

SENTRON Switching and Protection Devices – Molded Case Circuit-Breakers

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Introduction

3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

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3VF2 Molded Case Circuit-Breakers

3VF2 Molded Case Circuit-Breakers up to 100 A

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SENTRON Switching and Protection Devices – Molded Case Circuit-Breakers

Introduction

Overview



Type		VL160X/3VL1	VL160/3VL2	VL250/3VL3	VL400/3VL4			
3VL molded case circuit-breakers up to 1600 A								
Rated current I_n at 50 °C ambient temperature ¹⁾	A	16 to 160	26 to 160	80 to 250	125 to 400			
Number of poles		3	4	3	4			
Rated operational voltage U_e	AC 50/60 Hz	690	690	690	690			
	DC ²⁾	250	250	600	600			
Electronic trip units								
Thermal-magnetic		✓	✓	✓	✓			
Electronic ETU LCD		--	--	✓	✓			
Replaceable		--	--	✓	✓			
PROFIBUS module COM10		--	--	✓	✓			
Dimensions								
	A	mm	105	139	105	139	139	183
	B	mm	157	157	175	175	175	279
	C	mm	81	81	81	81	81	102
	D	mm	107	107	107	107	107	138
Switching capacity I_{cu}/I_{cs} RMS value according to IEC 60947-2								
Standard switching capacity N ³⁾								
Up to 240 V AC	kA	65/65	65/65	65/65	65/65			
Up to 415 V AC	kA	40/40	40/40	40/40	45/45			
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 ⁵⁾	12/6	12/6	15/8			
Up to 250 V DC ⁴⁾	kA	30/30	32/32	32/32	32/32			
Up to 500 V DC ⁴⁾	kA	--	--	--	--			
Up to 600 V DC ⁴⁾	kA	--	--	--	--			
NEMA breaking capacity ⁶⁾								
Up to 480 V AC	kA	25	25	25	35			
Up to 600 V AC	kA	8 ⁵⁾	12	12	20			
High switching capacity H ³⁾								
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 ⁵⁾	12/6	12/6	15/8			
Up to 250 V DC ⁴⁾	kA	30/30	32/32	32/32	32/32			
Up to 500 V DC ⁴⁾	kA	--	32/32	32/32	32/32			
Up to 600 V DC ⁴⁾	kA	--	--	--	--			
NEMA breaking capacity ⁶⁾								
Up to 480 V AC	kA	42	50	50	50			
Up to 600 V AC	kA	12 ⁵⁾	12	12	20			
Very high switching capacity L ³⁾								
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 ⁴⁾	kA	--	32/32	32/32	32/32			
Up to 500 V DC ⁴⁾	kA	--	32/32	32/32	32/32			
Up to 600 V DC ⁴⁾	kA	--	30/30	30/30	30/30			
NEMA breaking capacity ⁶⁾								
Up to 480 V AC	kA	--	75	75	75			
Up to 600 V AC	kA	--	12	12	20			

✓ available

-- not available

1) 3VF2 at 40 °C ambient temperature.

2) Rated DC voltage applies only for circuit-breakers with thermal-magnetic trip unit.

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.

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	
252 to 630		320 to 800		400 to 1250		640 to 1600		16 to 100	
3	4	3	4	3	4	3	4	3 and 4	
690		690		690		690		Up to 415	
600	600	--	--	--	--	--	--	--	
✓	✓	--	--	--	--	--	--	✓	
✓	✓	✓	✓	✓	✓	✓	✓	--	
✓	✓	✓	✓	✓	✓	✓	✓	--	
190	253	190	253	229	305	229	305	76/102	
279	279	406	406	406	406	406	406	124	
102	102	114	114	152	152	152	152	68	
138	138	151	151	207	207	207	207	73	

65/65		65/65		65/35		65/35		65/33
45/45		50/50		50/25		50/25		18/9
35/26		35/26		35/26		35/26		--
25/20		25/20		25/20		25/20		--
20/10		20/10		20/10		20/10		--
32/32		--		--		--		--
--		--		--		--		--
--		--		--		--		--
25		25		25		25		--
20		20		20		20		--
100/75		100/75		100/75		100/50		--
70/70		70/70		70/35		70/35		--
50/38		50/38		50/38		50/38		--
40/30		40/30		40/30		40/30		--
30/15		30/15		30/15		30/15		--
32/32		--		--		--		--
32/32		--		--		--		--
--		--		--		--		--
50		50		50		50		--
30		30		30		30		--
200/150		200/150		200/100		200/100		--
100/75		100/75		100/50		100/50		--
75/50		75/50		75/50		75/50		--
50/38		50/38		50/38		50/38		--
35/17		35/17		35/17		35/17		--
32/32		--		--		--		--
32/32		--		--		--		--
30/30		--		--		--		--
65		65		65		65		--
35		35		35		35		--

4) The maximum permitted DC voltage for each current path needs to be taken into account for DC switching applications, see Catalog LV 1T, "Configuration", "Switching of DC Currents".

5) Rated current $I_n \geq 25$ A.

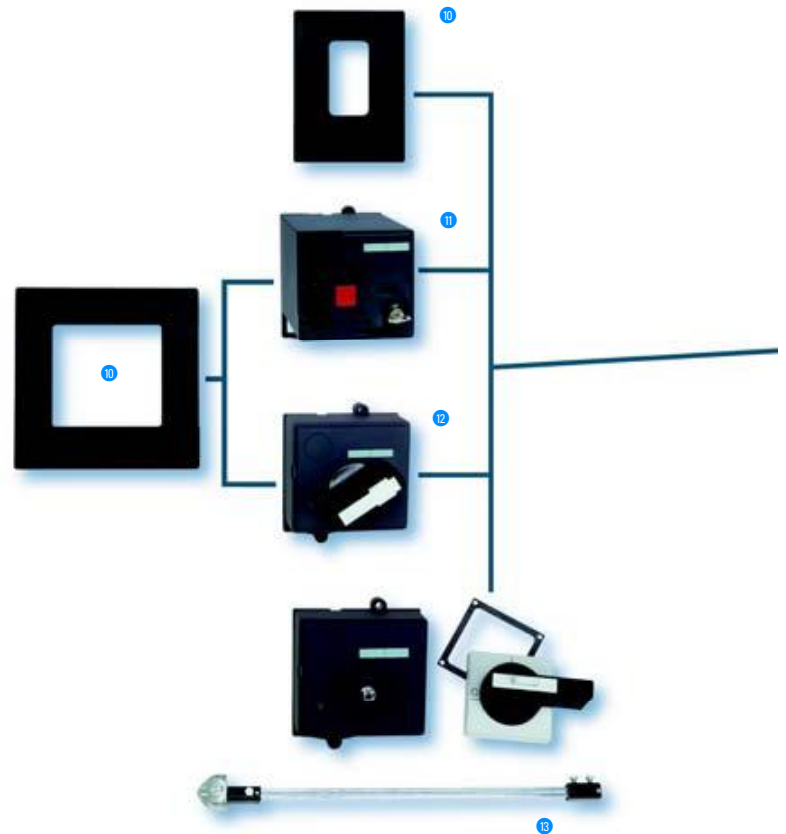
6) The NEMA breaking capacity can be found on the rating plate of each IEC circuit-breaker.

