

SENTRON Switching and Protection Devices – Air Circuit-Breakers

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3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

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SENTRON Switching and Protection Devices – Air Circuit-Breakers

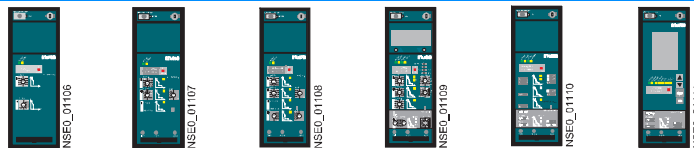
Introduction

Overview



Size	I, II, III			I, II, III		II	
3WL air circuit-breakers/non-automatic air circuit-breakers up to 6300 A (AC)				3WL air circuit-breakers / non-automatic air circuit-breakers acc. to UL 489 up to 5000 A		3WL non-automatic air circuit-breakers up to 4000 A (DC)	
Rated current I_n	A	630, 800, 1000, 1250, 1600, 2000, 2500, 3200, 4000, 5000, 6300			1000, 1600, 2000, 2500, 3000, 4000, 5000		1000, 2000, 4000
Number of poles		3-pole, 4-pole			3-pole, 4-pole		3-pole, 4-pole
Rated operational voltage U_e	V AC V DC	Up to 690/1000			Up to 600 \surd /347		Up to 1000
Rated ultimate short-circuit breaking capacity at 415 V AC	kA	Size I 50/65	Size II 55/80/100	Size III 100	Size I 65 (480 V)	Size II, III 100 (480 V)	30/25/20 (at 300/600/1000 V DC)
Endurance	Operating cycles	20000	15000	10000	20000	15000/10000	15000
Mounting position							
Degree of protection	With cover Without cover (with door sealing frame)	IP55 IP41					IP55 IP41
Dimensions 3-/4-pole	W mm H mm D mm H mm D mm	320/410 434 291 465.5 471	460/590 434 291 465.5 471	704/914 434 291 465.5 471	For dimensions see *3WL Air Circuit-Breakers/ Non-Automatic Air Circuit-Breakers up to 6300 A (AC)*		460/590 434 291 465.5 471
	Fixed-mounted Withdrawable						

Electronic trip units for SENTRON 3WL circuit-breakers

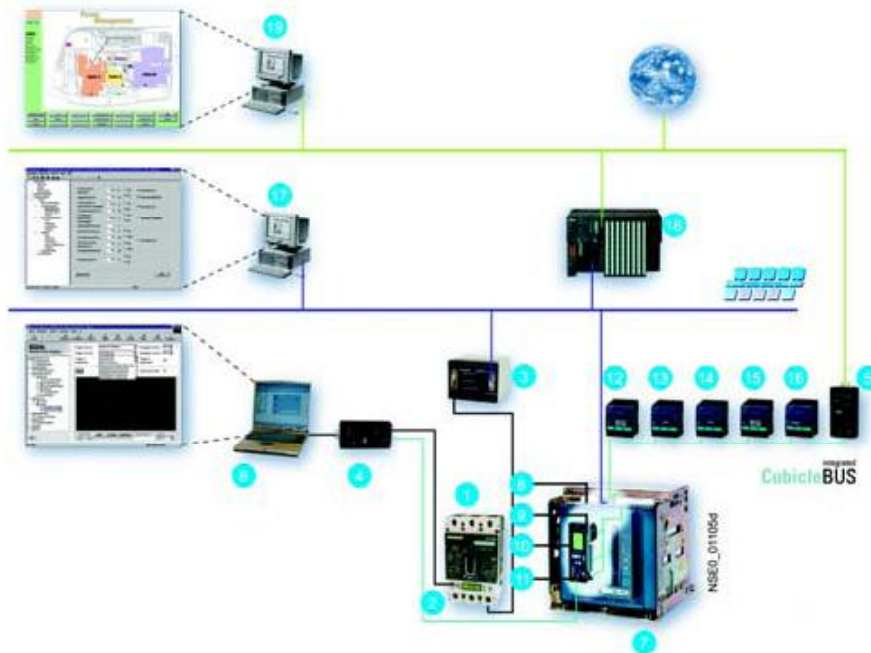


Type	ETU15B	ETU25B	ETU27B	ETU45B	ETU55B	ETU76B
Overload protection	✓	✓	✓	✓	✓	✓
Short-time delayed short-circuit protection	--	✓	✓	✓	✓	✓
Instantaneous short-circuit protection	✓	✓	✓	✓	✓	✓
Neutral conductor protection	--	--	✓	✓	✓	✓
Ground-fault protection	--	--	✓	□	□	□
Zone Selective Interlocking	--	--	--	□	□	□
LCD, 4-line	--	--	--	□	--	--
LCD, graphic	--	--	--	--	--	✓
Communication through PROFIBUS DP	--	--	--	□	□	□
Measurement function <i>Plus</i>	--	--	--	□	□	□
Selectable parameter sets	--	--	--	--	✓	✓
Parameters freely programmable	--	--	--	--	✓	✓

✓ standard
-- not available
□ optional

Communication-capable circuit-breakers

- 1 SENTRON 3VL
- 2 LCD ETU release
- 3 COM10 PROFIBUS module including short-time grading control (ZSI module)
- 4 Breaker Data Adapter (BDA)
- 5 BDA Plus with Ethernet interface
- 6 Browser-capable input and output device (e.g. notebook)
- 7 SENTRON 3WL
- 8 COM15 PROFIBUS module
- 9 Breaker Status Sensor (BSS)
- 10 Electronic release ETU
- 11 Metering function Plus
- 12 Short-time grading control (ZSI module)
- 13 Digital output module as relay
- 14 Digital output module as relay, configurable
- 15 Analog output module
- 16 Digital input module
- 17 Switch ES Power on PC
- 18 PLC e.g. SIMATIC S7
- 19 Power Management software



Features

- Coordinated communication concept using the PROFIBUS DP, ranging from 16 A to 6300 A with SENTRON 3VL and SENTRON 3WL
- 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 **CubicleBUS** of the SENTRON 3WL

- Innovative software products for parameterization, operation, monitoring, and diagnostics of SENTRON circuit-breakers, both locally or via PROFIBUS DP or Ethernet/Intranet/Internet
- Complete integration of the SENTRON circuit-breakers into the Totally Integrated Power and Totally Integrated Automation solutions

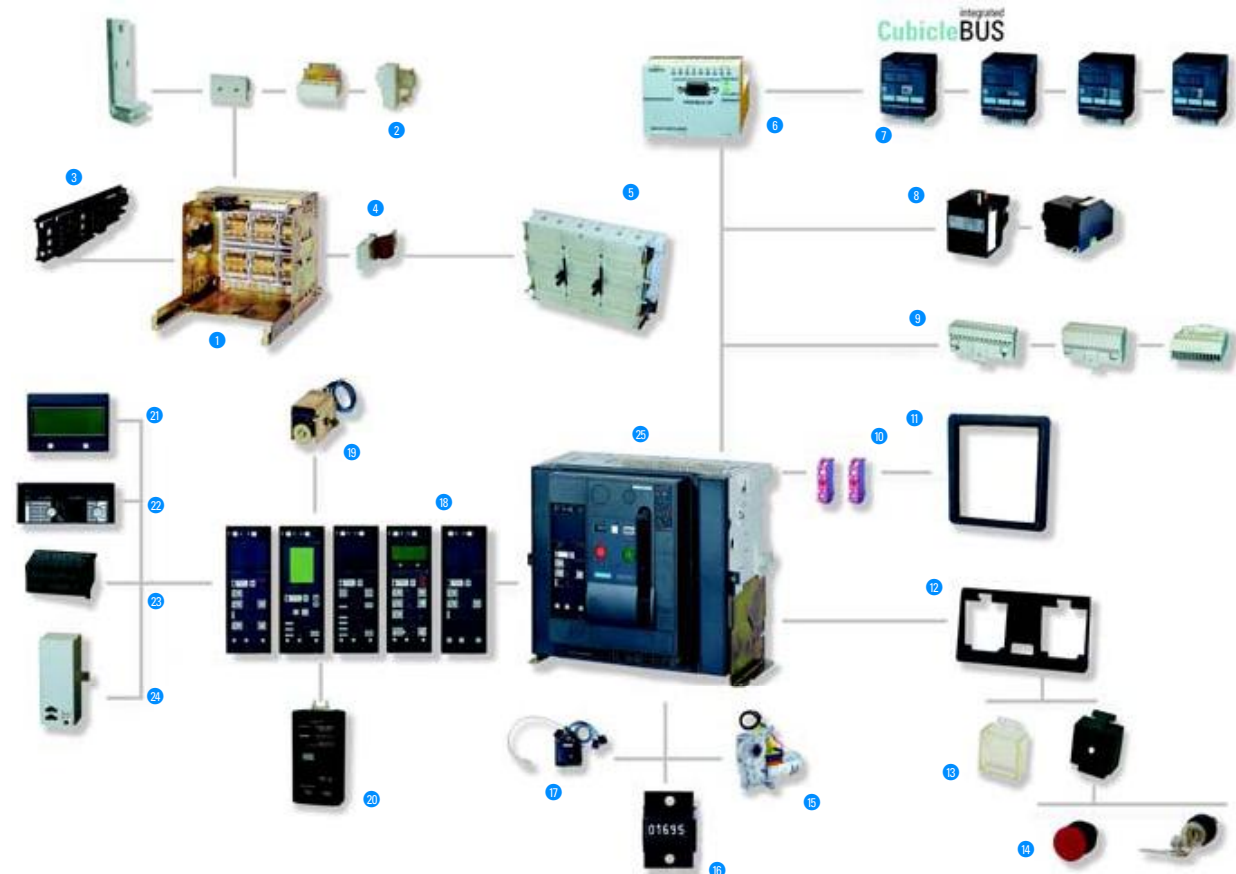
3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Design

SENTRON 3WL:
Superior individual products integrated into uniform power distribution systems - up to and including industry-specific industrial and infrastructure solutions



- 1 Guide frame
- 2 Main connection, front, flange, horizontal, vertical
- 3 Position indicator switch
- 4 Grounding contact, leading
- 5 Shutter
- 6 COM15 PROFIBUS module
- 7 External **CubicleBUS** modules
- 8 Closing solenoid, auxiliary trip unit
- 9 Auxiliary conductor plug-in system
- 10 Auxiliary switch block
- 11 Door sealing frame
- 12 Interlocking set for base plate
- 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 Electronic trip unit (ETU)
- 19 Reset solenoid
- 20 Breaker Data Adapter (BDA)
- 21 4-line LCD module
- 22 Ground-fault protection module
- 23 Rating Plug
- 24 Measuring function module
- 25 Circuit-breaker

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Circuit-breaker rated current $I_{n \max}$ (A)	Breaking capacity I_{cu} at 500 V AC (kA) or I_{cc} at 300 V DC (kA)	Dimensions		
		Fixed-mounted, 3- /4-pole	Draw-out 3- /4-pole	
Size III 		704 / 914	704 / 914	Width
		434 / 434	460 / 460	Height
		291 / 291	385 / 385	Depth
Size II 		460 / 590	460 / 590	Width
		434 / 434	460 / 460	Height
		291 / 291	385 / 385	Depth
		320 / 410	320 / 410	Width
		434 / 434	460 / 460	Height
		291 / 291	385 / 385	Depth
Size I 		320 / 410	320 / 410	Width
		434 / 434	460 / 460	Height
		291 / 291	385 / 385	Depth

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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1) Size II, $I_{cu} = 55$ kA; deliverable for $I_{n \max} = 2000$ A and 2500 A

Overview of SENTRON 3WL Circuit-Breakers/Non-Automatic Circuit-Breakers

Versions

- Rated currents: 630 A to 6300 A
- 3 sizes for different rated current ranges (see illustration "Overview of SENTRON 3WL Circuit-Breakers/Non-Automatic Circuit-Breakers")
- 3 and 4-pole versions
- Rated operational voltage up to 690 V AC and 1000 V DC. Special versions up to 1000 V AC available
- 3 different switching capacity classes in the range from 50 kA to 100 kA for AC applications and one switching capacity class for DC applications.

The SENTRON 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 trip units.

Installation types

Fixed-mounted or withdrawable version

Ambient temperatures

The SENTRON 3WL circuit-breakers are climate-proof according to IEC 60068-2-30. They are intended for use in enclosed areas where no severe operating conditions (e.g. dust, corrosive vapors, damaging gases) are present.

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

Coordinated dimensions

The dimensions of SENTRON 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 design are determined by the dimensions of the guide frames, which are slightly larger.

Non-automatic circuit-breakers

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

One potential application is the use as a bus coupler in systems with parallel feed-ins.

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

Operating mechanisms

The circuit-breakers are available with various optional operating mechanisms:

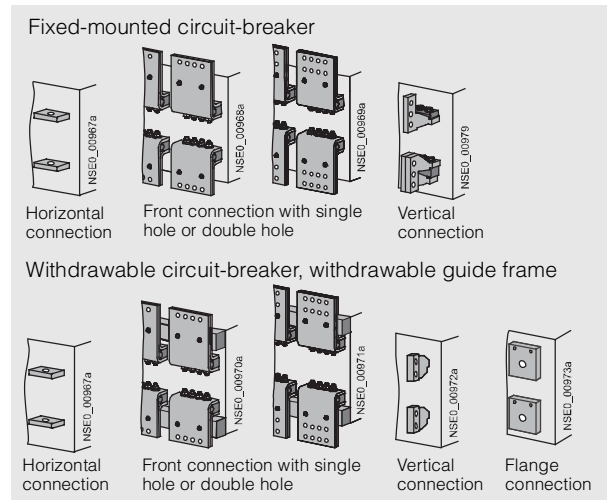
- Manual operating mechanism with mechanical closing (standard design)
- Manual operating mechanism with mechanical and electrical closing
- Motorized operating mechanism with mechanical and electrical closing.

The operating mechanisms with electrical closing can be used for synchronization tasks.

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data



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).

Circuit-breakers with a max. rated current of 6300 A are equipped with vertical main circuit connections (for vertically installed busbars).

The following options are available, with all combinations of top and bottom connections possible:

- Accessible from the front, one hole (for vertically installed busbars)
- Accessible from the front, two holes (holes according to DIN 43673) (for vertically installed busbars)
- At the rear, vertical (for vertically installed busbars)
- Connecting flange (for direct connection to guide frame up to 4000 A).



Connection Options for Auxiliary Supply Connections

Auxiliary supply 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 illustration "Guide Frame") in the guide frame. Various adapters can then be used to complete the wiring (see illustration "Connection Options for Auxiliary Circuit Connections").
- **Fixed mounting:** In this case the auxiliary circuit plugs 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 operator controls and displays with the door closed.

The operator panels for all circuit-breakers (fixed-mounted/withdrawable designs, 3-/4-pole) are identical. The operator panel ensures degree of protection IP41.

Safety and reliability

To protect the circuit-breakers and plant against unauthorized switching as well as the maintenance and operator personnel, the system contains many blocking devices. Others can be retrofitted.

Other safety features include:

- Incoming supply 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 closing lockout after overload or short-circuit tripping as standard
- The circuit-breaker is always equipped with the required number of auxiliary supply connectors

Standard design

SENTRON 3WL circuit-breakers are equipped with the following features as standard:

- Mechanical ON and OFF pushbutton
- Manual operating mechanism with mechanical activation
- Contact position indication
- Ready-to-close indicator
- Memory 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
- 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 system with SIGUT screw terminal Delivery inclusive of all auxiliary circuit connectors to internal specifications including coding device for the prevention of incorrect installation of auxiliary supply connectors for fixed-mounted circuit-breakers
- Mechanical "tripped" indicator for electronic trip unit system
- Mechanical closing lockout after tripping operation
- Control panel cannot be taken off with the circuit-breaker in the ON position

Additional features of the withdrawable design:

- **Main contacts:** Laminated receptacles in the guide frame, penetration blades on the withdrawable circuit-breaker
- Position indicator in the control panel of the withdrawable circuit-breaker
- Captive manual crank lever 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

SENTRON 3WL circuit-breakers comply with:

- IEC 60947-2
 - DIN VDE 0660 Part 101
 - Climate-proof to DIN IEC 68 Part 30-2
- Also available with UL 489.

For further specifications, see Appendix.

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

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 terminals are fitted to the side of the switch enclosure and establish the connection when inserted into the guide frame.

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

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

Qualified electricians can easily convert it to a withdrawable bridging unit by following the enclosed instructions.

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

Withdrawable short-circuit and grounding unit

The withdrawable short-circuit and grounding unit consists of a breaker enclosure with penetration blades 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 wound 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 trip units

Up to two auxiliary trip units can be installed at the same time. The following are available:

1 shunt trip unit
or 1 undervoltage trip unit
or 2 shunt trip units
or 1 shunt trip unit
+ 1 undervoltage trip unit.

Alarm switch for auxiliary trip units

One signal contact is used for each auxiliary trip unit to determine the positions of the auxiliary trip units.

Shunt trip unit

When the operational voltage is connected to the shunt trip unit, the circuit-breaker is opened immediately. The shunt trip unit is available in the variants 5 % ON-time for overexcitation and 100 % ON-time 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 trip unit allows the circuit-breaker to be opened even if the control voltage is no longer available.

Undervoltage trip unit

The undervoltage trip unit 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 trip unit is not connected to the operational voltage. The undervoltage trip unit 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 trip unit with a delay in the range from 0.2 to 3.2 s is available.

Closing solenoid

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

Motorized operating mechanisms

The operating mechanism is used to load the storage spring automatically.

The operating mechanism is activated if the storage spring has been unloaded and the control voltage is available.

It is switched off automatically after loading. This does not affect manual loading of the storage spring.

Indicators, signals, and operator controls

Motor STOP switch

Control switch for switching off the motorized operating mechanism (automatic loading).

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 storage spring is fully loaded.

Resetting 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 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 closing lockout

When the ETU is activated, reclosing of the circuit-breaker is prevented until the trip unit is either electrically or manually reset. If the "Automatic resetting of closing 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 signal switch

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

Ready-to-close indicator switch

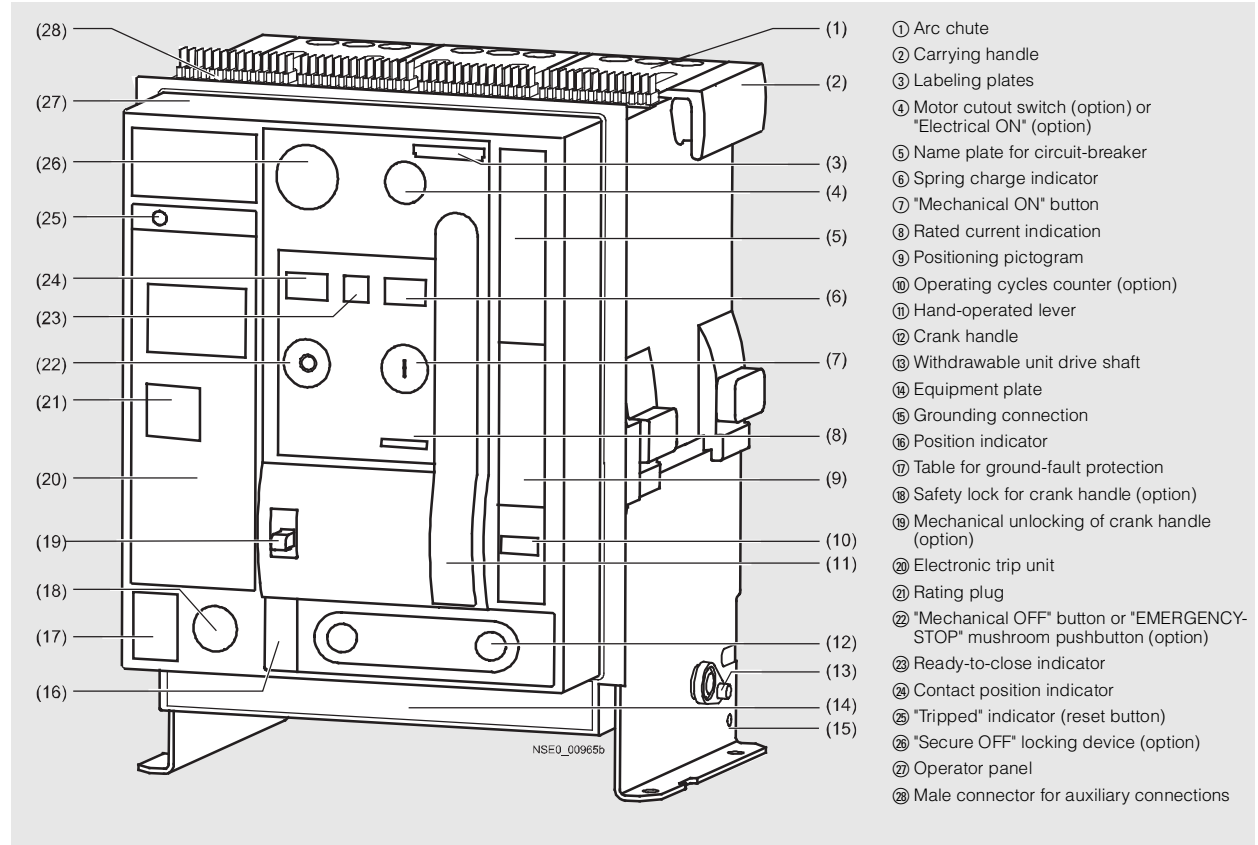
The SENTRON 3WL circuit-breakers are equipped with an optical ready-to-close indicator as standard. In addition, the ready-to-close status can be transmitted by means of a signal switch as an option. If the switch is used for communication, the signal switch is supplied as standard.

