 and X21
3 Fasten the cables with the binders

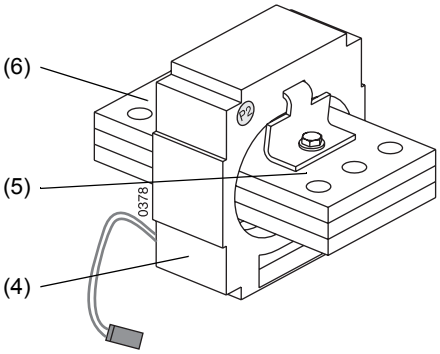
Then:

– Remount the overcurrent release (→ page 9 – 39)
– Install front panel (→ page 24 – 13)
– Install the fixed-mounted circuit-breaker (→ page 5 – 1) or place the circuit-breaker in the withdrawable unit and rack into connected position (→ page 6 – 1)

9.3.2 External current transformer for neutral conductor

Note
The secondary connection cables from neutral CT to circuit-breaker must be twisted!



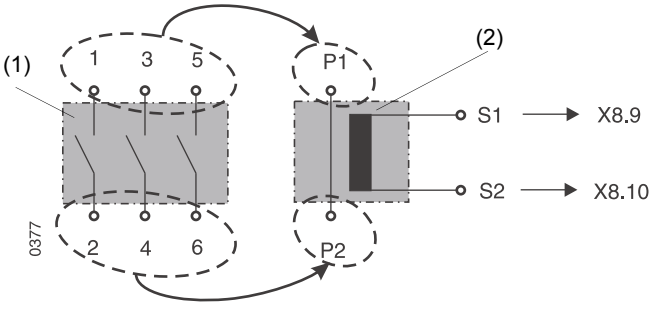


(1) Version for copper bar on switchboard side
(2) Mounting bracket
(3) Bolt M6 with washer and nut
(4) Version with copper connection pieces
(5) Terminal P2
(6) Terminal P1

→ Dimension drawings (page 7 – 14)

Terminal assignment

Remove the bridge X8.9 - X8.10



(1) Power circuit
(2) External sensor for neutral

This arrangement ensures the same direction of the current flow for the circuit-breaker and the external neutral CT.

Ring-type transformer	Part no.
IZM…1-…	IZM1-XW
IZM…2-…	IZM2-XW
IZM…3-…	IZM3-XW

Transformers with copper connection	Part no.
IZM…1-…	IZM1-XWC
IZM…2-…	IZM2-XWC
IZM…3-…	IZM3-XWC

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area).
→ (page 5 – 16)

9.3.3 Voltage transformers

Voltage transformers are necessary for voltage measuring by the metering function.

The voltage transformers from serial number 980102XXXXXX have an internal primary and secondary star-point.

The voltage transformers can be snapped onto a standard 35 mm tophat rail inside the switchboard. Horizontal or vertical mounting is possible.

When vertical mounted an end stop stops the voltage transformer from slipping onto the bars.

The accuracy of the voltage transformer is dependant upon the number of connected measuring functions per voltage transformer :

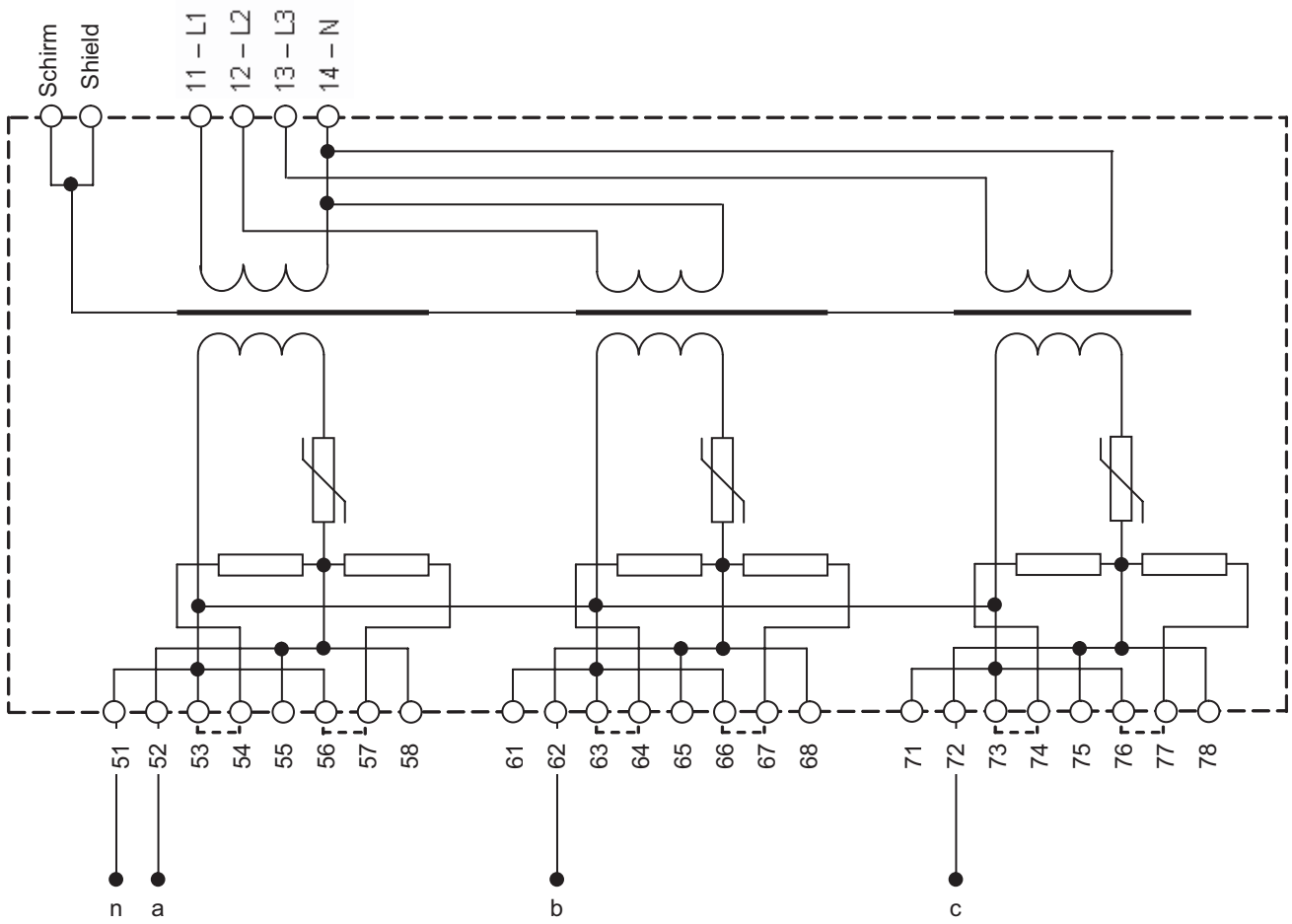
– Class 0.5for 1 - 3 measuring functions
– Class 3for 4 - 6 measuring functions

