

SENTRON Switching and Protection Devices – Molded Case Circuit Breakers



16/2	Introduction
	3VL Molded Case Circuit Breakers <u>3VL Molded Case Circuit Breakers up to 1600 A</u> General data 16/6 - Design 16/13 - Function 16/16 - Integration 16/17 - Configuration 16/19 - Technical specifications Project planning aids 16/26 - Characteristic curves 16/27 - Dimensional drawings 16/94 - Schematics 16/98 - More information
	3VF2 Molded Case Circuit Breakers <u>3VF2 Molded Case Circuit Breakers up to 100 A</u> General data 16/99 - Technical specifications Project planning aids 16/100 - Dimensional drawings

Introduction

Overview



Type

VL160X/3VL1

VL160/3VL2

VL250/3VL3

VL400/3VL4

Molded case circuit breakers

3VL molded case circuit breakers up to 1600 A

Rated current I_n at 50 °C ambient temperature ¹⁾	A	16 ... 160		50 ... 160		200 ... 250		200 ... 400	
Number of poles		3	4	3	4	3	4	3	4
Rated operational voltage U_e									
AC 50/60 Hz	V	690	690	690	690	690	690	690	690
DC ²⁾	V	500	500	600	600	600	600	600	600
Solid-state releases									
Thermal-magnetic		✓	✓	✓	✓	✓	✓	✓	✓
Solid-state LCD ETU/ETU		--	--	✓	✓	✓	✓	✓	✓
Replaceable		--	--	✓	✓	✓	✓	✓	✓
PROFIBUS module COM10/COM20		--	--	✓	✓	✓	✓	✓	✓
Dimensions									
	A	mm	105	139	105	139	105	139	183
	B	mm	157	157	175	175	175	279	279
	C	mm	81	81	81	81	81	102	102
	D	mm	107	107	107	107	107	138	138

Switching capacity I_{cu}/I_{cs} RMS value acc. to IEC 60947-2

Standard switching capacity N³⁾ N					
Up to 240 V AC	kA	65/65	65/65	65/65	65/65
Up to 415 V AC	kA	55/55	55/55	55/55	55/55
Up to 440 V AC	kA	25/20	25/20	25/20	35/26
Up to 500/525 V AC	kA	18/14	25/20	25/20	25/20
Up to 690 V AC	kA	8/4 ⁴⁾	12/6	12/6	15/8
Up to 250 V DC ⁵⁾	kA	30/30	32/32	32/32	32/32
Up to 500 V DC ⁵⁾	kA	--	--	--	--
Up to 600 V DC ⁵⁾	kA	--	--	--	--
NEMA breaking capacity⁶⁾					
Up to 480 V AC	kA	25	25	25	35
Up to 600 V AC	kA	8 ⁴⁾	12	12	20
High switching capacity H³⁾ H					
Up to 240 V AC	kA	100/75	100/75	100/75	100/75
Up to 415 V AC	kA	70/70	70/70	70/70	70/70
Up to 440 V AC	kA	42/32	50/38	50/38	50/38
Up to 500/525 V AC	kA	30/23	40/30	40/30	40/30
Up to 690 V AC	kA	12/6 ⁴⁾	12/6	12/6	15/8
Up to 250 V DC ⁵⁾	kA	30/30	32/32	32/32	32/32
Up to 500 V DC ⁵⁾	kA	30/30	32/32	32/32	32/32
Up to 600 V DC ⁵⁾	kA	--	--	--	--
NEMA breaking capacity⁶⁾					
Up to 480 V AC	kA	42	50	50	50
Up to 600 V AC	kA	12 ⁴⁾	12	12	20
Very high switching capacity L³⁾ L					
Up to 240 V AC	kA	--	200/150	200/150	200/150
Up to 415 V AC	kA	--	100/75	100/75	100/75
Up to 440 V AC	kA	--	75/50	75/50	75/50
Up to 500/525 V AC	kA	--	50/38	50/38	50/38
Up to 690 V AC	kA	--	12/6	12/6	15/8
Up to 250 V DC ⁵⁾	kA	--	32/32	32/32	32/32
Up to 500 V DC ⁵⁾	kA	--	32/32	32/32	32/32
Up to 600 V DC ⁵⁾	kA	--	32/32	32/32	32/32
NEMA breaking capacity⁶⁾					
Up to 480 V AC	kA	--	75	75	75
Up to 600 V AC	kA	--	12	12	20

✓ Available
-- Not available

For 3VL molded case circuit breakers according to UL 489
see Catalog LV 16.

¹⁾ 3VF2 at 40 °C ambient temperature.

²⁾ Rated DC voltage applies only for circuit breakers with thermal-magnetic overcurrent release.

SENTRON Switching and Protection Devices – Molded Case Circuit Breakers

Introduction



VL630/3VL5



VL800/3VL6



VL1250/3VL7



VL1600/3VL8



3VF2

3VL molded case circuit breakers up to 1600 A

3VF2 molded case circuit breakers up to 100 A

315 ... 630

800

1000 ... 1250

1600

16 ... 100

3

4

3

4

3

4

3

4

3 and 4

690
600690
600690
--690
--690
--690
--690
--690
--Up to 415
--✓
✓
✓
✓✓
✓
✓
✓--
✓
✓
✓--
✓
✓
✓--
✓
✓
✓--
✓
✓
✓--
✓
✓
✓--
✓
✓
✓✓
--
--
--190
279
102
138253
279
102
138190
406
114
151253
406
114
151229
406
152
207305
406
152
207229
406
152
207305
406
152
20776/102
124
68
7365/65
45/45
35/26
25/20
20/10
32/32
--
--65/65
50/50
35/26
25/20
20/1065/35
50/25
35/26
25/20
20/1065/35
50/25
35/26
25/20
20/1065/33
18/9
--
--
--25
2025
2025
2025
20--
--100/75
70/70
50/38
40/30
30/15
32/32
32/32
--100/75
70/70
50/38
40/30
30/15100/50
70/35
50/38
40/30
30/15100/50
70/35
50/38
40/30
30/15--
--
--
--
--
--
--
--50
3050
3050
3050
30--
--200/150
100/75
75/50
50/38
20/10
32/32
32/32
32/32200/150
100/75
75/50
50/38
20/10200/100
100/50
75/50
50/38
35/17200/100
100/50
75/50
50/38
35/17--
--
--
--
--
--
--
--65
3565
3565
3565
35--
--

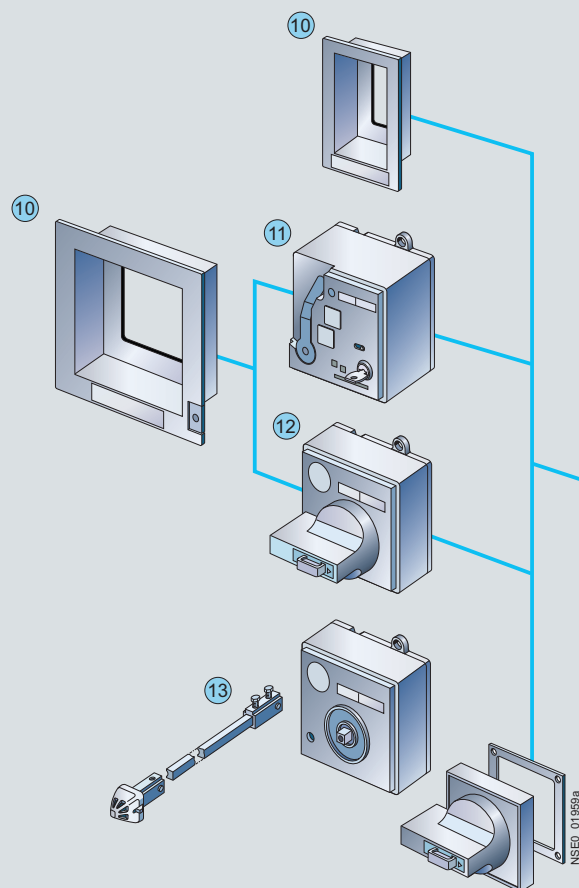
³⁾ At 240 V AC, 415 V AC and 525 V AC max. 5 % overvoltage, at 440 V AC, 500 V AC and 690 V AC max. 10 % overvoltage, at 250/500/600 V DC max. 5 % overvoltage.

⁴⁾ Rated current $I_n \geq 25$ A.

⁵⁾ The maximum permitted DC voltage for each conducting path needs to be taken into account for DC switching applications, [see the topic "Configuring", "Switching of DC Currents"](#); time constant $t = 15$ ms.

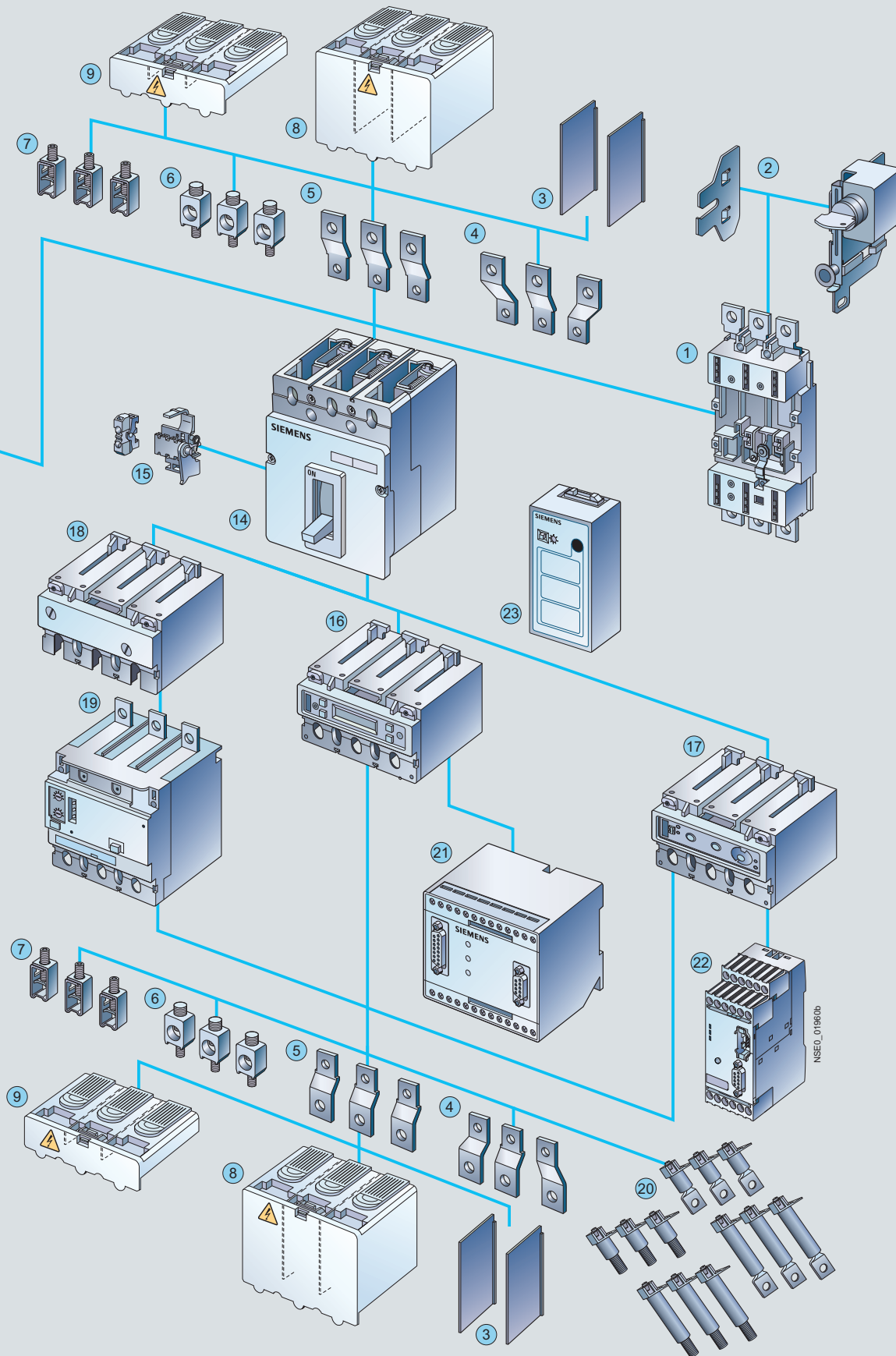
⁶⁾ The NEMA breaking capacity can be found on the rating plate of each IEC circuit breaker.

Introduction



- ① Withdrawable/plug-in bases
- ② Side walls for withdrawable version
- ③ Phase barriers
- ④ Flared front busbar connecting bars
- ⑤ Straight connecting bars
- ⑥ Multiple feed-in terminals for Al/Cu
- ⑦ Box terminals for Cu
- ⑧ Extended terminal covers
- ⑨ Standard terminal covers
- ⑩ Masking frames/cover frames for door cut-out
- ⑪ Motorized operating mechanisms with spring energy store
- ⑫ Front-operated rotary operating mechanisms
- ⑬ Door-coupling rotary operating mechanisms
- ⑭ SENTRON 3VL circuit breakers
- ⑮ Internal accessories
- ⑯ Solid-state releases (LCD ETU)
- ⑰ Solid-state releases with communication function
- ⑱ Thermal-magnetic overcurrent releases
- ⑲ RCD modules
- ⑳ Rear terminals – flat and round
- ㉑ COM10 communication modules to the PROFIBUS DP
- ㉒ COM20 communication modules to the PROFIBUS DP
- ㉓ Battery power supplies with test function for solid-state releases

For additional information see Catalog LV 1.



3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Design

- Rated current range from 16 A to 1600 A
- Different switching capacity for each size

N	Standard (45 to 55 kA)
H	High (70 kA)
L	Very high (100 kA)

- No derating or loss of performance up to 50 °C
- Solid-state releases from size 160 A (VL160), particularly for time-based discrimination and ground-fault protection
- 2 families of internal accessories
- Full range of external accessories e. g. terminals for aluminum cable.

All circuit breakers are supplied with integrated solid-state releases. The SENTRON VL160X to VL1600 circuit breakers are available with busbar connection pieces or box terminals (up to 400 A; see "Main Connections, Basic Equipment and Options", page 16/12). Auxiliary switches/alarm switches or auxiliary releases can be easily adapted by the customer, or they are also available ready installed if required.

The breaking capacity is shown on the front of every circuit breaker.

- Standard switching capacity:
 $I_{cu} = 45$ to 55 kA at AC 50/60 Hz 380/415 V
- High switching capacity:
 $I_{cu} = 70$ kA at AC 50/60 Hz 380/415 V
- Very high switching capacity:
 $I_{cu} = 100$ kA at AC 50/60 Hz 380/415 V

Standards and specifications

SENTRON 3VL circuit breakers comply with:

IEC 60947-1, EN 60947-1,
IEC 60947-2, EN 60947-2,
Isolating features according to IEC 60947-2, EN 60947-2

Disconnecting features (main control switches)
according to EN 60204-1.

The SENTRON 3VL circuit breakers comply in addition with requirements for "disconnecter units with features for stopping and switching off in an emergency" (EMERGENCY-STOP switches) in conjunction with lockable rotary operating mechanisms (red-yellow) and terminal covers.

Please contact Siemens for details of other standards.

The solid-state releases of the circuit breakers for motor protection also comply with IEC 60947-4-1, EN 60947-4-1.

VL160X to VL400 circuit breakers can be equipped with a SENTRON 3VL RCD module. They then comply with IEC 60947-2 Appendix B.

The SENTRON 3VL RCD module complies with IEC 61000-4-2 to IEC 61000-4-6, IEC 61000-4-11 and EN 55011, Class B (equivalent to CISPR 11) with regard to electromagnetic compatibility.

Degree of protection

Circuit breaker	IP20
Masking frame	IP40
Terminal cover	IP30
With front-operated rotary operating mechanism	IP40
With door-coupling rotary operating mechanism	IP65
With motorized operating mechanism	IP30
With motorized operating mechanism and masking frame for the door cut-out	IP40
Plug-in base/withdrawable version	IP20

Connection

The SENTRON VL160X to VL1600 circuit breakers can be factory-fitted with incoming and outgoing box terminals which are suitable for stranded conductors, flexible copper bars and finely stranded conductors with end sleeves, as well as with screw terminals for flat connectors. Different feeder terminals are available for VL630 to VL1600 (sizes 630 A to 1600 A).



Appropriate accessories for screw terminal to fixed and flexible copper bars or cables are available for SENTRON VL160X to VL1600 circuit breakers.

SENTRON VL160X to VL1600 circuit breakers can be equipped with connecting bars. These are intended for connection of standard busbars and can be used for front or rear connection. The SENTRON VL1600 circuit breaker is supplied with front connecting bars.

The incoming and outgoing terminals for the circuit breaker can be freely selected. The electrical specifications remain the same.

The infeed for circuit breakers with RCD modules can be connected above or below.

For 4-pole circuit breakers, the fourth pole (N pole) of the main current path is 100 % loadable with the rated current.

Bare conductors at the top connections must be insulated in the arc quenching space that is necessary above the arc chutes. Phase barriers or terminal covers can be used for this purpose.

For the SENTRON VL160X to VL1600 circuit breakers, the connections for the internal accessories (auxiliary releases, auxiliary switches and alarm switches) are supplied with terminal screws.

The auxiliary releases (shunt releases and undervoltage releases), auxiliary switches and alarm switches for all SENTRON 3VL circuit breakers can be connected easily and directly.

The motorized operating mechanisms with spring energy stores are always equipped with terminals. The leading auxiliary switches for the rotary operating mechanisms are always supplied with connecting cables.

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

SENTRON VL160X circuit breakers

The main components of the SENTRON VL160X circuit breakers are the three conducting paths with the incoming and outgoing terminals. The fixed and moving contacts are designed in such a way that the contacts are magnetically repelled if there is a short-circuit. In conjunction with the arcing chambers, a dynamic impedance is created that causes current limiting due to a reduction in the damaging effects of I^2t and I_p energy that arises during short-circuits.

The release is preassembled and equipped with fixed or adjustable overload releases as well as with fixed short-circuit releases for each pole.

The circuit breaker is trip-free.

To the right and left of the operating mechanism, the double-insulated accessory compartments are situated for the auxiliary releases and auxiliary switches.

SENTRON VL160 to VL630 circuit breakers

The arrangement of the conducting path, main contact and switching mechanism corresponds to that of the SENTRON VL160X circuit breakers.

The releases for the SENTRON VL160 to VL630 have the following features:

- The releases are available in thermal-magnetic and solid-state versions.
- The thermal-magnetic releases have adjustable overload and short-circuit releases.

SENTRON VL800 to VL1600 circuit breakers

The arrangement of the conducting paths and switching mechanisms corresponds with those of the SENTRON VL160X to VL630 circuit breakers.

The SENTRON VL800 to VL1600 circuit breakers are only available with solid-state releases.

As is the case for all versions of the SENTRON 3VL circuit breakers with solid-state releases, the current transformers are in the same enclosure as the releases. They send a signal which is proportional to the load current to the solid-state overcurrent release.

All SENTRON 3VL circuit breakers with solid-state releases measure the actual r.m.s. current. This type of measurement is the most accurate method. Currents in today's electrical distribution systems with many harmonics are evaluated reliably.

Overcurrent release systems

The overcurrent release systems can be replaced by the customer using a special tool.

When the solid-state release has been installed in the circuit breaker, it is recommended that it is tested with the battery power supply using the 3VL9 000-8AP00 test function.

1. Solid-state release system of the SENTRON VL160X to VL630 circuit breakers - thermal-magnetic

The overcurrent and short-circuit releases function with bimetallic and magnetic releases. They are available in fixed set or adjustable versions.

The 4-pole circuit breakers for system protection can be equipped with solid-state releases for all four poles or without an solid-state release for the fourth pole (N). Depending on the size, circuit breakers are available with a release in the fourth pole (N) with 60 % or 100 % of the current of the 3 main current paths.

The circuit breakers for starter combination applications are usually combined with a motor contactor and a suitable overload relay.

The non-automatic air circuit breakers have an integrated short-circuit self-protection system eliminating the need for back-up fuses. Non-automatic air circuit breakers have no overload protection. 4-pole non-automatic air circuit breakers do not have a short-circuit release for the fourth pole (N).

2. Solid-state release system for SENTRON VL160 to VL1600 circuit breakers, solid-state, ETU

The solid-state overcurrent release system consists of:

- 3 current transformers
- Evaluation electronics with microprocessor
- Internal power supply, no external auxiliary voltage necessary
- Tripping solenoid

The 4-pole circuit breakers for system protection can be equipped with solid-state releases for all four poles or without an solid-state release for the fourth pole (N).

On ETU releases the neutral conductor protection is adjustable to 50 % or 100 %. On LCD ETU releases the neutral conductor protection is adjustable from 50 to 100 % or can be switched off.

For the LCD ETU on the SENTRON VL160 and VL250, the tripping solenoid is installed in the left accessory compartment.

The protection functions of the solid-state releases are maintained without additional auxiliary voltage. The solid-state releases are supplied with energy through circuit breaker-internal current transformers.

The solid-state release has to be activated for parameterizing. This requires a load current of at least 20 % of the respective rated current I_n of the circuit breaker. If this load current is not available, the necessary auxiliary power can be fed in through a 3VL9 000-8AP00 battery power supply. For communication-capable circuit breakers the release is supplied with energy through the communication module.

At the output of the solid-state overcurrent release module there is a tripping solenoid which trips in the case of overload or short-circuit.



Circuit breakers with standard switching capacity N (I_{cu} up to 55 kA at 415 V)



Circuit breakers with high switching capacity H (I_{cu} up to 70 kA at 415 V)



Circuit breakers with very high switching capacity L (I_{cu} up to 100 kA at 415 V)

These circuit breakers are indicated in the Technical specifications by orange backgrounds.

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

RCD modules

- Easy mounting
- Assembly kit for lateral mounting according to EN 60715 for SENTRON VL160X circuit breakers under Order No. 3VL9 112-5GB30/3VL9 112-5GB40
- A tripping button enables the function of the integrated RCD module to be tested.
- Protruding reset/tripping button (prevents the circuit breaker from being reclosed before the reset/tripping button has been reset)
- Circuit for remote-controlled tripping of the circuit breaker does not require an additional external voltage supply (for SENTRON VL160 to VL400 circuit breakers)
- LED displays which enable visual monitoring of the RCD module:
 - Green
 $\leq 25 \% I_{\Delta n}$ of $I_{\Delta n}$
 - Green + Yellow
 $25 \% < I_{\Delta n} = 50 \%$ of the set $I_{\Delta n}$
 - Green + Yellow + Red
 $I_{\Delta n} \geq 50 \%$ of the set $I_{\Delta n}$
- RCD alarm switch (changeover contact) for VL160 to VL400 to indicate a tripping operation by the RCD module
- 690 V AC application
- "Power disconnect" enables electrical testing without disconnecting the cables
- The functional properties of the circuit breaker are not adversely affected by the addition of the RCD module
- Internal power supply, no external voltage

(For diagrams see Catalog LV1 "Accessories".)

Abbreviations (functions)

L	= Long Time Delay	= Overload protection
S	= Short Time Delay	= Short-circuit protection (short-time delayed)
I	= Instantaneous	= Short-circuit protection (instantaneous)
N	= Neutral Protection	= Neutral conductor protection
G	= Ground Fault	= Ground-fault protection

L, S, I, N, G designations according to IEC 60947-2, Appendix K

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

VL160 to VL1600 solid-state releases – Overview of functions

Order No. supplement	Releases	System protection	Motor protection	Starter protection	Generator protection	Function	Setting options					
							L	S ¹⁾		I ¹⁾	G	
							Overload protection $I_r = \times I_n$	Short-circuit protection (short-time delayed) $I_{sd} = \times I_r$	t_{sd} [s]	Short-circuit protection (instantaneous) $I_i = \times I_n$	Ground-fault protection $I_g = \times I_n$	t_g [s]
DK	M	--	--	✓	--	I	--	--	--	7 ... 15	--	--
DC	TM ²⁾	✓	--	--	--	LI	0.8 ... 1	--	--	5 ... 10	--	--
EJ	TM ²⁾	✓	--	--	--	LI	0.8 ... 1	--	--	5 ... 10	--	--
EC	TM ²⁾	✓	--	--	--	LIN	0.8 ... 1	--	--	5 ... 10	--	--
EM	TM ²⁾	✓	--	--	--	LIN	0.8 ... 1	--	--	5 ... 10	--	--
SP	ETU10M ³⁾	--	✓	--	✓	LI	0.4 ... 1	--	--	1.25 ... 11	--	--
MP	ETU10M ³⁾	--	✓	--	✓	LI	0.4 ... 1	--	--	1.25 ... 11	--	--
SB	ETU10	✓	--	--	--	LI	0.4 ... 1	--	--	1.25 ... 11	--	--
MB	ETU10	✓	--	--	--	LI	0.4 ... 1	--	--	1.25 ... 11	--	--
TA	ETU10	✓	--	--	--	LIN	0.4 ... 1	--	--	1.25 ... 11	--	--
NA	ETU10	✓	--	--	--	LIN	0.4 ... 1	--	--	1.25 ... 11	--	--
TB	ETU10	✓	--	--	--	LI	0.4 ... 1	--	--	1.25 ... 11	--	--
NB	ETU10	✓	--	--	--	LI	0.4 ... 1	--	--	1.25 ... 11	--	--
SL	ETU12	✓	--	--	--	LIG	0.4 ... 1	--	--	1.25 ... 11	0.6 ... 1, OFF	0.1 ... 0.3
ML	ETU12	✓	--	--	--	LIG	0.4 ... 1	--	--	1.25 ... 11	0.6 ... 1, OFF	0.1 ... 0.3
SF	ETU12	✓	--	--	--	LING	0.4 ... 1	--	--	1.25 ... 11	0.6 ... 1, OFF	0.1 ... 0.3
MF	ETU12	✓	--	--	--	LING	0.4 ... 1	--	--	1.25 ... 11	0.6 ... 1, OFF	0.1 ... 0.3
TN	ETU12	✓	--	--	--	LING	0.4 ... 1	--	--	1.25 ... 11	0.6 ... 1, OFF	0.1 ... 0.3
NN	ETU12	✓	--	--	--	LING	0.4 ... 1	--	--	1.25 ... 11	0.6 ... 1, OFF	0.1 ... 0.3
SE	ETU20	✓	--	--	✓	LSI	0.4 ... 1	1.5 ... 10	0 ... 0.5	11	--	--
ME	ETU20	✓	--	--	✓	LSI	0.4 ... 1	1.5 ... 10	0 ... 0.5	11	--	--
TE	ETU20	✓	--	--	✓	LSI	0.4 ... 1	1.5 ... 10	0 ... 0.5	11	--	--
NE	ETU20	✓	--	--	✓	LSI	0.4 ... 1	1.5 ... 10	0 ... 0.5	11	--	--
TF	ETU20	✓	--	--	✓	LSIN	0.4 ... 1	1.5 ... 10	0 ... 0.5	11	--	--
NF	ETU20	✓	--	--	✓	LSIN	0.4 ... 1	1.5 ... 10	0 ... 0.5	11	--	--
SG	ETU22	✓	--	--	✓	LSIG	0.4 ... 1	1.5 ... 10	0 ... 0.5	11	0.6 ... 1, OFF	0.1 ... 0.3
MG	ETU22	✓	--	--	✓	LSIG	0.4 ... 1	1.5 ... 10	0 ... 0.5	11	0.6 ... 1, OFF	0.1 ... 0.3
SH	ETU22	✓	--	--	✓	LSING	0.4 ... 1	1.5 ... 10	0 ... 0.5	11	0.6 ... 1, OFF	0.1 ... 0.3
MH	ETU22	✓	--	--	✓	LSING	0.4 ... 1	1.5 ... 10	0 ... 0.5	11	0.6 ... 1, OFF	0.1 ... 0.3
TH	ETU22	✓	--	--	✓	LSING	0.4 ... 1	1.5 ... 10	0 ... 0.5	11	0.6 ... 1, OFF	0.1 ... 0.3
NH	ETU22	✓	--	--	✓	LSING	0.4 ... 1	1.5 ... 10	0 ... 0.5	11	0.6 ... 1, OFF	0.1 ... 0.3
SS	ETU30M ³⁾	--	✓	--	✓	LI	0.4 ... 1	--	--	6/8/11	--	--
MS	ETU30M ³⁾	--	✓	--	✓	LI	0.4 ... 1	--	--	6/8/11	--	--
CP	LCD ETU40M ³⁾	--	✓	--	✓	LI	0.4 ... 1	--	--	1.25 ... 11	--	--
CH	LCD ETU40	✓	--	--	--	LI, LSI	0.4 ... 1	1.5 ... 10	0 ... 0.5	1.25 ... 11	--	--
CJ	LCD ETU40	✓	--	--	--	LI, LSIN	0.4 ... 1	1.5 ... 10	0 ... 0.5	1.25 ... 11	--	--
CL	LCD ETU42	✓	--	--	--	LSIG	0.4 ... 1	1.5 ... 10	0 ... 0.5	1.25 ... 11	0.4 ... 1	0.1 ... 0.5
CM	LCD ETU42	✓	--	--	--	LSIG	0.4 ... 1	1.5 ... 10	0 ... 0.5	1.25 ... 11	0.4 ... 1	0.1 ... 0.5
CN	LCD ETU42	✓	--	--	--	LSIG, LSING	0.4 ... 1	1.5 ... 10	0 ... 0.5	1.25 ... 11	0.4 ... 1	0.1 ... 0.5

¹⁾ Size-dependent.

²⁾ TM up to $I_n = 630$ A.

³⁾ Motor protection up to $I_n = 500$ A.

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Order No. supplement	Releases	Thermal image	Phase failure	Communication-capable	Ground-fault protection	Number of poles	N pole protected ¹⁾	I^2t (ON/OFF)	Trip class (t_c)	Time-lag class (t_R)	Thermo-magnetic release	Magnetic release	Solid-state release	LCD display
DK	M	--	--	--	--	3	--	--	--	--	--	✓	--	--
DC	TM ²⁾	✓	--	--	--	3	--	--	--	--	✓	--	--	--
EJ	TM ²⁾	✓	--	--	--	4	--	--	--	--	✓	--	--	--
EC	TM ²⁾	✓	--	--	--	4	60 %	--	--	--	✓	--	--	--
EM	TM ²⁾	✓	--	--	--	4	100 %	--	--	--	✓	--	--	--
SP	ETU10M ³⁾	✓	40 % I_R	--	--	3	--	--	10	--	--	--	✓	--
MP	ETU10M ³⁾	✓	40 % I_R	✓ ⁴⁾	--	3	--	--	10	--	--	--	✓	--
SB	ETU10	✓	--	--	--	3	--	--	--	2.5 ... 30	--	--	✓	--
MB	ETU10	✓	--	✓ ⁴⁾	--	3	--	--	--	2.5 ... 30	--	--	✓	--
TA	ETU10	✓	--	--	--	4	50/100 %	--	--	2.5 ... 30	--	--	✓	--
NA	ETU10	✓	--	✓ ⁴⁾	--	4	50/100 %	--	--	2.5 ... 30	--	--	✓	--
TB	ETU10	✓	--	--	--	4	--	--	--	2.5 ... 30	--	--	✓	--
NB	ETU10	✓	--	✓ ⁴⁾	--	4	--	--	--	2.5 ... 30	--	--	✓	--
SL	ETU12	✓	--	--	①	3	--	✓	--	2.5 ... 30	--	--	✓	--
ML	ETU12	✓	--	✓ ⁴⁾	①	3	--	✓	--	2.5 ... 30	--	--	✓	--
SF	ETU12	✓	--	--	②	3	50/100 %	✓	--	2.5 ... 30	--	--	✓	--
MF	ETU12	✓	--	✓ ⁴⁾	②	3	50/100 %	✓	--	2.5 ... 30	--	--	✓	--
TN	ETU12	✓	--	--	②	4	50/100 %	✓	--	2.5 ... 30	--	--	✓	--
NN	ETU12	✓	--	✓ ⁴⁾	②	4	50/100 %	✓	--	2.5 ... 30	--	--	✓	--
SE	ETU20	✓	--	--	--	3	--	✓	--	--	--	--	✓	--
ME	ETU20	✓	--	✓ ⁴⁾	--	3	--	✓	--	--	--	--	✓	--
TE	ETU20	✓	--	--	--	4	--	✓	--	--	--	--	✓	--
NE	ETU20	✓	--	✓ ⁴⁾	--	4	--	✓	--	--	--	--	✓	--
TF	ETU20	✓	--	--	--	4	50/100 %	✓	--	--	--	--	✓	--
NF	ETU20	✓	--	✓ ⁴⁾	--	4	50/100 %	✓	--	--	--	--	✓	--
SG	ETU22	✓	--	--	①	3	--	✓	--	--	--	--	✓	--
MG	ETU22	✓	--	✓ ⁴⁾	①	3	--	✓	--	--	--	--	✓	--
SH	ETU22	✓	--	--	②	3	50/100 %	✓	--	--	--	--	✓	--
MH	ETU22	✓	--	✓ ⁴⁾	②	3	50/100 %	✓	--	--	--	--	✓	--
TH	ETU22	✓	--	--	②	4	50/100 %	✓	--	--	--	--	✓	--
NH	ETU22	✓	--	✓ ⁴⁾	②	4	50/100 %	✓	--	--	--	--	✓	--
SS	ETU30M ³⁾	✓	40 % I_R	--	--	3	--	--	10, 20, 30	--	--	--	✓	--
MS	ETU30M ³⁾	✓	40 % I_R	✓ ⁴⁾	--	3	--	--	10, 20, 30	--	--	--	✓	--
CP	LCD ETU40M ³⁾	✓	5 ... 50 % I_R	✓ ⁵⁾	--	3	--	--	5, 10, 15, 20, 30	--	--	--	✓	✓
CH	LCD ETU40	✓	--	✓ ⁵⁾	--	3	--	✓	--	2.5 ... 30	--	--	✓	✓
CJ	LCD ETU40	✓	--	✓ ⁵⁾	--	4	50 ... 100 %, OFF	✓	--	2.5 ... 30	--	--	✓	✓
CL	LCD ETU42	✓	--	✓ ⁵⁾	①	3	--	✓	--	2.5 ... 30	--	--	✓	✓
CM	LCD ETU42	✓	--	✓ ⁵⁾	①/③	3	--	✓	--	2.5 ... 30	--	--	✓	✓
CN	LCD ETU42	✓	--	✓ ⁵⁾	②	4	50 ... 100 %, OFF	✓	--	2.5 ... 30	--	--	✓	✓

Ground-fault protection

- ① Vectorial summation current formation (3-conductor system)
 ② Vectorial summation current formation (4-conductor system)
 ③ Direct detection of ground-fault current in the neutral point of the transformer

1) Size-dependent.

2) TM up to $I_n = 630$ A.

3) Motor protection up to $I_n = 500$ A.

4) With COM20/COM21.

5) With COM10/COM11.

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Internal accessories (auxiliary switches, undervoltage releases, shunt releases)

The SENTRON 3VL circuit breakers can be supplied with all the internal accessories (e. g. auxiliary switches, undervoltage releases or shunt releases). The available versions can be found in the tables with the Order No. supplements.

Fixed-mounted, plug-in or withdrawable version

The fixed-mounted circuit breaker is the basic version. This can be converted very easily into a plug-in or withdrawable version with the aid of the appropriate assembly kit. This kit contains blade contacts, a locking pin and terminal covers for the plug-in version. The assembly kit for the withdrawable version also contains side covers and a racking mechanism. Even with the masking frame mounted, it is still possible to move using the handle with the door closed.

Operating mechanisms

The basic versions of the SENTRON 3VL circuit breakers are equipped with a toggle lever as an operating mechanism which is also used as a switch position indicator. In addition to "ON" and "OFF", "Tripped" is also indicated.

The toggle lever assumes the "tripped" position when the internal tripping mechanism is activated by an overcurrent tripping, e. g. an overload or short-circuit. The activation of an undervoltage release or shunt release also causes the toggle lever to assume the "tripped" position. The toggle lever must be put into the "OFF/RESET" position before the circuit breakers can be reclosed. It will then be possible to reset the internal tripping mechanism and reclose the main contacts on the circuit breaker (see illustration).

A toggle handle extension is supplied with the SENTRON VL1250 and VL1600 circuit breakers. This accessory must be ordered separately for SENTRON VL400 to VL800 circuit breakers, if required.

Front-operated rotary operating mechanisms

These operating mechanisms have been designed for direct mounting to the circuit breaker and change the toggle lever movement from a linear to a rotary motion.

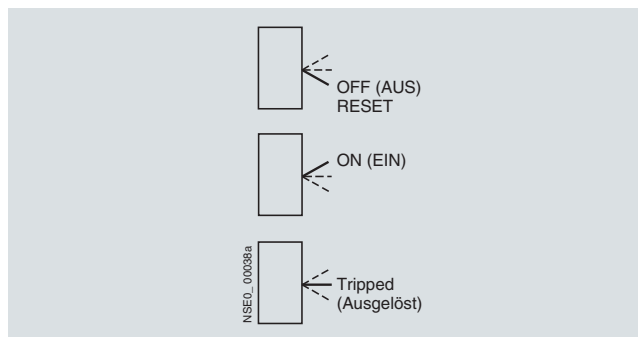
A leading voltage can be applied to the undervoltage release of a circuit breaker with leading auxiliary switches which makes the circuit breaker ready-to-close.

Door-coupling rotary operating mechanisms (complete operating mechanisms)

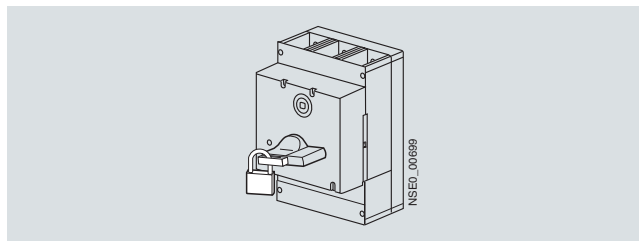
Door-coupling rotary operating mechanisms and removable covers are available for circuit breakers which are installed into control cabinets and distribution boards. These are supplied as complete assembly kits, including an articulated-shaft mechanism.

With regard to the switching status indication and the "RESET" position, the same applies to the rotary operating mechanisms as to the toggle lever. The position of the operator lever (knob) indicates the status.

All rotary operating mechanisms can be locked in the OFF position with the help of suitable padlocks. This means that all SENTRON 3VL circuit breakers which have these operating mechanisms as well as the corresponding terminal covers can be used as main control switches.



Toggle lever operating mechanism positions



Rotary operating mechanism secured with a padlock

Motorized operating mechanisms

The SENTRON VL160X to VL1600 circuit breakers (sizes 160 to 1600 A) can be equipped with motorized operating mechanisms for remote opening and closing during operation.

These motorized operating mechanisms for SENTRON VL160X to VL800 circuit breakers have a stored-energy feature (for synchronization) with a maximum ON period of $t_E \leq 100$ ms.

For SENTRON VL160X, VL160, VL250, VL1250 and VL1600 circuit breakers there are motorized operating mechanisms without a stored-energy feature for remote-controlled ON and OFF switching.

All motorized operating mechanisms are always supplied with a locking device for padlocks. Optional safety locks are also available for motorized operating mechanisms with stored-energy feature.

These locking devices can be used to block the operating mechanism electrically and mechanically. All remote-controlled operating mechanisms are equipped with a manual operation option for maintenance purposes.

The motorized operating mechanisms with stored-energy feature for VL160X to VL800 as well as the motorized operating mechanisms for VL1250 and VL1600 are each optionally equipped inside with a signaling contact (NO) for the following functions:

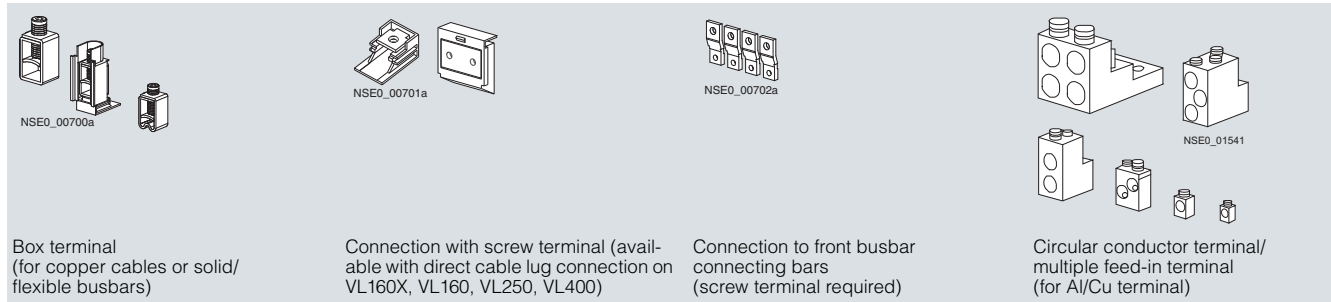
- Querying the AUTO/Manual selector switch for VL160X to VL800 (not possible with VL1250 to VL1600)
- Actuating the mechanical OFF/0 button

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Main connections, basic equipment and options



Main circuit connections (for conductor cross-sections see "Technical Specifications", page 16/19)

Circuit breakers	Connection overview and further options				
	Box terminals	Screw terminal with metric thread for flat connectors	Circular conductor terminal/multiple feed-in terminal	Rear-mounting terminals	Front-accessible connecting bars
VL160X	□	□	x	x	x
VL160	□	□	x	x	x
VL250	□	□	x	x	x
VL400	x	○	x ²⁾³⁾	x	x
VL630	x ¹⁾	○	x ²⁾	x	x
VL800	--	○	x ²⁾	x	x
VL1250	--	○	x ²⁾	x	x
VL1600	--	x	--	x	○

○ Scope of supply

□ Optional scope of supply

x Available

-- Not available

1) Connecting terminal plate for flexible busbar; not for 690 V AC/600 V DC.

2) Multiple feed-in terminal.

3) Circular conductor terminal also available.

Auxiliary releases and auxiliary switches

Undervoltage releases, leading auxiliary switches

If there is no voltage present, closing of the circuit breaker is not possible. If voltage is not applied to the releases, operation of the circuit breaker will result in no-load switching.

Frequent re-tripping should be avoided because of its adverse effect on the endurance of the circuit breaker.

All undervoltage releases are designed and tested so that they meet all applicable requirements in accordance with IEC 60947 (drop-out voltage 0.70 to 0.35 U_e , response voltage 0.85 to 1.10 U_e).

A leading voltage can be applied to the undervoltage release of a circuit breaker with leading auxiliary switches which makes the circuit breaker ready-to-close.

For SENTRON 3VL circuit breakers, the leading auxiliary switch can be supplied with the front rotary operating mechanism or complete operating mechanism. For more detailed information please see "Selection and Ordering Data" for accessories in Catalog LV 1.

Shunt releases

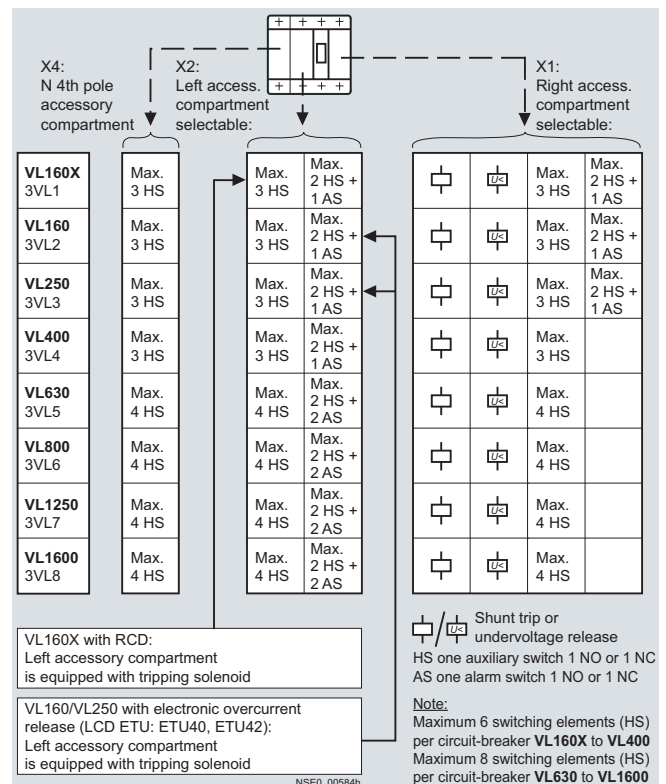
The shunt release is used for remote tripping of the circuit breaker.

The coil of the shunt release is designed for short-time operation only. A coil trip is implemented internally.

These devices operate according to IEC 60947 (tripping voltage 0.70 to 1.10 U_e).

It is not permissible to apply a continuous trip command to a shunt release to prevent closing when the circuit breaker is tripped.

A central tap is provided as standard for checking the conductivity of the coil.