3WL Air Circuit-Breakers

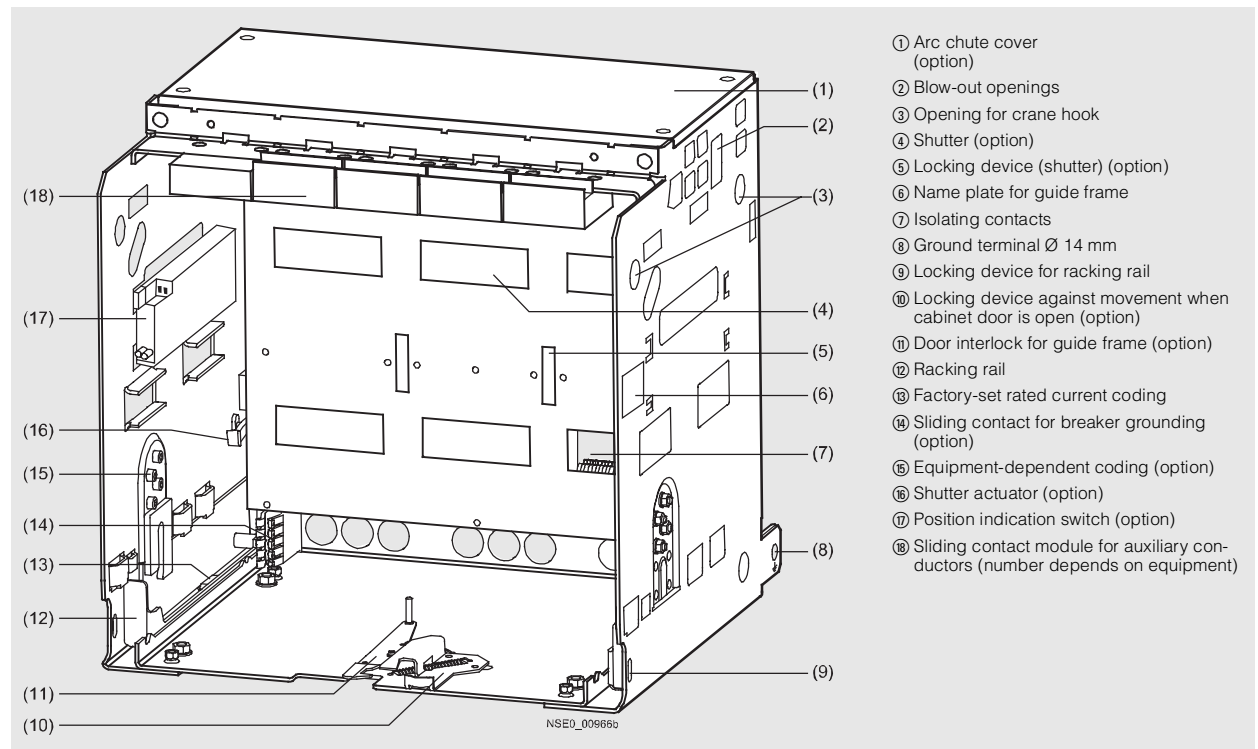
3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Circuit-breaker



Guide frame



3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Locking devices

Locking device in OFF position

This function prevents closing of the circuit-breaker and complies to the specifications for main switches to EN 60204 (VDE 0113) - disconnecter unit. 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 illustration "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 illustration "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.

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

This special circuit-breaker-independent function for withdrawable circuit-breakers prevents closing and fulfills the specifications for main switches to EN 60204 (VDE 0113) – disconnecter unit. Unauthorized closing remains impossible even after the circuit-breaker has been exchanged.

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 storage spring cannot be loaded manually.

Locking device against resetting the "tripped" indicator

A lockable cover prevents manual resetting of the "tripped" indicator after overcurrent tripping. This locking device is supplied together with the transparent cover 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 button" and "OFF"

The locking set contains covering caps which can be sealed.

Sealing device for electronic trip units

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

Blocking mechanisms

Blocking device against movement for withdrawable circuit-breakers when the cabinet door is open

The crank handle is blocked when the 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 wire) or
- The withdrawable circuit-breaker is in the connected position.

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

The "Mechanical ON" and "OFF" buttons are covered with a cap which only allows activation with a tool. These covering caps are part of the locking set.

Additional 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.

3WL Air Circuit-Breakers

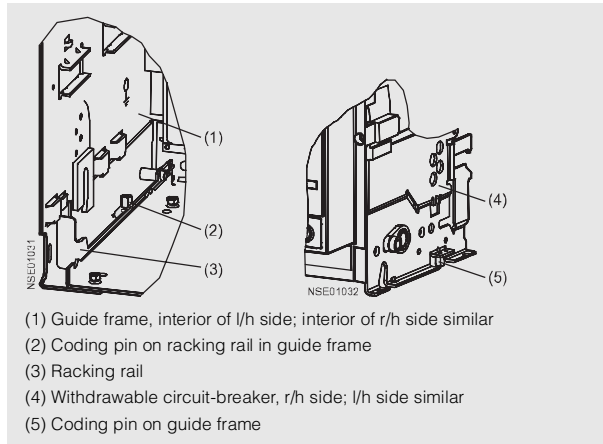
3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

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 penetration blades are suited to the laminated contacts of the guide frame can be inserted into a guide frame (see diagram below).



- (1) Guide frame, interior of l/h side; interior of r/h side similar
- (2) Coding pin on racking rail in guide frame
- (3) Racking rail
- (4) Withdrawable circuit-breaker, r/h side; l/h side similar
- (5) Coding pin on guide frame

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 indicator switch for guide frames

The guide frame can be equipped with position indicator 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 changeover contact
- Test position 1 changeover contact
- Disconnect position 1 changeover contact

Option 2

- Connected position 3 changeover contacts
- Test position 2 changeover contacts
- Disconnect position 1 changeover contact

Positions of the withdrawable circuit-breaker in the guide frame

	Display	Position indicator	Main circuit	Auxiliary circuit	Control cabinet door	Shutters
Maintenance position			Disconnected	Disconnected	Open	Closed
Disconnected position			Disconnected	Disconnected	Closed	Closed
Test position			Disconnected	Connected	Closed	Closed
Connected position			Connected	Connected	Closed	Open

- (1) Auxiliary circuit
- (2) Main circuit
- (3) Control cabinet door
- (4) Shutter

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 (standard for versions according to UL 489). The arc chute cover protects switchgear components which are located directly above the circuit-breaker.

Door sealing frame and cover

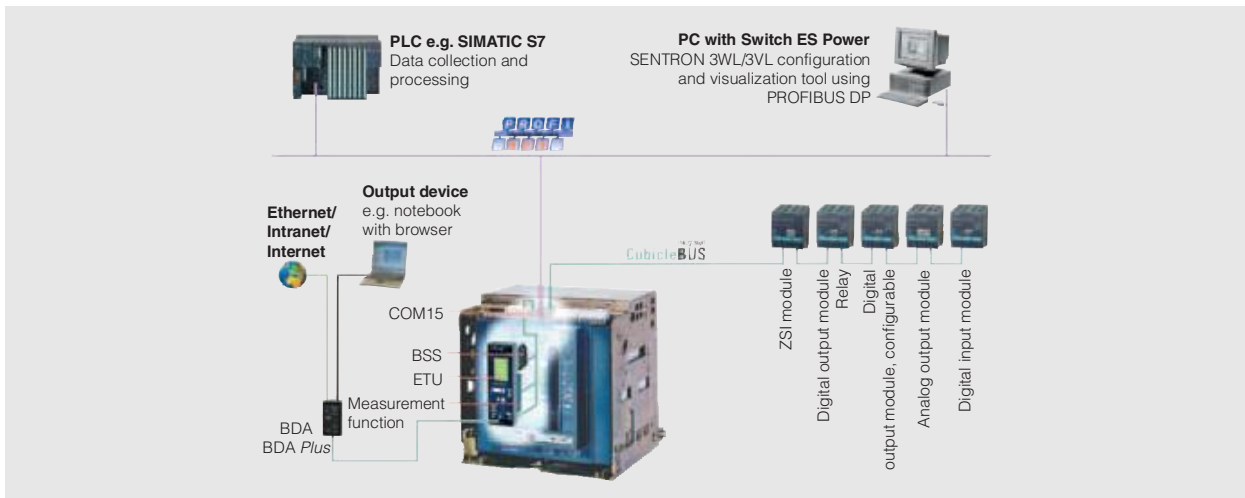
SETRON 3WL circuit-breakers have degree of protection IP20 as standard. However, if the switchgear is to be equipped with a higher degree of protection, a door sealing frame with IP41 and a cover with IP55 are available.

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Communication-capable circuit-breakers



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 SENTRON 3WL to ensure that it can satisfy these requirements.

The core component of this architecture is the **CubicleBUS**, which links together all of the intelligent components within the SENTRON 3WL and enables the easy and safe connection of other additional external components to the circuit-breaker. The **CubicleBUS** is already incorporated and pre-connected in all complete circuit-breakers with ETU45B, ETU55B and ETU76B trip units.

The high level of modularity of the system allows communication functions to be retrofitted at any time (e.g. the measurement function). Similarly, the upgrade of a non-communication-capable SENTRON 3WL (e.g. changeover from ETU25B to ETU45B with **CubicleBUS**) can be carried out easily on site in the plant. All modules connected to the **CubicleBUS** 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/outputs, analog outputs) can be connected to the **CubicleBUS** to provide cost-effective solutions for the automation of further devices in the switchboard.

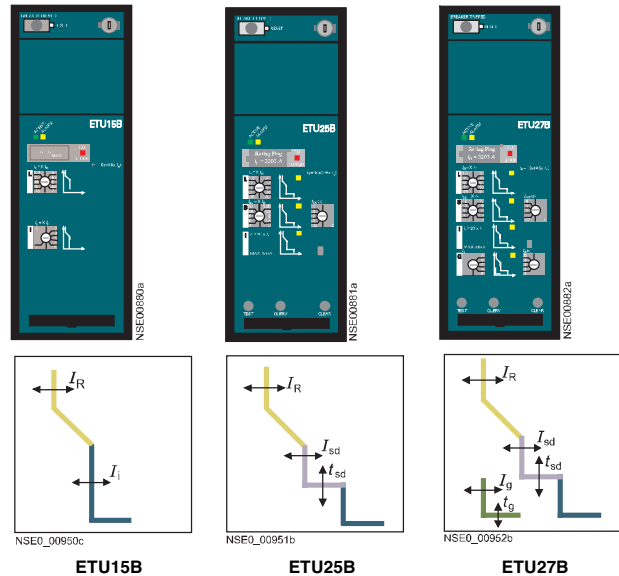
3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Function

Functions of the electronic trip units



Basic protection functions

Function	Code	ETU15B	ETU25B	ETU27B
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

N-conductor protection can be switched on/off	--	--	✓
N-conductor protection adjustable	--	--	--
Short-time delayed short-circuit protection can be switched on/off	--	--	--
Instantaneous short-circuit protection can be switched on/off	--	--	--
Thermal image can be switched on/off	--	--	--
Load monitoring	--	--	--
Short-time delayed 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	--	--	--

Configuration and display

Configuration through rotary coding switches (10 steps)	✓	✓	✓
Configuration through communication (absolute values)	--	--	--
Configuration through user interface of ETU (absolute values)	--	--	--
Configuration of the extended protection functions	--	--	--
LCD alphanumerical	--	--	--
Graphic LCD	--	--	--

Measurement function

Measurement function <i>Plus</i>	--	--	--
----------------------------------	----	----	----

Communication

CubicleBUS	--	--	--
Communication through PROFIBUS DP	--	--	--
Communication through Ethernet	--	--	--

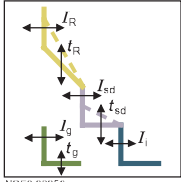
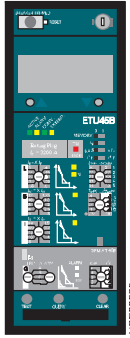
✓ Standard -- Not available □ Optional

Detailed information about the functions of the electronic trip units is given in the following.

3WL Air Circuit-Breakers

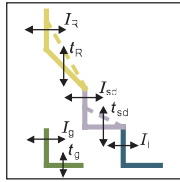
3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data



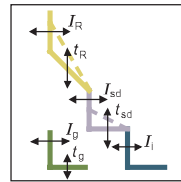
NSE0 00953a

ETU45B



NSE0 00953a

ETU55B



NSE0 00553a

ETU76B

	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	☐	☐	☐
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	--	✓	✓
	--	✓	✓
	✓	--	--
	--	✓	✓
	--	--	✓
	☐	☐	☐
	☐	--	--
	--	--	✓
	☐	☐	☐
	☐	☐	☐
	✓	✓	✓
	☐	☐	☐
	☐	☐	☐

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

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 capabilities

The international standard PROFIBUS DP can be used to transmit data such as current values, switching states, reasons for tripping etc. to central computers.

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

A new internal circuit-breaker data bus allows switchboard panel communication between the circuit-breaker and secondary devices in the circuit-breaker panel:

- Actuation of analog displays
- Ability to test the communication build-up with circuit-breakers
- Display of release status and tripping reasons
- Input module for reading in further switchgear panel signals and for transmission of these signals to the PROFIBUS DP
- 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 curve for overload protection

The best protection for the whole switchgear 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, ETU55B, and ETU76B electronic trip units allows the characteristic curve to be switched between I^2t - and I^4t .

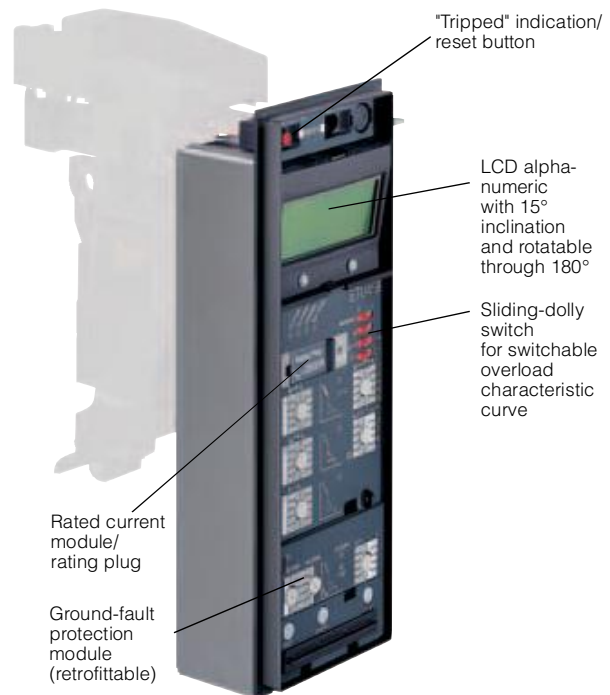
The I^4t characteristic improves discrimination for downstream circuit-breakers and fuses.

Electronic trip units ETU

Modularity has also been strictly emphasized 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
- Measurement function
- Display
- Rated current module (Rating Plug)

This allows quick adaptation to new local mains specifications. In addition, innovative functions have been included in the ETUs.



Example of configuration for ETU45B

Rated current module/Rating Plug

The rated current module 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 taken into operation. The rated current module must be selected to fit the rated current of the plant.

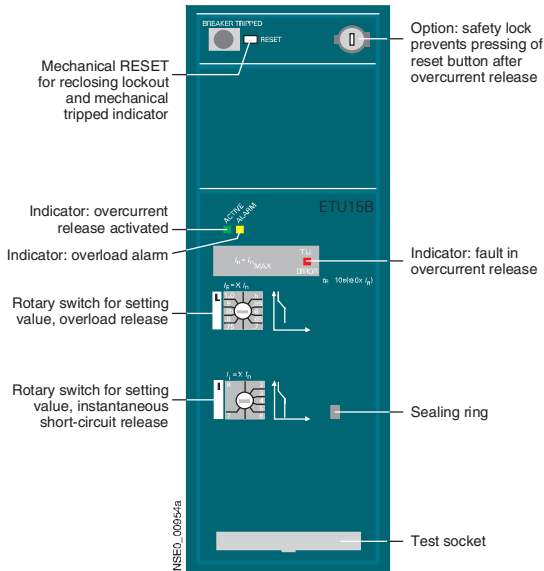
Selectable parameters

In the case of quick changes of power supply conditions, e.g. for switchovers from transformer to generator operation or if a section of the supply is shutdown when the shift changes, SENTRON 3WL allows the relevant protection parameters to be quickly adapted to the new conditions. The ETUs contain two independent tripping characteristic curves (parameter sets). The switchover is completed within 200 ms and is performed with the help of an external signal.

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

ETU15B electronic trip unit



Application:

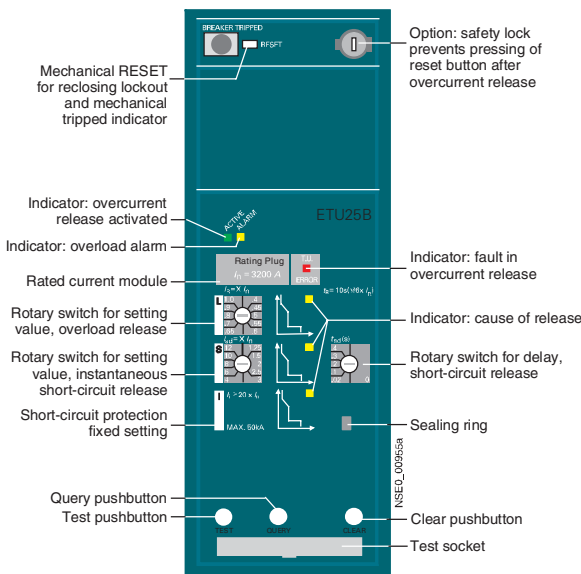
Simple building and plant protection without time-selective coordination up to 3200 A

Features:

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

For technical details see the table "Functional Overview of the Electronic Trip Unit System" under "Technical Specifications".

ETU25B electronic trip unit



Application:

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

Features:

- Adjustable overload protection with I^2t characteristic curve
Delay time $t_R = 10$ seconds at $6 \times I_R$
- Short-time delayed short-circuit protection adjustable in the range $1.25 \dots 12 \times I_n$ and
- Instantaneous short-circuit protection preset to $20 \times I_n$, max. 50 kA
- Can be adapted at any time to the required plant currents through retrofittable rated current module, thus ensuring overload protection in the range from 100 A to 6300 A.
- Overload display
- Indicates the reason for tripping by means of an LED
- Test option for the release
- Protection functions are set by means of the rotary coding switch

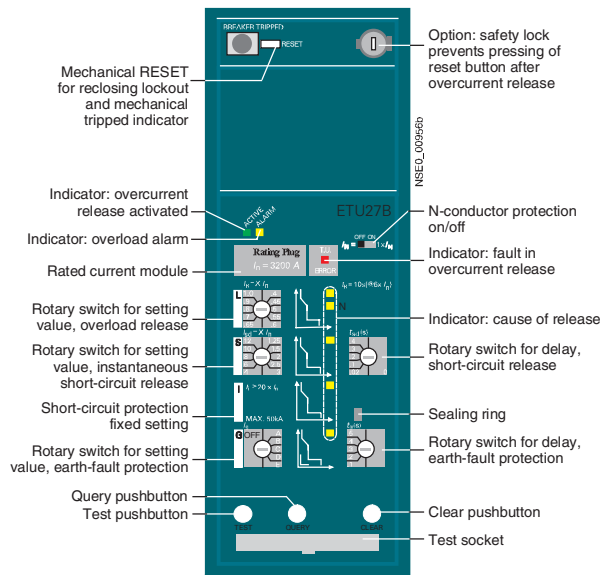
For technical details see the table "Functional Overview of the Electronic Trip Unit System" under "Technical Specifications".

