SIEMENS

3WL1 Air Circuit Breakers

SENTRON

Configu-
ration
Manual

Edition
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siemens.com/lowvoltage

3WL1 Air Circuit Breakers

All dimensions in mm.

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Technical data

Introduction

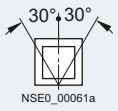
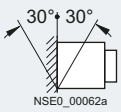
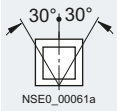
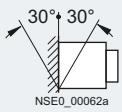
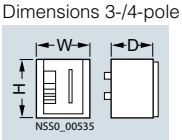
Overview


Size I


Size II


Size III

3WL air circuit breakers

			3WL1 air circuit breakers/non-automatic air circuit breakers up to 6300 A (AC), IEC				3WL1 non-automatic air circuit breakers up to 4000 A (DC)	
Size			I, II, III				I	II
Rated current I_n		A	630, 800, 1000, 1250, 1600, 2000, 2500, 3200, 4000, 5000, 6300				2000	1000, 2000, 4000
Number of poles			3-pole, 4-pole				4-pole	3-pole, 4-pole
Rated operational voltage U_e		V AC V DC	... 690/1000/1150 --				-- ... 1000	
Rated ultimate short-circuit breaking capacity at 500 V AC		kA	Size I 55/66/85	Size II 66/80/100	Size II 130	Size III 100/150 (3-pole), 130 (4-pole)	20 (at ≤ 1000 V DC)	30/25/20 (at 300/600/1000 V DC)
Endurance	Operating cycles		Up to 20000	15000	10000	10000	15000	
Mounting position			 NSE0_00061a	 NSE0_00062a			 NSE0_00061a	 NSE0_00062a
Degree of protection With cover Without cover (with door sealing frame)			IP55 IP41				IP55 IP41	
Dimensions 3-/4-pole		W mm	320/410	460/590	460/590	704/914	410	460/590
 NSS0_00535	Fixed	H mm D mm	434 291	434 291	434 291	434 291	434 291	434 291
	With-drawable	H mm D mm	465.5 471	465.5 471	465.5 471	465.5 471	-- --	465.5 471


NSE0_01106a


NSE0_01107a


NSE0_01108a


NSE0_01109a


NSE0_01111a

Electronic Trip Units for 3WL circuit breakers

Type	ETU15B[1)]	ETU25B	ETU27B		ETU45B	ETU76B
Overload protection	✓	✓	✓		✓	✓
Short-time delayed short-circuit protection	--	✓	✓		✓	✓
Instantaneous short-circuit protection	✓	✓	✓		✓	✓
Neutral conductor protection	--	--	✓		✓	✓
Ground-fault protection	--	--	✓		❑	❑
Zone Selective Interlocking	--	--	--		❑	❑
LCD, 4-line	--	--	--		❑	--
LCD, graphic	--	--	--		--	✓
Communication	--	--	--		❑	❑
Metering function *Plus*	--	--	--		❑	❑
Selectable parameter sets	--	--	--		--	✓
Parameters freely programmable	--	--	--		--	✓
CubicleBUS	--	--	--		✓	✓

✓ Standard
-- Not available
❑ Optional

1) ETU15B cannot be used with 3WL circuit breakers, size III.

3WL air circuit breakers/non-automatic air circuit breakers according to UL 489 up to 5000 A, see Catalog LV 16.

Breaking capacity

Size		I			II				III		
Type		3WL11			3WL12				3WL13		
Breaking capacity		N (N)	S (S)	H (H)	N (N)	S (S)	H (H)	C (C)	H (H)	C 3-pole (C)	C 4-pole (C)
Rated short-circuit breaking capacity											
Rated operational voltage U_e up to 415 V AC											
I_{cu}	kA	55	66	85	66	80	100	130	100	150	130
I_{cs}	kA	55	66	85	66	80	100	130	100	150	130
I_{cm}	kA	121	145	187	145	176	220	286	220	330	286
Rated operational voltage U_e up to 500 V AC											
I_{cu}	kA	55	66	85	66	80	100	130	100	150	130
I_{cs}	kA	55	66	85	66	80	100	130	100	150	130
I_{cm}	kA	121	145	187	145	176	220	286	220	330	286
Rated operational voltage U_e up to 690 V AC											
I_{cu}	kA	42	50	66	50	75	85	100	85	150	130
I_{cs}	kA	42	50	66	50	75	85	100	85	150	130
I_{cm}	kA	88	105	145	105	165	187	220	187	330	286
Rated operational voltage U_e up to 1000 V/1150 V AC											
I_{cu}	kA	--	--	50[9]	--	--	50	--	50	70[4]	70[4]
I_{cs}	kA	--	--	50[9]	--	--	50	--	50	70[4]	70[4]
I_{cm}	kA	--	--	105[9]	--	--	105	--	105	154[4]	154[4]
Rated short-time withstand current I_{cw} of the circuit breakers[3]											
0.5 s	kA	55	66	75	66	80	100	100	100	100	100
1 s	kA	42	50	66	55	66	85	100	100	100	100
2 s	kA	29.5	35	46	39	46	65[1]/70[2]	70	80	80	80
3 s	kA	24	29	44	32	44	50[1]/65[2]	65	65	65	65
Rated conditional short-circuit current I_{cc} of the non-automatic air circuit breakers											
Up to 500 V AC	kA	55	66	75	66	80	100	130	100	100	100
Up to 690 V AC	kA	42	50	66	50	75	85	100	85	100	100
Up to 1000 V/1150 V AC	kA	--	--	50[9]	--	--	50[4]	--	50[10]	70[4]	70[4]

Size		I (DC)	II (DC)
Type		3WL11	3WL12
Breaking capacity		DC	DC
Rated short-circuit breaking capacity			
Up to 220 V DC I_{cc}	kA	20	35
Up to 300 V DC I_{cc}	kA	20	30
Up to 600 V DC I_{cc}	kA	20	25
Up to 1000 V DC I_{cc}	kA	20	20
Rated short-time withstand current I_{cw}			
0.5 s	kA	--	--
1 s	kA	20	35[5]/30[6]/25[7]/20[8]
2 s	kA	--	--
3 s	kA	--	--

(N) Circuit breakers with ECO breaking capacity N

(S) Circuit breakers with standard breaking capacity S

(H) Circuit breakers with high breaking capacity H

(C) Circuit breakers with very high breaking capacity C

(DC) Non-automatic air circuit breakers with DC breaking capacity

These breaking capacities are indicated in the corresponding tables by the symbols shown on orange backgrounds.

1) Size II with $I_{n\,max} \leq 2500$ A.

2) Size II with $I_{n\,max} = 3200$ A and $I_{n\,max} = 4000$ A.

3) At a rated voltage of ≥ 690 V, the I_{cw} value of the circuit breaker cannot be greater than the I_{cu} or I_{cs} value at 690 V.

4) Rated operational voltage $U_e = 1150$ V.

5) At $U_e = 220$ V DC

6) At $U_e = 300$ V DC

7) At $U_e = 600$ V DC

8) At $U_e = 1000$ V DC

9) Values also apply to 690 V + 20% version with Z option "A16".

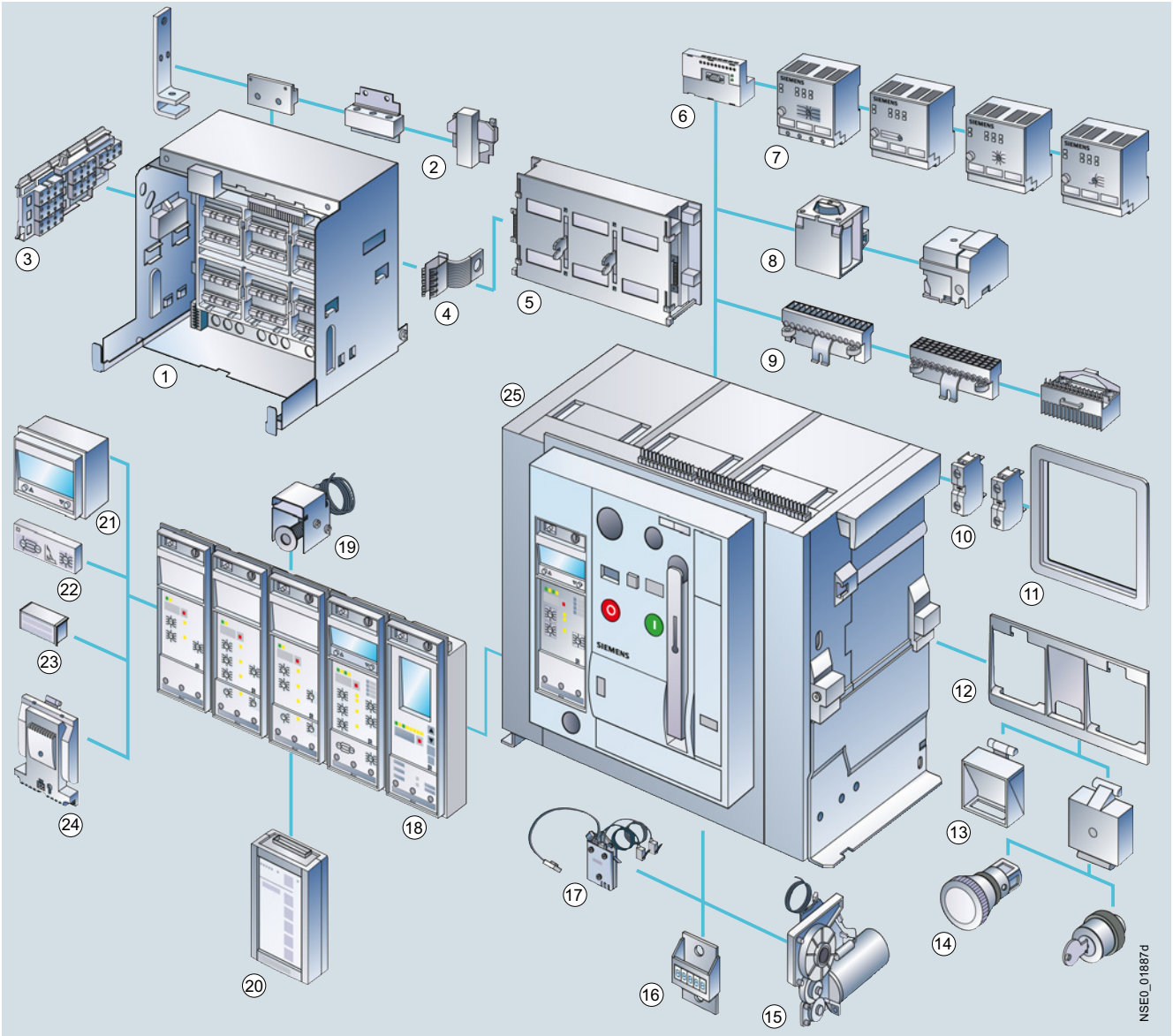
10) Rated operational voltage $U_e = 1000$ V.

Abbreviations* (functions)	English long text	Explanation
L	Long Time Delay	Overload protection
S	Short Time Delay	Short-circuit protection (short-time delayed)
I	Instantaneous	Short-circuit protection (instantaneous)
N	Neutral Protection	Neutral conductor protection
G	Ground Fault	Ground-fault protection

* Designations according to IEC 60947-2, Annex K.

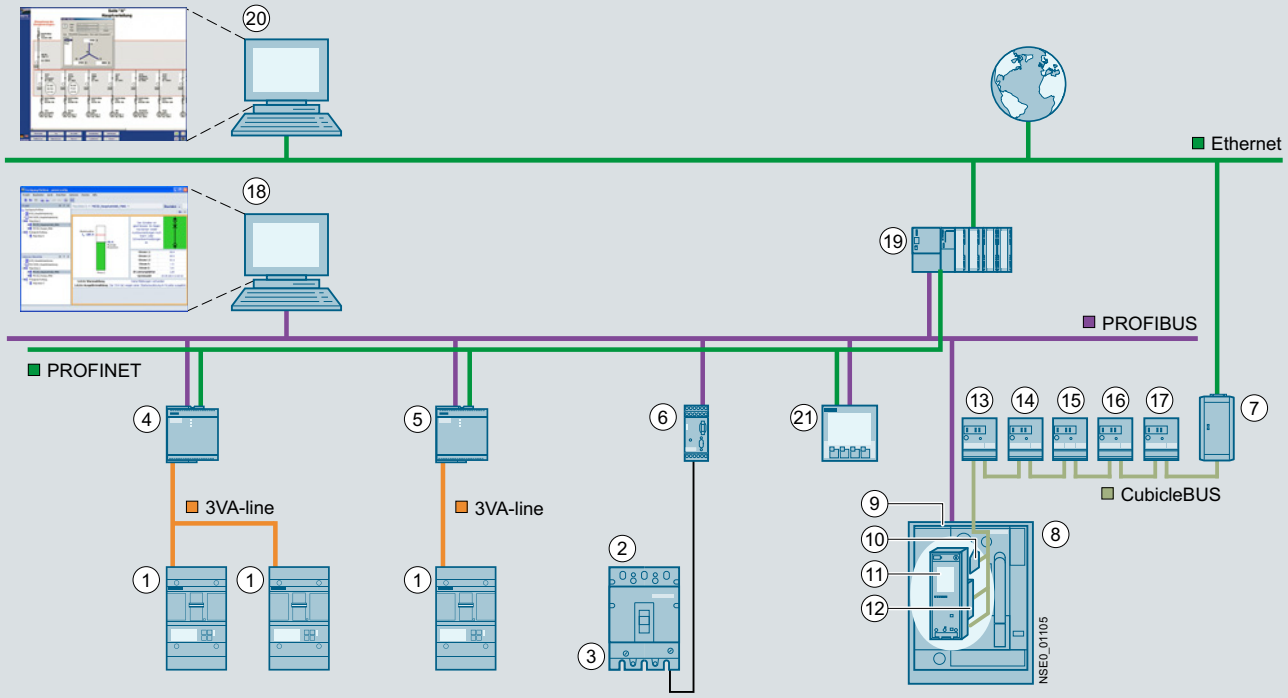
Introduction

3WL1 air circuit breakers:
3WL1 air circuit breakers offer highly flexible application and consistent communication capability. With the 3WL1 circuit breakers, just three sizes cover a performance range of 630 A to 6300 A. All models are characterized by the same design, the same operation and the same comprehensive accessories.



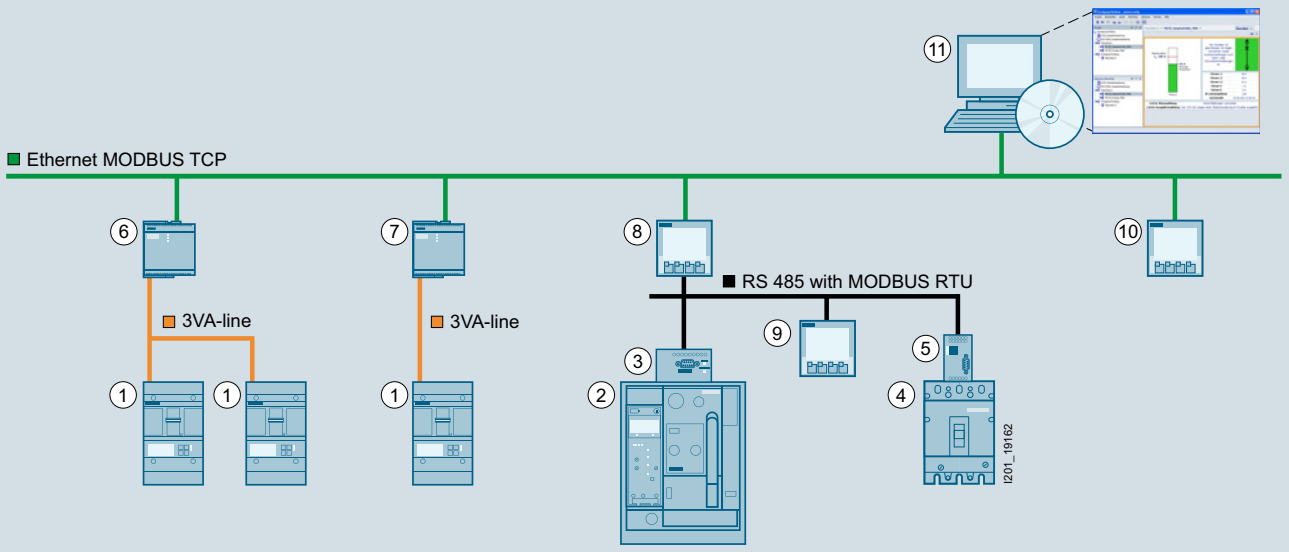
① Guide frame
② Main circuit connection front, flange, horizontal, vertical
③ Position signaling switch
④ Grounding connection, leading
⑤ Shutters
⑥ COM15 PROFIBUS module or COM16 MODBUS module
⑦ External **Cubicle**BUS modules
⑧ Closing coil, auxiliary release
⑨ Auxiliary conductor plug-in system
⑩ Auxiliary switch block
⑪ Door sealing frame
⑫ Interlocking set for mechanical ON/OFF
⑬ Transparent panel, function insert
⑭ EMERGENCY STOP pushbutton, key operated
⑮ Motorized operating mechanism
⑯ Operating cycles counter
⑰ Breaker Status Sensor (BSS)
⑱ Protective device with device holder, Electronic Trip Unit (ETU)
⑲ Remote reset solenoid
⑳ Breaker Data Adapter (BDA *Plus*)
㉑ Four-line display
㉒ Ground-fault protection module
㉓ Rating plug
㉔ Metering function module
㉕ Air circuit breaker

Communication-capable circuit breakers (with ETU45B or ETU76B Electronic Trip Unit)



1. 3VA molded case circuit breakers
2. 3VL molded case circuit breaker
3. Electronic Trip Unit ETU / LCD ETU
4. COM800 breaker data server
5. COM100 breaker data server
6. COM20 Release 2 PROFIBUS module including Zone Selective Interlocking
7. BDA *Plus* with Ethernet interface
8. 3WL air circuit breaker
9. COM15 PROFIBUS module
10. Breaker Status Sensor (BSS)
11. Electronic Trip Unit (ETU)
12. Metering function *Plus*
13. Zone Selective Interlocking module
14. Digital output module with relay contacts
15. Digital output module with relay contacts, configurable
16. Analog output module
17. Digital input module
18. Powerconfig commissioning and service software V2.3 and higher
19. PLC, e.g. SIMATIC S7
20. E.g. SIMATIC powerrate
21. 7KM PAC measuring devices

Introduction



1 3VA molded case circuit breakers
2 3WL air circuit breaker
3 COM16 MODBUS module
4 3VL molded case circuit breaker
5 COM21 MODBUS module
6 COM800 breaker data server
7 COM100 breaker data server
8 7KM PAC4200 measuring device
9 7KM PAC3100 measuring device
10 7KM PAC3200 measuring device
11 Powerconfig commissioning and service software V2.3 and higher

Characteristics

- Coordinated communication concept using the PROFIBUS DP or MODBUS, ranging from 16 A to 6300 A with 3VL molded case circuit breakers and 3WL air circuit breakers
- The high level of modularity of circuit breakers and accessories allows easy retrofitting of all communication components
- Significant additional benefits for the switchboard due to the possibility of linking up external input and output modules to the circuit breaker-internal **Cubicle**BUS of the 3WL air circuit breaker
- Innovative software products for parameterization, operation, monitoring, and diagnostics of circuit breakers, both locally or via PROFIBUS DP, MODBUS or Ethernet/Intranet/Internet
- Complete integration of the circuit breakers into the Totally Integrated Power and Totally Integrated Automation solutions

Communication:

- For air circuit breakers with optional communication function (ETU45B or ETU76B Electronic Trip Units), see Catalog LV 10.
- For accessories, see Catalog LV 10.
- For more information, see also Catalog LV 10, chapters "Measuring Devices and Power Monitoring" and "Software".

Benefits

Low space requirements

The 3WL air circuit breakers require very little space. Size I devices (up to 2000 A) fit into a 400 mm wide switchboard panel. Size III devices (up to 6300 A) are the smallest of their kind and with their construction width of 704 mm fit into an 800 mm wide switchboard panel.

Modular design

Components such as auxiliary releases, motorized operating mechanisms, Electronic Trip Units, current sensors, auxiliary circuit signaling switches, automatic reset devices, interlocks and engagement operating mechanisms can all be exchanged or retrofitted at a later stage, thus allowing the circuit breaker to be adapted to new, changing requirements.

The main contact elements can all be replaced in order to increase the endurance of the circuit breaker.

Retrofittable modules for Electronic Trip Units

Modularity is one of the main features of the new 3WL air circuit breakers.
Special LCDs, ground-fault modules, rating plugs and communication modules for the Electronic Trip Units are available for fast and easy retrofitting and adaptation to changing requirements.

Communication/metering functions

The use of modern communication-capable circuit breakers opens up completely new possibilities in terms of start-up, parameterization, diagnostics, maintenance and operation. This allows many different ways of reducing costs and improving productivity in industrial plants, buildings and infrastructure projects to be achieved:

- Fast and reliable parameterization
- Timely information and response can prevent plant stoppages
- Effective diagnostics management
- Measured values are the basis for efficient load management, for drawing up power demand profiles and for allocating energy to cost centers
- Preventive maintenance reduces the risk of expensive plant downtimes
- Metering function with a very wide range of measured values, such as current, voltage, energy, power, etc.
- Can be used in 690 V networks

Application

- As incoming-feeder, distribution, tie, and outgoing-feeder circuit breakers in electrical installations.
- For switching and protecting motors, capacitors, generators, transformers, busbars and cables.

When connected to an electronic I&C system, the air circuit breakers offer a wide range of options for monitoring network events.

Air circuit breakers belong to the SENTRON product family of protection, switching, measuring and monitoring devices and can be used in applications between 16 A and 6300 A.

The AC devices are available as circuit breakers and non-automatic air circuit breakers. DC devices are only available as non-automatic air circuit breakers.

Standards

3WL air circuit breakers comply with:

- IEC 60947-2
- IEC 60947-2 Annex F / CISPR 11/22 Class B
- Climate-proof according to IEC 60068-2-30.

Versions with UL 489 also available, see Catalog LV 16.

Conductor cross-sections for AC

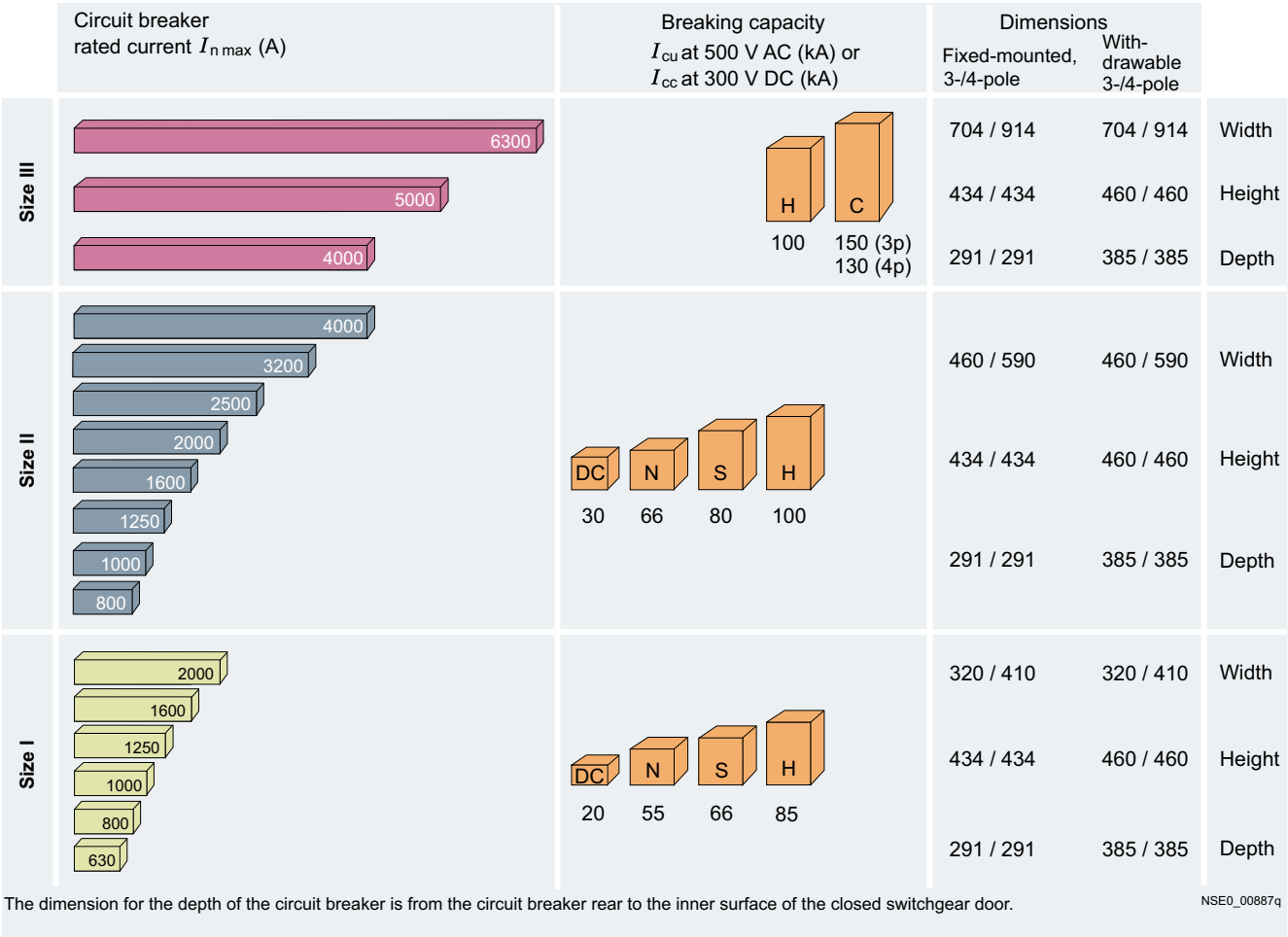
Size			**I**				**II**				
Type			**Up to 3WL11 10**	**3WL11 12**	**3WL11 16**	**3WL11 20**	**3WL12 08**	**3WL12 10**	**3WL12 12**	**3WL12 16**	**3WL12 20**
Permissible load for withdrawable versions at rear horizontal main circuit connections	• Up to 55 °C (Cu bare) • Up to 60 °C (Cu bare)[1] • Up to 70 °C (Cu painted black)[1]	A A A	1000 1000 1000	1250 1250 1210	1600 1600 1490[2]	2000 1930 1780	800 800 800	1000 1000 1000	1250 1250 1250	1600 1600 1600	2000 2000 2000
Main conductor minimum cross-sections	• Copper bars, bare	Unit(s) mm^2	1 × 60 × 10	2 × 40 × 10	2 × 50 × 10	3 × 50 × 10	1 × 50 × 10	1 × 60 × 10	2 × 40 × 10	2 × 50 × 10	3 × 50 × 10
	• Copper bars, painted black	Unit(s) mm^2	1 × 60 × 10	2 × 40 × 10	2 × 50 × 10	3 × 50 × 10	1 × 50 × 10	1 × 60 × 10	2 × 40 × 10	2 × 50 × 10	3 × 50 × 10

Size			**II**			**III**		
Type			**3WL12 25**	**3WL12 32**	**3WL12 40[3]**	**3WL13 40**	**3WL13 50**	**3WL13 63[3]**
Permissible load for withdrawable versions at rear horizontal main circuit connections	• Up to 55 °C (Cu bare) • Up to 60 °C (Cu bare)[1] • Up to 70 °C (Cu painted black)[1]	A A A	2500 2500 2280	3200 3020 2870	3950[4] 3810 3600	4000 4000 4000	5000 5000 5000	5920 5810 5500
Main conductor minimum cross-sections	• Copper bars, bare	Unit(s) mm^2	2 × 100 × 10	3 × 100 × 10	4 × 120 × 10	4 × 100 × 10	6 × 100 × 10	6 × 120 × 10
	• Copper bars, painted black	Unit(s) mm^2	2 × 100 × 10	3 × 100 × 10	4 × 100 × 10[5]	4 × 100 × 10	6 × 100 × 10	6 × 120 × 10

1) ETU76B with graphics display can be used up to max. 55 °C.
2) At breaking capacity H: 1600 A up to 70 °C
3) With rear vertical connections
4) Size II, 3-pole, in fixed-mounted version
5) Minimum main conductor cross-sections for 4-pole withdrawable circuit breakers: 4 × 120 mm × 10 mm

General data

Design



The dimension for the depth of the circuit breaker is from the circuit breaker rear to the inner surface of the closed switchgear door.

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Overview of 3WL circuit breakers/non-automatic air circuit breakers

Versions

- Rated currents: 630 A to 6300 A
- 3 sizes for different rated current ranges (see diagram above)
- 3 and 4-pole versions
- Rated operational voltage up to 690 V AC and 1000 V DC. Special versions up to 1000 V AC and 1150 V AC available
- 4 different breaking capacities from 55 kA to 150 kA for AC applications and one breaking capacity for DC applications

The 3WL circuit breakers are supplied complete with operating mechanism (manual operating mechanism with mechanical closing), Electronic Trip Unit and auxiliary switches (2 NO contacts + 2 NC contacts in the standard version), and can be equipped with auxiliary releases.