Possible complements for the insulated accessory subsections in the SENTRON 3VL circuit breakers

Before ordering, use the table above to check whether the required combination of shunt releases, undervoltage releases and auxiliary/alarm switches is feasible.

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Auxiliary switches

Auxiliary switches are used for indication and control. The contacts of the auxiliary switch close and open together with the main contacts.

Alarm switch

The alarm switches (AS) are activated when the circuit breaker has been tripped due to an overcurrent e. g. overload or short-circuit. However, they are also activated if the circuit breaker has been tripped by a shunt release or undervoltage release.

Installation of internal accessories

The insulated accessory subsections for installing accessories (auxiliary releases and auxiliary switches/alarm switches) have the designations X1, X2 and X4.

The equipping of the circuit breaker with internal accessories and the configuration possibilities for circuit breakers with auxiliary releases and auxiliary/alarm switches depend on the mounting position and size of the circuit breaker (see the illustration "Possible Complements for the Insulated Accessory Subsections of the 3VL Circuit Breakers").

PLC control

The auxiliary and alarm switches can be used to send signals to programmable controllers. These switching blocks are part of the Siemens 3SB3 range.

Leading auxiliary switches

The leading auxiliary switches OFF to ON or ON to OFF are available as a retrofit set for rotary operating mechanisms.

Function

Current limiting

The SENTRON 3VL circuit breakers utilize the design principle of magnetic repulsion of the contacts. The contacts open before the anticipated peak value of the short-circuit current is achieved. The current-limiting effects of the SENTRON 3VL circuit breakers provide effective protection for system components against the thermal and dynamic effects of the short-circuit current in the event of an electrical fault.

Ground-fault protection

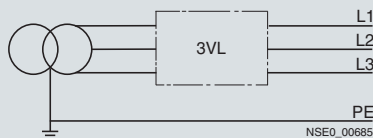
Ground-fault release "G" senses fault currents that flow to ground and that can cause fire in the plant. Several circuit breakers connected in series can provide graduated discrimination by means of the adjustable delay time.

The following measurement methods can be used to detect neutral conductor and ground-fault currents:

Vectorial summation current formation (measurement method 1)

Ground-fault detection in symmetrically loaded systems

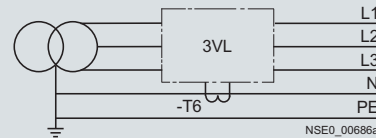
The three phase currents are evaluated with the help of the vectorial summation current formation.



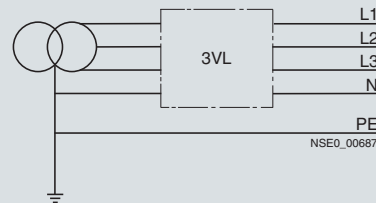
Ground-fault detection in asymmetrically loaded systems

The neutral conductor current is measured directly. For the 3-pole circuit breakers this measurement is only evaluated for ground-fault protection; for 4-pole circuit breakers it is also evaluated for neutral conductor overload protection.

The solid-state release determines the ground-fault current for the three phase currents and neutral conductor current by means of vectorial summation current formation. For 4-pole circuit breakers, the fourth current transformer for the neutral conductor is installed internally.



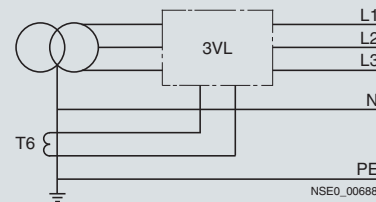
3-pole circuit breaker, current transformer in the neutral conductor



4-pole circuit breaker, current transformer installed internally

Direct detection of the ground-fault current through a current transformer in the grounded neutral point of the transformer (measurement method 2)

The current transformer is installed directly in the grounded neutral point of the transformer.



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

For RCD modules see Catalog LV 1 "Accessories".
For external current transformers see Catalog LV 1, "Accessories".

Transformer protection

The SENTRON 3VL circuit breakers protect power distribution systems against overload and short-circuit on the low-voltage side of the infeed transformer. The resulting requirements with respect to current-based and/or time-based discrimination are reliably fulfilled by the SENTRON 3VL circuit breakers for system protection (equipped with thermal-magnetic (TM) or solid-state overcurrent releases (ETU or LCD ETU)).

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Thermal-magnetic overcurrent releases TM¹⁾



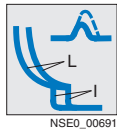
Application: system protection –
TM, LI/LIN function

Overload protection, fixed, short-circuit protection, fixed; see "Selection and ordering data" for VL160X, releases installed in the switch enclosure



Application: system protection –
TM, LI/LIN function

Overload protection adjustable $I_R = 0.8$ to $1 \times I_N$, short-circuit protection, fixed, see "Selection and ordering data" for VL160X, releases installed in the switch enclosure



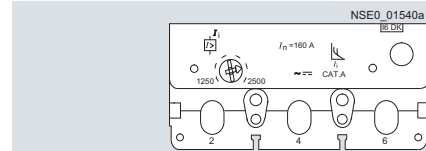
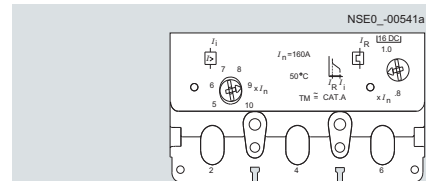
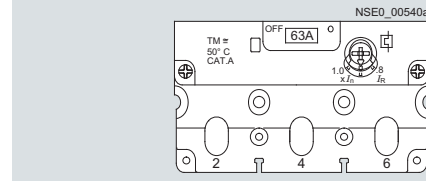
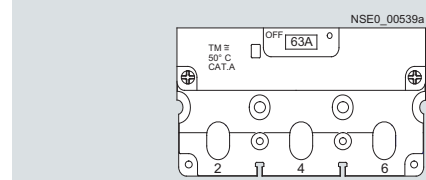
Application: system protection –
TM, LI/LIN function

Overload protection adjustable $I_R = 0.8$ to $1 \times I_N$, short-circuit protection, adjustable $I_i = 5$ to $10 \times I_N$, for VL160 to VL630



Application: starter protection –
M, I function

Short-circuit protection, adjustable $I_i = 7$ to $15 \times I_N$, for VL160 to VL630²⁾



Solid-state releases ETU

For types
VL160 to VL1600

General information:

- No auxiliary voltage for release required
- All ETUs have a thermal image
- Flashing green LED indicates faultless operation of microprocessor

- Overload status ($I > 1.05 \times I_R$) is indicated by continuous yellow LED (alarm)
- Integrated self-test function
- Female connector for test unit

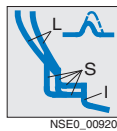
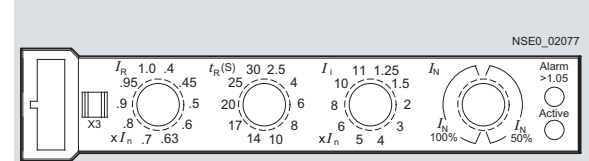


Application: system protection – ETU10,
LI/LIN function

Overload protection $I_R = 0.4; 0.45; 0.5$ to $0.95; 1 \times I_N$, time-lag class $t_R = 2.5$ to 30

Short-circuit protection (instantaneous)
 $I_i = 1.25$ to $11 \times I_N$ ²⁾

Neutral conductor protection
 $I_N = 50\%/100\% \times I_R$, versions "TA" and "NA".



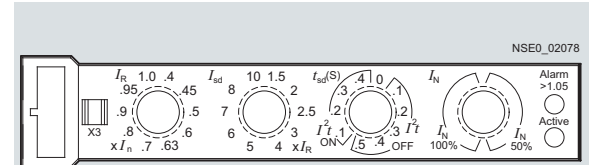
Application: system and generator protection –
ETU20, LSI/LSIN function

Overload protection $I_R = 0.4; 0.45; 0.5$ to $0.95; 1 \times I_N$,

Short-circuit protection (short-time delayed)
 $I_{sd} = 1.5$ to $10 \times I_R$ ²⁾, $t_{sd} = 0$ to 0.5 s,
 I^2t selectable on/off

Short-circuit protection (instantaneous)
 $I_i = 11 \times I_N$ (fixed)²⁾

Neutral conductor protection
 $I_N = 50\%/100\% \times I_R$, versions "TF" and "NF".



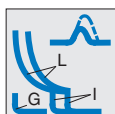
¹⁾ Operating temperature TM TU: $0^\circ\text{C} \dots 75^\circ\text{C}$.

²⁾ Size-dependent, see Catalog LV 1, "Selection and ordering data".

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data



NSE0_00693

Application: system protection – ETU12, LIG/LING function

Overload protection $I_R = 0.4; 0.45; 0.5$ to $0.95; 1 \times I_n$, time-lag class $t_R = 2.5$ to 30

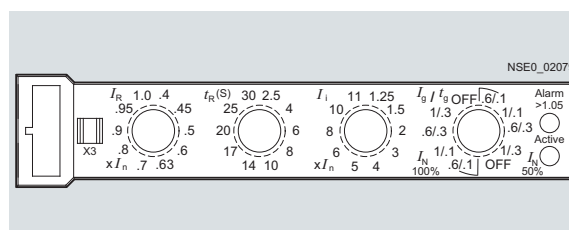
Short-circuit protection (instantaneous)
 $I = 1.25$ to $11 \times I_n$ ¹⁾

For 4-pole circuit breakers:

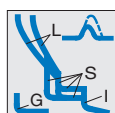
Neutral conductor protection $50\%/100\% \times I_R$

Ground-fault protection: measurement method 1:

$I_g = 0.6/1.0 I_n$, $t_g = 0.1/0.3$ s,
(G_R) vectorial summation current formation for the currents of the three phases/and neutral conductor (four-conductor systems); $I_{\Delta n} = I_n$, versions "SL", "SF", "ML", "MF", "TN", "NN" (for Order No. supplements see Catalog LV 1, "Selection and ordering data").



NSE0_02079



NSE0_00921

Application: system and generator protection – ETU22, LSIG/LSING function

Overload protection $I_R = 0.4; 0.45; 0.5$ to $0.95; 1 \times I_n$,

Short-circuit protection (short-time delayed)
 $I_{sd} = 1.5$ to $10 \times I_R$, $t_{sd} = 0$ to 0.5 s,

I^2t selectable on/off

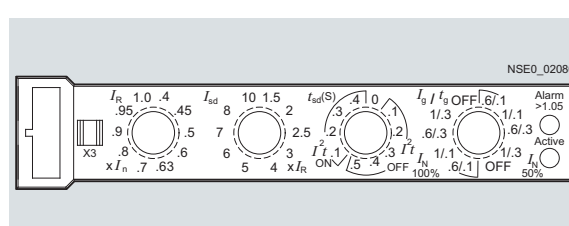
Short-circuit protection (instantaneous) $I_i = 11 \times I_n$ (fixed)¹⁾

For 4-pole circuit breakers:

Neutral conductor protection $50\%/100\% \times I_R$

Ground-fault protection: measurement method 1:

$I_g = 0.6/1.0 I_n$, $t_g = 0.1/0.3$ s,
(G_R) vectorial summation current formation for the currents of the three phases/and neutral conductor (four-conductor systems);
 $I_{\Delta n} = I_n$, versions "SG", "SH", "MG", "MH", "TH", "NH" (for Order No. supplements see Catalog LV 1, "Selection and ordering data").



NSE0_02080



NSE0_00943

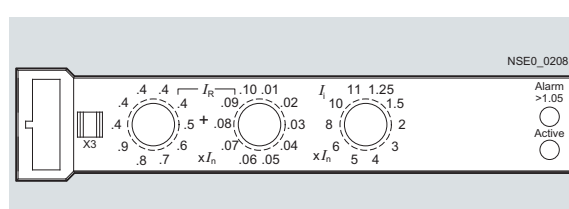
Application: motor protection – ETU10M, LI function

Overload protection, finely adjustable $I_R = 0.41; 0.42$ to $0.98; 0.99; 1 \times I_n$,
trip class $t_c = 10$ (fixed)

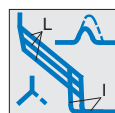
Thermal image

Short-circuit protection (instantaneous)

$I_i = 1.25$ to $11 \times I_n$ ¹⁾
with phase failure sensitivity (40 % I_R fixed).



NSE0_02081



NSE0_01419

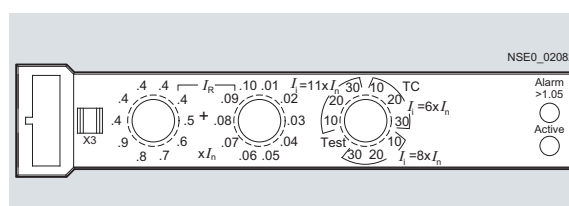
Application: motor protection – ETU30M, LI function

Overload protection, finely adjustable $I_R = 0.41; 0.42$ to $0.98; 0.99; 1 \times I_n$,
trip class $t_c = 10, 20, 30$

Thermal image

Short-circuit protection (instantaneous)

$I_i = 6$ to $11 \times I_n$
with phase failure sensitivity (40 % I_R fixed).



NSE0_02082

¹⁾ Size-dependent, see Catalog LV 1, "Selection and ordering data".

3VL Molded Case Circuit Breakers

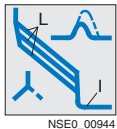
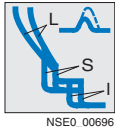
3VL Molded Case Circuit Breakers up to 1600 A

General data

Solid-state releases LCD ETU

General information:

- No auxiliary voltage for release required
- Current indicator
- Illuminated LCD display indicates faultless operation of microprocessor
- The overload status ($I > 105 \% I_R$) is indicated by "overload" on the LCD display



Application: system protection – ETU40,
LI/LS/LSI/LIN/LSIN functions and motor protection –
ETU40M, LI function

Overload protection $I_R = 0.4$ to $1 \times I_n$,
trip class $t_c = 5$ to 30 for ETU40M,
time-lag class $t_R = 2.5$ to 30 for ETU40

Thermal image memory, selectable On/Off,
with phase failure sensitivity for ETU40M
($5 \dots 50 \% I_R$ adjustable)

Short-circuit protection (short-time delayed) for
ETU40

$I_{sd} = 1.5$ to $10 \times I_R$, $t_{sd} = 0$ to 0.5 s,

Application: system protection –
ETU42, LSIG/LSING function

Overload protection $I_R = 0.4$ to $1 \times I_n$,
time-lag class $t_R = 2.5$ to 30

On/off selectable thermal image

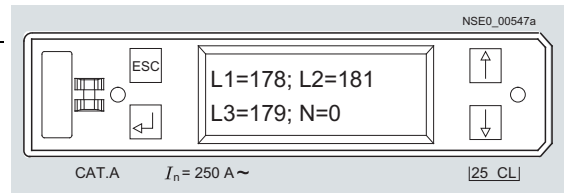
Short-circuit protection (short-time delayed)
 $I_{sd} = 1.5$ to $10 \times I_R$, $t_{sd} = 0$ to 0.5 s,

I^2t selectable on/off

Short-circuit protection (instantaneous)
 $I_i = 1.25$ to $11 \times I_n$ ¹⁾

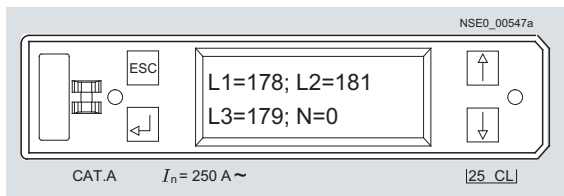
Ground-fault protection: measurement method 1:
(G_R) vectorial summation current formation for the
currents of the three phases/and neutral conductor
(four-conductor systems);
 $I_{\Delta n} = 0.4$ to $1 \times I_n$, versions "CL", "CM", "CN" (for Order
No. supplements see Catalog LV 1, "Selection and
ordering data").

- User-friendly, menu-driven setting of protection parameters in absolute ampere values by means of keys
- Integrated self-test function
- Female connector for test unit
- For communications integration to PROFIBUS DP see section "Communication".



I^2t selectable on/off for ETU40

Short-circuit protection (instantaneous)
 $I_i = 1.25$ to $11 \times I_n$ ¹⁾



Measurement method 2:
(G_{GND}) direct detection of ground-fault current by
means of current transformer, $I_g = 0.4$ to $1 \times I_n$,
 $t_g = 0.1$ to 0.5 s; version "CM" (for Order No. supple-
ment see Catalog LV 1, "Selection and ordering
data").

For 4-pole circuit breakers:
Neutral conductor protection N: 50 to $100 \% I_R$
adjustable or can be switched off.

¹⁾ Size-dependent, see Catalog LV 1, "Selection and ordering data".

Integration

Mounting

The SENTRON 3VL circuit breakers are suitable for use in open and enclosed switchboards and distribution systems. The recommended mounting positions for the SENTRON 3VL circuit breakers are shown in the diagrams under "Technical specifications, permissible mounting positions".

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Configuration

Communication

Three alternatives are available for communication.

An LCD ETU (ETU40, ETU40M or ETU42) is required in addition for the more extensive communication with COM10, or a COM20 is used with a communication-capable ETU.

If less data is required, the SIMOCODE Professional can be used as interface. All versions can be switched on and off using an optional motorized operating mechanism.

	Data transmission through COM10	Data transmission through COM20	Data transmission through SIMOCODE Pro
Transmittable data			
Commands			
Switch on/off	✓	✓	✓
Alarm and tripping memory, min./max. measured values and maintenance information	✓	✓ ²⁾	--
Operating statuses			
ON or OFF status trip position	✓	✓	✓
Event signals			
Tripped signals with tripping current and time stamp	✓	✓ ¹⁾	--
Alarm signals (e. g. overload)	--	✓	✓
Alarm signals with time stamp (e. g. overload, phase unbalance, current etc.)	✓	--	--
Threshold value warning, with time stamp (e. g. phase currents)	✓	✓ ¹⁾	--
Measured values			
Phase currents and neutral conductor current, each with min./max. value and time stamp	✓	✓ ²⁾	--
Phase currents, voltages, power	--	--	✓
Parameter values			
Read and write	✓	✓	--
Set values for SIMOCODE Pro	--	--	✓
Maintenance information			
(e. g. number of tripping operations, number of switching operations)	✓	✓	--
Device identification data			
	✓	✓	--
Time synchronization			
	✓	✓	--

✓ Available -- Not available

Function	Local			Remote		SIMOCODE	Breaker Data Adapter	Breaker Data Adapter <i>Plus</i>
	Solid-state release version			COM10 module	COM20 module			
	TM	ETU	LCD ETU					
Functions of the communication components								
Transmission of the operating state (only ON, OFF, tripped) to the PROFIBUS	✓	✓	✓	--	--	✓	--	--
Transmission of the operating state (ON, OFF, tripped, warnings, causes of tripping, event log) to the PROFIBUS	--	✓	✓	✓	✓	--	☐	☐
Display of measured values (current only) and parameters in release, change parameters through display	--	--	✓	☐	☐	☐	☐	☐
Transmission of maximum value of present current in %	✓	✓	✓	--	--	✓	☐	☐
Transmission of individual present phase currents incl. min./max. and time stamp	--	✓	✓	✓	✓ ¹⁾²⁾	--	☐	☐
Transmission of identification data	--	✓	✓	✓	✓	--	☐	☐
Transmission of switch information on HTML basis locally to a PC	--	--	✓	☐	--	--	✓	✓
Transmission of switch information on HTML basis through Ethernet	--	--	✓	☐	--	--	--	✓
Read out and adjust protection parameters through PROFIBUS	--	✓	✓	✓	✓	--	☐	☐

✓ Required

Function can optionally be taken over by more than one release.

Function can optionally be taken over by one of these adapters.

□ Not necessary for this function, optionally combinable

-- Function not available

¹⁾ Without time stamp.

²⁾ Only max. values.

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Switching of DC currents

The VL160X to VL630 circuit breakers (for system protection with TM, for starter combinations, non-automatic air circuit breakers) can also be used for DC switching and protection applications.

The VL160 to VL1600 circuit breakers with solid-state releases (ETU) are not suitable for DC applications.

However, the maximum permitted DC current for each conducting path needs to be taken into account for DC switching applications.

For voltages above 250 V for VL160 to VL630, a series connection of 2 or 4 conducting paths is required.

As the current has to flow through all of the conducting paths, the following connections are recommended in order to satisfy the thermal tripping characteristics.

With DC applications, the response values of the instantaneous short-circuit releases ("I" releases) are increased by 30 to 40 %.

Recommended connection/Maximum permitted DC voltage U_e		Remarks
Circuit A	Circuit B ¹⁾	
For 3- and 4-pole circuit breakers²⁾³⁾		
250 V DC ⁴⁾ 	500 V DC ⁴⁾ 	2-pole switching (non-grounded system) If there is no possibility of a ground fault, or if every ground fault is rectified immediately (ground-fault monitoring), then the maximum permitted DC voltage is 600 V for both circuits.
500 V DC 	600 V DC 	2-pole switching (grounded system) The grounded pole is always assigned to the individual conducting path, so that there are always 2 conducting paths in series in the event of a ground fault in circuit A and 3 conducting paths in series in the event of a ground fault in circuit B.
600 V DC 	600 V DC 	1-pole switching (grounded system) The grounded pole is assigned to the unconnected conducting path.

¹⁾ Circuit B: A current reduction to 75 % is necessary with 4 conducting paths. The characteristic curve is also shifted by the greater temperature rise.

²⁾ VL160X on request.

³⁾ 4th pole (N) without overload and short-circuit releases, or 4th pole (N=100 %).

⁴⁾ With a non-grounded system, all poles must be disconnected.

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Technical specifications

Type		VL160X 3VL1	VL160 3VL2	VL250 3VL3	VL400 3VL4	VL630 3VL5	VL800 3VL6	VL1250 3VL7	VL1600 3VL8
Max. rated current I_n									
N pole		A 160	160	250	400	630	800	1250	1600
Rated insulation voltage U_i acc. to IEC 60947-2									
Main current paths	AC V	800	800	800	800	800	800	800	800
Auxiliary circuits	AC V	690	690	690	690	690	690	690	690
Rated impulse withstand voltage U_{imp}									
Main current paths	kV	8	8	8	8	8	8	8	8
Auxiliary circuits	kV	4	4	4	4	4	4	4	4
Rated operational voltage U_e									
IEC 50/60 Hz	AC V	690	690	690	690	690	690	690	690
	DC ²⁾ V	500	600	600	600	600	600	600	600
NEMA 60 Hz	AC V	600	600	600	600	600	600	600	600
Utilization categories (IEC 60947-2)	A	A	A	A	A	A B ³⁾	A B ³⁾	A B ³⁾	A B ³⁾
Permissible ambient temperature⁴⁾									
Operation	°C	-25 ... +70	-25 ... +70	-25 ... +70	-25 ... +70	-25 ... +70	-25 ... +70	-25 ... +70	-25 ... +70
Storage	°C	-40 ... +80	-40 ... +80	-40 ... +80	-40 ... +80	-40 ... +80	-40 ... +80	-40 ... +80	-40 ... +80
Permissible load at various ambient temperatures Close to the circuit breaker, related to the rated current of the circuit breaker									
• Circuit breakers for system protection	TM/ETU Up to 50 °C %	100/--	100/100	100/100	100/100	100/100	--/100	--/100	--/100
	TM/ETU At 60 °C %	93/--	93/95	93/95	93/95	93/95	--/95	--/95	--/95
	TM/ETU At 70 °C %	86/--	86/80	86/80	86/80	86/80	--/80	--/80	--/80
• Circuit breakers for motor protection	Up to 50 °C %	--	100	100	100	100	--	--	--
	At 60 °C %	--	95	95	95	95	--	--	--
	At 70 °C %	--	80	80	80	80	--	--	--
• Circuit breakers for starter com- binations and non-automatic circuit breakers	Up to 50 °C %	100	100	100	100	100	100	100	100
	At 60 °C %	93	93	93	93	93	93	93	93
	At 70 °C %	86	86	86	86	86	86	86	86
Weights of 3-pole circuit breakers									
Basic unit without solid-state release	kg	--	1.5	1.6	4.2	7.8	14.2	21	27.3
Thermal-magnetic overcurrent release	kg	--	0.7	0.7	1.5	1.2	--	--	--
Solid-state release	kg	--	0.9	0.9	1.7	1.5	1.8	4.0	4.0
Basic unit									
• With thermal-magnetic overcurrent release	kg	2.0	2.2	2.3	5.7	9.0	--	--	--
• With solid-state release	kg	--	2.4	2.5	5.9	9.3	16.0	25.0	31.3
Weights of 4-pole circuit breakers									
Basic unit without solid-state release	kg	--	2.0	2.2	5.5	9.7	18.2	27.5	34.8
Thermal-magnetic overcurrent release	kg	--	1.0	1.0	1.9	1.5	--	--	--
Solid-state release	kg	--	1.1	1.1	2.1	2.0	2.3	6.0	6.0
Basic unit									
• With thermal-magnetic overcurrent release	kg	2.5	3.0	3.2	7.4	11.2	--	--	--
• With solid-state release	kg	--	3.1	3.3	7.6	11.7	20.5	33.5	40.8
Rated short-circuit breaking capacity acc. to IEC 60947-2	For rated short-circuit breaking capacity see table under "Overview".								

¹⁾ Circuit breaker cannot be used for direct current.

²⁾ Rated DC data apply only for thermal-magnetic overcurrent releases.

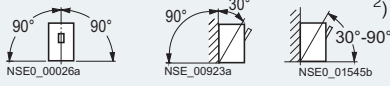
³⁾ On request.

⁴⁾ Exception: 3VL molded case circuit breakers with TM TU: 0 °C ... 75 °C due to derating at low temperatures.

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Type			VL160X 3VL1	VL160 3VL2	VL250 3VL3	VL400 3VL4	VL630 3VL5	VL800 3VL6	VL1250 3VL7	VL1600 3VL8	
Endurance	Operating cycles		20000	20 000	20 000	20 000	10 000	10 000	3000	3000	
Electrical endurance	Operating cycles		10000	10 000	10 000	10 000	5000	3000	1500	1500	
Max. switching frequency	1/h		120	120	120	120	60	60	30	30	
Connection types			See *Main Connections, Basic Equipment and Options*								
Conductor cross-sections											
Box terminals ⁴⁾											
• Solid or stranded cable • Finely stranded with end sleeve • Flexible busbar	Copper only	mm ²	2.5 ... 95	2.5 ... 95	25 ... 185	50 ... 300	--	--	--	--	
		mm ²	2.5 ... 50	2.5 ... 50	25 ... 120	50 ... 240	--	--	--	--	
		mm	12 x 10	12 x 10	17 x 10	25 x 10	--	--	--	--	
		Connecting terminal plate for flexible busbar ³⁾		mm	--	--	--	2 units 10 x 32	--	--	--
Circular conductor terminal for cable ⁴⁾											
• Solid or stranded cable • Finely stranded with end sleeve	Cu or Al	mm ²	16 ... 70	16 ... 70	25 ... 185	50 ... 300	--	--	--	--	
		mm ²	10 ... 50	10 ... 50	25 ... 120	50 ... 240	--	--	--	--	
Multiple feed-in terminal ⁴⁾											
• Solid or stranded cable • Finely stranded with end sleeve	Cu or Al	mm ²	--	--	--	2 units 50 ... 120	2 units 50 ... 240	3 units 50 ... 240	4 units 50 ... 240	--	
		mm ²	--	--	--	2 units 50 ... 95	2 units 50 ... 185	3 units 50 ... 185	4 units 50 ... 185	--	
• Direct connection of busbars • Screw for connection with screw terminal	Cu or Al	mm	17 x 7	22 x 7	24 x 7	32 x 10	40 x 10	2 x 40 x 10	2 x 50 x 10	3 x 60 x 10	
		M6	M6	M8	M8	M6	M8	M8	M8	--	
Conductor cross-sections for control circuits with terminal connection											
Screw terminals											
• Solid • Finely stranded with end sleeve		mm ²	0.75 ... 1.5	0.75 ... 1.5	0.75 ... 1.5	0.75 ... 1.5	0.75 ... 1.5	0.75 ... 1.5	0.75 ... 1.5	0.75 ... 1.5	
		mm ²	0.75 ... 1.0	0.75 ... 1.0	0.75 ... 1.0	0.75 ... 1.0	0.75 ... 1.0	0.75 ... 1.0	0.75 ... 1.0	0.75 ... 1.0	
For details see Mounting Instruction.											
Power loss per circuit breaker at max. rated current											
System protection	TM 0.8 ... 1.0	W	12 ... 70	15 ... 48	32 ... 80	60 ... 175	85 ... 230	--	--	--	
System protection	ETU or LCD ETU	W	--	40	60	90	160	250	210	260	
For starter combinations or non-automatic air circuit breaker			W	40	40	60	90	160	250	210	260
For motor protection			W	--	40	60	90	160	--	--	--
Permissible mounting position ¹⁾											
Auxiliary and alarm switches											
Conventional free-air thermal current I _{th}			A	10	10	10	10	10	10	10	
Rated making capacity			A	10	10	10	10	10	10	10	
AC											
Rated operational voltage			V	24	48	110	230	400	600		
Rated operational current	AC-12	A	10	10	10	10	10	10			
	AC-15	A	6	6	6	6	3	1			
DC											
Rated operational voltage			V	24	48	110	230				
Rated operational current	DC-12	A	10	5	2.5	1					
	DC-13	A	3	1.5	0.7	0.3					
Back-up fuse/ miniature circuit breaker			A	10 TDz/10	10 TDz/10	10 TDz/10	10 TDz/10	10 TDz/10	10 TDz/10	10 TDz/10	
Leading auxiliary switch with rotary operating mechanism											
Conventional thermal current I _{th}			A	2	2	2	2	2	2	2	
Rated making capacity			A	2 (ind. 0.5)	2 (ind. 0.5)	2 (ind. 0.5)	2 (ind. 0.5)	2 (ind. 0.5)	2 (ind. 0.5)	2 (ind. 0.5)	
Rated operational voltage			V AC	230	230	230	230	230	230	230	
Rated operational current			A	2	2	2	2	2	2	2	
Rated breaking capacity, inductive, p.f. = 0.7			A	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Rated breaking capacity			A	2	2	2	2	2	2	2	
Back-up fuse, quick			A	2	2	2	2	2	2	2	
Position indicator switches											
Conventional thermal current I _{th}			A	16	16						
Rated making capacity			A	16	10						
Rated operational voltage			V AC	250	400						
Rated operational current			A	16	10						
Rated breaking capacity, inductive, p.f. = 0.7			A	4	4						
Rated breaking capacity			A	16	10						
Back-up fuse, quick			A	16	10						

¹⁾ For VL800 to VL1600 circuit breakers with guide frame in lateral mounting position. Adapter set on request.

²⁾ Permissible current load factor 0.9; only with internal accessories.

³⁾ Not for 690 V AC/600 V DC.

⁴⁾ Cross-sections according to IEC 60999.

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Type		VL160X 3VL1	VL160 3VL2	VL250 3VL3	VL400 3VL4	VL630 3VL5	VL800 3VL6	VL1250 3VL7	VL1600 3VL8
Auxiliary and alarm switches									
Tripped signal switch in RCD module ¹⁾									
Conventional thermal current I_{th}	A	--	2	2	2	--	--	--	--
Rated making capacity	A	--	2	2	2	--	--	--	--
Rated operational voltage	V AC	--	250	250	250	--	--	--	--
Rated operational current	A	--	2	2	2	--	--	--	--
Rated breaking capacity, inductive, p.f. = 0.7	A	--	0.5	0.5	0.5	--	--	--	--
Rated breaking capacity	A	--	2	2	2	--	--	--	--
Back-up fuse, quick	A	--	2	2	2	--	--	--	--
Auxiliary releases									
Group 1: VL160X to VL400									
Group 2: VL630 to VL1600									
Undervoltage releases									
Response voltage:									
Release (circuit breaker is tripped)	V	0.35 ... 0.70 × U_s					0.35 ... 0.70 × U_s		
Pick-up (circuit breaker can be closed)	V	0.85 ... 1.1 × U_s					0.85 ... 1.1 × U_s		
Power consumption (uninterrupted duty) at:									
AC 50/60 Hz 24 V	VA	1.4					1.2		
AC 50/60 Hz 110 ... 127 V	VA	1.0					1.8		
AC 50/60 Hz 220 ... 250 V	VA	1.0					1.8		
AC 50/60 Hz 208 V	VA	1.0					1.8		
AC 50/60 Hz 277 V	VA	1.0					1.8		
AC 50/60 Hz 380 ... 415 V	VA	1.0					1.8		
AC 50/60 Hz 440 ... 480 V	VA	1.0					1.8		
AC 50/60 Hz 500 ... 525 V	VA	1.0					1.8		
AC 50/60 Hz 600 V	VA	1.0					1.8		
12 V DC	W	0.8					1.5		
24 V DC	W	0.8					1.5		
48 V DC	W	0.8					1.5		
60 V DC	W	0.8					1.5		
110 ... 127 V DC	W	0.8					1.5		
220 ... 250 V DC	W	0.8					1.5		
Max. opening time	ms	50					50		
Shunt release									
Response voltage:	U_s					U_s			
Pick-up (circuit breaker is tripped)	V	0.7 ... 1.1					0.7 ... 1.1		
Power consumption (short time) at:									
AC 50/60 Hz 24 V	VA	310					330		
AC 50/60 Hz 48 ... 60 V	VA	335 ... 465					380 ... 460		
AC 50/60 Hz 110 ... 127 V	VA	470 ... 630					330 ... 430		
AC 50/60 Hz 208 ... 277 V	VA	585 ... 1000					520 ... 800		
AC 50/60 Hz 380 ... 600 V	VA	180 ... 500					228 ... 750		
24 V DC	W	360					385		
48 ... 60 V DC	W	380 ... 590					480 ... 720		
110 ... 127 V DC	W	506 ... 680					362 ... 424		
220 ... 250 V DC	W	470 ... 580					418 ... 476		
Max. opening time	ms	50					50		
Max. duration of operational voltage	s	Interrupts automatically, less than 10 ms					Interrupts automatically, less than 10 ms		
Time-delay device for undervoltage release									
Rated control supply voltage U_s	V AC/DC	220 ... 250					220 ... 250		
Control voltage for undervoltage release	V DC	220 ... 250					220 ... 250		
Conductor cross-sections									
Finely stranded with end sleeve	mm ²	2 × (0.5 ... 1.5)					2 × (0.5 ... 1.5)		
Solid	mm ²	2 × (0.5 ... 1.5)					2 × (0.5 ... 1.5)		
Delay time/connection									
Undervoltage release	s	3/-- 6/Jumper Y2–Y1					1.5/-- 3/Jumper Y2–Y1		
Undervoltage release and auxiliary relay (3RH11)	s	0.6/-- 1.2/Jumper Y2–Y1					0.3/-- 0.6/Jumper Y2–Y1		

¹⁾ Max. DC rated operational voltage 125 V, minimum load 50 mA at 5 V DC.

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Type		VL160X 3VL1	VL160 3VL2	VL250 3VL3	VL400 3VL4	VL630 3VL5	VL800 3VL6	VL1250 3VL7	VL1600 3VL8
Motorized operating mechanisms		x	x	x	--	--	--	x	x
Motorized operating mechanism with energy store (synchronizable)		x	x	x	x	x	x	--	--
Motorized operating mechanisms									
Power consumption	VA/W	< 100	< 100	< 100	--	--	--	< 250	< 250
Rated control supply voltage U_s	AC 50/60 Hz V	42	110-127/220-240		--	--	--	42-48/60	110-127/220-250
	V DC	24/48	60/110-127/220		--	--	--	24/42-48/60	110-127/220-250
DIAZED fuses (gG operational class, characteristic slow)	A	4	2		--	--	--	4	2
Miniature circuit breaker (C characteristic acc.to EN 60898)	A	4	2		--	--	--	4	2
Operating range	V	0.85 ... 1.1 x U_s	0.85 ... 1.1 x U_s	0.85 ... 1.1 x U_s	--	--	--	0.85 ... 1.1 x U_s	0.85 ... 1.1 x U_s
Minimum command duration at U_s	ms	50	50	50	--	--	--	50	50
Max. command duration, depends on circuit ¹⁾		Non-maintained or continuous command			--	--	--	Non-maintained or continuous command	
Total make-time	s	< 1	< 1	< 1	--	--	--	< 5	< 5
Break-time	s	< 1	< 1	< 1	--	--	--	< 5	< 5
Interval time between OFF and ON commands	s	> 2	> 2	> 2	--	--	--	> 5	> 5
Interval time between ON and OFF commands	s	> 2	> 2	> 2	--	--	--	> 5	> 5
Max. permissible switching frequency	1/h	120	120	120	--	--	--	30	30
Motorized operating mechanism with energy store (synchronizable)									
Power consumption	VA/W	< 100	< 100	< 100	< 200	< 250	< 250	--	--
Rated control supply voltage U_s	AC 50/60 Hz V	42-48/60			110-127/220-250			--	--
	V DC	24/42-48/60			110-127/220-250			--	--
DIAZED fuses (gG operational class, characteristic slow)	A	4			2			--	--
Miniature circuit breaker (C characteristic acc. to EN 60898)	A	4			2			--	--
Operating range	V	0.85 ... 1.1 x U_s	0.85 ... 1.1 x U_s	0.85 ... 1.1 x U_s	0.85 ... 1.1 x U_s	0.85 ... 1.1 x U_s	0.85 ... 1.1 x U_s	--	--
Minimum command duration at U_s	ms	50	50	50	50	50	50	--	--
Max. command duration, depends on circuit ¹⁾		Non-maintained or continuous command						--	--
Total make-time	ms	< 100	< 100	< 100	< 100	< 100	< 100	--	--
Break-time	s	< 5	< 5	< 5	< 5	< 5	< 5	--	--
Interval time between OFF and ON commands	s	> 5	> 5	> 5	> 5	> 5	> 5	--	--
Interval time between ON and OFF commands	s	> 1	> 1	> 1	> 1	> 1	> 1	--	--
Max. permissible switching frequency	1/h	120	120	120	120	60	60	--	--

x Available

-- Not available

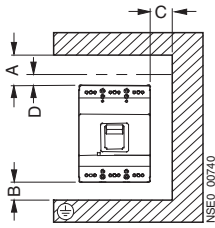
¹⁾ Changeover contact also permissible, note dead times between ON and OFF commands.

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Space requirements above arc chutes



Arcing spaces

Minimum clearances from adjacent grounded parts and from non-insulated live parts.

Plain conductors and busbars must be insulated with phase barriers within the arcing space.

The specific mounting instructions for the various sizes must be observed for plain conductors and busbars outside the arcing space.

[For mounting instructions and manual refer to the Internet](#)

[Manual for the SENTRON 3VL circuit breaker](#)

This manual contains additional technical information, covering a product description, mode of operation, electrical wiring system and retrofitting.

The manual and operating instructions are available in PDF format at:

<http://www.siemens.com/lowvoltage/manuals>

Circuit breakers	Switching capacity	Minimum enclosure volume	A			B	C	D
			≤ 415 V	>415 ... 690 V	>415 ... 690 V	≤ 690 V	≤ 690 V	≤ 690 V
Type		m ³	Without/with terminal cover	Without terminal cover	With terminal cover			
VL160X	Standard High	0.011	35	70	35	25	25	35
VL160	Standard High Very high	0.011	50	100	50	25	25	35
VL250	Standard High Very high	0.015	50	100	50	25	25	35
VL400	Standard High Very high	0.036	50	100	50	25	25	35
VL630	Standard High Very high	0.18	50	100	50	25	25	35
VL800	Standard High Very high	0.22	50	100	50	25	25	35
VL1250	Standard High Very high	0.22	70	100	70	30	30	50
VL1600	Standard High Very high	0.264	100	100	100	100	30	100

Definition of the permissible safety clearances

Clearance between

A: circuit breaker and busbars (bare metal and grounded metal); terminal cover required above 600 V AC, 500 V DC

B: circuit breaker connection and floor

C: side of the circuit breaker and the side panels (bare metal and grounded metal)

D: circuit breaker and non-conducting parts with an insulation thickness of at least 3 mm (insulator, insulated busbar, painted plate)

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

General criteria for the selection of current transformers for measurement purposes



4NC53 current transformer

Standards	IEC 60044-1, EN 60044-1
Window-type current transformers	The conductor to be measured (busbar or cable) is passed through the window opening and constitutes the primary circuit of the window-type current transformer. Pin-wound transformers: An economical solution especially for small primary currents of 5 A to 75 A is achieved when the conductor to be measured is pin-wound several times.
Rated primary current I_{pn}	Current transformers can be continuously loaded with 1.3 times the rated primary current (I_{pn}).
Rated secondary current I_{sn}	
1 A	Particularly suitable for longer measuring leads. Cable losses of only 4% in contrast to 5 A current transformers.
5 A	5 A current transformers generate 25 times the power losses on measuring leads as compared with 1 A current transformers. These stray losses result in higher power in the case of long cables. Only recommended for use with short measuring leads.
Accuracy class	
Class 1	Operation measurement, internal metering Current error $\pm 1\%$ at $1 \times I_{pn}$ and $1.2 \times I_{pn}$
Class 3	Coarse measurement Current error $\pm 3\%$ at $0.5 \times I_{pn}$ and $1.2 \times I_{pn}$
Rated power P_n	The rated power of transformers is specified in VA. The actual load rating should be similar to the rated power; a lower actual load rating (underburden) increases the overcurrent factor and measuring devices may be damaged in case of a short-circuit, a higher actual load rating (overburden) has a negative effect on the accuracy. With a frequency of 60 Hz the rated power increases to 1.2 times. With $16^{2/3}$ Hz the output power decreases to $1/3$ of the rated power.
Maximum voltage for equipment U_m	This is the rms value of the maximum voltage between the conductors of a system. For this voltage the insulation must be rated at normal operating conditions. 4NC5 current transformers are suitable for 720 V.
Overcurrent limiting factor FS	The overcurrent limiting factor is expressed using the characters FS and a factor, e. g. FS5 or FS10. When a short-circuit current flows through the primary winding of a current transformer, the load on the measuring devices connected to the current transformer is the lower the smaller the overcurrent limiting factor is.
Rated short-time thermal current I_{th}	The rated short-time thermal current I_{th} is the rms value of the primary current with a duration of one second, whose heat effect the current transformer can resist without being damaged in the event of a short-circuited secondary winding.
Rated impulse current I_{dyn}	The rated impulse current I_{dyn} is the highest instantaneous value of the current after a short-circuit whose force the current transformer can resist without being damaged. The rated impulse current is specified as peak value.

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

General data

Standards		IEC 60044-1, EN 60044-1
Rated primary current I_{pn}	A	50 ... 1500, 5 ... 75, for use as pin-wound transformer for low currents
Rated secondary current I_{sn}	A	1 or 5
Maximum voltage for equipment U_m	V	720
Frequency	Hz	50 ... 60
Rated overcurrent limiting factor FS		FS5
Max. uninterrupted current		$1.2 \times I_{pn}$
Rated short-time thermal current I_{th}		$60 \times I_{pn}$
Rated impulse current I_{dyn}		$2.5 \times I_{th}$ or $150 \times I_{pn}$
Accuracy class		1 (3)
Ambient temperature	°C	+55 at $1.0 \times I_{pn}$ °C +40 at $1.2 \times I_{pn}$ °C -10 minimum value
Max. busbar temperature	°C	+120
Molded-plastic class		E (max. 120 °C continuously)
Insulation		Thermoplast enclosure, halogen-free
Test voltage	kV	3 AC
Secondary terminals		Double terminals using M4 captive screws, finger-safe to EN 61140
Solid	mm ²	$2 \times (2.5 ... 6)$
Two-wire	mm ²	$2 \times (1.5 ... 4)$
Terminals with same polarity		Primary → secondary K/P1 → k/S1 L/P2 → l/S2
Mounting		Either busbar or foot mounting

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

Characteristic curves

- General information:** The indicated tripping values for the inverse-time delayed solid-state releases (thermal overload releases, "L" releases) are mean values taken from the spread of all setting ranges from the cold state and under even load conditions on the conducting paths.

The tripping characteristics of the instantaneous (electromagnetic) short-circuit releases ("I" releases) are based on the phase rated current I_n , which also represents the upper value of the setting range on circuit breakers with adjustable thermal overload releases. With a lower operational current there is a correspondingly higher multiple for the tripping current of the "I" releases.

The shown characteristic curve for the circuit breaker relates to a specific setting range. It is, however, also valid as a schematic representation of circuit breakers with other current ranges.

"L" = Thermal release.

"I" = Instantaneous (electromagnetic) short-circuit release

The time/current characteristic, the current limiting characteristics and the I^2t characteristic curves were determined according to IEC 60947 and EN 60947.

The time/current characteristic of the inverse-time delayed overload release (thermal overload releases, L overload release) for DC and AC with a frequency of 50/60 Hz.

- For thermomagnetic releases (TM) the following applies:**

The characteristic curves apply to the cold state; at operating temperature, the tripping times of the thermal releases are reduced to approximately 25 %.