This data is applicable for ambient temperatures from 30 - 50 °C and a primary voltage from 80 - 120 % U_n for a duration of one year.

CAUTION

Before performing insulation tests in the switchboard the primaries of the voltage transformers must be disconnected from the power supply.

Wiring diagram



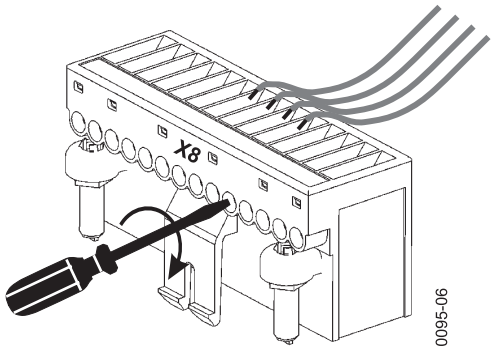
Voltage transformer type: IZM-XW380-690AC

Designation Voltage (conductor-conductor) 380 – 690 V AC	**Primary** Terminal	**Secondary** Terminal
Phase L1	11	52
Phase L2	12	62
Phase L3	13	72
N	14	51, 61, 71
Screen[1)]	S	

1) Connect the screen of the voltage transformer to the earth point (PE potential) of the switchboard (minimum cross section = 2.5 mm²)

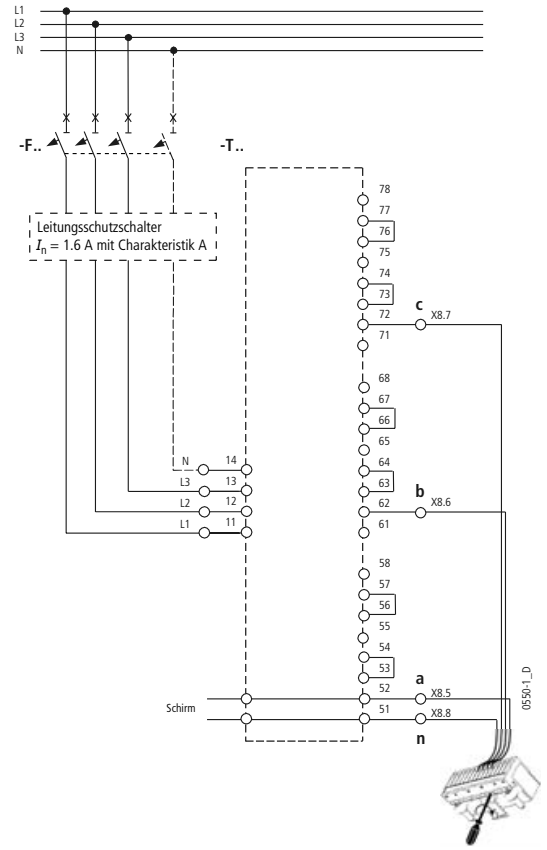
Number of measuring functions	**Phase L1/a** bridge	**Phase L2/b** bridge	**Phase L3/c** bridge
1	53 – 54 56 – 57	63 – 64 66 – 67	73 – 74 76 – 77
2	56 – 57	66 – 67	76 – 77
3 – 6	–	–	–