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

ETU27B electronic trip unit



Application:

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

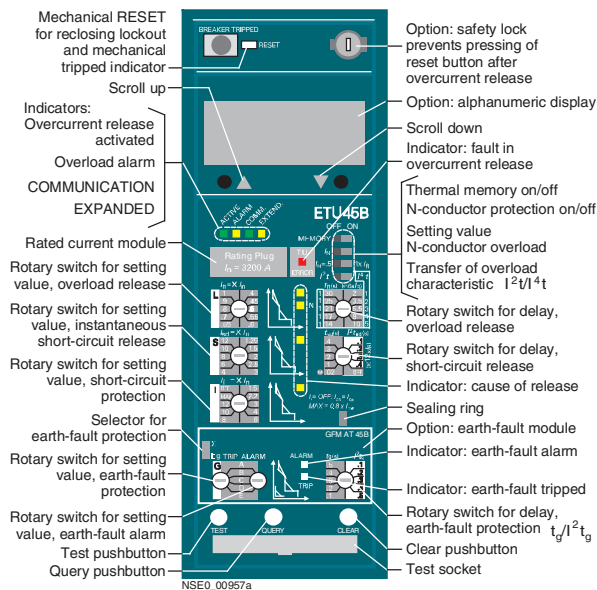
Features:

The same as ETU25B but also

- Reversible 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 "Functional Overview of the Electronic Trip Unit System" under "Technical Specifications".

ETU45B electronic trip unit



Application:

Low-cost all-round system for intelligent buildings and all types of industrial applications – "CubicleBUS integrated"

Features:

The same as ETU25B but also

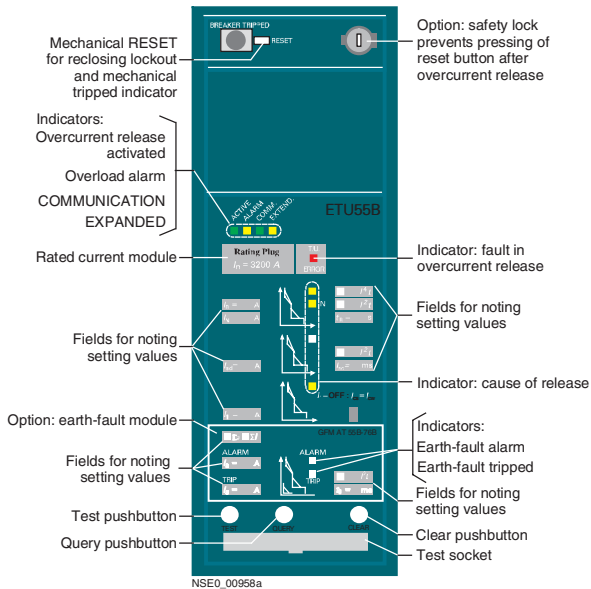
- Adjustable time-lag class for overload protection
- Selectable characteristic for overload and short-delayed short-circuit range (current discrimination) for more accurate discrimination adaptation to upstream fuses and protection equipment
- Thermal image as restart protection for tripped motor outgoing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

For technical details see the table "Functional Overview of the Electronic Trip Unit System" under "Technical Specifications".

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

ETU55B electronic trip unit



Application:

The trip unit for special safety requirements which can be set via exclusive external parameter access for generator and motor protection as well as industrial applications – "CubicleBUS integrated"

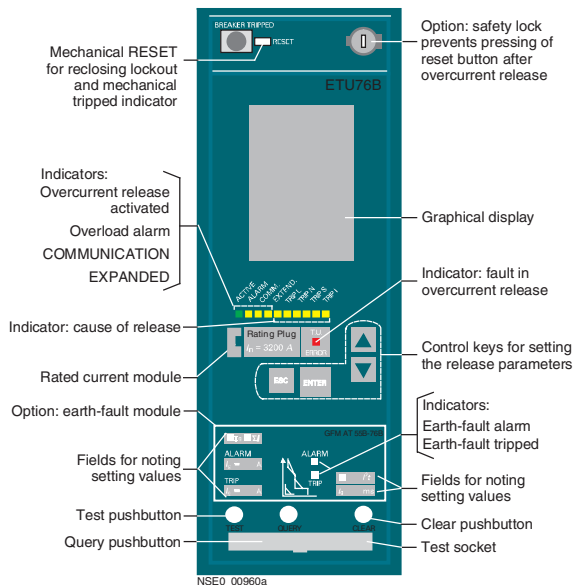
Features:

The same as ETU45B but also including

- Two protection parameter sets which can be stored separately in the release (switchover is performed by means of external signal)
- With overload protection which can be deactivated for operation in modern drive technology
- Adjustable delay of delayed short-circuit protection up to 4000 ms
- Neutral conductor protection adjustable up to $I_N = 2 \times I_n$
- Setting of protection functions by means of Breaker Data Adapter (BDA) or via communications interface

For technical details see the table "Functional Overview of the Electronic Trip Unit System" under "Technical Specifications".

ETU76B electronic trip unit



Application:

The multi-talent with graphical display for system analysis – "CubicleBUS integrated"

Features:

The same as ETU55B but also including

- 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 "Functional Overview of the Electronic Trip Unit System" under "Technical Specifications".

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

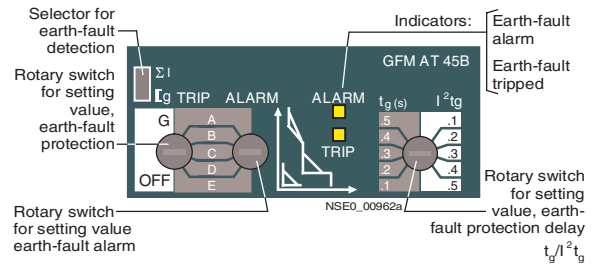
General data

Ground-fault protection

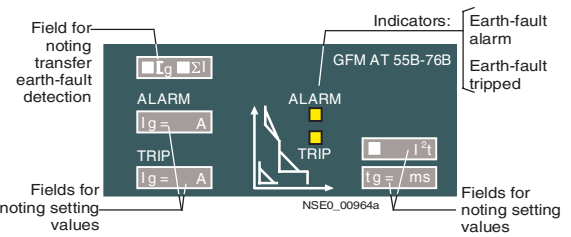
Ground-fault releases "G" sense fault currents that flow to ground and that can cause fire in the plant. Multiple circuit-breakers connected in series can have their delay times adjusted so as to provide graduated discrimination.

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, ETU55B and ETU76B electronic trip unit versions can be retrofitted with a ground-fault module. This ground fault protection function is integrated in ETU27B electronic trip units.



GFM AT 45B Ground-fault module



GFM AT 55B-76B Ground-fault module

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Measurement method

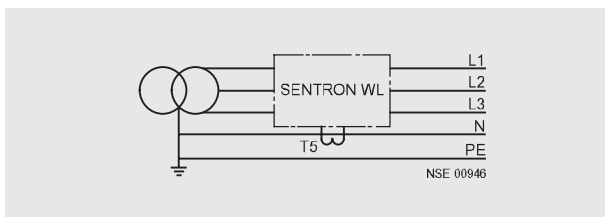
Vectorial summation current formation

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

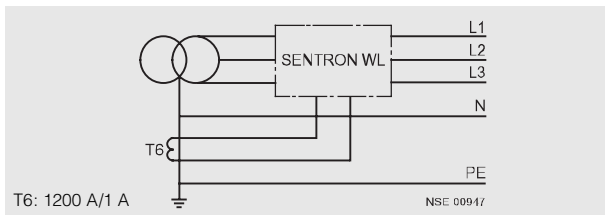
The electronic trip unit determines the ground-fault current by means of vectorial summation current formation for the three phase currents and the N-conductor current.

Direct measurement of the ground-fault current

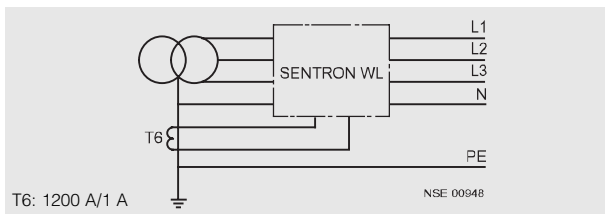
A standard transformer with the following data is used for measurement of the ground-fault current: 1200 A/1 A, Class 1 (the internal load of SENTRON 3WL is 0.11 Ω). The transformer can be installed directly in the grounded neutral point of a transformer.



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

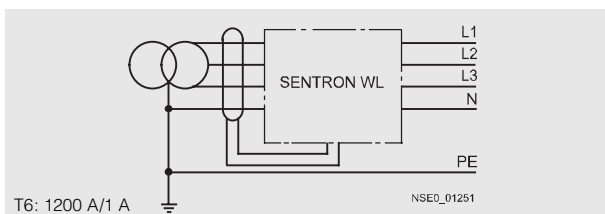


3-pole circuit-breakers, current transformers in the grounded neutral point of the transformer.



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

It is also possible to use a summation current transformer.



Use of a summation current 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 ΣI_g .

This setting can be implemented for the ETU55B and ETU76B electronic trip unit versions 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 SENTRON 3WL circuit-breakers

Basic criteria for selecting circuit-breakers are:

- **Max. short-circuit current** at mounting location 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 illustration "Overview of SENTRON 3WL Circuit-Breakers/Non-Automatic Circuit-Breakers".
- **Rated current I_n** which is to flow through the branch circuit. This value must not be larger than the maximum rated current for the circuit-breaker. The rated current for the SENTRON 3WL is set with the rated current module. See illustration "Overview of SENTRON 3WL Circuit-Breakers/Non-Automatic Circuit-Breakers".
- **Ambient temperature** for the circuit-breaker. This is usually the temperature inside the switchgear cabinet.
- **Version** 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 determined by the selection of the corresponding electronic trip unit. See table "Functions of the Electronic Trip Units" under "Functions".

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

SENTRON 3WL for DC applications

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

This is based on the measuring chain of a shunt resistor and the DIGmat S100 trip 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 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 possible therefore.

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

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



DIGmat S100

- Short-circuit protection:
Setting range $I_i = 1.25 \times I_R$ up to max. $4 \times I_n$
If the set value is exceeded, tripping occurs in less than 50 ms.

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

The components are available only from the company mat – Maschinen- und Anlagentechnik (for address see "Appendix" => "External Partners").

Configuration

Mutual mechanical circuit-breaker interlocking

The module for mutual mechanical interlocking can be used for one or two SENTRON 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 and 3WN1 circuit-breakers.

The circuit-breakers can be mounted alongside 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.

Minimum requirements must be fulfilled in the switching system for the interlocking to function:

- Bowden cables must be installed as far as possible in a straight line with minimum bending.

- The bending radii of the Bowden cable must be greater than 500 mm.
- The sum of all bending angles along the Bowden cable must not exceed 640°.
- In a vertical arrangement of circuit-breakers to be interlocked, the interlocking mechanisms must be in line.
- Circuit-breakers to be interlocked must be arranged so that 2 m or 4.5 m long 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 switchgear cubicle to allow enough freedom of movement for adjusting the interlock!
- Openings and cut-outs in system elements must be designed so that Bowden cables are not changed in direction or obstructed when they are passed through.

Mutual mechanical interlocking of circuit-breakers – examples

Mutual interlocking of two circuit-breakers	Interlocking between three circuit-breakers	Mutual interlocking of three circuit-breakers	Interlocking of three circuit-breakers, two of them mutual
<p>NSE01041</p>	<p>NSE01042</p>	<p>NSE01044</p>	<p>NSF01045</p>

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

SENTRON 3WL Communication-Capable Circuit-Breakers

Function	Electronic trip unit version			Breaker status sensor	PROFIBUS communication port	Measurement function Plus	Analog output module	Digital output module	Digital input module	ZSI module	Breaker Data Adapter	Breaker Data Adapter Plus
	ETU45B	ETU76B	ETU55B									
Indication of measured values in trip unit (current only)	✓	✓	--	☐	☐	☐	☐	☐	☐	☐	☐	☐
Indication of measured values in trip unit (U, I, P, S, Q, p.f., etc.)	✓	✓	--	☐	☐	✓	☐	☐	☐	☐	☐	☐
Indication of measured values (current only), parameter, 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 moving-coil instruments in cabinet door	✓	✓	✓	☐	☐	☐	✓	☐	☐	☐	☐	☐
Output of measured values (U, I, P, S, Q, p.f., etc.) to moving-coil instruments in cabinet door	✓	✓	✓	☐	☐	✓	✓	☐	☐	☐	☐	☐
Output of digital signals (e.g. reason for tripping, alarm signals, status) through contacts	✓	✓	✓	☐	☐	☐	☐	✓	☐	☐	☐	☐
Automatic changeover between parameter sets A and B	--	✓	✓	☐	☐	☐	☐	☐	✓	☐	☐	☐
Read in digital signals and forward to PROFIBUS	✓	✓	✓	☐	✓	☐	☐	☐	✓	☐	☐	☐
Transmission of circuit-breaker information on HTML basis locally to a PC	✓	✓	✓	✓	☐	☐	☐	☐	☐	☐	✓	✓
Transmission of circuit-breaker information on HTML basis through Ethernet	✓	✓	✓	✓	☐	☐	☐	☐	☐	☐	☐	✓
Short-time grading control for S tripping and G protection	✓	✓	✓	☐	☐	☐	☐	☐	☐	✓	☐	☐
Local display of harmonic analysis and waveform memory	--	✓	--	☐	☐	✓	☐	☐	☐	☐	☐	☐
Local storage of harmonic analysis and waveform memory and transmission through PROFIBUS	✓	✓	✓	✓	✓	✓	☐	☐	☐	☐	☐	☐
Read out protection parameters through PROFIBUS	✓	✓	✓	✓	✓	☐	☐	☐	☐	☐	☐	☐
Read out and adjust protection parameters through PROFIBUS	--	✓	✓	✓	✓	☐	☐	☐	☐	☐	☐	☐

- ✓ Required
 Function can optionally be taken over by more than one trip unit.
 Function can optionally be taken over by one of these modules.
- ☐ Not necessary for this function, optionally combinable
 -- Function not available

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

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

All SENTRON 3WLs with ETU45B, ETU55B, ETU76B (CubicleBUS integrated)



	BSS	BDA	BSS	COM15
Transmittable circuit-breaker data				
Order code (Order No. of circuit-breaker + "-Z")		F01		F02
Order No.		+BDA/BDAPLUS Order No.		
Potential applications				
Transmission of circuit-breaker data to PROFIBUS DP and integration into higher-level visualization systems are 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 measurement function				
Device identification Communication address, Order No., circuit-breaker in delivery status, circuit-breaker parameters (size, number of poles, rated current module etc.), identification numbers, release type, free text for plant code and comments		✓ ..1)		✓ ✓
Operating statuses On/off status message, storage spring, tripped, readiness Switching position (connected, test and disconnected position, not present) for withdrawable circuit-breakers, PROFIBUS write protection on/off, free user input		✓ ..1) ..1)		✓ ✓ ✓
Control commands Switch circuit-breaker on/off, switch free user output on/off Reset tripped signal Delete event and history memory Reset the min./max. measured values, reset the maintenance information		✓ ..1) ✓ ✓		✓ ✓ ✓ ✓
History Read out the event protocol, read out the release protocol		..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 signal 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)		✓ ✓ ✓
Configuration of the protection functions Reading 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 switchgear cabinet with min./max. value All of the named measured values with time stamp		✓ ..1) ..1) ..1)		✓ ✓ ✓ ✓



Additional transmittable circuit-breaker data with integrated measurement function

Measurement function Plus

Order code F01+ ... or F02+ ...	F05
Additional event messages Threshold value alarms (e.g. over/underfrequency, over/undervoltage)	✓
Configuration of the extended protection functions and setpoints (threshold values) Reading out the parameters of the extended protection functions Settings for the extended protection function parameters can be changed Reading out and adjusting threshold values	✓ ✓ ✓
Additional measured values Voltages, power, energy, power factor, frequency, each with min./max. value Harmonic analysis Recording of currents and voltages for configurable events in the curve form memory	✓ ✓ ✓

1) Data only available in conjunction with the COM15 module (PROFIBUS link not required).

2) Only possible with ETU55B, ETU76B.

✓ available

-- not possible

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Technical specifications

Short-circuit breaking capacity							
Size		I		II			III
Type		3WL11		3WL12			3WL13
Switching capacity class		N	S	N	S	H	H
Rated operational voltage U_b up to 415 V AC							
I_{cu}	kA	50	65	55	80	100	100
I_{cs}	kA	50	65	55	80	100	100
I_{cm}	kA	105	143	121	176	220	220
Rated operational voltage U_b up to 500 V AC							
I_{cu}	kA	50	65	55	80	100	100
I_{cs}	kA	50	65	55	80	100	100
I_{cm}	kA	105	143	121	176	220	220
Rated operational voltage U_b up to 690 V AC							
I_{cu}	kA	42	50	50	75	85	85
I_{cs}	kA	42	50	50	75	85	85
I_{cm}	kA	88	105	105	165	187	187
Rated operational voltage U_b up to 1000 V AC							
I_{cu}	kA	--	--	--	--	45	50
I_{cs}	kA	--	--	--	--	45	50
I_{cm}	kA	--	--	--	--	95	105

Rated short-time withstand current I_{cw} of the circuit-breakers							
Size		I		II			III
Type		3WL11		3WL12			3WL13
Switching capacity class		N	S	N	S	H	H
0.5 s	kA	42	65	55	80	85	$85^3/100^4$
1 s	kA	30	50	55	65	80	$80^3/100^4$
2 s	kA	21	35	39	46	$50^1/56^2$	$56^3/70^4$
3 s	kA	17	29	32	37	$40^1/50^2$	$50^3/57^4$

Short-circuit breaking capacity I_{cc} of the non-automatic circuit-breakers							
Size		I		II			III
Type		3WL11		3WL12			3WL13
Switching capacity class		N	S	N	S	H	H
Up to 500 V AC	kA	42	65	55	80	100	100
Up to 690 V AC	kA	42	50	50	75	85	85

- 1) Size II with $I_{n \max} \leq 2500$ A.
- 2) Size II with $I_{n \max} = 3200$ A.
- 3) Size III with $I_{n \max} \leq 5000$ A.
- 4) Size III with $I_{n \max} = 6300$ A.