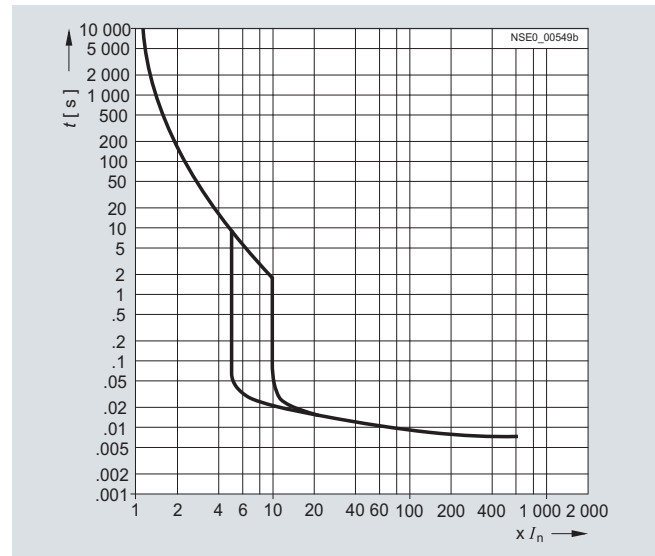
Under normal operating conditions, all three poles of the device must be loaded. The three main current paths must be connected in series in order to protect single-phase or DC loads.

- Tripping characteristic curves of the SENTRON VL160, VL250, VL400 and VL630 circuit breakers for motor/generator protection with solid-state releases.**

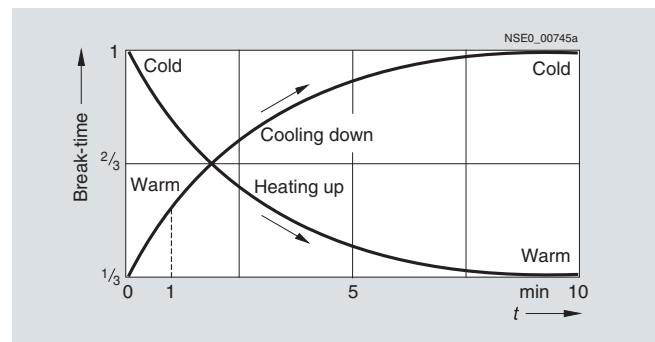
The tripping times of the inverse-time delayed solid-state releases apply to the non-preloaded (cold) state. In the operating/warm state (after application of a load at the rated current), the tripping times are reduced to approx. 33 %. After a tripping operation due to overcurrent, the tripping times are reduced in accordance with the dynamic tripping response (see diagram), as a result of which a cooling time of a few minutes is required before the next motor start.

Time/current characteristic curves, current limiting characteristic curves and I^2t curves can be ordered from "Technical Assistance" (e-mail: technical-assistance@siemens.com) or downloaded from the following Internet site:

<http://www.siemens.com/lowvoltage/characteristics>



Schematic representation of the time/current characteristic curve for SENTRON VL160 circuit breakers for system protection, I_{cu} 100 kA max. at 415 V; adjustable "I" release.



Dynamic tripping response (thermal image)

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

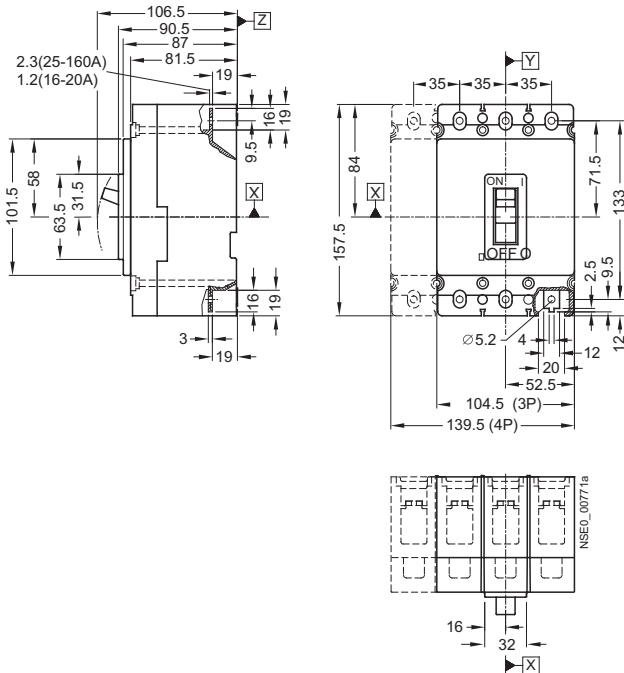
Project planning aids

Dimensional drawings

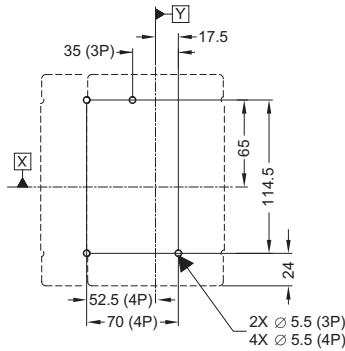
VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole, up to 250 A

Circuit breakers

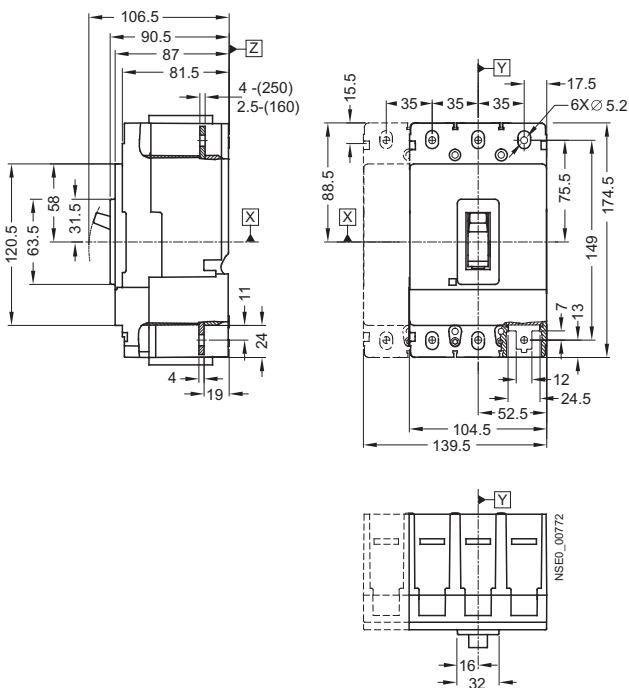
SENTRON VL160X (3VL1) circuit breakers



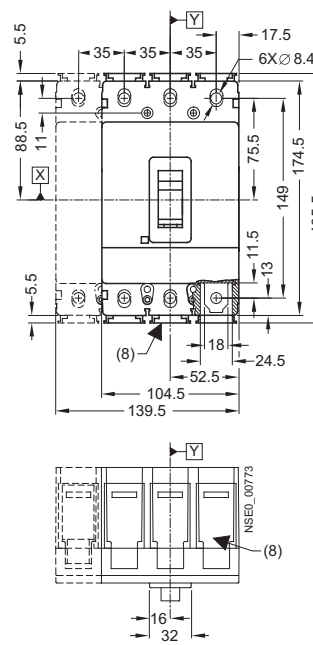
Circuit breaker installation instructions



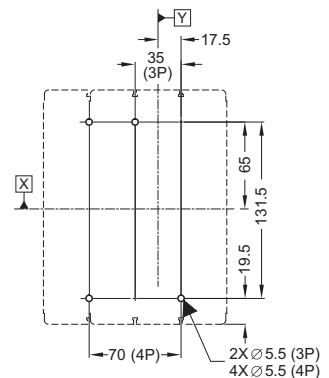
SENTRON VL160/VL250 (3VL2/3VL3) circuit breakers



SENTRON VL250 (3VL3) circuit breakers



SENTRON VL160 and VL250 (3VL2 and 3VL3) circuit breakers installation instructions



Note:
The 5.5 mm extension at each end of the SENTRY VL250 (3VL3) circuit breaker only applies when using box terminals or circular conductor terminals (8).

3VL Molded Case Circuit Breakers

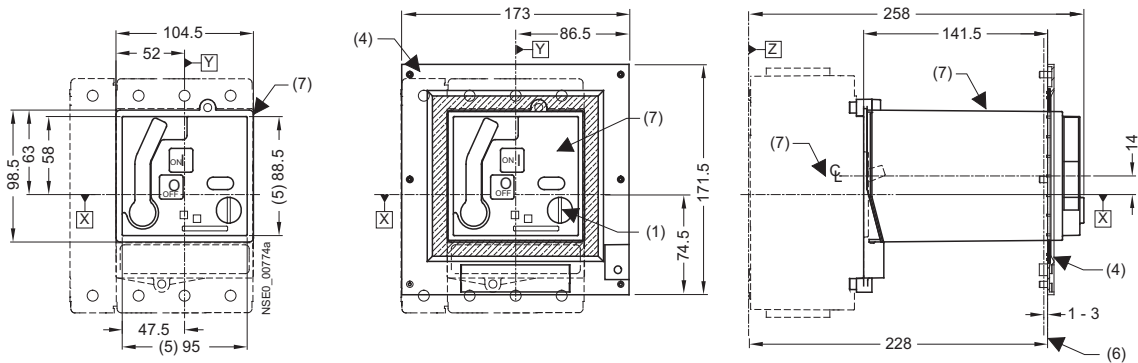
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

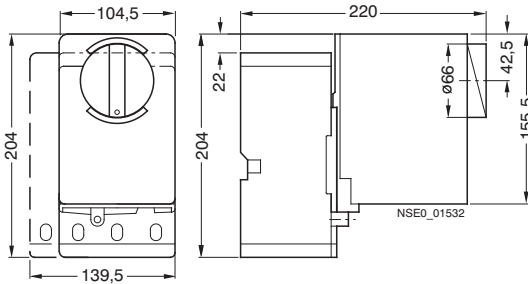
VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole, up to 250 A

Operating mechanisms

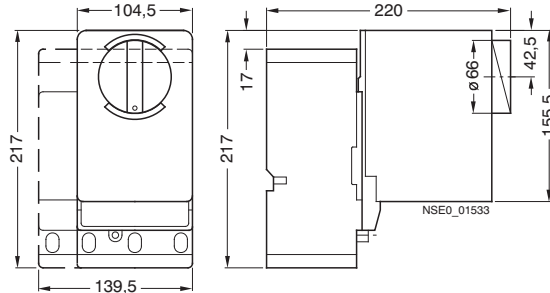
Motorized operating mechanism with stored-energy mechanism



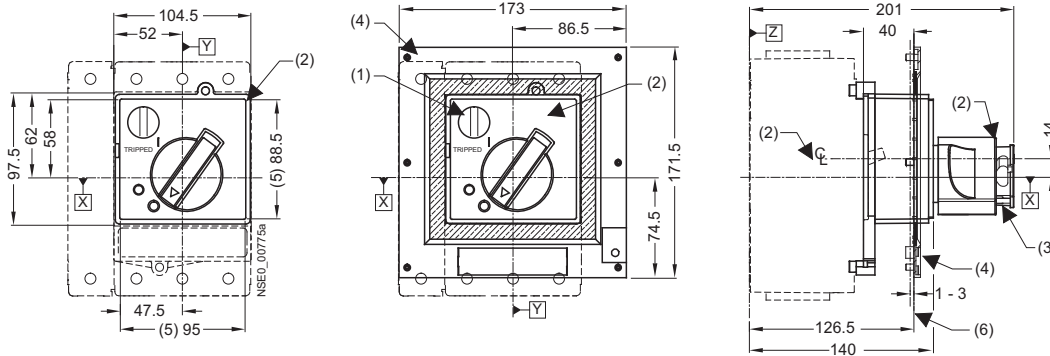
Motorized operating mechanism for VL160X (3VL1)



Motorized operating mechanism for VL160 (3VL2) and VL250 (3VL3)



Front-operated rotary operating mechanism



- (1) Safety locks
- (2) Front-operated rotary operating mechanism
- (3) Padlock
- (4) Masking frame for door cut-out (for circuit breaker with operating mechanism)
- (5) Step for cover
- (6) Outside surface of cabinet door
- (7) Motorized operating mechanism with stored-energy mechanism
- (8) Terminal insulation

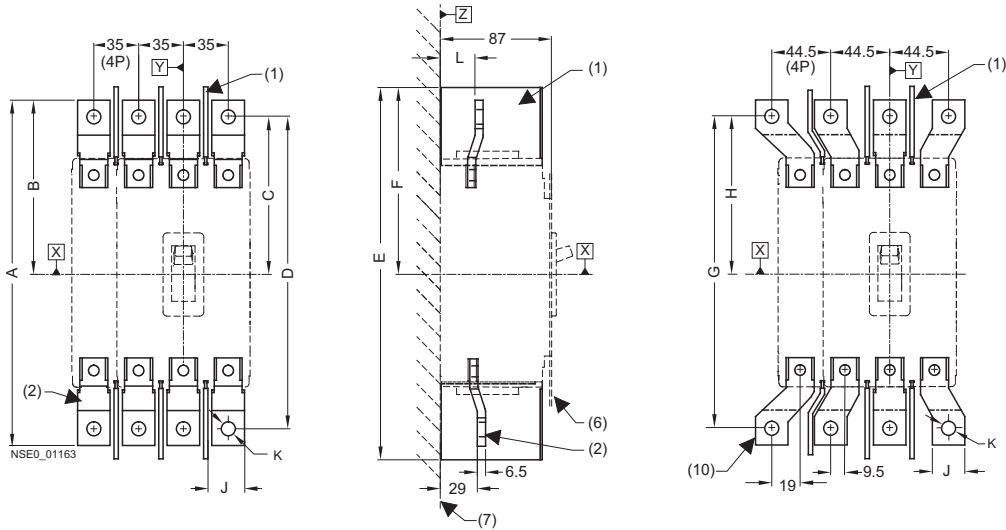
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole, up to 250 A

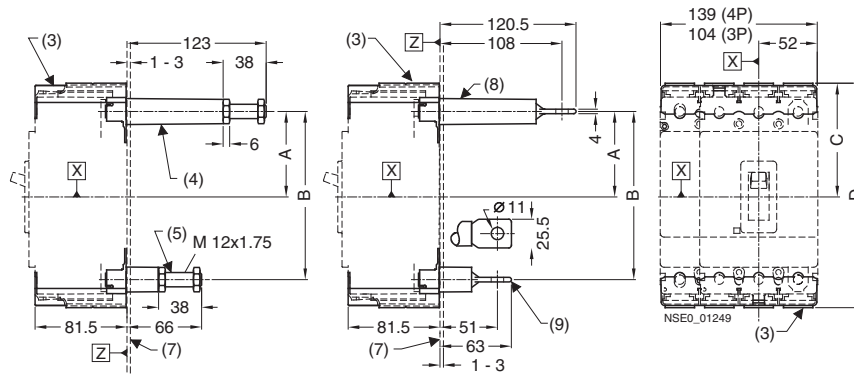
Terminals and phase barriers



Type	A	B	C	D	E	F	G	H	J	K	L
VL160X (3VL1)	242	126	116	222	266.5	138.5	222	116	20	7	27
VL160 (3VL2)	258	130	120	238	283.5	143	238	120	20	7	27
VL250 (3VL3)	263.5	133	120	238	283.5	143	238	120	22	11	29

- (1) Phase barrier
- (2) Front connecting bars
- (3) Terminal covers (standard)
- (4) Threaded rear terminals, threaded bolt (long)
- (5) Threaded rear terminals, threaded bolt (short)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Rear flat connector (long)
- (9) Rear flat connector (short)
- (10) Flared front busbar connecting bars

Circuit breaker with rear terminals – long and short



Type	A	B	C	D
VL160X (3VL1)	71.5	133	96	182
VL160 (3VL2)	75.5	149	101	199
VL250 (3VL3)	75.5	149	101	199

3VL Molded Case Circuit Breakers

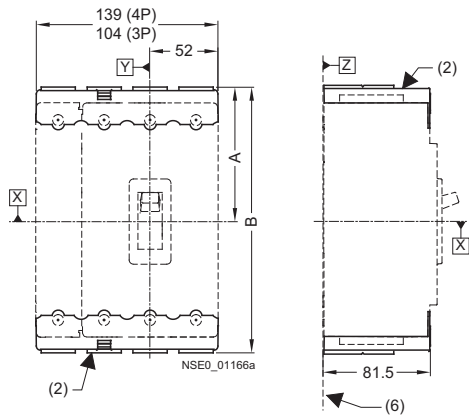
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole, up to 250 A

Terminal covers

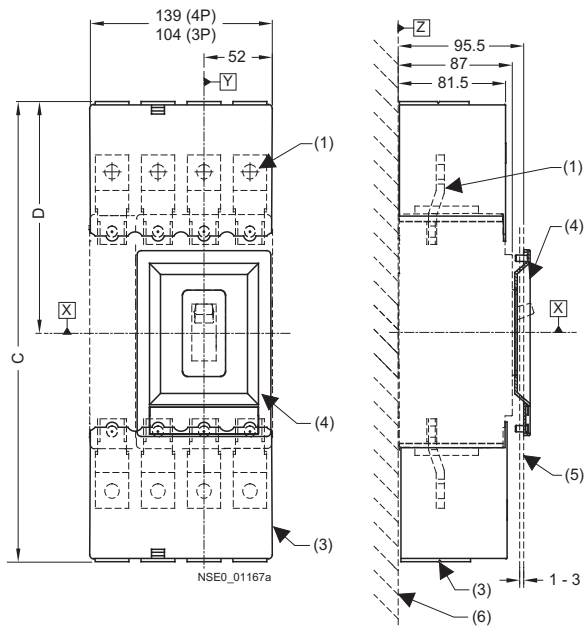
Terminal covers, standard



- (1) Front connecting bars
- (2) Terminal covers (standard)
- (3) Terminal covers (extended)
- (4) Masking frame for door cut-out
(for circuit breaker with toggle lever)
- (5) Outside surface of cabinet door
- (6) Installation level

Type	A	B	C	D
VL160X (3VL1)	96	182	326.5	168.5
VL160 (3VL2)	101	199	343	173
VL250 (3VL3)	101	199	343	173

Extended terminal covers



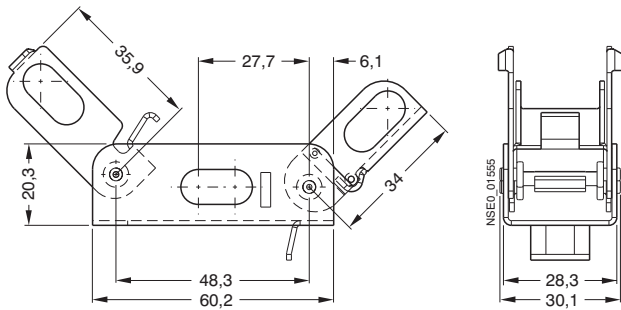
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole, up to 250 A

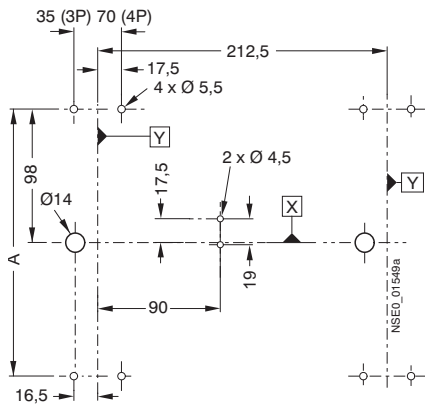
Locking devices for toggle levers



Rear interlocking modules

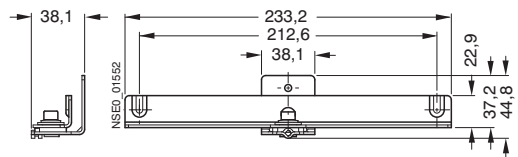
Rear interlocking module
for plug-in/withdrawable circuit breakers,
with front connection, without/with RCD module
(withdrawable version only without RCD module)

For more detailed dimensional drawings
see "Mounting Instructions for Rear Interlocking Module".

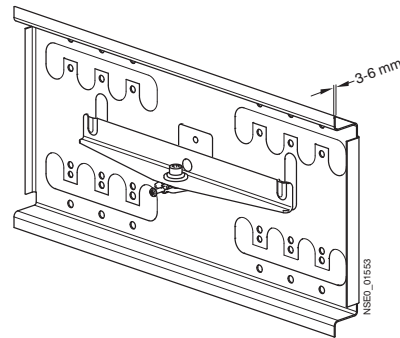


Type		A
Without RCD module	VL160X (3VL1), VL160 (3VL2), VL250 (3VL3)	194
With RCD module – only "plug-in version"	VL160X (3VL1), VL160 (3VL2), VL250 (3VL3)	315

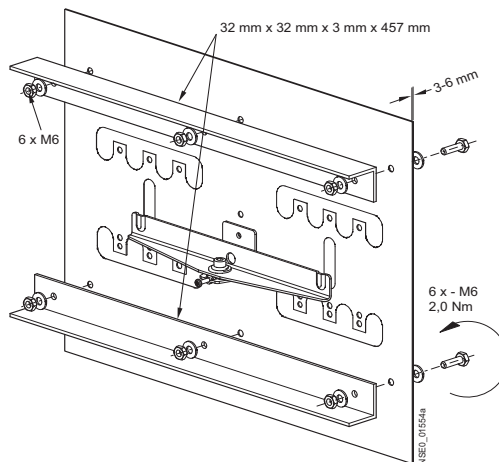
Rear interlocking module



Mounting plate, example 1, not included in scope of supply



Mounting plate, example 2, not included in scope of supply



3VL Molded Case Circuit Breakers

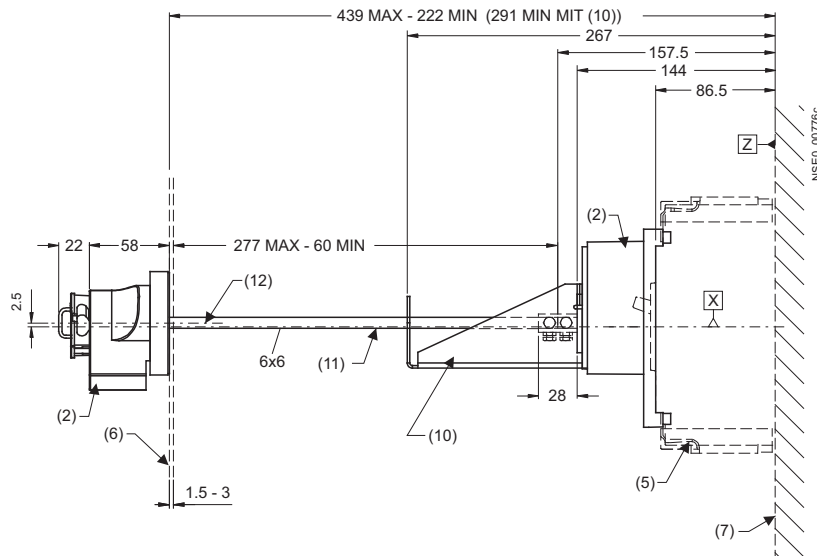
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

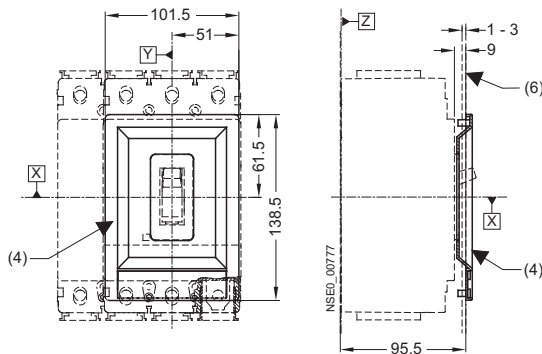
VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole, up to 250 A

Accessories

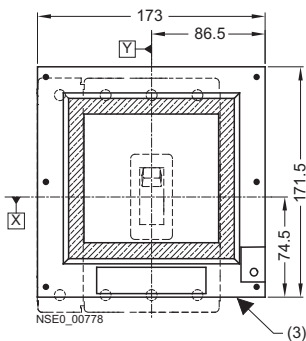
Circuit breaker with door-coupling rotary operating mechanism



Masking frame for door cut-out for circuit breaker with toggle lever



Masking frame for door cut-out for circuit breaker with operating mechanism



- (2) Door-coupling rotary operating mechanism
- (3) Masking frame for door cut-out
(for circuit breaker with operating mechanism)
- (4) Masking frame for door cut-out
(for circuit breaker with toggle lever)
- (5) Terminal covers
- (6) Outside surface of cabinet door
- (7) Installation level
- (10) Support bracket
- (11) Extension
- (12) Center line of drive shaft

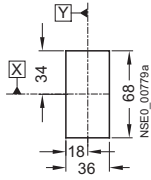
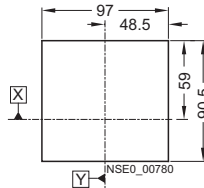
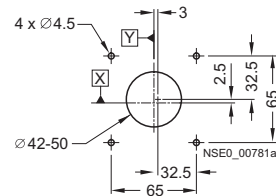
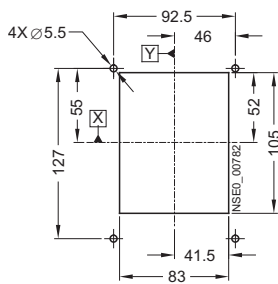
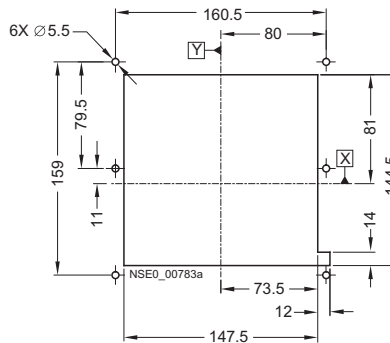
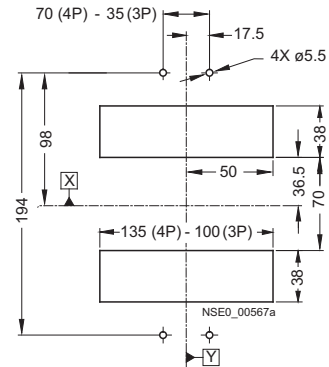
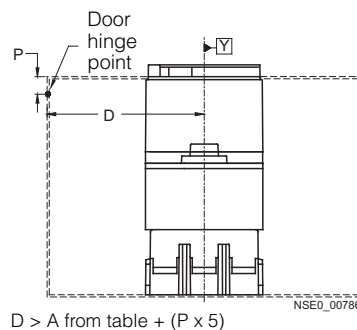
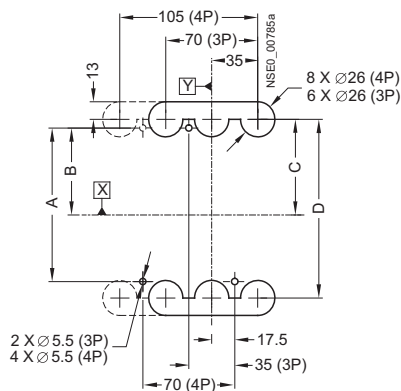
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole, up to 250 A

Door cut-outs

Door cut-out for toggle lever
(without masking frame)Door cut-out for front-operated rotary operating
mechanism and motorized operating mechanism
with stored-energy mechanism
(without masking frame)Door cut-out for door-coupling rotary
operating mechanismDoor cut-out for toggle lever
(with masking frame)Door cut-out for front-operated rotary operating
mechanism, motorized operating mechanism with
stored-energy mechanism and extended escutcheon
(with masking frame)Hole pattern and cut-out for plug-in base
with rear connecting barsHole pattern and cut-out
for rear terminals

D > A from table + (P x 5)

Note:
A minimum distance between
reference point Y and the door
hinge is required for the door
cut-outs.

Type	A	B	C	D
VL160X (3VL1)	114.5	65	71.5	133
VL160 (3VL2)	131.5	65	75.5	149
VL250 (3VL3)	131.5	65	75.5	149

Combination	A
Circuit breaker only	100
Circuit breaker + plug-in base + motorized operating mechanism with stored-energy mechanism	100
Circuit breaker + plug-in base + front-operated rotary operating mechanism	200
Circuit breaker + withdrawable version	200

3VL Molded Case Circuit Breakers

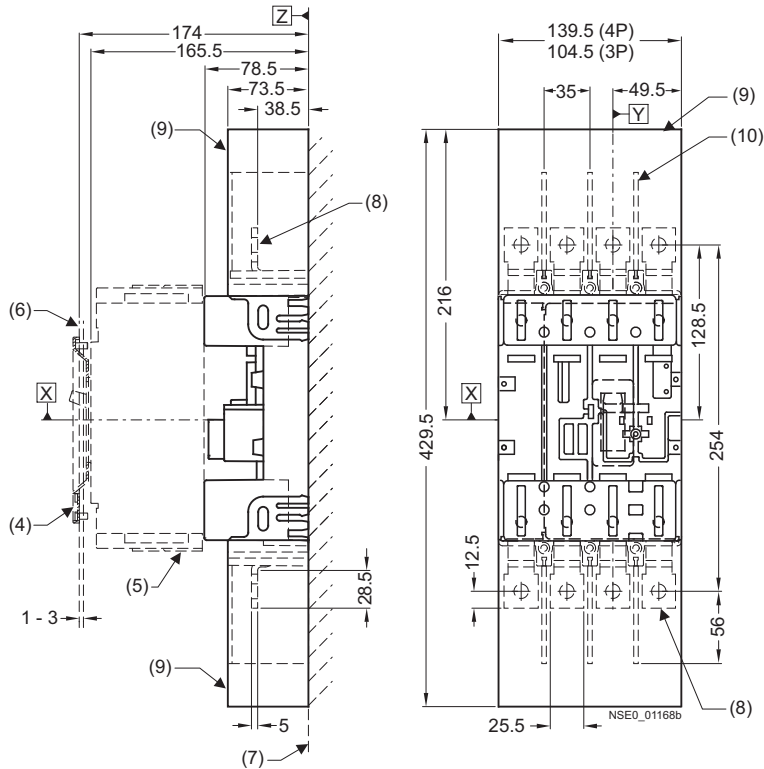
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

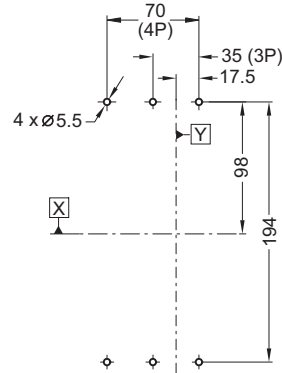
VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole, up to 250 A

Plug-in bases and accessories

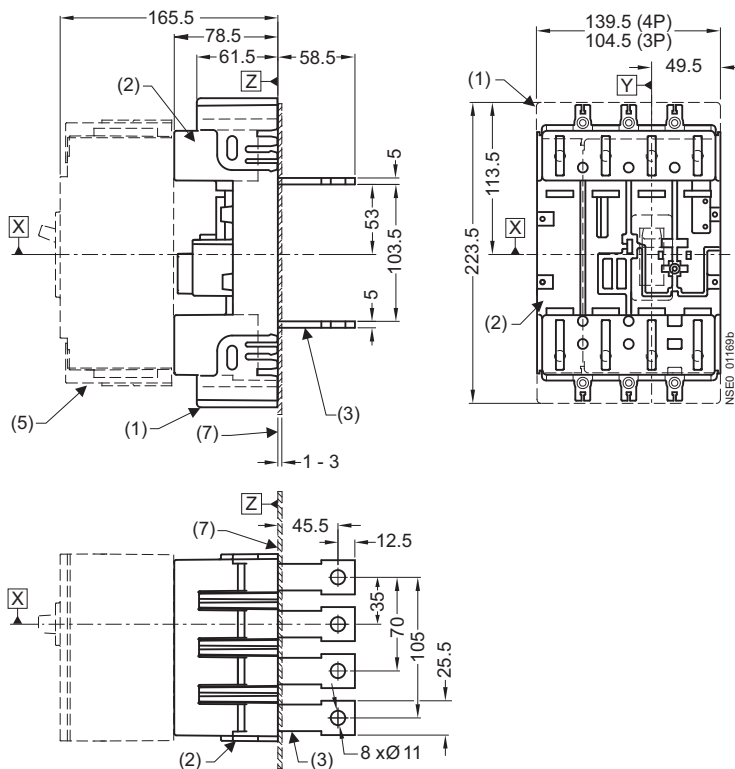
Plug-in base with front connecting bars



Hole pattern for plug-in base with front connecting bars



Plug-in base with rear flat bar connection



- (1) Plug-in base with rear terminal covers
- (2) Plug-in base
- (3) Plug-in base with rear flat bar connection
- (4) Masking frame for door cut-out (for circuit breaker with toggle lever)
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Plug-in base with front connecting bars
- (9) Plug-in base with terminal covers on the front
- (10) Phase barriers

3VL Molded Case Circuit Breakers

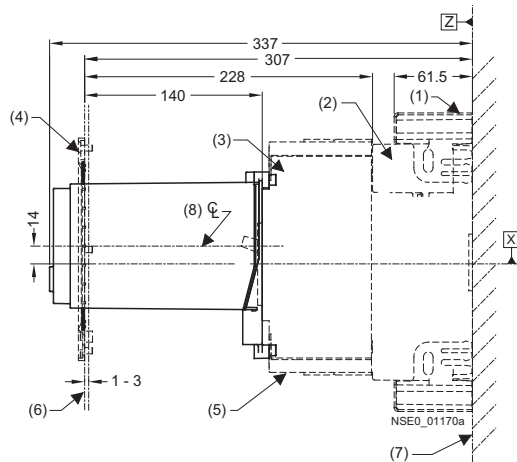
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL160X (3VL1), 3- and 4-pole, up to 160 A

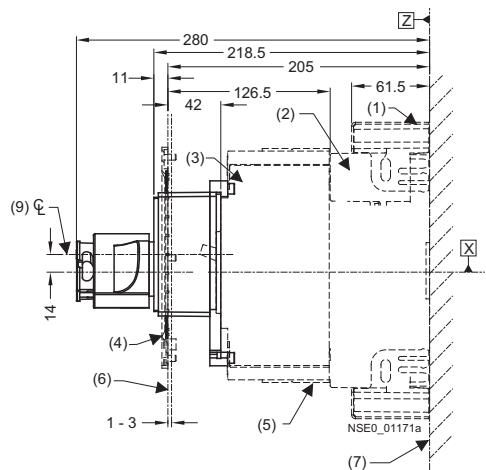
Plug-in bases and accessories

SENTRON VL160X (3VL1) circuit breakers with motorized operating mechanism with stored-energy mechanism, mounted on plug-in base

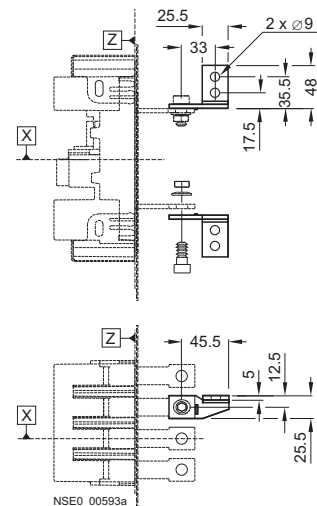


- (1) Plug-in base with terminal covers
- (2) Plug-in base
- (3) Circuit breaker
- (4) Masking frame for door cut-out
(for circuit breaker with operating mechanism)
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Motorized operating mechanism with stored-energy
mechanism
- (9) Front-operated rotary operating mechanism

SENTRON VL160X (3VL1) circuit breakers with front-operated rotary operating mechanism mounted on plug-in base



90° angle connecting adapter



3VL Molded Case Circuit Breakers

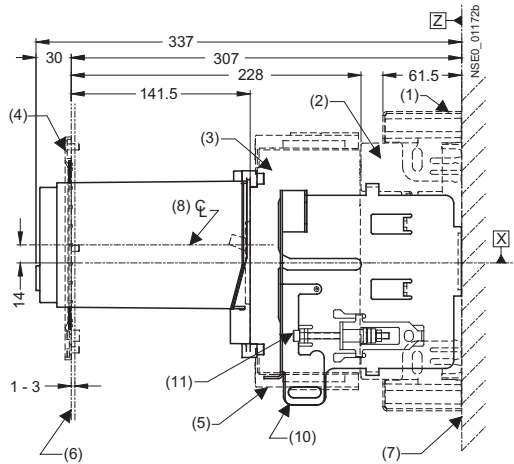
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

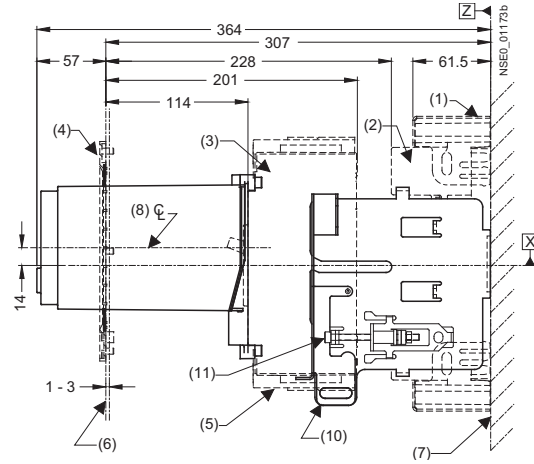
VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole, up to 250 A

Withdrawable version and accessories

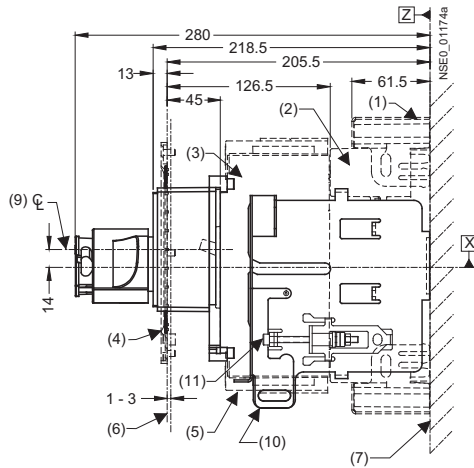
SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with motorized operating mechanism with stored-energy mechanism (connected position)



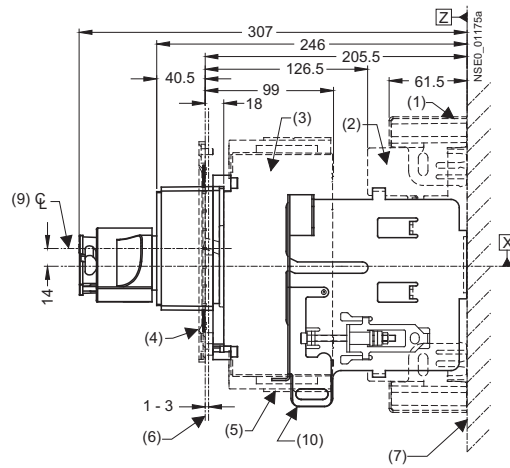
SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with motorized operating mechanism with stored-energy mechanism (disconnected position)



SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with front-operated rotary operating mechanism (connected position)



SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with front-operated rotary operating mechanism (disconnected position)



- (1) Plug-in base with terminal covers
- (2) Plug-in base
- (3) Circuit breaker
- (4) Masking frame for door cut-out
(for circuit breaker with operating mechanism)
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Motorized operating mechanism with stored-energy mechanism
- (9) Front-operated rotary operating mechanism
- (10) Locking device for racking mechanism
- (11) Racking mechanism

3VL Molded Case Circuit Breakers

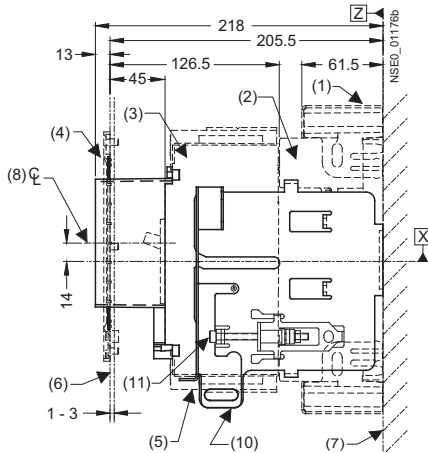
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

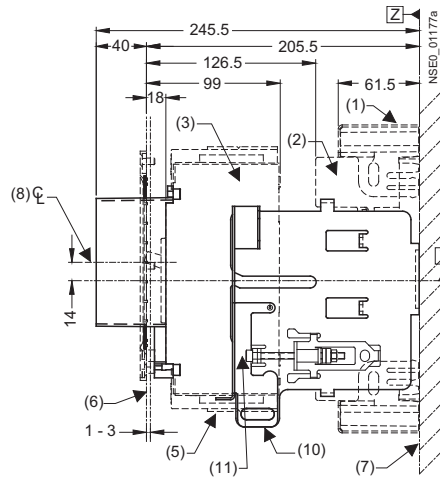
VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole, up to 250 A

Withdrawable version and accessories

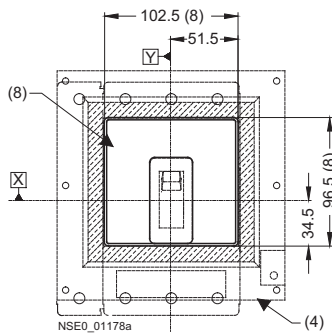
SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with extended escutcheon (connected position)



SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with extended escutcheon (disconnected position)

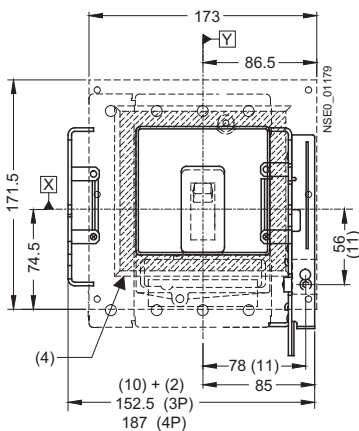


Dimensions of extended escutcheon



- (1) Plug-in base with terminal covers
- (2) Plug-in base
- (3) Circuit breaker
- (4) Masking frame for door cut-out
(for circuit breaker with operating mechanism)
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Extended escutcheon
- (10) Locking device for racking mechanism
- (11) Racking mechanism

Dimensions of withdrawable version



3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

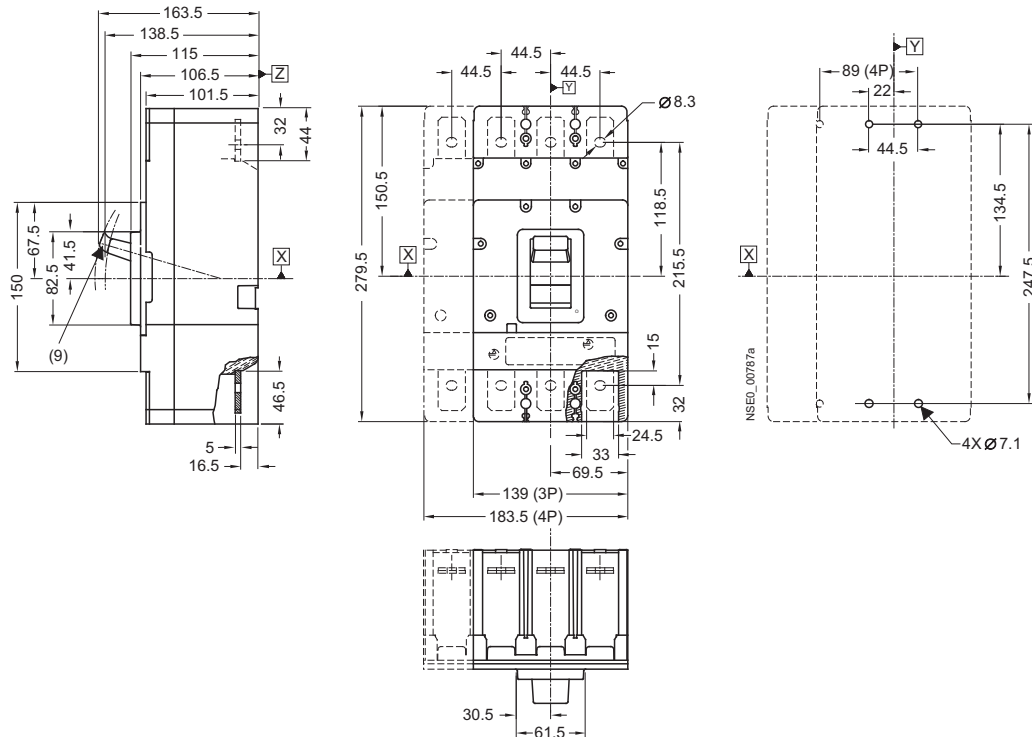
Project planning aids

VL400 (3VL4), 3- and 4-pole, up to 400 A

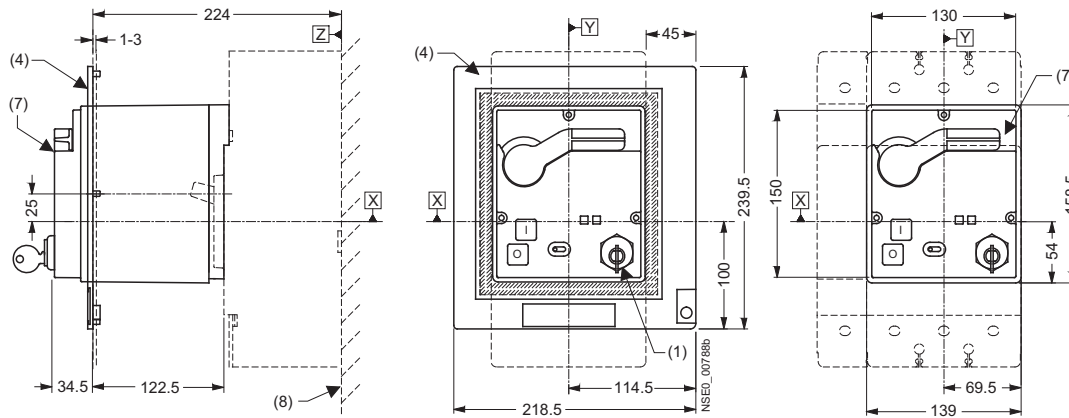
Circuit breakers

SENTRON VL400 (3VL4) circuit breakers

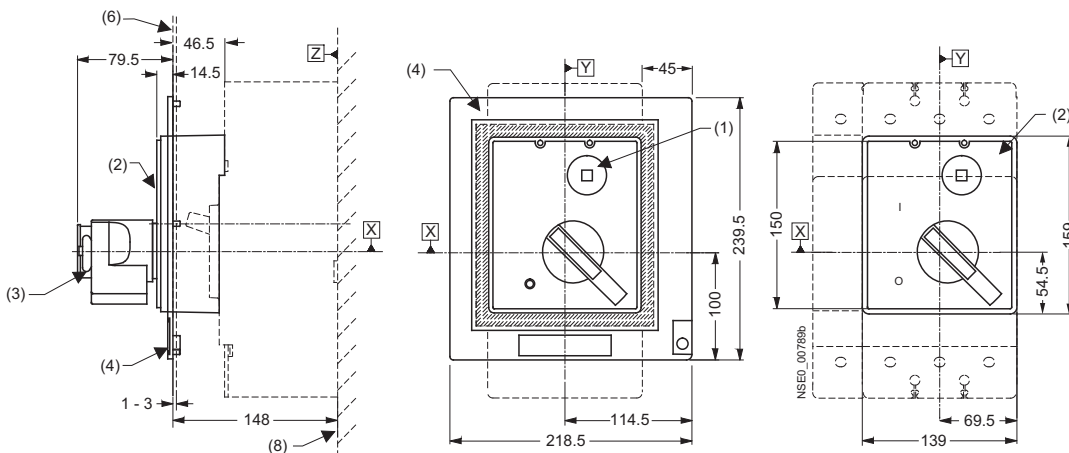
Circuit breaker installation instructions



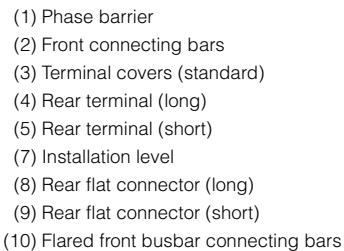
Motorized operating mechanism with stored-energy mechanism



Front-operated rotary operating mechanism



- (1) Safety lock
- (2) Front-operated rotary operating mechanism
- (3) Padlock
- (4) Masking frame for door cut-out (for circuit breaker with operating mechanism)
- (6) Outside surface of cabinet door
- (7) Motorized operating mechanism with stored-energy mechanism
- (8) Installation level
- (9) Toggle lever extension



Project planning aids

Terminal covers

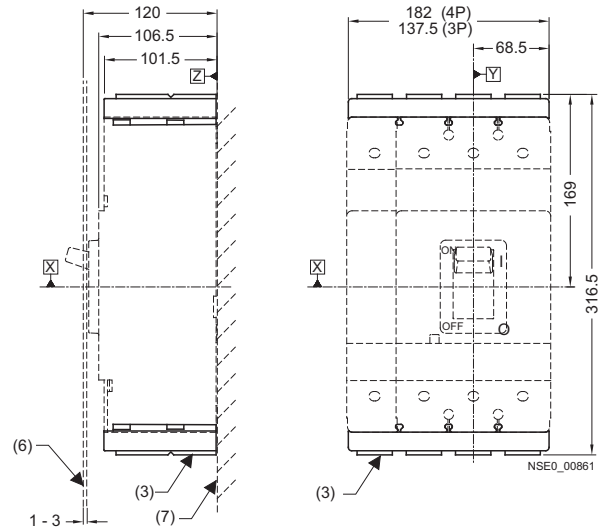
Technical drawing of the NSE0_00870a device, showing front and side views with dimensions and callouts.