Connection to IZM

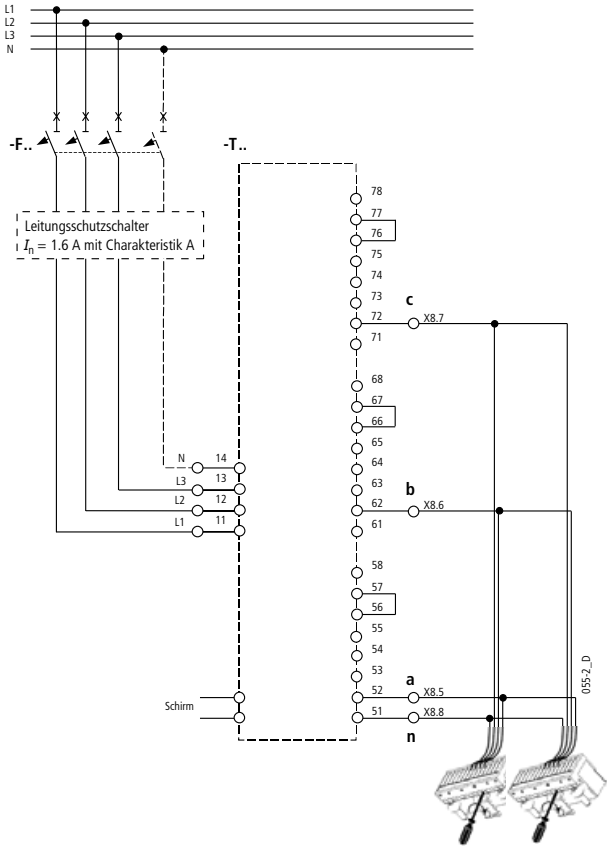


X8.5: Phase L1/a
X8.6: Phase L2/b
X8.7: Phase L3/c
X8.8: N/n

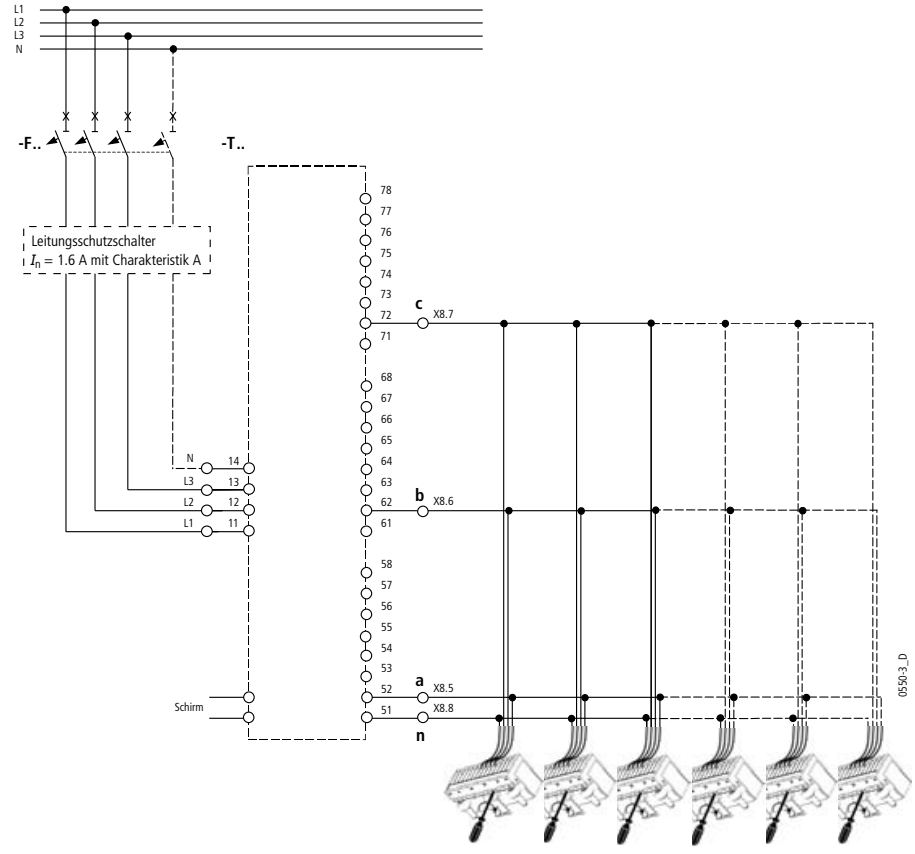
Connection examples



1 × measuring function: primary (L-L) 380 V … 690 V AC
secondary connection one measuring function



2 × measuring functions: primary (L-L) 380 V … 690 V AC
secondary connection two measuring functions



3 – 6 × measuring functions: primary (L-L) 380 V … 690 V AC
secondary connection from three to six measuring functions

Parameterizing the metering function

The measuring functions must be subsequently parameterised via the overcurrent release on the voltage transformer input voltage 400V with primary star-switching.

The parameterisation can be via :

– the graphic display (digital release IZM..D)
– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software

Via CHANGE PARAMETER / System Config. / voltage CT the following data of the voltage CT must be entered:

– Primary 400 V (default setting)
– Secondary 100 V (default setting)
– Star switching (default setting)

Via CHANGE PARAMETER / System Config. / power flow must be entered:

– Top to bottom (default setting)

or

– bottom to top

Via CHANGE PARAMETER / System Config. / phase rotation must be entered:

– L1 - L2 - L3 (default setting)

or

– L1 - L3 - L2

Customer orders for voltage transformers

Ordering by customers is possible when the following conditions apply:

– Rated output voltage 100 V…120 V
– Output load with 100 k for each connected measuring function
– For a measuring accuracy of 1% class 0.5 transformers are necessary

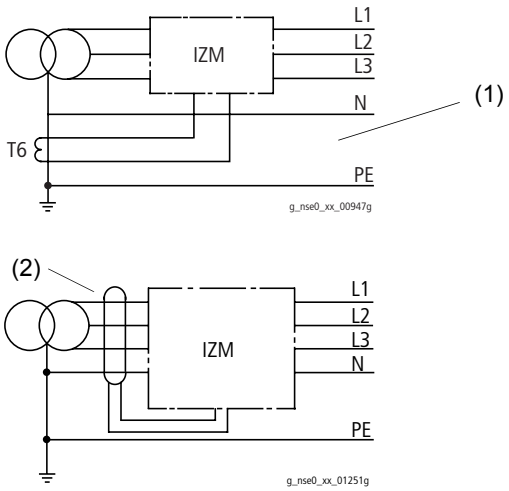
The voltage transformers have to be wired according to circuit examples (→ page 9 – 71) and protected both on the primary and the secondary side.