Installation methods

Fixed-mounted or withdrawable versions

Ambient temperatures

3WL circuit breakers are suitable for use in any climate in accordance with IEC 60068-2-30. They are intended for use in enclosed rooms in which no severe operating conditions (such as dust, caustic vapors, hazardous gases) prevail.

When installed in dusty and damp areas, suitable enclosures must be provided.

Coordinated dimensions

The dimensions of 3WL circuit breakers only differ in terms of the width of the device which depends on the number of poles and the size.

Due to the nature of the design, the dimensions of devices with a withdrawable version are determined by the dimensions of the guide frames, which are slightly larger.

Non-automatic air circuit breakers

One special version of circuit breaker is utilized as a non-automatic air circuit breaker. The non-automatic air circuit breakers are designed without an electronic trip system and do not perform any protection functions for the plant.

One potential application is the use as a tie-breaker in systems with parallel infeeds.

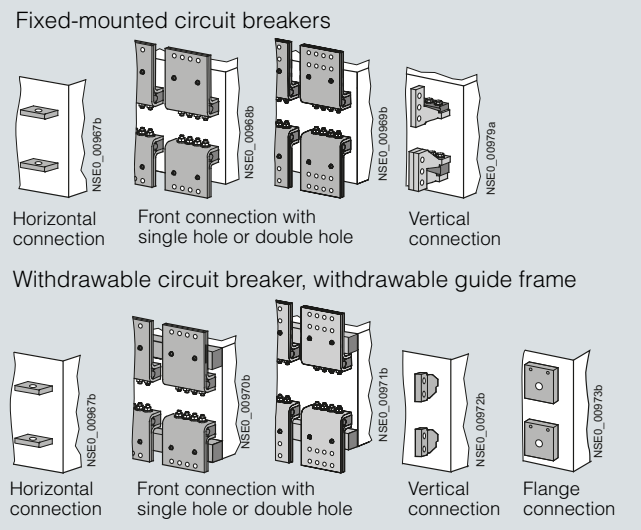
The versions and features can be selected according to those of the circuit breakers.

Operating mechanisms

The circuit breakers are available with various optional operating mechanisms:

- Manual operating mechanism with mechanical closing (standard design)
- Manual operating mechanism with mechanical and electrical closing
- Motorized operating mechanism with mechanical and electrical closing

The operating mechanisms with electrical closing are suitable for synchronization tasks.

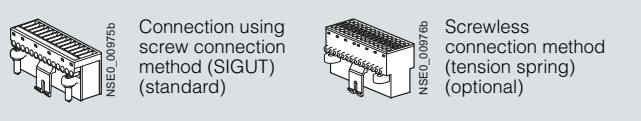


Main circuit connections – connection types

Main circuit connections

All circuit breakers are equipped with horizontal main circuit connections on the rear for up to 5000 A as standard (horizontal connection to busbars). Exception: Circuit breakers of size II with max. rated current 4000 A.
Circuit breakers with a max. rated current of 6300 A and circuit breakers of size II with a max. rated current of 4000 A are equipped with vertical main circuit connections (for upright busbars).

The following options are available, with all combinations of top and bottom connections possible:
- Accessible from the front, single hole (for vertically installed busbars)
- Accessible from the front, double hole (holes according to DIN 43673) (for vertically installed busbars)
- At the rear, vertical (for vertically installed busbars)
- Connecting flange (for direct connection to guide frames up to 4000 A)



Connection options for auxiliary circuit connections

Auxiliary circuit connections

The type of connection for the auxiliary switches depends on the type of installation:

- Withdrawable version: The internal auxiliary switches are connected to the male connector on the switch side. When fully inserted, the connector makes a connection with the sliding contact module (see the graphic "Guide frame" under "Design") in the guide frame. Various adapters can then be used to complete the wiring (see the graphic "Connection options for auxiliary circuit connections").
- Fixed-mounted version: In this case the auxiliary supply connectors are engaged directly onto the circuit breaker. The connectors are equipped with coding pins that prevent them being mistakenly interchanged

Operator panel

The operator panel is designed to protrude from a cutout in the door providing access to all control elements and displays with the control cabinet door closed.
The operator panels for all circuit breakers (fixed-mounted/withdrawable versions, 3-/4-pole) are identical. The operator panel ensures degree of protection IP41.

Safety and reliability

To protect the circuit breakers and system against unauthorized switching and to protect the maintenance and operator personnel, the system contains many locking devices. Others can be retrofitted.

Other safety features include:
- Infeed from above or below, as required
- Locking of the guide frame with the circuit breaker removed, as standard
- Locking of the withdrawable circuit breaker against movement, as standard
- High degree of protection with cover IP55
- Mechanical reclosing lockout after overload or short-circuit tripping as standard
- The circuit breaker is always equipped with the required number of auxiliary supply connectors

Standard version

3WL circuit breakers are equipped with the following features as standard:
- Mechanical ON and OFF button
- Manual operating mechanism with mechanical closing
- Switching position indication
- Ready-to-close indicator
- Store status indicator
- Auxiliary switch 2 NO + 2 NC
- Rear horizontal main circuit connections for fixed-mounted and withdrawable versions up to 5000 A, and rear vertical main circuit connections for 6300 A applications and size II with 4000 A
- For 4-pole circuit breakers, the fourth pole (N) is installed on the left and is 100% loadable with the rated current
- Contact erosion indicator for the main contacts
- Auxiliary circuit plug-in system with SIGUT screw terminals Delivery inclusive of all auxiliary supply connectors as per internal equipment including coding device for the prevention of incorrect installation of auxiliary supply connectors for fixed-mounted circuit breakers
- Mechanical "tripped" indicator for electronic trip system
- Mechanical reclosing lockout after tripping operation
- Operator panel cannot be taken off with the circuit breaker in the ON position

Additional features of the withdrawable version:
- Main contacts: Laminated receptacles in the guide frame, blade contacts on the withdrawable circuit breaker
- Position indicator in the operator panel of the withdrawable circuit breaker
- Captive manual crank handle for moving the withdrawable circuit breaker
- Guide frame with guide rails for easy moving of the withdrawable circuit breaker
- The withdrawable circuit breaker can be locked to prevent it being pushed out of position
- The withdrawable circuit breaker cannot be moved when it is in the ON position
- Coding of the rated current between the guide frame and the withdrawable circuit breaker

Standards

3WL circuit breakers comply with:
- IEC 60947-2
- Climate-proof according to IEC 60068-2-30.

Versions acc. to UL 489 also available, see Catalog LV 16.
For further standards, see www.siemens.com/lowvoltage/product-support or www.siemens.com/lowvoltage/configurators.

General data

Withdrawable short-circuit, grounding, and bridging units

Portable positively-driven grounding and short-circuit devices are used for the disconnected system sections to verify isolation from the supply at the workplace.

Withdrawable grounding units allow simple and comfortable grounding. They are simply inserted into the guide frames in place of the corresponding withdrawable circuit breakers. This ensures that these devices are always first connected with the grounding electrode and then with the components to be grounded.

The grounding contacts are fitted to the side of the breaker enclosure and establish the connection when inserted into the guide frame.

Short-time current of the grounding contact	kA	15 (500 ms)
Rated operational voltage	V	1000 (690 for size I)
Standards		DIN VDE 0683

All withdrawable contacts are short-circuited and grounded on delivery.

Electrically skilled persons can easily convert them to withdrawable bridging units by following the enclosed instructions.

In addition, the withdrawable unit can be adapted to various rated currents of one size.

Withdrawable short-circuit and grounding unit

The withdrawable short-circuit and grounding unit consists of a breaker enclosure with blade contacts which are connected with the short-circuiting link.

Depending on the version, the short-circuiting links are arranged at the top or bottom. The grounding and short-circuit connections are established when the device is inserted.

It must be ensured that the side to be short-circuited and grounded is not live. For this reason it is recommended that the withdrawable unit is only cranked in when the door is closed.

Withdrawable bridging unit

The withdrawable bridging unit consists of a breaker enclosure in which all disconnection components and the operating mechanism have been replaced with simple connections between the upper and lower contacts.

Auxiliary releases

Up to two auxiliary releases can be installed at the same time. The following are available for selection:

1 shunt release
or 1 undervoltage release
or 2 shunt releases
or 1 shunt release
+ 1 undervoltage release

Signaling switches for auxiliary releases

One signaling contact is used for each auxiliary release to determine the positions of the auxiliary releases.

Shunt releases

When the operational voltage is connected to the shunt release, the circuit breaker is opened immediately. The shunt release is available in the versions 5% OP for overexcitation and 100% OP for permanent excitation. This means that it is also possible to block the circuit breaker against being jogged into closing.

An energy storage device for shunt releases allows the circuit breaker to be opened even if the control voltage is no longer available.

Undervoltage releases

The undervoltage release causes the circuit breaker to be opened if the operational voltage falls below a certain value or is not applied. The circuit breaker cannot be closed manually or by means of an electrical ON command if the undervoltage release is not connected to the operational voltage. The undervoltage release has no delay as standard. A delay can be set by the customer in the range between t_d < 80 ms and t_d < 200 ms.

In addition, an undervoltage release with a delay in the range from 0.2 to 3.2 s is available.

Closing coil

The closing coil is used to close the circuit breaker electrically by means of a local electrical "ON" command or by remote means.

Motorized operating mechanism

The operating mechanism is used to charge the spring energy store automatically.

The operating mechanism is activated if the spring energy store has been discharged and the control voltage is available.

It is switched off automatically after charging. This does not affect manual operation of the spring energy store.

Indicators, signals and control elements

Motor cutout switch

Selector switch for switching off the motorized operating mechanism (automatic charging).

Operating cycles counter

The motorized operating mechanism can be supplied with a 5-digit operating cycles counter. The display is incremented by "1" as soon as the spring energy store is fully charged.

Resetting of the manual tripped signal

When the circuit breaker has tripped, this is indicated by the protruding red mechanical tripped indicator on the ETU. When the mechanical tripped indicator is activated, the tripping solenoid and tripped signal are reset. If this manual display is to be reset remotely, the reset button can be equipped with a reset solenoid.

This option allows the circuit breaker to be reset both manually and electrically.

Automatic resetting of reclosing lockout

When the ETU is tripped, reclosing of the circuit breaker is prevented until the trip unit is either electrically or manually reset. If the "Automatic resetting of reclosing lockout" option is used, the pre-tensioned circuit breaker is ready to close immediately after tripping. Resetting the manual "tripped" indicator is not included in this option.

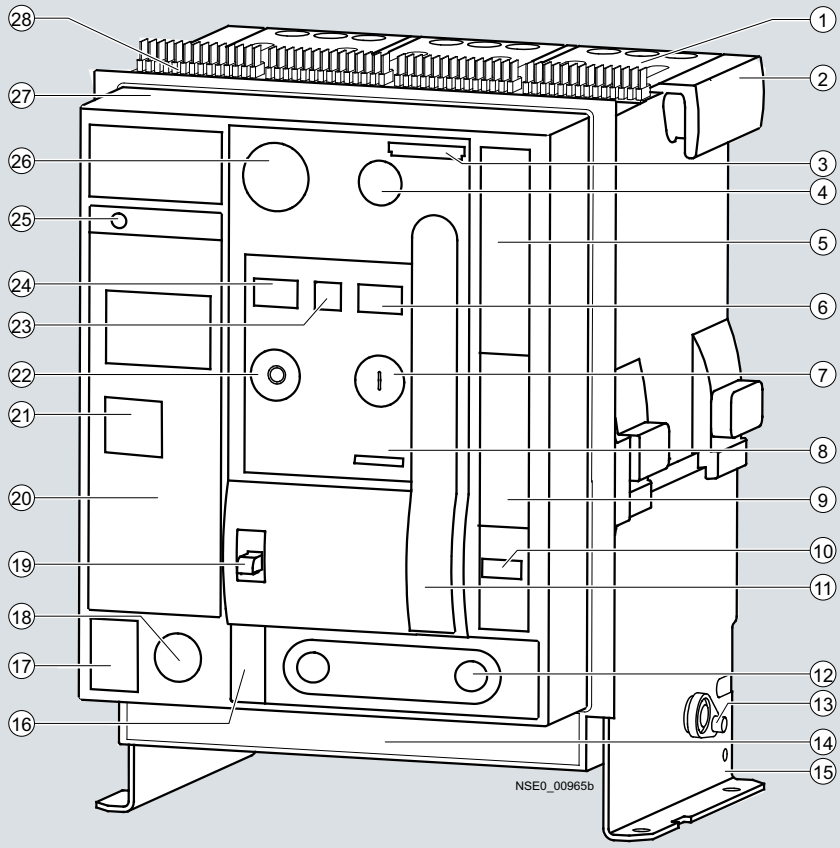
Tripped signaling switch

If the circuit breaker has tripped due to an overload, short-circuit, ground fault or extended protection function, the tripped signaling switch can indicate this. This signaling switch is available as an option. If the circuit breaker is used for communication, this option is supplied as standard.

Ready-to-close signaling switch

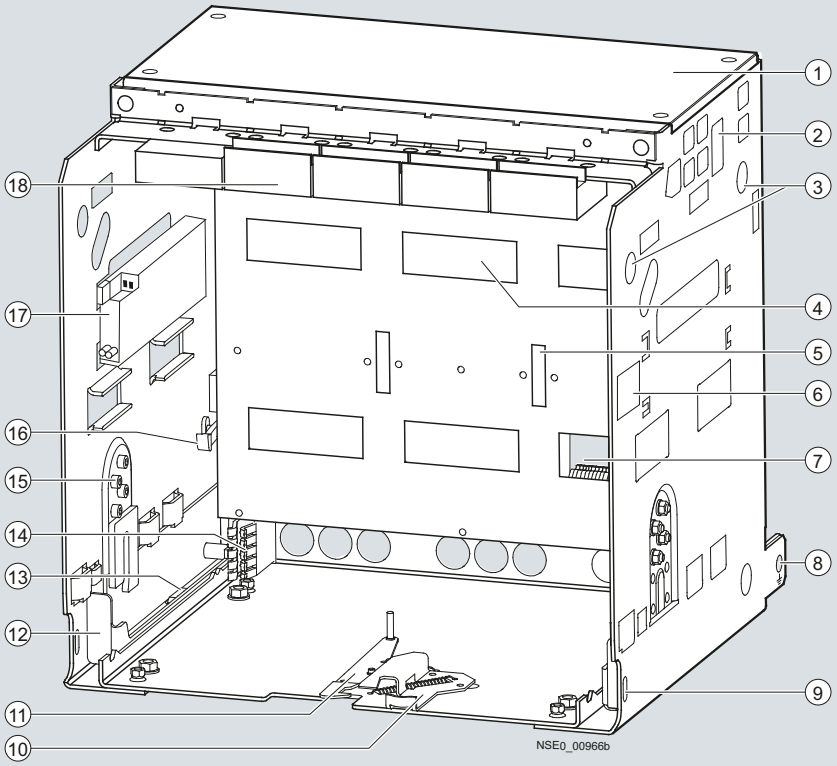
The 3WL circuit breakers are equipped with an optical ready-to-close indicator as standard. In addition, the ready-to-close status can be transmitted by means of a signaling switch as an option. If the switch is used for communication, this signaling switch is supplied as standard.

Circuit breakers



1. Arc chute
2. Carrying handle
3. Labeling plates
4. Motor cutout switch (option) or "Electrical ON" (option)
5. Type plate for circuit breaker
6. Spring charge indicator
7. "Mechanical ON" button
8. Rated current indication
9. Positioning pictogram
10. Operating cycles counter (option)
11. Hand-operated lever
12. Crank handle
13. Withdrawable unit drive shaft
14. Equipment plate
15. Grounding connection
16. Position indicator
17. Table for ground-fault protection
18. Safety lock for crank handle (option)
19. Mechanical unlocking of crank handle (option)
20. Electronic trip unit
21. Rating plug
22. "Mechanical OFF" button or "EMERGENCY-STOP" mushroom pushbutton (option)
23. Ready-to-close indicator
24. Contact position indicator
25. "Tripped" indicator (reset button)
26. "Secure OFF" locking device (option)
27. Operator panel
28. Male connector for auxiliary connections

Guide frames



1. Arc chute cover (option)
2. Blow-out openings
3. Opening for crane hook
4. Shutter (option)
5. Locking device (shutter) (option)
6. Type plate for guide frame
7. Isolating contacts
8. Ground terminal Ø14 mm
9. Locking device for racking rail
10. Locking device against movement when cabinet door is open (option)
11. Door interlock for guide frame (option)
12. Racking rail
13. Factory-set rated current coding
14. Sliding contact for breaker grounding (option)
15. Equipment-dependent coding (option)
16. Shutter actuator (option)
17. Position indicator switch (option)
18. Sliding contact module for auxiliary conductors (number depends on equipment)

General data

Locking devices

Locking device in OFF position

This function prevents closing of the circuit breaker and complies with the requirements for main control switches according to EN 60204 (VDE 0113) – supply disconnecting device. This lockout only affects this circuit breaker.

If the circuit breaker is replaced, closing is no longer prevented unless the new circuit breaker is also protected against unauthorized closing.

To activate the locking device, the circuit breaker must be opened. The locking device is disabled when the circuit breaker is closed. The lock is only activated when the key is removed. The safety key can be removed only in the "OFF" position.

Locking device for "Electrical ON"
(see graphic "Circuit breakers")

This prevents unauthorized electrical closing from the operator panel. Mechanical closing and remote closing remain possible. The lock is only activated when the key is removed.

Locking device for "Mechanical ON"
(see graphic "Circuit breakers")

This prevents unauthorized mechanical closing. The mechanical ON button can only be activated if the key is inserted (key operation). Closing with the "Electrical ON" button and remote closing remain possible. The lock is only activated when the key is removed.

"Safe OFF" circuit breaker-independent locking device against unauthorized closing

This special breaker-independent function for withdrawable circuit breakers prevents closing and fulfills the requirements for main control switches to EN 60204 (VDE 0113) – supply disconnecting device. Unauthorized closing remains impossible even after the circuit breaker has been replaced.

To activate the lock, the circuit breaker must be opened. The locking device is disabled when the circuit breaker is closed. The lock is only activated when the key is removed. The safety key can be removed only in the "OFF" position.

Locking device for crank handle

Prevents removal of the crank. The circuit breaker is protected against movement. The lock is only activated when the key is removed.

Locking device for "Mechanical OFF"

Prevents unauthorized mechanical opening from the operator panel. The "Mechanical OFF button" can only be activated if the key is inserted (key operation). Remote opening remains possible. The lock is only activated when the key is removed.

Locking device for hand-operated lever

The hand-operated lever can be locked with a padlock. The spring energy store cannot be charged manually.

Locking device against resetting the "tripped" indicator

A lockable cover prevents manual resetting of the "tripped" indicator after tripping due to overcurrent. This locking device is supplied together with the transparent cover option for Electronic Trip Units.

Sealing devices

Sealing cap for "Electrical ON" button

The "Electrical ON" button is equipped with a sealing cap as standard.

Sealing cap for "Mechanical ON" and "OFF" button

The locking set contains covering caps which can be sealed.

Sealing device for Electronic Trip Units

The transparent cover can be sealed. The parameter setting sections are covered to prevent unauthorized access. Openings allow access to the query and test button.

Locking mechanisms

Locking mechanism against movement for withdrawable circuit breakers when the control cabinet door is open

The crank handle is blocked when the control cabinet door is open and cannot be removed. The withdrawable circuit breaker cannot be moved. The lock only affects the inserted crank handle.

Locking of the control cabinet door

The control cabinet door cannot be opened if

- the fixed-mounted circuit breaker is closed (the blocking signal is transmitted via the Bowden cable) or
- the withdrawable circuit breaker is in the connected position

Blocking mechanism using "Mechanical ON" and "OFF" button

The "Mechanical ON" and "OFF" buttons are covered with a cap which only allows actuation with a tool. These cover caps are part of the interlocking set.

Optional equipment for guide frames

Shutters

The sealing strips of the shutter seal the laminated contacts of the guide frame when the withdrawable circuit breaker is removed and therefore implement touch protection.

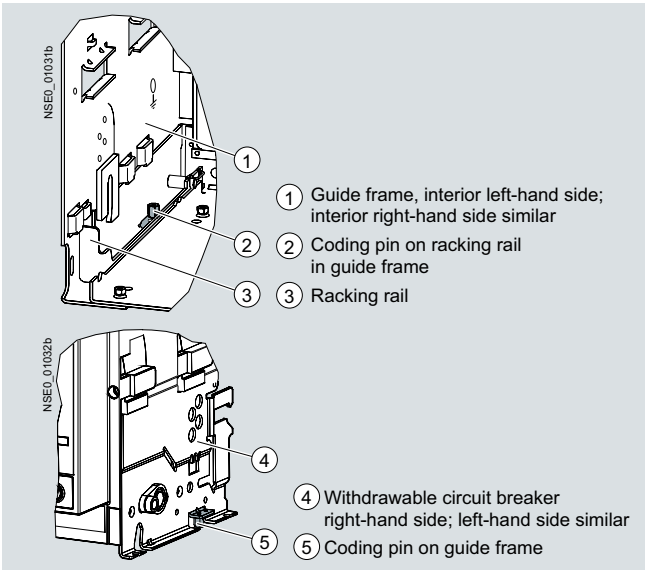
The sealing strips can be manually opened using the strip levers.

The position of the sealing strips can be locked in various positions using padlocks for securing against tampering.

Rated current coding unit between circuit breaker and guide frame

Withdrawable circuit breakers and guide frames are equipped with a rated current coding unit as standard.

This ensures that only circuit breakers whose blade contacts are suited to the laminated contacts of the guide frame can be inserted into a guide frame (see diagram below).



Rated current coding unit between circuit breaker and guide frame

Equipment-dependent coding

Withdrawable circuit breakers and guide frames can be retrofitted with an equipment-dependent coding unit.

This allows different designs of circuit breakers and guide frames to be uniquely assigned. If the circuit breaker and guide frame have been assigned different codes, the circuit breaker cannot be inserted.

36 different coding options can be selected.

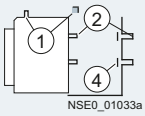
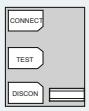
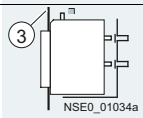
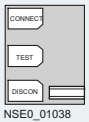
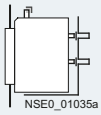
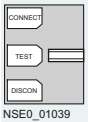
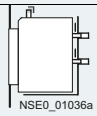
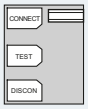
Position signaling switches for guide frame

The guide frame can be equipped with position signaling switches. These can be used to determine the position of the circuit breaker in the guide frame.

Two versions are available:

- Option 1
  Connected position 1 CO contact,
  Test position 1 CO contact,
  Disconnected position 1 CO contact
- Option 2
  Connected position 3 CO contacts,
  Test position 2 CO contacts,
  Disconnected position 1 CO contact

Positions of the withdrawable circuit breaker in the guide frame

	Representation	Position indicator	Main circuit	Auxiliary circuit	Cabinet door	Shutter
Maintenance position	 NSE0_01033a 1 Auxiliary circuit 2 Main circuit 4 Shutter	 NSE0_01037	Disconnected	Disconnected	Open	Closed
Disconnected position	 NSE0_01034a 3 Control cabinet door	 NSE0_01038	Disconnected	Disconnected	Closed	Closed
Test position	 NSE0_01035a	 NSE0_01039	Disconnected	Connected	Closed	Closed
Connected position	 NSE0_01036a	 NSE0_01040	Connected	Connected	Closed	Open

Phase barriers

The plant engineering company can manufacture phase barriers made of insulating material for the arcing fault barriers. The rear panel of the fixed-mounted circuit breakers or guide frames are equipped with guide grooves.

Arc chute cover

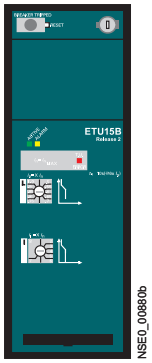
The arc chute cover is available as optional equipment for the guide frame. It protects switchboard components which are located directly above the circuit breaker.

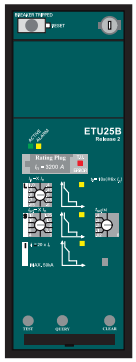
Door sealing frame and cover

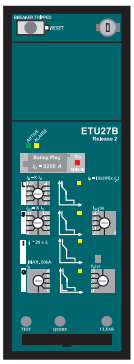
3WL circuit breakers have degree of protection IP20 as standard. However, if the switchboard is to be equipped with a higher degree of protection, a door sealing frame with IP41 and a cover with IP55 are available.

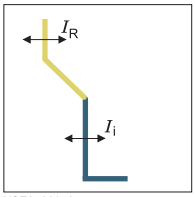
General data

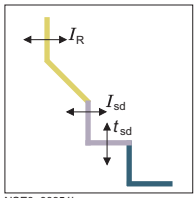
Function

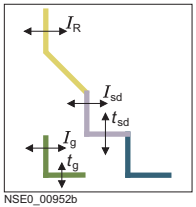










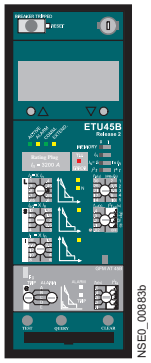


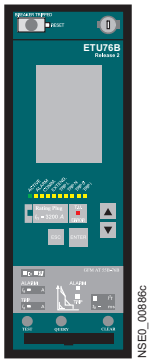
		ETU15B	ETU25B	ETU27B
Functions of the Electronic Trip Units				
Basic protection functions				
Overload protection	L	✔	✔	✔
Short-time delayed short-circuit protection	S	--	✔	✔
Instantaneous short-circuit protection	I	✔	✔	✔
Neutral conductor protection	N	--	--	✔
Ground-fault protection	G	--	--	✔
Additional functions				
Neutral conductor protection (can be switched on/off)		--	--	✔
N-conductor protection adjustable		--	--	--
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		--	--	--
Short-time delay short-circuit protection switchable to I^2t		--	--	--
Instantaneous short-circuit protection adjustable		✔	--	--
Overload protection switchable to I^4t		--	--	--
Overload protection can be switched on/off		--	--	--
Selectable parameter sets		--	--	--
Parameterization and display				
Parameterization through rotary coding switches (10 steps)		✔	✔	✔
Parameterization through communication (absolute values)		--	--	--
Parameterization through user interface of ETU (absolute values)		--	--	--
Parameterization of the extended protection functions		--	--	--
LCD alphanumerical		--	--	--
LCD graphical		--	--	--
Metering function				
Metering function *Plus*		--	--	--
Communication				
CubicleBUS		--	--	--
Communication through PROFIBUS DP		--	--	--
Communication through MODBUS		--	--	--
Communication via Ethernet		--	--	--

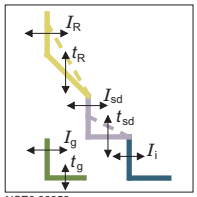
✔ Standard -- Not available ❑ Optional

Note

Detailed information about the functions of the Electronic Trip Units is given in the following.







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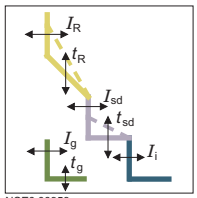

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	ETU45B	ETU76B
	✔	✔
	✔	✔
	✔	✔
	✔	✔
	❑	❑
	✔	✔
	✔	✔
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	❑	❑
	❑	❑
	❑	❑

General data

Electronic Trip Units (ETU)

The Electronic Trip Unit is controlled by a microprocessor and operates independently of an auxiliary voltage. It enables systems to be adapted to the different protection requirements of distribution systems, motors, transformers and generators.

Communication capability

The international standardized PROFIBUS DP or MODBUS can be used to transmit data such as current values, switching states, causes of tripping etc. to central computers.

Data acquisition and energy management are possible in conjunction with the *Plus* metering function.

An internal circuit breaker data bus allows switchboard panel communication between the circuit breaker and typical secondary devices in the circuit breaker section:

- Control of analog displays
- Facility to test the communication build-up with circuit breakers
- Display of tripping state and tripping reasons
- Input module for reading in further switchboard panel signals and for transmission of these signals to the PROFIBUS DP or MODBUS
- Various output modules for displaying measured values

This means that it is not only possible to monitor the device remotely, but also to transmit current values from the entire system and perform switching operations remotely.

I^2t and I^4t characteristic curves for overload protection

The best protection for the whole switchboard is achieved by setting the tripping characteristic curve to an optimum value. In order to achieve optimal discrimination for upstream fuses or medium-voltage protection systems, the inclination of the characteristic curve can be selected for the overload range.

The overload protection L (long time protection) for the ETU45B and ETU76B Electronic Trip Units allows the curve to be switched between the I^2t and I^4t characteristics.

The I^4t characteristic improves discrimination for downstream circuit breakers and fuses.