Front View (Right):

- Overall width: 182 (4P)
- Overall height: 560.5
- Top section width: 137.5 (3P)
- Top section height: 68.5
- Central section height: 291
- Bottom section height: 182 (4P)
- Callouts: (4) points to the top section, (2) points to the bottom section, (8) points to the bottom terminals.
- Internal features: A 3x3 grid of circular holes with a diameter of $\varnothing 11$. A central rectangular area is labeled "ON" and "OFF" with a switch symbol.
- Reference: XSE0_00870a

Side View (Left):

- Overall width: 101.5
- Top section width: 31.5
- Callouts: (2) points to the top section, (7) points to the bottom section.
- Reference: XSE0_00870a



- (2) Front connecting bars
- (3) Terminal covers (standard)
- (4) Terminal covers (extended)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Cut-out

Technical drawing of the NSE0_01562 sensor, showing dimensions in millimeters (mm).

Top View Dimensions:

- Overall width: 381 mm
- Overall height: 155 mm
- Mounting hole diameter: $\varnothing 25$
- Mounting hole spacing: 89 (4P), 44,5 (3P), 22 (3P+4P)
- Internal dimensions: 149,5, 38, 22, 29,5
- Bottom hole pattern: $4 \times \varnothing 7,1$
- Feature labels: X, Y, (+), (-)

Side View Dimensions:

- Mounting hole diameter: $2 \times \varnothing 0,9$
- Mounting hole spacing: 3 - 6

Part Number: NSE0_01562

Technical drawing of the NSE0_01564 component, showing a side view with dimensions and a detail view of the end bracket.

Dimensions (mm):

- Overall length: 431,8
- Distance from left end to first mounting hole: 32,8
- Distance between mounting holes: 22,9
- Distance from left end to second mounting hole: 4 x 8,3
- Distance from second mounting hole to third mounting hole: 69,9
- Distance from third mounting hole to right end: 38,1
- Distance from left end to fourth mounting hole: 369,4
- Distance from fourth mounting hole to right end: 409,1
- Distance from right end to mounting hole: 59,8
- Distance from mounting hole to end: 3,8

Part Number: NSE0_01564

Type	A
Without RCD module	VL400 (3VL4)
With RCD module	VL400 (3VL4)

3VL Molded Case Circuit Breakers

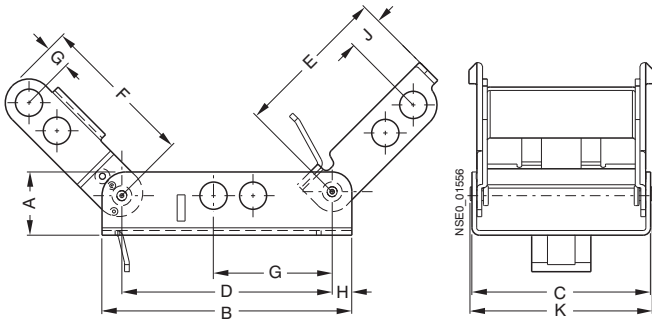
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL400 (3VL4), 3- and 4-pole, up to 400 A

Interlocks

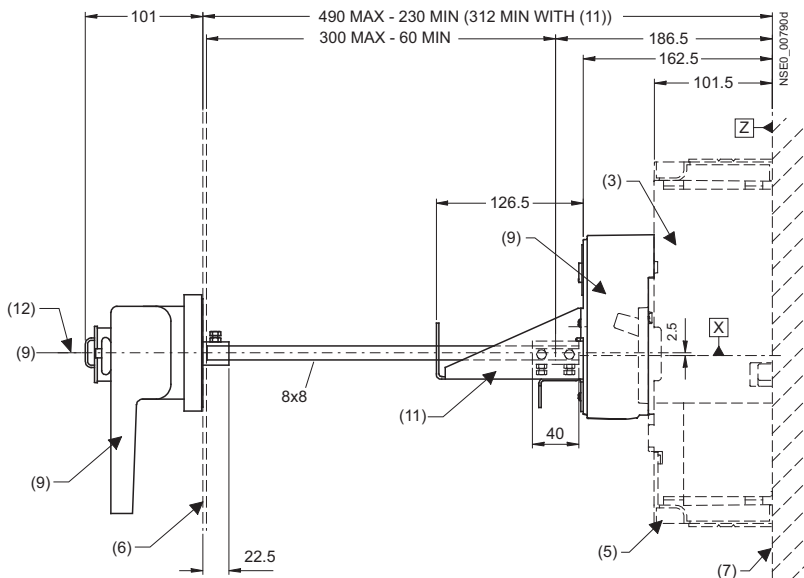
Locking devices for toggle levers



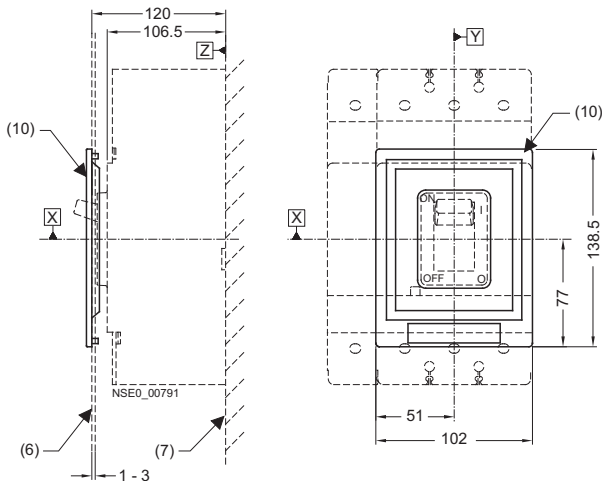
Type	a	b	c	d	e	f	g	h	i	k
3VL9 4	20.3	80.3	57.4	52.8	49.3	49.8	6.35	6.3	11.2	58.5
3VL9 6	21.6	79.8	71.1	62.0	50.4	46.5	12.9	8.9	8.6	72.2
3VL9 8	21.6	110.5	88.9	96.5	77.2	69.1	11.7	5.1	24.8	90.0

Accessories

Plug-in base for door-coupling rotary operating mechanism



Masking frame for door cut-out for circuit breaker with toggle lever



- (3) Circuit breaker
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (9) Door-coupling rotary operating mechanism
- (10) Masking frame for door cut-out (for circuit breaker with toggle lever)
- (11) Support bracket
- (12) Center line of drive shaft

3VL Molded Case Circuit Breakers

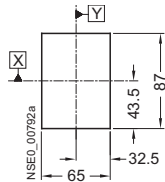
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

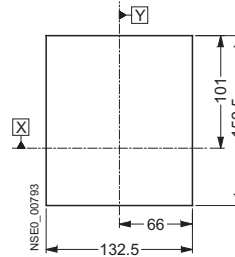
VL400 (3VL4), 3- and 4-pole, up to 400 A

Door cut-outs

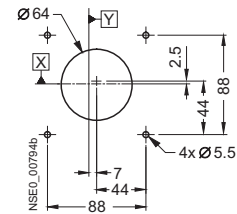
Door cut-out for toggle lever operating mechanism (without masking frame)



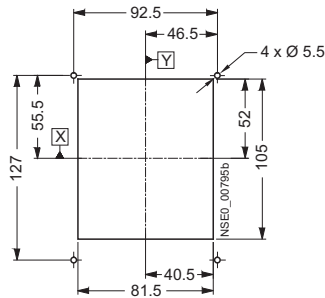
Door cut-out for front-operated rotary operating mechanism and motorized operating mechanism with stored-energy mechanism (without masking frame)



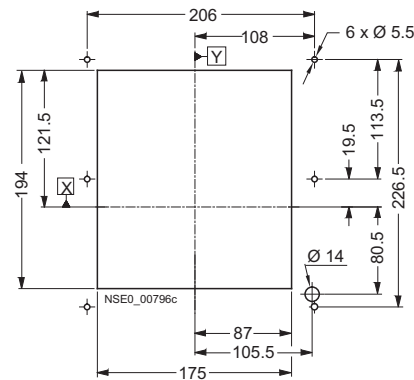
Door cut-out for door-coupling rotary operating mechanism



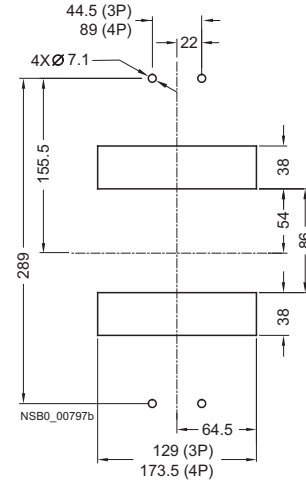
Door cut-out for toggle lever operating mechanism (with masking frame)



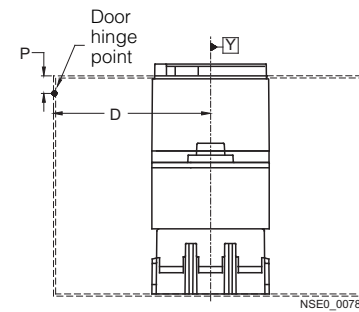
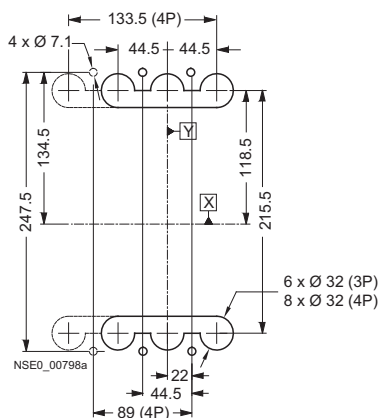
Door cut-out for front-operated rotary operating mechanism, motorized operating mechanism with stored-energy mechanism and extended escutcheon (with masking frame)



Hole pattern and cut-out for plug-in base with rear flat connection bars



Hole pattern and cut-out for rear terminals



$D > A$ from table + $(P \times 5)$

Note:
A minimum distance between reference point Y and the door hinge is required for the door cut-outs.

Combination	A
Circuit breaker only	150
Circuit breaker + plug-in base + motorized operating mechanism with stored-energy mechanism	150
Circuit breaker + plug-in base + front-operated rotary operating mechanism	200
Circuit breaker + withdrawable version	200

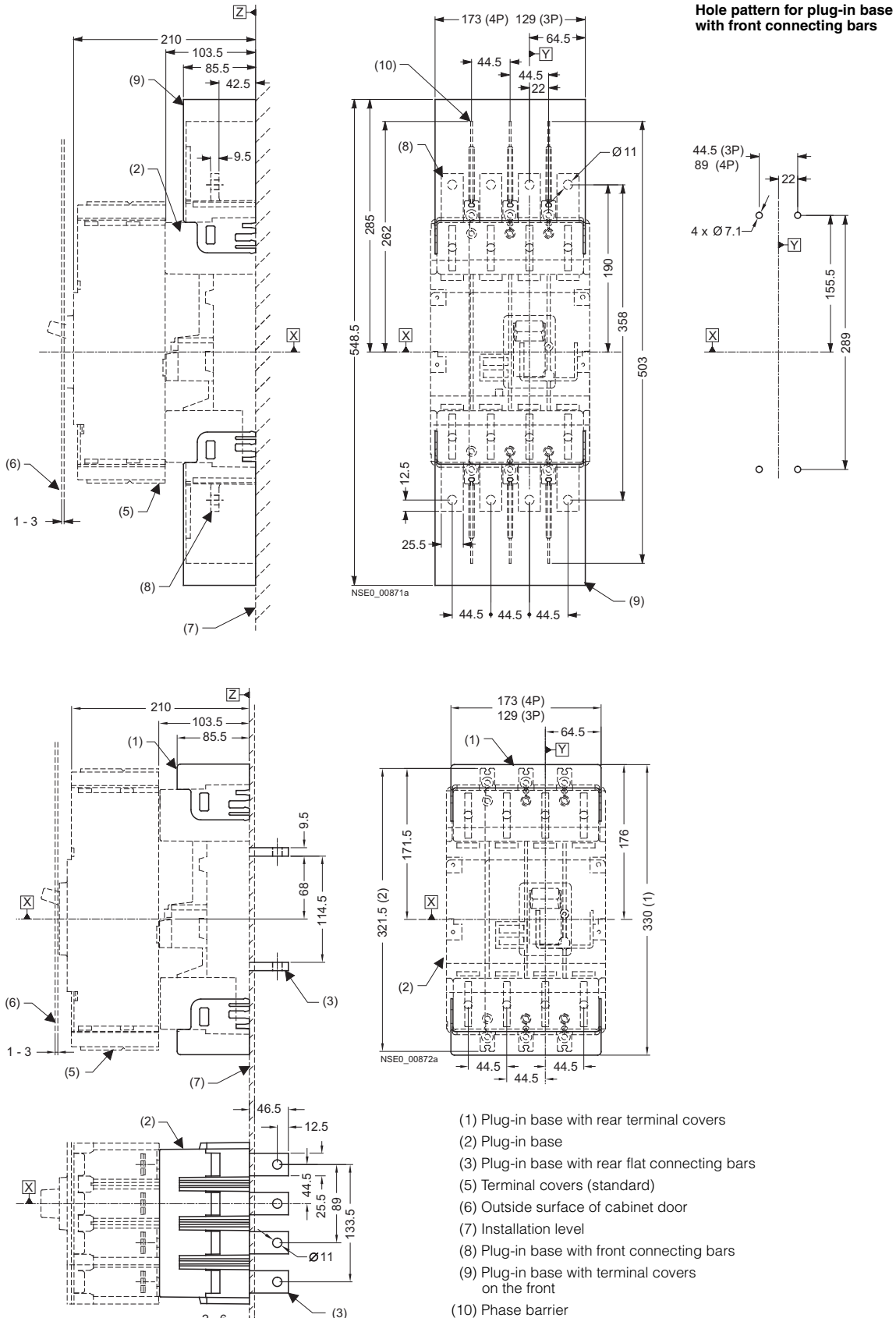
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL400 (3VL4), 3- and 4-pole, up to 400 A

Plug-in bases and accessories



3VL Molded Case Circuit Breakers

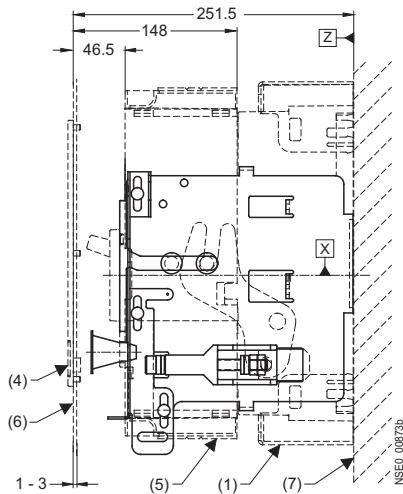
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

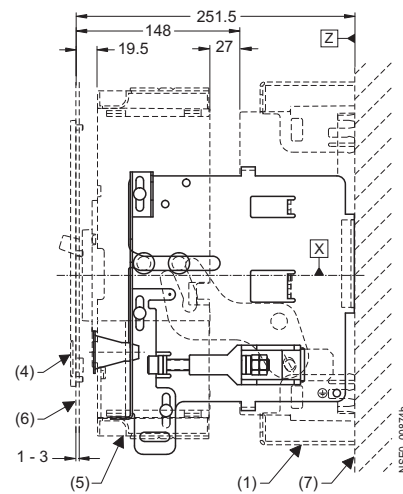
VL400 (3VL4), 3- and 4-pole, up to 400 A

Plug-in bases and accessories

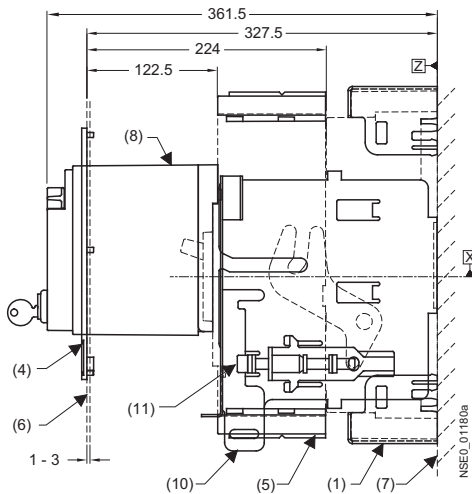
Plug-in base for front-operated rotary operating mechanism (connected position)



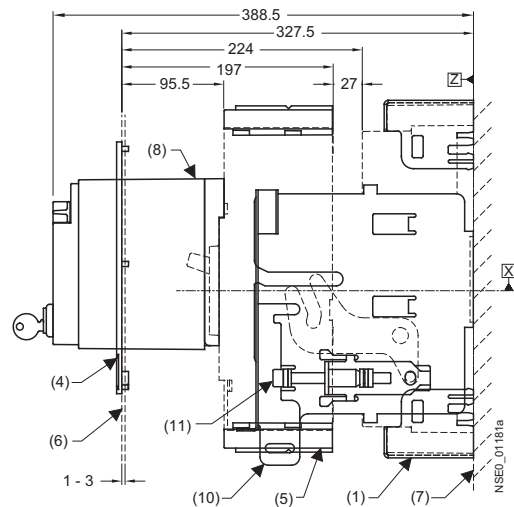
Plug-in base for front-operated rotary operating mechanism (disconnected position)



Plug-in base for motorized operating mechanism with stored-energy mechanism (connected position)



Plug-in base for motorized operating mechanism with stored-energy mechanism (disconnected position)



- (1) Plug-in base with terminal covers
- (4) Masking frame for door cut-out
(for circuit breaker with operating mechanism)
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Motorized operating mechanism with stored-energy mechanism
- (9) Front-operated rotary operating mechanism
- (10) Locking device for racking mechanism
- (11) Racking mechanism

3VL Molded Case Circuit Breakers

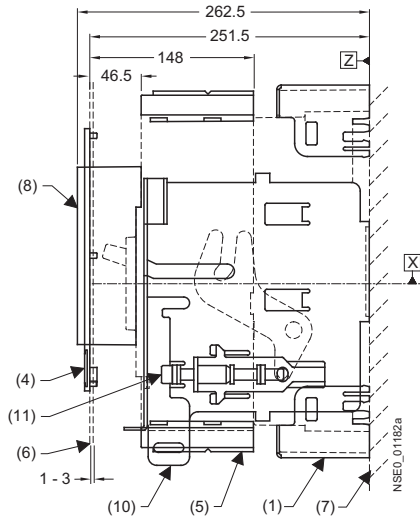
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

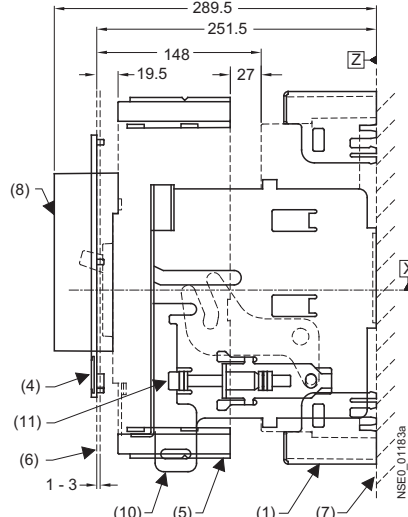
VL400 (3VL4), 3- and 4-pole, up to 400 A

Plug-in bases and accessories

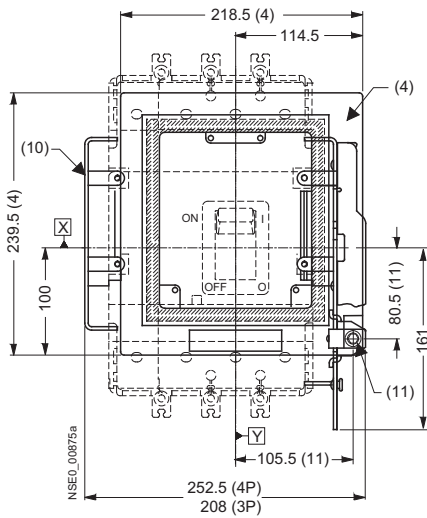
Plug-in base for extended escutcheon (connected position)



Plug-in base for extended escutcheon (disconnected position)



Extended escutcheon mounted on withdrawable version



Locking device for
racking mechanism

- (1) Plug-in base with terminal covers
- (4) Masking frame for door cut-out
(for circuit breaker with operating mechanism)
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Extended escutcheon
- (10) Locking device for racking mechanism
- (11) Racking mechanism

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

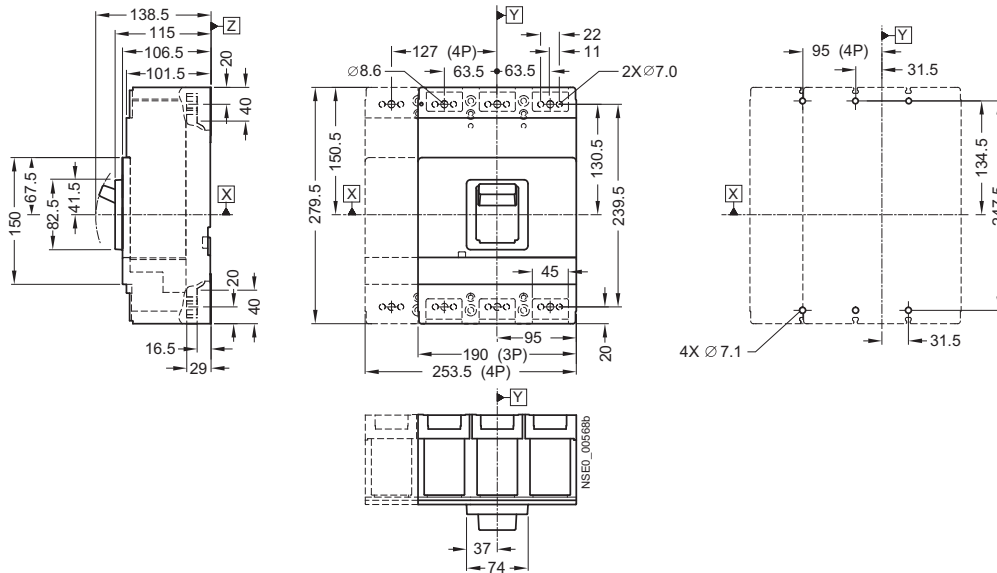
Project planning aids

VL630 (3VL5), 3- and 4-pole, up to 630 A

Circuit breakers

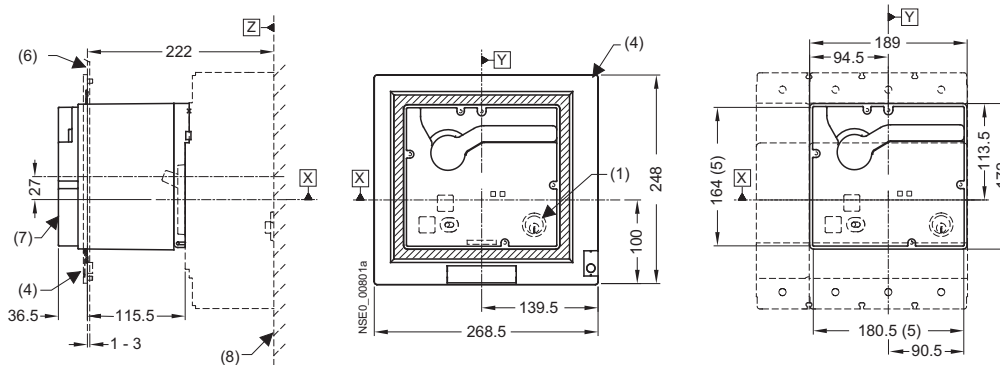
SENTRON VL630 (3VL5) circuit breakers

Circuit breaker installation instructions

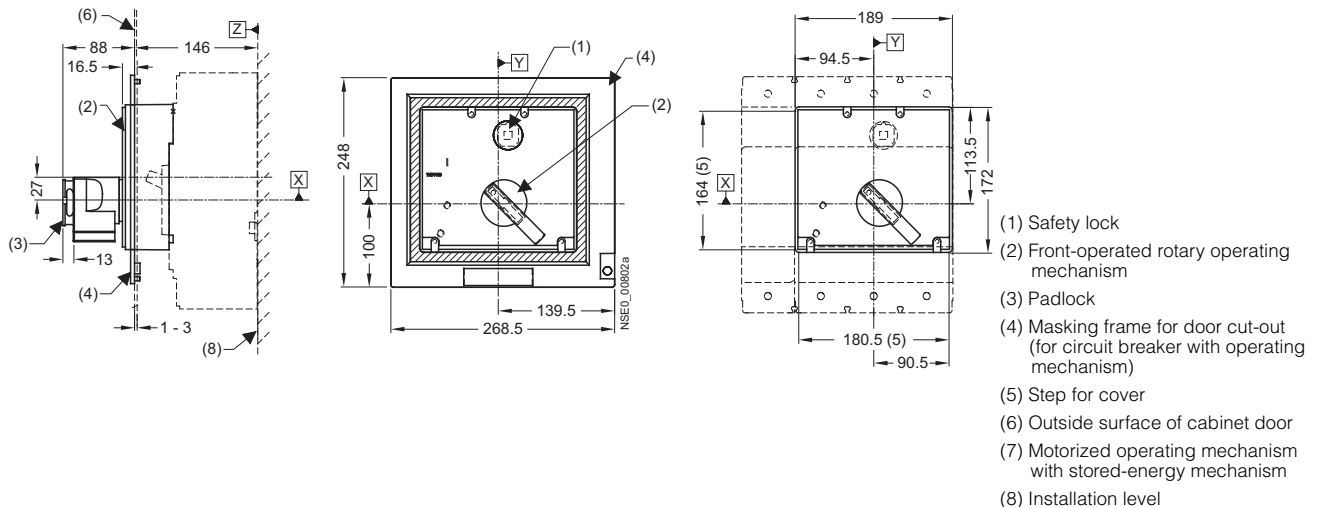


Operating mechanisms

Motorized operating mechanism with stored-energy mechanism



Front-operated rotary operating mechanism



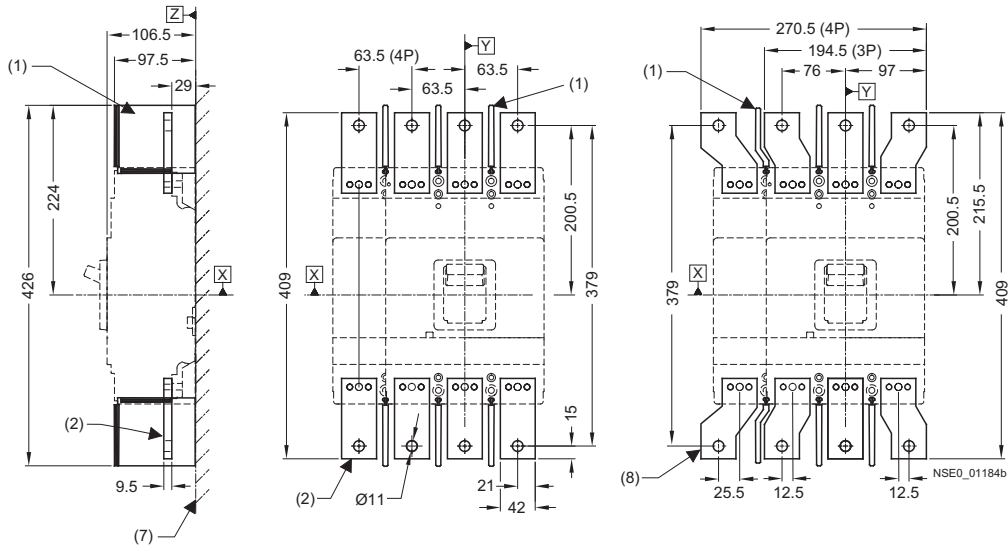
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

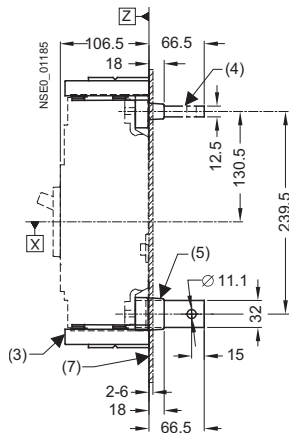
Project planning aids

VL630 (3VL5), 3- and 4-pole, up to 630 A

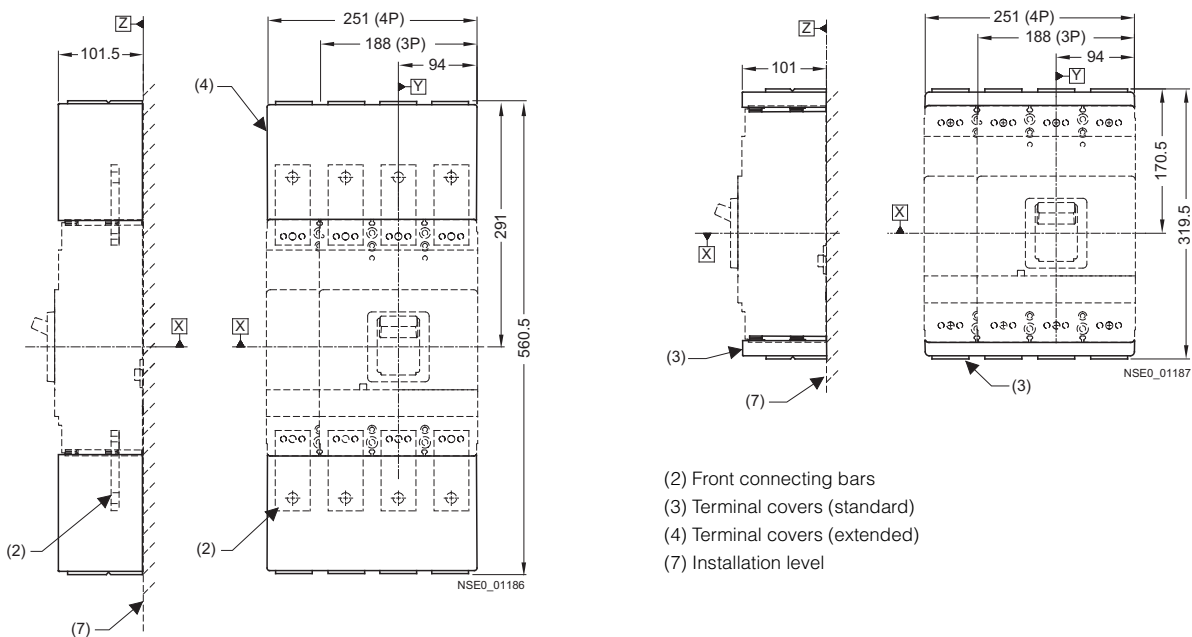
Terminals and phase barriers



- (1) Phase barrier
- (2) Front connecting bars
- (3) Terminal covers (standard)
- (4) Rear terminal (horizontal connection)
- (5) Rear terminal (vertical connection)
- (7) Installation level
- (8) Flared front busbar connecting bars



Terminal covers



- (2) Front connecting bars
- (3) Terminal covers (standard)
- (4) Terminal covers (extended)
- (7) Installation level

3VL Molded Case Circuit Breakers

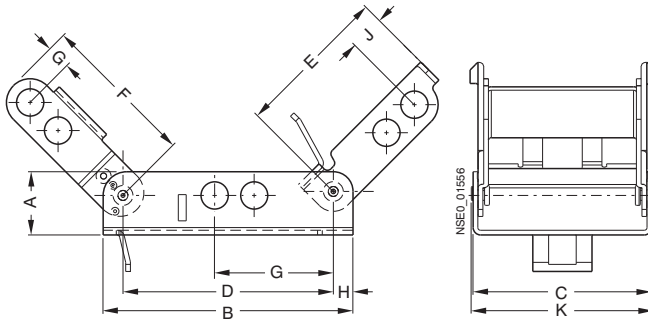
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL630 (3VL5), 3- and 4-pole, up to 630 A

Interlocks

Locking devices for toggle levers

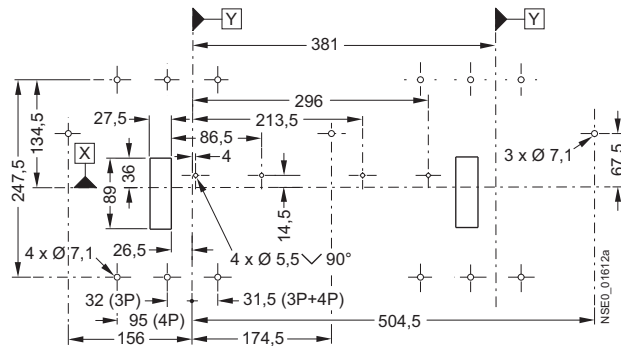


Type	a	b	c	d	e	f	g	h	i	k
3VL9 4	20.3	80.3	57.4	52.8	49.3	49.8	6.35	6.3	11.2	58.5
3VL9 6	21.6	79.8	71.1	62.0	50.4	46.5	12.9	8.9	8.6	72.2
3VL9 8	21.6	110.5	88.9	96.5	77.2	69.1	11.7	5.1	24.8	90.0

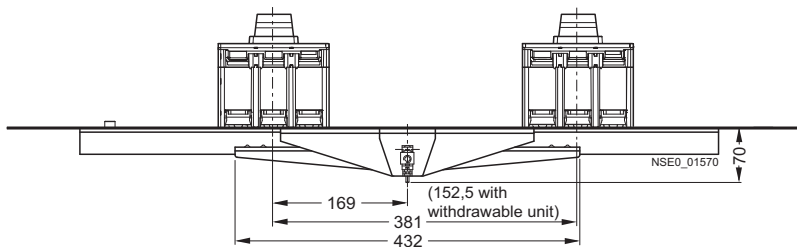
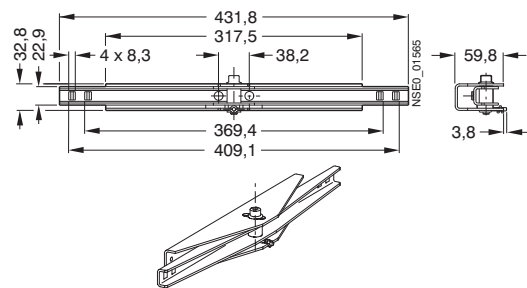
Rear interlocking modules

**Rear interlocking module
for plug-in/withdrawable circuit breakers
for front connection**

For more detailed dimensional drawings see mounting instructions for "Rear Interlocking Module".