3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

General data

Design

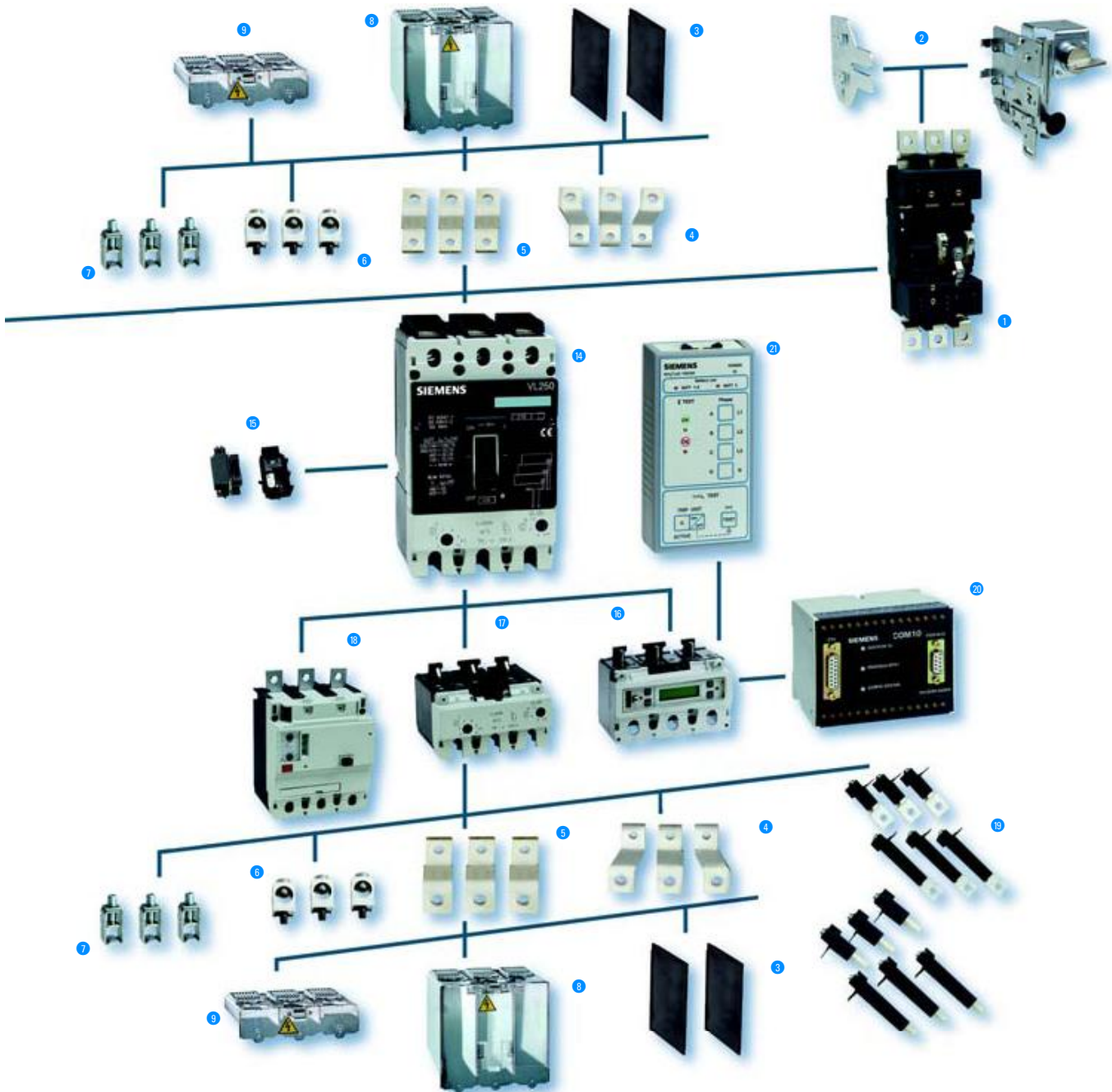


- ① Withdrawable/plug-in base
- ② Side walls for withdrawable version
- ③ Phase barriers
- ④ Flared front busbar connecting bars
- ⑤ Straight connecting bars
- ⑥ Multiple supply terminal for Al/Cu
- ⑦ Box terminal for Cu
- ⑧ Extended terminal cover
- ⑨ Standard terminal cover
- ⑩ Masking frame/cover frame for door cut-out
- ⑪ Motorized operating mechanism with spring energy store
- ⑫ Front-operated rotary operating mechanism
- ⑬ Door-coupling rotary operating mechanism
- ⑭ SENTRON 3VL circuit-breaker
- ⑮ Internal accessories
- ⑯ Electronic overcurrent trip unit
- ⑰ Thermal/magnetic overcurrent trip unit
- ⑱ RCD module
- ⑲ Rear terminals – flat and round
- ⑳ COM10 communication module to the PROFIBUS DP
- ㉑ Manual tester for electronic trip unit

3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

General data



3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

General data

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

N	Standard (40 to 50 kA)
H	High (70 kA)
L	Very high (100 kA)

- No derating or loss of performance up to 50 °C
- Electronic overcurrent trip units 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 overcurrent trip units. 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 16/10). Auxiliary switches/alarm switches or auxiliary trip units can be easily adapted by the customer, or they are also available ready installed if required. The switching capacity is shown on the front of every circuit-breaker.

- Standard switching capacity:
 $I_{cu} = 40$ to 50 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,
DIN VDE 0660, Part 100,
IEC 60947-2, EN 60947-2,
DIN VDE 0660, Part 101.

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

Disconnecting features (main control switches) according to EN 60204 or DIN VDE 0113.

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 overcurrent trip units of the circuit-breakers for motor protection also comply with IEC 60947-4-1, DIN VDE 0660, Part 102.

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

The SENTRON 3VL RCD module complies with IEC 61000-4-2 to 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-breakers	IP20
Masking frame	IP40
Terminal covers	IP30
With front 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 VL160 circuit-breakers can be equipped in the factory with incoming and outgoing box terminals which are suitable for stranded conductors, flexible copper rails and finely stranded conductors with end sleeves as well as



with screw terminals for flat connectors. Different supply 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 connections 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.