Electronic Trip Units ETU

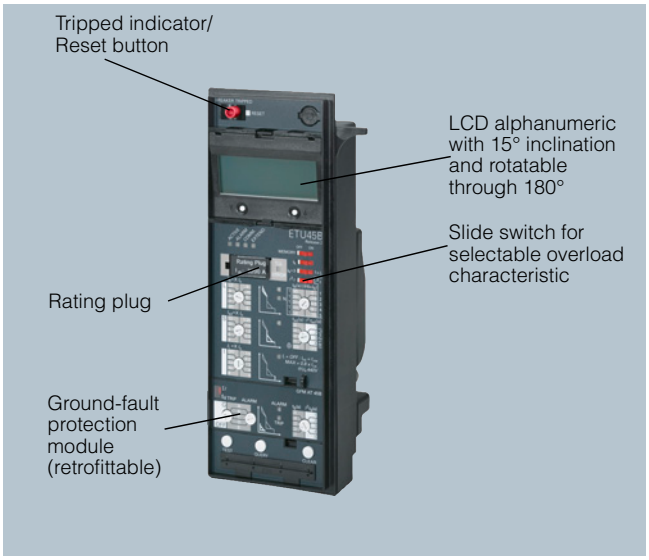
High emphasis has also been placed on modularity during the development of the Electronic Trip Units. These are some of the modules which can be easily retrofitted at any time:

- Ground-fault protection module
- Communication
- Metering function
- Display
- Rating plug

This allows quick adaptation to new local power supply conditions. In addition, innovative functions have been included in the ETUs.

Rating plug

The rating plug is an exchangeable module which allows the user to reduce the rated device current so as to adapt it optimally to the plant; e.g. if a new plant section is put into operation. The rating plug must be selected to correspond to the rated current of the plant.



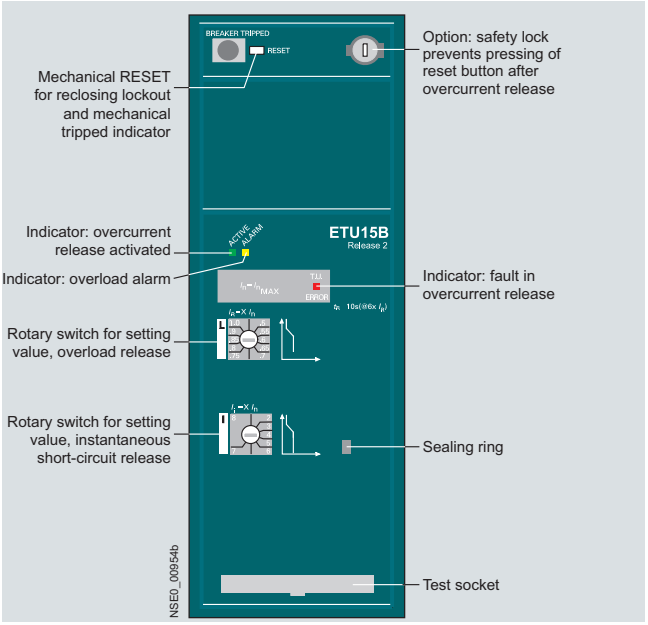
Example of configuration for ETU45B

Metering function *Plus*

Selectable parameters

In the case of quick changes of power supply conditions, e.g. for switchover from transformer to generator operation or if a section of the supply is disconnected when the shift changes, 3WL circuit breakers allow the relevant protection parameters to be quickly adapted to the new conditions.
The ETU76B contains two independent tripping characteristics (parameter sets). The switchover is completed within 200 ms and is performed with the help of an external signal.

ETU15B Electronic Trip Unit



Application:

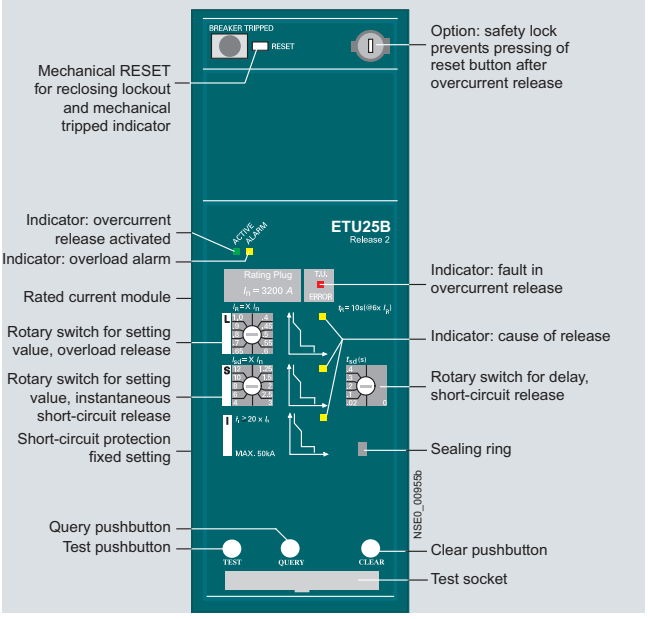
Simple building and system protection without time-selective coordination up to 4000 A.
Not to be used for size III.

Properties:

- Adjustable overload protection with I^2t characteristic with non-adjustable delay time t_R = 10 seconds at 6 × I_R
- Instantaneous short-circuit protection adjustable in the range 2 ... 8 × I_n
- Overload display
- Protection function is set by means of the rotary coding switch

For technical details, see the table "Function overview of the electronic trip system" under "Technical specifications".

ETU25B Electronic Trip Unit



Application:

Classical building, motor and system protection with time-selective coordination for up to 6300 A

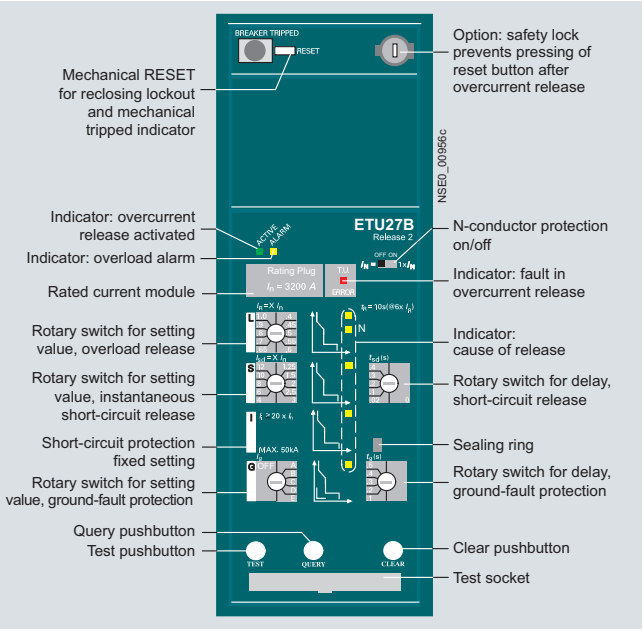
Properties:

- Adjustable overload protection with I^2t-characteristic delay time t_R = 10 seconds at 6 × I_R
- Short-time delayable short-circuit protection adjustable in the range 1.25 ... 12 × I_n and
- Instantaneous short-circuit protection non-adjustable at 20 × I_n, max. 50 kA
- Can be adapted at any time to the required plant currents through exchangable rating plug, thus ensuring overload protection in the range from 100 A to 6300 A
- Overload display
- Indicates the cause of tripping by means of an LED
- Test facility for the trip unit
- Protection function is set by means of the rotary coding switch

For technical details, see the table "Function overview of the electronic trip system" under "Technical specifications".

General data

ETU27B Electronic Trip Unit



Application:

Classical building, motor and system protection with time-selective coordination for up to 6300 A

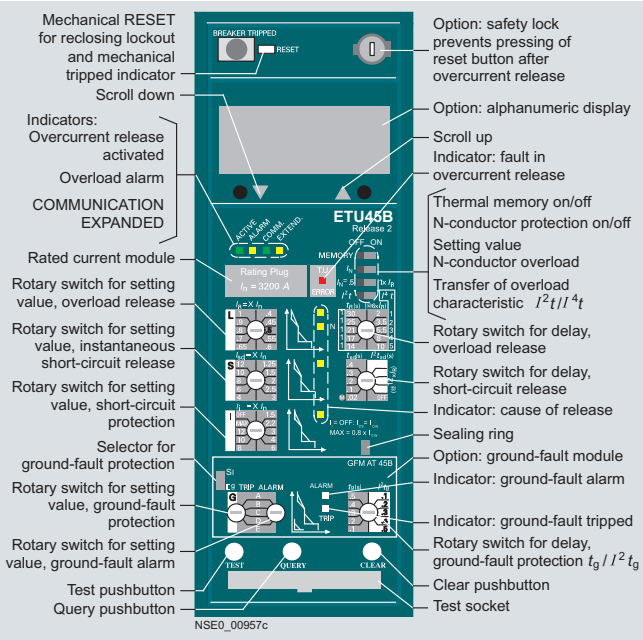
Properties:

The same as ETU25B but also

- Connectable neutral conductor protection
- Permanently integrated ground-fault protection. Calculation of the ground-fault current through vectorial summation current formation

For technical details, see the table "Function overview of the electronic trip system" under "Technical specifications".

ETU45B Electronic Trip Unit



Application:

Low-cost highly versatile device for intelligent buildings and all types of industrial applications – "**Cubicle**BUS integrated"

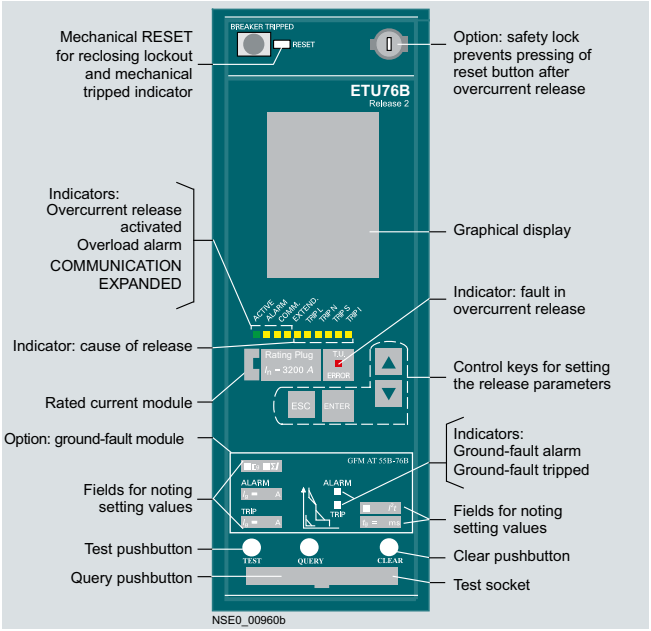
Properties:

The same as ETU25B but also

- Adjustable time-lag class for overload protection
- Selectable characteristic for overload and short-time delayed short-circuit range (current discrimination) for more accurate discrimination adaptation to upstream fuses and protective devices
- Thermal memory as restart protection for tripped motor outgoing units
- Connectable and adjustable neutral conductor protection
- Modular ground-fault protection module with alarm and tripping functions which can be adjusted separately
- Communication interface, *Plus* metering function, optional connection of external modules or for retrofitting
- Storage of events and causes of tripping for specific fault analysis
- Extended protection functions possible with metering function
- Optional high-contrast display with viewing angle adjustment option
- The protection functions can be set by means of a rotary coding switch or slide switch

For technical details, see the table "Function overview of the electronic trip system" under "Technical specifications".

ETU76B Electronic Trip Unit



Application:

The multi-talent with graphical display for system analysis – "**Cubicle**BUS integrated"

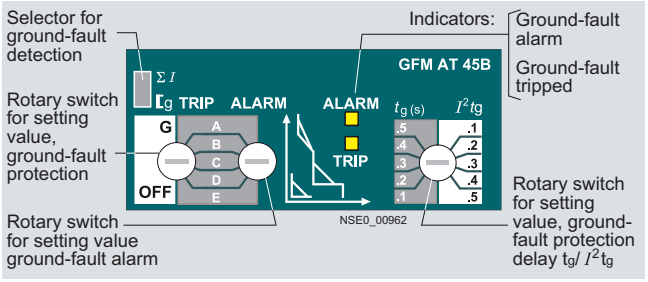
Properties:

The same as ETU45B but also including

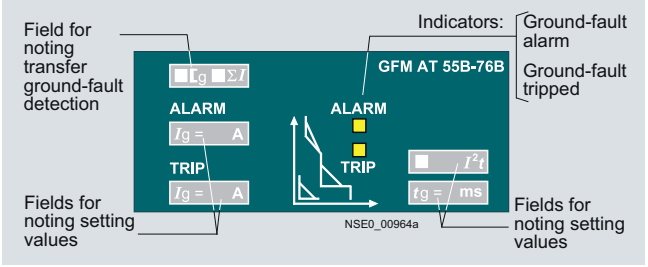
- Two protection parameter sets which can be stored separately in the trip unit (switchover is performed by means of external signal)
- With overload protection which can be deactivated for use in modern drive engineering applications
- Adjustable delay of delayed short-circuit protection up to 4000 ms
- Neutral conductor protection adjustable up to I_N = 200% I_n
- Setting of protection functions by means of Breaker Data Adapter (BDA *Plus*) or via communications interface
- Graphical display of all parameters and events/curve trends
- Graphics display with high contrast, backlit display, and sleep mode

For technical details, see the table "Function overview of the electronic trip system" under "Technical specifications".

Ground-fault protection



GFM AT 45B ground-fault module



GFM AT 55B-76B ground-fault module

Ground-fault releases "G" sense fault currents that flow to ground and that can cause a fire in the plant. Multiple circuit breakers connected in series can have their delay times adjusted so as to provide graduated discrimination.

When setting the parameters for the Electronic Trip Unit it is possible to choose between "alarm" and "trip" in the event that the set current value is exceeded. The reason for tripping is indicated by means of an LED when the query button is activated.

The ETU45B and ETU76B Electronic Trip Unit versions can be retrofitted with a ground-fault protection module. This ground-fault protection function is integrated in ETU27B Electronic Trip Units.

General data

Measurement method

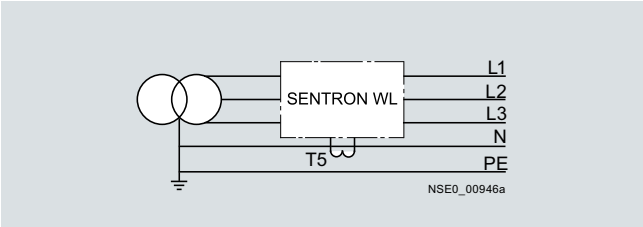
Vectorial summation current formation (measurement method 1)

The three phase currents and the N-conductor current are measured directly.

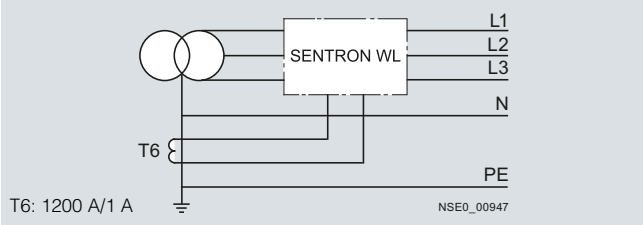
The Electronic Trip Unit determines the ground-fault current by means of vectorial summation current formation for the three phase currents and the N-conductor current.

Direct measurement of the ground-fault current (measurement method 2)

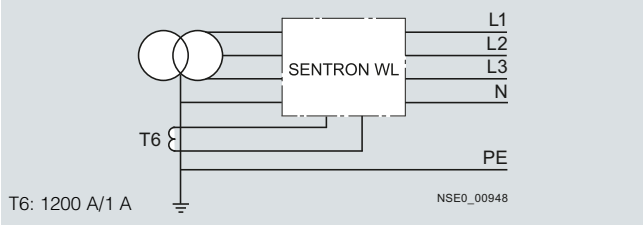
A standard current transformer with the following data is used for measurement of the ground-fault current: 1200 A/1 A, Class 1 (the internal load of the 3WL circuit breaker is 0.11 Ω). The current transformer can be installed directly in the grounded neutral point of a transformer.



3-pole circuit breakers, current transformers in the N-conductor



3-pole circuit breakers, current transformers in the grounded neutral point of the transformer



4-pole circuit breakers, current transformers in the grounded neutral point of the transformer

Setting

How the module is set depends on the measurement method used (see above):

Measurement method 1: in position ΣI.

Measurement method 2: in position I_g.

This setting can be implemented for the Electronic Trip Unit version ETU76B with Menu/Comm.

Ground-fault protection with I^2t characteristic curve

With the exception of the ETU27B Electronic Trip Unit, all versions of the ground-fault modules are supplied with an I^2t characteristic curve which can be activated.

Selection criteria for 3WL circuit breakers

Basic criteria for selecting circuit breakers are:

- Max. short-circuit current at place of installation of circuit breaker $I''_{k\,max}$.
  This value determines the short-circuit breaking capacity or short-circuit current carrying capacity of the circuit breaker.
- It is compared with the value I_{cu}, I_{cs}, I_{cw} of the circuit breaker and essentially determines the size of the circuit breaker.
  See Figure "Overview of 3WL circuit breakers/non-automatic air circuit breakers".
- Rated current I_n that is to flow through the branch circuit. This value must not be higher than the maximum rated current for the circuit breaker.
  The rated current for the 3WL circuit breaker is set with the rating plug. See Figure "Overview of 3WL circuit breakers/non-automatic air circuit breakers" under "Design".
- Ambient temperature for the circuit breaker.
  This is usually the control cabinet's internal temperature.
- Design of the circuit breaker
- Minimum short-circuit current which flows through the switching device. The trip unit must still detect this value as a short-circuit and must respond by tripping.

Protection functions of the circuit breaker.
These are defined by selection of the corresponding Electronic Trip Unit; see table "Functions of the Electronic Trip Units" under "Functions".

3WL circuit breakers for DC applications

This version of the 3WL non-automatic air circuit breaker is suitable for direct current applications. The external protective device DIGmat S100 provides adjustable overload and short-circuit protection for the 3WL non-automatic air circuit breaker.

This is based on the measuring chain of a shunt resistor and the DIGmat S100 tripping unit. Shunt resistors are available for 1000 A, 2000 A and 4000 A (special ranges on request). They are in accordance with DIN 43703 and have a class accuracy of 0.5.

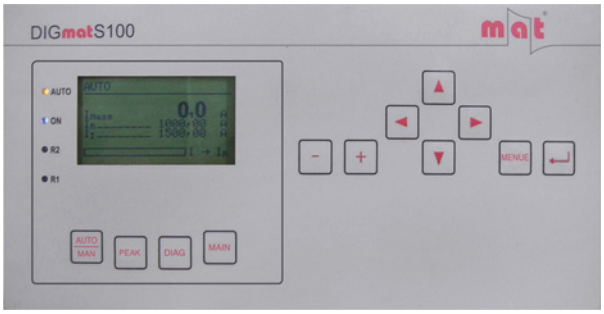
A measuring-circuit voltage of 60 mV DC is picked off for the rated current I_n.

The measuring-circuit voltage is a linear image of the primary current.

The DIGmat S100 trip unit monitors the image of the primary current thus supplied and compares it with the tripping characteristic curve set on the device. The parameter settings on the DIGmat S100 apply also for DC feedbacks. Reversing duty is thus possible.

The tripping characteristic curve is determined and described by the following variables:

- Overload protection:
  Setting range I_R = 0.4 ... 1.0 I_n
  The characteristic curve has a I^2t characteristic.
  The tripping time t_R is selectable between 2 and 10 s, with t_R defined for 6 × I_R.



DIGmat S100

- Short-circuit protection:
  Setting range I_i = 1.25 × I_R to max. 4 × I_n
  Tripping occurs in less than 50 ms if the set value is exceeded.

I_n = Rated current of the circuit breaker
I_R = Current setting value of the adjustable overload release
t_R = Assigned tripping time of the overload trip
I_i = Instantaneous tripping current of the adjustable short-circuit release

The components are available only from the company mat – Maschinen- und Anlagentechnik:

mat – Maschinen- und Anlagentechnik
Dr. Becker GmbH
Rudolf-Diesel-Straße 22
22941 Bargteheide
Tel.: +49 (4532) 20-2101
Fax: +49 (4532) 20-2121
Email: info@m-a-t.de
Internet: www.m-a-t.de

Configuration

Mutual mechanical circuit breaker interlocks

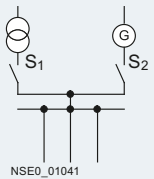
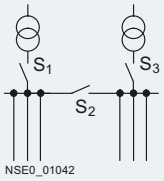
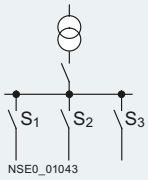
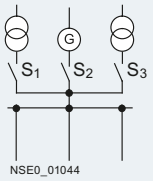
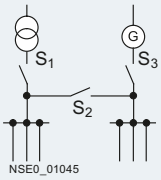
The module for mutual mechanical interlocking can be used for two or three 3WL circuit breakers and can be adapted easily to the corresponding versions. The fixed-mounted and withdrawable circuit breaker versions are fully compatible and can therefore be used in a mixed configuration in an installation. This also applies to 3WN6 circuit breakers.

The circuit breakers can be mounted adjacent to each other or one above the other, whereby the distance of the circuit breakers is determined solely by the length of the Bowden cable (lengths: 2 m/3 m/4.5 m). Interlock signals are looped through using the Bowden cables. Interlocking is only effective in the connected position in the case of withdrawable circuit breakers. The mechanical endurance of the Bowden cables is 10000 operating cycles.

To ensure that the interlock functions properly, the following minimum switchboard requirements must be fulfilled:

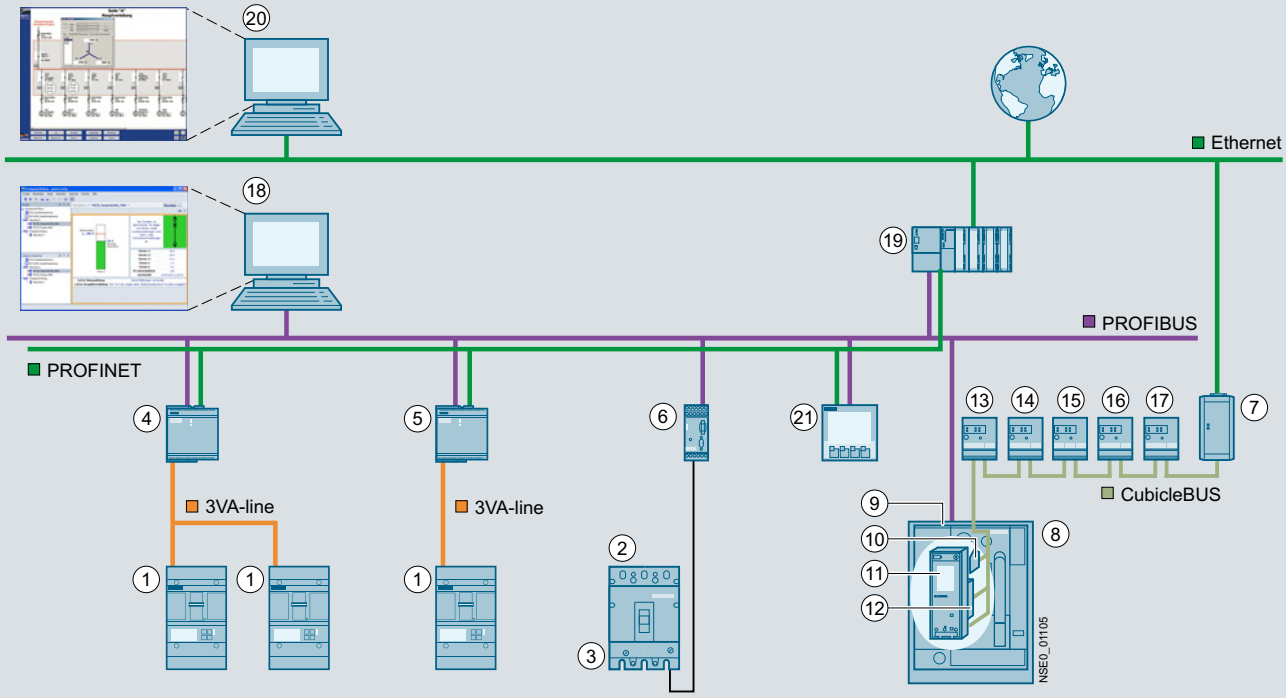
- Bowden cables must be laid so that they are as straight as possible
- The bending radii of the Bowden cable must be > 500 mm
- The total bending angle across the length of the Bowden cable must not exceed 640°
- If the circuit breakers to be interlocked are arranged vertically, the interlock mechanisms must be aligned
- Circuit breakers to be interlocked must be arranged so that Bowden cables can be optimally installed in compliance with the conditions mentioned in the above points
- The installed Bowden cable must be fixed (with cable ties or the like) before the interlock is adjusted
- Select the width of switchboard cubicle to allow enough freedom of movement for adjusting the interlock!
- Openings and cutout sections in system elements must be designed in such a way that the direction of the Bowden cables is not changed and that the wires are not obstructed when they are routed

Mutual mechanical interlocking of circuit breakers – examples

Mutual interlocking of two circuit breakers	Interlocking of three circuit breakers		Mutual interlocking of three circuit breakers	Interlocking of three circuit breakers, two of them mutual
				

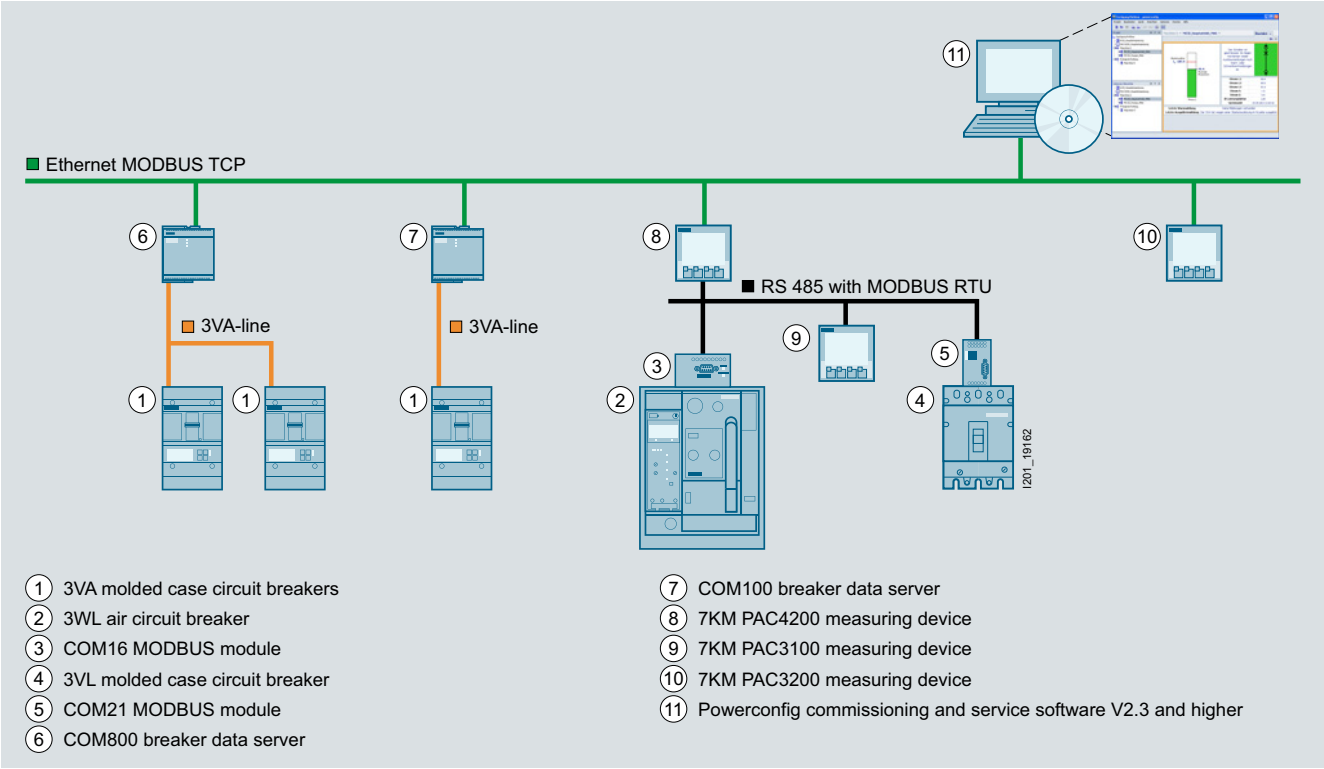
General data

Communication-capable circuit breakers



1 3VA molded case circuit breakers
2 3VL molded case circuit breaker
3 Electronic Trip Unit ETU / LCD ETU
4 COM800 breaker data server
5 COM100 breaker data server
6 COM20 Release 2 PROFIBUS module including Zone Selective Interlocking
7 BDA *Plus* with Ethernet interface
8 3WL air circuit breaker
9 COM15 PROFIBUS module
10 Breaker Status Sensor (BSS)
11 Electronic Trip Unit (ETU)
12 Metering function *Plus*
13 Zone Selective Interlocking module
14 Digital output module with relay contacts
15 Digital output module with relay contacts, configurable
16 Analog output module
17 Digital input module
18 Powerconfig commissioning and service software V2.3 and higher
19 PLC, e.g. SIMATIC S7
20 E.g. SIMATIC powerrate
21 7KM PAC measuring devices

Communication with PROFIBUS DP



Communication with MODBUS RTU

The requirements for power distribution in terms of communication capability, data transparency, flexibility and integration are constantly increasing. An integrated and modular communication architecture was designed for the 3WL circuit breaker to ensure that it can satisfy these requirements.