9.3.4 External summation transformer

To guarantee the protection function from impermissable earth-fault currents a standard external voltage transformer with the following characteristics can be used:

– Primary rated current: 1200A
– Secondary rated current: 1A
– Accuracy: class 1
– Internal switching load: 0.11 Ohm

Example

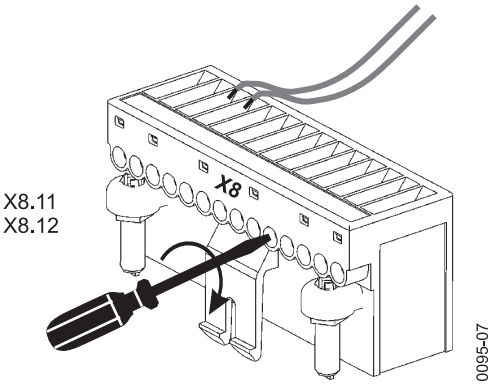


(1) 3 pole circuit-breaker with current transformer in the earthed star-point of the transformer.
(2) 4 pole circuit-breaker with core-balance current transformer

Connection

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area).
→ (page 5 – 16)



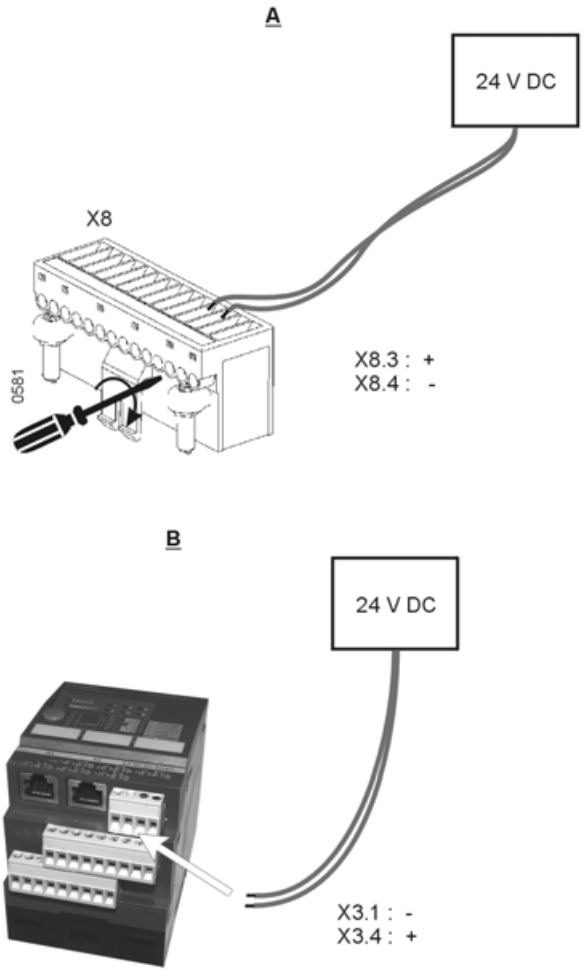
9.4 External supply voltage

The basic functions of the electronic overcurrent releases do not require auxiliary power supply.

Should further functions of the overcurrent releases XZMU and XZMD be used that require a data exchange over the internal system bus, an external 24 V DC power supply must be connected.

Connection

Version **A**: connection to the plug X8 (prefered version)
Version **B**: connection to any expansion module



Requirements

The external voltage supply with 24 V DC must comply at least with the requirements of EN 61204.

To supply a circuit-breaker equiped with the maximum number of external expansion modules the power supply shown below can be used.

When using voltage supply units from other manufacturers, the following conditions must be fulfilled:

– Primary-switched-mode power supply unit

– 24 V DC, ±3 %

– Current rating: 5 A per circuit-breaker with the maximum number of external expansion modules possible

Article number

	Part no.
Power supply input: AC 110/240 V, output 24 V DC/5 A	SN3-050-BU8

CAUTION

The external power supply, used for electronic components, shall not be used to supply the motor operating mechanism!

	Max. continuous current mA	**Max. starting current mA**
Current consumption for the communication module		
Release XZMU	120	2000
Release XZMD	170	2000
Measuring function XMP or XMH	120	120
Breaker Status Sensor XBSS	40	110
Communication module XCOM-DP	125	280
ZSI-module	50	125
Digital output module with rotary coding switch, relay outputs	180	125
Digital output module, configurable, relay outputs	180	125
Analog output module	110	800
Digital input module	30	125
Parameterising device PG (E)	250	350

9.5 Parameter assignment module

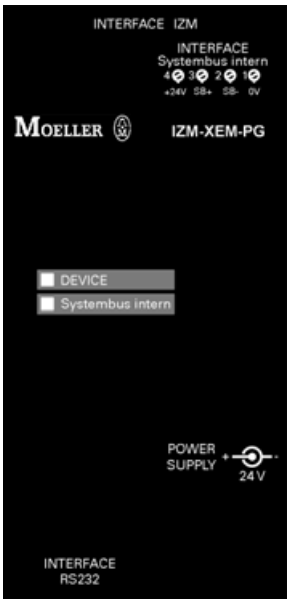
9.5.1 Application

The Parameter assignment module PG(E) makes it possible to parameterise, operate and observe the circuit-breaker without additional software by means of an input/output unit with browser features (e.g. a notebook). The only system requirement is a standard Browser with JAVA 2 Virtual Machine. After the connection of the parameter assignment module to the circuit-breaker the browser is loaded with the website of the parameter assignment module and the circuit-breaker. This is possible for circuit-breakers equipped with overcurrent releases of the part nos XZMU and XZMD. On the overcurrent release XZMU, however, the basic protective functions cannot be parameterisd. These are adjusted with the rotary coding switches.