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3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Size		I	II							
Type		up to 3WL11 10	3WL11 12	3WL11 16	3WL12 08	3WL12 10	3WL12 12	3WL12 16	3WL12 20	
Rated current I_n at 40 °C, at 50/60 Hz										
Main conductor	A	Up to 1000	1250	1600	800	1000	1250	1600	2000	
Neutral conductor (only on 4-pole versions)	A	Up to 1000	1250	1600	800	1000	1250	1600	2000	
Rated operational voltage U_o at 50/60 Hz (1000 V version, see Catalog LV 1, Options)	V AC	Up to 690	Up to 690	Up to 690	Up to 690/1000	Up to 690/1000	Up to 690/1000	Up to 690/1000	Up to 690/1000	
Rated insulation voltage U_i	V AC	1000	1000	1000	1000	1000	1000	1000	1000	
Rated impulse withstand voltage U_{imp}										
Main circuits	kV	12	12	12	12	12	12	12	12	
Auxiliary circuits	kV	4	4	4	4	4	4	4	4	
Control circuits	kV	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Isolating function 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) ⁴⁾	°C	-25/+70	-25/+70	-25/+70	-25/+70	-25/+70	-25/+70	-25/+70	-25/+70	
During storage (special conditions for LCDs must be observed)	°C	-40/+70	-40/+70	-40/+70	-40/+70	-40/+70	-40/+70	-40/+70	-40/+70	
Permissible load										
Up to 55 °C (Cu bare)	A	1000	1250	1600	800	1000	1250	1600	2000	
At rear horizontal main circuit connections	A	1000	1250	1600	800	1000	1250	1600	2000	
Up to 60 °C (Cu bare) ⁵⁾	A	1000	1210	1490	800	1000	1250	1600	2000	
Up to 70 °C (Cu black paint.) ⁵⁾	A	1000	1210	1490	800	1000	1250	1600	2000	
Rated rotor operational voltage U_{er}	V	2000	2000	2000	2000	2000	2000	2000	2000	
Power loss at I_n										
With AC symmetrical load										
Fixed-mounted circuit-breakers	W	100	105	150	40	45	80	85	180	
Withdrawable circuit-breakers	W	195	205	350	85	95	165	175	320	
Operating times										
Opening time	ms	35	35	35	35	35	35	35	35	
Break-time	ms	38	38	38	34	34	34	34	34	
Electrical opening time (through closing solenoid) ²⁾	ms	80	80	80	100	100	100	100	100	
Electrical break-time (through shunt trip unit)	ms	73	73	73	73	73	73	73	73	
Electrical break-time (instantaneous undervoltage trip unit)	ms	73	73	73	73	73	73	73	73	
Break-time due to ETU, instantaneous short-circuit release	ms	50 ¹⁾	50 ¹⁾	50 ¹⁾	50 ¹⁾	50 ¹⁾	50 ¹⁾	50 ¹⁾	50 ¹⁾	
Endurance										
Mechanical (without maint.)	Operating cycles	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	
Mechanical (with maint.) ³⁾	Operating cycles	20 000	20 000	20 000	15 000	15 000	15 000	15 000	15 000	
Electrical (without maint.)	Operating cycles	10 000	10 000	10 000	7500	7500	7500	7500	7500	
1000 V version	Operating cycles	--	--	--	1000	1000	1000	1000	1000	
Electrical (with maintenance) ³⁾	Operating cycles	20 000	20 000	20 000	15 000	15 000	15 000	15 000	15 000	
Operating frequency										
690 V version	1/h	60	60	60	60	60	60	60	60	
1000 V version	1/h	--	--	--	20	20	20	20	20	
Minimum interval	ms	80	80	80	80	80	80	80	80	
Between tripping operation by electronic trip unit and next making operation of the circuit-breaker (only with autom. mechanical resetting of the lockout device)										
Mounting position										
Degree of protection	IP20 without cabinet door, IP41 with door mounting frame, IP55 with cover									
Main conductor minimum cross-sections										
Copper bars, bare	Qty mm ²	1 × 60 × 10	2 × 40 × 10	2 × 50 × 10	1 × 50 × 10	1 × 60 × 10	2 × 40 × 10	2 × 50 × 10	3 × 50 × 10	
Copper bars, painted black	Qty mm ²	1 × 60 × 10	2 × 40 × 10	2 × 50 × 10	1 × 50 × 10	1 × 60 × 10	2 × 40 × 10	2 × 50 × 10	3 × 50 × 10	
Auxiliary conductors (Cu)										
Max. number of auxiliary conductors × cross-section (solid/stranded)		Standard connection = strain-relief clamp without end sleeve with end sleeve according to DIN 46228 Part 2 with twin end sleeve								
		2 × 0.5 mm ² (AWG 20) ... 2 × 1.5 mm ² (AWG 16); 1 × 2.5 mm ² (AWG 14)								
		1 × 0.5 mm ² (AWG 20) ... 1 × 1.5 mm ² (AWG 16)								
		2 × 0.5 mm ² (AWG 20) ... 2 × 1.5 mm ² (AWG 16)								
		Optional conn. = tension spring without end sleeve with end sleeve according to DIN 46228 Part 2								
		2 × 0.5 mm ² (AWG 20) ... 2 × 2.5 mm ² (AWG 14)								
		2 × 0.5 mm ² (AWG 20) ... 2 × 1.5 mm ² (AWG 16)								
Position indicator switches	Tension spring terminals	1 × 0.5 mm ² (AWG 20) ... 1 × 2.5 mm ² (AWG 14)								
Weights										
3-pole	Fixed-mounted circuit-break.	kg	43	43	43	56	56	56	56	
	Withdrawable circuit-break.	kg	45	45	45	60	60	60	60	
	Guide frame	kg	25	25	25	31	31	31	31	
4-pole	Fixed-mounted circuit-break.	kg	50	50	50	67	67	67	67	
	Withdrawable circuit-break.	kg	54	54	54	72	72	72	72	
	Guide frame	kg	30	30	30	37	37	37	37	

- 1) Break-time on instantaneous short-circuit release with ETU15B = 85 ms.
- 2) Make-time through activation solenoid for synchronization purposes (short-time excited) 50 ms.

- 3) Maintenance means: replace main contact elements and arc chutes (see Operator's Guide).
- 4) Use of trip units from -20 °C
- 5) ETU76B with graphics display can be used up to max. 55 °C.

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Size			II		III		
Type			3WL12 25	3WL12 32	3WL13 40	3WL13 50	3WL13 63
Rated current I_n at 40 °C, at 50/60 Hz							
Main conductor	A		2500	3200	4000	5000	6300
Neutral conductor (only on 4-pole versions)	A		2500	3200	4000	5000	6300
Rated operational voltage U_g at 50/60 Hz (1000 V version, see Catalog LV 1, Options)	V AC		Up to 690/1000	Up to 690/1000	Up to 690/1000	Up to 690/1000	Up to 690/1000
Rated insulation voltage U_i	V AC		1000	1000	1000	1000	1000
Rated impulse withstand voltage U_{imp}							
Main circuits	kV		12	12	12	12	12
Auxiliary circuits	kV		4	4	4	4	4
Control circuits	kV		2.5	2.5	2.5	2.5	2.5
Isolating function to EN 60947-2			Yes	Yes	Yes	Yes	Yes
Utilization category			B (except switching capacity class DC)				
Permissible ambient temperature							
During operation (in operation with LCD max. 55 °C) ⁴⁾	°C		-25/+70	-25/+70	-25/+70	-25/+70	-25/+70
During storage (special conditions for LCDs must be observed)	°C		-40/+70	-40/+70	-40/+70	-40/+70	-40/+70
Permissible load							
Up to 55 °C (Cu bare)	A		2500	3200	4000	5000	5920
Up to 60 °C (Cu bare) ⁵⁾	A		2500	3020	4000	5000	5810
Up to 70 °C (Cu black painted) ⁵⁾	A		2280	2870	4000	5000	5500
Rated rotor operational voltage U_{er}	V		2000	2000	2000	2000	2000
Power loss at I_n							
With AC symmetrical load							
Fixed-mounted circuit-breakers	W		270	410	520	630	900
Withdrawable circuit-breakers	W		520	710	810	1050	1600
Operating times							
Opening time	ms		35	35	35	35	35
Break-time	ms		34	34	34	34	34
Electrical opening time (through closing solenoid) ²⁾	ms		100	100	100	100	100
Electrical break-time (through shunt trip unit)	ms		73	73	73	73	73
Electrical break-time (instantaneous undervoltage trip unit)	ms		73	73	73	73	73
Break-time due to ETU, instantaneous short-circuit release	ms		50 ¹⁾	50 ¹⁾	50	50	50
Endurance							
Mechanical (without maint.)	Operating cycles		10000	10000	5000	5000	5000
Mechanical (with maint.) ³⁾	Operating cycles		15000	15000	10000	10000	10000
Electrical (without maintenance)	Operating cycles		7500	4000	2000	2000	2000
1000 V version	Operating cycles		1000	1000	1000	1000	1000
Electrical (with maintenance) ³⁾	Operating cycles		15000	15000	10000	10000	10000
Operating frequency							
690 V version	1/h		60	60	60	60	60
1000 V version	1/h		20	20	20	20	20
Minimum interval			80	80	80	80	80
Between tripping operation by electronic trip unit and next making operation of the circuit-breaker (only with automatic mechanical resetting of the lockout device)							
Mounting position							
Degree of protection			IP20 without cabinet door, IP41 with door mounting frame, IP55 with cover				
Main conductor minimum cross-sections							
Copper bars, bare	Qty		2 x	3 x	4 x	6 x	6 x
	mm ²		100 x 10	100 x 10	100 x 10	100 x 10	120 x 10
Copper bars, painted black	Qty		2 x	3 x	4 x	6 x	6 x
	mm ²		100 x 10	100 x 10	100 x 10	100 x 10	120 x 10
Auxiliary conductors (Cu)							
Max. number of auxiliary conductors x cross-section (solid/stranded)			Standard connection = strain-relief clamp without end sleeve with end sleeve according to DIN 46228 Part 2 with twin end sleeve 2 x 0.5 mm ² (AWG 20) ... 2 x 1.5 mm ² (AWG 16); 1 x 2.5 mm ² (AWG 14) 1 x 0.5 mm ² (AWG 20) ... 1 x 1.5 mm ² (AWG 16)				
			Optional connection = tension spring without end sleeve with end sleeve according to DIN 46228 Part 2 2 x 0.5 mm ² (AWG 20) ... 2 x 1.5 mm ² (AWG 16)				
			2 x 0.5 mm ² (AWG 20) ... 2 x 2.5 mm ² (AWG 14) 2 x 0.5 mm ² (AWG 20) ... 2 x 1.5 mm ² (AWG 16)				
Position indicator switches	Tension spring terminals		1 x 0.5 mm ² (AWG 20) ... 1 x 2.5 mm ² (AWG 14)				
Weights							
3-pole	Fixed-mounted circuit-breakers	kg	59	64	82	82	90
	Withdrawable circuit-breakers	kg	63	68	88	88	96
	Guide frame	kg	39	45	60	60	70
4-pole	Fixed-mounted circuit-breakers	kg	71	77	99	99	108
	Withdrawable circuit-breakers	kg	76	82	106	106	108
	Guide frame	kg	47	54	84	84	119

1) Break-time on instantaneous short-circuit release with ETU15B = 85 ms.
 2) Make-time through activation solenoid for synchronization purposes (short-time excited) 50 ms.

3) Maintenance means: replace main contact elements and arc chutes (see Operator's Guide).
 4) Use of trip units from -20 °C
 5) ETU76B with graphics display can be used up to max. 55 °C.

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Size		I to III			
Manual operating mechanism with mechanical activation					
Closing/ Charging stored-energy feature	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 stored-energy feature					
Closing solenoid (CC)	Operating range		0.85 ... 1.1 × U_s		
	Extended operating range for battery operation	for 24 V DC, 48 V DC 60 V DC, 110 V DC 220 V DC	0.7 ... 1.26 × U_s		
	Power consumption	AC/DC	VA/W	15/15	
	Minimum command duration at U_s for the closing solenoid		ms	60	
	Short-circuit protection	1 A TDz (slow)/1 A			
	Smallest permissible DIAZED fuse (gL operational class)/ miniature circuit-breaker with C-characteristic				
Manual/motorized operating mechanism with mechanical and electrical closing					
Manual operating mechanism		For data see above.			
Motor	Operating range		0.85 ... 1.1 × U_s		
	Extended operating range for battery operation	for 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	110/110	
	Time required to charge the stored-energy mechanism at 1 × U_s		s	≤ 10	
Closing solenoid For motor and closing solenoid	Short-circuit protection			For data see above.	
	Motor and closing solenoid for the same rated control supply voltages			2 A TDz (slow)/1 A	
	Smallest permissible DIAZED fuse (gL operational class)/ miniature circuit-breaker with C-characteristic (for different rated control supply voltages)			at $U_s = 24-30$ V 2 A at $U_s = 48-60$ V 2 A at $U_s = 110-127$ V 1 A at $U_s = 220-250$ V 1 A	
Electronic trip unit signals					
Measuring accuracy of the electronic trip unit		Protection functions according to EN 60947; current indication ≤ 10 %; Measurement function base quantities ≤ 1 %; Measurement function derived quantities ≤ 4 %			
Auxiliary trip units					
Shunt trip unit (ST) (F1, F2)	For continuous command (100 % ON-time), locks out on momentary- contact commands	Operating value	Pickup	> 0.7 × U_s (circuit-breaker is tripped)	
		Operating range		0.85 to 1.1 × U_s	
		Extended operating range for battery operation	for 24 V DC, 48 V DC 60 V DC, 110 V DC 220 V DC	0.7 to 1.26 × U_s	
		Rated control supply voltage U_s	AC 50/60 Hz DC	V	110; 230 24; 30; 48; 60; 110; 220
		Power consumption	AC/DC	VA/W	15/15
		Minimum command duration at U_s		ms	60
		Opening time of circuit-breaker at $U_s = 100$ %	AC/DC	ms	80
		Short-circuit protection			1 A TDz (slow)/1 A
		Smallest permissible DIAZED fuse (gL operational class)/ miniature circuit-breaker with C-characteristic			
	With stored energy feature consisting of shunt trip unit and capacitor storage device	Rated control supply voltage U_s	AC 50/60 Hz DC	V	110; 230 110; 220
Operating range			0.85 to 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 circuit-breaker, short-circuit protection			As with "for continuous command"	

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Size	I to III		
Auxiliary trip units			
Undervoltage trip unit UVR (F3) and UVR-t _d (F4)	Operating values	Pickup	≥ 0.85 × U _s (circuit-breaker can be closed)
		Dropout	0.35 to 0.7 × U _s (circuit-breaker is tripped)
	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	AC 50/60 Hz DC	V 110–127/208–240/380–415 V 24/30/48/110/220–250 ¹⁾
	Power consumption (pickup/continuous duty)	AC DC	VA 200/5 W 200/5
	Opening time of circuit-breaker at U _s = 0		ms 200
	Version UVR (F3)		
	Instantaneous		ms 80
	With delay		ms 200
	Version UVR-t _d (F8)		
	With delay, t _d = 0.2 to 3.2 s		s 0.2 to 3.2
	Reset through additional NC contact – direct switching-off		ms ≤ 100
	Short-circuit protection		1 A TDz (slow) 1 A
	Smallest permissible DIAZED fuse (gL operational class)/miniature circuit-breaker with C-characteristic		
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
Switching capacity	Alternating current 50/60 Hz	Rated operational voltage U _e	V 24 to 230 380/400 500
		Rated operational current	
		I _e /AC-12	A 10 10 10
		I _e /AC-15	A 4 3 2
	Direct current	Rated operational voltage U _e	V 24 48 110 220
		Rated operational current	
		I _e /DC-12	A 10 8 3.5 1
		I _e /DC-13	A 8 4 1.2 0.4
Short-circuit protection	Largest permissible DIAZED fuse (gL operational class)		10 A TDz, 10 A Dz
	Largest permissible miniature circuit-breaker with C-characteristic		10 A
Ready-to-close signaling switch (S20) (according to DIN VDE 0630)			
Switching capacity	Alternating current	Rated operational voltage U _e	V 250
		Rated operational current I _e	A 8
	Direct current	Rated operational voltage U _e	V 125 250
		Rated operational current I _e	A 0.4 0.2
Short-circuit protection	Largest permissible DIAZED fuse (gL operational class)		2 A Dz (quick)
"Tripped" switch	Signal duration after tripping		On req.
Tripped signaling switch (S24) (according to DIN VDE 0630)			
Switching capacity	Alternating current	Rated operational voltage U _e	V 250
		Rated operational current I _e /AC-12	A 8
	Direct current	Rated operational voltage U _e	V 24 125 250
		Rated operational current I _e /DC-12	A 6 0.4 0.2
Short-circuit protection	Largest permissible DIAZED fuse (gL operational class)		6 A Dz (quick)
"Tripped" switch	Signal duration after tripping		Until manual or electrical remote-controlled reset (option)
Position indicator switch on guide frame			
Type of contact	Signal:	"Circuit-breaker in connected position"	3 W 1 W
		"Circuit-breaker in test position"	2 W 1 W
		"Circuit-breaker in disconnected position"	1 W 1 W
			or
Rated insulation voltage U _i		AC 50/60 Hz	V 440
		DC	V 250
Rated operational voltage U _e			V 250
Switching capacity	Rated operational current I _e	I _e /AC-12	24 V 10 A, 110/127 V 10 A, 220/240 V 10 A, 320/440 V 10 A
		I _e /AC-15	220/240 V 4 A, 320/440 V 3 A,
		I _e /DC-12	24 V 10 A, 48 V 2.5 A, 220/240 V 0.2 A,
		I _e /DC-13	24 V 3.0 A, 220/240 V 0.1 A
		A 300 (AC)	120 V 6 A, 240 V 3 A
		R 300 (DC)	125 V 0.22 A, 250 V 0.11 A
Short-circuit protection	Largest permissible DIAZED fuse (gL operational class)		8 A TDz (slow)
	Largest permissible miniature circuit-breaker with C-characteristic		8 A TDz (slow)

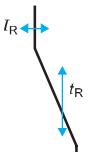
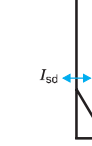
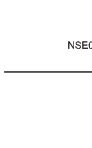


1) 24 V and 30 V only with undervoltage trip unit UVR (F3).

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

Functional overview of the electronic trip unit system

Protective functions		ETU15B	ETU25B	ETU27B
Parameterization by		D	D	D & S
	L Overload protection Function can be switched on/off Setting range $I_R = I_n \times \dots$	✓ -- 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
	Switchable overload protection (I^2t or I^4t -dependent function) Setting range for time-lag class t_R at I^2t Setting range for time-lag class t_R at I^4t Thermal image can be switched on/off Phase loss sensitivity	-- 10 s fixed -- --	-- 10 s fixed -- at $t_{sd} = 20$ ms (M)	-- 10 s fixed -- at $t_{sd} = 20$ ms (M)
	N Neutral conductor protection Function can be switched on/off N conductor setting range $I_N = I_n \times \dots$	-- -- --	-- -- --	✓ ✓ 1
	S Short-time delayed short-circuit protection Function can be switched on/off Setting range $I_{sd} = I_n \times \dots$ Setting range for delay time t_{sd} Switchable short-time delayed short-circuit protection (I^2t -dependent function) Setting range for delay time t_{sd} at I^2t Zone Selective Interlocking function	-- -- -- -- --	✓ -- 1.25-1.5-2-2.5-3-4-6-8-10-12 0-M-100-200-300-400 ms --	✓ -- 1.25-1.5-2-2.5-3-4-6-8-10-12 0-M-100-200-300-400 ms --
	I Instantaneous short-circuit protection Function can be switched on/off Setting range $I_I = I_n \times \dots$	✓ 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
	G Ground-fault protection Tripping and alarm function 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 neutral conductor transformer Detection of ground-fault current through external transformer Setting range of the operating current I_g for release Setting range of the operating current I_g for alarm Setting range of the delay time t_g Switchable ground-fault protection characteristic curve (I^2t -dependent function) Setting range for delay time t_g at I^2t Zone Selective Interlocking G-function	-- -- -- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- -- -- --	✓ fixed mounted ✓ ✓ -- A-B-C-D-E 100-200-300-400-500 ms -- --
Parameter set switchover				
	Switchable between parameter set A and B	--	--	--
LCD				
	Alphanumeric LCD (4-line)	--	--	--
	Graphical LCD (24 V, external power supply required)	--	--	--
Communication				
	CubicleBUS integrated	--	--	--
	Communication-capable through PROFIBUS DP	--	--	--
Measurement function				
	Measur.-function capable with measur. function Plus	--	--	--
LED display				
	Electronic trip unit active	✓	✓	✓
	Alarm	✓	✓	✓
	ETU fault	✓	✓	✓
	L-release	--	✓	✓
	S-release	--	✓	✓
	I-release	--	✓	✓
	N-release	--	--	✓
	G-release	--	--	✓
	G-alarm	--	--	--
	Release through extended protection function	--	--	--
Communication	--	--	--	
Signals from signaling switches with external CubicleBUS modules (relays)				
	Overload warning	--	--	--
	Load shedding, load receiving	--	--	--
	Leading signal overload release 200 ms	--	--	--
	Temperature alarm	--	--	--
	Phase unbalance	--	--	--
	Instantaneous short-circuit release	--	--	--
	Short-time delayed short-circuit release	--	--	--
	Overload release	--	--	--
	Neutral conductor release	--	--	--
	Ground-fault protection release	--	--	--
	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.

Setting range of the operating current I_g see page 15/29.