The core component of this architecture is the **Cubicle**BUS, which links together all of the intelligent components within the 3WL circuit breaker and enables the easy and safe connection of other additional external components to the circuit breaker. The **Cubicle**BUS is already incorporated and connected in all complete circuit breakers with ETU45B and ETU76B trip units.

The high modularity of the system allows retrofitting of communication functions (e.g. metering function) at any time. Similarly, a non-communication-capable 3WL circuit breaker can be upgraded (e.g. changeover from ETU25B to ETU45B with **Cubicle**BUS) easily on site in the plant. All modules connected to the **Cubicle**BUS can directly access the existing source data of the circuit breaker, which guarantees the quickest possible access to information and response to events.

Furthermore, additional external modules (including digital inputs and outputs, analog outputs) can be connected to the **Cubicle**BUS to provide cost-effective solutions for the automation of additional devices in the switchboard.

General data

Communication-capable 3WL circuit breakers

Function	Electronic Trip Unit version		Breaker Status Sensor	PROFIBUS communi-cation port	Metering function *Plus*	Analog output module	Digital output module	Digital input module	ZSI module	Breaker Data Adapter *Plus*
	ETU45B	ETU76B								
Functions of the communication-capable 3WL circuit breakers										
Indication of measured values in trip unit (current only)	✓	✓	❑	❑	❑	❑	❑	❑	❑	❑
Indication of measured values in the trip unit (*U*, *I*, *P*, *S*, *Q*, p.f., etc.)	✓	✓	❑	❑	✓	❑	❑	❑	❑	❑
Indication of measured values (current only), parameters, diagnostic values etc. on display	--	✓	❑	❑	❑	❑	❑	❑	❑	❑
Indication of measured values (*U*, *I*, *P*, *S*, *Q*, p.f., etc.), parameters, diagnostic values, etc. in trip unit	--	✓	❑	❑	✓	❑	❑	❑	❑	❑
Output of measured values (current only) to rotary coil instruments in control cabinet door	✓	✓	❑	❑	❑	✓	❑	❑	❑	❑
Output of measured values (*U*, *I*, *P*, *S*, *Q*, p.f., etc.) to rotary coil instruments in control cabinet door	✓	✓	❑	❑	✓	✓	❑	❑	❑	❑
Output of digital signals (e.g. reason for tripping, alarms, status) through contacts	✓	✓	❑	❑	❑	❑	✓	❑	❑	❑
Automatic changeover between parameter sets A and B	--	✓	❑	❑	❑	❑	❑	✓	❑	❑
Read-in of digital signals and forwarding to PROFIBUS/MODBUS	✓	✓	❑	✓	❑	❑	❑	✓	❑	❑
Transmission of breaker information on HTML basis locally to a PC	✓	✓	✓	❑	❑	❑	❑	❑	❑	✓
Transmission of breaker information on HTML basis through Ethernet	✓	✓	✓	❑	❑	❑	❑	❑	❑	✓
Short-time discrimination for S tripping and G protection	✓	✓	❑	❑	❑	❑	❑	❑	✓	❑
Local display of harmonics analysis and waveform memory	--	✓	❑	❑	✓	❑	❑	❑	❑	❑
Local storage of harmonics analysis and waveform memory and transmission through PROFIBUS	✓	✓	✓	✓	✓	❑	❑	❑	❑	❑
Read-out of protection parameters through PROFIBUS	✓	✓	✓	✓	❑	❑	❑	❑	❑	❑
Read-out and adjustment of protection parameters through PROFIBUS	--	✓	✓	✓	❑	❑	❑	❑	❑	❑

✓ Required

❑ Not necessary for this function, optionally combinable

-- Function not available

Function can optionally be adopted by several trip units.

Function can optionally be adopted by one of these modules.

Data that can be transmitted over the PROFIBUS DP/MODBUS or the Breaker Data Adapter

All 3WL circuit breakers with ETU45B, ETU76B (**Cubicle**BUS integrated)

Order code (Article No. of circuit breaker + "-Z") Article No.	**BSS BDA*PLUS* F01 + "BDA*PLUS*"- Article No.**	**BSS COM15/COM16 F02/F12**
Possible applications		
Transmission of circuit breaker data to PROFIBUS DP or MODBUS and integration into higher-level visualization systems possible e.g. in PCS7, Power Management Systems, WinCC (including add-ons like the text message radio server)	--	✔
Transmission of circuit breaker data and software (i.e. HTML pages with data) to a local output device, or remotely through Ethernet/Intranet/Internet (without the possibility of integration into higher-level visualization systems) e.g. for monitoring, diagnostics, maintenance and parameterization of individual circuit breakers	✔	--
Utilization of the functionality of all CubicleBUS modules e.g. configuration of the configurable digital output module, status check of the digital input modules, diagnostics	✔	✔
Transmittable circuit breaker data without integrated metering function		
Device identification Communication address, Article No. Circuit breaker in delivery state, circuit breaker parameters (size, number of poles, rating plug etc.), identification numbers, trip unit type, free text for plant code and comments	✔ --[1]	✔ ✔
Operating states On/Off status message, spring energy store, tripped, readiness Breaker position (connected, test and disconnected position, removed) for withdrawable circuit breakers, PROFIBUS/MODBUS write protection on/off, free user input, tripped signal	✔ --[1] --[1]	✔ ✔ ✔
Control commands Switch circuit breaker on/off, switch free user output on/off Reset tripped signal Delete event and history memory Reset min./max. measured values, reset maintenance information	--[1] ✔ --[1] ✔	✔ ✔ ✔ ✔
History Read-out of event log, read-out of trip log	--[1]	✔
Maintenance information Number of tripping operations L, S/I and in total, contact wear Number of operating cycles under load and in total, number of operating hours	✔ --[1]	✔ ✔
Event signals Tripped signals with details of the tripping current Alarm signals (e.g. overload) with incoming/outgoing information All of the named event signals with time stamp	✔ --[1] --[1]	✔ ✔ ✔
Parameterization of the protection functions Read-out of the protection function parameters Settings for the protection function parameters can be changed by means of communication Parameter set switchover possible (set A to set B and back)	✔ ✔[2] ✔[2]	✔ ✔[2] ✔[2]
Measured values Phase currents, each with min./max. value Temperature in the circuit breaker with min./max. value Temperature in the control cabinet with min./max. value All of the named measured values with time stamp	✔ --[1] --[1] --[1]	✔ ✔ ✔ ✔

Order code F01+ ... or F02+ ...	Metering function Plus F05
Additional transmittable circuit breaker data with integrated metering function	
Additional event signals Threshold value alarms (e.g. over/underfrequency, over/undervoltage)	✔
Parameterization of the extended protection functions and setpoints (threshold values) Read-out of the parameters of the extended protection functions Settings for the extended protection function parameters can be changed Read-out and adjustment of threshold values	✔ ✔ ✔
Additional measured values Voltages, power, energy, p.f., frequency, each with min./max. value Harmonics analysis Recording of currents and voltages for configurable events in the waveform memory	✔ ✔ ✔

[1] Data only available in conjunction with the COM15 module (BUS connection not required).

[2] Only possible with ETU76B.

✔ Available
-- Not available

General data

CubicleBUS modules

Digital output module with rotary coding switch

6 items of binary information concerning the state of the circuit breaker (reasons for tripping and alarms) can be output via this module to external signaling devices (e.g. LED, horn) or used for the selective shutdown of other system components (e.g. frequency converters).

Digital output modules are available in versions with and without a rotary coding switch. On modules with a rotary coding switch it is possible to choose between two signaling blocks each with 6 defined assignments and to set an additional response delay.

All the digital output modules are available as a version with relay outputs (CO contacts, up to 12 A). Up to two modules of this type can be connected to one 3WL circuit breaker.

Digital output module with rotary coding switch

Digital output module, configurable

The configurable output module is available for higher-performance solutions. With this module, random events on the **Cubicle**BUS can be switched directly to one of six available outputs or three of these outputs can be assigned with up to six events. In other words, up to six events can be placed on one physical output with "OR" operation. Either BDA *Plus* or powerconfig is used for configuring.

A relay variant is also available here the same as for the output modules with rotary coding switch. Only one module of this type is possible per 3WL circuit breaker.

Digital output module, configurable

Analog output module

The analog output module can be used to output the following measured values to analog indicators in the control cabinet door:

- I_{L1}, I_{L2}, I_{L3}, I_N or
- U_{L12}, U_{L23}, U_{L31}, U_{L1N} or
- P_{L1}, P_{L2}, P_{L3}, S_{tot} or
- p.f.$_1$, p.f.$_2$, p.f.$_3$, ΔI % or
- f_{avg}, U_{LLavg}, P_{tot}, p.f. $_{avg}$

Four 4-20 mA/0-10 V interfaces are available for this. The measured values to be output are selected with a rotary coding switch. By using the analog output module it is possible to do without additional converters and their conventional installation/wiring in the main conducting path. Up to two modules of this type can be connected to one 3WL circuit breaker.

Analog output module

Digital input module

With the digital input module, up to 6 additional binary signals (24 V DC) in the circuit breaker environment can be connected to the system. It is thus possible for example to send messages concerning the state of a switch disconnector or a control cabinet door to the PROFIBUS DP/MODBUS.

With the digital input module on the **Cubicle**BUS it is also possible for the two different protection parameter sets held in the ETU76B Electronic Trip Unit trip unit to be switched over automatically in a few milliseconds. It is thus possible, for example, to automatically change the parameters of a tie-breaker should the transformer infeed fail.

One module each of this type can be used for holding the six items of digital information and for automatically switching over the parameters.

Digital input module

ZSI module (short-time discrimination control)

The use of ZSI modules is recommended when Siemens circuit breakers are arranged in several staggered levels but full discrimination with the smallest possible delay is to be assured nevertheless.

The circuit breakers are interconnected by these modules. In case of a short-circuit, each affected circuit breaker interrogates the circuit breakers directly downstream whether the short-circuit has also occurred in the next, lower level. The short-circuit is exactly localized as a result, and only the next upstream circuit breaker in the energy flow direction is switched off.

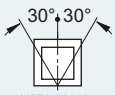
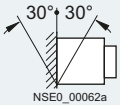
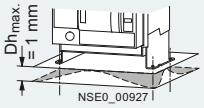
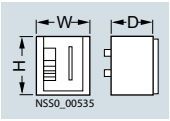
ZSI module (short-time discrimination control)

Technical specifications

Size		I				II			
Type		**... 3WL11 10**	**3WL11 12**	**3WL11 16**	**3WL11 20**	**3WL12 08**	**3WL12 10**	**3WL12 12**	**3WL12 16**
Number of poles		3-pole, 4-pole							
Rated current I_n at 40 °C, at 50/60 Hz									
Main conductor	A	... 1000	1250	1600	2000	800	1000	1250	1600
N-conductor (only on 4-pole versions)	A	... 1000	1250	1600	2000	800	1000	1250	1600
Rated operational voltage U_e at 50/60 Hz	V AC	...	...	...	...	...	...	...	...
(1000 V version, see Catalog LV 10 "Options")		690/1000	690/1000	690/1000	690/1000	690/1000	690/1000	690/1000	690/1000
Rated insulation voltage U_i	V AC	1000	1000	1000	1000	1000	1000	1000	1000
Rated impulse withstand voltage U_{imp}									
• Main conducting paths	kV	12	12	12	12	12	12	12	12
• Auxiliary circuits	kV	4	4	4	4	4	4	4	4
• Control circuits[9]	kV	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Isolating function acc. to EN 60947-2		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Utilization category		B							
Permissible ambient temperature									
• During operation (in operation with LCD max. 55 °C)[1]	°C	–25/+70	–25/+70	–25/+70	–25/+70	–25/+70	–25/+70	–25/+70	–25/+70
• Storage	°C	–40/+70	–40/+70	–40/+70	–40/+70	–40/+70	–40/+70	–40/+70	–40/+70
Permissible load for withdrawable versions at rear horizontal main circuit connections • Up to 55 °C (Cu bare)	A	1000	1250	1600	2000	800	1000	1250	1600
• Up to 60 °C (Cu bare)[2]	A	1000	1250	1600	1930	800	1000	1250	1600
• Up to 70 °C (Cu painted black)[2]	A	1000	1210	1490[3]	1780	800	1000	1250	1600
Rated rotor operational voltage U_{er}	V	2000	2000	2000	2000	2000	2000	2000	2000
Power loss at I_n									
With 3-phase symmetrical load									
• Fixed-mounted circuit breakers	W	100	105	150	240	40	45	80	85
• Withdrawable circuit breakers	W	195	205	350	440	85	95	165	175
Switching times									
• Make time	ms	35	35	35	35	35	35	35	35
• Opening time	ms	38	38	38	38	34	34	34	34
• Electrical make time (through closing coil)[4]	ms	80	80	80	80	100	100	100	100
• Electrical opening time (through shunt release)	ms	73	73	73	73	73	73	73	73
• Electrical opening time (instantaneous undervoltage release)	ms	73	73	73	73	73	73	73	73
• Opening time due to ETU, instantaneous short-circuit release	ms	50	50	50	50	50	50	50	50
Service life: Breaking capacity N and S, 3-/4-pole									
• Mechanical (without maintenance)	Operating cycles	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000
• Mechanical (with maintenance)[5]	Operating cycles	20 000	20 000	20 000	15 000	15 000	15 000	15 000	15 000
• Electrical (without maintenance)	Operating cycles	10 000	10 000	10 000	7500	7500	7500	7500	7500
• 1000 V version, electrical (without maintenance)	Oper. cycles	--	--	--	--	--	--	--	--
• 1150 V version, electrical (without maintenance)	Oper. cycles	--	--	--	--	--	--	--	--
• Electrical (with maintenance)[5]	Operating cycles	20 000	20 000	20 000	15 000	15 000	15 000	15 000	15 000
Service life: Breaking capacity H, 3-pole									
• Mechanical (without maintenance)	Operating cycles	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000
• Mechanical (with maintenance)[5]	Operating cycles	15 000	15 000	15 000	15 000	15 000	15 000	15 000	15 000
• Electrical (without maintenance)	Operating cycles	7 500	7 500	7 500	7500	7500	7500	7500	7500
• 1000 V version, electrical (without maintenance)	Oper. cycles	1000	1000	1000	1000	1000	1000	1000	1000
• 1150 V version, electrical (without maintenance)	Oper. cycles	--	--	--	--	500	500	500	500
• Electrical (with maintenance)[5][6]	Operating cycles	15 000	15 000	15 000	15 000	15 000	15 000	15 000	15 000
Service life: Breaking capacity H, 4-pole									
• Mechanical (without maintenance)	Operating cycles	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000
• Mechanical (with maintenance)[5]	Operating cycles	15 000	15 000	15 000	15 000	15 000	15 000	15 000	15 000
• Electrical (without maintenance)	Operating cycles	7 500	7 500	7 500	7500	7500	7500	7500	7500
• 1000 V version, electrical (without maintenance)	Oper. cycles	1000	1000	1000	1000	1000	1000	1000	1000
• 1150 V version, electrical (without maintenance)	Oper. cycles	--	--	--	--	500	500	500	500
• Electrical (with maintenance)[5][6]	Operating cycles	10 000	10 000	10 000	10 000	15 000	15 000	15 000	15 000
Service life: Breaking capacity C									
• Mechanical (without maintenance)	Operating cycles	--	--	--	--	5 000	5 000	5 000	5 000
• Mechanical (with maintenance)[5]	Operating cycles	--	--	--	--	10 000	10 000	10 000	10 000
• Electrical (without maintenance)	Operating cycles	--	--	--	--	5 000	5 000	5 000	5 000
• Electrical (with maintenance)[5]	Operating cycles	--	--	--	--	10 000	10 000	10 000	10 000
Switching frequency[7]									
• 690 V version	1/h	60[8]	60[8]	60[8]	60	60[8]	60[8]	60[8]	60[8]
• 1000 V version	1/h	--	--	--	20	20	20	20	20
• 1150 V version	1/h	--	--	--	--	20	20	20	20
Minimum interval between tripping operation by Electronic Trip Unit and next making operation of the circuit breaker (only with automatic mechanical resetting of the lockout device). Minimum interval between On-Off or Off-On switching operations.	ms	80	80	80	80	80	80	80	80

1) Use of trip units from –20 °C
2) ETU76B with graphics display can be used up to max. 55 °C.
3) At breaking capacity H: 1600 A to 70 °C.
4) Make time through closing coil for synchronization purposes (short-time excited) 50 ms.
5) Maintenance means: Replace main contact elements and arc chutes (see Operating Manual).
6) Replacement of the main contact elements of circuit breakers size I with breaking capacity H is only possible at the factory.
7) Minimum interval time between 2 tripping operations.
8) 3-pole switching with breaking capacity N and S: 45/h.
9) Motorized operating mechanisms U_{imp} = 1.2 kV

General data

Size			I				II			
Type			**... 3WL11 10**	**3WL11 12**	**3WL11 16**	**3WL11 20**	**3WL12 08**	**3WL12 10**	**3WL12 12**	**3WL12 16**
Mounting position			 NSE0_00061a and/or  NSE0_00062a				 NSE0_00927			
Degree of protection			IP20 without cabinet door, IP41 with door sealing frame, IP55 with cover							
Main conductor minimum cross-sections	• Copper bars, bare	Unit(s)	1 ×	2 ×	2 ×	3 ×	1 ×	1 ×	2 ×	2 ×
		mm^2	60 × 10	40 × 10	50 × 10	50 × 10	50 × 10	60 × 10	40 × 10	50 × 10
	• Copper bars, painted black	Unit(s)	1 ×	2 ×	2 ×	3 ×	1 ×	1 ×	2 ×	2 ×
		mm^2	60 × 10	40 × 10	50 × 10	50 × 10	50 × 10	60 × 10	40 × 10	50 × 10
Auxiliary conductors (Cu) Max. number Auxiliary conductors × cross-section (solid/stranded)	Standard connection = strain-relief clamp									
	• Without end sleeve		2 × 0.5 mm^2 (AWG 20) ... 2 × 1.5 mm^2 (AWG 16); 1 × 2.5 mm^2 (AWG 14)							
	• With end sleeve acc. to DIN 46228 Part 2		1 × 0.5 mm^2 (AWG 20) ... 1 × 1.5 mm^2 (AWG 16)							
	• With twin end sleeve		2 × 0.5 mm^2 (AWG 20) ... 2 × 1.5 mm^2 (AWG 16)							
	Optional connection = tension spring									
	• Without end sleeve		2 × 0.5 mm^2 (AWG 20) ... 2 × 2.5 mm^2 (AWG 14)							
	• With end sleeve acc. to DIN 46228 Part 2		2 × 0.5 mm^2 (AWG 20) ... 2 × 1.5 mm^2 (AWG 16)							
Position signaling switches	Tension spring terminals		1 × 0.5 mm^2 (AWG 20) ... 1 × 2.5 mm^2 (AWG 14)							
Weights 3-pole	• Fixed-mounted circuit breakers	kg	43	43	43	43	56	56	56	56
	• Withdrawable circuit breakers	kg	45	45	45	45	60	60	60	60
	• Guide frames	kg	25	25	25	25	31	31	31	31
4-pole	• Fixed-mounted circuit breakers	kg	50	50	50	50	67	67	67	67
	• Withdrawable circuit breakers	kg	54	54	54	54	72	72	72	72
	• Guide frames	kg	30	30	30	30	37	37	37	37
Dimensions 3-/4-pole  NSS0_00535		W mm	320/410				460/590			
	Fixed-mounted	H mm	434				434			
		D mm	291				291			
	Withdrawable	H mm	465.5				465.5			
		D mm	471				471			

Size			II				III		
Type			**3WL12 20**	**3WL12 25**	**3WL12 32**	**3WL12 40**	**3WL13 40**	**3WL13 50**	**3WL13 63**
Number of poles			3-pole, 4-pole						
Rated current I_n at 40 °C, at 50/60 Hz									
Main conductor		A	2000	2500	3200	4000	4000	5000	6300
N-conductor (only on 4-pole versions)		A	2000	2500	3200	4000	4000	5000	6300
Rated operational voltage U_e at 50/60 Hz		V AC	...	...	...	... 690	...	...	...
(1000 V version, see Catalog LV 10 "Options")			690/1000	690/1000	690/1000		690/1000	690/1000	690/1000
Rated insulation voltage U_i		V AC	1000	1000	1000	1000	1000	1000	1000
Rated impulse withstand voltage U_{imp}									
• Main conducting paths		kV	12	12	12	12	12	12	12
• Auxiliary circuits		kV	4	4	4	4	4	4	4
• Control circuits[10]		kV	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Isolating function acc. to EN 60947-2			Yes	Yes	Yes	Yes	Yes	Yes	Yes
Utilization category			B						
Permissible ambient temperature									
• During operation (in operation with LCD max. 55 °C)[1]		°C	–25/+70	–25/+70	–25/+70	–25/+70	–25/+70	–25/+70	–25/+70
• Storage		°C	–40/+70	–40/+70	–40/+70	–40/+70	–40/+70	–40/+70	–40/+70
Permissible load for withdrawable versions[2]	• Up to 55 °C (Cu bare)	A	2000	2500	3200	3950[3]	4000	5000	5920
	• Up to 60 °C (Cu bare)[4]	A	2000	2500	3020	3810	4000	5000	5810
	• Up to 70 °C (Cu painted black)[4]	A	2000	2280	2870	3600	4000	5000	5500
Rated rotor operational voltage U_{er}		V	2000	2000	2000	2000	2000	2000	2000
Power loss at I_n									
With 3-phase symmetrical load									
• Fixed-mounted circuit breakers		W	180	270	410	750	520	630	900
• Withdrawable circuit breakers		W	320	520	710	925	810	1050	1600
Switching times									
• Make time		ms	35	35	35	35	35	35	35
• Opening time		ms	34	34	34	34	34	34	34
• Electrical make time (through closing coil)[5]		ms	100	100	100	100	100	100	100
• Electrical opening time (through shunt release)		ms	73	73	73	73	73	73	73
• Electrical opening time (instantaneous undervoltage release)		ms	73	73	73	73	73	73	73
• Opening time due to ETU, instantaneous short-circuit release		ms	50	50	50	50	50	50	50
Service life: Breaking capacity N, S and H[11]									
• Mechanical (without maintenance)		Operating cycles	10000	10000	10000	10000	5000	5000	5000
• Mechanical (with maintenance)[6]		Operating cycles	15000	15000	15000	15000	10000	10000	10000
• Electrical (without maintenance) up to 690 V		Operating cycles	7500	7500	4000	2000	2000	2000	2000
• 1000 V version, electrical (without maintenance)		Operating cycles	1000	1000	1000	1000	1000	1000	1000
• 1150 V version, electrical[7] (without maintenance)		Operating cycles	500	500	500	500	500	500	500
• Electrical (with maintenance)[6]		Operating cycles	15000	15000	15000	15000	10000	10000	10000
Service life: Breaking capacity C									
• Mechanical (without maintenance)		Operating cycles	5000	5000	5000	--	5000	5000	5000
• Mechanical (with maintenance)[6]		Operating cycles	10000	10000	10000	--	10000	10000	10000
• Electrical (without maintenance) up to 690 V		Operating cycles	5000	5000	4000	--	1000	1000	1000
• Electrical (without maintenance) up to 1150 V		Operating cycles	--	--	--	--	500	500	500
• Electrical (with maintenance) up to 690 V[6]		Operating cycles	10000	10000	8000	--	--	--	--
Switching frequency[8]									
• 690 V version		1/h	60[9]	60[9]	60[9]	60[9]	60	60	60
• 1000 V version		1/h	20	20	20	20	20	20	20
• 1150 V version[7]		1/h	20	20	20	20	20	20	20
Minimum interval between tripping operation by Electronic Trip Unit and next making operation of the circuit breaker (only with automatic mechanical resetting of the lockout device).		ms	80	80	80	80	80	80	80
Minimum interval between On-Off or Off-On switching operations.									

1) Use of trip units from –20 °C

2) 4000 A, size II in fixed-mounted version, 3-pole.

3) Derating factors for fixed mounting of 3WL12 40.

4) ETU76B with graphics display can be used up to max. 55 °C.

5) Make time through closing coil for synchronization purposes (short-time excited) 50 ms.

6) Maintenance means: Replace main contact elements and arc chutes (see Operating Manual).

7) Size II with order code "A15" and size III: data for very high breaking capacity.

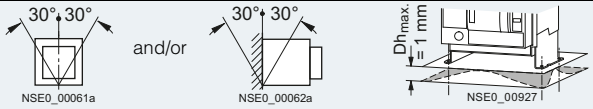
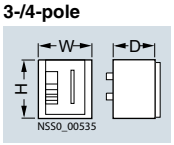
8) Minimum interval time between 2 tripping operations.

9) 3-pole switching with breaking capacity N and S: 45/h.

10) Motorized operating mechanisms U_{imp} = 1.2 kV

11) 1000 V and 1150 V versions only in the case of H breaking capacity

General data

Size			II				III		
Type			**3WL12 20**	**3WL12 25**	**3WL12 32**	**3WL12 40**	**3WL13 40**	**3WL13 50**	**3WL13 63**
Mounting position									
Degree of protection			IP20 without cabinet door, IP41 with door sealing frame, IP55 with cover						
Main conductor minimum cross-sections	• Copper bars, bare	Unit(s) mm²	3 × 50 × 10	2 × 100 × 10	3 × 100 × 10	4 × 120 × 10	4 x 100 x 10	6 x 100 x 10	6 x 120 x 10
	• Copper bars, painted black	Unit(s) mm²	3 × 50 × 10	2 × 100 × 10	3 × 100 × 10	4 × 100 × 10[1]	4 × 100 × 10	6 × 100 × 10	6 × 120 × 10
Auxiliary conductors (Cu) Max. number of auxiliary conductors × cross-section (solid/stranded)	Standard connection = strain-relief clamp • Without end sleeve • With end sleeve acc. to DIN 46228 Part 2 • With twin end sleeve Optional connection = tension spring • Without end sleeve • With end sleeve acc. to DIN 46228 Part 2		2 × 0.5 mm² (AWG 20) ... 2 × 1.5 mm² (AWG 16); 1 × 2.5 mm² (AWG 14) 1 × 0.5 mm² (AWG 20) ... 1 × 1.5 mm² (AWG 16) 2 × 0.5 mm² (AWG 20) ... 2 × 1.5 mm² (AWG 16) 2 × 0.5 mm² (AWG 20) ... 2 × 2.5 mm² (AWG 14) 2 × 0.5 mm² (AWG 20) ... 2 × 1.5 mm² (AWG 16)						
Position signaling switches	Tension spring terminals		1 × 0.5 mm² (AWG 20) ... 1 × 2.5 mm² (AWG 14)						
Weights 3-pole	• Fixed-mounted circuit breakers	kg	56	59	64	85	82	82	90
	• Withdrawable circuit breakers	kg	60	63	68	121	88	88	96
	• Guide frames	kg	31	39	45	52	60	60	70
4-pole	• Fixed-mounted circuit breakers	kg	67	71	77	103	99	99	108
	• Withdrawable circuit breakers	kg	72	76	82	146	106	106	108
	• Guide frames	kg	37	47	54	62	84	84	119
Dimensions 3-/4-pole 		W mm	460/590				704/914		
	Fixed-mounted	H mm	434				434		
		D mm	291				291		
	Withdrawable	H mm	465.5				465.5		
		D mm	471				471		

Minimum main conductor cross-sections for 4-pole withdrawable circuit breakers: 4 x 120 x 10 mm.