Bare conductors at the top connections must be insulated in the arc quenching space that is necessary above the arcing chambers. 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 trip units, auxiliary switches and alarm switches) are supplied with terminal screws.

The auxiliary trip units (shunt trip units and undervoltage trip units), 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 leads.

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 trip unit 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 trip units and auxiliary switches.

3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

General data

SENTRON VL160 to VL630 circuit-breakers

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

The trip units for the SENTRON VL160 to VL630 have the following features:

- The trip units are available in thermal-magnetic and electronic versions.
- The thermal-magnetic trip units have adjustable overload and short-circuit releases.

SENTRON VL800 to VL1600 circuit-breakers

The arrangement of the current 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 electronic trip units.

As is the case for all versions of the SENTRON 3VL circuit-breakers with electronic trip units, the current transformers are in the same enclosure as the trip units. They send a signal which is proportional to the load current to the electronic overcurrent tripping unit.

All SENTRON 3VL circuit-breakers with electronic trip units 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 trip unit systems

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

When the electronic overcurrent trip unit has been installed in the circuit-breaker, it is recommended that it is tested using the 3VL9 000-8AK00 function tester.

1. Overcurrent trip unit system of the SENTRON VL160X to VL630 circuit-breakers – thermal-magnetic

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

The 4-pole circuit-breakers for system protection can be equipped with overcurrent trip units for all four poles or without an overcurrent trip unit for the fourth pole (N). Depending on the size, circuit-breakers are available with a trip unit in the fourth pole (N) with 60% or 100% of the current of the 3 main conducting parts.

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

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

2. Overcurrent trip unit system for SENTRON VL160 to VL1600 circuit-breakers, electronic, ETU

The electronic overcurrent trip unit 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 overcurrent trip units for all four poles or without an overcurrent trip unit for the fourth pole (N).

Depending on the size, the trip units for the fourth pole (N) are set to 50 % of the current for the 3 main current paths, so that safe protection for neutral conductors with a reduced cross-section is ensured. On LCD ETU trip units the neutral conductor protection is adjustable from 50 to 100% or can be switched off.

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

The protection functions of the electronic overcurrent trip units are maintained without additional auxiliary voltage. The electronic trip units are supplied with power through circuit-breaker-internal current transformers.

The electronic trip unit 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 or through the 3VL9 000-8AK00 function tester. For communication-capable circuit-breakers the trip unit is supplied with power through COM10.

At the output of the electronic overcurrent trip unit module there is a tripping solenoid which trips in the case of overload or short-circuit.

RCD module

- Easy mounting
- Installation kit for lateral assembly according to DIN 50023 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 $\leq 25\% I_{\Delta}$ of $I_{\Delta n}$
 - Green + Yellow $25\% < I_{\Delta} = 50\%$ of the set $I_{\Delta n}$
 - Green + Yellow + Red $I_{\Delta} \geq 50\%$ 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 overcurrent trip units – Overview of functions

Order No. supplement	Trip units	System protection	Motor protection	Starter protection	Generator protection	Function	Setting options				
							L Overload protection $I_r = \times I_n$	S ¹⁾ Short-circuit protection (short-time delayed) $I_{sd} = \times I_r$ t_{sd} [s]		I ¹⁾ Short-circuit protection (instantaneous) $I_i = \times I_n$	G Ground-fault protection $I_g = \times I_n$
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	
AP	ETU 10 M ³⁾		✓		✓	LI	0.4-1			1.25-11	
AB	ETU 10	✓				LI	0.4-1			1.25-11	
BA	ETU 10	✓				LIN	0.4-1			1.25-11	
AC	ETU 12	✓				LIG	0.4-1			1.25-11	1
BD	ETU 12	✓				LING	0.4-1			1.25-11	1
AE	ETU 20	✓			✓	LSI	0.4-1	1.5-10	0-0.5	11	
BF	ETU 20	✓			✓	LSIN	0.4-1	1.5-10	0-0.5	11	
AG	ETU 22	✓			✓	LSIG	0.4-1	1.5-10	0-0.5	11	1
BH	ETU 22	✓			✓	LSING	0.4-1	1.5-10	0-0.5	11	1
AS	ETU 30 M ³⁾		✓		✓	LI	0.4-1			6/8/11	
CP	LCD ETU 40 M ³⁾		✓		✓	LI	0.4-1			1.25-11	
CH	LCD ETU 40	✓				LI, LSI	0.4-1	1.5-10	0-0.5	1.25-11	
CJ	LCD ETU 40	✓				LI, LSIN	0.4-1	1.5-10	0-0.5	1.25-11	
CL	LCD ETU 42	✓				LSIG	0.4-1	1.5-10	0-0.5	1.25-11	0.4-1 ⁴⁾
CM	LCD ETU 42	✓				LSIG	0.4-1	1.5-10	0-0.5	1.25-11	0.4-1 ⁴⁾
CN	LCD ETU 42	✓				LSIG, LSING	0.4-1	1.5-10	0-0.5	1.25-11	0.4-1 ⁴⁾

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Order No. supplement	Trip units	Thermal image	Phase failure	Communication-capable	Ground-fault protection	Number of poles	N pole protected ¹⁾	I_r (ON/OFF)	Trip class (t_c)	Time-lag class (t_R)	Thermo-magnetic trip unit	Magnetic trip unit	Electronic trip unit	LCD display
DK	M					3						✓		
DC	TM ²⁾	✓				3					✓			
EJ	TM ²⁾	✓				4					✓			
EC	TM ²⁾	✓				4	60 %				✓			
EM	TM ²⁾	✓				4	100 %				✓			
AP	ETU 10 M ³⁾	✓	40 % I_R			3		10					✓	
AB	ETU 10	✓				3				2.5-30			✓	
BA	ETU 10	✓				4	50/100 %			2.5-30			✓	
AC	ETU 12	✓			a	3		✓		2.5-30			✓	
BD	ETU 12	✓			b	4	50/100 %	✓		2.5-30			✓	
AE	ETU 20	✓				3		✓					✓	
BF	ETU 20	✓				4	50/100 %	✓					✓	
AG	ETU 22	✓			a	3		✓					✓	
BH	ETU 22	✓			b	4	50/100 %	✓					✓	
AS	ETU 30 M ³⁾	✓	40 % I_R			3			10, 20, 30				✓	
CP	LCD ETU 40 M ³⁾	✓	5-50 % I_R	✓		3		✓	5, 10, 15, 20, 30				✓	✓
CH	LCD ETU 40	✓		✓		3		✓		2.5-30			✓	✓
CJ	LCD ETU 40	✓		✓		4	50-100 % OFF	✓		2.5-30			✓	✓
CL	LCD ETU 42	✓		✓	a	3		✓		2.5-30			✓	✓
CM	LCD ETU 42	✓		✓	a/c	3		✓		2.5-30			✓	✓
CN	LCD ETU 42	✓		✓	b	4	50-100 % OFF	✓		2.5-30			✓	✓