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

General data

15

Functional overview of the electronic trip unit system

Protective functions	ETU45B	ETU55B	ETU76B
Parameterization by	D & S	K	M/K
Overload protection	✓	✓	✓
Function can be switched on/off	-	✓	✓
Setting range $I_R = I_n \times \dots$	0.4-0.45-0.5-0.55-0.6-0.65-0.7-0.8-0.9-1	0.4 ... 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	2-3-5-5-8-10-14-17-21-25-30 s	2 ... 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	1 ... 5 s
Thermal image can be switched on/off	✓	✓	✓
Phase loss sensitivity	at $t_{sd} = 20$ ms (M)	✓ (on/off)	✓ (on/off)
Neutral conductor protection	✓	✓	✓
Function can be switched on/off	✓	✓	✓
N conductor setting range $I_N = I_n \times \dots$	0.5-1	0.2 ... 2	0.2 ... 2
Short-time delayed short-circuit protection	✓	✓	✓
Function can be switched on/off	✓	✓	✓
Setting range $I_{sd} = I_n \times \dots$	1.25-1.5-2-2.5-3-4-6-8-10-12	$1.25 \times I_n \dots 0.8 \times I_{cw}$	$1.25 \times I_n \dots 0.8 \times I_{cw}$
Setting range for delay time t_{sd}	M-100-200-300-400 ms	M-80 ... 4000 ms	M-80 ... 4000 ms
Switchable short-time delayed short-circuit protection (I^2t -dependent function)	✓	✓	✓
Setting range for delay time t_{sd} at I^2t	100-200-300-400 ms	100 ... 400 ms	100 ... 400 ms
Zone Selective Interlocking function	by CubicleBUS-Modul	by CubicleBUS-Modul	by CubicleBUS-Modul
Instantaneous short-circuit protection	✓	✓	✓
Function can be switched on/off	✓	✓	✓
Setting range $I_i = I_n \times \dots$	1.5-2-2.3-4-6-8-10-12-0.8 $\times I_{cs}$	$1.5 \times I_n \dots 0.8 \times I_{cs}$	$1.5 \times I_n \dots 0.8 \times I_{cs}$
Ground-fault protection	<input type="checkbox"/> Module can be retrofitted	<input type="checkbox"/> Module can be retrofitted	<input type="checkbox"/> Module can be retrofitted
Tripping and alarm function	✓	✓	✓
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 neutral conductor transformer	✓	✓	✓
Detection of ground-fault current through ext. transf.	✓	✓	✓
Setting range of the operating current I_g for release	A-B-C-D-E	A ... E	A ... E
Setting range of the operating current I_g for alarm	A-B-C-D-E	A ... E	A ... E
Setting range of the delay time t_g	100-200-300-400-500 ms	100 ... 500 ms	100 ... 500 ms
Switchable ground-fault protection characteristic curve (I^2t -dependent function)	✓	✓	✓
Setting range for delay time t_g at I^2t	100-200-300-400-500 ms	100 ... 500 ms	100 ... 500 ms
Zone Selective Interlocking G-function	by CubicleBUS-Modul	by CubicleBUS-Modul	by CubicleBUS-Modul
Parameter set switchover	-	✓	✓
Switchable between parameter set A and B	-	✓	✓
LCD	<input type="checkbox"/>	-	-
Alphanumeric LCD (4-line)	<input type="checkbox"/>	-	-
Graphical LCD (24 V, external power supply required)	-	-	✓
Communication	✓	✓	✓
CubicleBUS integrated	✓	✓	✓
Communication-capable through PROFIBUS DP	✓	✓	✓
Measurement function	✓	✓	✓
Measurement-function capable with measurement function Plus	✓	✓	✓
LED display	✓	✓	✓
Electronic trip unit active	✓	✓	✓
Alarm	✓	✓	✓
ETU fault	✓	✓	✓
L-release	✓	✓	✓
S-release	✓	✓	✓
I-release	✓	✓	✓
N-release	✓	✓	✓
G-release	✓ (only with ground-fault prot. mod.)	✓ (only with ground-fault prot. mod.)	✓ (only with ground-fault prot. mod.)
G-alarm	✓ (only with ground-fault prot. mod.)	✓ (only with ground-fault prot. mod.)	✓ (only with ground-fault prot. mod.)
Release through extended protection functions	✓	✓	✓
Communication	✓	✓	✓
Signals from signaling switches with external CubicleBUS modules (relays)	✓	✓	✓
Overload warning	✓	✓	✓
Load shedding, load receiving	✓	✓	✓
Leading signal overload release 200 ms	✓	✓	✓
Temperature alarm	✓	✓	✓
Phase unbalance	✓	✓	✓
Instantaneous short-circuit release	✓	✓	✓
Short-time delayed short-circuit release	✓	✓	✓
Overload release	✓	✓	✓
Neutral conductor release	✓	✓	✓
Ground-fault protection release	✓ (only with ground-fault prot. mod.)	✓ (only with ground-fault prot. mod.)	✓ (only with ground-fault prot. mod.)
Ground-fault alarm	✓ (only with ground-fault prot. mod.)	✓ (only with ground-fault prot. mod.)	✓ (only with ground-fault prot. mod.)
Auxiliary relay	✓	✓	✓
ETU fault	✓	✓	✓
Setting range of the operating current I_g	Increment size for adjustment of M		
Size I and size II Size III	From ... to Increment size From ... to Increment size		
A 100 A 400 A	0 ... 1 0.1 1000 ... 1600 50		
B 300 A 600 A	1 ... 100 1 1600 ... 10000 100		
C 600 A 800 A	100 ... 500 5 10000 ... max. 1000		
D 900 A 1000 A	500 ... 1000 10		
E 1200 A 1200 A			

For continuation of legends see page 15/28.

3WL Air Circuit-Breakers

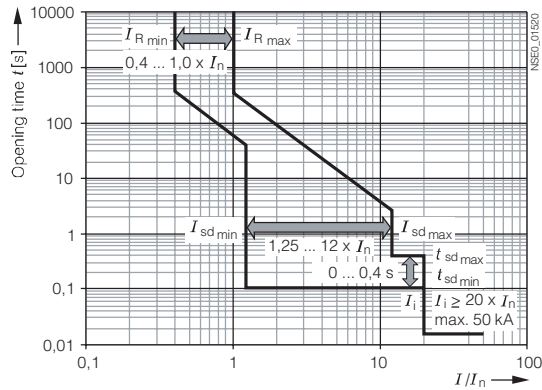
3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

Project planning aids

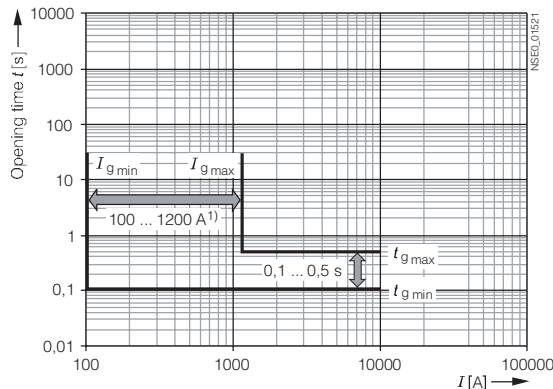
Characteristic curves

Every electronic trip unit type and every setting has its own characteristic. Only a selection is shown in the following. The characteristic curves each show the largest and smallest setting range of SENTRON 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, the relevant parts of the characteristics 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 switch on and the electronic trip unit is therefore not yet enabled, the opening time is extended, depending on the level of the overcurrent by up to 15 ms. In order to determine the break-times of the circuit-breakers, approximately 15 ms must be added to the opening times shown for the arcing time. Refer to the following table for tolerances.

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.



SENTRON 3WL circuit-breaker with ETU25B electronic trip unit, LSI characteristic curve



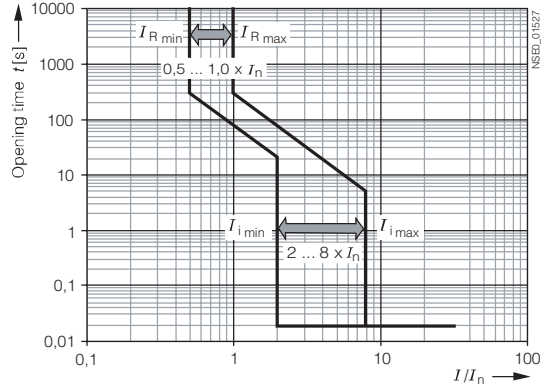
SENTRON 3WL circuit-breaker with ETU27B electronic trip unit, G characteristic curve

Tolerances for the set currents

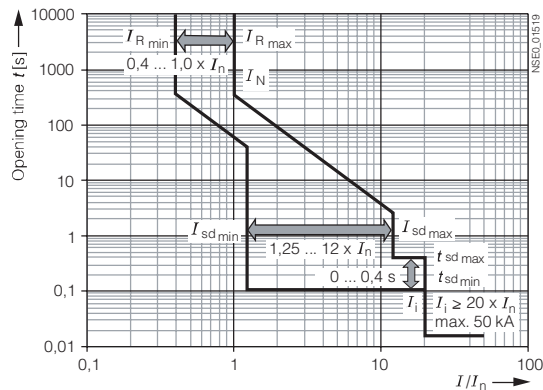
- L: tripping operations between 1.05 and 1.2 x I_R
- S: -0 %, +20 %
- I: -0 %, +20 %
- G: -0 %, +20 %

Tolerances for the tripping times

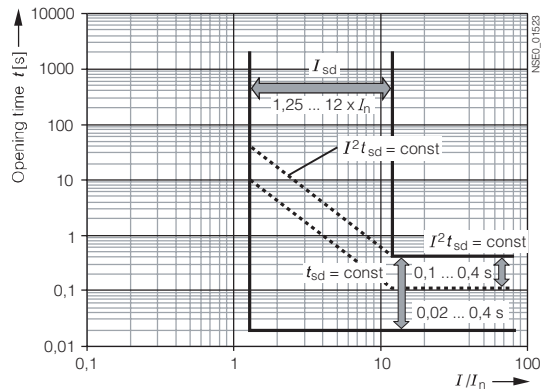
- L: -20 %, +0 % for $I^2 t$ characteristic curve
- S: -0 %, +60 ms or -0 %, +10 % for characteristic curve with fixed delay time
- I: < 50 ms
- G: -0 ms, +60 ms or -0 %, +10 % for characteristic curve with fixed delay time



SENTRON 3WL circuit-breaker with ETU15B electronic trip unit



SENTRON 3WL circuit-breaker with ETU27B electronic trip unit, LSIN characteristic curve



SENTRON 3WL circuit-breaker with ETU45B electronic trip unit, S characteristic curve

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

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

Project planning aids

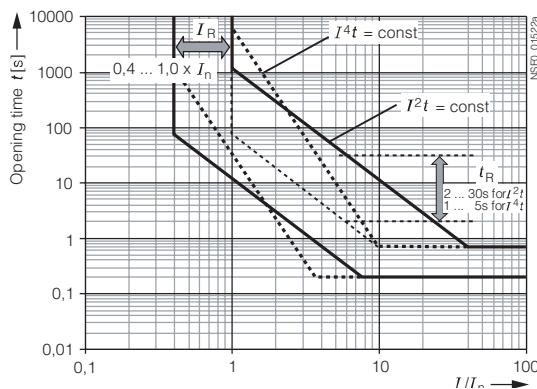
Every electronic trip unit type and every setting has its own characteristic. Only a selection is shown in the following. The characteristic curves each show the largest and smallest setting range of SENTRON 3WL circuit-breakers with 1000 A rated current at 500 V rated voltage with various trip units.

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

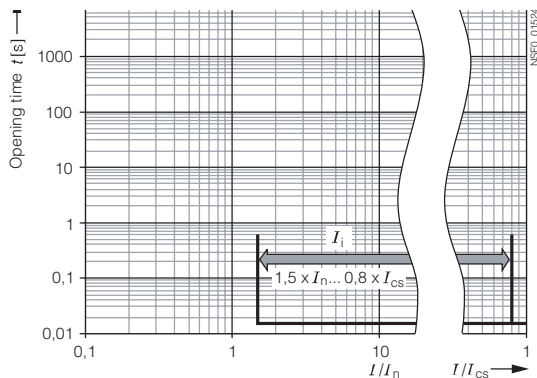
The characteristic curves show the behavior of the electronic trip unit when it is activated by a current that is already flowing before the tripping operation. If the overcurrent tripping occurs immediately after switch on and the electronic trip unit is therefore not yet enabled, the opening time is 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.

Refer to the following table for tolerances.

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 graphics display up to +55 °C). An extended tolerance band can apply at these temperatures.

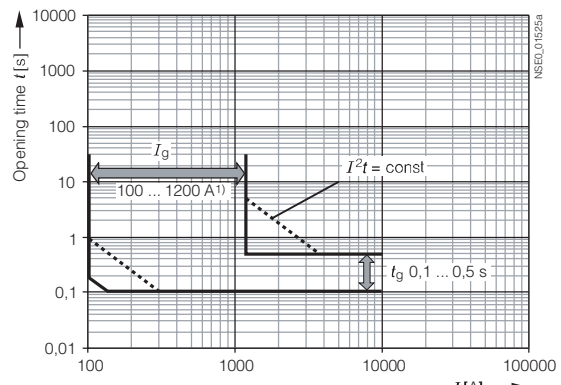


SENTRON 3WL circuit-breaker with ETU45B, ETU55B and ETU76B electronic trip unit, L characteristic curve

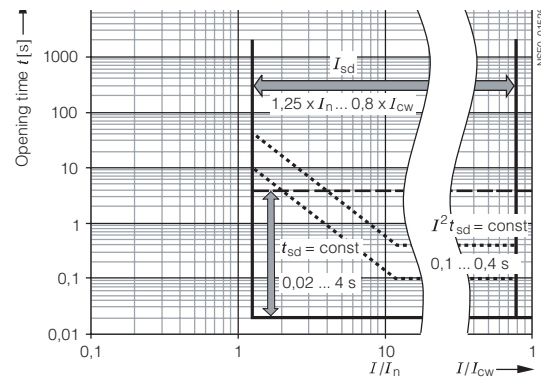


SENTRON 3WL circuit-breaker with ETU45B, ETU55B and ETU76B electronic trip unit, I characteristic curve

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



SENTRON 3WL circuit-breaker with ETU45B, ETU55B and ETU76B electronic trip unit, G characteristic curve



SENTRON 3WL circuit-breaker with ETU55B and 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 set currents

- L: tripping operations between 1.05 and 1.2 × I_R
- S: -0 %, +20 %
- I: -0 %, +20 %
- G: -0 %, +20 %

Tolerances for the tripping times

- L: -20 %, +0 % for I²t characteristic curve
- S: -0 %, +60 ms or -0 %, +10 % for characteristic curve with fixed delay time
- I: < 50 ms
- G: -0 ms, +60 ms or -0 %, +10 % for characteristic curve with fixed delay time

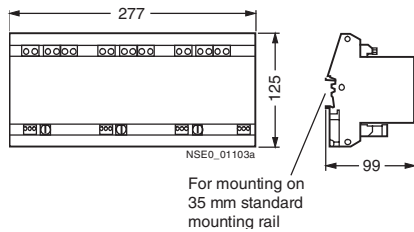
3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

Project planning aids

Dimensional drawings

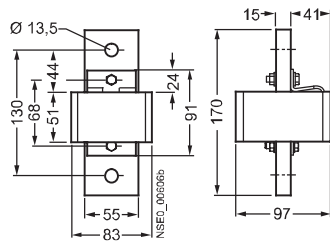
Voltage transformer for SENTRON 3WL



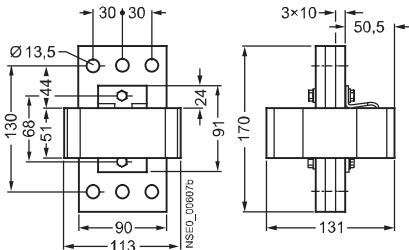
Current transformers for overload protection in the neutral conductor

External transformers for neutral conductor with copper connection pieces

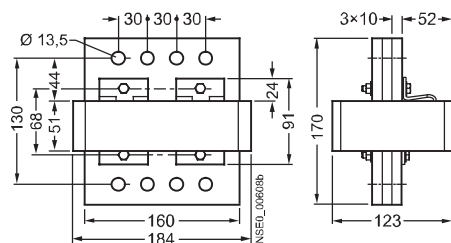
Size I, 3WL9 111-0AA31-0AA0



Size II, 3WL9 111-0AA32-0AA0



Size III, 3WL9 111-0AA33-0AA0

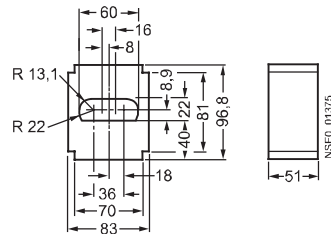


■ Dimensions for option with door interlocking

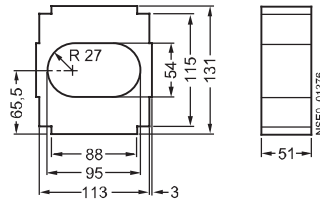
- 1) Mounting surface
- 2) Center SENTRON 3WL operator panel
- 3) 8 mounting holes for door sealing frame
- 4) 3 mounting holes for door interlocking

External transformers for neutral conductor without copper connection pieces

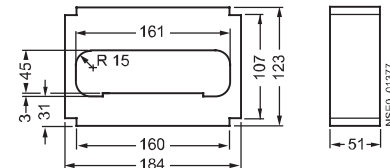
Size I, 3WL9 111-0AA21-0AA0



Size II, 3WL9 111-0AA22-0AA0

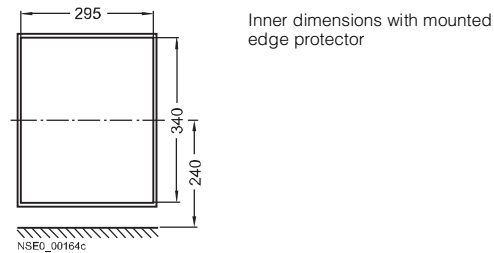


Size III, 3WL9 111-0AA23-0AA0



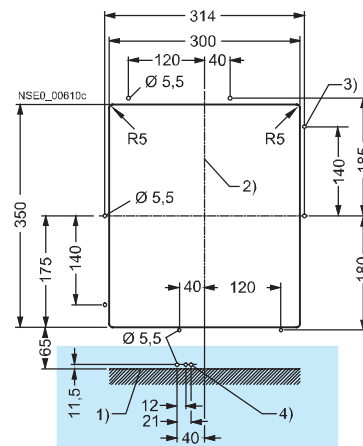
Door cut-out for operator panel

Door cut-out with edge protector



Door cut-out for operator panel using the door sealing frame

Option with/without door interlocking

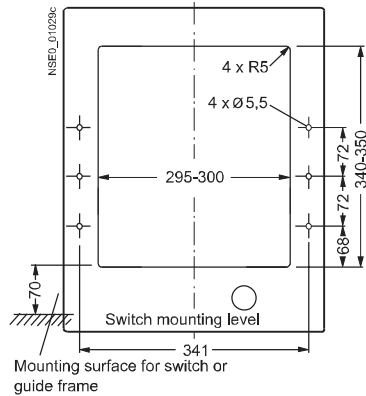


3WL Air Circuit-Breakers

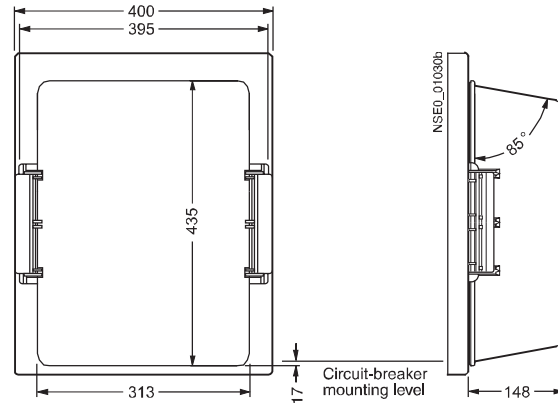
3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

Project planning aids

Door cut-out for operator panel using protective cover IP55



Protective cover, IP55



Clearance from grounded parts

Rated operational voltage V/AC	Above auxiliary connector mm	Lateral (each side) mm	Rear mm
Size I, fixed-mounted version			
500	75 ¹⁾	0	0
690	75 ¹⁾	0	0
Size I, withdrawable version, without arc chute cover			
500	50 ¹⁾	0	0
690	50 ¹⁾	0	0
Size I, withdrawable version, with arc chute cover			
500	0	0 ²⁾	0
690	0	0 ²⁾	0
Size II, fixed-mounted design			
500	75 ¹⁾	0	0
690	75 ¹⁾	0	0
1000	180	0	0
Size II, withdrawable version, without arc chute cover			
500	50 ¹⁾	0	0
690	50 ¹⁾	0	0
1000	100	0	0
Size II, withdrawable version, with arc chute cover			
500	0	0 ²⁾	0
690	0	0 ²⁾	0
Size III, fixed-mounted version			
500	75 ¹⁾	0	0
690	75 ¹⁾	0	0
1000	180	0	0
Size III, withdrawable version, without arc chute cover			
500	50 ¹⁾	0	0
690	50 ¹⁾	0	0
1000	100	0	0
Size III, withdrawable version, with arc chute cover			
500	0	0 ²⁾	0
690	0	0 ²⁾	0
DC non-automatic circuit-breakers			
300	45	0	0
600	200	0	0
1000	150	0	0

Clearance from live parts

Rated operational voltage V/AC	Above auxiliary connector mm	Lateral (each side) mm	Rear mm
Size I, fixed-mounted version			
500	150	20	20
690	300	50	125
Size I, withdrawable version, without arc chute cover			
500	150	20	14
690	300	50	14
Size I, withdrawable version, with arc chute cover			
500	14	100	14
690	14	100	14
Size II, fixed-mounted version			
500	250	50	20
690	600	100	140
1000	430	100	125
Size II, withdrawable version, without arc chute cover			
500	250	50	14
690	600	100	30
1000	350	100	14
Size II, withdrawable version, with arc chute cover			
500	14	50	14
690	14	225	14
Size III, fixed-mounted version			
500	75	20	20
690	500	100	125
1000	430	100	125
Size III, withdrawable version, without arc chute cover			
500	50	20	14
690	500	100	14
1000	350	100	14
Size III, withdrawable version, with arc chute cover			
500	14	50	14
690	14	200	14

1) Value for plate; 0 mm for struts and grids

2) 40 mm (size II: 70 mm) for plates which cover the lateral openings in the guide frame

All clearances above the circuit-breaker refer to the upper edge of the auxiliary connector – not to the upper edge of the arc chute! See dimensional drawings on pages 15/34 to 15/39, parts 4) and 5).