Communications with the electronic system of the circuit-breaker takes place through the internal system bus. For this purpose, the PG(E) can be optionally connected to the test socket of the overcurrent release, or – in case of longer stationary operation – to the last expansion module, and snapped on a 35-mm DIN-rail. The required connection cables are supplied with the unit.

Two PG(E) versions are available. Differently to the standard version the PGE contains additionally an Ethernet connection.

9.5.2 Design



9.5.3 Indications

LED	Indicator	Significance
DEVICE	Green	PG(E) in operation
	Yellow	PG(E) in test mode
	Red	PG(E) faulty
Internal system bus	Green	Connection to internal system bus available
	Red	Serious fault on the internal system bus; check connections and expansion modules
	Off	No connection to internal system bus

9.5.4 Connection versions

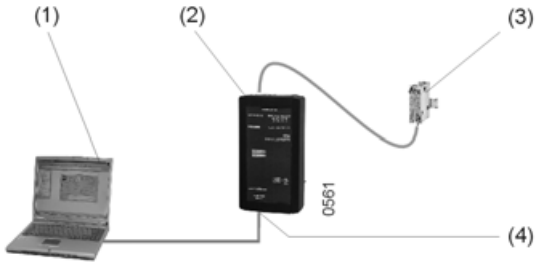
The PG(E) is connected in different ways according to the corresponding application.

Note

To avoid malfunctions, connect the voltage supply at last.

Offline mode

All circuit-breaker parameters can be entered and saved e.g. on a notebook, without the need to communicate with the circuit-breaker. When the connection to the circuit-breaker is established, this data can be transmitted and the circuit-breaker can be parameterized automatically.

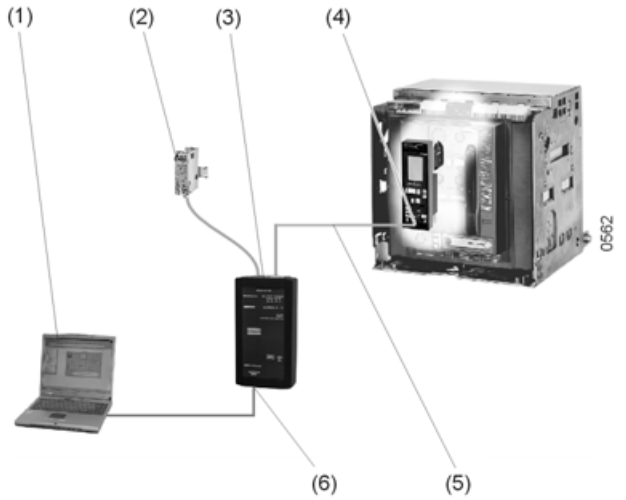


(1) Input/output unit with browser feature (e.g. notebook)
(2) PG or PGE
(3) Voltage supply 24 V DC
(4) RS232 interface

The power supply can be from a standard 24 V DC plug-in power supply with 5.5 mm jackplug (“Plus” pole in centre) and 500 mA rated load. The plug-in power supply must conform with SELV specifications.

Local operation

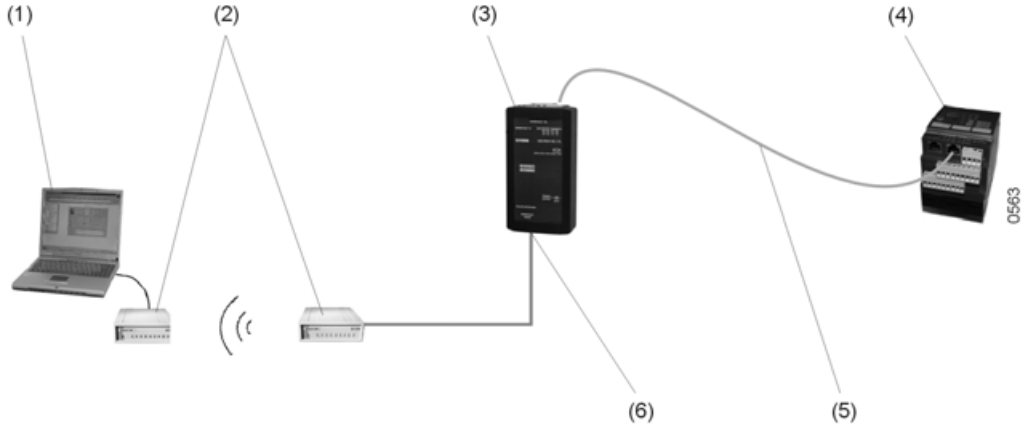
The circuit-breaker is parameterised directly on site. Furthermore, the parameter settings can be saved on the notebook, and the circuit-breaker diagnosis data can be read.