Ground-fault protection

- a Vectorial summation current formation (3-conductor system)
- b Vectorial summation current formation (4-conductor system)
- c 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) t_g 0.1-0.5s

3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

General data

Internal accessories (auxiliary switches, undervoltage trip units, shunt trip units)

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

Fixed-mounting, plug-in or withdrawable version

The fixed-mounting 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 mounting set. This set contains blade contacts, a locking pin and terminal covers for the plug-in version. The set for the withdrawable version also contains side covers and a moving mechanism. Even with the masking frame mounted, it is still possible to move using the handle with the door closed.

Actuators

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 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 trip operation, e.g. an overload or short-circuit. The activation of an undervoltage trip unit or shunt trip unit 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 release mechanism and reclose the main contacts on the circuit-breaker (see figure).

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.

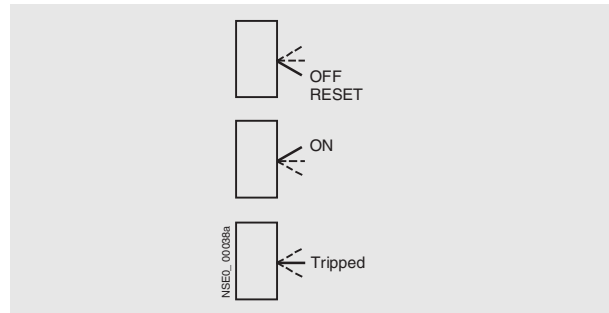
A leading voltage can be applied to the undervoltage trip unit of a circuit-breaker with leading auxiliary switches which makes the circuit-breaker ready-to-close.

Door-coupling rotary operating mechanisms (complete operating mechanisms)

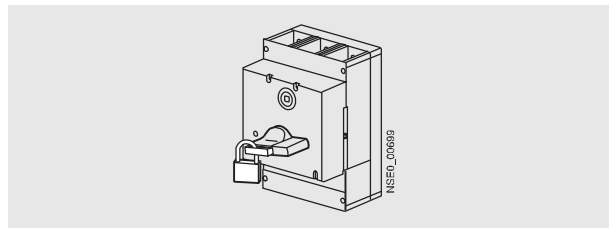
Door-coupling rotary operating mechanisms and removable covers are available for circuit-breakers which are installed into control cabinets and distribution boards. These are supplied as complete sets, including an articulated-shaft mechanism.

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 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 equipped inside with a floating contact (NO) for the following functions:

- Querying the auto/manual selector switch
- 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

Box terminal (for copper cables or solid/flexible busbars) **Connection with screw connection** (available with direct cable lug connection on VL160X, VL160, VL250, VL400) **Connection to front busbar connecting bars** (screw-type connection required) **Circular conductor terminal/multiple feed-in terminal** (for Al/Cu terminal)

Main circuit connections (for conductor cross-sections see "Technical Specifications", page 16/18)

Circuit-breaker	Connection overview and further options				
	Box terminals	Screw-type connection with metric thread for flat connector	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	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 delivery
- Optional scope of delivery
- 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 trip units and auxiliary switches

Undervoltage trip units, leading auxiliary switches

If there is no voltage present, closing of the circuit-breaker is not possible. If voltage is not applied to the trip units, 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 trip units have been designed and tested to fulfill 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 trip unit 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 refer to the selection and ordering tables for accessories in Catalog LV1.

Shunt trip unit

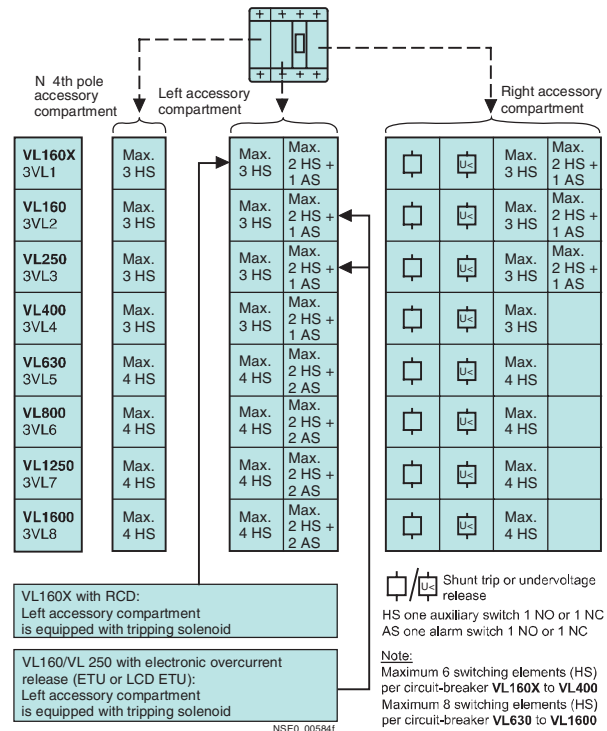
The shunt trip unit is used for remote tripping of the circuit-breaker.

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

These devices operate in compliance with IEC 60947 (tripping voltage 0.70 to 1.10 U_e).

It is not permissible to apply a continuous trip command to a shunt trip unit 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 trip units, undervoltage trip units 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 switches

The alarm switches (AS) are active 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 trip unit or undervoltage trip unit.

Installation of internal accessories

The insulated accessory subsections for installing accessories (auxiliary trip units 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 trip units and auxiliary switches/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 switch 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

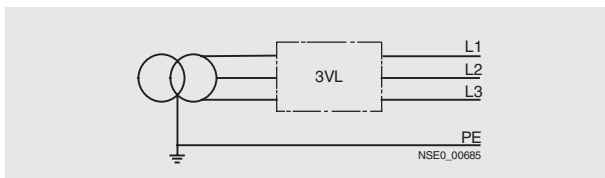
Ground-fault release "G" sense fault currents that flow to ground and that can cause fire in the plant. Several circuit-breakers connected in series can provide graduated discrimination by means of the adjustable delay time.