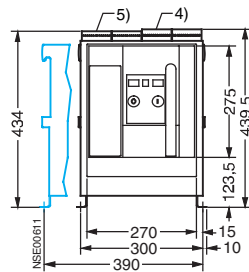
3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

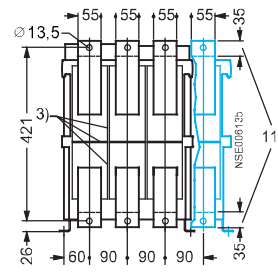
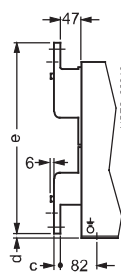
Project planning aids

Size I, up to 1600 A, 3- and 4-pole, fixed-mounted version

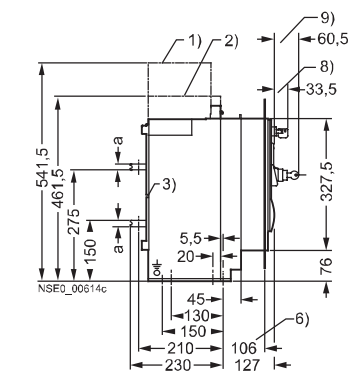
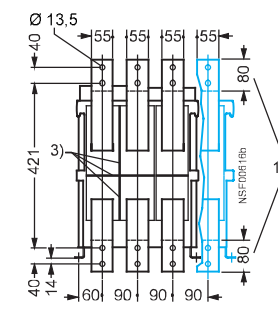
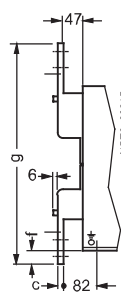
Standard design Horizontal connection



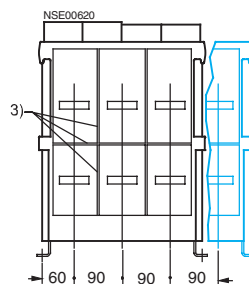
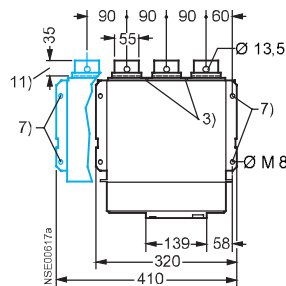
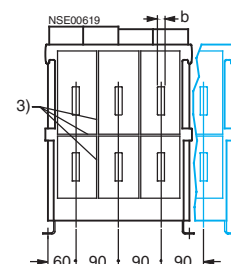
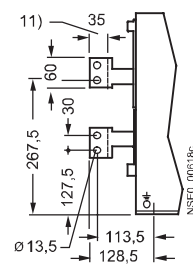
Optional connection variants Front connection (single)



Front connection (double hole) according to DIN 43673



Vertical connection



4-pole version

- 1) Mounting space for removal of the arc chutes.
- 2) Space above arc chute, space for electrical auxiliary circuit connections.
- 3) Slots (4 mm wide, 5 mm deep) for supporting phase barriers in the system.
- 4) Auxiliary connector with screw terminals (SIGUT).
- 5) Auxiliary connector with screwless connection system (tension spring).
- 6) Dimension to inside surface of the closed cabinet door.
- 7) Fixing points for mounting the circuit-breaker in the system.
- 8) "Secure OFF" locking device.
- 9) Key operation.
- 11) Terminal face.

Rated circuit-breaker current A	a	b	c	d	e	f	g
Up to 1000	10	10	10	11	451	34	541
1250-1600	15	15	15	6	461	39	551

For clearances to grounded parts and to live parts see page 15/33.

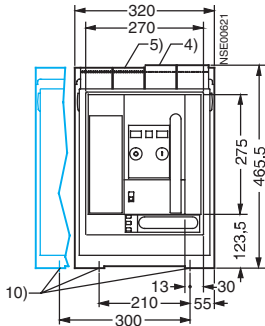
3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

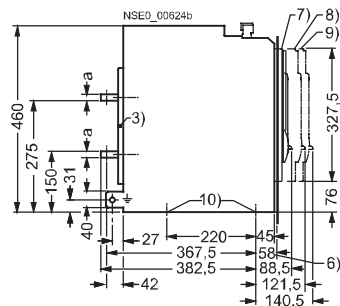
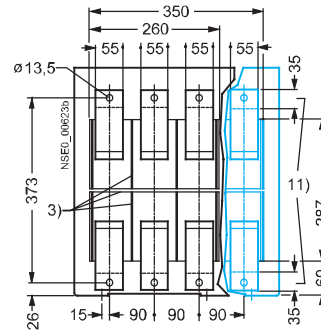
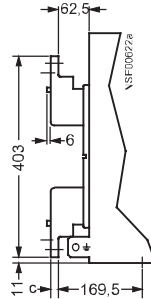
Project planning aids

Size I, up to 1600 A, 3- and 4-pole, withdrawable version

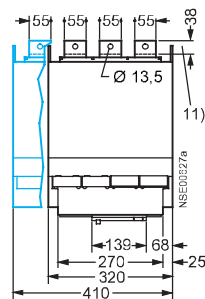
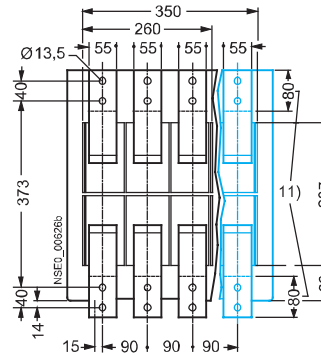
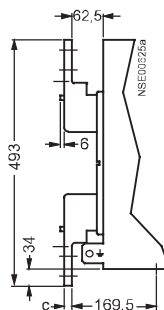
Standard design Horizontal connection



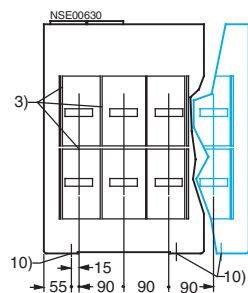
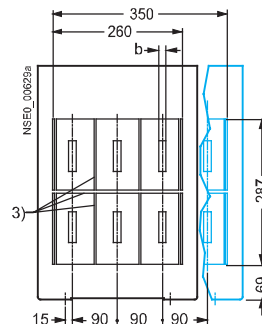
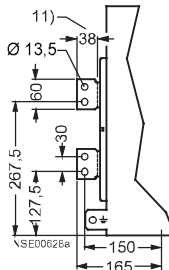
Optional connection variants Front connection (single)



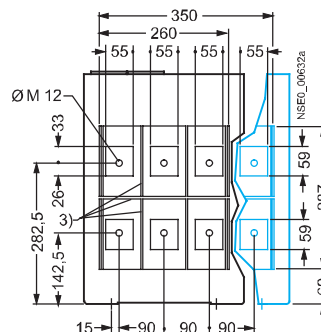
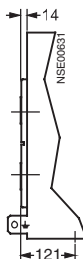
Front connection (double hole) according to DIN 43673



Vertical connection



Flange connection



4-pole version

- 3) Slots (4 mm wide, 5 mm deep) for supporting phase barriers in the system.
- 4) Auxiliary connector with screw terminals (SIGUT).
- 5) Auxiliary connector with screwless connection system (tension spring).
- 6) Dimension to inside surface of the closed cabinet door.
- 7) SENTRON 3WL in connected position.
- 8) SENTRON 3WL in test position.
- 9) SENTRON 3WL in disconnected position.
- 10) Fixing holes 9 mm.
- 11) Terminal face.

Rated circuit-breaker current

A	a	b	c
Up to 1000	10	10	10
1250–1600	15	15	15

For clearances to grounded parts and to live parts see page 15/33.

15

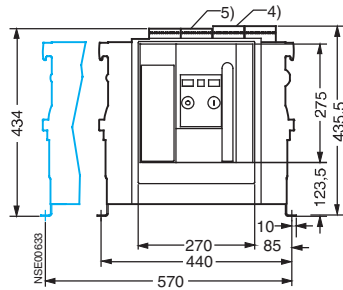
3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

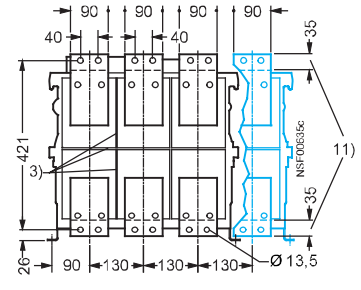
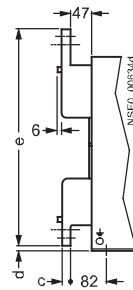
Project planning aids

Size II, up to 3200 A, 3- and 4-pole, fixed-mounted version

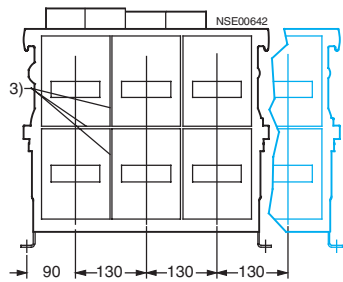
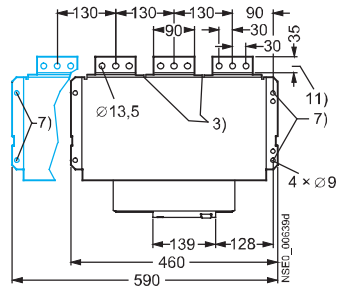
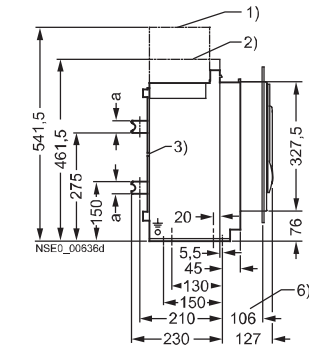
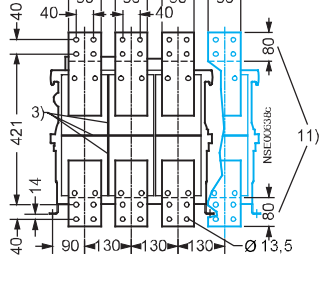
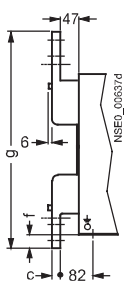
Standard design Horizontal connection



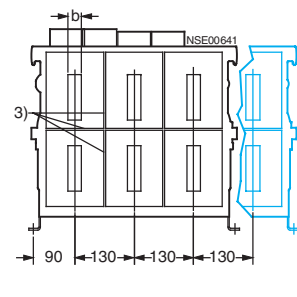
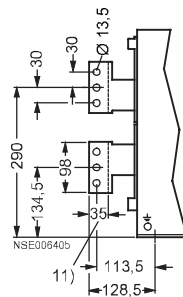
Optional connection variants Front connection (single)



Front connection (double hole) according to DIN 43673



Vertical connection



4-pole version

- 1) Mounting space for removal of the arc chutes.
- 2) Space above arc chute, space for electrical auxiliary circuit connections.
- 3) Slots (4 mm wide, 5 mm deep) for supporting phase barriers in the system.
- 4) Auxiliary connector with SIGUT screw terminals.
- 5) Auxiliary connector with tension spring connection.
- 6) Dimension to inside surface of the closed cabinet door.
- 7) Fixing points for mounting the circuit-breaker in the system.
- 11) Terminal face.

* Distance to grounded parts.

Rated circuit-breaker current A	a	b	c	d	e	f	g
Up to 2000	10	10	10	11	451	34	541
2500	15	15	20	6	461	39	551
3200	30	30	20	6	461	39	551

For clearances to grounded parts and to live parts see page 15/33.

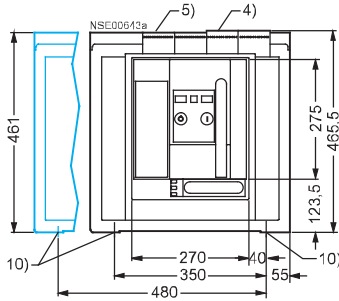
3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

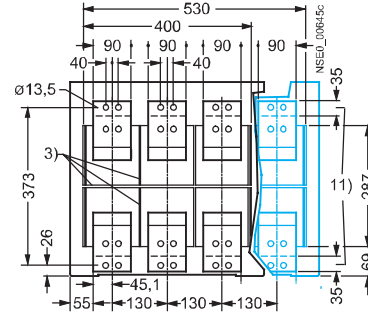
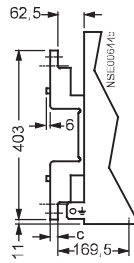
Project planning aids

Size II, up to 3200 A, 3- and 4-pole, withdrawable version

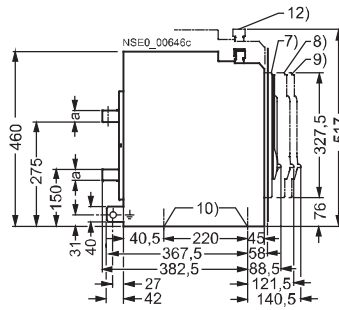
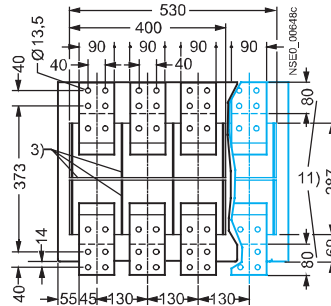
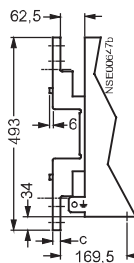
Standard design Horizontal connection



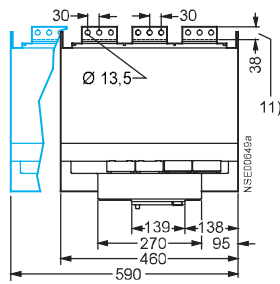
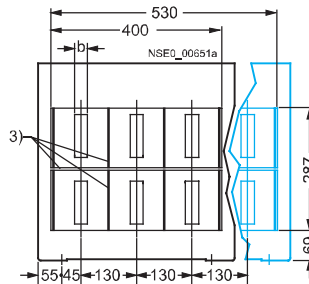
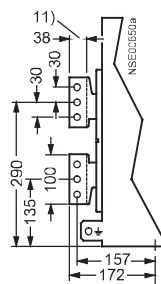
Optional connection variants Front connection (single)



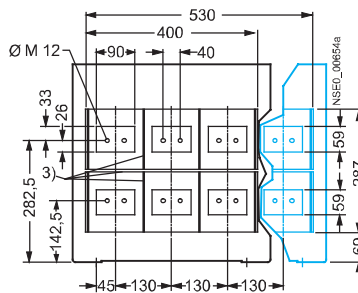
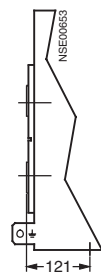
Front connection (double hole) according to DIN 43673



Vertical connection



Flange connection



4-pole version

- 3) Slots (4 mm wide, 5 mm deep) for supporting phase barriers in the system.
 - 4) Auxiliary connector with SIGUT screw terminals.
 - 5) Auxiliary connector with tension spring connection.
 - 7) SENTRON 3WL in connected position.
 - 8) SENTRON 3WL in test position.
 - 9) SENTRON 3WL in disconnected position.
 - 10) Fixing holes, diameter 9 mm.
 - 11) Terminal face.
 - 12) Top edge of circuit-breaker – only 1000 V AC version.
- * Distance to grounded parts.

Rated circuit-breaker current

A	a	b	c
Up to 2000	10	10	10
2500	15	15	20
3200	30	30	20

For clearances to grounded parts and to live parts see page 15/33.

15

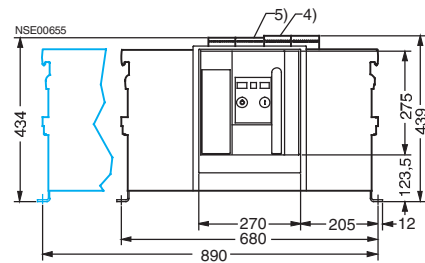
3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

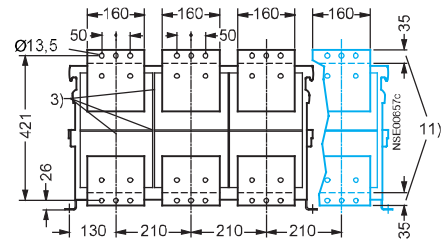
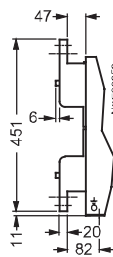
Project planning aids

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

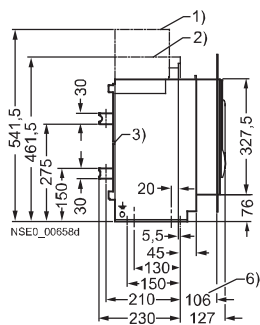
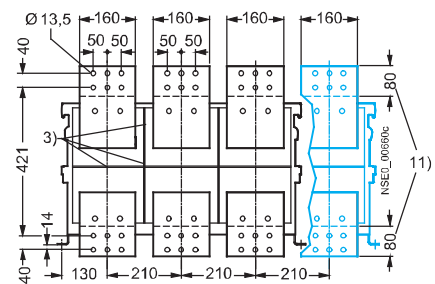
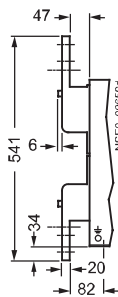
Standard design Horizontal connection



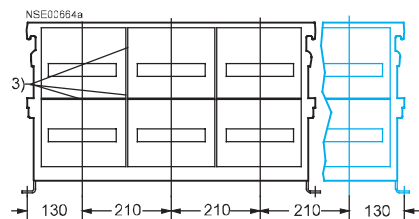
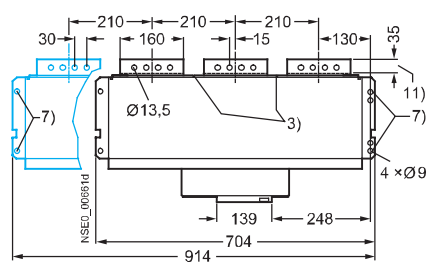
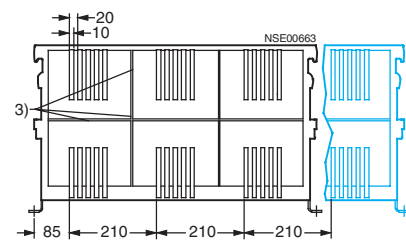
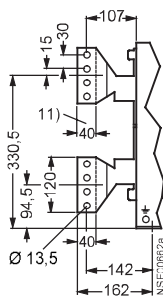
Optional connection variants Front connection (single)



Front connection (double hole) according to DIN 43673



Vertical connection



4-pole version

- 1) Mounting space for removal of the arc chutes.
- 2) Space above arc chute, space for electrical auxiliary circuit connections.
- 3) Slots (4 mm wide, 5 mm deep) for supporting phase barriers in the system.
- 4) Auxiliary connector with SIGUT screw terminals.
- 5) Auxiliary connector with tension spring connection.
- 6) Dimension to inside surface of the closed cabinet door.
- 7) Fixing points for mounting the circuit-breaker in the system.
- 11) Terminal face.

* Distance to grounded parts.

For clearances to grounded parts and to live parts see page 15/33.