Rear interlocking module



3VL Molded Case Circuit Breakers

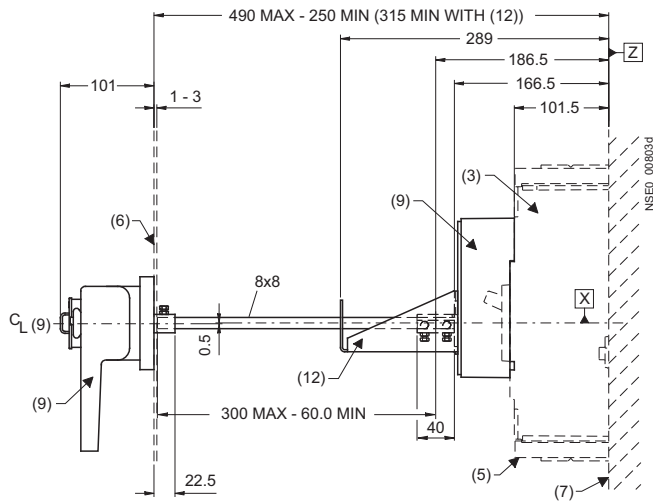
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

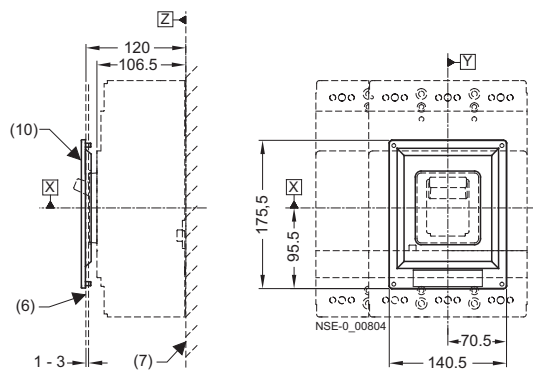
VL630 (3VL5), 3- and 4-pole, up to 630 A

Accessories

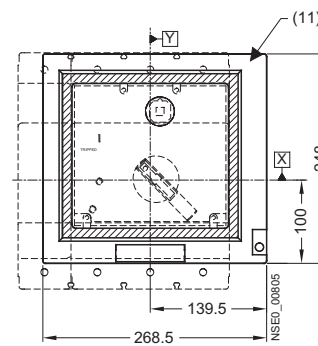
Door-coupling rotary operating mechanism



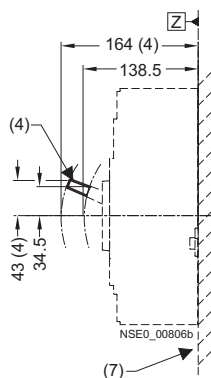
Masking frame for door cut-out for circuit breaker with toggle lever



Masking frame for door cut-out for circuit breaker with operating mechanism



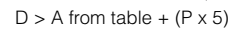
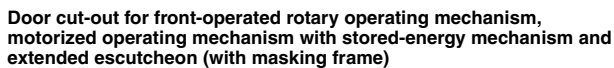
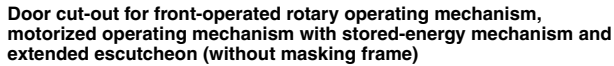
Toggle handle extension



- (3) Circuit breaker
- (4) Toggle handle extension
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (9) Door-coupling rotary operating mechanism
- (10) Masking frame for door cut-out (for circuit breaker with toggle lever)
- (11) Masking frame for door cut-out (for circuit breaker with operating mechanism)
- (12) Support bracket

VL630 (3VL5), 3- and 4-pole, up to 630 A

Door cut-out for door-coupling rotary operating mechanism



**Hole pattern and cut-out for plug-in base
(with rear flat bar connection)**



3VL Molded Case Circuit Breakers

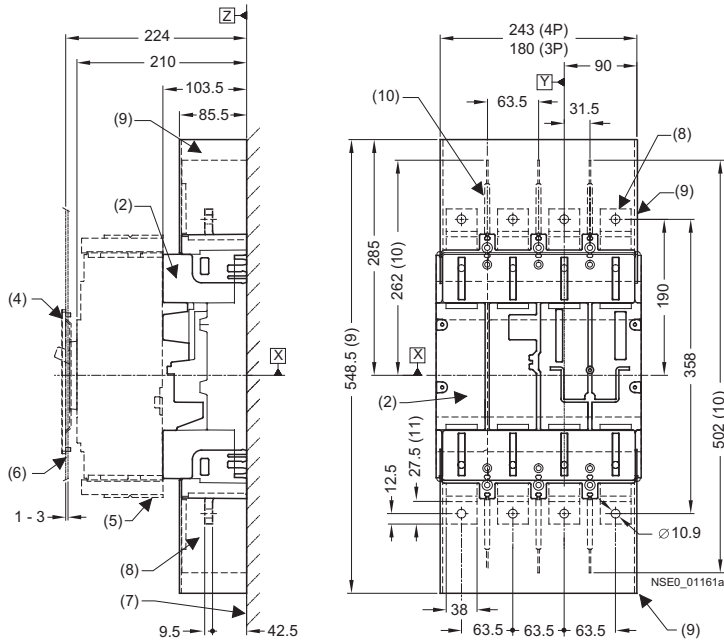
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

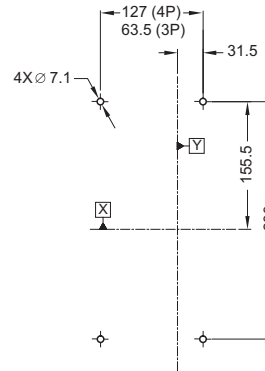
VL630 (3VL5), 3- and 4-pole, up to 630 A

Plug-in bases and accessories

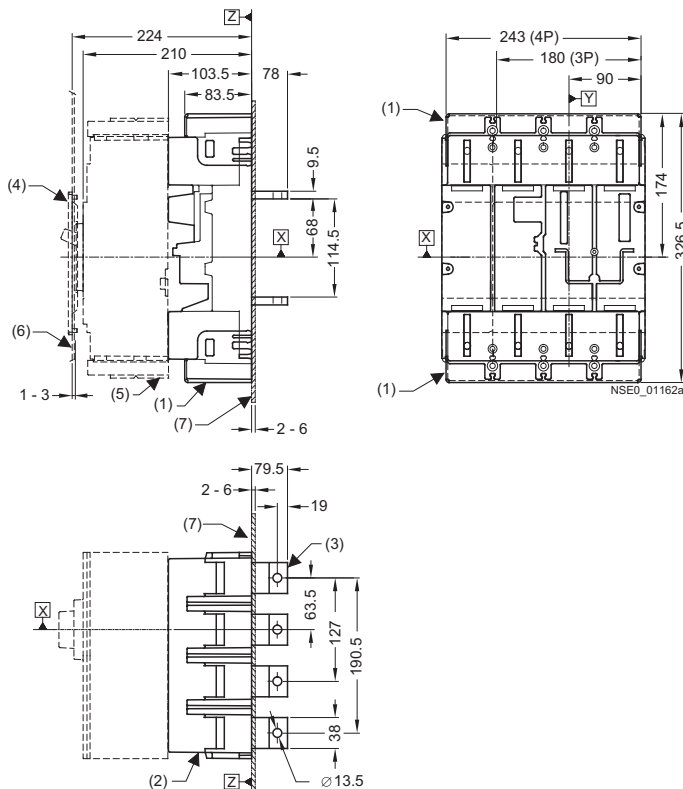
Plug-in base with terminal covers on the front



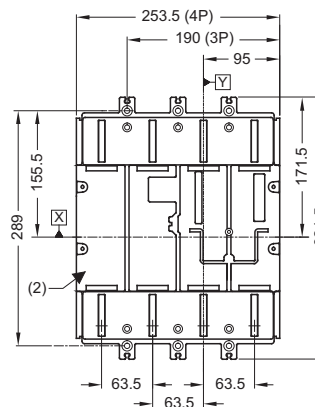
Hole pattern for plug-in base, front connecting bars



Plug-in base, with terminal covers, rear flat connecting bars



Plug-in base



- (1) Plug-in base with rear terminal covers
- (2) Plug-in base
- (3) Plug-in base with rear flat connecting bars
- (4) Masking frame for door cut-out (for circuit breaker with toggle lever)
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Plug-in base with front connecting bars
- (9) Plug-in base with terminal covers on the front
- (10) Phase barrier
- (11) Terminal face

3VL Molded Case Circuit Breakers

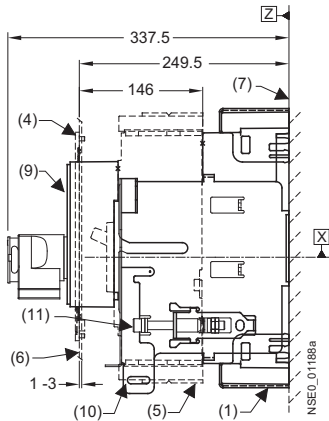
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

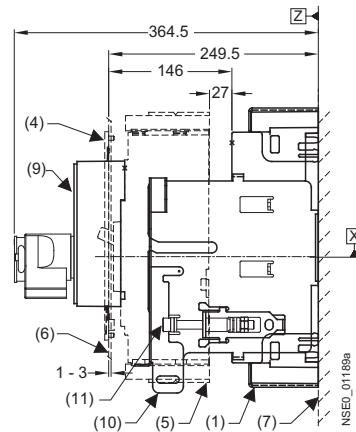
VL630 (3VL5), 3- and 4-pole, up to 630 A

Withdrawable version and accessories

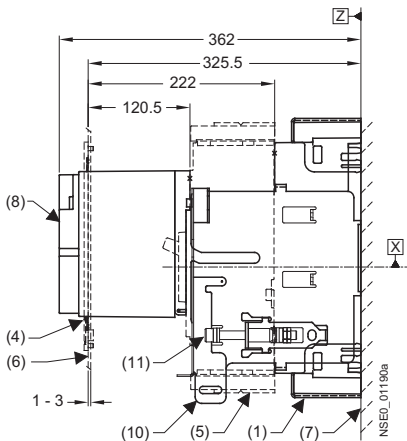
SENTRON VL630 (3VL5) circuit breakers with rotary operating mechanism, withdrawable version (connected position)



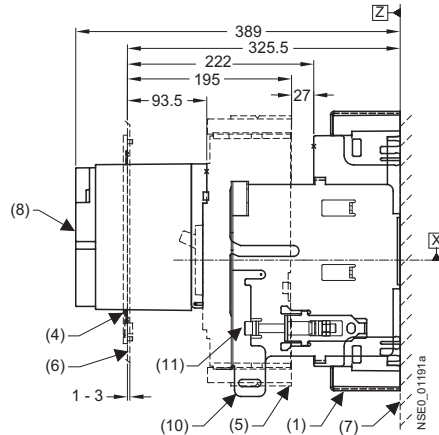
SENTRON VL630 (3VL5) circuit breakers with rotary operating mechanism, withdrawable version (disconnected position)



SENTRON VL630 (3VL5) circuit breakers with motorized operating mechanism with stored-energy mechanism, withdrawable version (connected position)



SENTRON VL630 (3VL5) circuit breakers with motorized operating mechanism with stored-energy mechanism, withdrawable version (disconnected position)



- (1) Plug-in base with terminal covers
- (4) Masking frame for door cut-out
(for circuit breaker with operating mechanism)
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Motorized operating mechanism with stored-energy mechanism
- (9) Front-operated rotary operating mechanism
- (10) Locking device for racking mechanism
- (11) Racking mechanism

3VL Molded Case Circuit Breakers

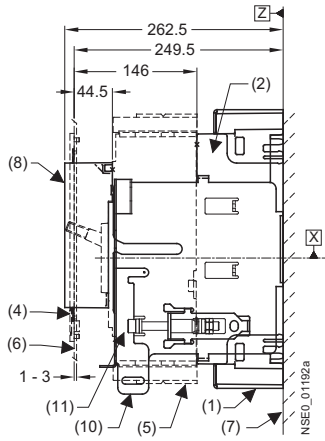
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

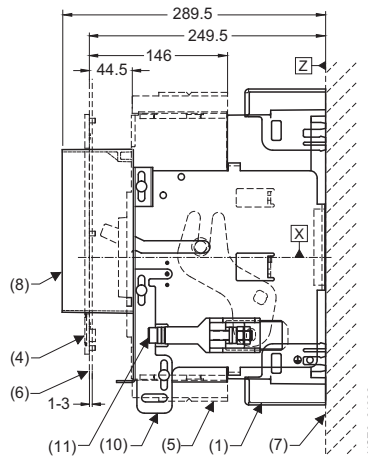
VL630 (3VL5), 3- and 4-pole, up to 630 A

Withdrawable version and accessories

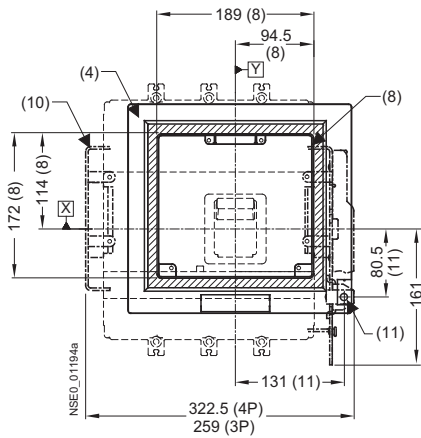
SENTRON VL630 (3VL5) circuit breakers with extended escutcheon, withdrawable version (connected position)



SENTRON VL630 (3VL5) circuit breakers with extended escutcheon, withdrawable version (disconnected position)



SENTRON VL630 (3VL5) circuit breakers with extended escutcheon, withdrawable version



- (1) Plug-in base with terminal covers
- (2) Plug-in base
- (4) Masking frame for door cut-out
(for circuit breaker with operating mechanism)
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Extended escutcheon
- (10) Locking device for racking mechanism
- (11) Racking mechanism

3VL Molded Case Circuit Breakers

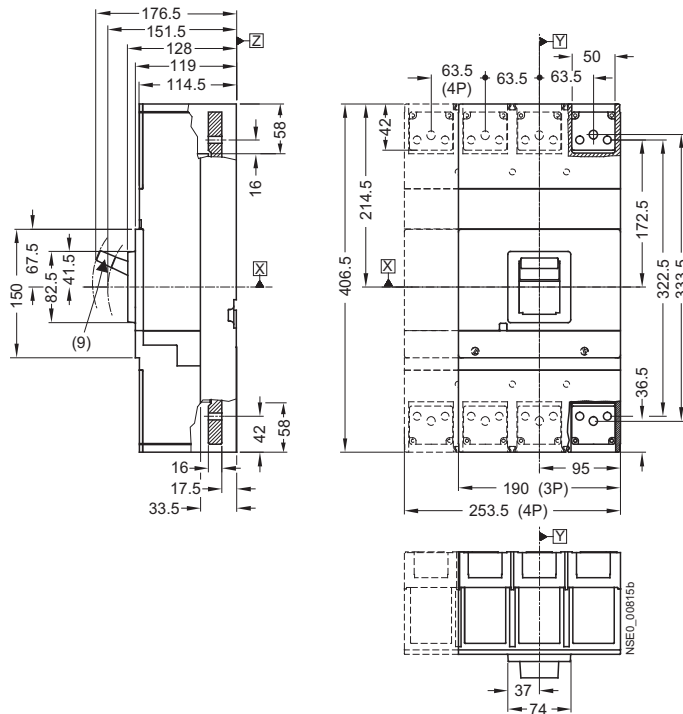
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

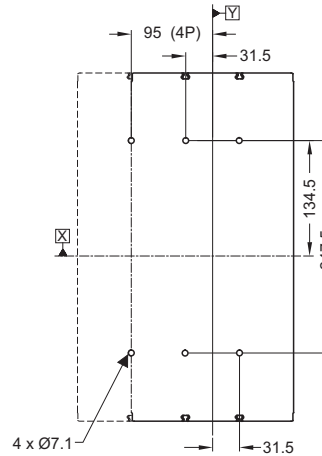
VL800 (3VL6), 3- and 4-pole, up to 800 A

Circuit breakers

SENTRON VL800 (3VL6) circuit breaker

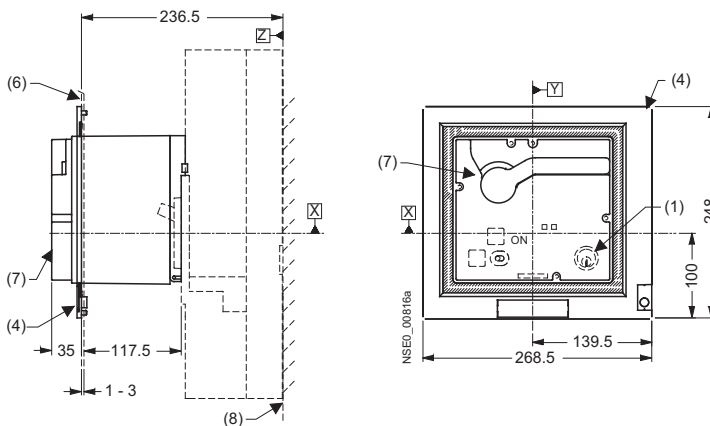


Circuit breaker installation instructions

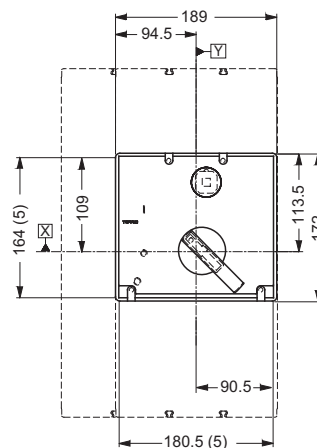
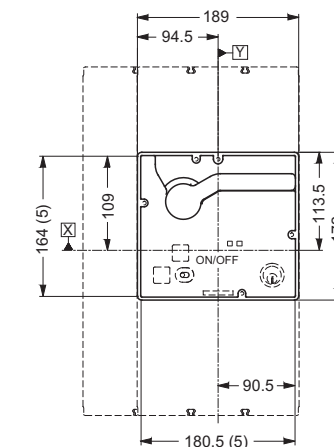
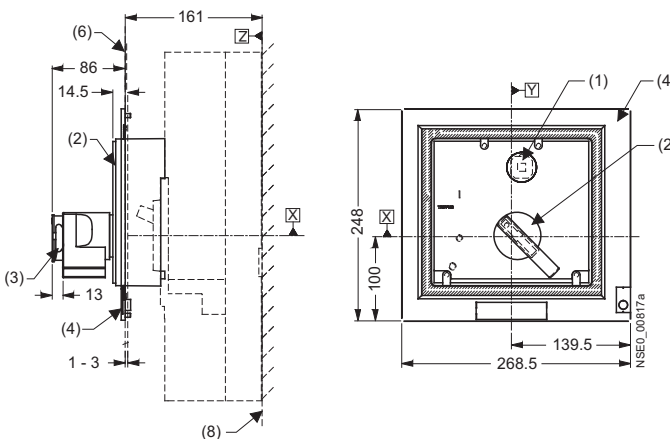


Operating mechanisms

Motorized operating mechanism with stored-energy mechanism



Front-operated rotary operating mechanism



- (1) Safety lock
- (2) Front-operated rotary operating mechanism
- (3) Padlock
- (4) Masking frame for door cut-out (for circuit breaker with operating mechanism)
- (5) Step for cover
- (6) Outside surface of cabinet door
- (7) Motorized operating mechanism with stored-energy mechanism
- (8) Installation level
- (9) Toggle lever extension

3VL Molded Case Circuit Breakers

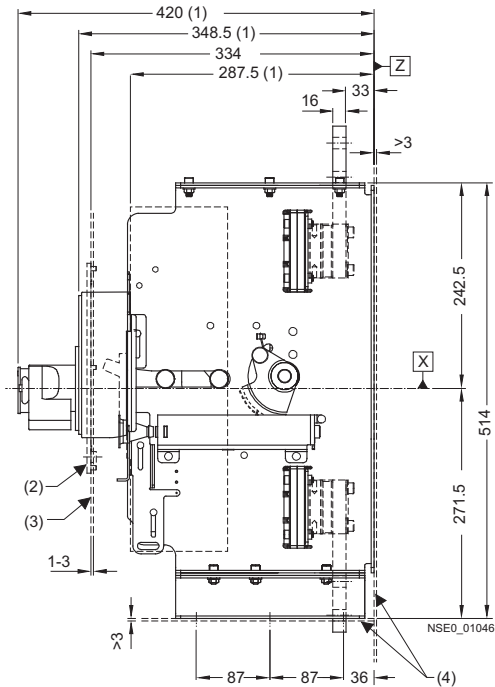
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

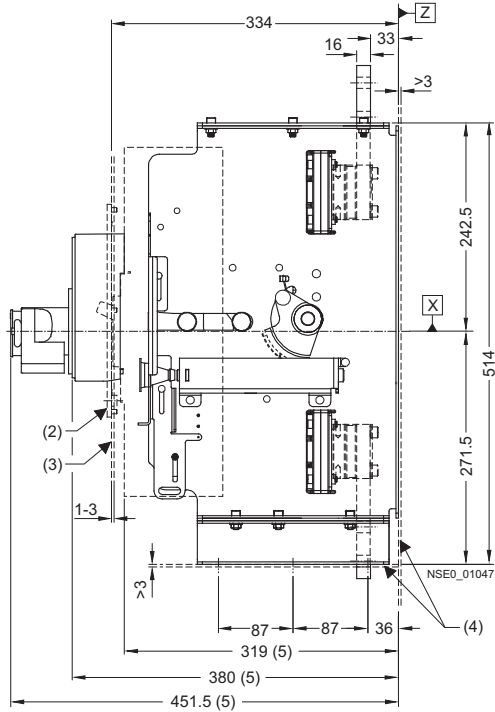
VL800 (3VL6), 3- and 4-pole, up to 800 A

Withdrawable versions

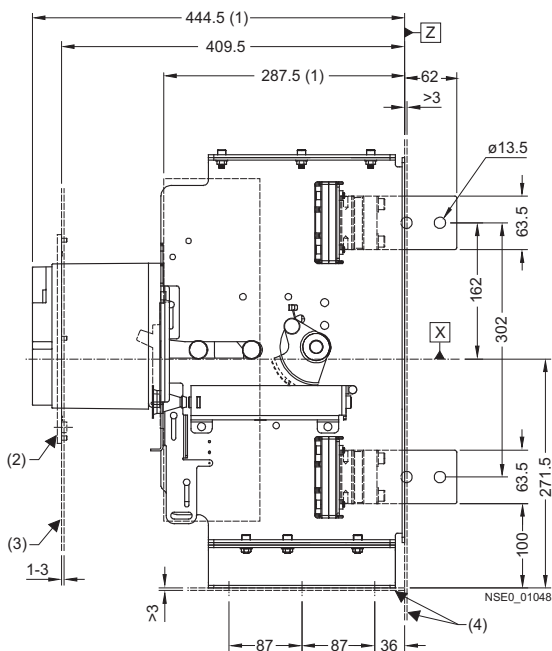
Withdrawable version with front-operated rotary operating mechanism
Insert position



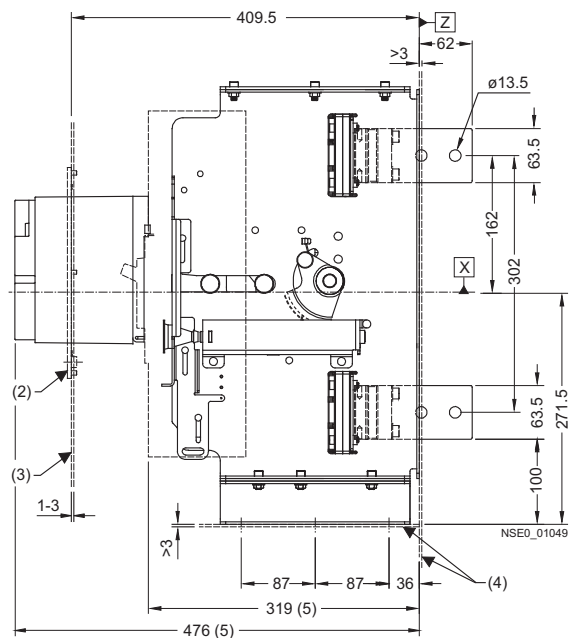
Withdrawable version with front-operated rotary operating mechanism
Withdraw position



Withdrawable version with motorized operating mechanism with stored-energy mechanism
Insert position



Withdrawable version with motorized operating mechanism with stored-energy mechanism
Withdraw position



- (1) Connected position
- (2) Masking frame for door cut-out
- (3) Outside surface of cabinet door
- (4) Installation level
- (5) Disconnected position

3VL Molded Case Circuit Breakers

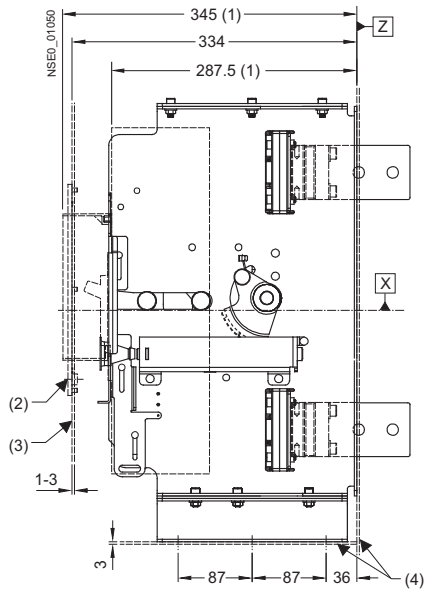
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL 800 (3VL6), 3- and 4-pole, up to 800 A

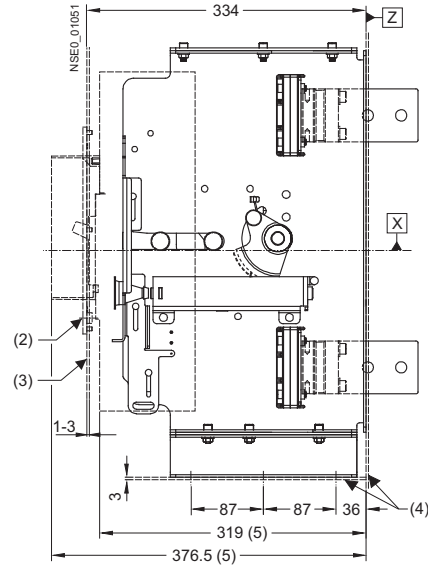
Withdrawable version with extended escutcheon
(without masking frame)

Insert position

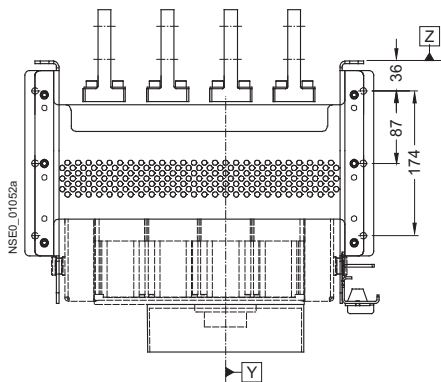
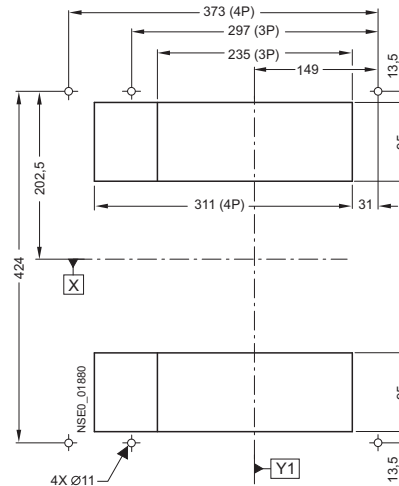
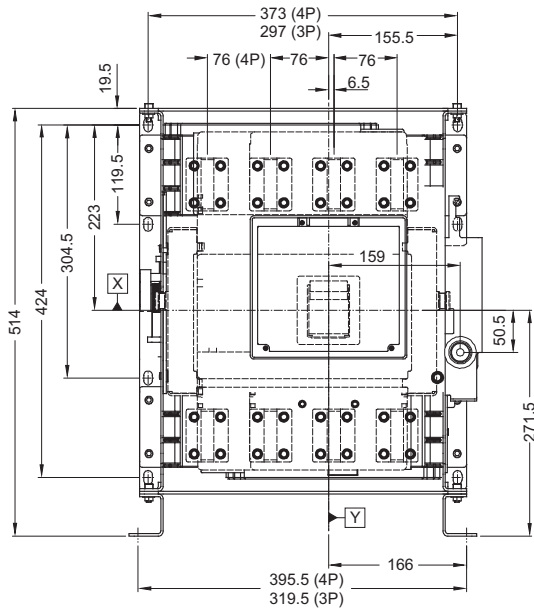
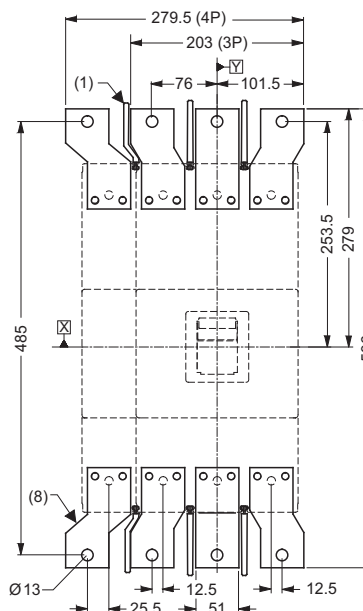


Withdrawable version with extended escutcheon
(without masking frame)

Withdraw position



- (1) Connected position
- (2) Masking frame for door cut-out
- (3) Outside surface of cabinet door
- (4) Installation level
- (5) Disconnected position

[illegible]

- (1) Phase barrier
- (2) Front connecting bars
- (7) Installation level
- (8) Flared front busbar connecting bars

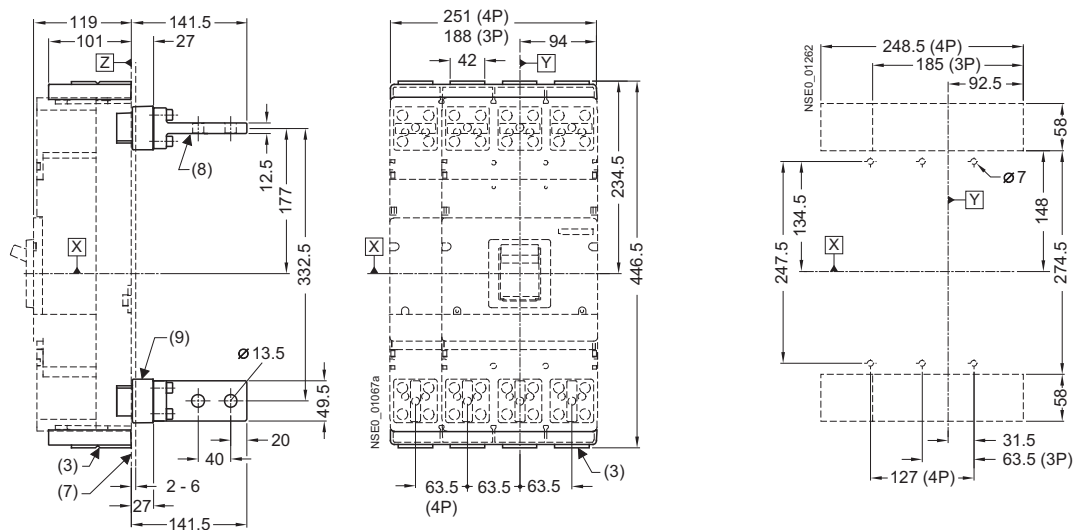
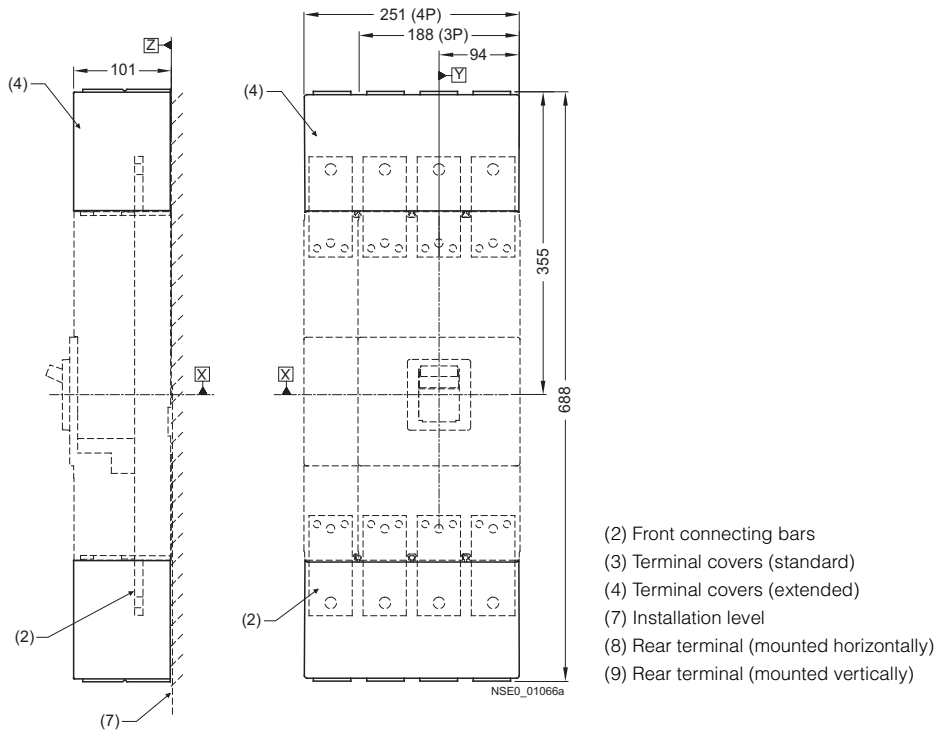
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

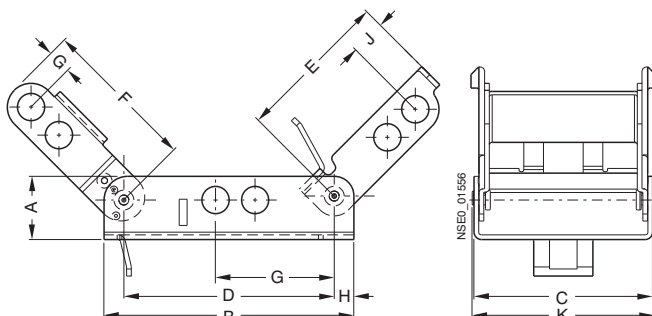
VL800 (3VL6), 3- and 4-pole, up to 800 A

Terminal covers



Interlocks

Locking devices for toggle levers



Type	a	b	c	d	e	f	g	h	i	k
3VL9 4	20.3	80.3	57.4	52.8	49.3	49.8	6.35	6.3	11.2	58.5
3VL9 6	21.6	79.8	71.1	62.0	50.4	46.5	12.9	8.9	8.6	72.2
3VL9 8	21.6	110.5	88.9	96.5	77.2	69.1	11.7	5.1	24.8	90.0

3VL Molded Case Circuit Breakers

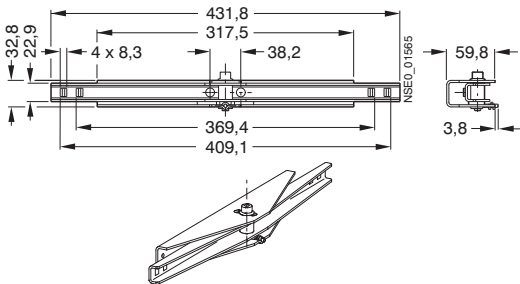
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL800 (3VL6), 3- and 4-pole, up to 800 A

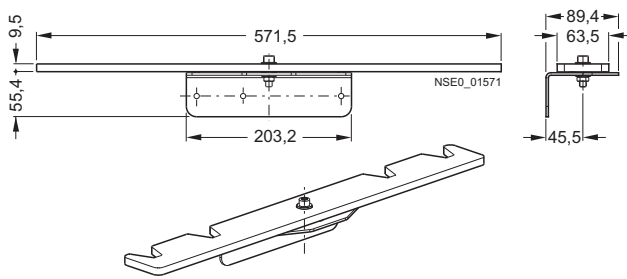
Rear interlocking modules

Rear interlocking module 3-pole circuit breaker

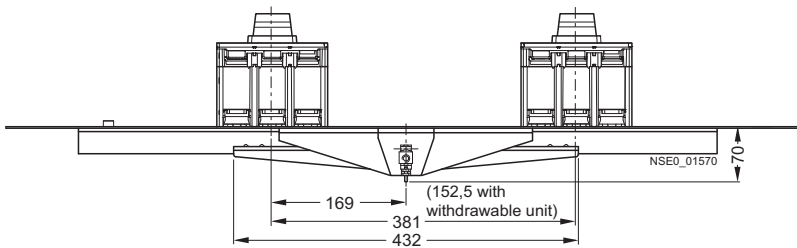


For more detailed dimensional drawings see "Mounting Instructions for Rear Interlocking Module".

Rear interlocking module 4-pole circuit breaker



Rear interlocking module



3VL Molded Case Circuit Breakers

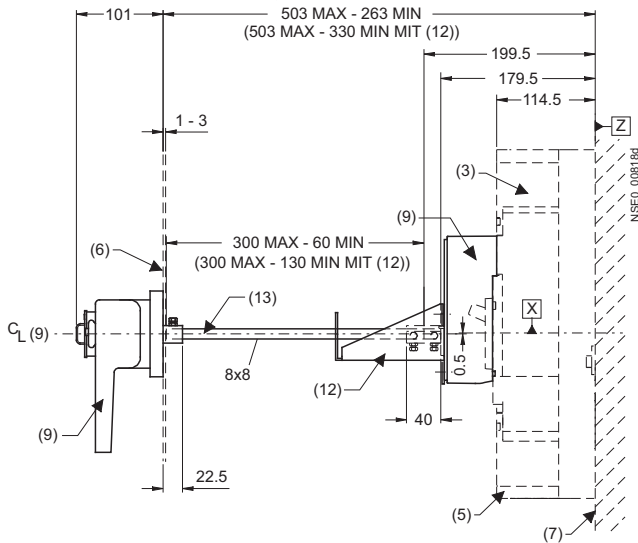
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

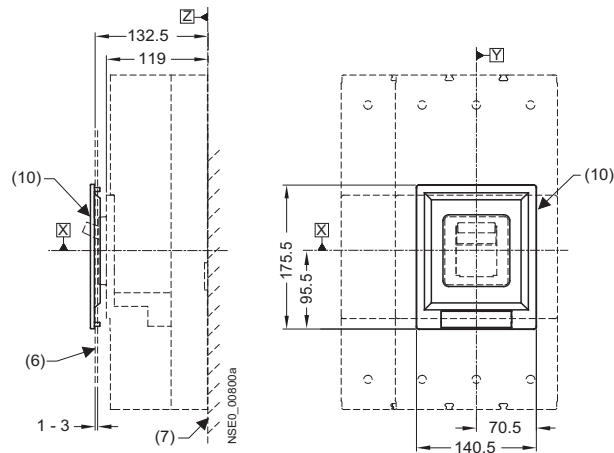
VL800 (3VL6), 3- and 4-pole, up to 800 A

Accessories

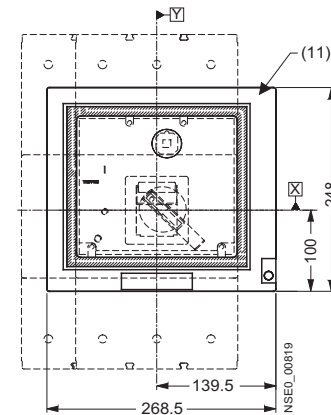
Door-coupling rotary operating mechanism



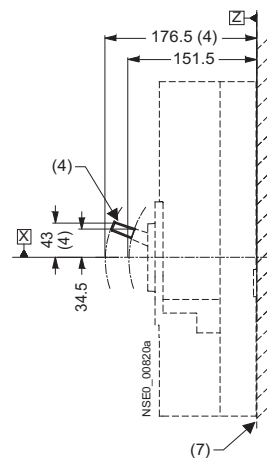
Masking frame for door cut-out for circuit breaker with toggle lever



Masking frame for door cut-out for circuit breaker with operating mechanism



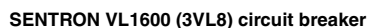
Toggle handle extension



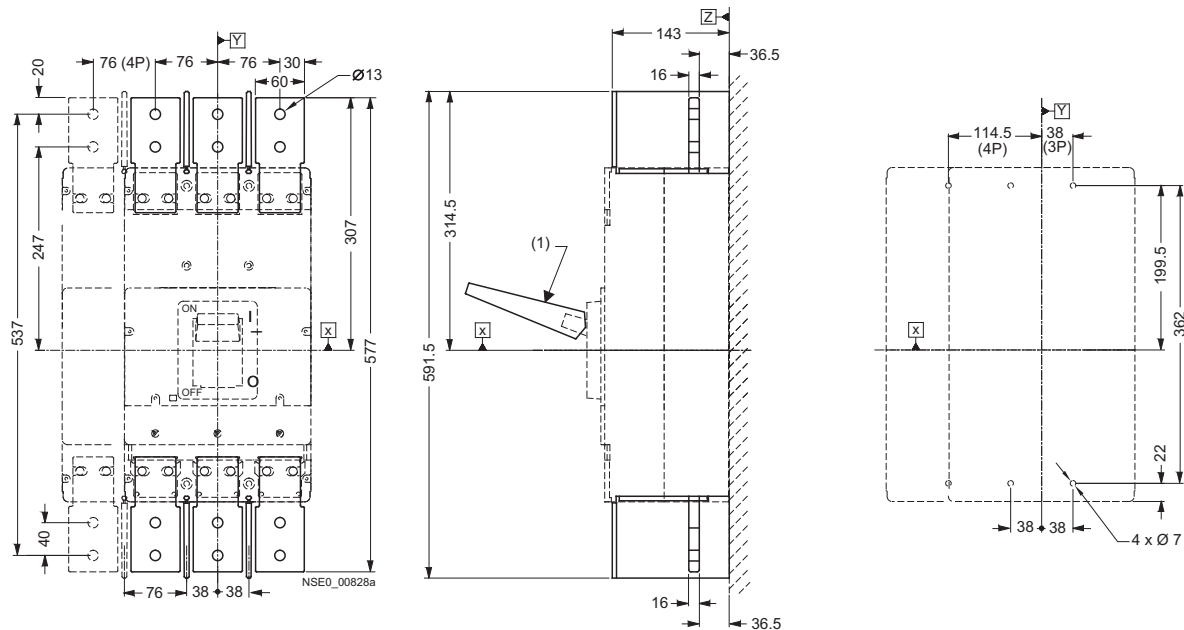
- (3) Circuit breaker
- (4) Toggle handle extension
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (9) Door-coupling rotary operating mechanism
- (10) Masking frame for door cut-out (for circuit breaker with toggle lever)
- (11) Masking frame for door cut-out (for circuit breaker with operating mechanism)
- (12) Support bracket
- (13) Center line of drive shaft

Circuit breakers

Circuit breaker installation instructions



Circuit breaker installation instructions



16/62

3VL Molded Case Circuit Breakers

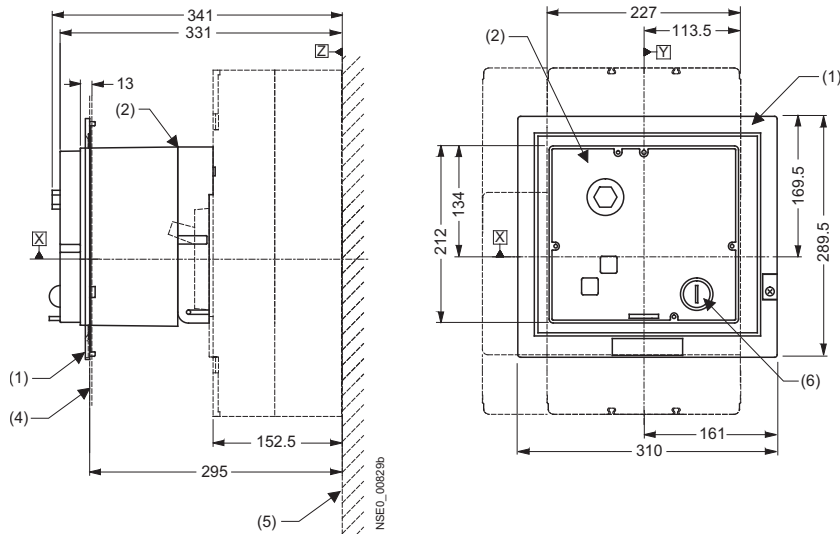
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

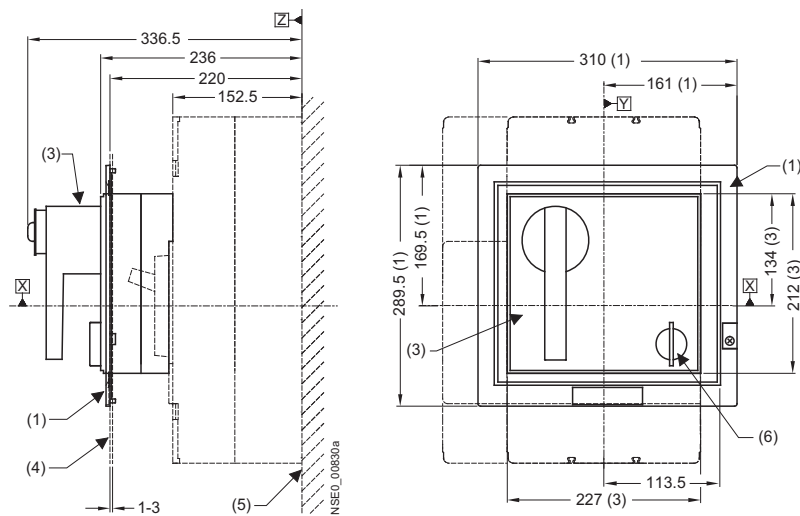
VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

Operating mechanisms

Motorized operating mechanism



Front-operated rotary operating mechanism



- (1) Masking frame for door cut-out
(for circuit breaker with operating mechanism)
- (2) Motorized operating mechanism
- (3) Front-operated rotary operating mechanism
- (4) Outside surface of cabinet door
- (5) Installation level
- (6) Safety lock

3VL Molded Case Circuit Breakers

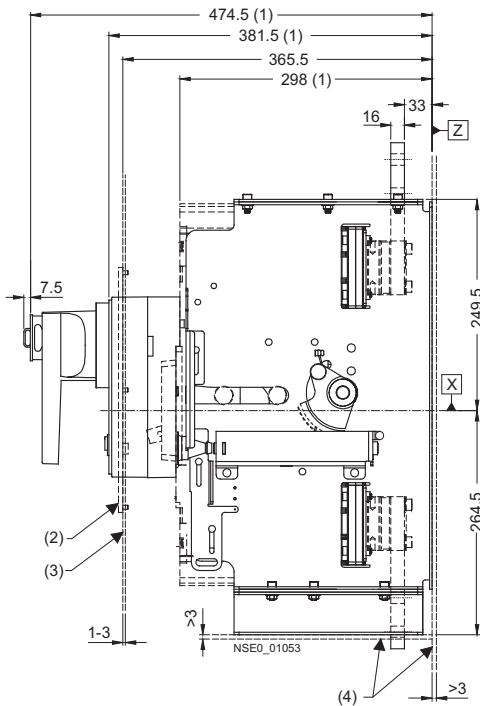
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

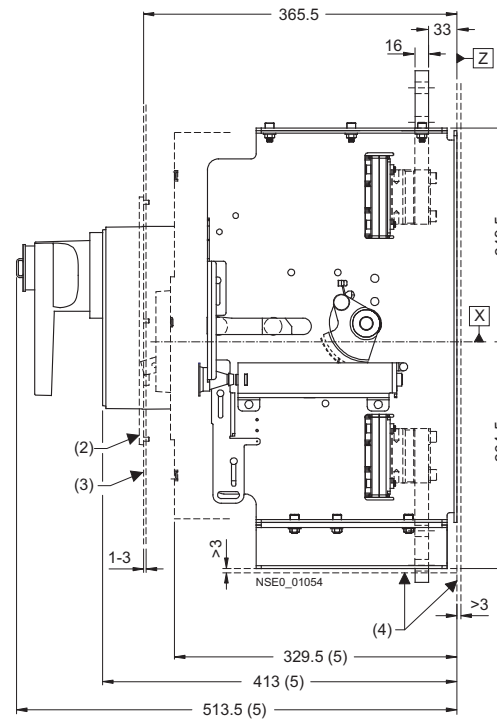
VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

Withdrawable versions

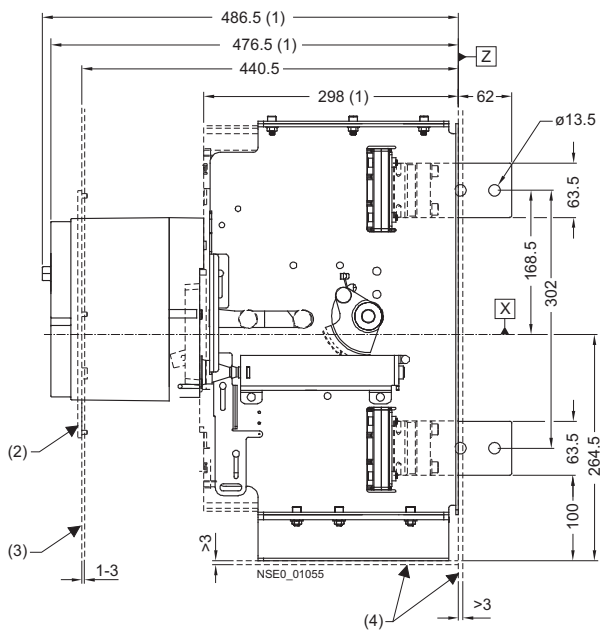
Withdrawable version with front-operated rotary operating mechanism
Insert position



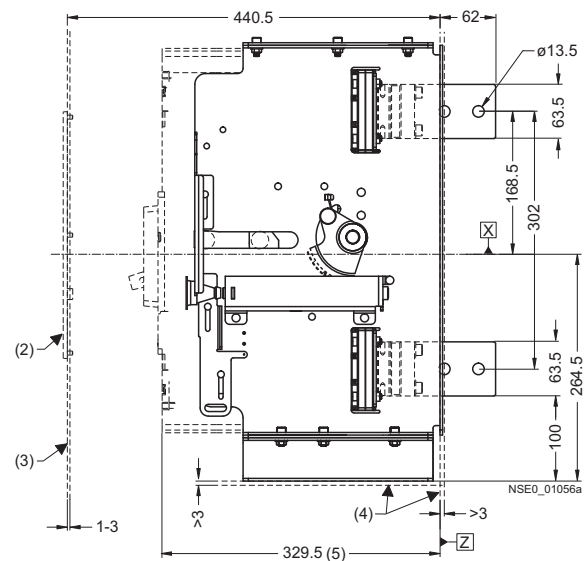
Withdrawable version with front-operated rotary operating mechanism
Withdraw position