(1) Input/output unit with browser feature (e.g. notebook)
(2) Voltage supply 24 V DC, if there is no voltage supply via the internal system bus
(3) PG or PGE
(4) Test socket of the overcurrent release (40-pole)
(5) – Connection cable SUB-D, 15-pole (PG(E)) to SUB-D, 40-pole (test socket of overcurrent release) or
– connection cable from overcurrent release Ser. No. 02 SUB-D 15 pole (PG(E)) on plug connector 40 pole
(6) RS232 interface SUB-D, 9-pole

Remote access via modem

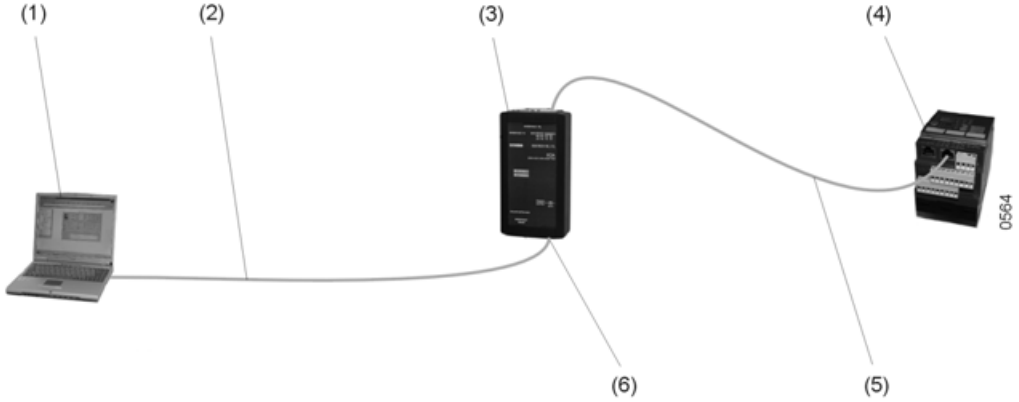
The circuit-breaker data including parameterisation can be accessed from any remote location.



(1) Input/output unit with browser feature (e.g. notebook)
(2) Modem
(3) PG or PGE
(4) External expansion module
(5) Connection cable SUB-D, 15-pole (PG(E)) to RJ45 western plug (connection internal system bus)
(6) RS232 interface SUB-D, 9-pole

Remote access via Ethernet

The circuit-breaker data including parameterization is accessed via the customer-side Ethernet. This connection is only possible with the parameter assignment module PGE.



(1) Input/output unit with browser feature (e.g. notebook)
(2) Ethernet cable
(3) PGE
(4) External expansion module
(5) Connection cable SUB-D, 15-pole (PG(E)) to RJ45 western plug (connection internal system bus)
(6) Ethernet connection

9.5.5 Power supply

The PG(E) requires a voltage supply of 24 V DC. This can be applied through:

– A separate normal plug-in power supply unit (→ page 9 – 74) or
– the internal system bus with the external voltage supply of the circuit-breaker electronics

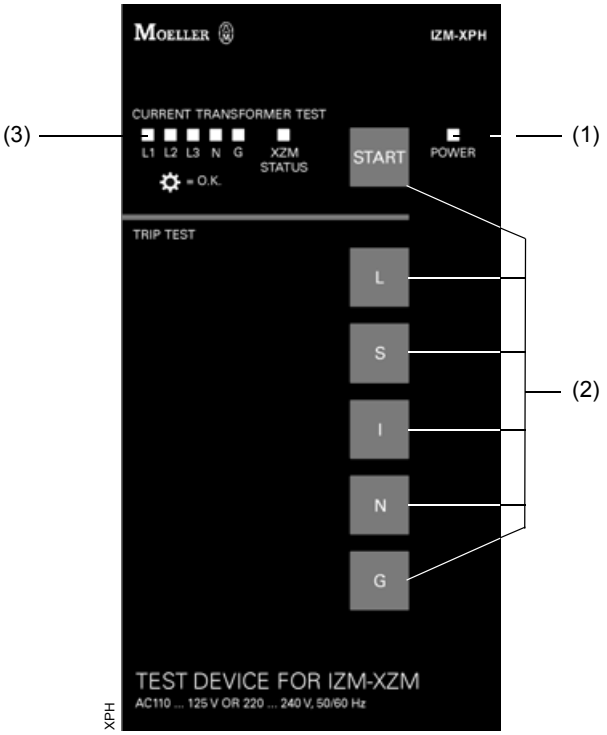
9.5.6 Article numbers

	Part no.
Parameter assignment module	IZM-XEM-PG
Parameter assignment module with Ethernet interface	IZM-XEM-PGE

9.6 Hand-held test unit IZM-XPH for electronic overcurrent release

The hand-held test unit can be used to check the correct functioning of the overcurrent release, the power and current transformers, the release coil F5 and the measured value indicator.

9.6.1 Design



(1) LED for operating voltage indication
(2) Control buttons
(3) 6 LEDs to show test results

9.6.2 Preparations

– Switch off and isolate the circuit-breaker
– Note the setting values of the overload release
– Earth-fault protection, trips when present using the overcurrent release (I_g = OFF)
– Setting $I_{r = 1.0\ In}$
– Interrupt external voltage supply for the electronic system if present (connections X8: 3,4)
– Remove cover from the test socket X25 of the XZM.