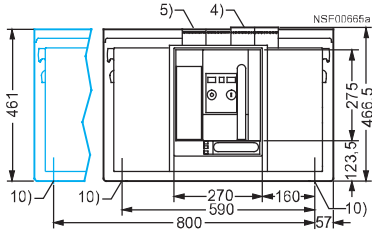
3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

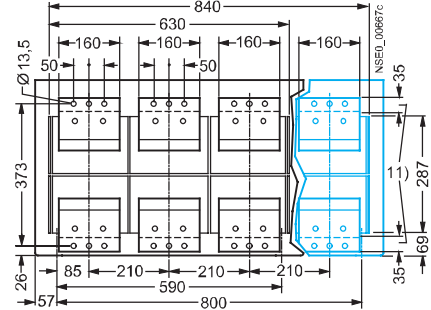
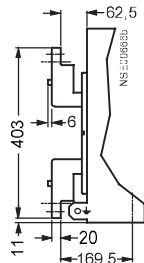
Project planning aids

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

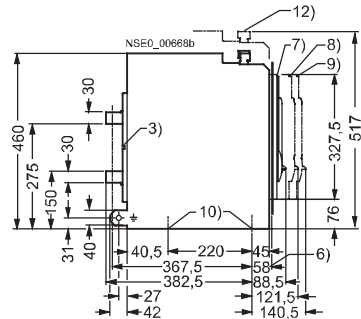
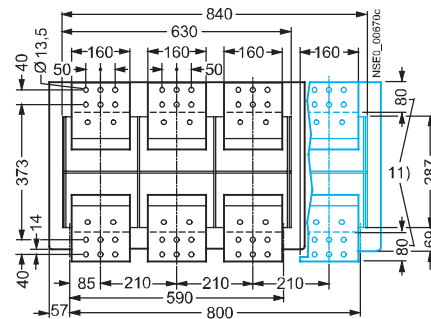
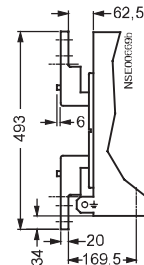
Standard design Horizontal connection, up to 5000 A



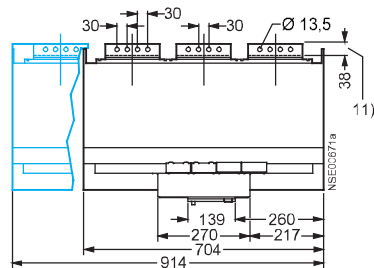
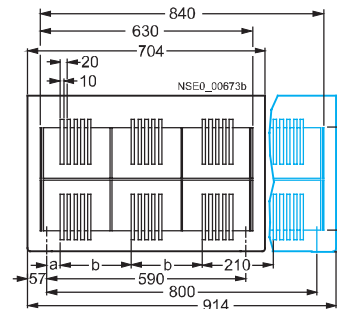
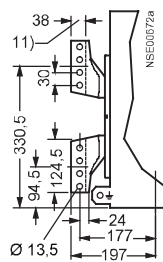
Optional connection variants Front connection (single hole), up to 4000 A



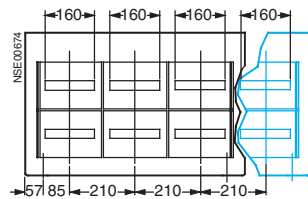
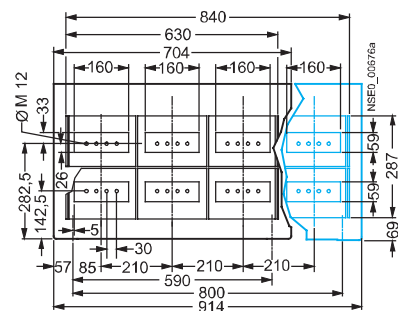
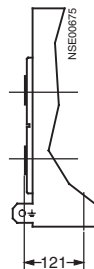
Front connection (double hole) according to DIN 43673, up to 4000 A



Vertical connection, up to 6300 A



Flange connection, up to 4000 A



4-pole version

- 3) Slots (4 mm wide, 5 mm deep) for supporting phase barriers in the system.
 - 4) Auxiliary connector with SIGUT screw terminals.
 - 5) Auxiliary connector with tension spring connection.
 - 6) Dimension to inside surface of the closed cabinet door.
 - 7) SENTRON 3WL in connected position.
 - 8) SENTRON 3WL in test position.
 - 9) SENTRON 3WL in disconnected position.
 - 10) Fixing holes, diameter 9 mm.
 - 11) Terminal face.
 - 12) Top edge of circuit-breaker – only 1000 V AC version.
- * Distance to grounded parts.

Rated circuit-breaker current

A	a	b
4000	40	210
5000	40	210
6300	5	245

For clearances to grounded parts and to live parts see page 15/33.

15

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

Project planning aids

Schematics

Terminal assignment diagram

optional
Zubehör / Accessories
(Hilfsschalter S1, S2 = Standard)
(Auxiliary switch S1, S2 = Standard)

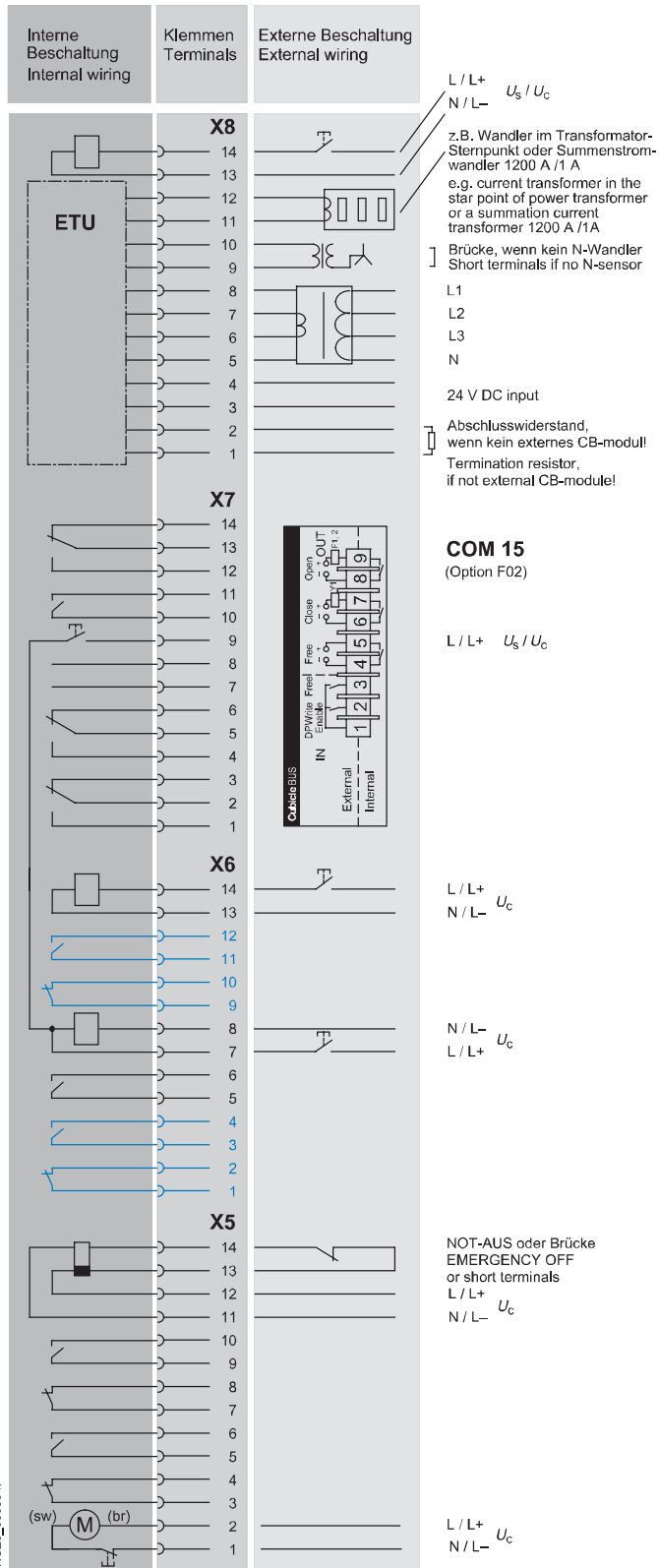
- Fern-Rücksetzmagnet / Remote reset bell alarm & tripped indicator F7
- G-Wandler / G transformer S2
- G-Wandler / G transformer S1
- N-Wandler / N sensor S2
- N-Wandler / N sensor S1
- ext. Spannungswandler Stern / ext. voltage transformer Com
- ext. Spannungswandler / ext. voltage transformer L3
- ext. Spannungswandler / ext. voltage transformer L2
- ext. Spannungswandler / ext. voltage transformer L1
- 0 V DC
- 24 V DC
- CubicleBUS +
- CubicleBUS -

Nicht vorhanden bei Kommunikationsfunktion "F02". Auf der Position von "-X7" befindet sich das Modul COM15.
Not available with communication connection "F02". COM15 module is at position "-X7".

- Ausgelöst-Meldeswitcher / trip signalling switch S24
- Speicherzustandsmeldung / "Spring charged" signal S21
- Elektrisch "EIN" / Local electric close S10
- Meldeswitcher am ersten Hilfsauslöser / S22 Signaling contact at the 1st auxiliary release
- Meldeswitcher am zweiten Hilfsauslöser / S23 Signaling contact at the 2nd auxiliary release

- Erster Hilfsauslöser F1 "P" / 1st auxiliary release F1 "ST"
- S1 "S" / "NO"
- S1 "Ö" / "NC"
- Einschaltmagnet / Closing solenoid
- Einschaltbereitschaftsmeldung / "Ready to close" signal S20
- S2 "S" / "NO"
- S2 "Ö" / "NC"

- nur F4 "Schnell AUS" / F4 only "quick OFF"
- nur F4 "Schnell AUS" / F4 only "quick OFF"
- Zweiter Hilfsauslöser: F2 "ST", F3 "UVR", F4 "UVR td" / 2nd auxiliary release: F2 "ST", F3 "UVR", F4 "UVR td"
- S3 "S" oder S7 "S" / S3 "NO" or S7 "NO"
- S3 "Ö" oder S7 "S" / S3 "NC" or S7 "NO"
- S4 "S" oder S8 "S" / S4 "NO" or S8 "NO"
- S4 "Ö" oder S8 "S" / S4 "NC" or S8 "NO"
- Motorantrieb / Charging motor
- opt.: Motorabstellschalter / opt. motor main switch S12



3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)

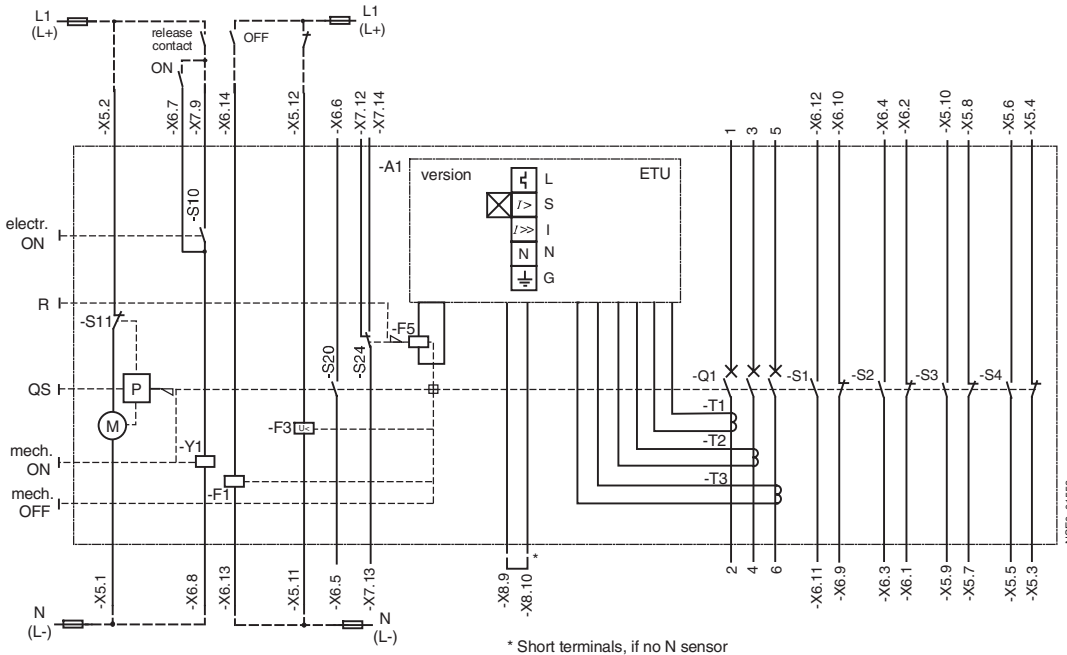
Project planning aids

Example of an overall circuit diagram for SENTRON 3WL

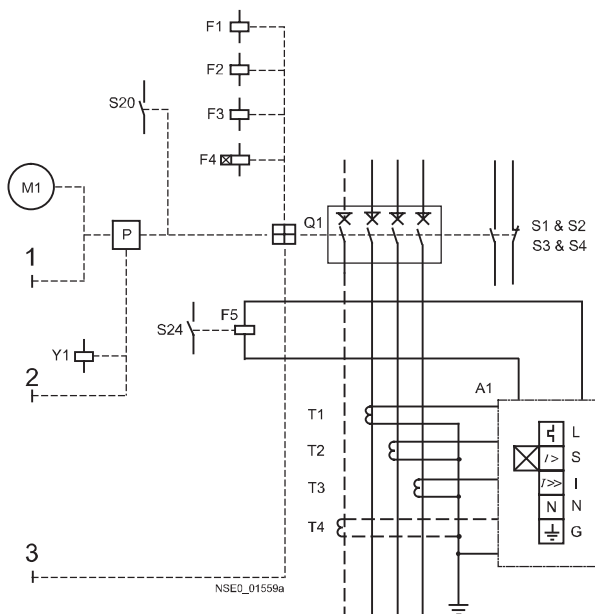
(3WL1...-...-4GN4-Z C11 + C22 + K07)

Manual/motorized operating mechanism with stored-energy feature, with electrical ON button (option C11), with ready-to-close signaling switch (option C22), with LSING overcurrent

release, with "UVR" undervoltage trip unit (F3), with "ST" shunt release (F1), with tripped signaling switch (option K07), with auxiliary switch 4 NO + 4 NC.



Function diagram of SENTRON 3WL circuit-breaker



- A1 Electronic trip unit ETU
- S1/-S2 1st auxiliary switch block (2NO+2NC)
- S3/-S4 2nd auxiliary switch block (2NO+2NC)
- S7 (optional) 2nd auxiliary switch block, S7 (2NO) can be used if there is no S3 - S3 and S7 have the same terminal assignment/mounting space
- S8 (optional) 2nd auxiliary switch block, S8 (2NO) can be used if there is no S4 - S4 and S8 have the same terminal assignment/mounting space
- 3WL 1...-...-2 (2NO+2NC) S1+S2
- 3WL 1...-...-4 (4NO+4NC) S1+S2+S3+S4
- 3WL 1...-...-7 (6NO+2NC) S1+S2+S7+S8
- 3WL 1...-...-8 (5NO+3NC) S1+S2+S3+S8
- S10 Electrical ON button
- S11 Storage spring contact
- S20 Ready-to-close signaling switch
- S24 Tripped signaling switch
- F1 1st auxiliary trip unit shunt trip unit
- F3 2nd auxiliary trip unit shunt trip unit
- F5 Tripping solenoid
- M Motor for "charging store"
- P Stored-energy mechanism
- QS Actuator lever for "stored-energy feature"
- Q1 Main contacts
- T1/-T2/-T3 Current transformers
- T4 Terminals
- Y1 Closing solenoid
- R Indicator and reset button for electronic trip unit
- X8.9/-X8.10 Connection option: external neutral conductor transformer

More information

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

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers acc. to UL 489 up to 5000 A (AC)

General data

Technical specifications

Short-circuit breaking capacity				
Size		I	II	III
Type		3WL51	3WL52	3WL53
Switching capacity class		S	H	H
Up to 480 V AC	kA	65	100	100
Up to 600 V Y/347 V AC	kA	50	--	85
Up to 600 V AC	kA	--	85	--
Rated short-time withstand current				
Size		I	II	III
Type		3WL51	3WL52	3WL53
Switching capacity class		S	H	H
At max. delay time $t_{sd} = 0.4$ s	kA	65	85	85
Further technical specifications				
Size		I	II	III
Type		3WL51 10	3WL51 16	3WL52 20
Rated current I_n at 40 °C, at 50/60 Hz	A	Up to 1000	1600	2000
Rated voltage U_g at 50/60 Hz	V AC	600 Y/347	600 Y/347	600
Ambient temperature of the system	°C	-25/+40	-25/+40	-25/+40
Power loss at rated current				
With AC symmetrical load				
Fixed-mounted circuit-breakers	W	100	150	180
Withdrawable circuit-breakers	W	195	350	320
Operating times				
Opening time	ms	35	35	35
Break-time	ms	38	38	34
Electrical opening time (through closing solenoid) ¹⁾	ms	80	80	100
Electrical break-time (through shunt trip unit)	ms	73	73	73
Electrical break-time (instantaneous undervoltage trip unit)	ms	73	73	73
Break-time due to ETU, instantaneous short-circuit release	ms	50	50	50
Endurance				
Mechanical (without maintenance) Operating cycles		10000	10000	10000
Mechanical (with maintenance) ²⁾ Operating cycles		20000	20000	15000
Electrical (without maintenance) Operating cycles		4000	4 000	4000
Operating frequency	1/h	60	60	60
Minimum interval	ms	80	80	80
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 dimension				
Circuit-breaker compartment 3-pole	mm	400 × 460 × 380	400 × 460 × 380	500 × 460 × 380
Width × height × depth				
Mounting position				
Main conductor minimum cross-sections	Qty, mm ² or inches	2 6.4 × 76.2 1/4 × 3	2 6.4 × 76.2 1/4 × 3	2 6.4 × 102 1/4 × 4
Auxiliary conductors (Cu)	Standard connection = strain-relief clamp without end sleeve with end sleeve according to DIN 46228 Part 2 with twin end sleeve	2 × 0.5 mm ² (AWG 20) ... 2 × 1.5 mm ² (AWG 16); 1 × 2.5 mm ² (AWG 14) 1 × 0.5 mm ² (AWG 20) ... 1 × 1.5 mm ² (AWG 16)		
Max. number of auxiliary conductors × cross-section (solid/stranded)	Optional connection = tension spring without end sleeve with end sleeve according to DIN 46228 Part 2	2 × 0.5 mm ² (AWG 20) ... 2 × 1.5 mm ² (AWG 16) 2 × 0.5 mm ² (AWG 20) ... 2 × 2.5 mm ² (AWG 14) 2 × 0.5 mm ² (AWG 20) ... 2 × 1.5 mm ² (AWG 16)		
Weights				
3-pole	Fixed-mounted circuit-breakers	kg	43	56
	Withdrawable circuit-breakers	kg	45	60
	Guide frame	kg	25	31

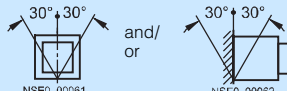
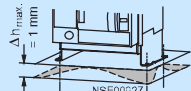
1) Make-time through activation solenoid for synchronization purposes (short-time excited) 85 ms.

2) Maintenance means: replace the main contact elements and arc chutes (see Operator's Guide).

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers acc. to UL 489 up to 5000 A (AC)

General data

Size		II	III		
Type		3WL52 25	3WL52 30	3WL53 40	3WL53 50
Rated current I_n at 40 °C, at 50/60 Hz	A	2500	3000	4000	5000
Main conductor					
Rated voltage U_e at 50/60 Hz	V AC	600	600	Up to 600 Y/347	Up to 600 Y/347
Ambient temperature of the system	°C	-25/+40	-25/+40	-25/+40	-25/+40
Power loss at rated current					
With AC symmetrical load					
Fixed-mounted circuit-breakers	W	270	410	520	630
Withdrawable circuit-breakers	W	520	710	810	1050
Operating times					
Opening time	ms	35	35	35	35
Break-time	ms	34	34	34	34
Electrical opening time (through closing solenoid) ¹⁾	ms	100	100	100	100
Electrical break-time (through shunt trip unit)	ms	73	73	73	73
Electrical break-time (instantaneous undervoltage trip unit)	ms	73	73	73	73
Break-time due to ETU, instantaneous short-circuit release	ms	50	50	50	50
Endurance					
Mechanical (without maintenance)	Operating cycles	10000	10000	5000	5000
Mechanical (with maintenance) ²⁾	Operating cycles	15000	15000	10000	10000
Electrical (without maintenance)	Operating cycles	4000	4000	1000	1000
Operating frequency	1/h	60	60	60	60
Minimum interval	ms	80	80	80	80
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 dimension					
Circuit-breaker compartment					
Width x height x depth	3-pole	mm	500 x 460 x 380	500 x 460 x 380	800 x 460 x 380
Mounting position					
					
Main conductor minimum cross-sections	Qty	2	4	4	4
	mm ²	6.4 x 127	6.4 x 63.5	6.4 x 102	10 x 120
	or				
	inches	1/4 x 5	1/4 x 2-1/2	1/4 x 4	1/4 x 5 ³⁾
Auxiliary conductors (Cu)	Standard connection = strain-relief clamp without end sleeve with end sleeve according to DIN 46228 Part 2 with twin end sleeve	2 x 0.5 mm ² (AWG 20) ... 2 x 1.5 mm ² (AWG 16); 1 x 2.5 mm ² (AWG 14)			
Max. no. of auxiliary conductors x cross-section (solid/stranded)	optional connection = tension spring without end sleeve with end sleeve according to DIN 46228 Part 2	1 x 0.5 mm ² (AWG 20) ... 1 x 1.5 mm ² (AWG 16)			
		2 x 0.5 mm ² (AWG 20) ... 2 x 1.5 mm ² (AWG 16)			
		2 x 0.5 mm ² (AWG 20) ... 2 x 2.5 mm ² (AWG 14)			
		2 x 0.5 mm ² (AWG 20) ... 2 x 1.5 mm ² (AWG 16)			
Weights					
3-pole	Fixed-mounted circuit-breakers	kg	59	64	82
	Withdrawable circuit-breakers	kg	63	68	88
	Guide frame	kg	39	45	60

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

2) Maintenance means: replace the main contact elements and arc chutes (see Operator's Guide).