Calculating the power consumption of the **Cubicle**BUS modules for SENTRON WL with **Cubicle**BUS system

CubicleBUS module	Number of modules per CubicleBUS	Max. continuous current per module from the CubicleBUS	Max. startup current per module from the CubicleBUS
ETU45B Electronic Trip Unit	1	120 mA	2000 mA
ETU76B Electronic Trip Unit	1	170 mA	2000 mA
Metering function PLUS	1	120 mA	120 mA
Breaker Status Sensor BSS	1	40 mA	110 mA
COM15 PROFIBUS communication module	1	125 mA	280 mA
ZSI module	1	50 mA	125 mA
Digital output modules with rotary coding switch, relay outputs	1-2	180 mA	125 mA
Digital output modules, configurable, relay outputs	1	180 mA	125 mA
Analog output modules	1-2	110 mA	800 mA
Digital input modules	1-2	30 mA	125 mA
BDA PLUS	1	250 mA	350 mA

Size				**I to III**
Type				**3WL1**
Manual operating mechanism with mechanical closing				
Switching on/charging the energy store	Max. force required to operate the hand lever Required number of strokes on the hand lever		N	≤ 230 9
Manual operating mechanism with mechanical and electrical closing				
Charging the energy store				
Closing coil (CC)	• Primary operating range			0.85 ... 1.1 × U_s
	• Extended operating range for battery operation	At 24 V DC, 48 V DC 60 V DC, 110 V DC 220 V DC		0.7 ... 1.26 × U_s
	• Rated control supply voltage U_s	50/60 Hz AC DC	V V	110 ... 127; 208 ... 240 24; 30; 48; 60; 110 ... 125; 220 ... 250
	• Power consumption	AC/DC	VA/ W	15/15
	• Min. command duration at U_s for the closing coil		ms	60
	• Short-circuit protection Smallest permissible DIAZED fuse (operational class gL)/ automatic circuit breaker with C characteristic			1 A TDz (slow)/1 A
Manual/motorized operating mechanism with mechanical and electrical closing				
Manual operating mechanism				For data, see above.
Motor	• Primary operating range			0.85 ... 1.1 × U_s
	• Extended operating range for battery operation	At 24 V DC, 48 V DC 60 V DC, 110 V DC 220 V DC		0.7 ... 1.26 × U_s
	• Power consumption of motor	AC/DC	VA/ W	135/135
	• Time required to charge the spring energy store at 1 × U_s		s	≤ 10
Closing coil				For data, see above.
For motor and closing coil	• Short-circuit protection Smallest permissible DIAZED fuse (operational class gL)/ automatic circuit breaker with C characteristic; Motor and closing coil for same rated control supply voltages			6 A TDz (slow)/2 A
	• Smallest permissible DIAZED fuse (operational class gL)/ automatic circuit breaker with C characteristic (for different rated control supply voltages)	At U_s = 24 ... 30 V At U_s = 48 ... 60 V At U_s = 110 ... 125 V DC/ 110 ... 127 V AC At U_s = 220 ... 250 V DC/ 208 ... 240 V AC		6 A 6 A 2 A 2 A
Signals of the Electronic Trip Unit				
Measuring accuracy of the Electronic Trip Unit				Protection functions acc. to EN 60947; Current indication ≤ 10%; Metering function for base quantities ≤ 1%; Metering function for derived quantities ≤ 4%
Auxiliary releases				
Undervoltage releases UVR (F3) and UVR-t_d (F4)	• Response values	Pickup Dropout		≥ 0.85 × U_s (circuit breaker can be closed) 0.35 ... 0.7× U_s (circuit breaker is opened)
	• Primary operating range			0.85 ... 1.1
	• Extended operating range for battery operation	At 24 V DC, 30 V DC, 48 V DC, 110 V DC, 220 V DC		0.85 ... 1.26
	• Rated control supply voltage U_s	Instantaneous 50/60 Hz AC DC Delayed 50/60 Hz AC DC	 V V V V	 110 ... 127/208 ... 240/380 ... 415 24/30/48/60/110 ... 125/220 ... 250[1)] 110 ... 127; 208 ... 240; 380 ... 415 48; 110 ... 125; 220 ... 250
	• Power consumption (pickup/uninterrupted duty)	AC DC	VA W	20/5 20/5
	• Opening time of the circuit breaker at U_s = 0 - Version UVR (F3) Without delay With delay - Version UVR-t_d (F8) With delay, t_d = 0.2 to 3.2 s Reset through additional NC contact – direct tripping		ms ms ms s ms	200 80 200 0.2 ... 3.2 ≤ 100
	• Short-circuit protection Smallest permissible DIAZED fuse (operational class gL)/ automatic circuit breaker with C characteristic			1 A TDz (slow)/1 A

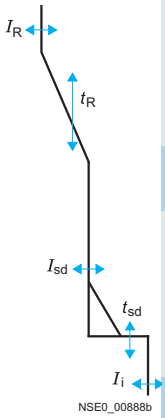
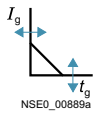
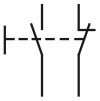
[1)] 24 V and 30 V only with undervoltage release UVR (F3).

General data

Size						**I to III**		
Type						**3WL1**		
Auxiliary releases								
Shunt releases (ST) (F1, F2)	• For continuous command (100% OP), locks out on momentary-contact commands	- Response value	Pickup			> 0.7 × U_s (circuit breaker is tripped)		
		- Primary operating range				0.85 ... 1.1 × U_s		
		- Extended operating range for battery operation	At 24 V DC, 48 V DC 60 V DC, 110 V DC 220 V DC			0.7 ... 1.26 × U_s		
		- Rated control supply voltage U_s	50/60 Hz AC DC	V V		110 ... 127; 208 ... 240 24; 30; 48; 60; 110 ... 125; 220 ... 250		
		- Power consumption	AC/DC	VA/W		15/15		
		- Min. command duration at U_s		ms		60		
		- Opening time of circuit breaker at U_s = 100%	At AC/DC	ms		80		
		- Short-circuit protection Smallest permissible DIAZED fuse (operational class gL)/ automatic circuit breaker with C characteristic				1 A TDz (slow)/1 A		
	5% OP	- Response value	Pickup			> 0.7 × U_s (circuit breaker is tripped)		
		- Primary operating range				0.85 ... 1.1 × U_s		
		- Extended operating range for battery operation	At 24 V DC, 48 V DC 60 V DC, 110 V DC 220 V DC			0.7 ... 1.26 × U_s		
		- Rated control supply voltage U_s	50/60 Hz AC DC	V V		110 ... 127; 208 ... 240 24; 48; 110 ... 125; 220 ... 250		
		- Power consumption	AC/DC	VA/W		15/15		
		- Min. command duration at U_s		ms		25		
		- Opening time of circuit breaker at U_s = 100%	At AC/DC	ms		50		
		- Short-circuit protection Smallest permissible DIAZED fuse (operational class gL)/ automatic circuit breaker with C characteristic				1 A TDz (slow)/1 A		
	• With spring energy store consisting of shunt release and capacitor storage device	- Rated control supply voltage U_s	50/60 Hz AC DC	V V		110; 230 110; 220		
		- Primary operating range				0.85 ... 1.1 × U_s		
		- Power consumption	AC/DC	VA/W		1/1		
		- Storage time at U_s/ Recharging time at U_s				max. 5 min/min. 5 s		
		- Opening time of the circuit breaker, short-circuit protection				As with "for continuous command"		
Remote reset solenoid for mechanical tripped indicator (F7)								
Remote reset solenoid for mechanical tripped indicator (F7)		- Primary operating range				0.85 ... 1.1 × U_s		
		- Extended operating range for battery operation	At 24 V DC, 48 V DC 110 V DC 220 V DC			0.7 ... 1.26 × U_s		
		- Power consumption	AC/DC	VA/W		50/50		
		- Min. command duration at U_s for the remote reset solenoid		ms		60		
		- Short-circuit protection Smallest permissible DIAZED fuse (operational class gL)/ automatic circuit breaker with C characteristic				2 A TDz (slow)/1 A at 24 V DC and 48 V DC, 1 A TDz (slow)/1 A at 110 V and 208 ... 250 V		
Contact position-driven auxiliary switches (S1, S2, S3, S4, S7, S8)								
Rated insulation voltage U_i				V AC/DC		500		
Rated operational voltage U_e				V AC/DC		500		
Rated impulse withstand voltage U_{imp}				kV		4		
Breaking capacity	• Alternating current 50/60 Hz	- Rated operational voltage U_e		V		24 ... 230		380/400
		- Rated operational current I_e/AC-12 I_e/AC-15		 A A		 10 4		 10 3
	• Direct current	- Rated operational voltage U_e		V	24	48	110	220
		- Rated operational current I_e/DC-12 I_e/DC-13		 A A	 10 8	 8 4	 3.5 1.2	 1 0.4
Short-circuit protection	• Largest permissible DIAZED fuse (operational class gL) • Largest permissible miniature circuit breaker with C characteristic					10 A TDz, 10 A Dz 10 A		

Size				**I to III**			
Type				**3WL1**			
Ready-to-close signaling switches (S20) (acc. to DIN VDE 0630)							
Breaking capacity	• Alternating current	- Rated operational voltage U_e - Rated operational current I_e	V A	250 8			
	• Direct current	- Rated operational voltage U_e - Rated operational current I_e	V A	125 0.4	250 0.2		
Short-circuit protection	Largest permissible DIAZED fuse (operational class gL)			2 A Dz (quick)			
Tripped signaling switches (S24) and signaling switches for auxiliary releases (S22, S23) (acc. to DIN VDE 0630)							
Breaking capacity	• Alternating current	- Rated operational voltage U_e - Rated operational current I_e/AC-12	V A	250 8			
	• Direct current	- Rated operational voltage U_e - Rated operational current I_e/DC-12	V A	24 6	125 0.4	250 0.2	
Short-circuit protection	Largest permissible DIAZED fuse (operational class gL)			6 A Dz (quick)			
Tripped signaling switch	Signal duration after tripping			Until manual or electrical remote reset (option)			
Position signaling switch on guide frame							
Type of contact	• Signal:	- "Circuit breaker in connected position" - "Circuit breaker in test position" - "Circuit breaker in disconnected position"		3 CO 2 CO 1 CO	or	1 CO 1 CO 1 CO	
Rated insulation voltage U_i		50/60 Hz AC DC	V V	440 250			
Rated operational voltage U_e			V	250			
Rated impulse withstand voltage U_{imp}			kV	4			
Breaking capacity	• Rated operational current I_e	- I_e/AC-12 - I_e/AC-15 - I_e/DC-12 - I_e/DC-13 - A 300 (AC) - R 300 (DC)		24 V 10 A, 110/127 V 10 A, 220/240 V 10 A, 320/440 V 10 A 220/240 V 4 A, 320/440 V 3 A, 24 V 10 A, 48 V 2.5 A, 220/240 V 0.2 A, 24 V 3.0 A, 220/240 V 0.1 A 120 V 6 A, 240 V 3 A 125 V 0.22 A, 250 V 0.11 A			
Short-circuit protection	• Largest permissible DIAZED fuse (operational class gL) • Largest permissible automatic circuit breaker with C characteristic			8 A TDz (slow) 8 A TDz (slow)			

General data

Protection functions Parameterization by			ETU15B D	ETU25B D	ETU27B D & S
Function overview of the electronic trip system					
		**Overload protection**	✓	✓	✓
		Function can be switched on/off	--	--	--
		Setting range $I_R = I_n \times$ ...	0.5-0.55-0.6-0.65-0.7-0.75-0.8-0.85-0.9-1	0.4-0.45-0.5-0.55-0.6-0.65-0.7-0.8-0.9-1	0.4-0.45-0.5-0.55-0.6-0.65-0.7-0.8-0.9-1
	L	Switchable overload protection (I^2t- or I^4t-dependent function)	--	--	--
		Setting range for time-lag class t_R at I^2t	10 s fixed	10 s fixed	10 s fixed
		Setting range for time-lag class t_R at I^4t	--	--	--
		Thermal memory can be switched on/off	--	--	--
		Phase failure sensitivity	--	At t_{sd} = 20 ms (M)	At t_{sd} = 20 ms (M)
	N	**N-conductor protection**	--	--	✓
		Function can be switched on/off	--	--	✓
		N-conductor setting range $I_N = I_n \times$ ...	--	--	1
		Short-time delayed short-circuit protection	--	✓	✓
		Function can be switched on/off	--	--	--
		Setting range $I_{sd} = I_n \times$ ...	--	1.25-1.5-2-2.5-3-4-6-8-10-12	1.25-1.5-2-2.5-3-4-6-8-10-12
	S	Setting range of delay time t_{sd}	--	0-M-100-200-300-400 ms	0-M-100-200-300-400 ms
		Switchable short-time delayed short-circuit protection (I^2t-dependent function)	--	--	--
		Setting range of delay time t_{sd} at I^2t	--	--	--
		ZSI function	--	--	--
NSE0_00888b	I	**Instantaneous short-circuit protection**	✓	✓	✓
		Function can be switched on/off	--	--	--
		Setting range $I_i = I_n \times$ ...	2-3-4-5-6-7-8	Fixed for $I_i \geq 20 \times I_n$, max. 50 kA	Fixed for $I_i \geq 20 \times I_n$, max. 50 kA
		Ground-fault protection	--	--	✓ permanently installed
		Tripping and alarm functions	--	--	--
		Tripping function can be switched on/off	--	--	✓
		Alarm function can be switched on/off	--	--	--
		Detection of the ground-fault current through summation current formation with internal or external N-conductor transformer	--	--	✓
NSE0_00889a	G	Detection of ground-fault current through external current transformer	--	--	--
		Setting range of the response current I_g for tripping	--	--	A-B-C-D-E
		Setting range of the response current I_a for alarm	--	--	--
		Setting range of the delay time t_g	--	--	100-200-300-400-500 ms
		Switchable ground-fault characteristic (I^2t-dependent function)	--	--	--
		Setting range for delay time t_g at I^2t	--	--	--
		ZSI-G function	--	--	--
Parameter set changeover					
		Switchable between parameter set A and B	--	--	--
LCD					
		Alphanumeric LCD (4-line)	--	--	--
		Graphical LCD (24 V, external power supply required)	--	--	--
Communication					
		CubicleBUS integrated	--	--	--
		Communications capability via PROFIBUS DP	--	--	--
Metering function					
		Metering capability with metering function *Plus*	--	--	--
LED display					
		Electronic Trip Unit active	✓	✓	✓
		Alarm	✓	✓	✓
		ETU fault	✓	✓	✓
		L tripping operation	--	✓	✓
NSE0_00890		S tripping operation	--	✓	✓
		I tripping operation	--	✓	✓
		N tripping operation	--	--	✓
		G tripping operation	--	--	✓
		G alarm	--	--	--
		Tripping operation as a result of extended protection function	--	--	--
		Communication	--	--	--
Signals from signaling switches with external CubicleBUS modules (relays)					
		Overload warning	--	--	--
		Load shedding, load absorbing	--	--	--
		Leading signal overload trip 200 ms	--	--	--
		Temperature alarm	--	--	--
		Phase unbalance	--	--	--
NSE0_00891		Instantaneous short-circuit trip	--	--	--
		Short-time delayed short-circuit trip	--	--	--
		Overload trip	--	--	--
		Neutral conductor trip	--	--	--
		Ground-fault protection trip	--	--	--
		Ground-fault alarm	--	--	--
		Auxiliary relay	--	--	--
		ETU fault	--	--	--

Delay time figures given in ms.
M = Motor protection, corresponds to 20 ms.
D = Rotary coding switch
D & S = Rotary coding and slide switch
K = Communication
M/K = Menu/Communication

✓ Available.
-- Not available.
❑ Optional.

For the setting range of the response current I_g, see page 35.

Protection functions **Parameterization by**	**ETU45B** **D & S**	**ETU76B** **M/K**
Function overview of the electronic trip system		
Overload protection	✓	✓
Function can be switched on/off	--	✓
Setting range $I_R = I_n \times ...$	0.4-0.45-0.5-0.55-0.6-0.65-0.7-0.8-0.9-1	0.4 ... 1
Switchable overload protection (I^2t- or I^4t-dependent function)	✓	✓
Setting range for time-lag class t_R at I^2t	2-3.5-5.5-8-10-14-17-21-25-30 s	2 ... 30 s
Setting range for time-lag class t_R at I^4t	1-2-3-4-5 s	1 ... 5 s
Thermal memory can be switched on/off	✓	✓
Phase failure sensitivity	At t_{sd} = 20 ms (M)	✓ (on/off)
N-conductor protection	✓	✓
Function can be switched on/off	✓	✓
N-conductor setting range $I_N = I_n \times ...$	0.5 ... 1	0.2 ... 2
Short-time delayed short-circuit protection	✓	✓
Function can be switched on/off	✓	✓
Setting range $I_{sd} = I_n \times ...$	1.25-1.5-2-2.5-3-4-6-8-10-12	1.25 × I_n ... 0.8 × I_{cw}
Setting range of delay time t_{sd}	M-100-200-300-400 ms	M-80 ... 4000 ms
Switchable short-time delayed short-circuit protection (I^2t-dependent function)	✓	✓
Setting range of delay time t_{sd} at I^2t	100-200-300-400 ms	100 ... 400 ms
ZSI function	By **Cubicle**BUS module	By **Cubicle**BUS module
Instantaneous short-circuit protection	✓	✓
Function can be switched on/off	✓	✓
Setting range $I_i = I_n \times ...$	1.5-2.2-3-4-6-8-10-12-0.8 x I_{cs}	1.5 × I_n ... 0.8 × I_{cs}
Ground-fault protection	❑ Module can be retrofitted	❑ Module can be retrofitted
Tripping and alarm functions	✓	✓
Tripping function can be switched on/off	✓	✓
Alarm function can be switched on/off	--	✓
Detection of the ground-fault current through summation current formation with internal or external N-conductor transformer	✓	✓
Detection of ground-fault current through external current transformer	✓	✓
Setting range of the response current I_g for tripping	A-B-C-D-E	A ... E
Setting range of the response current I_g for alarm	A-B-C-D-E	A ... E
Setting range of the delay time t_g	100-200-300-400-500 ms	100 ... 500 ms
Switchable ground-fault characteristic (I^2t-dependent function)	✓	✓
Setting range for delay time t_g at I^2t	100-200-300-400-500 ms	100 ... 500 ms
ZSI-G function	By **Cubicle**BUS module	By **Cubicle**BUS module
Parameter set changeover		
Switchable between parameter set A and B	--	✓
LCD		
Alphanumeric LCD (4-line)	❑	--
Graphical LCD (24 V, external power supply required)	--	✓
Communication		
CubicleBUS integrated	✓	✓
Communications capability via PROFIBUS DP	✓	✓
Metering function		
Metering capability with metering function *Plus*	✓	✓
LED display		
Electronic Trip Unit active	✓	✓
Alarm	✓	✓
ETU fault	✓	✓
L tripping operation	✓	✓
S tripping operation	✓	✓
I tripping operation	✓	✓
N tripping operation	✓	✓
G tripping operation	✓ (Only with ground-fault protection module)	✓ (Only with ground-fault protection module)
G alarm	✓ (Only with ground-fault protection module)	✓ (Only with ground-fault protection module)
Tripping operation as a result of extended protection functions	✓	✓
Communication	✓	✓
Signals from signaling switches with external CubicleBUS **modules (relays)**		
Overload warning	✓	✓
Load shedding, load absorbing	✓	✓
Leading signal overload trip 200 ms	✓	✓
Temperature alarm	✓	✓
Phase unbalance	✓	✓
Instantaneous short-circuit trip	✓	✓
Short-time delayed short-circuit trip	✓	✓
Overload trip	✓	✓
Neutral conductor trip	✓	✓
Ground-fault protection trip	✓ (Only with ground-fault protection module)	✓ (Only with ground-fault protection module)
Ground-fault alarm	✓ (Only with ground-fault protection module)	✓ (Only with ground-fault protection module)
Auxiliary relay	✓	✓
ETU fault	✓	✓

Setting range of the response current I_g

	Size I and size II	Size III
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

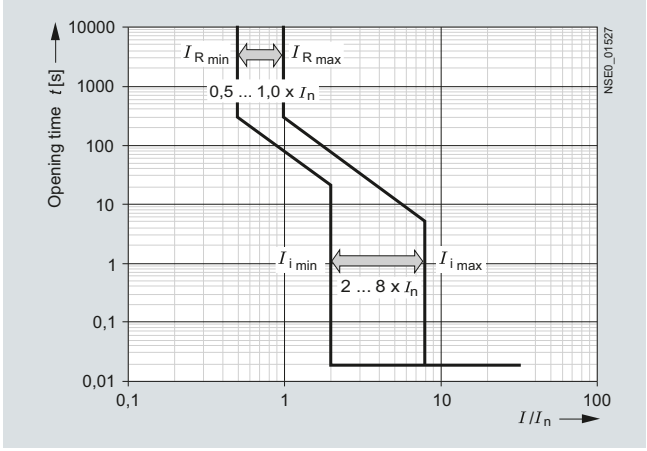
Increment size when settings are made for the ETU76B using the menu

From ... to	Increment size	From ... to	Increment size
0 ... 1	0.1	1000 ... 1600	50
1 ... 100	1	1600 ... 10000	100
100 ... 500	5	10000 ... max	1000
500 ... 1000	10		

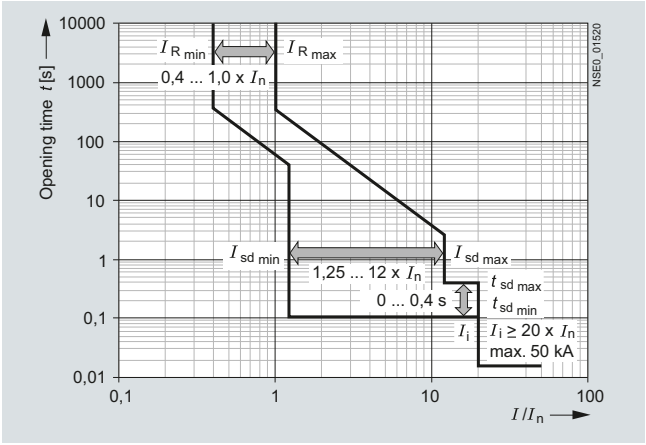
For the legend, see page 34.

Characteristic curves[2)]

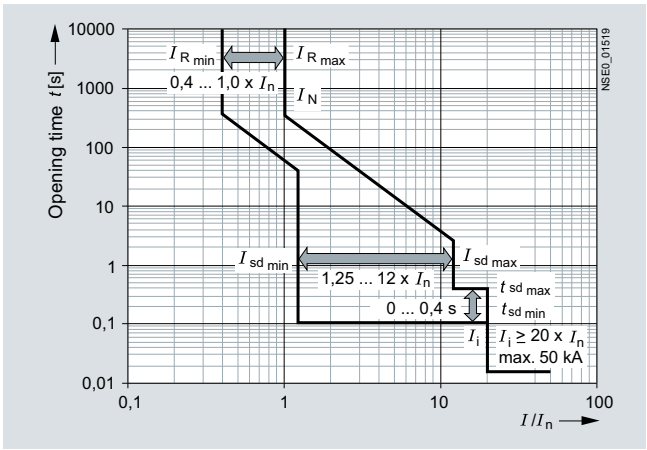
Every Electronic Trip Unit type and every setting has its own characteristic curve. Only a selection is shown in the following. The characteristic curves each show the largest and smallest setting range of 3WL circuit breakers with 1000 A rated current at 500 V rated voltage with various trip units. In order to obtain a complete tripping characteristic curve, the relevant parts of the characteristic curves have to be combined. The characteristic curves show the behavior of the Electronic Trip Unit when it is activated by a current that is already flowing before the tripping operation. If the overcurrent tripping occurs immediately after closing and the Electronic Trip Unit is therefore not yet activated, the opening time is extended, depending on the level of the overcurrent by up to 15 ms. To determine the break-times of the circuit breakers, approximately 15 ms must be added to the opening times shown for the arcing time.
For tolerances, see legend below.
The characteristic curves shown apply to ambient temperatures at the circuit breaker between –5 and +55 °C. The trip unit can be operated at ambient temperatures of –20 to +70 °C. An extended tolerance band can apply at these temperatures.



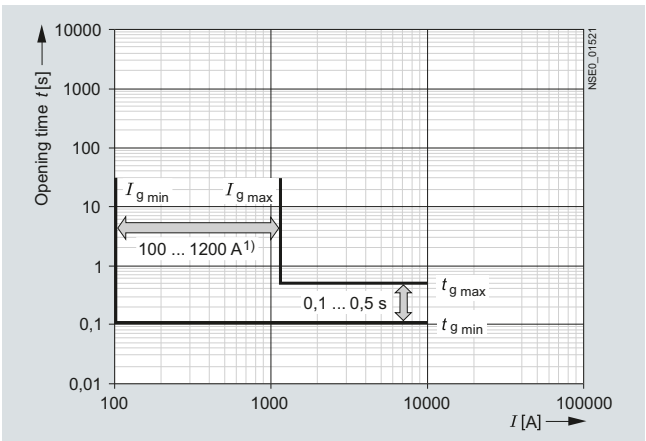
3WL circuit breaker with ETU15B Electronic Trip Unit



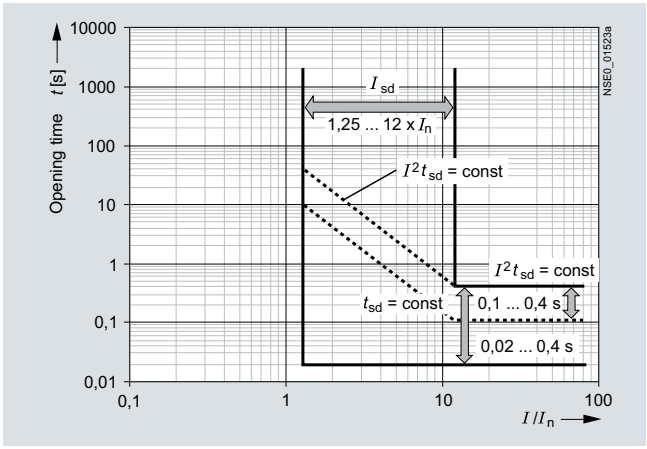
3WL circuit breaker with ETU25B Electronic Trip Unit,
LSI characteristic curve



3WL circuit breaker with ETU27B Electronic Trip Unit,
LSIN characteristic curve



3WL circuit breaker with ETU27B Electronic Trip Unit,
G characteristic curve



3WL circuit breaker with ETU45B Electronic Trip Unit,
S characteristic curve

Tolerances for the current settings
L: Tripping operations between 1.05 and 1.2 x I_R
S: –0%, +20%
I: –0%, +20%
G: –0%, +20%

Tolerances for the tripping times
L: –20%, +0% for I^2t characteristic curve
S: –0%, +60 ms or –0%, 10% for tripping times greater than 600 ms
I: <50 ms
G: –0%, +60 ms or –0%, 10% for tripping times greater than 600 ms

1) Sizes I and II: 100 ... 1200 A
Size III: 400 ... 1200 A.

2) With a single-pole load in the lowest rated current range, the response times of the short-circuit trip can increase by approx. 10% and the tripping times by approx. 15% with respect to the characteristic curve.

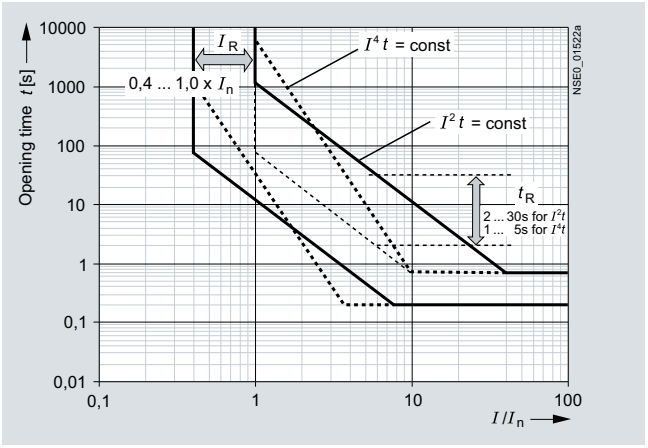
Every Electronic Trip Unit type and every setting has its own characteristic curve. Only a selection is shown in the following. The characteristic curves each show the largest and smallest setting range of 3WL circuit breakers with 1000 A rated current at 500 V rated voltage with various trip units.

In order to obtain a complete tripping characteristic curve, the relevant parts of the characteristic curves have to be combined.

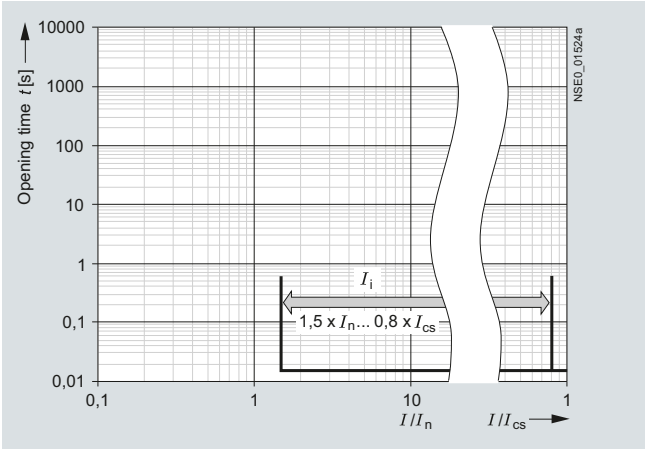
The characteristic curves show the behavior of the Electronic Trip Unit when it is activated by a current that is already flowing before the tripping operation. If the overcurrent tripping occurs immediately after closing and the Electronic Trip Unit is therefore not yet activated, the opening time is extended, depending on the level of the overcurrent by up to 15 ms. In order to determine the total break-times of the circuit breakers, approximately 15 ms must be added to the opening times shown for the arcing time.