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

Vectorial summation current formation (measurement method 1)

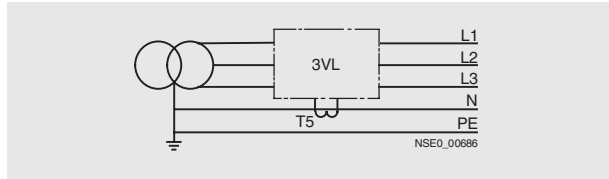
Ground-fault detection in symmetrically loaded systems

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

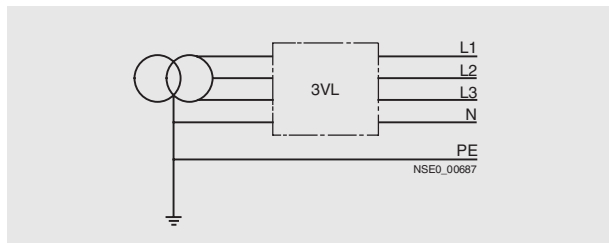


Ground-fault detection in asymmetrically loaded systems

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 overcurrent trip unit 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.



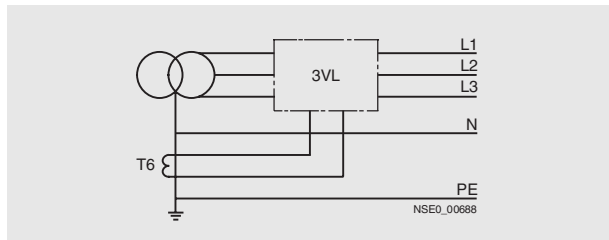
3-pole circuit-breaker, current transformer in the neutral conductor



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 module see Catalog LV 1 "Accessories".
For external current transformers see Catalog LV 1, "Accessories".**

Transformer protection

The SENTRON 3VL circuit-breakers protect energy 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 electronic overcurrent trip units (ETU or LCD ETU)).

3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

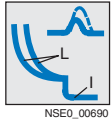
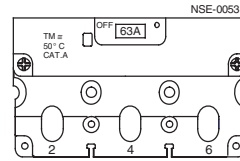
General data

Thermal-magnetic overcurrent trip unit



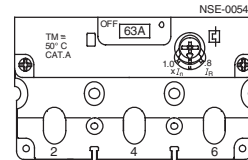
Application: System protection – TM, LI/LIN function

Overload protection, fixed, short-circuit protection, fixed, see selection tables for VL160X, trip units installed in the switch enclosure



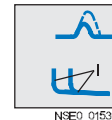
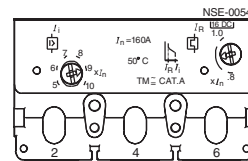
Application: System protection – TM, LI/LIN function

Overload protection, adjustable $I_R = 0.8$ to $1 \times I_n$, short-circuit protection, fixed, see selection tables for VL160X, trip units installed in the switch enclosure



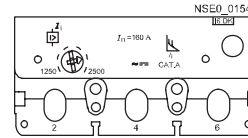
Application: System protection – TM, LI/LIN function

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 VL630¹⁾



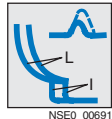
Electronic trip units ETU

For types VL160 to VL1600

General information:

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

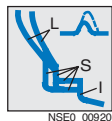
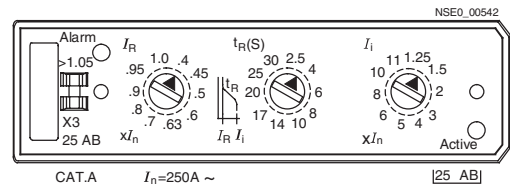
- Overload status ($I > 1.05 \times I_R$) is indicated by continuous yellow LED (alarm)
- Integrated self-test function
- Female connector for test unit



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 $11 \times I_n$ ¹⁾



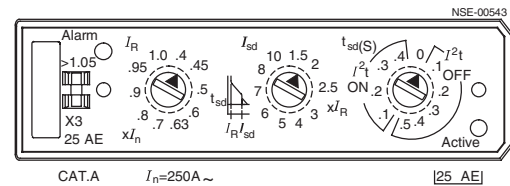
Application: System and generator protection – ETU20, LSI/LSIN function

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

I^2t selectable on/off

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



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



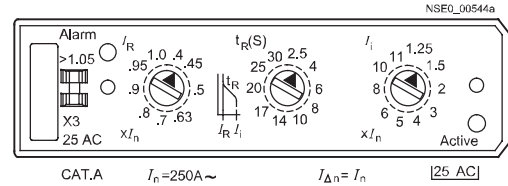
Application: System protection – ETU12, LIG/LING function

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 $I_n \leq 100$ A, N: 100%;
 $I_n \geq 125$ A, N: 50%

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); $I_{\Delta n} = I_n$, versions "AC", "BD" (for Order No. supplements see Catalog LV 1, "Selection and Ordering Data")



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

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

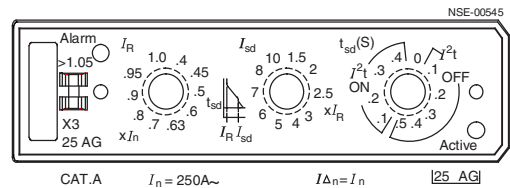
Short-circuit protection (short-time delayed)
 $I_{sd} = 1.5$ to $10 \times I_R$, $t_{sd} = 0$ to 0.5 s,

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 $I_n \leq 100$ A, N: 100%;
 $I_n \geq 125$ A, N: 50%

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); $I_{\Delta n} = I_n$, versions "AG", "BH" (for Order No. supplements see Catalog LV 1, "Selection and Ordering Data")

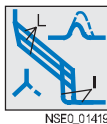
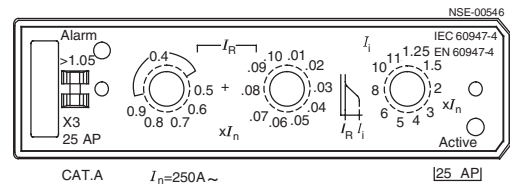


Application: Motor protection – ETU10M, LI function

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 $11 \times I_n^{(1)}$
fixed with phase failure sensitivity (40% I_R fixed)

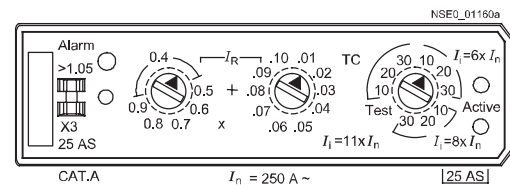


Application: Motor protection – ETU30M, LI function

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)



1) Size-dependent, see Catalog LV 1, "Selection and Ordering Data".