	CAUTION
⚠	The hand-held test unit is designed for testing an overcurrent release in an inactive state on the IZM circuit-breaker. An overcurrent release cannot be tested without circuit-breaker/transformer/coil. An overcurrent release activated by a current flow in the circuit-breaker or the internal system bus will also lead to incorrect results and in the worst case to destruction of the test device.

Note

When no N CT is connected to auxiliary plug X8: 9/10 the terminals 9/10 must be bridged!
(→ page 8 – 1)

9.6.3 Environmental conditions according to DIN-EN 61010-01 and IEC 61010-01

Qualified Person

For the purpose of this operating manual, a „qualified person“ is one who is familiar with the installation, construction and operation of the equipment and the hazards involved.
In addition, he has the following qualifications:

– Is trained and authorized to energize, de-energize, clear, earth and tag circuits and equipment in accordance with established safety practices.
– Is trained in the proper care and use of protective equipment in accordance with established safety practices.
– Is trained in rendering first aid.

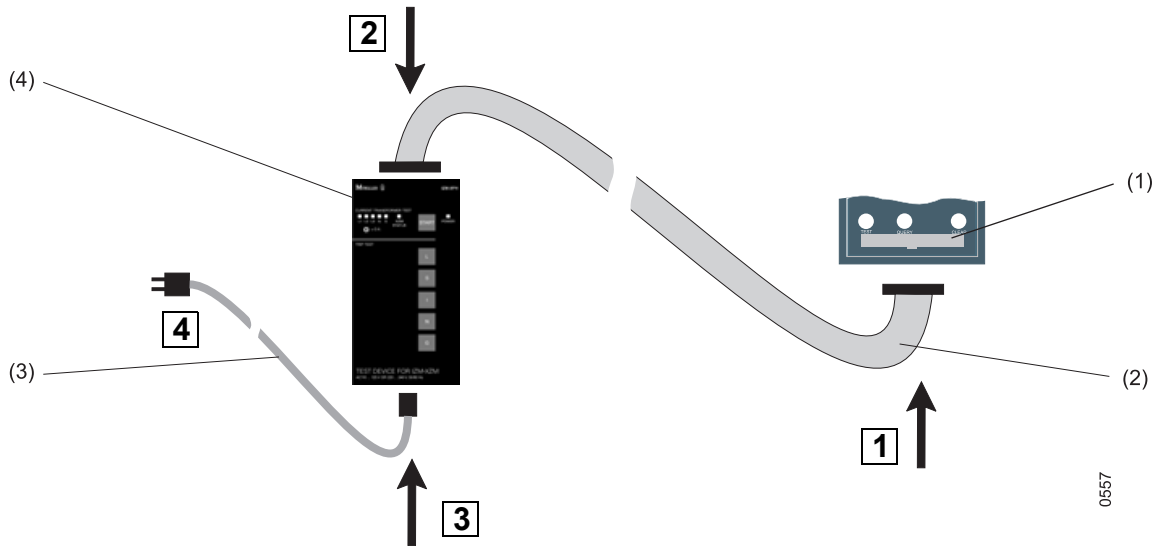
The hend-held test unit is suited for operation in enclosed spaces.

The following conditions must be observed:

– Environmental conditions in accordance to DIN EN 61010-01 1.4.1 and IEC 61010-01 1.4.1
– Variation of mains voltage ≤ 10%
– Impulse-withstand-voltage corresponding to overvoltage-category II (EC 60364-4-44)
– Pollution degree 2
– Clean with a damp, soft cloth only, no solvents, no detergents

9.6.4 Connection

ATTENTION
Please observe the connecting sequence! Otherwise there may be false tripping and false test results. Check connectors for proper assembly.



(1) Test socket at the overcurrent release
(2) – SUB-D 40-pole (hand held test unit) to socket connector, 40-pole
or
– from overcurrent release Ser. No. 02, SUB-D, 40 pole (hand held test unit) on plug connector 40 pole
(3) Voltage supply
(4) Hand-held test unit

9.6.5 Power supply

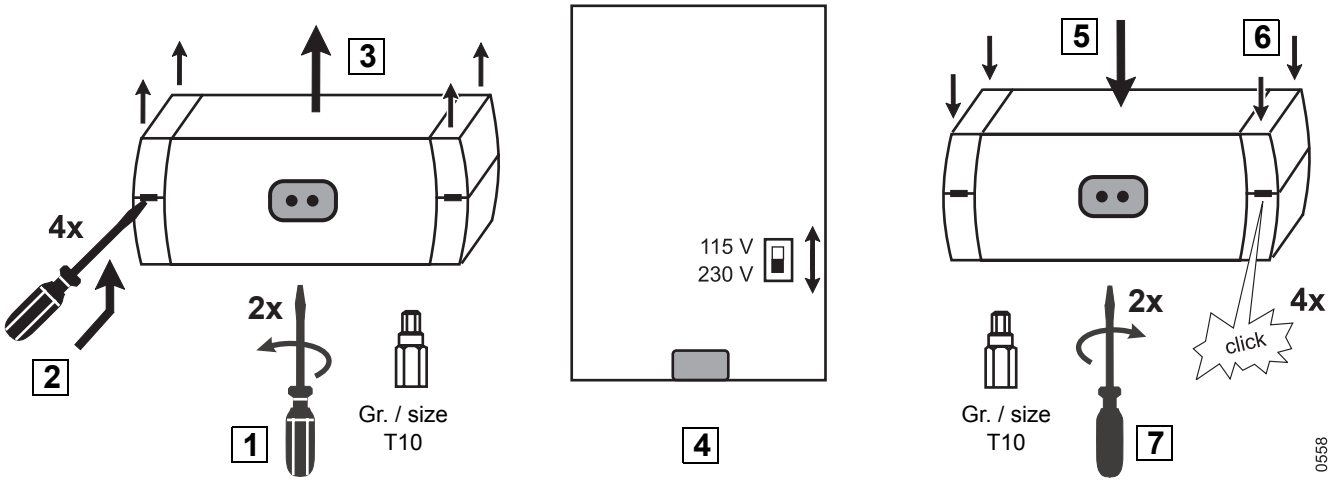
The hand-held test unit can be supplied by an AC power supply 220 – 240 V or 110 – 125 V, 50/60 Hz. Ex-factory setting is 220 – 240 V. The changeover switch is located on the printed circuit board inside the test device.