For tolerances, see legend below.

The characteristic curves shown apply to ambient temperatures at the circuit breaker between –5 and +55 °C. The trip unit can be operated at ambient temperatures of –20 to +70 °C (ETU76B with graphic display up to +55 °C). An extended tolerance band can apply at these temperatures.

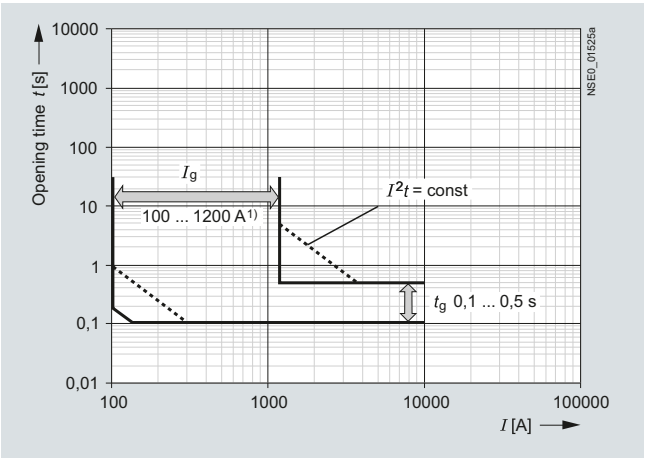


3WL circuit breaker with ETU45B and ETU76B Electronic Trip Unit, L characteristic curve

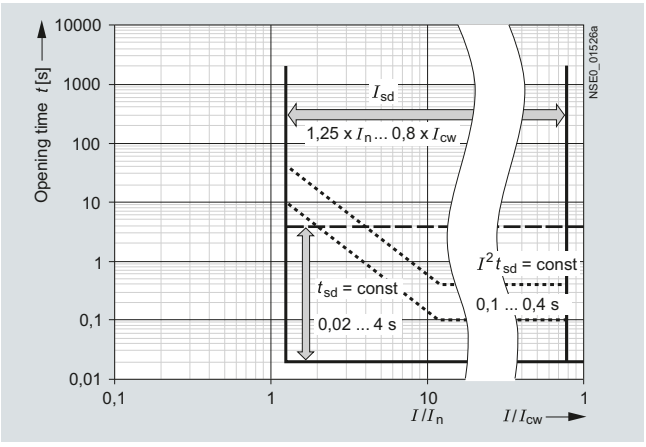


3WL circuit breaker with ETU45B and ETU76B Electronic Trip Unit, I characteristic curve

[1] Sizes I and II: 100 ... 1200 A
Size III: 400 ... 1200 A.



3WL circuit breaker with ETU45B and ETU76B Electronic Trip Unit, G characteristic curve



3WL circuit breaker with ETU76B Electronic Trip Unit, S characteristic curve

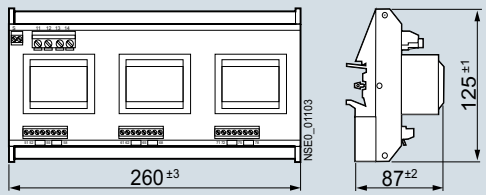
Further characteristic curves are shown in the manual and the planning and configuring tool SIMARIS design, or ask your Siemens contact person.

Tolerances for the current settings
L: Tripping operations between 1.05 and 1.2 x I_R
S: –0%, +20%
I: –0%, +20%
G: –0%, +20%

Tolerances for the tripping times
L: –20%, +0% for I^2t characteristic curve
S: –0%, +60 ms or –0%, 10% for tripping times greater than 600 ms
I: <50 ms
G: –0%, +60 ms or –0%, 10% for tripping times greater than 600 ms

Dimensional drawings

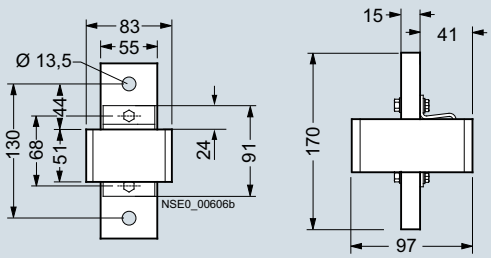
Voltage transformers for 3WL air circuit breakers



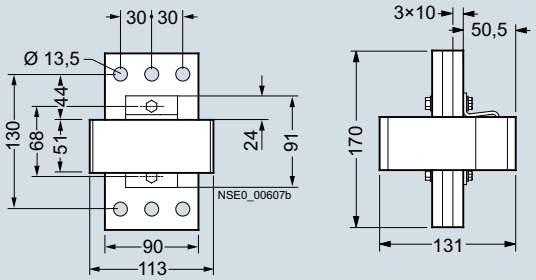
Current transformers for overload protection in the N-conductor

External current transformers for N-conductor with copper connection pieces

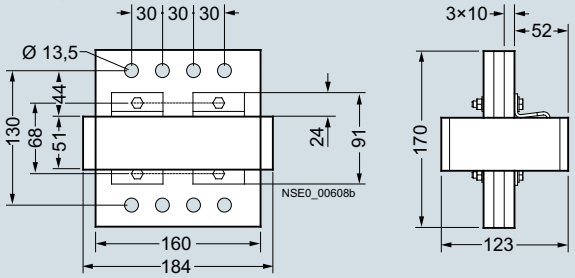
Size I, 3WL9111-0AA31-0AA0



Size II, 3WL9111-0AA32-0AA0

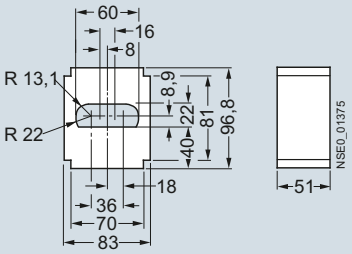


Size III, 3WL9111-0AA33-0AA0

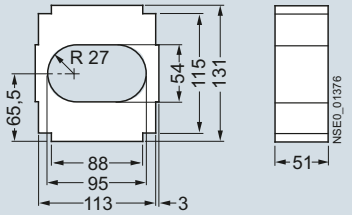


External current transformers for N-conductor without copper connection pieces

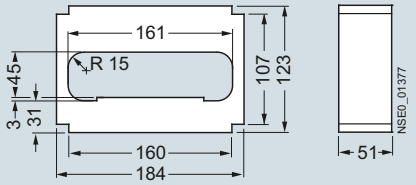
Size I, 3WL9111-0AA21-0AA0



Size II, 3WL9111-0AA22-0AA0

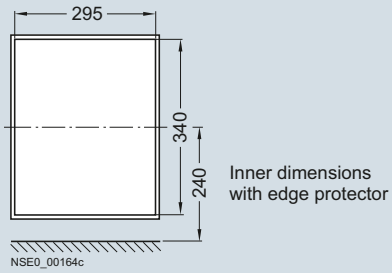


Size III, 3WL9111-0AA23-0AA0



Door cutout for operator panel

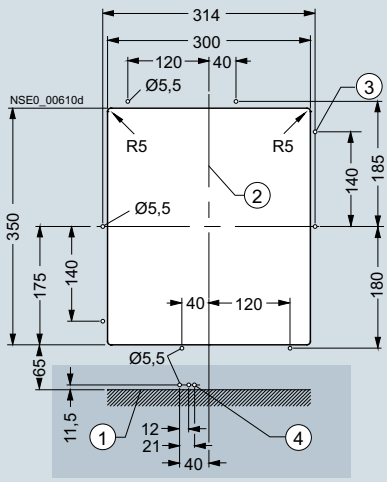
Door cutout with edge protector



Inner dimensions with edge protector

Door cutout for operator panel using the door sealing frame

Option with/without door interlocking



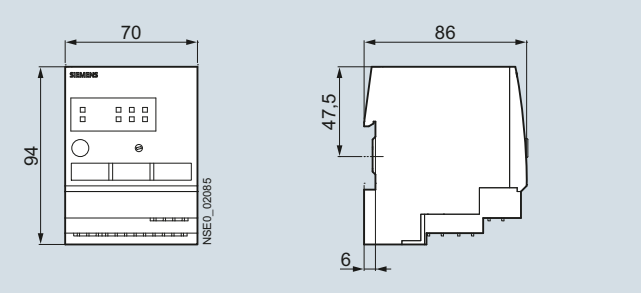
Dimensions for option with door interlocking

Dimensions for option with door interlocking

1) Mounting surface
2) Center 3WL circuit breaker operator panel
3) 8 mounting holes for door sealing frame
4) 3 mounting holes for door sealing frame

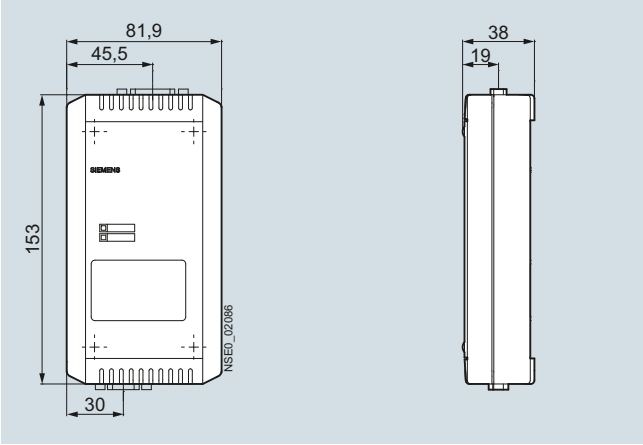
CubicleBUS modules

3WL9 111-0AT2.-0AA0

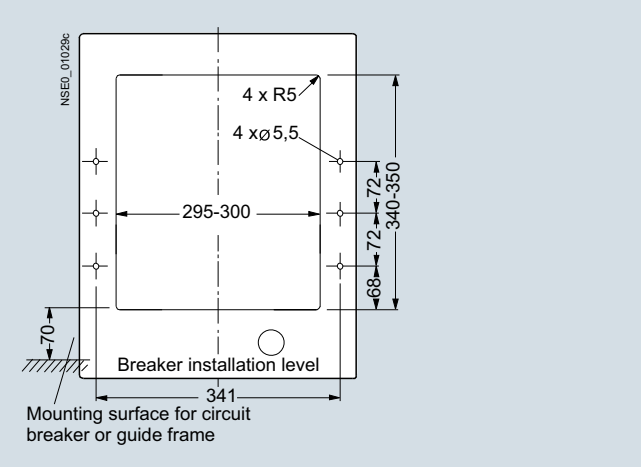


Breaker Data Adapter (BDA Plus)

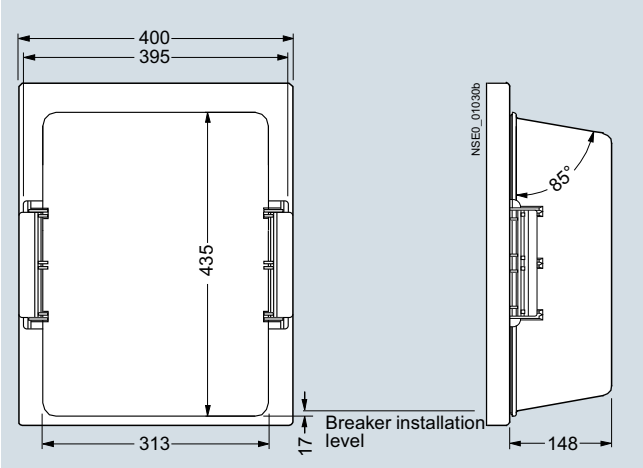
3WL9 111-0AT33-0AA0



Door cutout for operator panel using IP55 protective cover



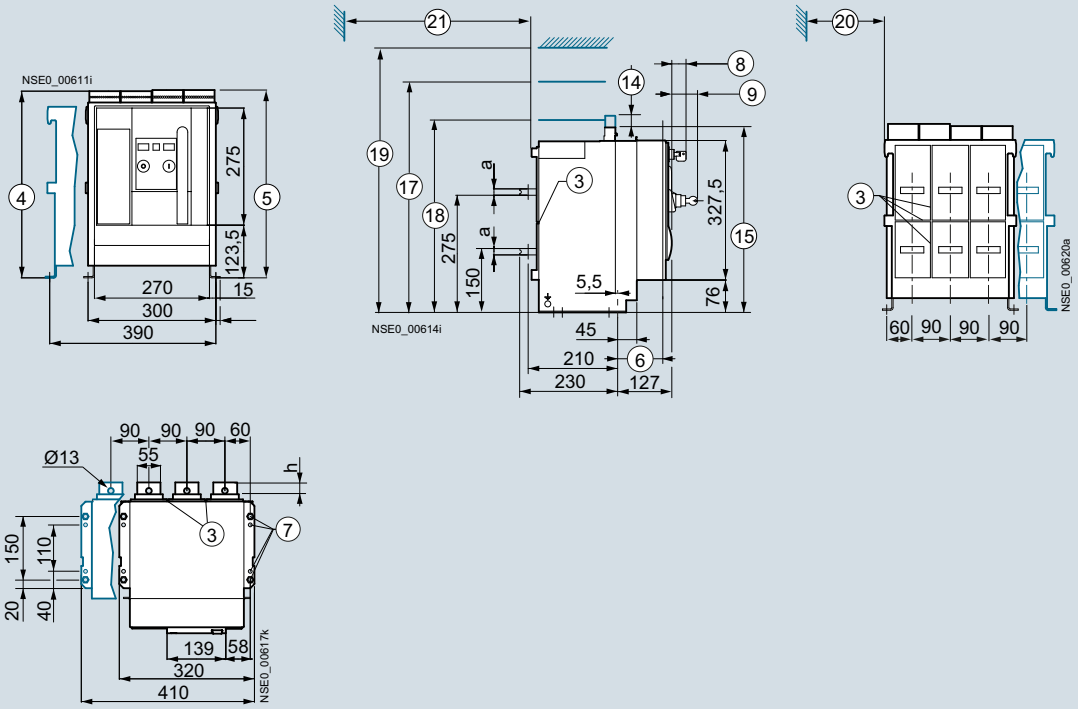
Protective cover, IP55



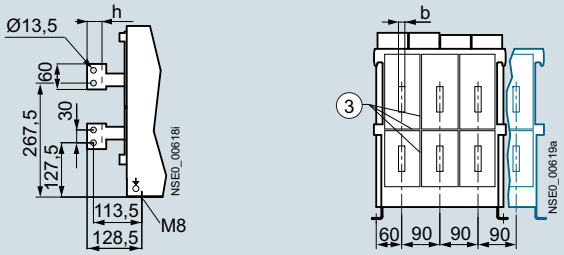
Configuration aids

Size I, up to 2000 A, fixed-mounted version, 3- and 4-pole

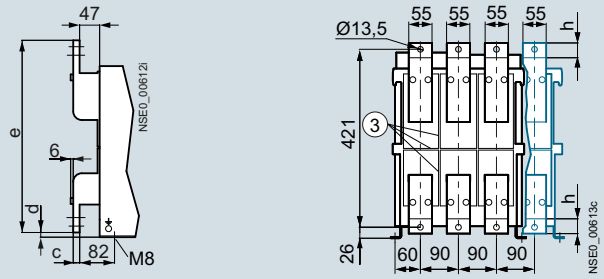
Standard version, horizontal connection



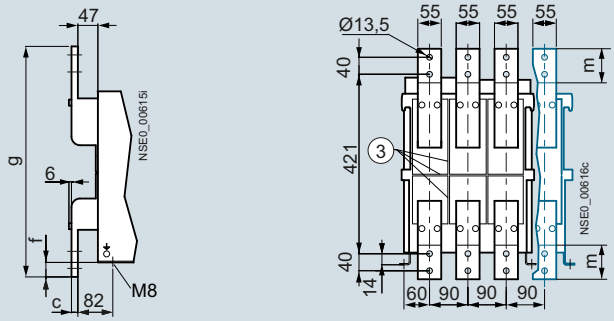
Vertical connection



Front connection (single)



Front connection (double hole)



Dimensions in mm

Item number		Dimensions	
③	Grooves (4 mm wide, 5 mm deep) for supporting phase partitions in the system		
	Auxiliary connector with:		
④	• SIGUT screw terminals	437	
⑤	• Screwless connections	440	
	• COM15/COM16	462	
⑥	Dimension to inside surface of the closed cabinet door	106	
⑦	Fixing points for mounting the circuit breaker in the system (grid dimensions in mm) 4 x M8 screw nut (150) and 4 x ∅ 9 (110)		
⑧	"Safe OFF" locking device	33.5	
⑨	Key operation	60.5	
⑭	Space for cable harness to electrical auxiliary circuit connections	20	
Z suffix or breaking capacity X		**Standard**	**A05, A16 or DC**
⑮	Maximum device height	462	462
⑰	Mounting space for removal of the arc chutes	541	591
⑱	Top edge of arc chutes	401	451
⑲⑳㉑	Safety clearances	See below	

Connection dimensions in mm

	Max. rated circuit breaker current • ≤ 1000 A AC, breaking capacity N and S only	• 1250 - 2000 A AC or breaking capacity H or ≤ 2000 A DC	
a	10	15	Busbar thickness
b	10	15	
c	10	15	
d	11	6	Clearance
e	451	461	Clearance
f	34	39	Overhang
g	541	551	Clearance
h	35		Terminal face length
I	80		

Safety clearances in mm

SZ I, fixed-mounted version	... from grounded or non-conductive parts			... from live parts			IT system
	Above ⑲[1]	At side	At rear	Above ⑲	At side ⑳	At rear ㉑	Above ⑲
Operational voltage, breaking capacity	**Standard arc chutes – 401 mm**						
500 V AC, N/S	460	0	0	615	20	20	550
500 V AC, H	460	0	0	715	20	20	550
690 V AC, N/S	460	0	0	765	50	125	--
690 V AC, H	460	0	0	965	75	140	--
Operational voltage, breaking capacity	**High arc chutes – 451 mm (A05, A16 or DC)**						
690 V AC	515	0	0	965	75	140	550[3]
690 V AC + 20% H	515	0	0	1015	100	140	--
1000 V AC, H	515	0	0	1015	100	140	--
1000 V DC	550	0	0	[2]	[2]	[2]	--

[1] Values for struts, grids and perforated sheets. When using plates with conductive surfaces: values on request.

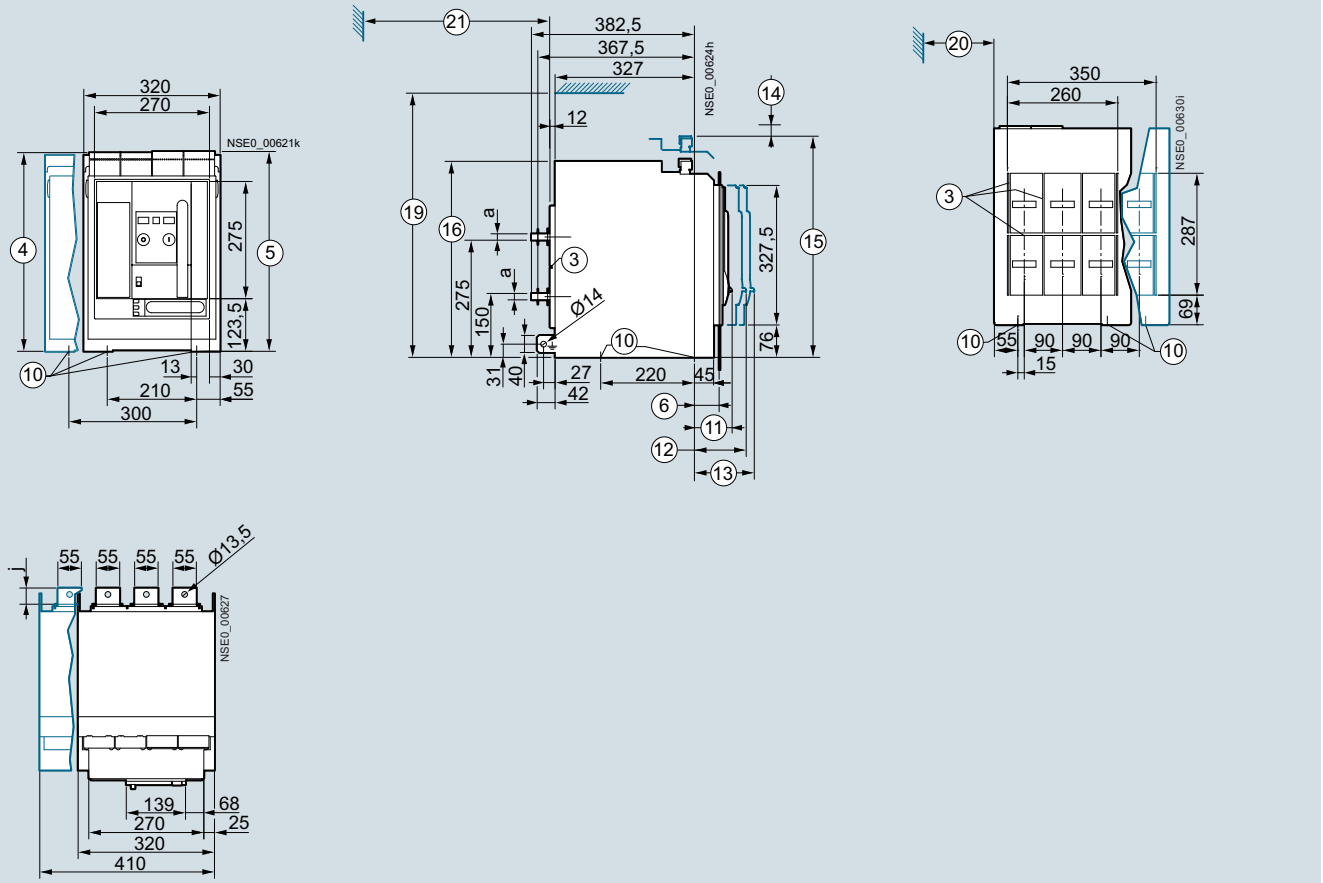
[2] With insulating shield; for clearance, see "non-conductive parts"

[3] U_e = 1000 V with breaking capacity H and Z option Z = A05

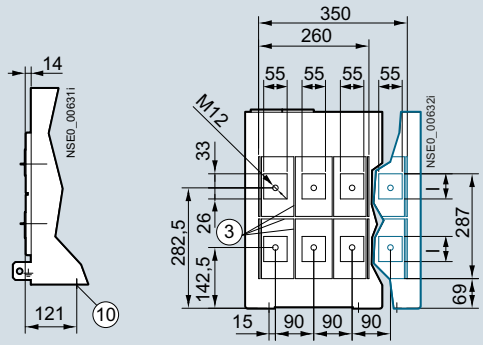
Configuration aids

Size I, up to 2000 A, withdrawable version, 3- and 4-pole

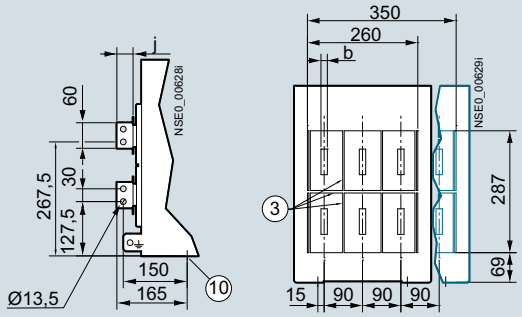
Standard version, horizontal connection



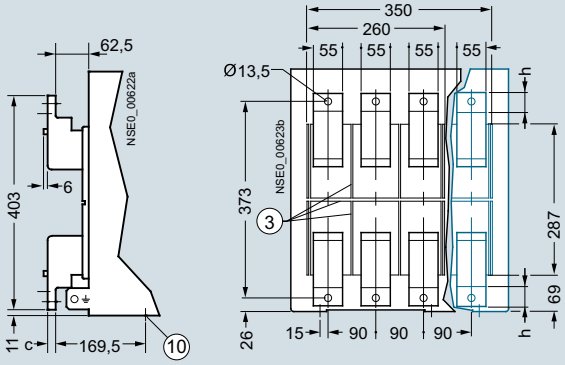
Flat terminals



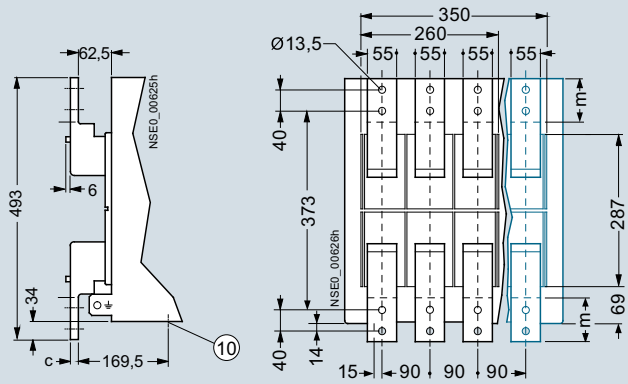
Vertical connection



Front connection (single)



Front connection (double hole)



Dimensions in mm

Item number Z suffix or breaking capacity X		Dimensions Standard	 A05, A16 or DC
③	Grooves (4 mm wide, 5 mm deep) for supporting phase partitions in the system		
	Auxiliary connector with:		
④	• SIGUT screw terminals (one-part)	465 (446)	515 (496)
⑤	• Screwless connections	468	518
⑥	Dimension to inside surface of the closed cabinet door	58.0	
⑩	Fixing holes	∅ 9	
⑪	Circuit breaker in connected position	88.5	
⑫	Circuit breaker in test position	121.5	
⑬	Circuit breaker in disconnected position	140.5	
⑭	Space for cable harness to electrical auxiliary circuit connections	20	
⑮	Maximum device height	468	518
⑯	Guide frame upper edge	460	510
⑲⑳㉑	Safety clearances	See below	

Connection dimensions in mm

	Max. rated circuit breaker current • Up to 1000 A AC, breaking capacity N and S only	 • 1250 - 2000 A AC or breaking capacity H	
a	10	15	Busbar thickness
b	10	15	
c	10	15	
d	11	6	Clearance
e	403	413	Clearance
f	34	39	Overhang
g	493	503	Clearance
h	35		Terminal face length
j	38		
l	59		
m	80		

Safety clearances in mm

SZ I, withdrawable versions	... from grounded or non-conductive parts			... from live parts			IT system
	Above ⑲	At side	At rear	Above ⑲	At side ⑳	At rear ㉑	Above ⑲
Arc chute covers	Without[1] / with	Without/with	Without/with	Without/with	Without/with	Without/with	Without
Operational voltage, breaking capacity	**Standard arc chutes – ⑯ = 460 mm**						
500 V AC, N/S	460 / 460	0 / 40[2]	0 / 0	615 / 480	20 / 100	20 / 14	550
500 V AC, H	460 / 460	0 / 40[2]	0 / 0	715 / 480	50 / 50	20 / 14	550
690 V AC, N/S	460 / 460	0 / 40[2]	0 / 0	765 / 480	50 / 100	125 / 14	--
690 V AC, H	460 / 460	0 / 40[2]	0 / 0	965 / 480	75 / 225	140 / 14	--
Operational voltage, breaking capacity	**High arc chutes – ⑯ = 510 mm (A05, A16 or DC)**						
690 V AC, H	510 / --	0 / --	0 / --	965 / --	75 / --	140 / --	550[3]
690 V AC + 20% H	510 / --	0 / --	0 / --	1015 / --	100 / --	140 / --	--
1000 V AC	510 / --	0 / --	0 / --	1015 / --	100 / --	140 / --	--

[1] Values for struts, grids and perforated sheets. When using plates with conductive surfaces: values on request.