3VL Molded Case Circuit-Breakers

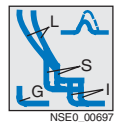
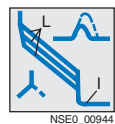
3VL Molded Case Circuit-Breakers up to 1600 A

General data

Electronic overcurrent trip units LCD ETU

General information:

- No auxiliary voltage for tripping unit 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, LSI/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

On/off selectable thermal image,
with phase failure sensitivity for ETU40M
(5–50% 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

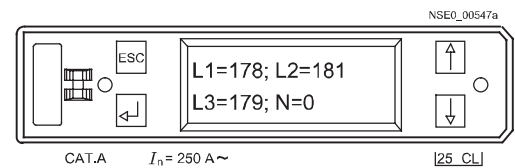
Short-circuit protection (instantaneous)
 $I_i = 1.25$ to $11 \times I_n$ ¹⁾

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);

$I_{AN} = 0.4$ to $1 \times I_n$, versions "CL", "CM", "CN"
(for Order No. supplements see Catalog LV 1,
"Selection and Ordering Data")

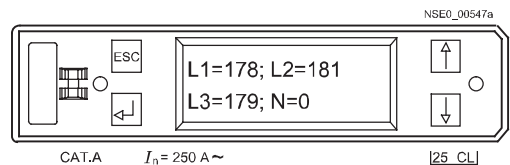
1) Size-dependent, see Catalog LV 1, "Selection and Ordering Data".

- 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
- 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. supplement 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.

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

Two alternatives are available for communication. An LCD ETU (ETU40, ETU40M or ETU42) is required in addition for the more extensive communication with COM10. If less data is required,

the SIMOCODE Professional can be used as interface. Both versions can be switched on and off by means of an optional motorized operating mechanism.

Transmittable data

	Data transfer through COM10	Data transfer through SIMOCODE Pro
Commands: • Switch on/off • Alarm and tripping memory, min./max. measured values and maintenance information	✓ ✓	✓ --
Operating states: • ON or OFF status trip position	✓	✓
Event signals: • Tripped signals with tripping current and time stamp • Alarm signals (e.g. overload) • Alarm signals with time stamp (e.g. overload, asymmetrical phase current etc.) • Threshold value warning, with time stamp (e.g. phase currents)	✓ -- ✓ ✓	-- ✓ -- --
Measured values: • Phase currents and neutral conductor current, each with min./max. value and time stamp • Phase currents, voltages	✓ --	-- ✓
Parameter values • Read and write • Setting 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	Overcurrent trip unit version			COM10 module	SIMOCODE	Breaker Data Adapter	Breaker Data Adapter Plus
	TM	ETU	LCD ETU				
Transmission of the operating status (only ON, OFF, tripped) to the PROFIBUS	✓	✓	✓	--	✓	--	--
Transmission of the operating status (ON, OFF, tripped, warnings, causes of tripping, event log) to the PROFIBUS	--	--	✓	✓	--	☐	☐
Display of measured values (current only) and parameters in trip unit, change parameters through display	--	--	✓	☐	☐	☐	☐
Transmission of maximum value of present current in %	✓	✓	✓	--	✓	☐	☐
Transmission of individual present phase currents incl. min./max. and time stamp	--	--	✓	✓	--	☐	☐
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 trip unit.
- ☐ Function can optionally be taken over by one of these modules.
- ☐ Not necessary for this function, optionally combinable
- Function not available

3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

General data

Switching of DC currents

The VL 160X to VL630 circuit-breakers (for system protection with TM, for starter combinations, non-automatic circuit-breakers) can also be used for DC switching and protection applications.

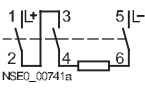
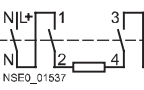
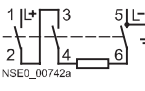
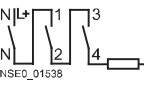
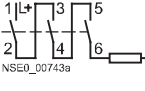
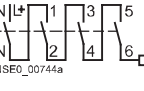
The VL 160 to VL1600 circuit-breakers with electronic trip units (ETU) are not suitable for DC applications.

However, the maximum permitted DC voltage for each current 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 current paths is required.

As the current has to flow through all of the current 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 trip units ("I" trip units) are increased by 30 to 40 %.

Recommended connection/Maximum permitted DC voltage U_g	Remarks	
For 3 and 4-pole circuit-breakers¹⁾²⁾		
250 V DC  Circuit A	500 V DC  Circuit B	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  Circuit A	600 V DC  Circuit B	2-pole switching (grounded system) The grounded pole is always assigned to the individual current path, so that there are always 2 current paths in series in the event of a ground fault in circuit A and 3 current paths in series in the event of a ground fault in circuit B.
600 V DC  Circuit A	600 V DC  Circuit B	1-pole switching (grounded system) The grounded pole is assigned to the unconnected current path.

- 1) VL160X on request.
- 2) 4th pole (N) without overload and short-circuit trip units.