Withdrawable version with motorized operating mechanism with stored-energy mechanism
Insert position



Withdrawable version with motorized operating mechanism with stored-energy mechanism
Withdraw position



- (1) Connected position
- (2) Masking frame for door cut-out
- (3) Outside surface of cabinet door
- (4) Installation level
- (5) Disconnected position

3VL Molded Case Circuit Breakers

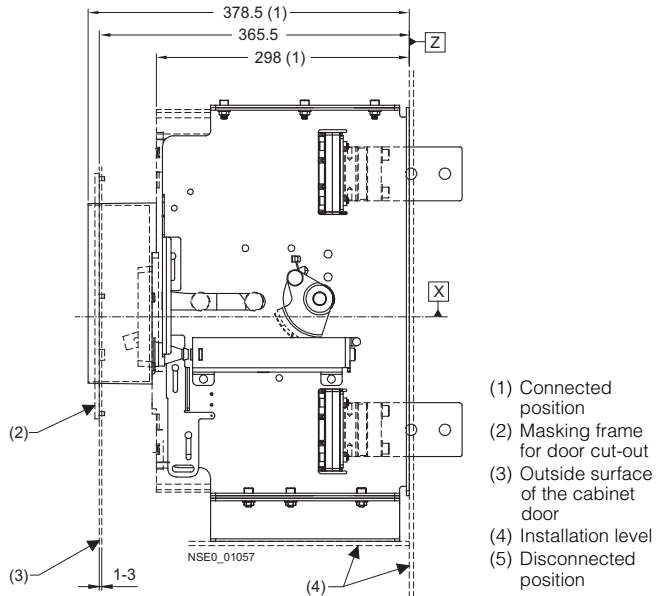
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

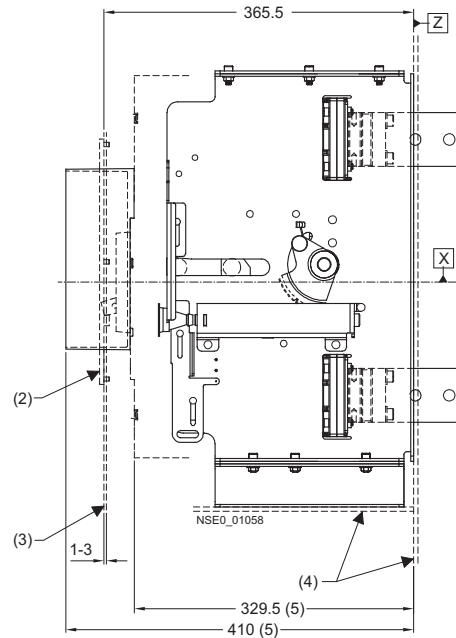
VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

Withdrawable versions

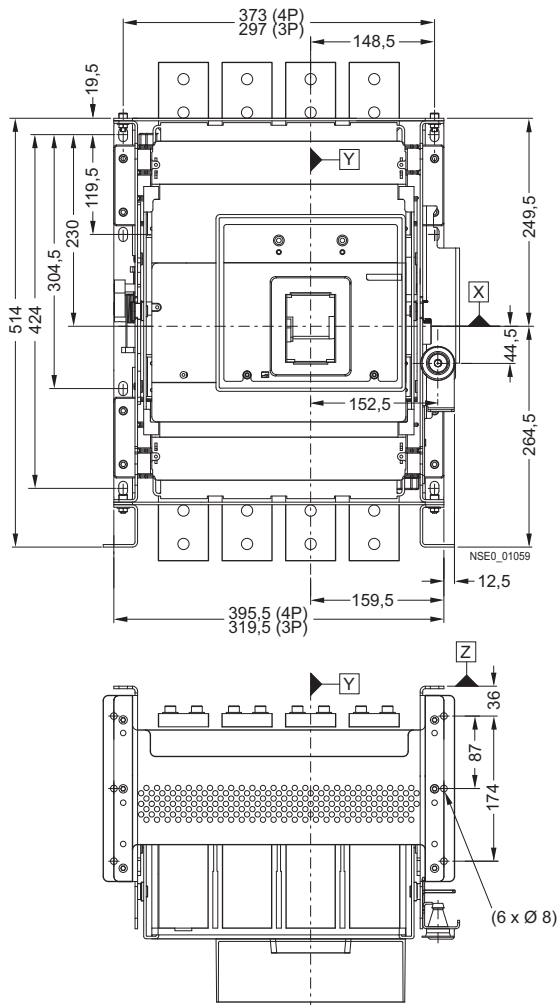
Withdrawable version with extended escutcheon (without masking frame)
Insert position



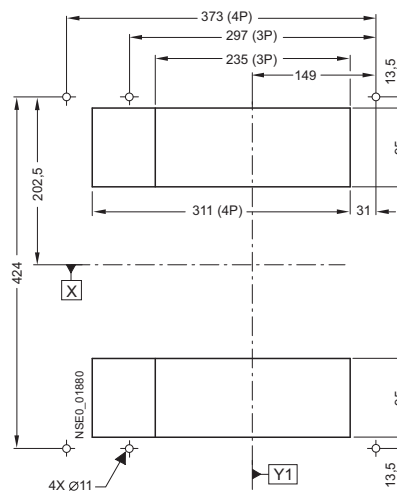
Withdrawable version with extended escutcheon (without masking frame)
Withdraw position



Withdrawable version



Hole pattern and cut-out for withdrawable versions
with rear flat bar connection



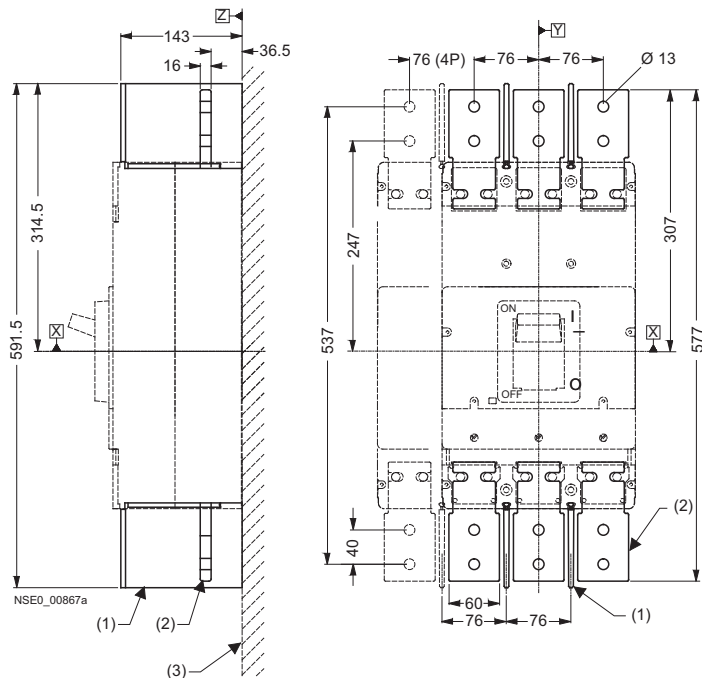
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

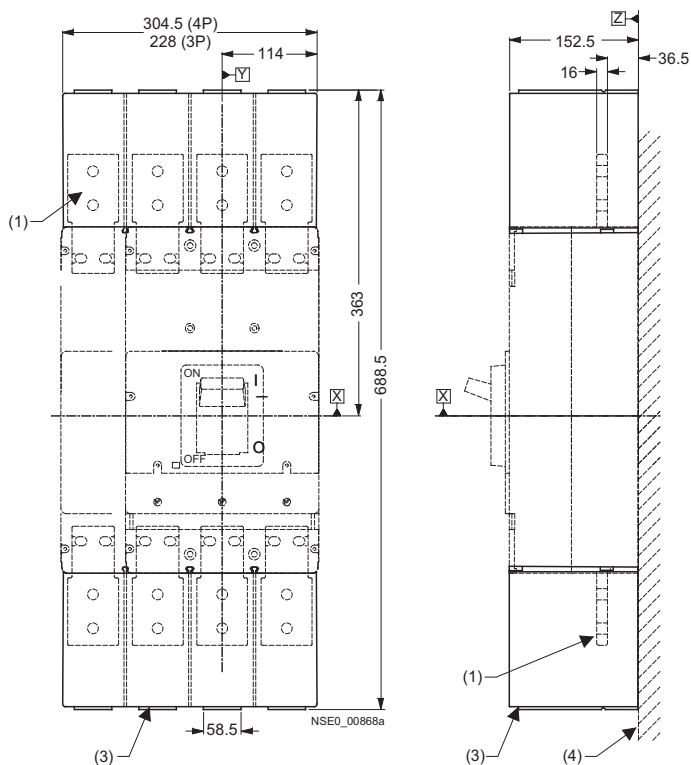
VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

Terminals and phase barriers



- (1) Phase barrier
- (2) Front connecting bars
- (3) Installation level

Terminal covers



- (1) Front connecting bars
- (2) Terminal covers (short) – only for SENTRON VL1250 (3VL7) circuit breakers
- (3) Terminal covers (extended)
- (4) Installation level
- (5) Rear terminal (mounted horizontally)
- (6) Rear terminal (mounted vertically)
- (7) Phase barriers

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

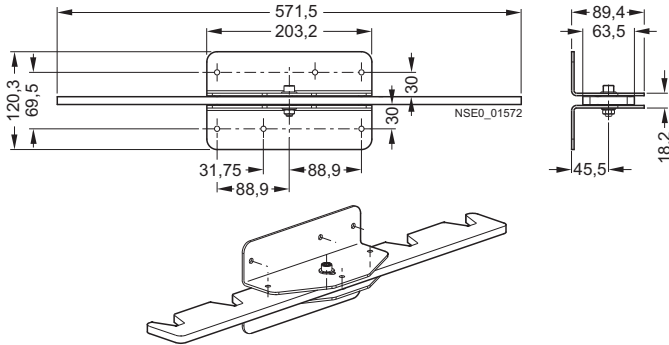
Project planning aids

VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

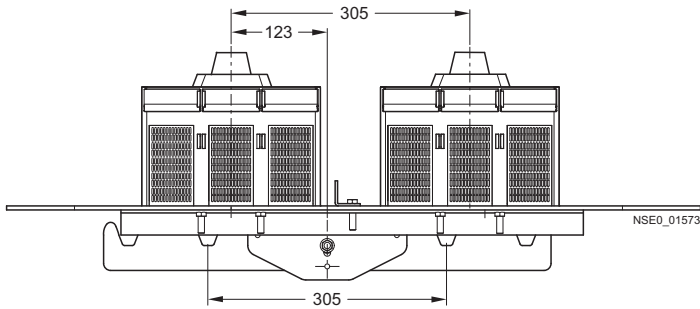
Rear interlocking modules

Rear interlocking module

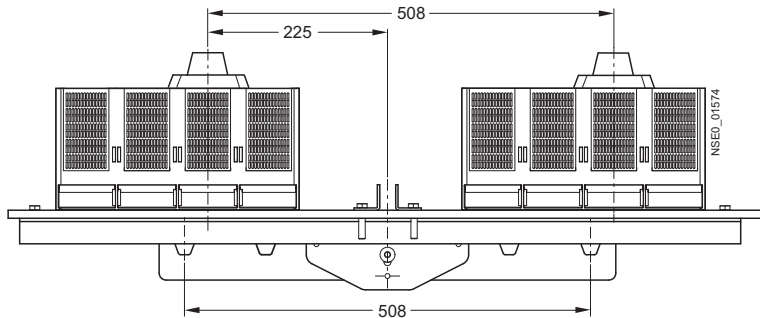
For more detailed dimensional drawings see "Mounting Instructions for Rear Interlocking Module".



3-pole version



4-pole version



3VL Molded Case Circuit Breakers

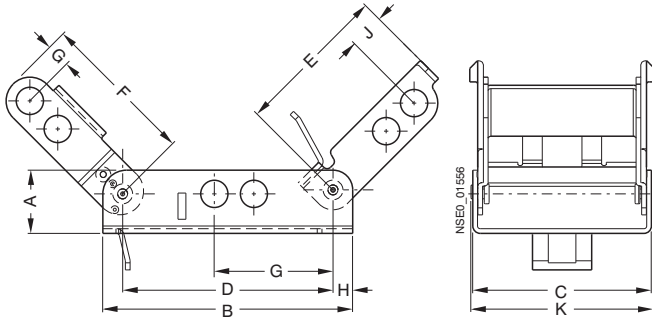
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

Interlocks

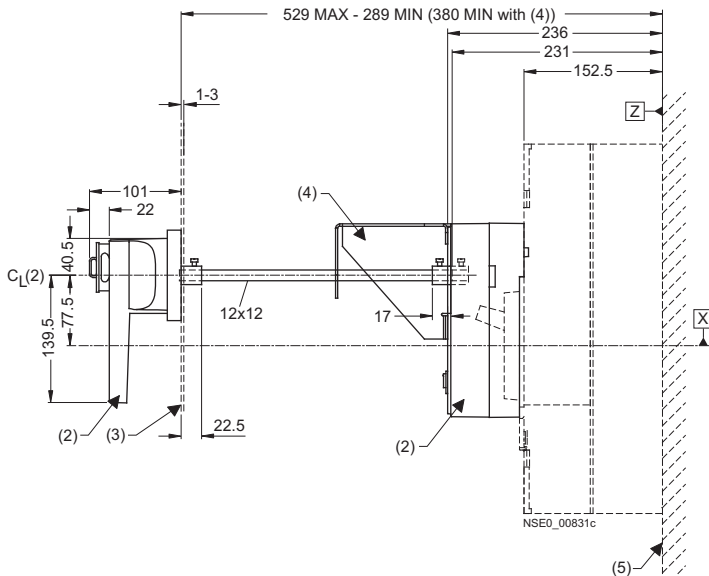
Locking devices for toggle levers



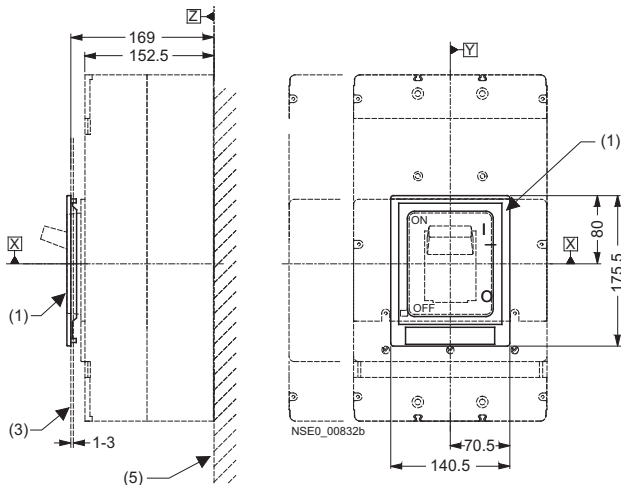
Type	a	b	c	d	e	f	g	h	i	k
3VL9 4	20.3	80.3	57.4	52.8	49.3	49.8	6.35	6.3	11.2	58.5
3VL9 6	21.6	79.8	71.1	62.0	50.4	46.5	12.9	8.9	8.6	72.2
3VL9 8	21.6	110.5	88.9	96.5	77.2	69.1	11.7	5.1	24.8	90.0

Accessories

Door-coupling rotary operating mechanism



Masking frame for door cut-out for circuit breaker with toggle lever



- (1) Masking frame for door cut-out (for circuit breaker with toggle lever)
- (2) Door-coupling rotary operating mechanism
- (3) Outside surface of cabinet door
- (4) Support bracket
- (5) Installation level

3VL Molded Case Circuit Breakers

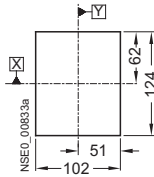
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

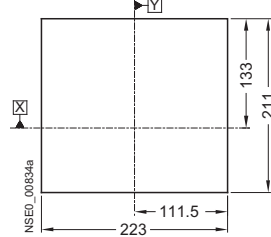
VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

Door cut-outs

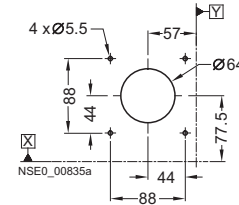
Door cut-out for toggle lever
(without masking frame)



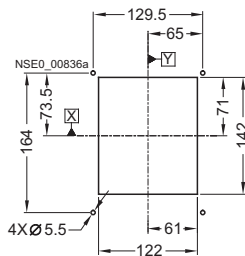
Door cut-out for front-operated rotary operating mechanism and motorized operating mechanism
(without masking frame)



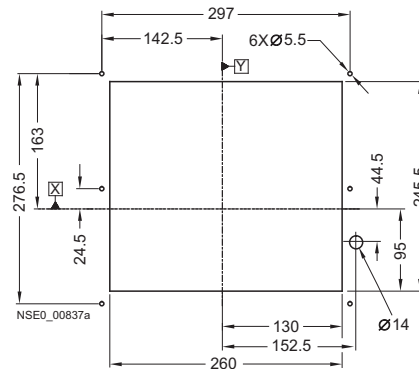
Door cut-out for door-coupling rotary operating mechanism



Door cut-out for toggle lever
(with masking frame)

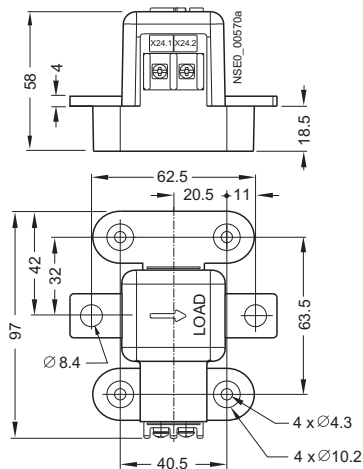


Door cut-out for front-operated rotary operating mechanism, motorized operating mechanism and extended escutcheon (with masking frame)

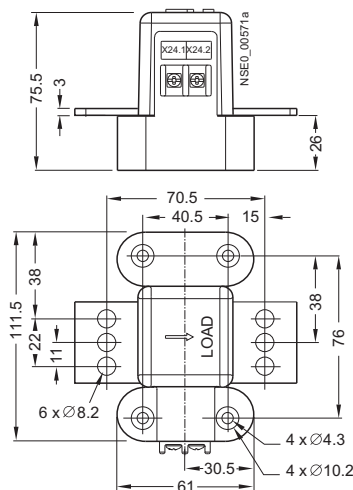


Current transformers

Current transformer for neutral conductors for ground-fault protection in 4-wire three-phase systems for SENTRON VL160 (3VL2)/VL250 (3VL3) circuit breakers



Current transformer for neutral conductors for ground-fault protection in 4-wire three-phase systems for SENTRON VL630 (3VL5)/VL800 (3VL6) circuit breakers



For more dimensional drawings (for current transformers for 3VL4, 3VL7, 3VL8) see mounting instruction for current transformers.

3VL Molded Case Circuit Breakers

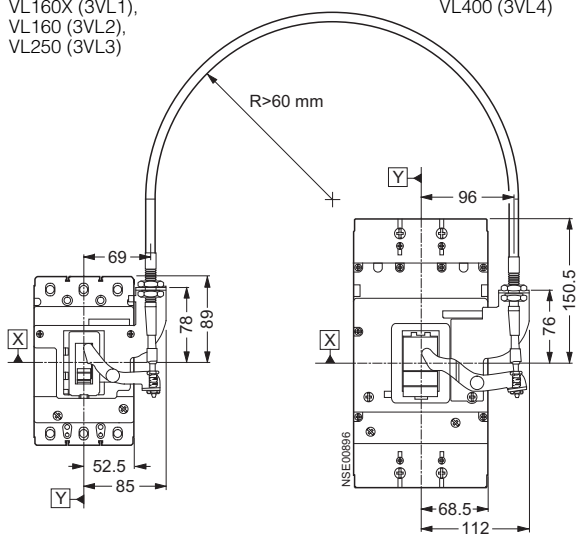
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

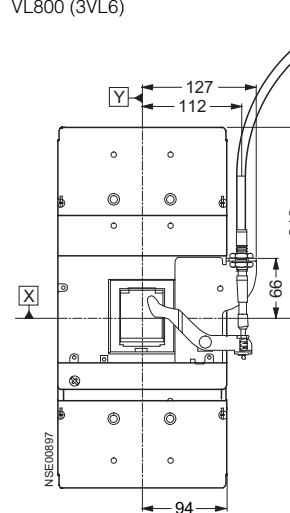
VL160X (3VL1) to VL800 (3VL6), 3- and 4-pole, up to 800 A

Interlock with Bowden wire

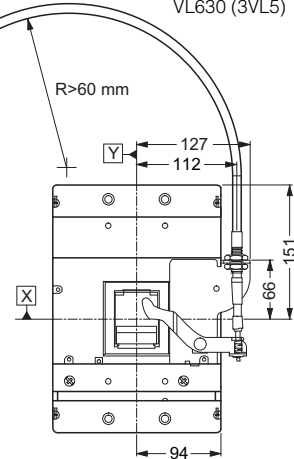
VL160X (3VL1),
VL160 (3VL2),
VL250 (3VL3)



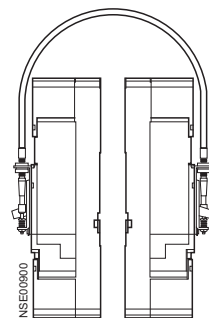
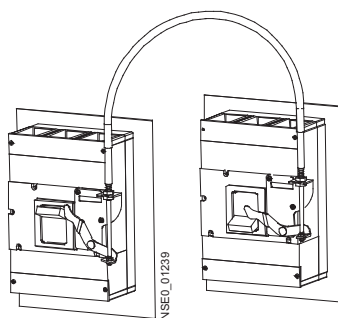
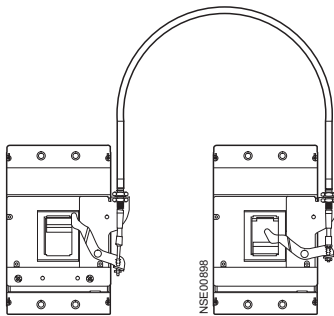
VL800 (3VL6)



VL630 (3VL5)



Combination options



3VL9 300-8LA00 For VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3)	3VL9 400-8LA00 For VL400 (3VL4)	3VL9 600-8LA00 For VL630 (3VL5) and VL800 (3VL6)	3VL9 800-8LA00 For VL1250 (3VL7) and VL1600 (3VL8)
--------------------------------------------------------------------------	------------------------------------	--------------------------------------------------------	----------------------------------------------------------

Interlock with Bowden wire

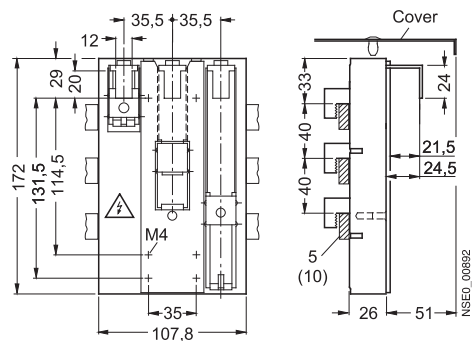
3VL9 300-8LA00 For VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3)	✓	--	--	--
3VL9 400-8LA00 For VL400 (3VL4)	--	✓	--	--
3VL9 600-8LA00 For VL630 (3VL5) and VL800 (3VL6)	--	--	✓	--
3VL9 800-8LA00 For VL1250 (3VL7) and VL1600 (3VL8)	--	--	--	✓

✓ Combination possible

VL160X (3VL1) to VL400 (3VL4), 3- and 4-pole, up to 400 A

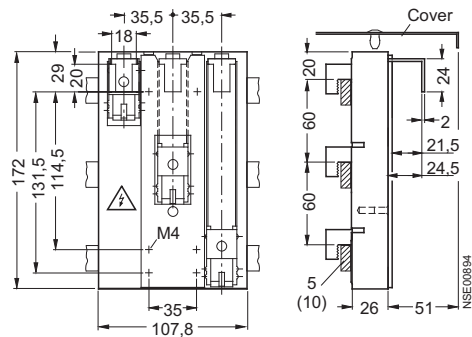
8US10 11-4SL01

(40 mm system)



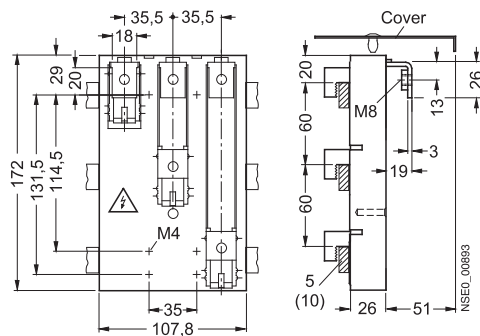
8US12 11-4SL01

(60 mm system)



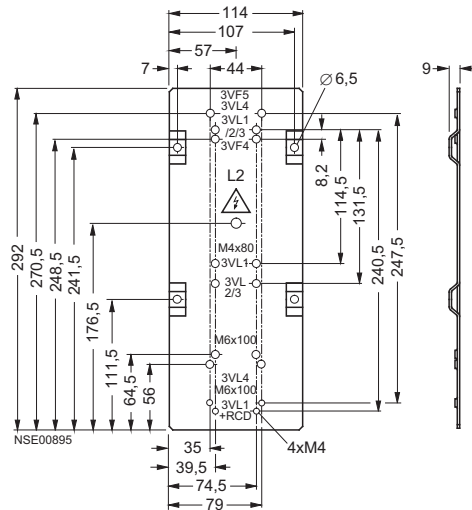
8US12 11-4SL00

(60 mm system)



8US19 27-4AF01

(60 mm system)



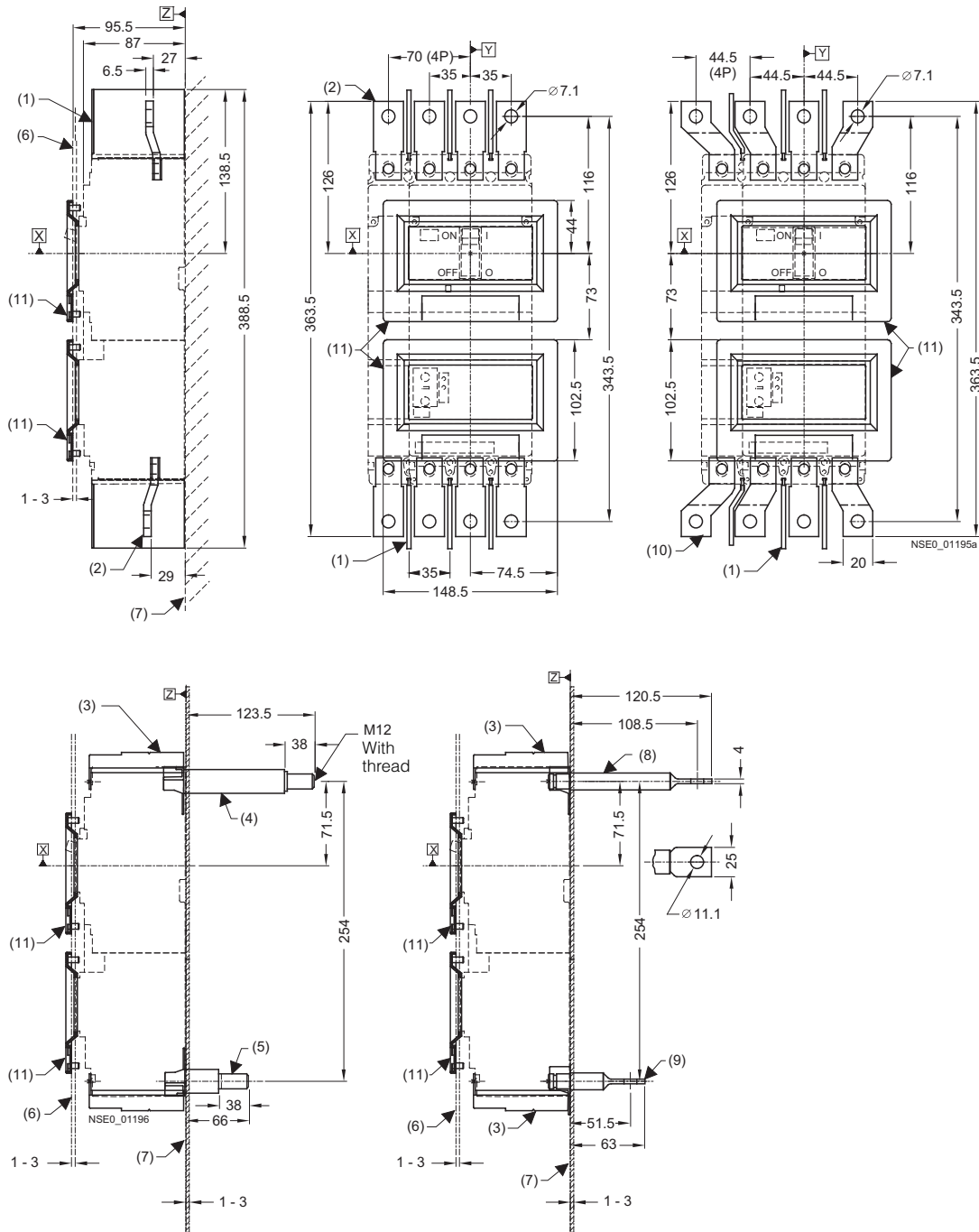
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL160X (3VL1) with RCD module, 3- and 4-pole, up to 160 A

Terminals and phase barriers



- (1) Phase barrier
- (2) Front connecting bars
- (3) Terminal covers (standard)
- (4) Threaded rear terminals, threaded bolt (long)
- (5) Threaded rear terminals, threaded bolt (short)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Rear terminal, long flat connector
- (9) Rear terminal, short flat connector
- (10) Flared front busbar connecting bars
- (11) Masking frame for door cut-out
(for circuit breaker with RCD module)

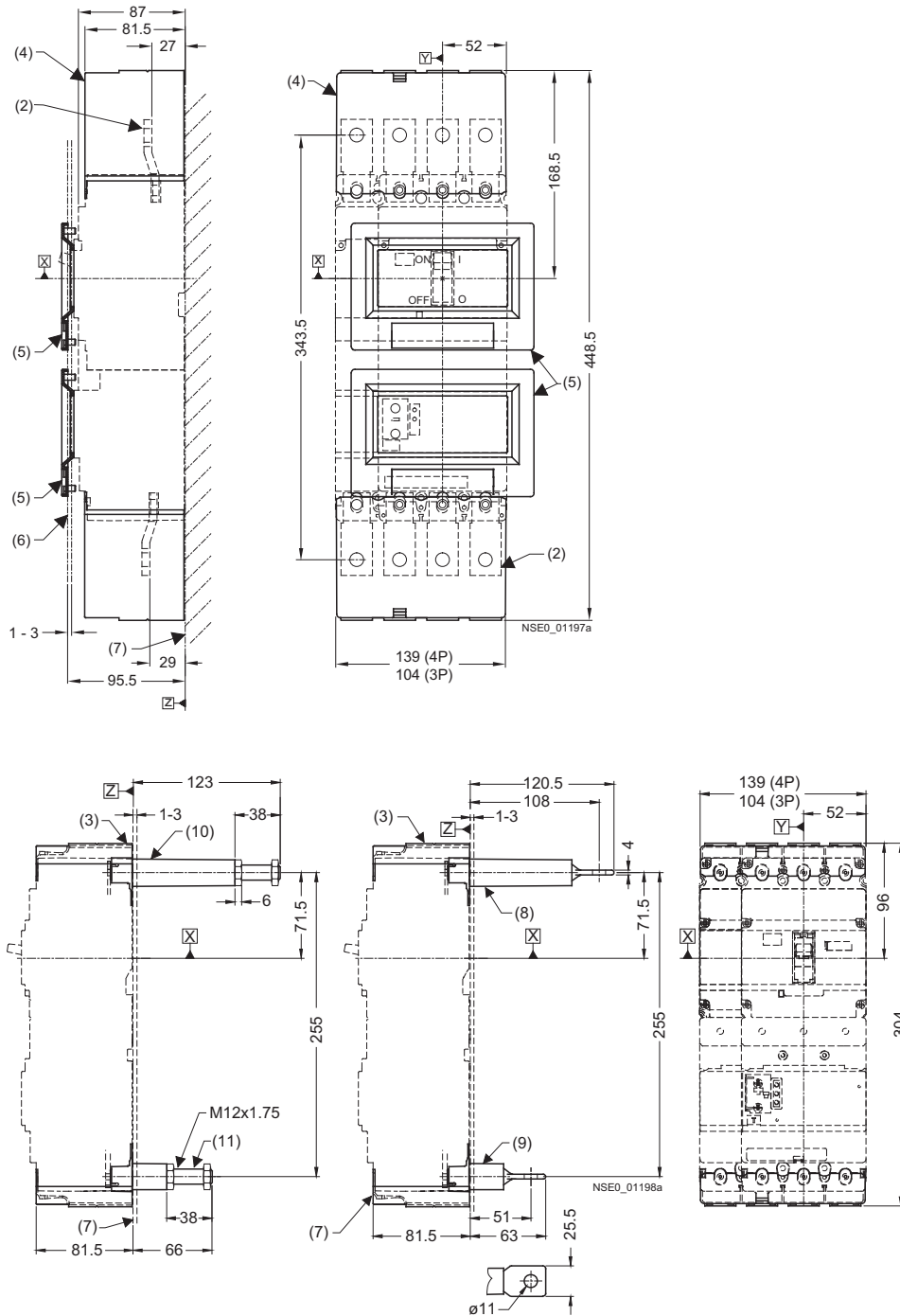
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL160X (3VL1) with RCD module, 3- and 4-pole, up to 160 A

Terminal covers



- (2) Front connecting bars
- (3) Terminal covers (standard)
- (4) Terminal covers (extended)
- (5) Masking frame for door cut-out
(for circuit breaker with RCD module)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Rear terminal, long flat connector
- (9) Rear terminal, short flat connector
- (10) Rear terminal, long
- (11) Rear terminal, short

3VL Molded Case Circuit Breakers

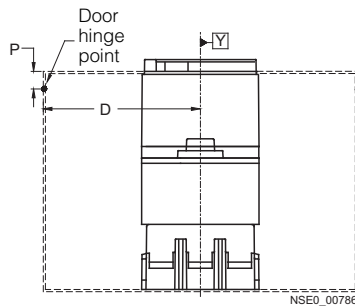
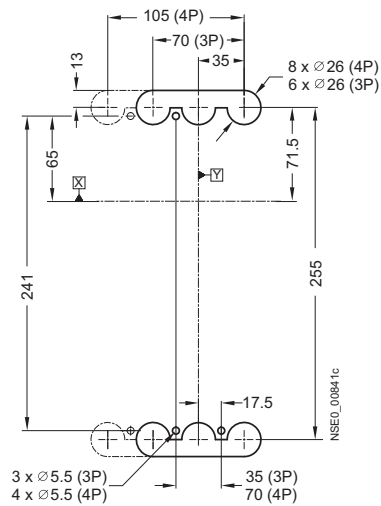
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL160X (3VL1) with RCD module, 3- and 4-pole, up to 160 A

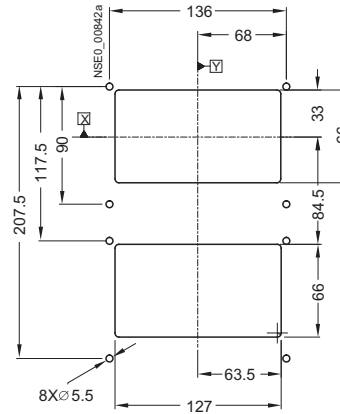
Door cut-outs

Hole pattern, cut-out for rear terminals

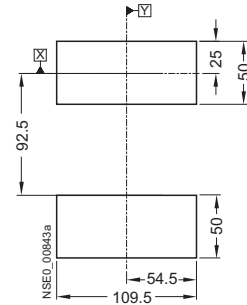


D > A from table + (P × 5)

Door cut-out for toggle lever (with masking frame)



Door cut-out for toggle lever (without masking frame)

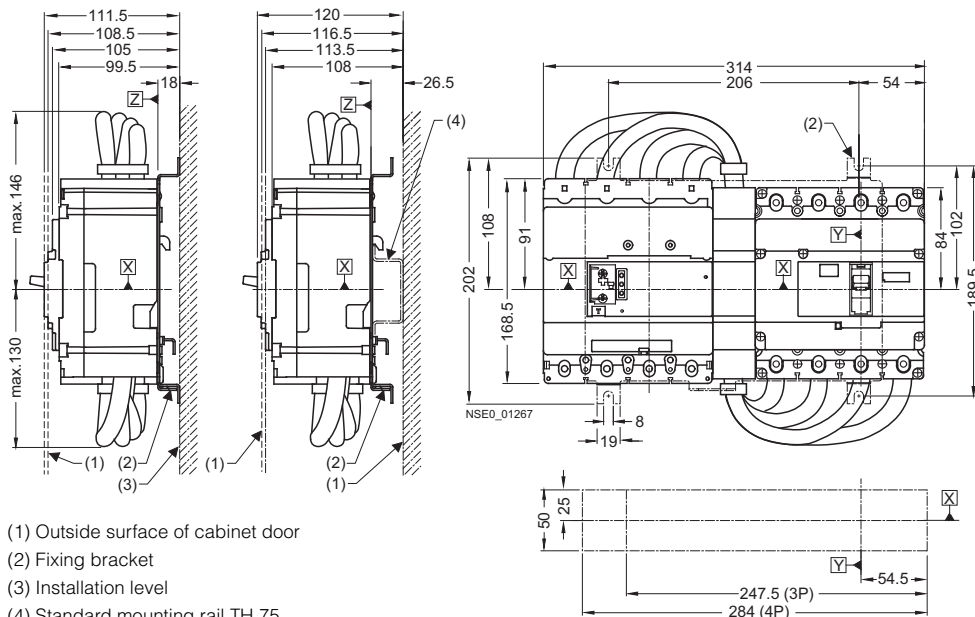


Note:

A minimum distance between reference point Y and the door hinge is required for the door cut-outs.

Combination	A
Circuit breaker only	100
Circuit breaker + plug-in base + motorized operating mechanism with stored-energy mechanism	100
Circuit breaker + plug-in base + front-operated rotary operating mechanism	200

Circuit breaker with laterally attached RCD module



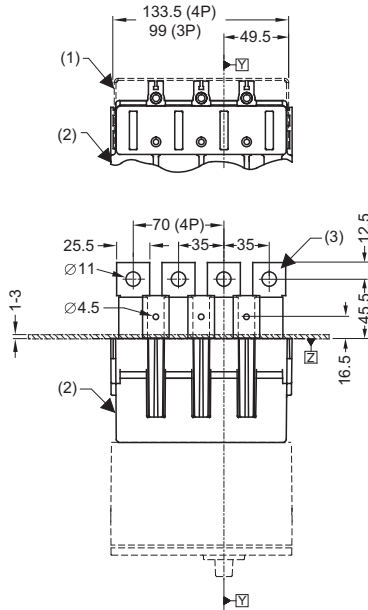
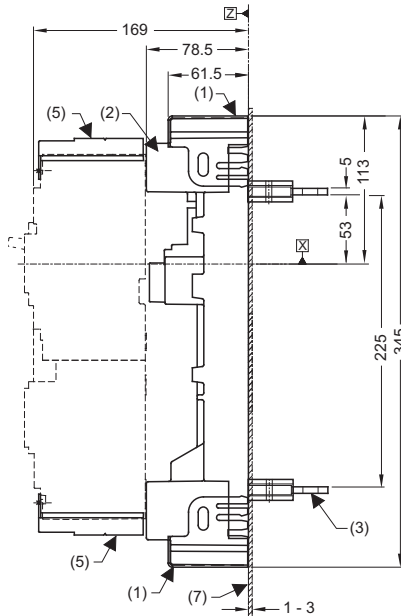
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

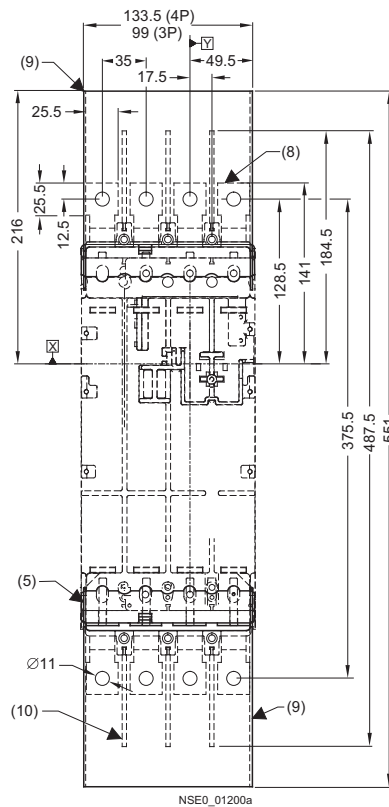
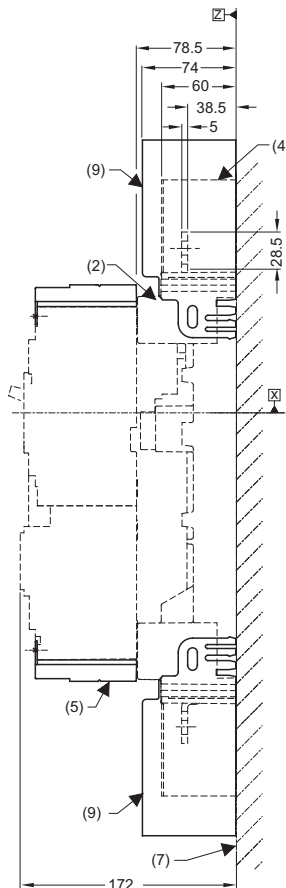
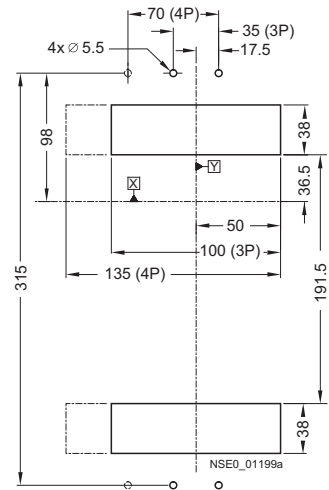
Project planning aids

VL160X (3VL1) with RCD module, 3- and 4-pole, up to 160 A

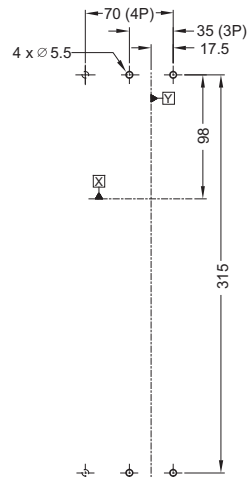
Plug-in bases and accessories



Hole pattern and cut-out for plug-in base with rear flat bar connection



Hole pattern for plug-in base with front connecting bars



- (1) Plug-in base with rear terminal covers
- (2) Plug-in base for circuit breaker with RCD module
- (3) Plug-in base with rear flat bar connection
- (4) Masking frame for door cut-out (for circuit breaker with RCD module)
- (5) Terminal cover (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Plug-in base with front connecting bars
- (9) Plug-in base with terminal covers on the front
- (10) Phase barrier

3VL Molded Case Circuit Breakers

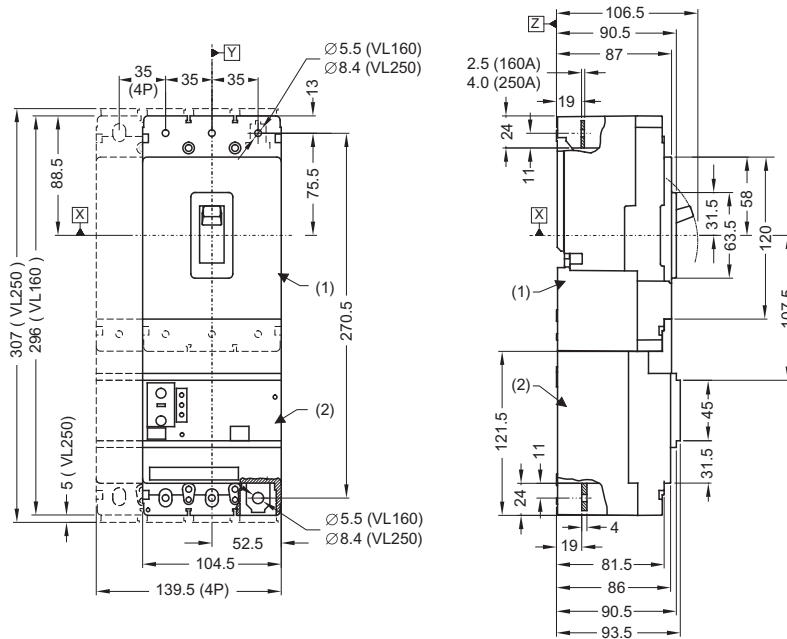
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL160 (3VL2) and VL250 (3VL3) with RCD module, 3- and 4-pole, up to 250 A

Circuit breakers

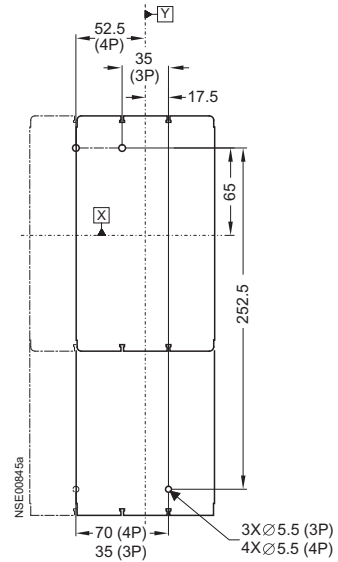
SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with RCD module



- (1) Circuit breaker
(2) RCD module

Note for the SENTRON VL250 (3VL3) circuit breaker: The 5 mm extension (overall height 307 mm) at each end only applies when using box terminals and circular conductor terminals.