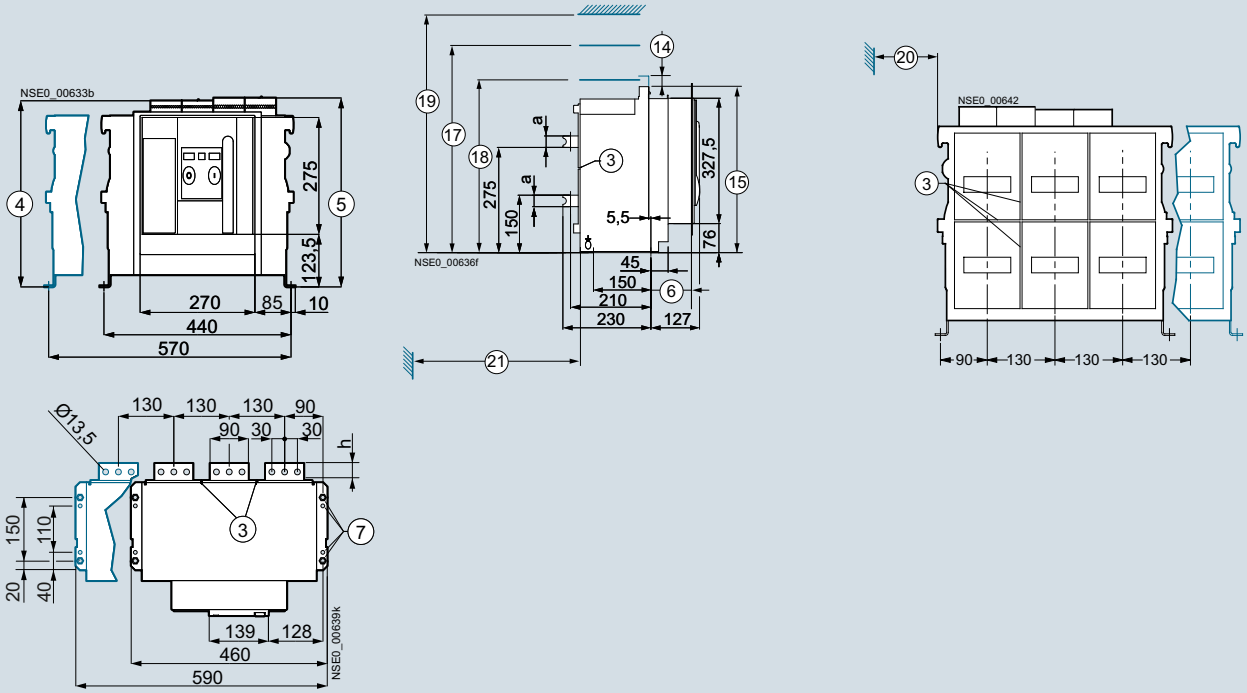
[2] Value for plates that cover the lateral openings in the guide frame, 0 mm for struts and grids

[3] U_e = 1000 V with breaking capacity H and Z option Z = A05

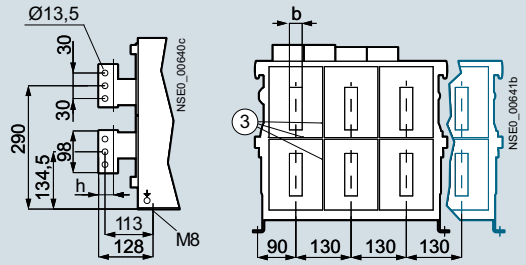
Configuration aids

Size II, up to 4000 A, fixed-mounted version, 3- and 4-pole

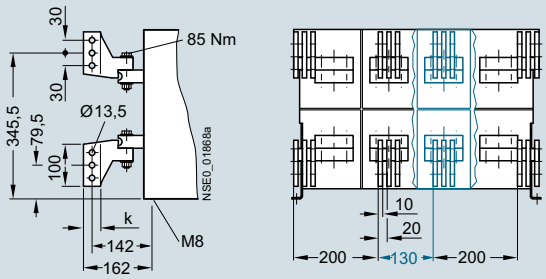
Standard version, horizontal connection



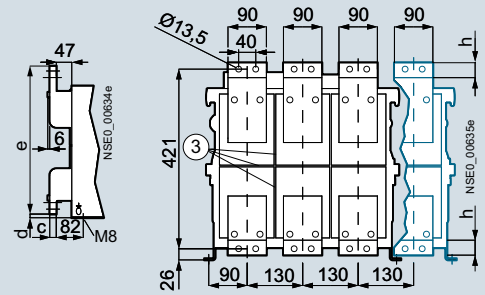
Vertical connection 3200 A AC and 4000 A DC



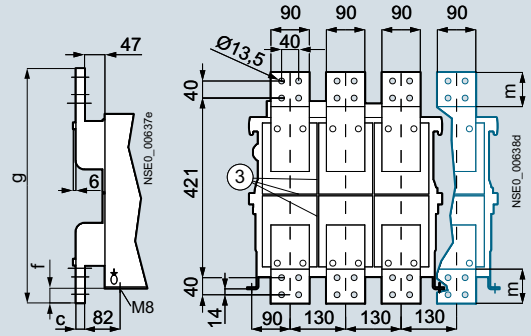
Vertical connection 4000 A AC (terminal face length k = 40 mm)



Front connection (single)



Front connection (double hole)



Dimensions in mm

Item number		Dimensions	
③	Grooves (4 mm wide, 5 mm deep) for supporting phase partitions in the system		
	Auxiliary connector with:		
④	• SIGUT screw terminals	437	
⑤	• Screwless connections	440	
	• COM15/COM16	462	
⑥	Dimension to inside surface of the closed cabinet door	106	
⑦	Fixing points for mounting the circuit breaker in the system (grid dimensions in mm) 4 x M8 screw nut (150) and 4 x ∅ 9 (110)		
⑭	Space for cable harness to electrical auxiliary circuit connections	20	
U_e, Z suffix or breaking capacity X		**Standard DC: ≤ 600 V**	**A05, A15 or C DC: > 600 V**
⑮	Maximum device height	462	462
⑰	Mounting space for removal of the arc chutes	541	591
⑱	Top edge of arc chutes	401	451
⑲⑳㉑	Safety clearances	See below	

Connection dimensions in mm

	Max. rated circuit breaker current • Up to 2000 A AC	• Up to 2000 A DC	• 2500[4] A AC	• 3200 A AC/4000 A DC	
a	10	10	15	30	Busbar thickness
b	15	15	15	30	
c	10	10	20	20	
d	11	11	6	6	Clearance
e	451	451	461	461	Clearance
f	34	34	39	39	Overhang
g	541	541	551	551	Clearance
h	35				Terminal face length
m	80			--	

Safety clearances in mm

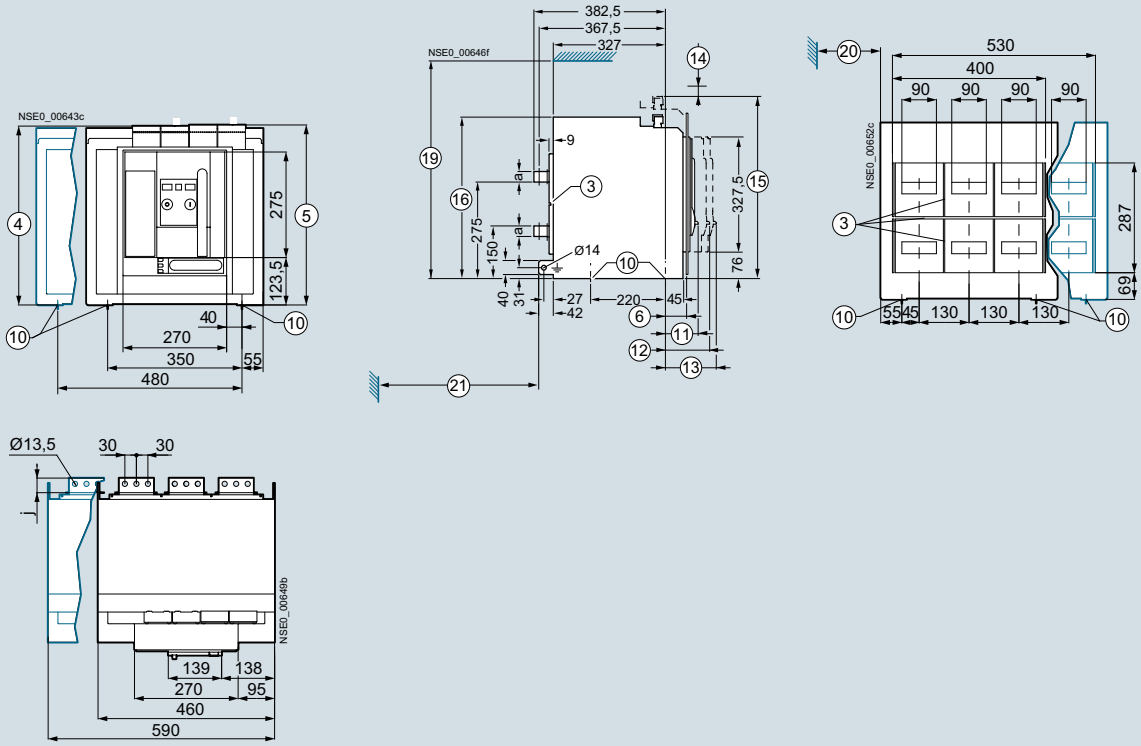
SZ II, fixed-mounted version	... from grounded or non-conductive parts			... from live parts			IT system
	Above[1] ⑲	At side	At rear	Above ⑲	At side ⑳	At rear ㉑	Above ⑲
Operational voltage	**Standard arc chutes – 401 mm**						
500 V AC	460	0	0	715	50	20	550
690 V AC	460	0	0	1065	100	140	--
300 V DC	495	0	0	[2]	[2]	[2]	--
600 V DC	650	0	0	[2]	[2]	[2]	--
Operational voltage, breaking capacity	**High arc chutes – 451 mm (A05, A16 or DC)**						
690 V AC, H	510	0	0	1015	100	140	600[3]
690 V AC, C	510	0	0	775	100	125	--
690 V AC + 20% H	620	0	0	1015	100	125	--
1000 V AC, H	620	0	0	1015	100	125	--
1150 V AC	620	0	0	[2]	[2]	[2]	--
1000 V DC	615	0	0	[2]	[2]	[2]	--
3WL52	**Double high arc chutes – 501 mm (A17)**						

1) Values for struts, grids and perforated sheets. When using plates with conductive surfaces: values on request.
2) With insulating shield; for clearance, see "non-conductive parts"
3) U_e = 1000 V with breaking capacity H and Z option Z = A05
4) Does not apply to 3WL5: 3WL5 see dimensions 3200 A AC

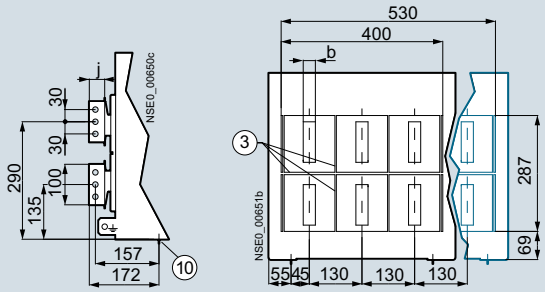
Configuration aids

Size II, up to 4000 A, withdrawable version, 3- and 4-pole

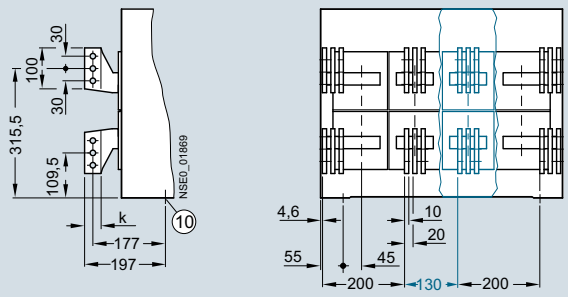
Standard version, horizontal connection



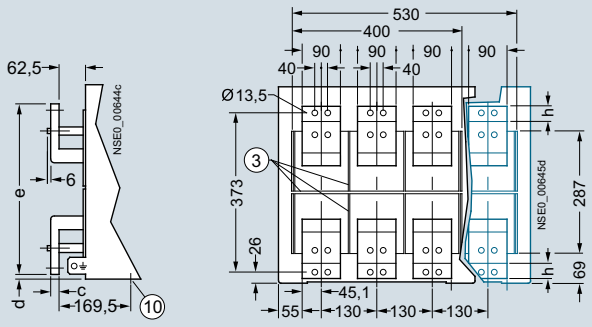
Vertical connection 3200 A AC and 4000 A DC



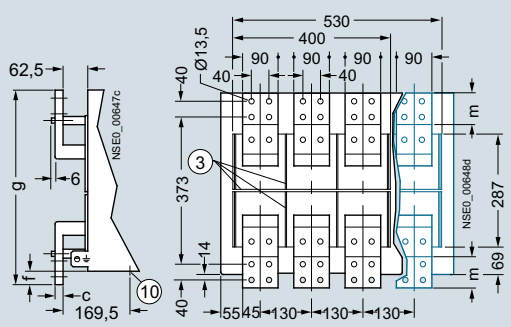
Vertical connection 4000 A AC (terminal face length k = 40 mm)



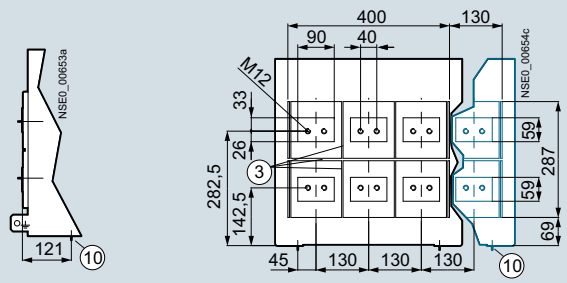
Front connection (single)



Front connection (double hole)



Flat terminals



Dimensions in mm

Item number U_e, Z suffix or breaking capacity X		Dimensions Standard DC: ≤ 600 V	 A05, A15 or C DC: > 600 V
③	Grooves (4 mm wide, 5 mm deep) for supporting phase partitions in the system		
	Auxiliary connector with:		
④	• SIGUT screw terminals (one-part)	465 (446)	515 (496)
⑤	• Screwless connections	468	518
⑥	Dimension to inside surface of the closed cabinet door	58.0	
⑩	Fixing holes	∅ 9	
⑪	Circuit breaker in connected position	88.5	
⑫	Circuit breaker in test position	121.5	
⑬	Circuit breaker in disconnected position	140.5	
⑭	Space for cable harness to electrical auxiliary circuit connections	20	
⑮	Maximum device height	468	518
⑯	Guide frame upper edge	460	510
⑲⑳㉑	Safety clearances	See below	

Connection dimensions in mm

	Max. rated circuit breaker current • Up to 2000 A AC/2000 A DC	 • 2500 A AC	 • 3200 A AC/4000 A DC	
a	10	15	30	Busbar thickness
b	10	15	30	
c	10	20	20	
d	11	6	6	Clearance
e	403	413	413	Clearance
f	34	39	39	Overhang
g	493	503	503	Clearance
h	35			Terminal face length
j	38		--	
m	80		--	

Safety clearances in mm

SZ II, withdrawable version	... from grounded or non-conductive parts			... from live parts			IT system
	Above ⑲	At side	At rear	Above ⑲	At side ⑳	At rear ㉑	Above ⑲
Arc chute covers	Without[1] / with	Without/with	Without/with	Without/with	Without/with	Without/with	Without
Operational voltage	**Standard arc chutes – ⑯ = 460 mm**						
500 V AC	460 / 460	0 / 70[2]	0 / 0	715 / 480	50 / 50	14 / 14	550
690 V AC	460 / 460	0 / 70[2]	0 / 0	1065 / 480	100 / 225	30 / 14	--
300 V DC	495 / --	0 / --	0 / --	[3]	[3]	[3]	--
600 V DC	650 / --	0 / --	0 / --	[3]	[3]	[3]	--
Operational voltage, breaking capacity	**High arc chutes – ⑯ = 510 mm (A05, A16 or DC)**						
690 V AC, H	510 / --	0 / --	0 / --	1015 / --	105 / --	30 / --	600[4]
690 V AC, C	510 / --	0 / --	0 / --	775 / --	100 / --	30 / --	
690 V AC + 20% H	620 / --	0 / --	0 / --	1015 / --	100 / --	140 / --	--
1000 V AC, H	620 / --	0 / --	0 / --	1015 / --	100 / --	140 / --	--
1150 V AC	620 / --	0 / --	0 / --	[3]	[3]	[3]	--
1000 V DC	615 / --	0 / --	0 / --	[3]	[3]	[3]	--

[1] Values for struts, grids and perforated sheets. When using plates with conductive surfaces: values on request.

[2] Value for plates that cover the lateral openings in the guide frame, 0 mm for struts and grids

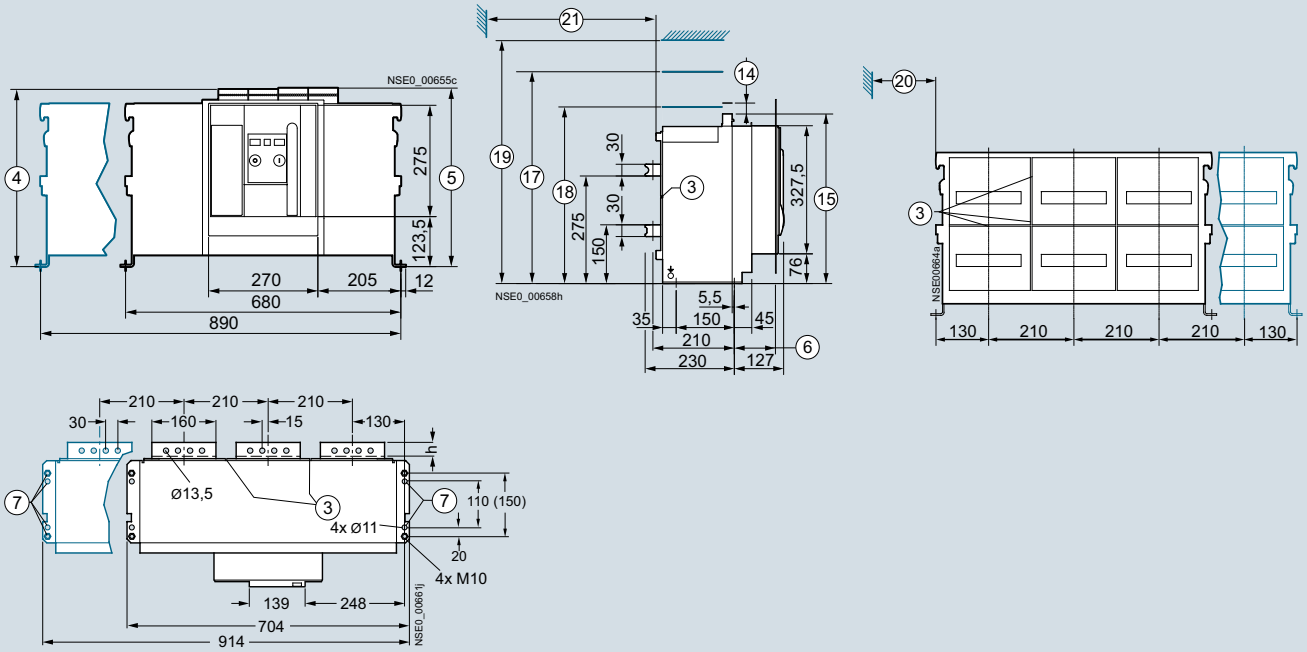
[3] With insulating shield; for clearance, see "non-conductive parts"

[4] U_e = 1000 V with breaking capacity H and Z option Z = A05

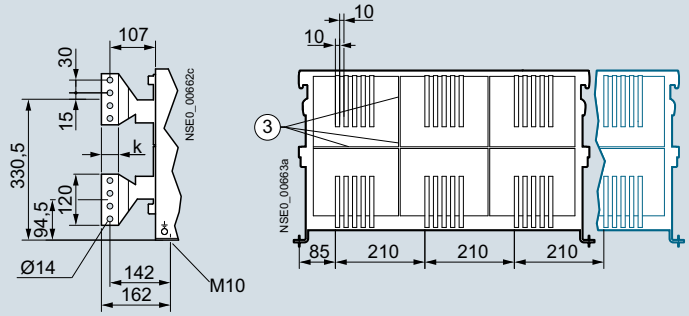
Configuration aids

Size III, up to 6300 A, fixed-mounted version, 3- and 4-pole

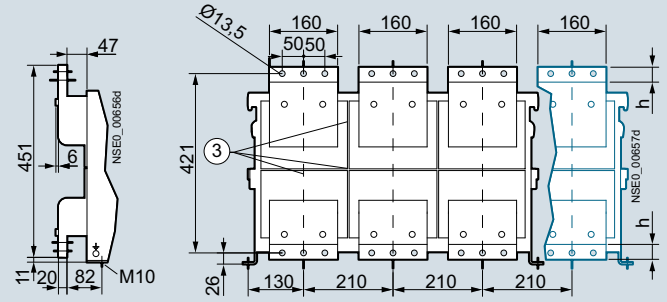
Standard version, horizontal connection



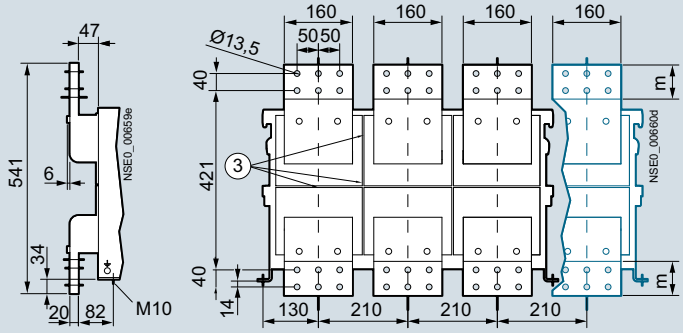
Vertical connection (terminal face length k = 40 mm)



Front connection (single)



Front connection (double hole)



Dimensions in mm

Item number		Dimensions	
③	Grooves (4 mm wide, 5 mm deep) for supporting phase partitions in the system		
	Auxiliary connector with:		
④	• SIGUT screw terminals	437	
⑤	• Screwless connections	440	
	• COM15/COM16	462	
⑥	Dimension to inside surface of the closed cabinet door	106	
⑦	Fixing points for mounting the circuit breaker in the system (grid dimensions in mm) 4 x M10 screw nut (150) and 4 x ∅ 11 (110)		
⑭	Space for cable harness to electrical auxiliary circuit connections	20	
U_e, Z suffix or breaking capacity X		**≤ 690 V AC, H**	**> 690 V AC, A05, or C**
⑮	Maximum device height	462	462
⑰	Mounting space for removal of the arc chutes	541	591
⑱	Top edge of arc chutes	401	451
⑲⑳㉑	Safety clearances	See below	

Connection dimensions in mm

h	35	Terminal face length
k	40	
m	80	

Safety clearances in mm

SZ III, fixed-mounted version	... from grounded or non-conductive parts			... from live parts			IT system
	Above[1] ⑲	At side	At rear	Above ⑲	At side ⑳	At rear ㉑	Above ⑲
Operational voltage	**Standard arc chutes – 401 mm**						
500 V AC	460	0	0	515	20	20	450
690 V AC	460	0	0	965	100	125	--
Operational voltage	**High arc chutes – 451 mm (> 690 V AC, A05 or C)**						
690 V AC	510	0	0	965	100	125	500[2]
690 V AC + 10% H	615	0	0	865	100	125	--
690 V AC + 20% H	615	0	0	865	100	125	--
1000 V AC	615	0	0	865	100	125	--
1150 V AC	615	0	0	[3]	[3]	[3]	--

[1] Values for struts, grids and perforated sheets. When using plates with conductive surfaces: values on request.

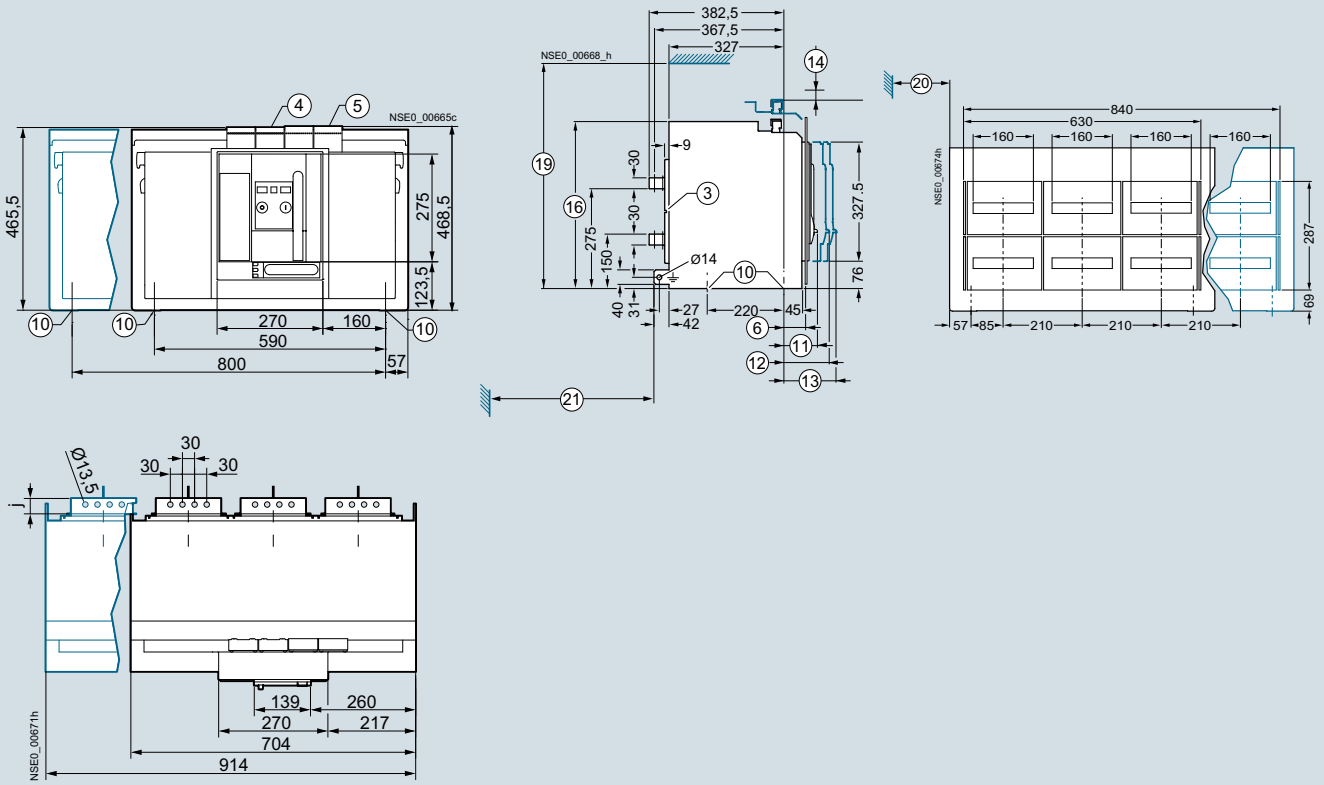
[2] U_e = 1000 V with breaking capacity H and Z option Z = A05 or breaking capacity C

[3] With insulating shield; for clearance, see "non-conductive parts"

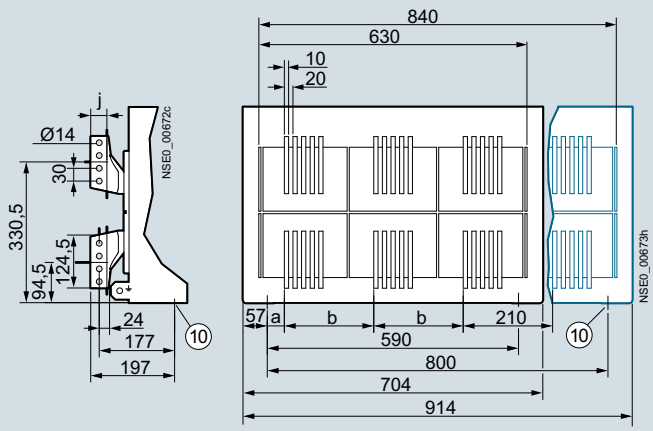
Configuration aids

Size III, up to 6300 A, withdrawable version, 3- and 4-pole

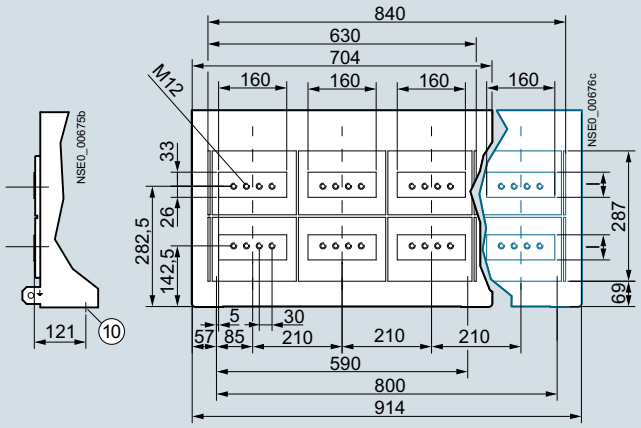
Standard version, horizontal connection



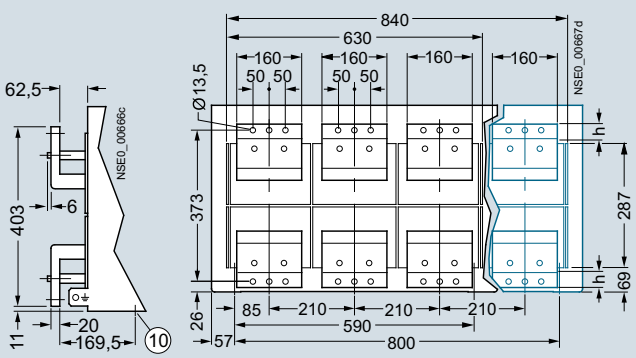
Vertical connection, up to 6300 A



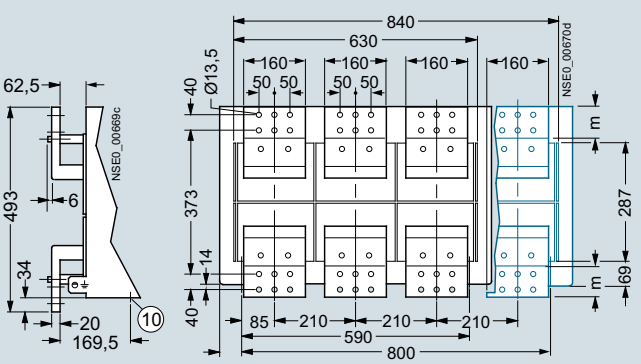
Flange connection, up to 4000 A



Front connection (single)



Front connection (double hole)



Dimensions in mm

Item number U_e, Z suffix or breaking capacity X		Dimensions ≤ 690 V AC, H	 > 690 V AC, A05, or C
③	Grooves (4 mm wide, 5 mm deep) for supporting phase partitions in the system		
	Auxiliary connector with:		
④	• SIGUT screw terminals (one-part)	465 (446)	515 (496)
⑤	• Screwless connections	468	518
⑥	Dimension to inside surface of the closed cabinet door	58.0	
⑩	Fixing holes	∅ 9	
⑪	Circuit breaker in connected position	88.5	
⑫	Circuit breaker in test position	121.5	
⑬	Circuit breaker in disconnected position	140.5	
⑭	Space for cable harness to electrical auxiliary circuit connections	20	
⑮	Maximum device height	468	518
⑯	Guide frame upper edge	460	510
⑲⑳㉑	Safety clearances	See below	

Connection dimensions in mm

	Max. rated circuit breaker current • Up to 4000 A AC	 • 5000 V AC	 • 6300 V AC	
a	40	40	5	Clearances
b	210	210	245	
h	35	--	--	Terminal face length
j	38			
l	59	--	--	
m	80	--	--	

Safety clearances in mm

SZ III, withdrawable version	... from grounded or non-conductive parts			... from live parts			IT system
	Above ⑲	At side	At rear	Above ⑲	At side ⑳	At rear ㉑	Above ⑲
Arc chute covers	Without[1] / with	Without/with	Without/with	Without/with	Without/with	Without/with	Without
Operational voltage	**Standard arc chutes – ⑯ = 460 mm**						
500 V AC	460 / 460	0 / 40[2]	0 / 0	510 / 480	20 / 50	14 / 14	460
690 V AC	460 / 460	0 / 40[2]	0 / 0	965 / 480	100 / 200	14 / 14	--
Operational voltage, breaking capacity	**High arc chutes – ⑯ = 510 mm (> 690 V AC, A05, A16 or C)**						
690 V AC	510 / --	0 / --	0 / --	965 / --	100 / --	14 / --	510[3]
1000 V AC, H	615 / --	0 / --	0 / --	865 / --	100 / --	14 / --	--
1000 V AC, C	615 / --	0 / --	0 / --	865 / --	100 / --	14 / --	--
1150 V AC	615 / --	0 / --	0 / --	[4]	[4]	[4]	--

[1] Values for struts, grids and perforated sheets. When using plates with conductive surfaces: values on request.