3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

General data

Technical specifications

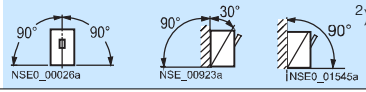
Type	VL160X 3VL1	VL160 3VL2	VL250 3VL3	VL400 3VL4	VL630 3VL5	VL800 3VL6	VL1250 3VL7	VL1600 3VL8	
Max. rated current I_n	A 160	160	250	400	630	800	1250	1600	
Rated insulation voltage U_i according to IEC 60947-2									
Main circuits	AC V 800	800	800	800	800	800	800	800	
Auxiliary circuits	AC V 690	690	690	690	690	690	690	690	
Rated impulse withstand voltage U_{imp}									
Main circuits	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 DC ²⁾ V 250	690 600	690 600	690 600	690 600	690 600 ⁻¹⁾	690 600 ⁻¹⁾	690 600 ⁻¹⁾	
NEMA 60 Hz	AC V 600	600	600	600	600	600	600	600	
Utilization categories (IEC 60947-2)	A	A	A	A	A B ³⁾	A B ³⁾	A B ³⁾	A B ³⁾	
Permissible ambient temperature									
Operation	°C -25 to +70	-25 to +70	-25 to +70	-25 to +70	-25 to +70	-25 to +70	-25 to +70	-25 to +70	
Storage	°C -40 to +80	-40 to +80	-40 to +80	-40 to +80	-40 to +80	-40 to +80	-40 to +80	-40 to +80	
Permissible load at various ambient temperatures Close to the circuit-breaker, related to the rated current of the circuit-breaker									
• <u>Circuit-breakers for system protection</u>	up to 50 °C % 100 at 60 °C % 93 at 70 °C % 86	100 93 86	100 93 86	100 93 86	100 93 86	100 93 86	100 95 86	100 95 80	
• <u>Circuit-breakers for motor protection</u>	up to 50 °C % – at 60 °C % – at 70 °C % –	100 93 86	100 93 86	100 93 86	100 93 86	– – –	– – –	– – –	
• <u>Circuit-breakers for starter combinations and non-automatic circuit-breakers</u>	up to 50 °C % 100 at 60 °C % 93 at 70 °C % 86	100 93 86	100 93 86	100 93 86	100 93 86	100 93 86	100 95 86	100 95 80	
Weights of 3-pole circuit-breakers									
Basic unit without overcurrent trip unit	kg –	1.5	1.6	4.2	7.8	14.2	21	27.3	
Thermal-magnetic overcurrent trip unit	kg –	0.7	0.7	1.5	1.2	–	–	–	
Electronic overcurrent trip unit	kg –	0.9	0.9	1.7	1.5	1.8	4.0	4.0	
Basic unit									
With thermal-magnetic overcurrent trip unit	kg 2.0	2.2	2.3	5.7	9.0	–	–	–	
With electronic overcurrent trip unit	kg –	2.4	2.5	5.9	9.3	16.0	25.0	31.3	
Weights of 4-pole circuit-breakers									
Basic unit without overcurrent trip unit	kg –	2.0	2.2	5.5	9.7	18.2	27.5	34.8	
Thermal-magnetic overcurrent trip unit	kg –	1.0	1.0	1.9	1.5	–	–	–	
Electronic overcurrent trip unit	kg –	1.1	1.1	2.1	2.0	2.3	6.0	6.0	
Basic unit									
With thermal-magnetic overcurrent trip unit	kg 2.5	3.0	3.2	7.4	11.2	–	–	–	
With electronic overcurrent trip unit	kg –	3.1	3.3	7.6	11.7	20.5	33.5	40.8	
Rated short-circuit breaking capacity According 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 trip units.
- 3) On request.

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	20000	20000	20000	10000	10000	3000	3000
Electrical endurance	Operating cycles	10000	10000	10000	10000	5000	3000	1500	1500
Max. operating frequency	1/h	120	120	120	120	60	60	30	30
Types of connection	See "Main Connections, Basic Equipment and Options"								
Conductor cross-sections									
Box terminal⁴⁾									
Solid or stranded cable	Copper only	mm ²	2.5-70	2.5-70	25-185	50-300	–	–	–
Finely stranded with end sleeve		mm ²	2.5-50	2.5-50	25-120	50-240	–	–	–
Flexible busbar		mm	12 × 10	12 × 10	17 × 10	25 × 10	–	–	–
Connecting terminal plate for flexible busbar ³⁾		mm	–	–	–	–	2 units 6 × 32	–	–
Circular conductor terminal for cable⁴⁾									
Solid or stranded cable	Cu or Al	mm ²	16-70	16-70	25-185	50-300	–	–	–
Finely stranded with end sleeve		mm ²	10-50	10-50	25-120	50-240	–	–	–
Multiple feed-in terminal ⁴⁾									
Solid or stranded cable	Cu or Al	mm ²	–	–	–	2 units 50-120	2 units 50-240	3 units 50-240	4 units 50-240
Finely stranded with end sleeve		mm ²	–	–	–	2 units 50-95	2 units 50-185	3 units 50-185	4 units 50-185
Direct connection of busbars	Cu or Al	mm	17 × 7	22 × 7	24 × 7	32 × 10	40 × 10	2 × 40 × 10	2 × 50 × 10
Screw for connection with screw terminal			M5	M5	M8	M8	M6	M8	M8
Conductor cross-sections for control circuits with terminal connection									
Screw terminal									
Solid		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
Finely stranded with end sleeve		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
For details see Installation Manual									
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	W	–	40	60	90	160	250	210
	ETU								
For starter combinations or non-automatic circuit-breakers		W	40	40	60	90	160	250	210
For motor protection		W	–	40	60	90	160	–	–
Permissible mounting position¹⁾									
									
Auxiliary and alarm switches									
Conventional free-air thermal current I_{th}									
	A	10	10	10	10	10	10	10	10
Rated making capacity									
	A	10	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		
	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							
Leading auxiliary switch with rotary operating mechanism									
Continuous thermal current I_{th}	A	2	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)	2 (ind. 0.5)
Rated operational voltage	V AC	230	230	230	230	230	230	230	230
Rated operational current	A	2	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	0.5
Rated switching capacity	A	2	2	2	2	2	2	2	2
Back-up fuse, quick	A	2	2	2	2	2	2	2	2
Position indicator switches									
Continuous 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 switching 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 indication switch in RCD module¹⁾								
Continuous thermal current I_{th}	A	2						
Rated making capacity	A	2						
Rated operational voltage	V AC	250						
Rated operational current	A	2						
Rated breaking capacity, inductive, p.f. = 0.7	A	0.5						
Rated switching capacity	A	2						
Back-up fuse, quick	A	2						
Trip unit	Group 1: VL160X to VL400				Group 2: VL630 to VL1600			
Undervoltage trip unit								
Response voltage:								
Release (circuit-breaker is tripped)	V	$0.35-0.70 \times U_s$			$0.35-0.70 \times U_s$			
Pick-up (circuit-breaker can be closed)	V	$0.85-1.1 \times U_s$			$0.85-1.1 \times U_s$			
Power input (continuous duty) at:								
50/60 Hz 24 V AC	VA	1.4			1.2			
50/60 Hz 110-127 V AC	VA	1.0			1.8			
50/60 Hz 220-250 V AC	VA	1.0			1.8			
50/60 Hz 208 V AC	VA	1.0			1.8			
50/60 Hz 277 V AC	VA	1.0			1.8			
50/60 Hz 380-415 V AC	VA	1.0			1.8			
50/60 Hz 440-480 V AC	VA	1.0			1.8			
50/60 Hz 500-525 V AC	VA	1.0			1.8			
50/60 Hz 600 V AC	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 trip unit								
Response voltage:								
Pick-up (circuit-breaker is tripped)	V	U_s 0.7-1.1			U_s 0.7-1.1			
Power input (short time) at:								
50/60 Hz 24 V AC	VA	310			330			
50/60 Hz 48-60 V AC	VA	335-465			380-460			
50/60 Hz 110-127 V AC	VA	470-630			330-430			
50/60 Hz 208-277 V AC	VA	585-1000			520-800			
50/60 Hz 380-600 V AC	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 operating voltage	s	interrupts automatically, less than 10 ms						
Time-delay device for undervoltage trip unit								
Rated control supply voltage U_s	V AC/DC	220-250			220-250			
Control voltage for undervoltage trip unit	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/circuit								
Undervoltage trip unit	s	3/- 6/Bridge Y2-Y1			1.5/- 3/Bridge Y2-Y1			
Undervoltage trip unit and auxiliary relay (3RH11)	s	0.6/- 1.2/Bridge Y2-Y1			0.3/- 0.6/Bridge 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 spring energy store (synchronizable)		x	x	x	x	x	x	–	–
Motorized operating mechanisms									
Power consumption	VA / W	< 100			--	--	--	< 250	
Rated control supply voltage U_s	50/60Hz V AC	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 according to DIN VDE 0641)	A	4	2		--	--	--	4	2
Operating range	V	$0.85 - 1.1 \times U_s$			--	--	--	$0.85 - 1.1 \times U_s$	
Minimum command duration at U_s	ms	50			--	--	--	50	
Max. command duration, depends on circuit ¹⁾		Non-maintained or continuous command			--	--	--	Non-maintained or continuous command	
Total make-time	s	< 1			--	--	--	< 5	
Break-time	s	< 1			--	--	--	< 5	
Interval time between OFF and ON commands	s	> 5			--	--	--	> 5	
Interval time between ON and OFF commands	s	> 5			--	--	--	> 5	
Max. permissible switching frequency	1/h	120			--	--	--	30	
Synchronized motorized operating mechanism									
Power consumption	VA / W	< 100			< 200	< 250	< 250	--	--
Rated control supply voltage U_s	50/60Hz V AC	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 according to DIN VDE 0641)	A	4			2			--	--
Operating range	V	$0.85 - 1.1 \times U_s$			--	--	--	--	--
Minimum command duration at U_s	ms	50			--	--	--	--	--
Max. command duration, depends on circuit ¹⁾		Non-maintained or continuous command			--	--	--	--	--
Total make-time	ms	< 100			--	--	--	--	--
Break-time	s	< 5			--	--	--	--	--
Interval time between OFF and ON commands		< 5			--	--	--	--	--
Interval time between ON and OFF commands	s	> 1			--	--	--	--	--
Max. permissible switching frequency	1/h	120			60			--	--