Circuit breaker installation instructions



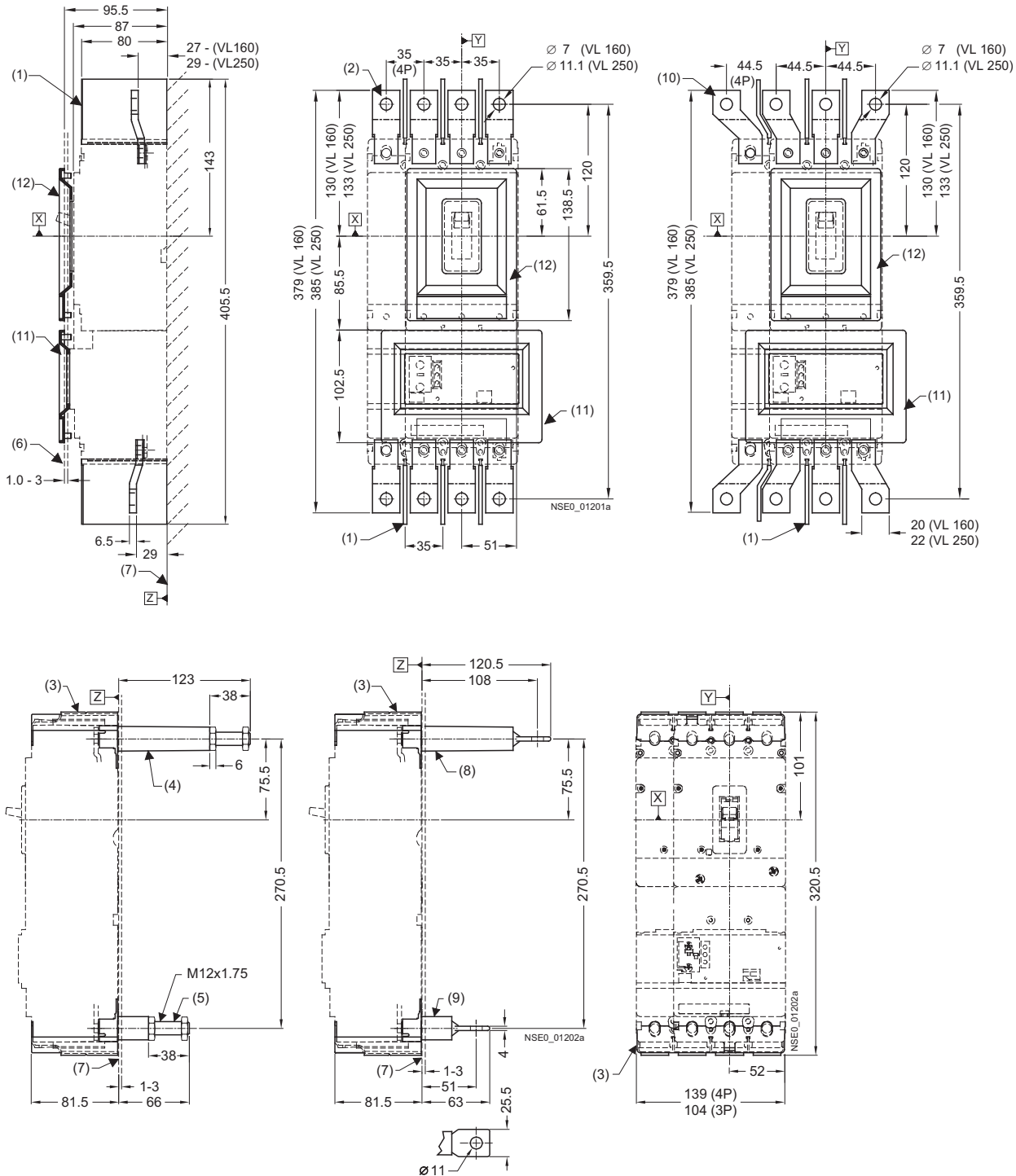
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL160 (3VL2) and VL250 (3VL3) with RCD module, 3- and 4-pole, up to 250 A

Terminals and phase barriers



- (1) Phase barrier
- (2) Front connecting bars
- (3) Terminal covers (standard)
- (4) Rear terminals (long)
- (5) Rear terminals (short)
- (6) Outside surface of cabinet door

- (7) Installation level
- (8) Rear flat connector (long)
- (9) Rear flat connector (short)
- (10) Flared front busbar connecting bars
- (11) Masking frame for door cut-out (for circuit breaker with RCD module)
- (12) Masking frame for door cut-out (for circuit breaker with toggle lever)

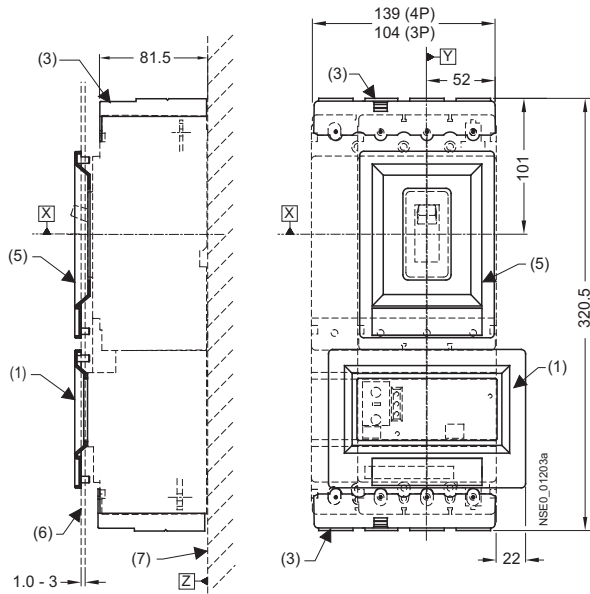
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

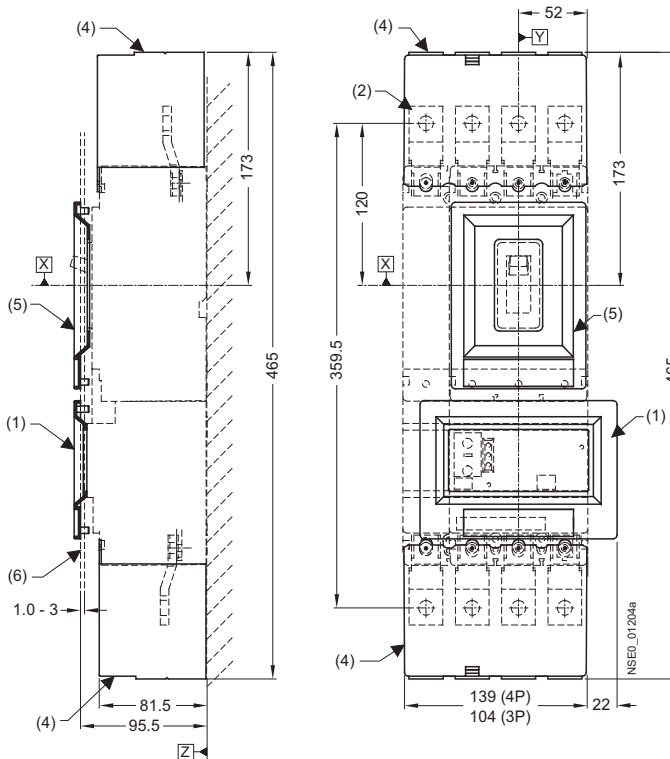
Project planning aids

VL160 (3VL2) and VL250 (3VL3) with RCD module, 3- and 4-pole, up to 250 A

Terminal covers



For dimensions of the lower masking frame, "VL160X (3VL1) with RCD module, 3- and 4-pole, up to 160 A", "Terminal covers", see bottom of page 16/75.



- (1) Masking frame for door cut-out (for circuit breaker with RCD module)
- (2) Front connecting bars
- (3) Terminal covers (standard)
- (4) Terminal covers (extended)
- (5) Masking frame for door cut-out (for circuit breaker with toggle lever)
- (6) Outside surface of cabinet door
- (7) Installation level

3VL Molded Case Circuit Breakers

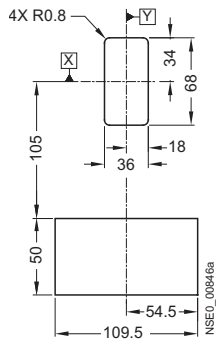
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

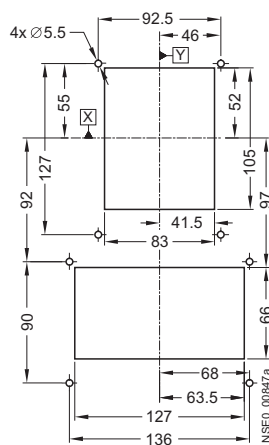
VL160 (3VL2) and VL250 (3VL3) with RCD module, 3- and 4-pole, up to 250 A

Door cut-outs

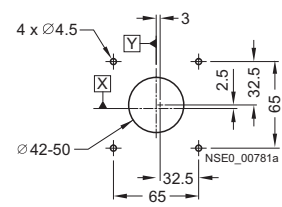
Door cut-out for toggle lever (without masking frame)



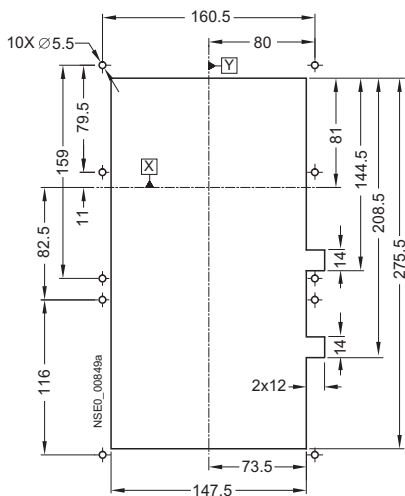
Door cut-out for toggle lever (with masking frame)



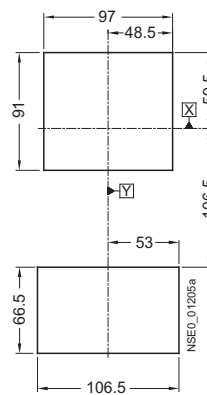
Door cut-out for door-coupling rotary operating mechanism



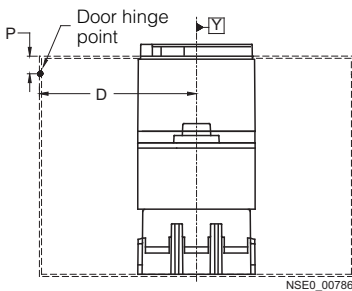
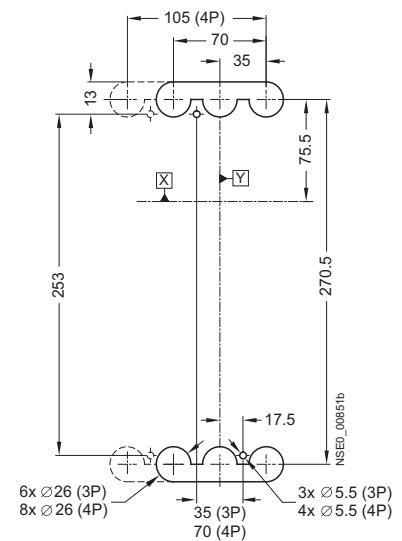
Door cut-out for front-operated rotary operating mechanism and motorized operating mechanism with stored-energy mechanism (with masking frame)



Door cut-out for front-operated rotary operating mechanism (without masking frame)



Hole pattern, cut-out for rear terminal studs

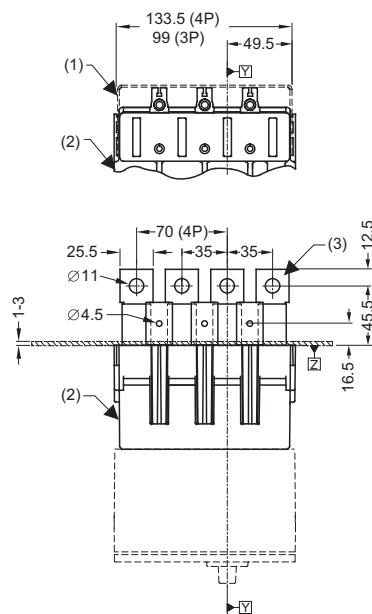


Note:
A minimum distance between reference point Y and the door hinge is required for the door cut-outs.

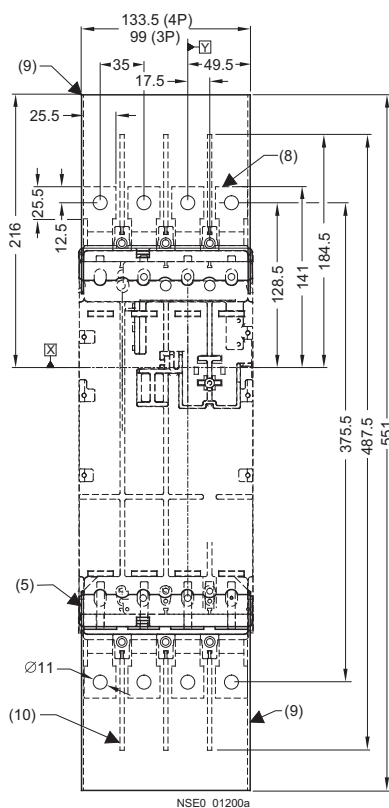
D > A from table + (P x 5)

Combination	A
Circuit breaker only	100
Circuit breaker + plug-in base + motorized operating mechanism with stored-energy mechanism	100
Circuit breaker + plug-in base + front-operated rotary operating mechanism	200
Circuit breaker + withdrawable version	200

Plug-in bases and accessories



Technical drawing of the front view of a mechanical part. The drawing shows a rectangular component with a total height of 315 and a total width of 191.5. The top section has a height of 98 and a width of 135 (4P). The bottom section has a height of 38 and a width of 100 (3P). The central section has a height of 36.5 and a width of 50. The drawing includes dimensions for the top section (70 (4P), 35 (3P), 17.5) and the bottom section (38). The drawing is labeled '图 10-10 前视图' and '图例'.

[illegible]

- Siemens LV 1 T · 2009

3VL Molded Case Circuit Breakers

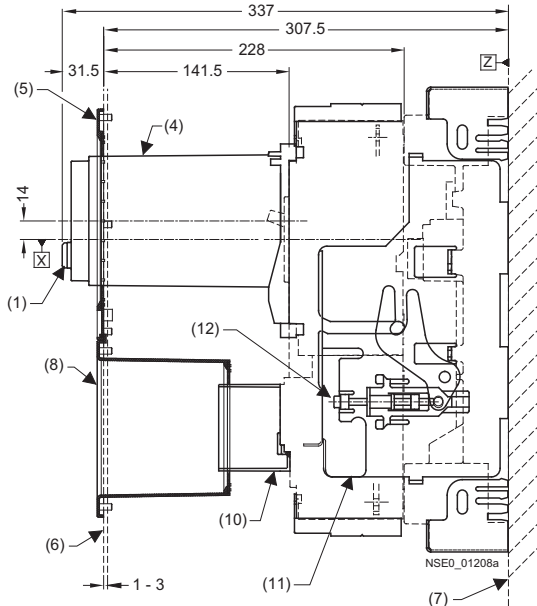
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

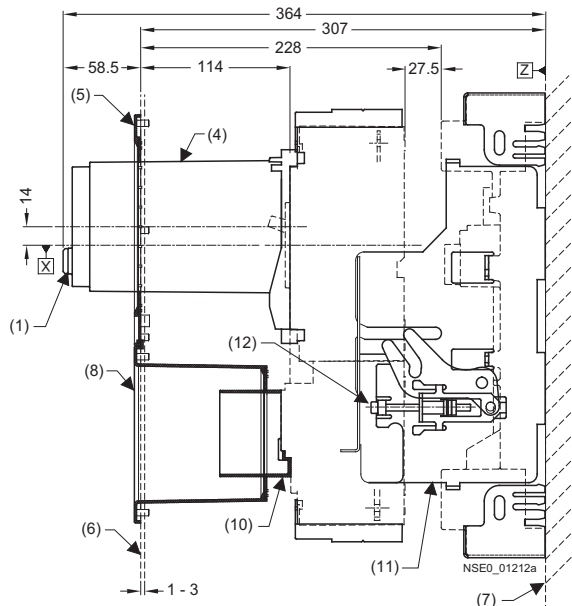
VL160 (3VL2) and VL250 (3VL3) with RCD module, 3- and 4-pole, up to 250 A

Plug-in bases and accessories

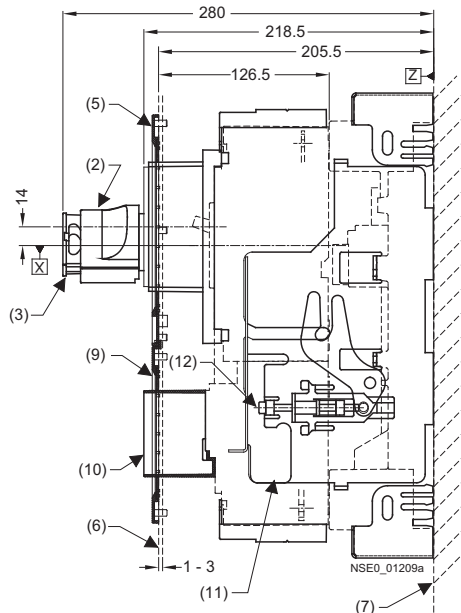
SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with RCD module and motorized operating mechanism with stored-energy mechanism (connected position)



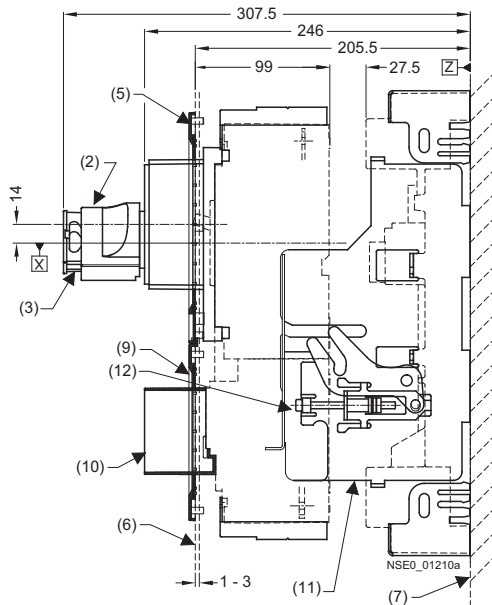
SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with RCD module and motorized operating mechanism with stored-energy mechanism (disconnected position)



SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with RCD module and front-operated rotary operating mechanism (connected position)



SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with RCD module and front-operated rotary operating mechanism (disconnected position)



- (1) Safety lock
- (2) Front-operated rotary operating mechanism
- (3) Padlock
- (4) Motorized operating mechanism with stored-energy mechanism
- (5) Masking frame for door cut-out (for circuit breaker with operating mechanism)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Masking frame for door cut-out (for circuit breaker with RCD module, motorized operating mechanism)
- (9) Masking frame for door cut-out (for circuit breaker with RCD module, toggle lever/rotary operating mechanism)
- (10) RCD extended escutcheon
- (11) Locking device for racking mechanism
- (12) Racking mechanism

3VL Molded Case Circuit Breakers

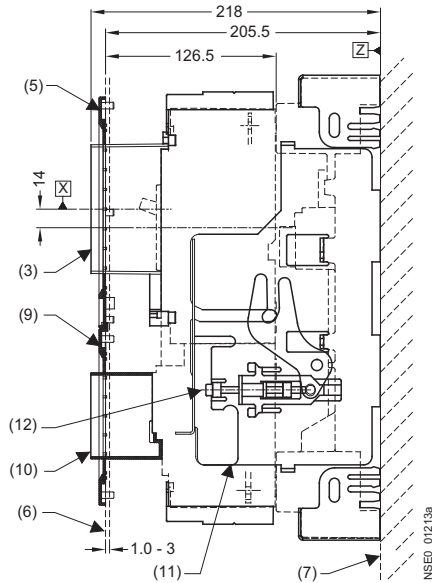
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

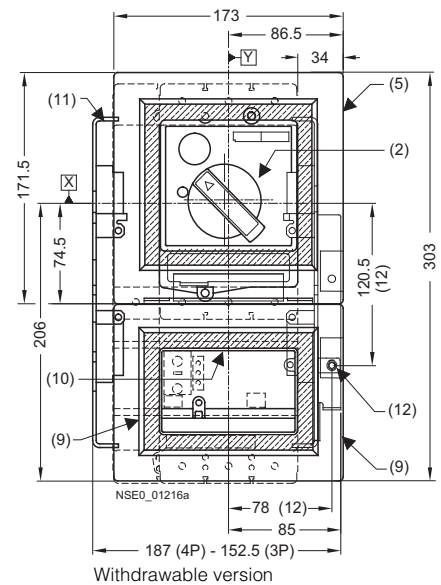
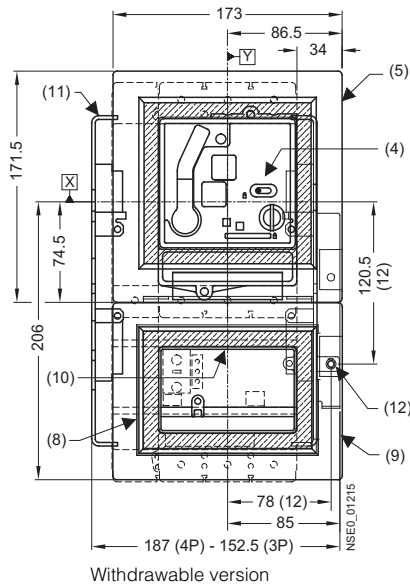
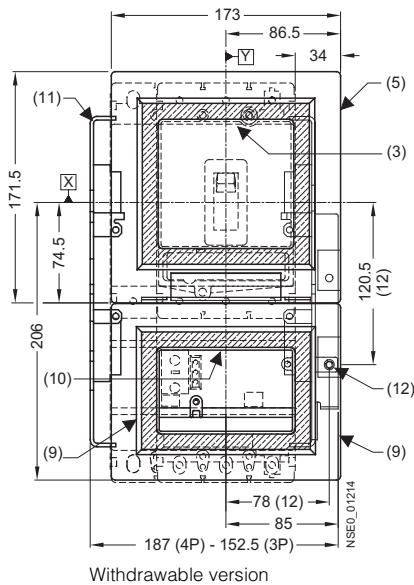
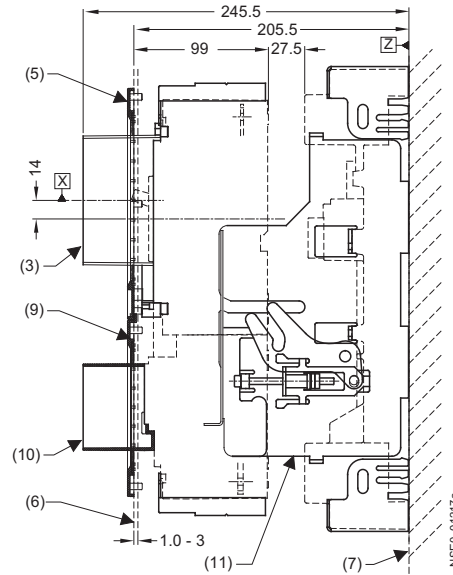
VL160 (3VL2) and VL250 (3VL3) with RCD module, 3- and 4-pole, up to 250 A

Plug-in bases and accessories

SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with RCD module and extended escutcheon (connected position)



SENTRON VL160 (3VL2) and VL250 (3VL3) circuit breakers with RCD module and extended escutcheon (disconnected position)



- (2) Front-operated rotary operating mechanism
- (3) Circuit breaker extended escutcheon
- (4) Motorized operating mechanism with stored-energy mechanism
- (5) Masking frame for door cut-out (for circuit breaker with operating mechanism)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Masking frame for door cut-out (for circuit breaker with RCD module, motorized operating mechanism)
- (9) Masking frame for door cut-out (for circuit breaker with RCD module, toggle lever/rotary operating mechanism)
- (10) RCD extended escutcheon
- (11) Locking device for racking mechanism
- (12) Racking mechanism

3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

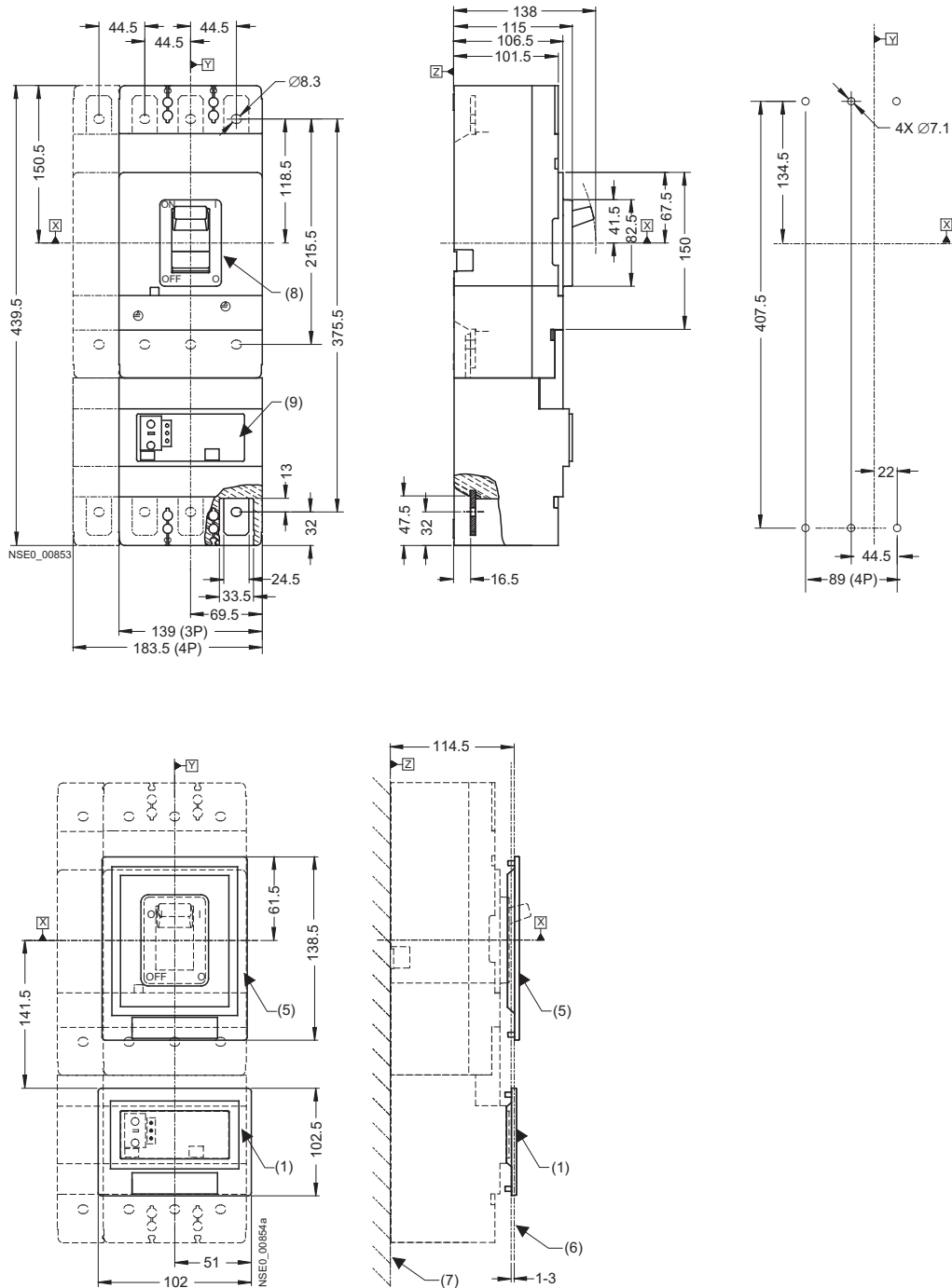
Project planning aids

VL400 (3VL4) with RCD module, 3- and 4-pole, up to 400 A

Circuit breakers

SENTRON VL400 (3VL4) circuit breaker with RCD module

Mounting hole pattern for SENTRON VL400 (3VL4) circuit breaker with RCD front connecting bar



- (1) Masking frame for door cut-out (for circuit breaker with RCD module)
- (5) Masking frame for door cut-out (for circuit breaker with toggle lever)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Circuit breaker
- (9) RCD module

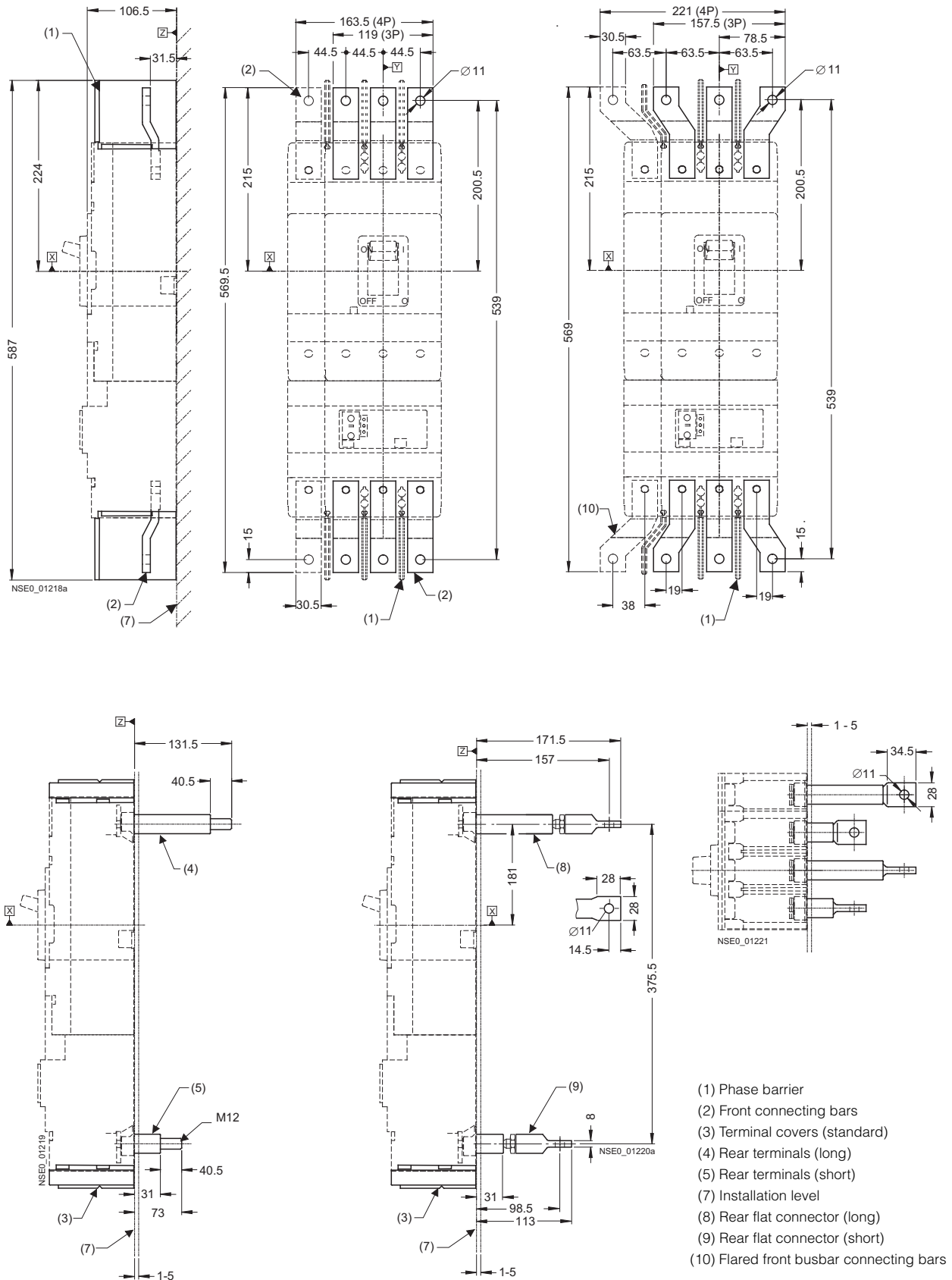
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL400 (3VL4) with RCD module, 3- and 4-pole, up to 400 A

Terminals and phase barriers



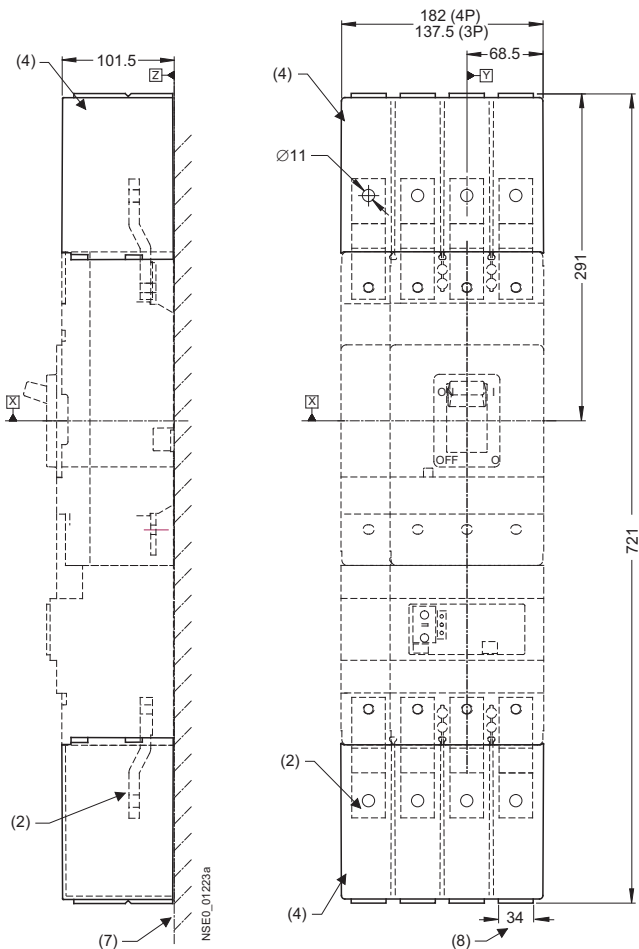
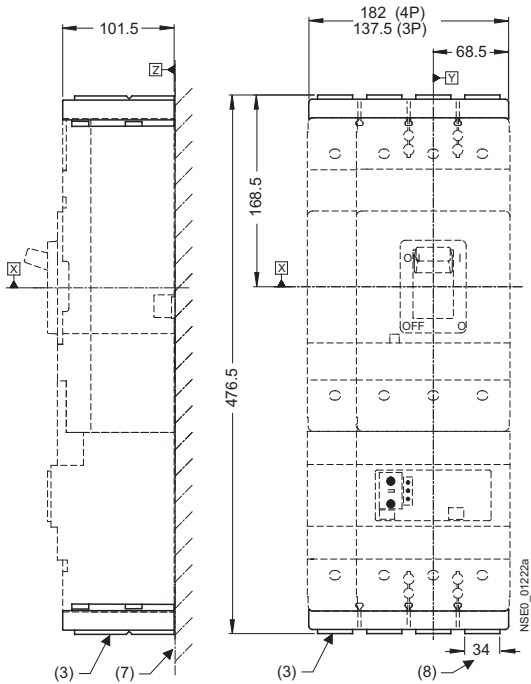
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

VL400 (3VL4) with RCD module, 3- and 4-pole, up to 400 A

Terminal covers



- (2) Front connecting bars
- (3) Terminal covers (standard)
- (4) Terminal covers (extended)
- (7) Installation level
- (8) Cut-out

3VL Molded Case Circuit Breakers

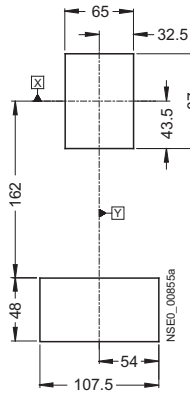
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

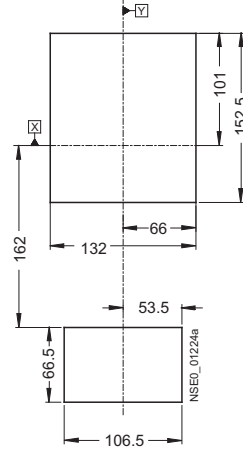
VL400 (3VL4) with RCD module, 3- and 4-pole, up to 400 A

Door cut-outs

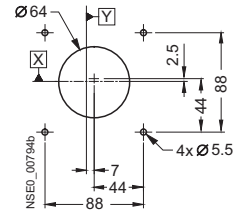
Door cut-out for toggle lever (with masking frame)



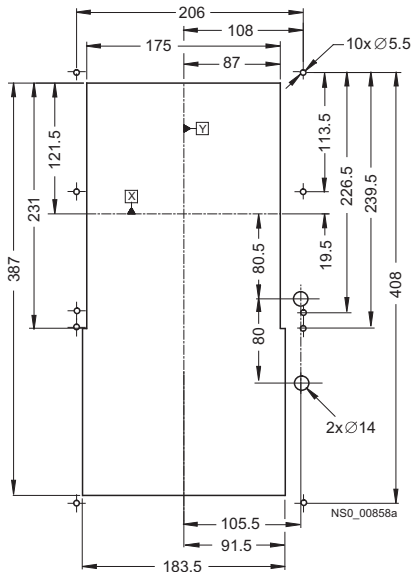
Door cut-out for front-operated rotary operating mechanism (without masking frame)



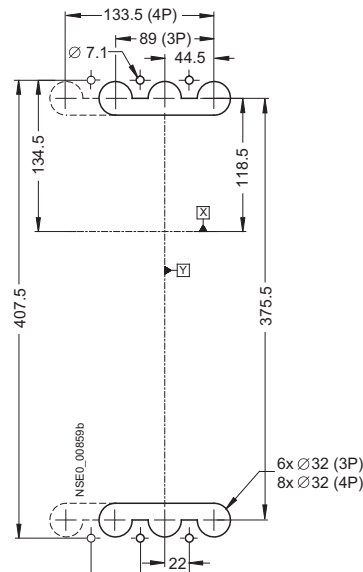
Door cut-out for door-coupling rotary operating mechanism



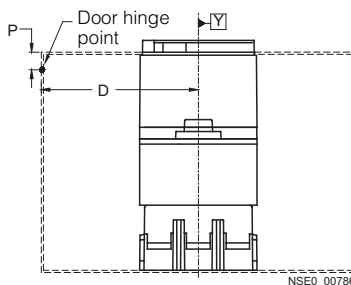
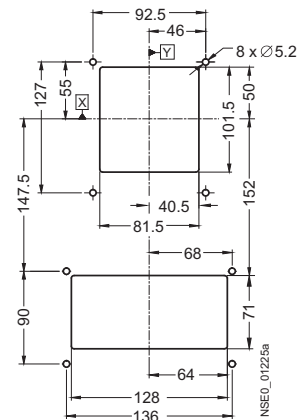
Door cut-out for front-operated rotary operating mechanism, motorized operating mechanism with stored-energy mechanism and extended escutcheon (with masking frame)



Hole pattern and cut-out for rear terminal studs



Door cut-out for toggle lever (with masking frame)



Note:
A minimum distance between reference point Y and the door hinge is required for the door cut-outs.