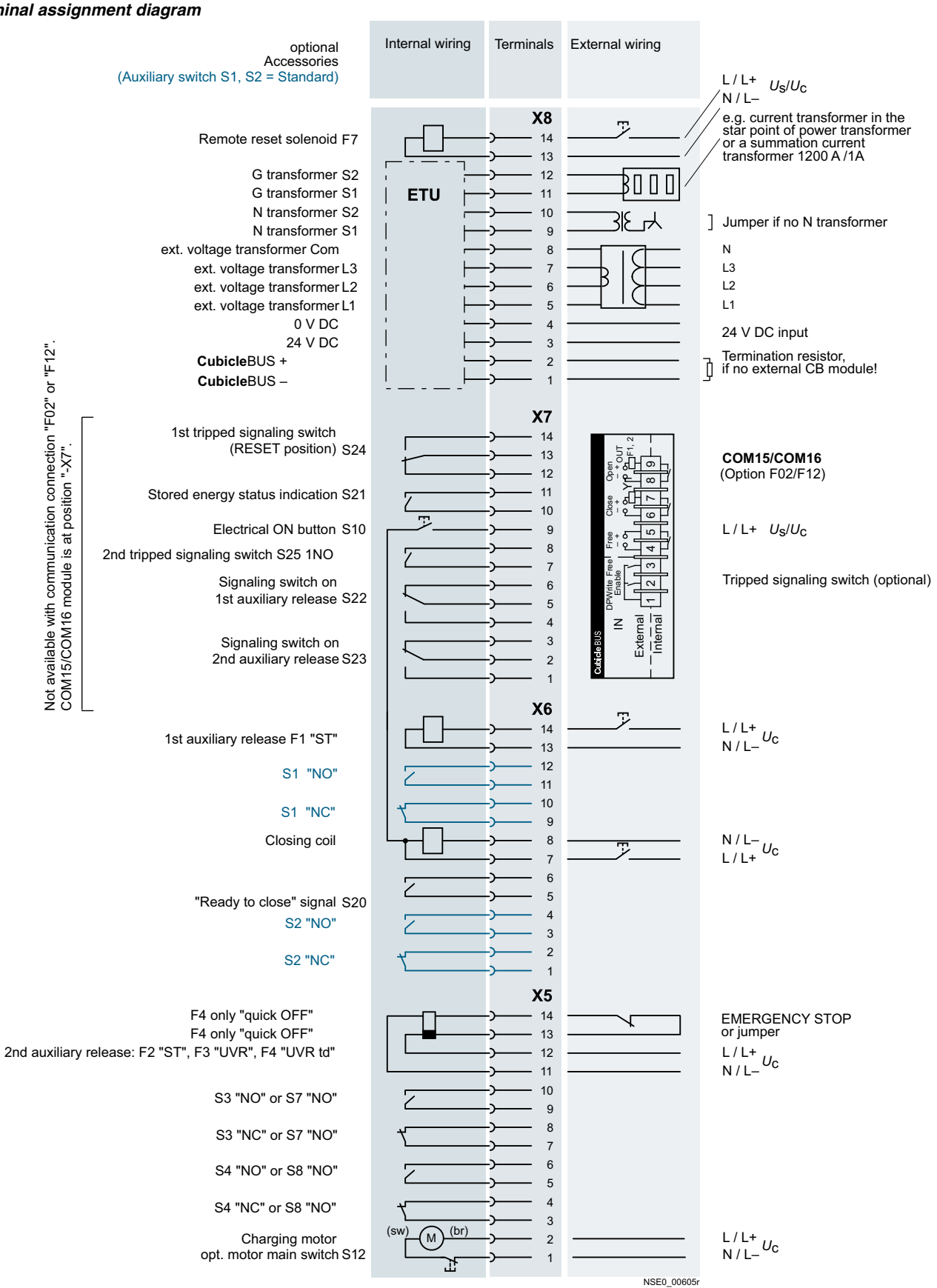
[2] Value for plates that cover the lateral openings in the guide frame, 0 mm for struts and grids

[3] U_e = 1000 V with breaking capacity H and Z option Z = A05 or breaking capacity C

[4] With insulating shield; for clearance, see "non-conductive parts"

Circuit diagrams

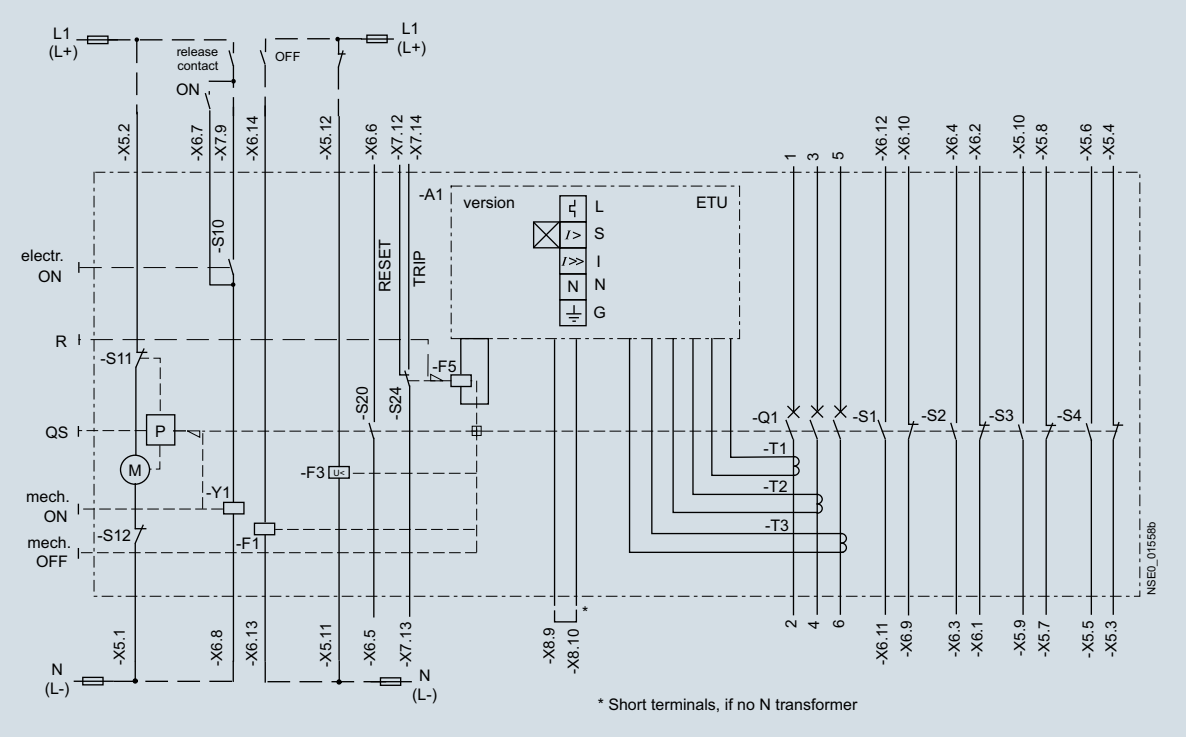
Terminal assignment diagram



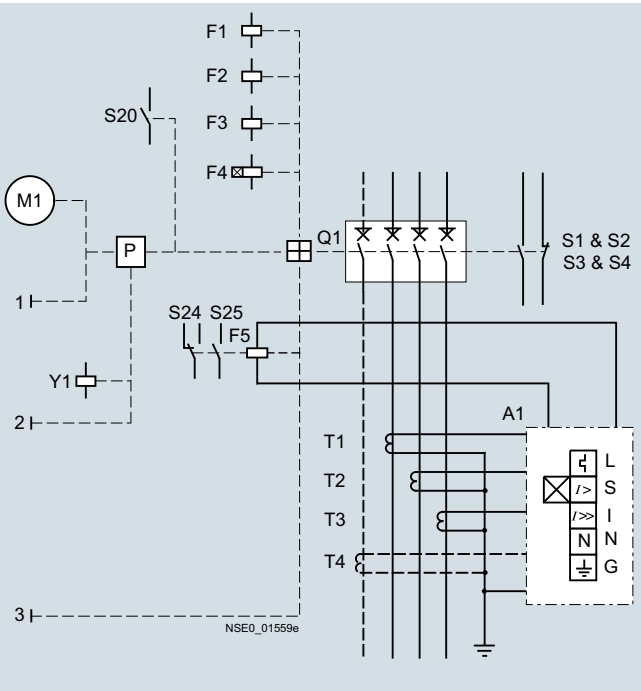
Example of an overall circuit diagram for 3WL circuit breakers

(3WL1. ..–.....–4GN4–Z C11 + C22 + K07)

Manual / motorized operating mechanism with stored-energy feature, with electrical ON button (option C11), with ready-to-close signaling switch (option C22), with Electronic Trip Unit LSING with undervoltage release "UVR" (F3), with shunt trip "ST" (F1), with tripped signaling switch (option K07), with auxiliary switch 4 NO + 4 NC.



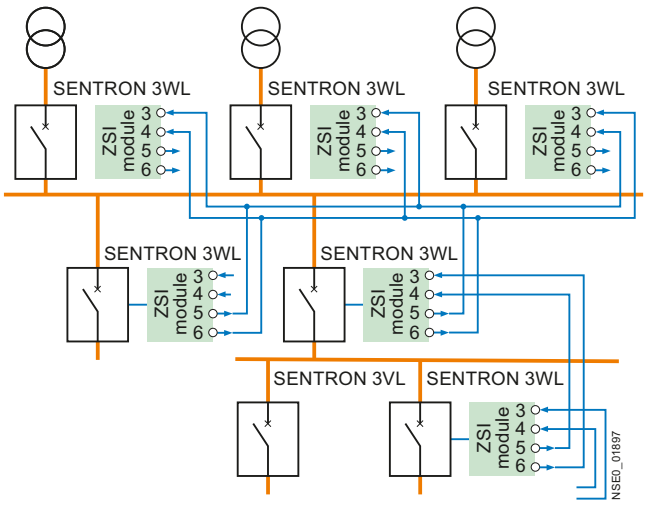
Function diagram of 3WL air circuit breaker



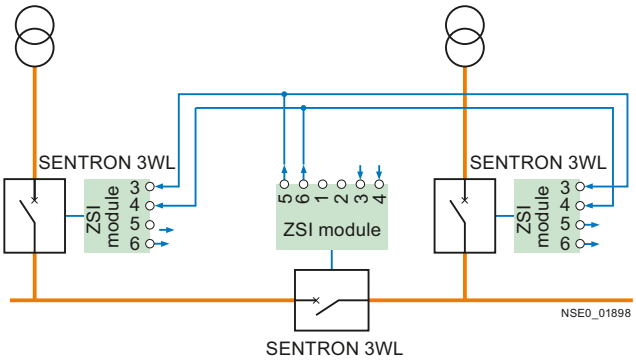
-A1	ETU Electronic Trip Unit
-S1/-S2	1st auxiliary switch block (2 NO + 2 NC)
-S3/-S4	2nd auxiliary switch block (2 NO + 2 NC)
-S7 (optional)	2nd auxiliary switch block, S7 (2 NO) can be used if there is no S3 – S3 and S7 have the same terminal assignment/mounting location
-S8 (optional)	2nd auxiliary switch block, S8 (2 NO) can be used if there is no S4 – S4 and S8 have the same terminal assignment/mounting location
	3WL1. ..-.....-...2 (2 NO + 2 NC) S1+S2
	3WL1. ..-.....-...4 (4 NO + 4 NC) S1+S2+S3+S4
	3WL1. ..-.....-...7 (6 NO + 2 NC) S1+S2+S7+S8
	3WL1. ..-.....-...8 (5 NO + 3 NC) S1+S2+S3+S8
-S10	Electrical ON button
-S11	Internal motor shutdown switch (if spring is tensioned)
-S12	Motor shutdown switch (no automatic tensioning of spring)
-S20	Ready-to-close signaling switch
-S24	Tripped signaling switch
-F1	1st auxiliary release, shunt release
-F3	2nd auxiliary release, undervoltage release
-F5	Tripping solenoid
-M	Motor for "charging energy store"
-P	Spring energy store
-QS	Actuator lever for "charging energy store"
-Q1	Main contacts
-T1/-T2/-T3	Current transformers
-X5/-X6/-X7/-X8	Terminals
-Y1	Closing coil
-R	Display and reset button for Electronic Trip Unit
-X8.9/-X8.10	Connection option: external N transformer

Configuration aids

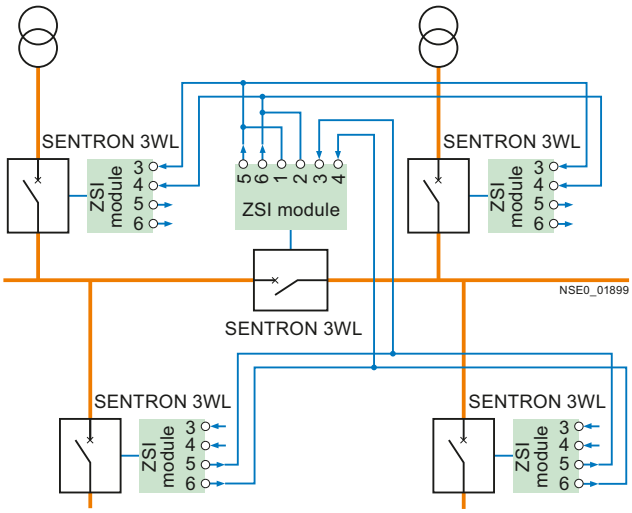
Example of the mode of operation of Zone Selective Interlocking function in power distribution



3VL and 3WL circuit breakers used in various staggered levels



Circuit diagram for a Zone Selective Interlocking function with multiple infeed and several outgoing units with 3WL circuit breakers

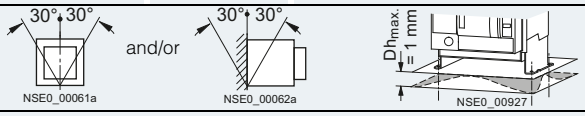


ZSI function: Connection using a tie-breaker, use of 3WL circuit breakers

More information

Up-to-date information on the Internet at:
http://www.siemens.com/sentron

Technical specifications

Size			I	II		
Type			**3WL11 20**	**3WL12 10**	**3WL12 20**	**3WL12 40**
Rated current I_n at 40 °C Main conductor		A	2000	... 1000	2000	4000
Rated operational voltage U_e (1000 V version, see Catalog LV 10, order code "A05")		V DC	1000	... 600/1000	... 600/1000	... 600/1000
Rated insulation voltage U_i		V DC	1000	1000	1000	1000
Rated impulse withstand voltage U_{imp}						
• Main conducting paths		kV	12	12	12	12
• Auxiliary circuits		kV	4	4	4	4
• Control circuits		kV	2.5	2.5	2.5	2.5
Isolating function acc. to EN 60947-2			Yes	Yes	Yes	Yes
Utilization category				B		
Permissible ambient temperature						
• Operation		°C	–25/+70	–25/+70	–25/+70	–25/+70
• Storage		°C	–40/+70	–40/+70	–40/+70	–40/+70
Permissible load	Up to 40 °C	A	2000	1000	2000	4000
At rear horizontal main circuit	Up to 55 °C	A	1910	1000	2000	3640
connections	Up to 60 °C	A	1850	1000	2000	3500
(Cu painted black)	Up to 70 °C	A	1710	1000	1950	3250
Power loss at I_n for symmetrical loads Withdrawable circuit breakers		W	150	280	770	1640
Switching times						
• Make time		ms	35	35	35	35
• Opening time		ms	38	34	34	34
• Electrical make time (through activation solenoid)[1]		ms	100	100	100	100
• Electrical opening time (through shunt release)		ms	73	73	73	73
• Electrical opening time (instantaneous undervoltage release)		ms	73	73	73	73
Endurance[3]						
• Mechanical (without maintenance)		Operating cycles	10 000	10000	10000	10000
• Mechanical (with maintenance)[2]		Operating cycles	15 000	15000	15000	15000
• Electrical (without maintenance)		Operating cycles	1000	6000	6000	4000
• 1000 V version		Operating cycles	1000	1000	1000	1000
• Electrical (with maintenance)[2]		Operating cycles	2000	15000	15000	15000
Switching frequency						
• 600 V version		1/h	--	60	60	60
• 1000 V version		1/h	20	20	20	20
Mounting position						
Degree of protection				IP20 without cabinet door, IP41 with door sealing frame, IP55 with cover		
Auxiliary conductors (Cu)	Standard connection = strain-relief clamp					
Max. number	• Without end sleeve			2 × 0.5 mm² (AWG 20) ... 2 × 1.5 mm² (AWG 16); 1 × 2.5 mm² (AWG 14)		
Auxiliary conductors ×	• With end sleeve acc. to DIN 46228 Part 2			1 × 0.5 mm² (AWG 20) ... 1 × 1.5 mm² (AWG 16)		
cross-section	• With twin end sleeve			2 × 0.5 mm² (AWG 20) ... 2 × 1.5 mm² (AWG 16)		
(solid/stranded)	Optional connection = tension spring					
	• Without end sleeve			2 × 0.5 mm² (AWG 20) ... 2 × 2.5 mm² (AWG 14)		
	• With end sleeve acc. to DIN 46228 Part 2			2 × 0.5 mm² (AWG 20) ... 2 × 1.5 mm² (AWG 16)		
Weights 3-pole	• Fixed-mounted circuit breakers	kg	43	56	56	64
	• Withdrawable circuit breakers	kg	--	60	60	68
	• Guide frames	kg	--	31	31	45
4-pole	• Fixed-mounted circuit breakers	kg	50	67	67	77
	• Withdrawable circuit breakers	kg	--	72	72	82
	• Guide frames	kg	--	37	37	54

[1] Make time through activation solenoid for synchronization purposes (short-time excited) 50 ms.

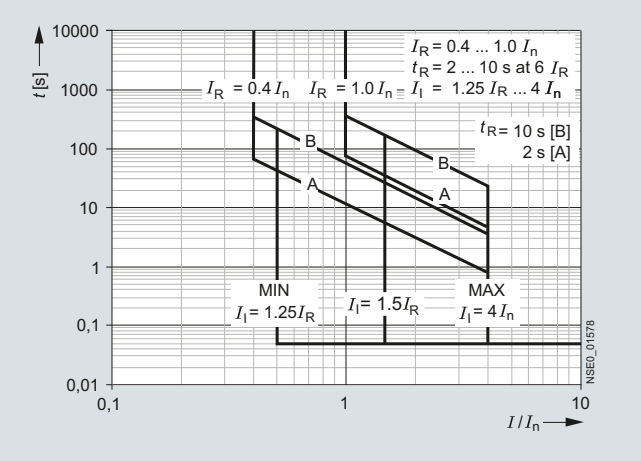
[2] Maintenance means: Replace main contact elements and arc chutes (see Operating Manual).

[3] Further technical specifications on request.

Size			I	II
Type			**3WL11**	**3WL12**
Breaking capacity			**DC**	**DC**
Rated short-circuit breaking capacity				
Up to 220 V DC	I_{cc}	kA	20	35
Up to 300 V DC	I_{cc}	kA	20	30
Up to 600 V DC	I_{cc}	kA	20	25
Up to 1000 V DC	I_{cc}	kA	20	20
Rated short-time withstand current I_{cw}				
0.5 s		kA	--	--
1 s		kA	20	35[1]/30[2]/25[3]/20[4]
2 s		kA	--	--
3 s		kA	--	--

[1] At U_e = 220 V DC
[2] At U_e = 300 V DC
[3] At U_e = 600 V DC
[4] At U_e = 1000 V DC

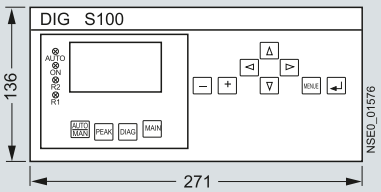
Characteristic curves



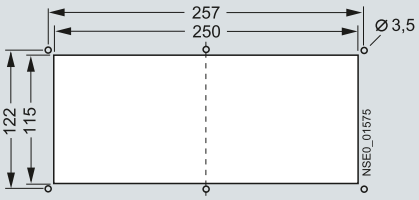
DIGmat S100 characteristic curve

Dimensional drawings

DIGmat S100



DIGmat S100

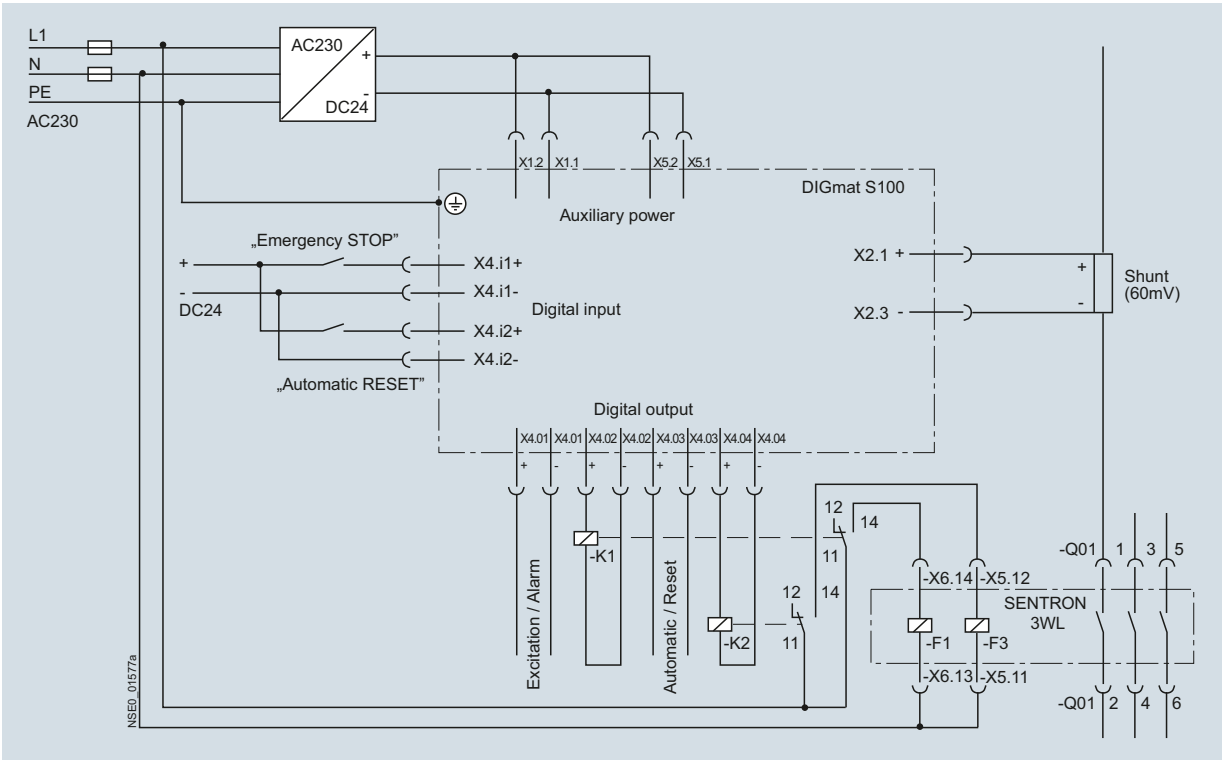


DIGmat S100 drilling pattern

Note:

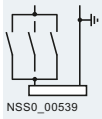
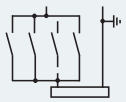
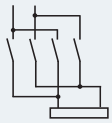
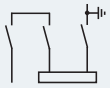
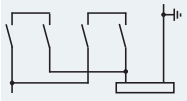
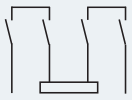
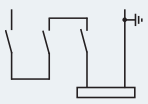
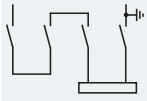
For dimensional drawings for non-automatic circuit breakers up to 4000 A (DC), see page 38 to 47.

Circuit diagrams



Circuit diagrams of the DIGmat S100 and the 3WL non-automatic air circuit breaker

Application examples of size 2 – non-automatic circuit breakers (DC)

Rated operational voltage	**Required series-connected contact gaps at rated voltage**	**For 3-pole non-automatic air circuit breakers** (operational currents up to 4000 A/conducting path)		**For 4-pole non-automatic air circuit breakers** (operational currents up to 4000 A/conducting path)	
Up to 300 V + 10%		 NSS0_00539			
		1-pole, 2 parallel conducting paths, only with grounded system	2-pole	1-pole, 3 parallel conducting paths, only with grounded system	2-pole 2 parallel conducting paths
Over 300 V + 10% Up to 600 V + 10%					
		2-pole, only with grounded system		1-pole, 2 parallel conducting paths, only with grounded system	2-pole
Over 600 V + 10% Up to 1000 V + 10% (version for 1000 V required, order with "-Z" and code A05)					
		1-pole, only with grounded system		2-pole, only with grounded system	1-pole, only with grounded system

The connection to the circuit breakers is not dependent on direction and polarity; the circuit diagrams can be adapted accordingly.

If the parallel or series connections are made directly to the connecting bars, for thermal reasons the continuous load on the circuit breakers must only be 80% of the permissible operational current. If the parallel or series connection is made at a distance of 1 m from the connecting bars, the circuit breaker can be used at full operational current load.

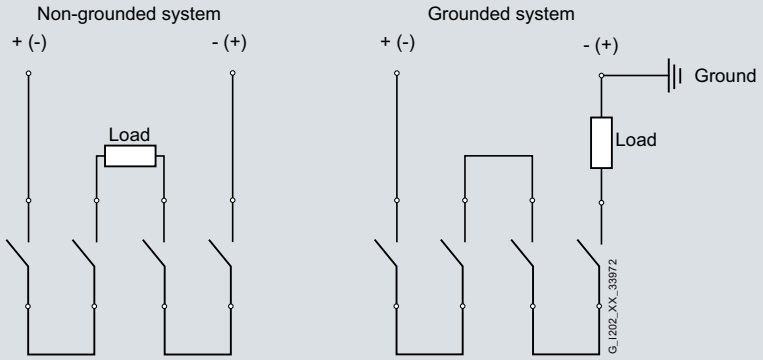
⊣⫴ Grounded system

□ Load

Configuration aids

Application examples of size 1 – non-automatic circuit breakers (DC)

Permissible interconnections
Circuit diagrams for size 1
1000 V DC non-automatic air circuit breakers



More information

Up-to-date information on the Internet at:

www.siemens.com/sentron

Siemens AG
Energy Management
Low Voltage & Products
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