Provided fuse: 250 mA slow/250 V
This fuse should be used at both primary- voltages.

	Note
	After mains voltage reconnection update the labels, using a white and indelible ink pen!

9.6.6 Mains voltage reconnection

	Danger
	**Dangerous electrical voltage!** **Can cause death or serious personal injury as well as damage to device and equipment.** Disconnect power before opening this device. Therefor disconnect feeder!



9.6.7 Operation

The status test starts immediately after connecting the voltage supply, inquiring various components and parameters of the overcurrent release. When the status test is successful “XZM STATUS” LED shows continuously. Otherwise the overload release or one of it´s components (e.g. rating plug) is faulty or missing. Then the “XZM” LED flashes. From the type of flashing the cause of the fault can be seen.

Indicator	Significance
1 x short, pause	Test device faulty
2 x short, pause	Overload release faulty
3 x short, pause	Type of overload release not identified
4 x short, pause	– Parameter not correctly set – Current transformer not correctly connected – Incorrect rating plug – Rating plug missing
5 x short, pause	– Release coil F5 not correctly connected or faulty

The status test can be repeated at any time by pressing the “START” button for more than 3 seconds. It is also possible to test already activated overcurrent releases, e.g. one that is powered from an external power supply. It should be noted that it is possible that the "XZM STATUS" could flash twice without there being a fault. As double check the status check should be redone with the overcurrent release´s external power supply switched off.

Note

The status check cannot be carried out with an overcurrent release of type XZMV/XZMV+XT/XZMA with an identity number lower as 253030xxxxxx / 273030xxxxxx / 150704xxxxxx.

The status check for this type can be jumped over by pressing the “L” button for approx. 3 seconds when the power supply is connected to the test device. In this case the correct functioning of the overcurrent release must be checked before starting further checks with the test device, e.g. by the function “activation of the overcurrent release” and checking the LED indication on the overcurrent release.

Testing the transformer

To check the current and power transformer press quickly (less than 2 s.) the “START” button.

START

A LED confirms the correct function of the respective transformer. If an LED flashes, the corresponding transformer is not available, not properly connected or defective.

Energy-transformers within CT’s will be tested "OK", if within the limits of 3,5 - 12 ohms and with an inductance above 300 mH. External earth-fault-CT’s within the limits of 2,5 - 11 ohms and inductance above 500 mH will be tested similarly.

The lenght of the testing-period necessary may reach 65 sec.

Result of N CT test
(with overcurrent release Ser. No. 02)

One flash (1s on, 1s off) signals a fault in the N measuring CT area. The cause is either a faulty measuring CT (e.g. external N conductor - CT connected) a faulty connection or a defect measuring CT.

A fast flash (0.5 s on, 0.5 s off) signals a fault in the N power CT area. Cause is either a faulty CT (e.g. by connection of an external CT), a faulty connection to power CT or a defect power CT.

Testing the tripping function

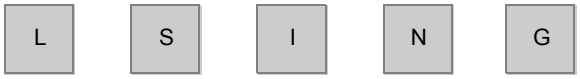
Note

Overcurrent release of the type XZMV or XZMV+XT with an identity number lower than 250205xxxxxx or 270206xxxxxx react only to the checking of the L tripping.

– Charge the storage spring by hand
– Switch on

To test the tripping function, press one of the buttons “L”, “S”, “I”, “N” or “G”.

The test of tripping function will fail, if the coreesponding protective funtions of the overcurrent release is not activated or available.



The circuit-breaker trips after the set time delay plus 2 seconds. The tripping reason can be inquired through the “PROTOCOL” button at the overcurrent release. The trip cause storage function is available only, if the overcurrent release had been activated for least 10 min before tripping. Otherwise, the overcurrent release doesn't have the corresponding protective function or is defective.

Testing the measured value indication

After a tripping test is carried out the function of the memory capability should be checked for non-activated overcurrent releases using the "PROTOCOL" button.

Press the “I” and “N” buttons at the same time to check the measure value indication in the display or by remote transmission.

For 30 s a current will be simulated in L1, L2, L3, N and G via the measuring CT. The LED of the appropriate CT will flash. The test is successful when current is shown on the appropriate position.

Activating the overload releases

To activate the overcurrent releases press the “N” and “G” buttons at the same time.

Until another button is pressed the overcurrent release stays activated.

With this function, for example, the “Error” LED can be checked when the status test with the error “overcurrent release faulty” is finished.

9.6.8 Follow-up work

– Reset noted set values
– Replace X25 cover (test socket overcurrent release)

9.6.9 Article numbers

	Type (Article no.)
Hand-held test unit	IZM-XPH (226018)