3) 1/4 x 5 for fixed-mounted circuit-breakers on request.

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3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers acc. to UL 489 up to 5000 A (AC)

General data

Size	I to III				
Manual operating mechanism with mechanical activation					
Closing/charging stored-energy feature	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 stored-energy feature					
Closing solenoid (CC)	Operating range			85 ... 110 %	
	Extended operating range for battery operation	for 24 V DC, 48 V DC 60 V DC, 110 V DC 220 V DC		70 ... 126 %	
	Power consumption	AC/DC	VA/W	15/15	
	Minimum command duration rated voltage for the closing solenoid		ms	60	
	Short-circuit protection	Fuse		1 A	
Manual/motorized operating mechanism with mechanical and electrical closing					
Manual operating mechanism					
Motor	Operating range			85 ... 110 %	
	Extended operating range for battery operation	for 24 V DC, 48 V DC 60 V DC, 110 V DC 220 V DC		70 ... 126 %	
	Power consumption of motor	AC/DC	VA/W	110/110	
	Time required to charge the stored-energy mechanism at 1 × rated voltage		s	≤ 10	
Closing solenoid For motor and closing solenoid	Short-circuit protection	Fuse		2 A	
	Motor and closing solenoid for the same rated control supply voltages			2 A	
	Smallest permissible fuse	at 24–30 V at 48–60 V at 110–127 V at 220–250 V		2 A 2 A 1 A 1 A	
Electronic trip unit signals					
Measuring accuracy of the electronic trip unit				Protection functions to UL 489 Current indication ≤ 5 %; Measurement functions base quantities ≤ 1 %; Measurement functions derived quantities ≤ 4 %	
Auxiliary trip units					
Shunt trip unit (ST) (F1, F2)/ Closing solenoid	For continuous command (100 % ON-time), locks out on momentary- contact commands	Operating value	Pickup	> 0.7 × rated voltage (circuit-breaker is tripped)	
		Operating range		85 ... 110 %	
		Extended operating range for battery operation	for 24 V DC, 48 V DC 60 V DC, 110 V DC 220 V DC		70 ... 126 %
	With stored energy feature consisting of shunt trip unit and capacitor storage device	Rated voltage	AC 50/60 Hz DC	V V	110; 230 24; 30; 48; 60; 110; 220
		Power consumption	AC/DC	VA/W	15/15
		Minimum command duration at rated voltage		ms	60
		Opening time of the circuit-breaker at rated voltage	AC/DC	ms	80
		Short-circuit protection			1 A
		Smallest permissible fuse			
		Rated voltage	AC 50/60 Hz DC	V V	110; 230 110; 220
		Operating range			85 ... 110 %
		Power consumption	AC/DC	VA/W	1/1
		Storage time/recharging time at rated voltage			max. 5 min/min. 5 s
		Opening time of circuit-breaker, short-circuit protection		ms	80

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers acc. to UL 489 up to 5000 A (AC)

General data

Size	I to III		
Auxiliary trip units			
Undervoltage trip unit UVR (F3) and UVR- t_d (F4)	Operating values	Pickup	$\geq 0.85 \times U_s$ (circuit-breaker can be closed) 0.35 to $0.7 \times U_s$ (circuit-breaker is tripped)
		Dropout	
	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	AC 50/60 Hz DC	V V 110–127/208–240/380–415 24/30/48/110/220–250 ¹⁾
	Power consumption (pickup/continuous duty)	AC DC	VA W (200 = pickup) 5 (200 = pickup) 5
	Opening time of circuit-breaker at $U_s = 0$		ms 200
	Version UVR (F3)		
	Instantaneous	ms	80
	With delay	ms	200
	Version UVR- t_d (F8)		
	With delay, $t_d = 0.2 \dots 3.2$ s	s	0.2 ... 3.2
	Reset through additional NC contact, direct switching-off	ms	≤ 100
	Short-circuit protection Smallest permissible fuse		1 A
Contact position-driven auxiliary switches (S1, S2, S3, S4, S7, S8)			
	Rated insulation voltage U_i		V AC/DC 300
	Rated operational voltage U_e		V AC/DC 240
Switching capacity	Alternating current 50/60 Hz	A 300 heavy duty	A 10
	Direct current	P 300 heavy duty	A 10
Ready-to-close signaling switch (S20) (according to UL 1054)			
Switching capacity	Rated operational voltage		V 250
	Rated operational current		A 0.2

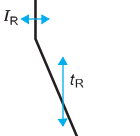

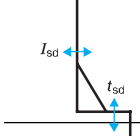
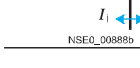
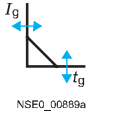
1) 24 V and 30 V only with undervoltage trip unit UVR (F3).

3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers acc. to UL 489 up to 5000 A (AC)

General data

Functional overview of the electronic trip unit system

Protective functions	ETU25B	ETU45B
Parameterization by	D	D & S
 L Overload protection Function can be switched on/off Setting range $I_R = I_n \times \dots$ Switchable overload protection (I^2t - or I^3t -dependent function) Setting range for time-lag class t_R at I^2t Setting range for time-lag class t_R at I^3t Thermal image can be switched on/off Phase loss sensitivity	✓	✓
	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
	10 s fixed	2-3-5-5.5-8-10-14-17-21-25-30 s
	at $t_{sd} = 20$ ms (M)	at $t_{sd} = 20$ ms (M)
 N Neutral conductor protection Function can be switched on/off N conductor setting range $I_N = I_n \times \dots$	✓	✓
	0.5 ... 1	0.5 ... 1
 S Short-time delayed short-circuit protection Function can be switched on/off Setting range $I_{sd} = I_n \times \dots$ Setting range for delay time t_{sd} Switchable short-time delayed short-circuit protection (I^2t -dependent function) Setting range for delay time t_{sd} at I^2t Zone Selective Interlocking function	✓	✓
	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
	0-M-100-200-300-400 ms	M-100-200-300-400 ms
	by CubicleBUS-Modul	by CubicleBUS-Modul
 I Instantaneous short-circuit protection Function can be switched on/off Setting range $I_I = I_n \times \dots$	✓	✓
	fixed for $I_I \geq 20 \times I_n$, max. 50 kA	1.5-2-2.3-4-6-8-10-12-0.8 $\times I_{cs}$
	Module can be retrofitted	Module can be retrofitted
 G Ground-fault protection Tripping and alarm function 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 neutral conductor transformer Detection of ground-fault current through external transf. Setting range of the operating current I_g for release Setting range of the operating current I_g for alarm Setting range of the delay time t_g Switchable ground-fault protection characteristic curve (I^2t -dependent function) Setting range for delay time t_g at I^2t Zone Selective Interlocking ground-fault protect. function	✓	✓
	A-B-C-D-E	A-B-C-D-E
	100-200-300-400-500 ms	100-200-300-400-500 ms
	by CubicleBUS-Modul	by CubicleBUS-Modul
	Parameter set switchover	
	Switchable between parameter set A and B	
	LCD	
	Alphanumeric LCD (4-line)	
Graphical LCD (24 V, external power supply required)		
Communication		
CubicleBUS integrated	✓	
Communication-capable through PROFIBUS DP	✓	
Measurement function		
Measurement function Plus		
LED display		
Electronic trip unit active	✓	
Alarm	✓	
ETU fault	✓	
L-release	✓	
S-release	✓	
I-release	✓	
N-release	✓	
G-release	✓ (only with ground-fault prot. module)	
G-alarm	✓ (only with ground-fault prot. module)	
Release through extended protection function	✓	
Communication	✓	
Signals from signaling switches with external CubicleBUS module (relay)		
Overload warning	✓	
Load shedding, load receiving	✓	
Leading signal overload release 200 ms	✓	
Temperature alarm	✓	
Phase unbalance	✓	
Instantaneous short-circuit release	✓	
Short-time delayed short-circuit release	✓	
Overload release	✓	
Neutral conductor release	✓	
Ground-fault protection release	✓ (only with ground-fault prot. module)	
Ground-fault alarm	✓ (only with ground-fault prot. module)	
Auxiliary relay	✓	
ETU fault	✓	

Delay-time figures given in ms.
 M = motor prot., corresponds to 20 ms.
 D = rotary coding switch
 D & S = rotary coding and slide switch
 ✓ available.
 -- not available.
 □ optional.

Setting range of the operating 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

For tripping characteristic curves and dimensions as "3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers up to 6300 A (AC)", see pages 15/30 to 15/39.

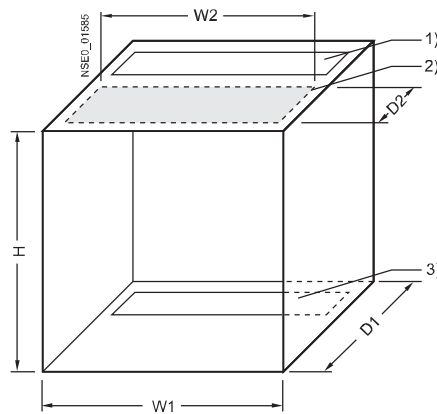
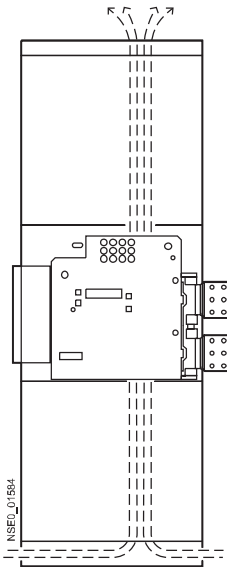
3WL Air Circuit-Breakers

3WL Air Circuit-Breakers/Non-Automatic Air Circuit-Breakers acc.to UL 489 up to 5000 A (AC)

Project planning aids

Dimensional drawings

Installation conditions for UL circuit-breakers



- 1) Ventilation opening on top
- 2) Insulation plate e.g. NEMA GPO-3 material, min. 2.3 mm thick
- 3) Ventilation opening on bottom

Size	$I_{n,max}$ A	Minimum dimensions of the installation space			Dimensions of the insulation plate		Ventilation
		Width W1 3/4-pole	Height H	Depth D1	Width W2 3/4-pole	Depth D2	
I	800, 1000 1250, 1600	400/500	460 ¹⁾	380	350/450	300	Not required
II	800, 1600, 2000 2000 3000	500/600			450/550		
III	4000 5000	800/1000			750/900		

1) Height of installation compartment applies in case of roof insulation or for guide frame with arcing space cover.

UL certificate

3WL5 circuit-breakers are not listed by Underwriters Laboratories (UL) under the Order No. but as individual components with their corresponding order numbers.

The UL designation of the basic circuit-breaker (without electronic trip unit, auxiliary trip unit, auxiliary switch, ...) is visible on the operator panel.

The file numbers are:

- E231263 for circuit-breakers
- E236088 for accessories
- E236299 for guide frames

The file number can be obtained on request.

Designation of basic circuit-breaker:

3WL51 06-3 F 3

- ① Order No. 1st to 8th digit
- ② Version
F: Fixed mounting
D: Withdrawable version
- ③ Number of poles

More information

Up-to-date information on the Internet at:

<http://www.siemens.com/sentron>

3WL Air Circuit-Breakers

3WL Non-Automatic Air Circuit-Breakers up to 4000 A (DC)

General data

Technical specifications

Size		II		
Type		3WL12 10	3WL12 20	3WL12 40
Rated current I_n at 40 °C				
Main conductor	A	Up to 1000	2000	4000
Rated operational voltage U_e (1000 V version, see Catalog LV 1, order code "A05")	V DC	Up to 600/1000	Up to 600/1000	Up to 600/1000
Rated insulation voltage U_i	V AC	1000	1000	1000
Rated impulse withstand voltage U_{imp}				
Main circuits	kV	12	12	12
Auxiliary circuits	kV	4	4	4
Control circuits	kV	2.5	2.5	2.5
Isolating function to EN 60947-2		Yes	Yes	Yes
Permissible ambient temperature				
Operation	°C	-25/+75	-25/+75	-25/+75
Storage	°C	-40/+70	-40/+70	-40/+70
Permissible load				
up to 40 °C	A	1000	2000	4000
At rear horizontal main circuit connections up to 55 °C	A	1000	2000	3640
up to 60 °C	A	1000	2000	3500
(Cu painted black) up to 70 °C	A	1000	1950	3250
Power loss at I_n				
With symmetrical load				
Withdrawable circuit-breakers	W	280	770	1640
Operating times				
Opening time	ms	35	35	35
Break-time	ms	34	34	34
Electrical opening time (through closing solenoid) ¹⁾	ms	100	100	100
Electrical break-time (through shunt trip unit)	ms	73	73	73
Electrical break-time (instantaneous undervoltage trip unit)	ms	73	73	73
Endurance³⁾				
Mechanical (without maintenance)	Operating cycles	10 000	10 000	10 000
Mechanical (with maintenance) ²⁾	Operating cycles	15 000	15 000	15 000
Electrical (without maintenance)	Operating cycles	6 000	6 000	4 000
1000 V version	Operating cycles	1 000	1 000	1 000
Electrical (with maintenance) ²⁾	Operating cycles	15 000	15 000	15 000
Operating frequency				
600 V version	1/h	60	60	60
1000 V version	1/h	20	20	20
Mounting position				
Degree of protection		IP20 without cabinet door, IP41 with door mounting frame, IP55 with cover		
Auxiliary conductors (Cu)		Standard connection = strain-relief clamp without end sleeve with end sleeve to DIN 46228 Part 2 with twin end sleeve		
Max. number of auxiliary conductors × cross-section (solid/stranded)		2 × 0.5 mm ² (AWG 20) ... 2 × 1.5 mm ² (AWG 16); 1 × 2.5 mm ² (AWG 14)		
		Optional connection = tension spring without end sleeve with end sleeve to DIN 46228 Part 2		
		2 × 0.5 mm ² (AWG 20) ... 2 × 2.5 mm ² (AWG 14)		
		2 × 0.5 mm ² (AWG 20) ... 2 × 1.5 mm ² (AWG 16)		
Weights				
3-pole	Fixed-mounted circuit-breakers	kg	56	64
	Withdrawable circuit-breakers	kg	60	68
	Guide frame	kg	31	45
4-pole	Fixed-mounted circuit-breakers	kg	67	77
	Withdrawable circuit-breakers	kg	72	82
	Guide frame	kg	37	54

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

3) Further technical specifications on request.

2) Maintenance means: replace main contact elements and arc chutes (see Operator's Guide).

Short-circuit breaking capacity

Size		II	
Type		3WL12	
Switching capacity class		DC	
Up to 300 V DC	I_{cc}	kA	30
Up to 600 V DC	I_{cc}	kA	25
Up to 1000 V DC	I_{cc}	kA	20
Rated short-time withstand current I_{cw}			
0.5 s		kA	--
1 s		kA	$30^{1)/25^2)/20^3)$
2 s		kA	--
3 s		kA	--

1) at $U_e = 300$ V DC.

2) at $U_e = 600$ V DC.

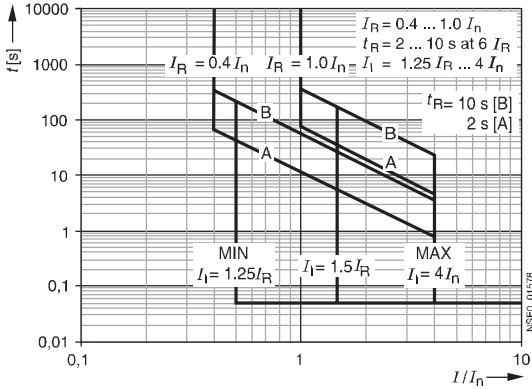
3) at $U_e = 1000$ V DC.

3WL Air Circuit-Breakers

3WL Non-Automatic Air Circuit-Breakers up to 4000 A (DC)

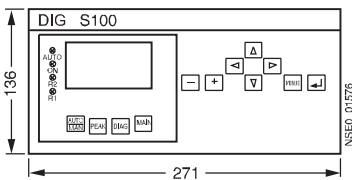
Project planning aids

Characteristic curves

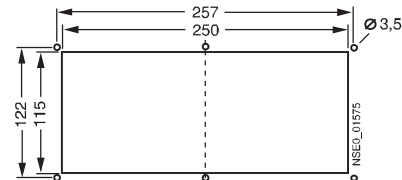


DIGmat S100 characteristic curve

Dimensional drawings



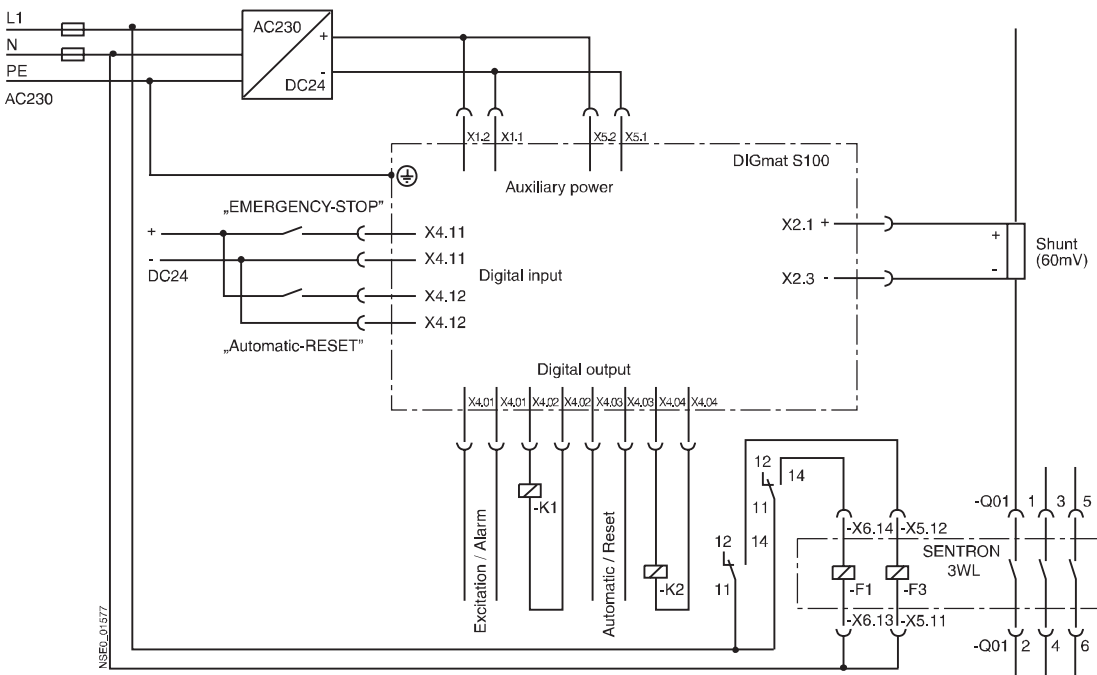
DIGmat S100



DIGmat S100 drilling pattern

For dimensions of the 3WL Non-Automatic Circuit-Breakers (DC) and the "3WL Air Circuit-Breakers/Non-Automatic Air Circuit-breakers up to 6300 A (AC)", "1000 V Version", see pages 15/32 to 15/39.

Schematics






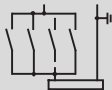
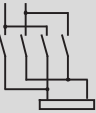







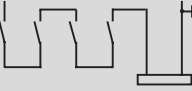
Schematic of the DIGmat S100 and the SENTRON 3WL non-automatic circuit-breaker

3WL Air Circuit-Breakers

3WL Non-Automatic Air Circuit-Breakers up to 4000 A (DC)

Project planning aids



Application examples

Rated operational voltage	Required series breaks at rated voltage	For 3-pole non-automatic circuit-breakers (operational currents up to 4000 A/ conducting path)		For 4-pole non-automatic circuit-breakers (operational currents up to 4000 A/ conducting path)	
Up to 300 V + 10 %					
Over 300 V + 10 % Up to 600 V + 10 %					
Over 600 V + 10 % Up to 1000 V + 10 %					

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 operating current load.

 grounded-neutral system
 load

More information

Up-to-date information on the Internet at:

<http://www.siemens.com/sentron>