$D > A$ from table + $(P \times 5)$

Combination	A
Circuit breaker only	150
Circuit breaker + plug-in base + motorized operating mechanism with stored-energy mechanism	150
Circuit breaker + plug-in base + front-operated rotary operating mechanism	200
Circuit breaker + withdrawable version	200

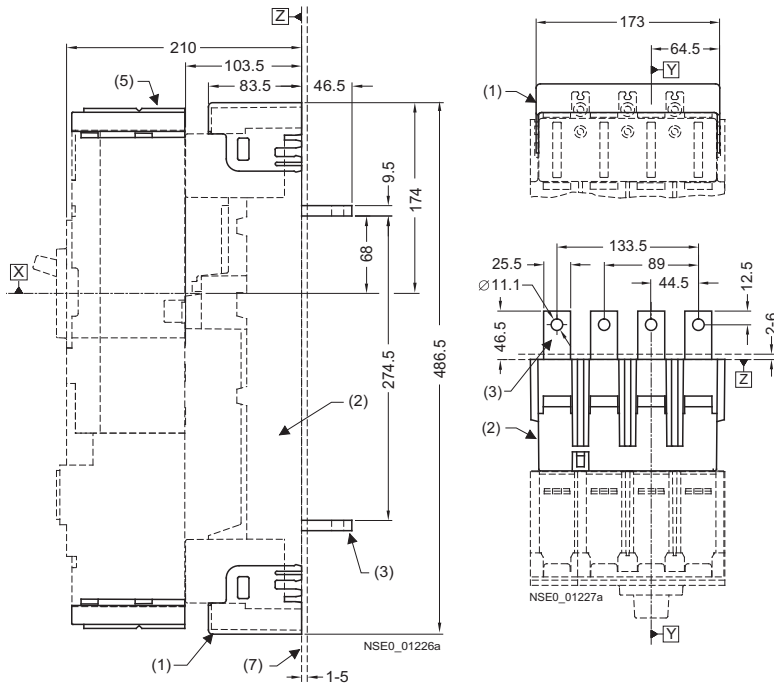
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

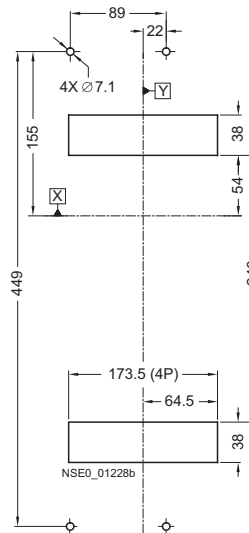
Project planning aids

VL400 (3VL4) with RCD module, 3- and 4-pole, up to 400 A

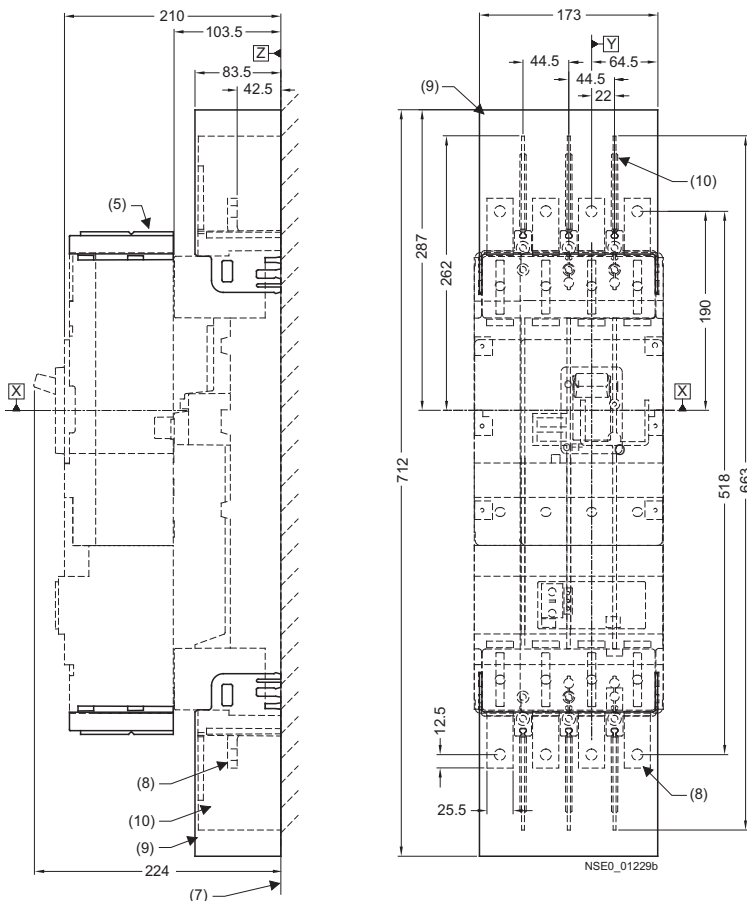
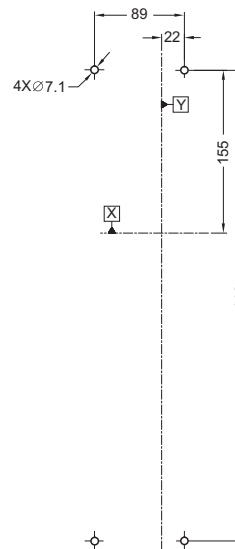
Plug-in bases and accessories



Hole pattern and cut-out for plug-in base with rear flat bar connection



Hole pattern for plug-in base with front connecting bars



- (1) Plug-in base with terminal covers
- (2) Plug-in base
- (3) Plug-in base with rear flat bar connection
- (5) Terminal covers (standard)
- (7) Installation level
- (8) Plug-in base with front connecting bars
- (9) Plug-in base with terminal covers on the front
- (10) Phase barrier

3VL Molded Case Circuit Breakers

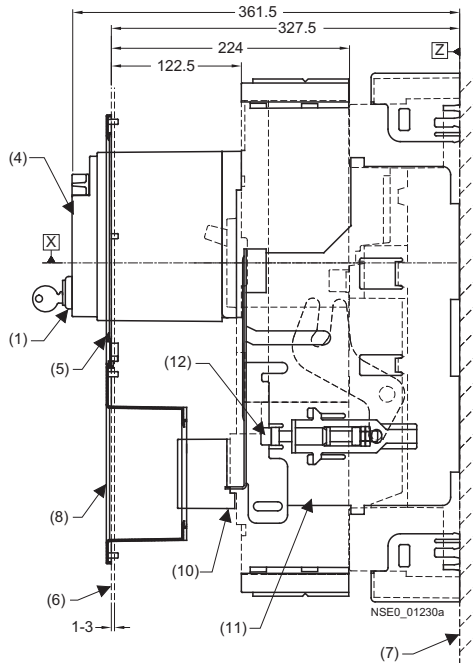
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

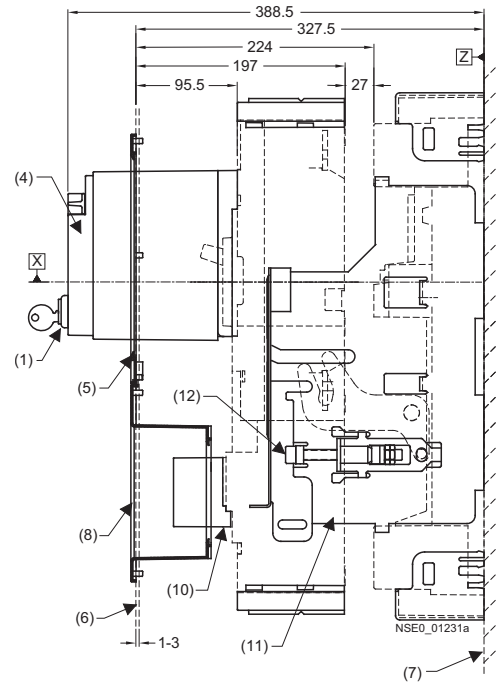
VL400 (3VL4) with RCD module, 3- and 4-pole, up to 400 A

Plug-in bases and accessories

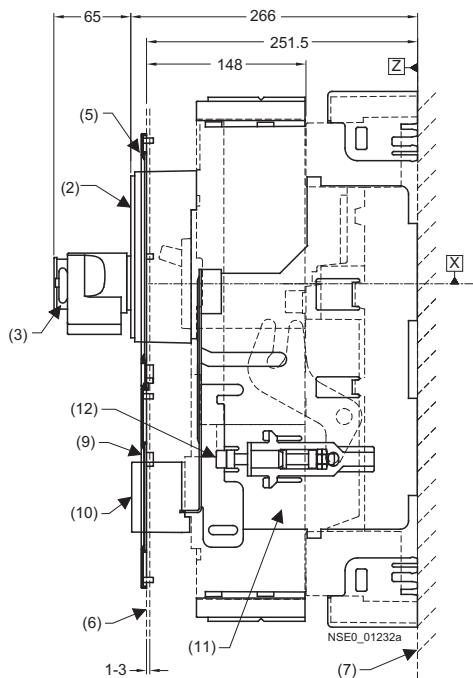
SENTRON VL400 (3VL4) circuit breakers with RCD module, withdrawable, with motorized operating mechanism with stored-energy mechanism (connected position)



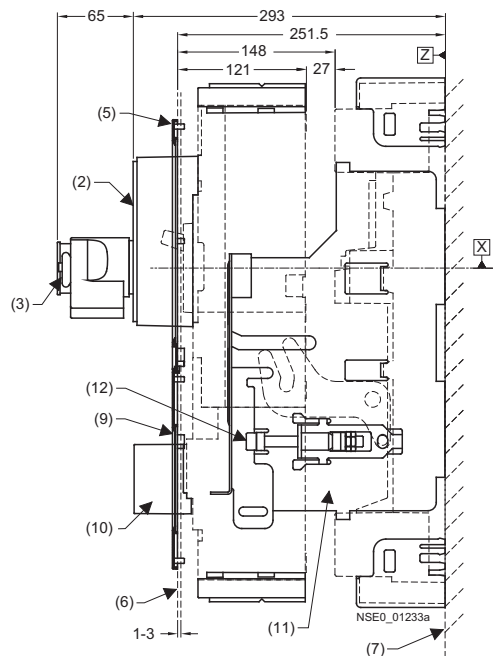
SENTRON VL400 (3VL4) circuit breakers with RCD module, withdrawable, with motorized operating mechanism with stored-energy mechanism (disconnected position)



SENTRON VL400 (3VL4) circuit breakers with RCD module, plug-in, with front-operated rotary operating mechanism (connected position)



SENTRON VL400 (3VL4) circuit breakers with RCD module, plug-in, with front-operated rotary operating mechanism (disconnected position)



- | | |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| (1) Safety lock | (7) Installation level |
| (2) Front-operated rotary operating mechanism | (8) Masking frame for door cut-out
(for circuit breaker with RCD module, motorized operating mechanism) |
| (3) Padlock | (9) Masking frame for door cut-out
(for circuit breaker with RCD module, toggle lever/rotary operating mechanism) |
| (4) Motorized operating mechanism with stored-energy mechanism | (10) RCD extended escutcheon |
| (5) Masking frame for door cut-out
(for circuit breaker with operating mechanism) | (11) Locking device for racking mechanism |
| (6) Outside surface of cabinet door | (12) Racking mechanism |

3VL Molded Case Circuit Breakers

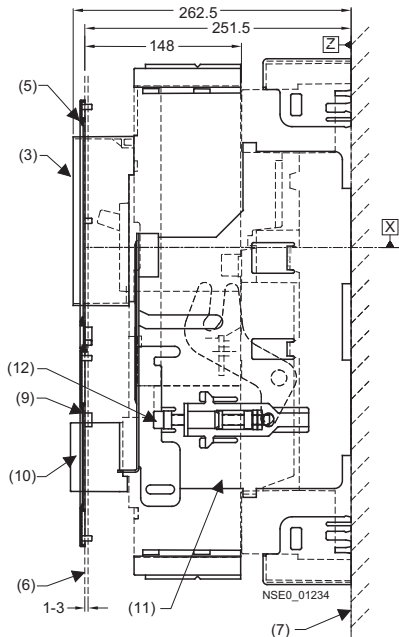
3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

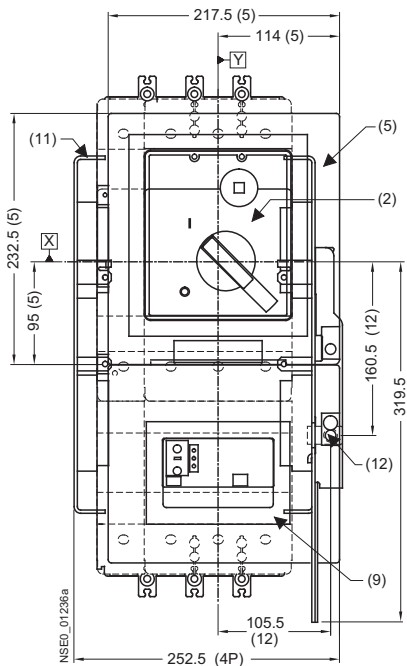
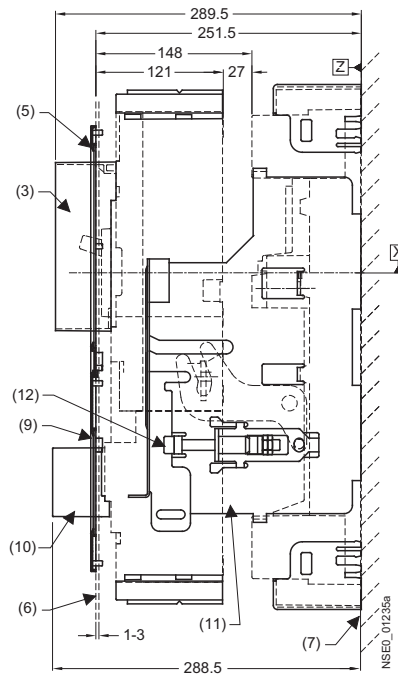
VL400 (3VL4) with RCD module, 3- and 4-pole, up to 400 A

Plug-in bases and accessories

SENTRON VL400 (3VL4) circuit breakers with RCD module, withdrawable, with extended escutcheon (connected position)



SENTRON VL400 (3VL4) circuit breakers with RCD module, withdrawable, with extended escutcheon (disconnected position)



- (1) Safety lock
- (2) Front-operated rotary operating mechanism
- (3) Circuit breaker extended escutcheon
- (4) Motorized operating mechanism with stored-energy mechanism
- (5) Masking frame for door cut-out (for circuit breaker with operating mechanism)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Masking frame for door cut-out (for circuit breaker with RCD module, motorized operating mechanism)
- (9) Masking frame for door cut-out (for circuit breaker with RCD module, toggle lever/rotary operating mechanism)
- (10) RCD extended escutcheon
- (11) Locking device for racking mechanism
- (12) Racking mechanism

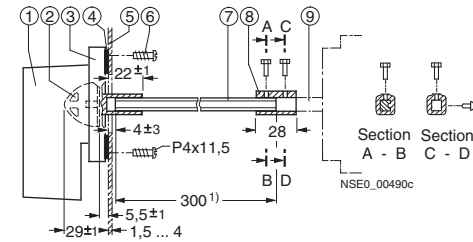
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

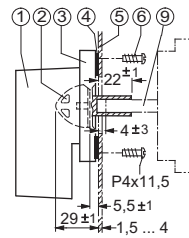
Project planning aids

8UC door-coupling rotary operating mechanisms

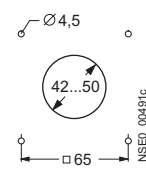
8UC71 and 8UC72 door-coupling rotary operating mechanisms, sizes 1 and 2



With extension shaft



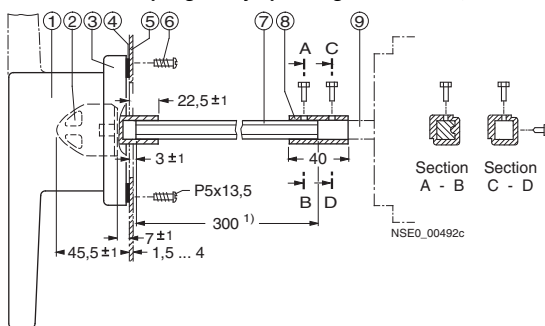
Without extension shaft



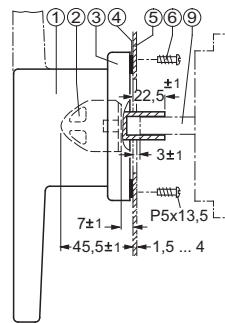
Door cut-out with mounting holes

- ① Selector switch
- ② Coupling driver
- ③ Masking plate
- ④ Seal
- ⑤ Door
- ⑥ Fixing screw, 4 units
- ⑦ Extension shaft
- ⑧ Shaft coupling
- ⑨ Actuating shaft of the control

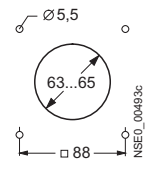
8UC73 door-coupling rotary operating mechanisms, size 3



With extension shaft



Without extension shaft

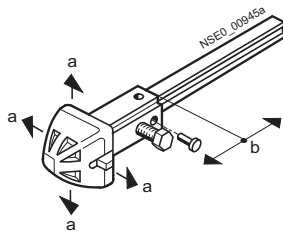


Door cut-out with mounting holes

- ① Handle or twin handle
- ② Coupling driver
- ③ Masking plate
- ④ Seal
- ⑤ Door
- ⑥ Fixing screw, 4 units
- ⑦ Extension shaft
- ⑧ Shaft coupling
- ⑨ Actuating shaft of the control

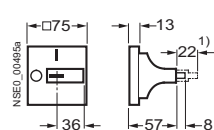
1) Length of extension shaft can be cut to fit mounting depth.
Extension shaft also available in 600 mm length.

8UC60 coupling driver

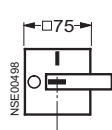


Coupling drivers	a	b	Shaft length
With tolerance compensation	+5	±5	x
Without tolerance compensation	+1.5	±2.5	x+23.5

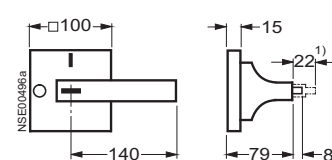
Size 1



Size 2

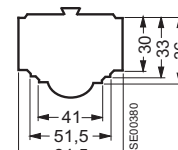
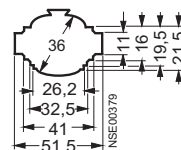
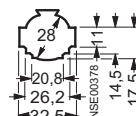
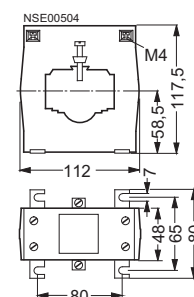
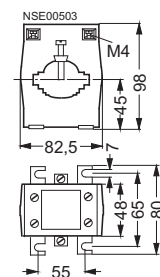
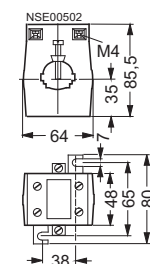
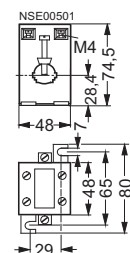


Size 3



Handles with masking plate, sizes 1 to 3

1) Padlock feature of handle pulled out.



1

 12×5

max. mm

17.5 Ø

2

2

2

28 Ø

2

2

2

36 Ø

2

3

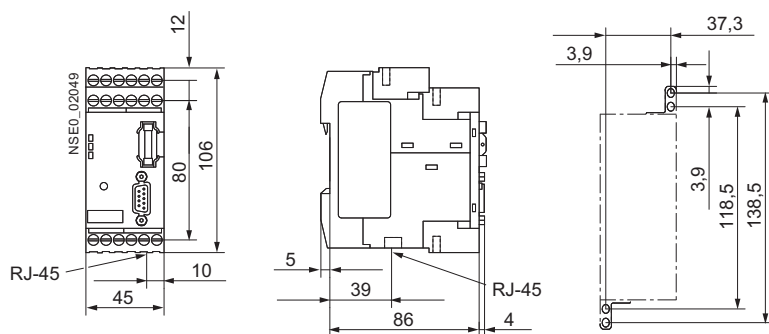
4

40

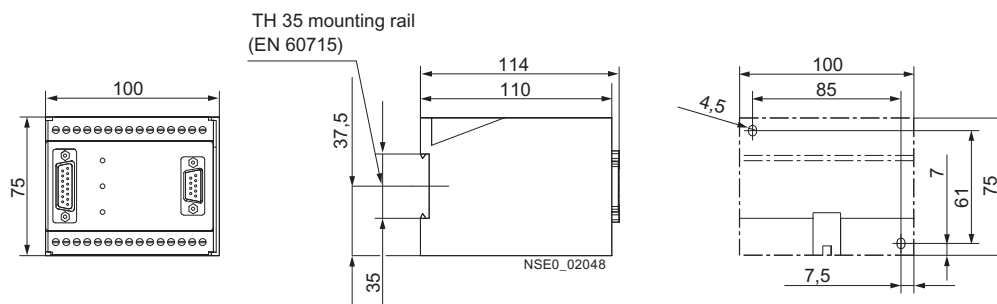
4

45 Ø

COM20/COM21 (communication module for SENTRON 3VL)



COM10/COM11 (communication module for SENTRON 3VL)



3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

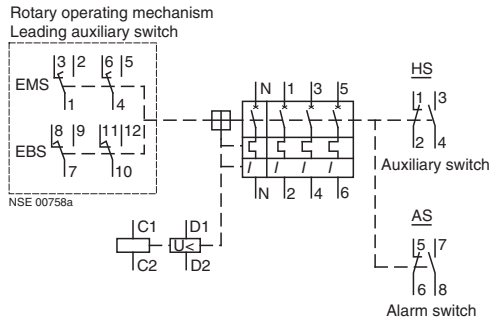
Project planning aids

Schematics

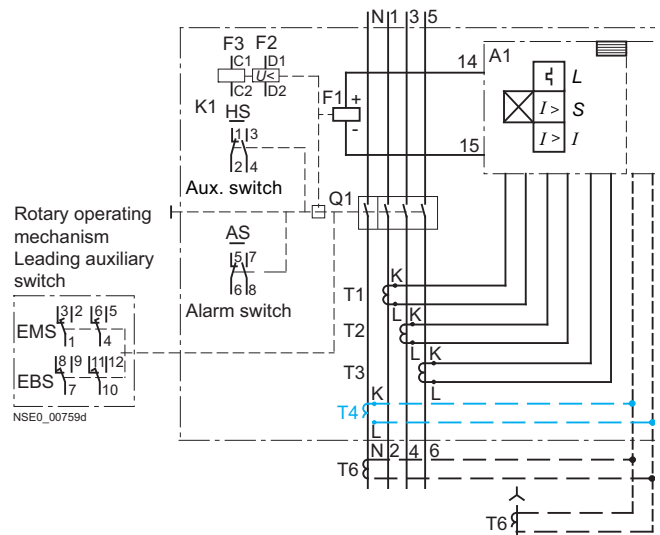
The graphical symbols used in the circuit diagrams provide information about the type, circuit and mode of operation of the devices according to DIN 40713, but contain no information about the design.

As it is not possible to show all of the potential combinations here, it may be necessary to alter the schematics accordingly for different versions.

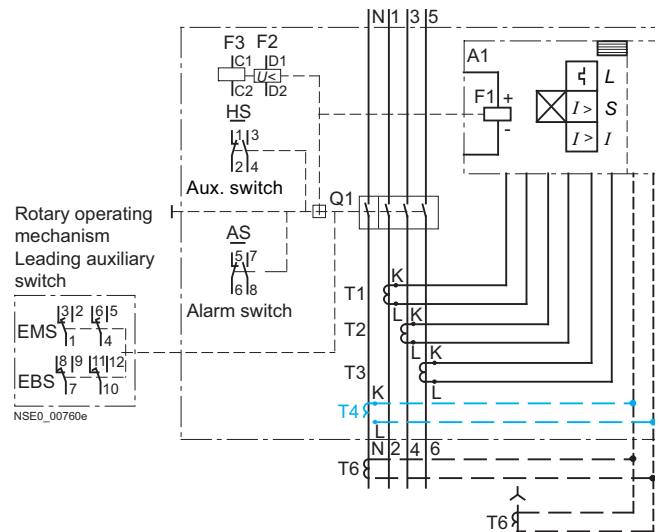
The purpose of these circuit diagrams is merely to help improve the understanding of the way in which the devices function.



Connection diagram for SENTRON VL160X (3VL1) to VL630 (3VL5), 3- and 4-pole circuit breakers for system protection with thermal-magnetic overcurrent releases



Internal circuit diagram for SENTRON VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole circuit breakers for system protection and motor protection with solid-state releases



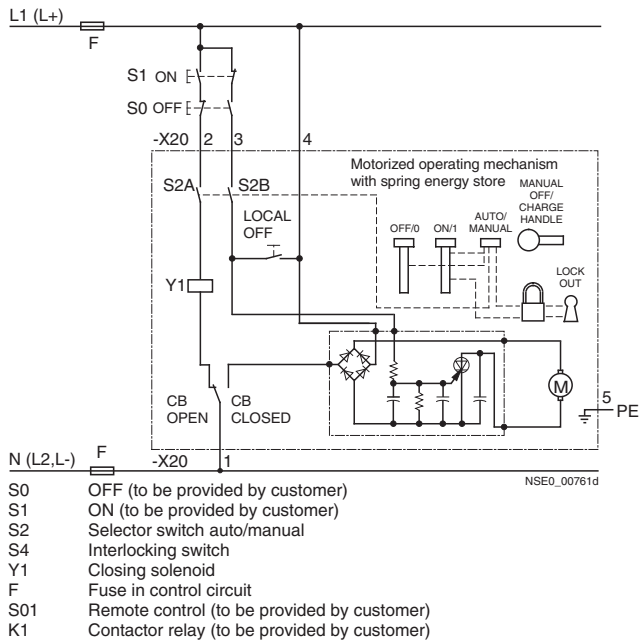
Internal circuit diagram for SENTRON VL400 (3VL4) circuit breaker for motor protection and SENTRON VL400 (3VL4) to VL1600 (3VL8), 3- and 4-pole circuit breakers for system protection with solid-state releases

	4-pole version
Q1	Main contacts
A1	Solid-state release
F1	Tripping solenoid for A1
F2	Undervoltage releases
F3	Shunt release
HS	Auxiliary switches
AS	Alarm switch
EBS	Leading auxiliary switch from ON to OFF (installed in rotary operating mechanism)
EMS	Leading auxiliary switch from OFF to ON (installed in rotary operating mechanism)
T1 ... T6	Current transformers

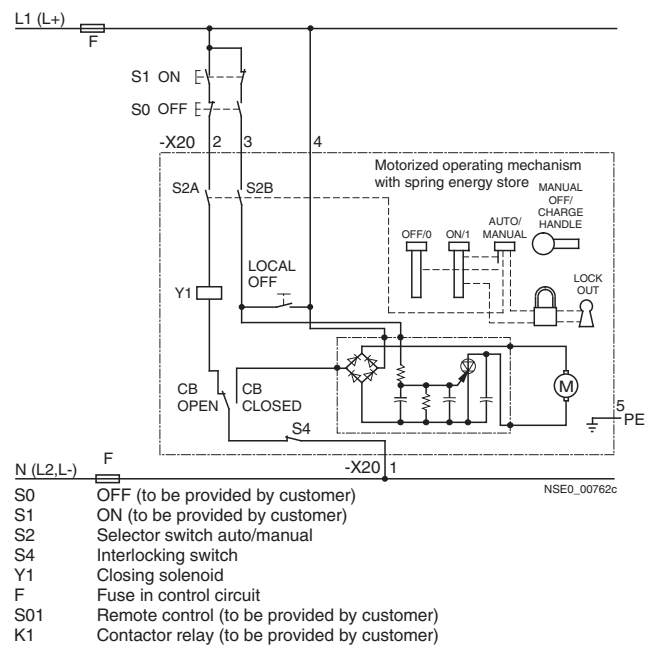
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

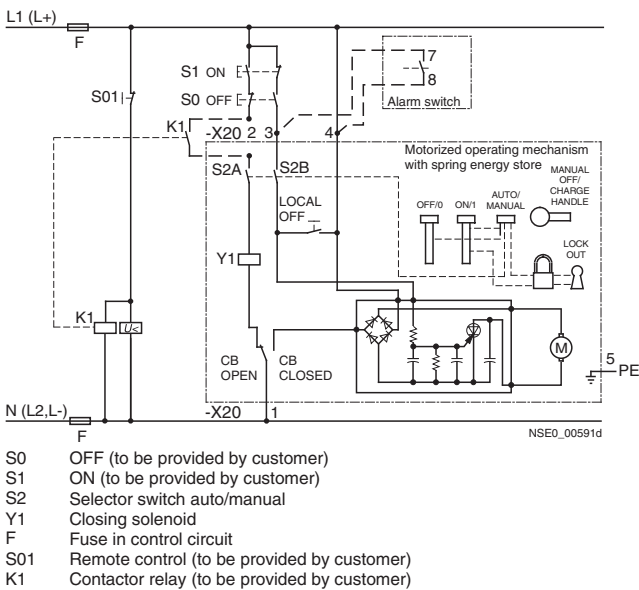
Project planning aids



Motorized operating mechanism with stored-energy mechanism for SENTRON VL160X (3VL1) to VL250 (3VL3) circuit breakers without undervoltage release

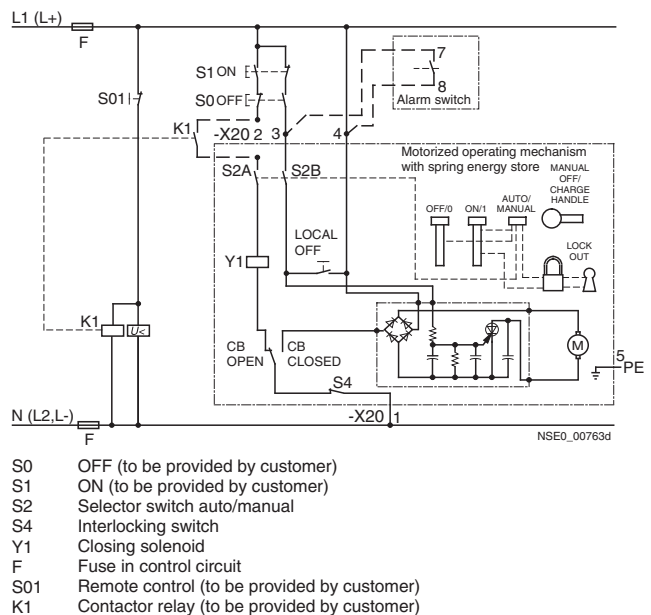


Motorized operating mechanism with stored-energy mechanism for SENTRON VL400 (3VL4) to VL800 (3VL6) circuit breakers without undervoltage release



Note: A separate alarm switch (7-8) can be incorporated for automatic charging after a release. Automatic closing of a tripped circuit breaker is not recommended, in order to prevent a switch of the circuit breaker to a fault in the protected circuit.

Motorized operating mechanism with stored-energy mechanism for SENTRON VL160X (3VL1) to VL250 (3VL3) circuit breakers with undervoltage release



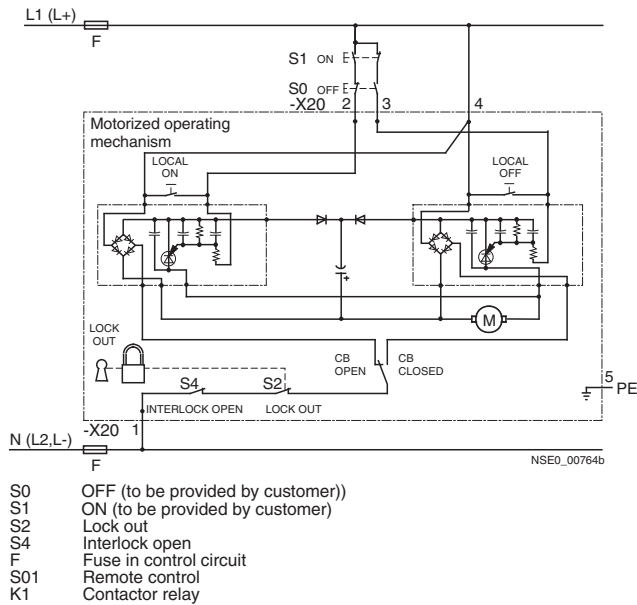
Note: A separate alarm switch (7-8) can be incorporated for automatic charging after a release. Automatic closing of a tripped circuit breaker is not recommended, in order to prevent a switch of the circuit breaker to a fault in the protected circuit.

Motorized operating mechanism with stored-energy mechanism for SENTRON VL400 (3VL4) to VL800 (3VL6) circuit breakers with undervoltage release

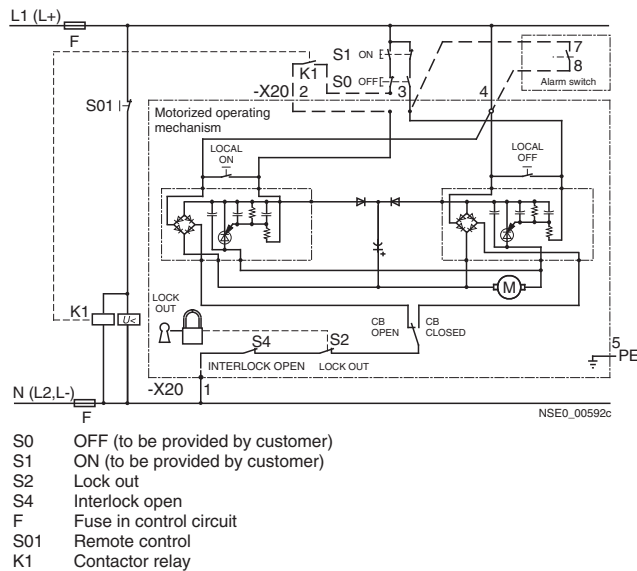
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

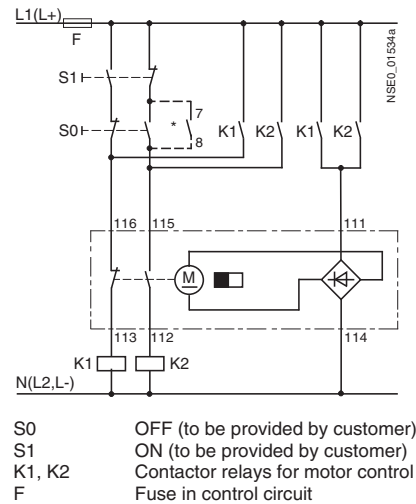


Motorized operating mechanism for SENTRON VL1250 (3VL7) and VL1600 (3VL8) circuit breakers without undervoltage release



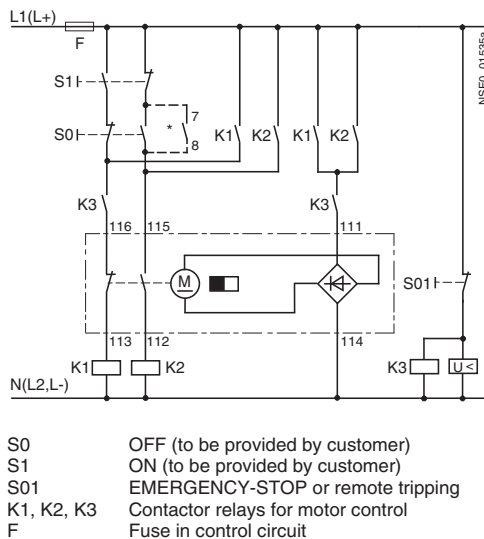
Note: A separate alarm switch (7-8) can be incorporated for automatic charging after a release.
Automatic closing of a tripped circuit breaker is not recommended, in order to prevent a switch of the circuit breaker to a fault in the protected circuit.

Motorized operating mechanism for SENTRON VL1250 (3VL7) and VL1600 (3VL8) circuit breakers with undervoltage release



* Alarm switch contact 7-8 causes a switch reset to RESET, i.e. reclosing capability after tripping. Without this contact the result would be a "closing lockout", i.e. reconnection after a trip is not possible until the switch is reset to RESET by the "OFF" command (S0).

Motorized operating mechanism for VL160X (3VL1) to VL250 (3VL3) circuit breakers without undervoltage release



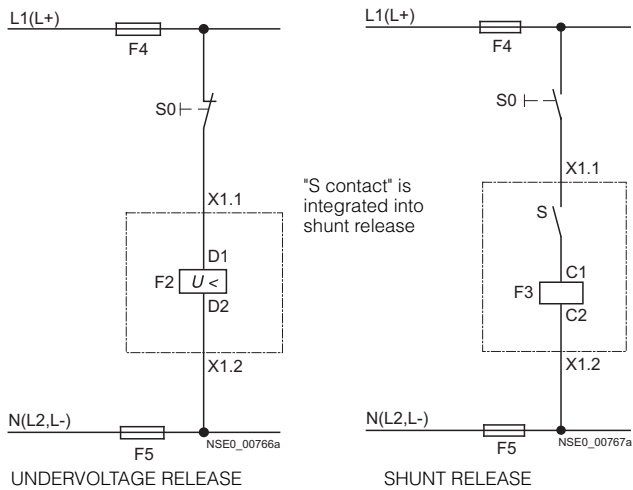
* Alarm switch contact 7-8 causes a switch reset to RESET, i.e. reclosing capability after tripping. Without this contact the result would be a "closing lockout", i.e. reconnection after a trip is not possible until the switch is reset to RESET by the "OFF" command (S0).

Motorized operating mechanism for VL160X (3VL1) to VL250 (3VL3) circuit breakers with undervoltage release

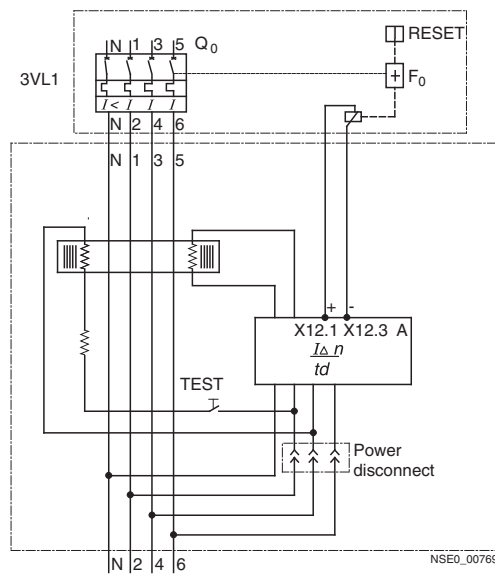
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

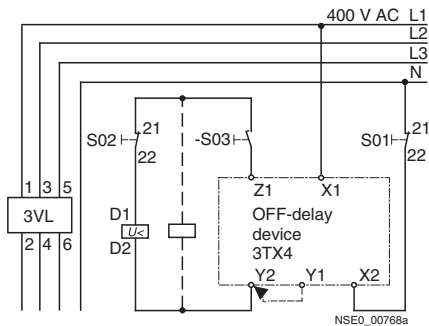


Undervoltage release and shunt release for SENTRON VL160X (3VL1) to VL1600 (3VL8) circuit breakers



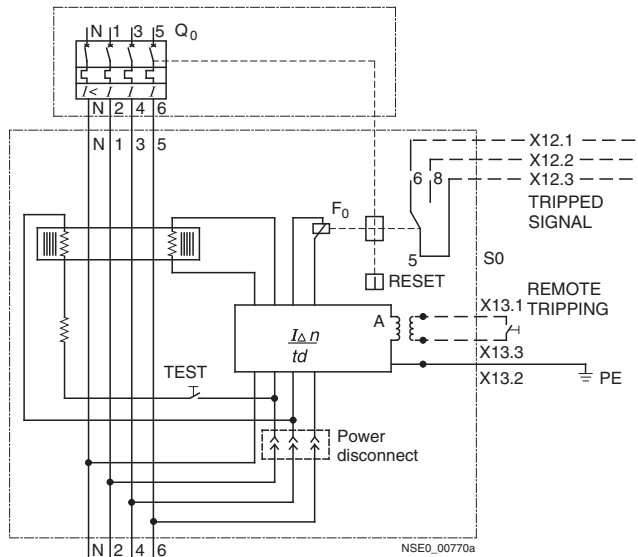
Q₀ Circuit breaker
A Solid-state evaluation unit
F₀ Tripping solenoid with local tripping display and reset
TEST Test button

SENTRON VL160X (3VL1) 4-pole circuit breaker with RCD module shown. 3-pole version similar, but without N pole.



S01 Delayed tripping
S02 Instantaneous tripping for EMERGENCY-STOP circuit (if required)
S03 Early-make auxiliary contact, e.g. 3VL9300-3AS10 "OFF to ON" in the front-operated rotary operating mechanism of the circuit breaker (if required)
K1 3RH11 contactor relay (if required)

Time-delay device for undervoltage release for SENTRON VL160X (3VL1) to VL1600 (3VL8) circuit breakers



Q₀ Circuit breaker
A Solid-state evaluation unit
F₀ Tripping solenoid with local tripping display and reset
TEST Test button
S0 Remote tripping (to be set by customer)

4-pole circuit breaker for SENTRON VL160 (3VL2), VL250 (3VL3) and VL400 (3VL4) circuit breakers with remote trip and RCD alarm switch. 3-pole version similar, but without N pole.

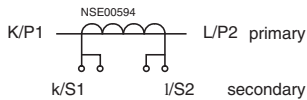
3VL Molded Case Circuit Breakers

3VL Molded Case Circuit Breakers up to 1600 A

Project planning aids

4NC current transformers for measuring purposes

Terminal designation acc. to IEC 60185/VDE 0414-1



More information

Manual for the SENTRON 3VL circuit breaker

This manual contains additional technical information, covering a product description, mode of operation, electrical wiring system and retrofitting.

The manual and operating instructions are available in PDF format at:

<http://www.siemens.com/lowvoltage/manuals>

SENTRON manual for communication solutions

Free download at

<http://www.siemens.com/lowvoltage/manuals>

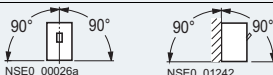
See also the chapter "Air Circuit Breakers" under "3WL Air Circuit Breakers/Non-Automatic Air Circuit Breakers up to 6300 A (AC)", "Accessories/Components".

3VF2 Molded Case Circuit Breakers

3VF2 Molded Case Circuit Breakers up to 100 A

General data

Technical specifications

Type	3VF2		
Standards	IEC 60947-2, EN 60947-2		
Max. rated current I_n	A	16 up to 100	
Rated insulation voltage U_i			
Main current paths	V AC	415	
Control circuits	V AC	415	
Rated impulse withstand voltage U_{imp}			
Main current paths	kV	6	
Control circuits	kV	4	
Rated operational voltage U_e , 50/60 Hz			
IEC	V AC	Up to 415	
Permissible ambient temperature	°C	–20 to +70	
Permissible load			
At various ambient temperatures close to the circuit breaker, related to the rated current of the circuit breaker		Up to 100 A	
– Circuit breakers	At 40 °C %	100	
for system protection	50 °C %	92	
	55 °C %	87	
	60 °C %	83	
	70 °C %	73	
Rated short-circuit breaking capacity	Switching capacity class	A	
Rated ultimate short-circuit breaking capacity I_{cu}	Up to 240 V	kA	65
	Up to 415 V	kA	18
Rated service short-circuit breaking capacity I_{cs}	Up to 240 V	kA	33
	Up to 415 V	kA	9
Rated short-circuit making capacity I_{cm}	Up to 240 V	kA	143
	Up to 415 V	kA	36
Main control switch properties acc. to IEC 60947-2 in conjunction with lockable rotary operating mechanisms		Yes	
EMERGENCY-STOP switch properties		Yes	
Acc. to EN 60204-1			
Mechanical endurance	Operating cycles	10 000	
Switching frequency	1/h	120	
Conductor cross-sections and connection types for main conductors (copper or aluminum)			
Connection type		Circular conductor terminal	
solid or stranded	To 40 A	mm ²	2.5 to 6
	45 to 100 A	mm ²	16 to 50
	125 A	mm ²	70
Conductor cross-sections for control circuits			
With terminal connection or terminal strip, solid	mm ²	0.5 to 2.5	
Power loss per circuit breaker			
At max. rated current I_n with 3-phase symmetrical load			
– System protection	W	16	
Permissible mounting positions			
Auxiliary switches			
Conventional thermal current I_{th}	A	6	
Rated making capacity	A	15	
AC (AC-15)			
– Rated operational voltage	V	240	
– Rated operational current	A	6	
DC current (DC-13)			
– Rated operational voltage	V	125	
– Rated operational current	A	0.5	
Back-up fuse	A	4	
Auxiliary releases			
Shunt release (f-release)			
Response voltage			
– Pick-up (circuit breaker is tripped)			
Power consumption (short time) at:			
AC 50/60 Hz 12–24 V	VA	108	
AC 50/60 Hz 48–60 V	VA	120	
AC 50/60 Hz 48–127 V	VA	162	
12 – 24 V DC	W	14.4	
48 – 60 V DC	W	19.2	
110 – 125 V DC	W	38.4	
220–250 V DC	W	44	
Max. duration of operational voltage		Interrupts automatically	
Max. opening time	ms	50	

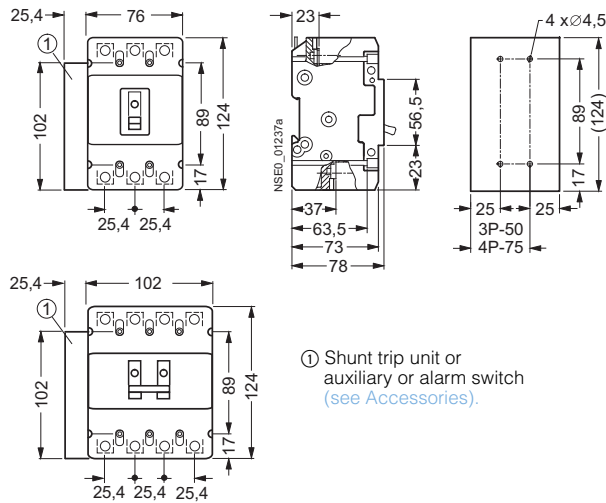
3VF2 Molded Case Circuit Breakers

3VF2 Molded Case Circuit Breakers up to 100 A

Project planning aids

Dimensional drawings

3VF2 circuit breakers, 3- and 4-pole

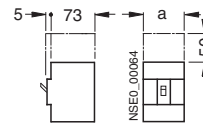


Arcing spaces

Minimum clearances from adjacent grounded parts and from non-insulated live parts at rated voltage.

The distance of at least 2 cm between large cover and the arc chute openings should be observed for the 3VF2.

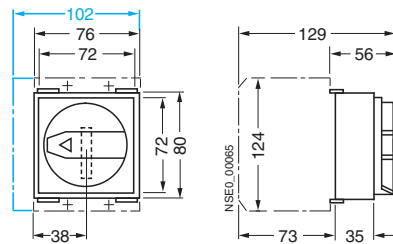
Plain conductors and busbars must be insulated within the arcing space.



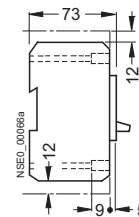
Type	a
3VF2, 3-pole	78
3VF2, 4-pole	101

3VF2

Accessories for 3VF2 circuit breakers, 3- and 4-pole



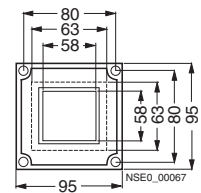
3VF9 223-1.A00 front-operated rotary operating mechanism with knob
for 3VF2



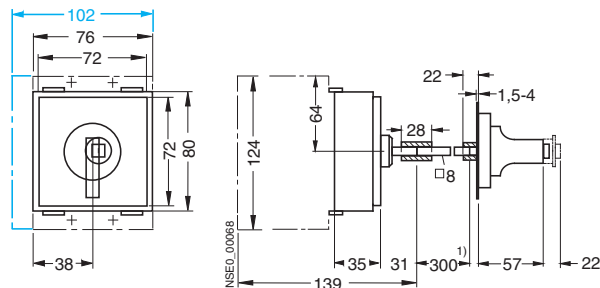
3VF9 224-1NB.0 terminal cover
for 3VF2



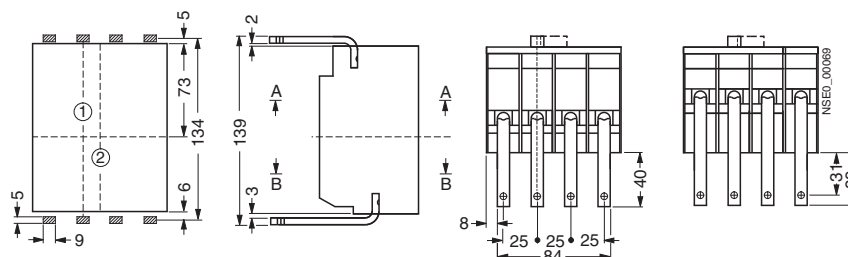
3VF9 220-1CA10 cover with cap dimension 45 mm for 3VF2



3VF9 220-1AA00 cover frame for door cut-out
for 3VF2



Door-coupling rotary operating mechanism, complete 8UC61 .2-.BD22 (rotary operating mechanism) and 3VF9 223-1JA00 (front-operated rotary operating mechanism with shaft end) for 3VF2



3VF9 224-1LD.0 rear terminal for 3VF2

View A

View B

Center line
① 3-pole circuit breaker
② 4-pole circuit breaker

1) As-supplied, shorten shaft to suit if necessary.
With lengths > 130 mm a support is necessary.

4-pole version

Note:
4-pole circuit breakers always have the 4th pole (N) on the left!