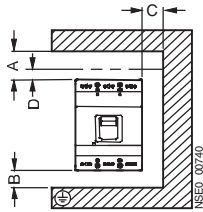
1) Changeover contact also permissible, note interval times between ON and OFF commands

3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

General data

Space requirements above arcing chambers



Arcing spaces

Minimum clearances from adjacent grounded parts and from non-insulated live parts. Plain conductors and busbars must be insulated with interphase barriers within the arcing space.

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

For installation 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.de/niederspannungsschalttechnik/handbuecher>

Circuit-breaker	Switching capacity	Minimum enclosure volume	A	A	A	B	C	D
Type		m ³	≤ 415 V Without/with terminal cover	> 415 – 690 V Without terminal cover	> 415 – 690 V With terminal cover	≤ 690 V	≤ 690 V	≤ 690 V
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 AC 600 V, DC 500 V

B: circuit-breaker connection and floor

C: side of the circuit-breaker and the side walls (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)

Correlation between short-circuit making capacity, short-circuit breaking capacity and the corresponding power factor (according to IEC 60947-2)

Short-circuit breaking capacity I_{cu}	Power factor	Minimum value for short-circuit making capacity I_{cm} (n x short-circuit breaking capacity)
A	p.f.	$n \times I_{cu}$
$4500 < I_{cu} \leq 6000$	0.7	$1.5 \times I_{cu}$
$6000 < I_{cu} \leq 10000$	0.5	$1.7 \times I_{cu}$
$10000 < I_{cu} \leq 20000$	0.3	$2.0 \times I_{cu}$
$20000 < I_{cu} \leq 50000$	0.25	$2.1 \times I_{cu}$
$50000 < I_{cu}$	0.2	$2.2 \times I_{cu}$

e.g. VL250H (H ≙ high switching capacity): $I_{cu} = 70$ kA (415 V AC)
 $I_{cm} = 2.2 \times 70000 = 154$ kA (415 V AC)

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 overcurrent trip units (thermal overload trip units, "L" trip units) 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 trip units ("I" trip units) 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 trip units. With a lower operational current there is a correspondingly higher multiple for the tripping current of the "I" trip units.

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 trip unit.

"I" = Instantaneous (electromagnetic) short-circuit trip unit

The time/current characteristic curve, the current limiting characteristic curves and the I^2t characteristic curves were determined according to DIN VDE 0660 and IEC 60947.

The tripping characteristic of the inverse-time delayed overload trip unit (thermal overload trip units, L trip units) for DC and AC with a frequency of 50/60 Hz.

- For thermomagnetic trip units (TM) the following applies:

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

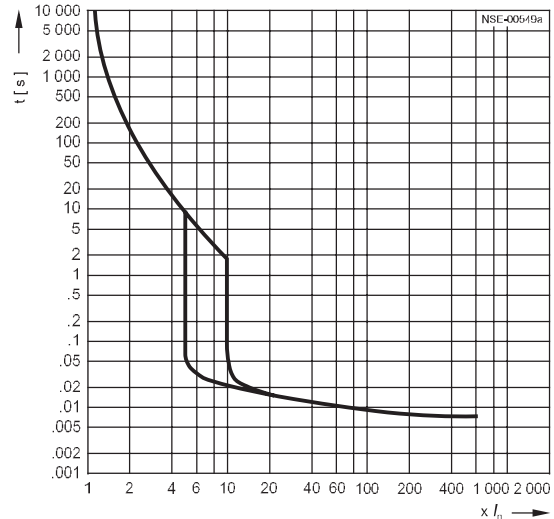
Under normal operating conditions, all three poles of the device must be loaded. The three main conducting paths must be connected in series in order to protect single-phase or DC loads.

- Tripping characteristic curves of the SENTRON VL160, VL250, VL400 and VL630 circuit-breakers for motor/generator protection with electronic overcurrent trip units.

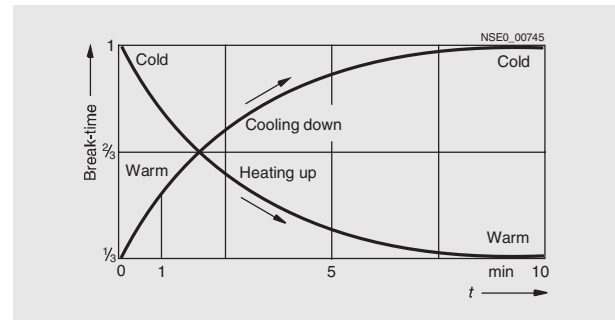
The tripping times of the inverse-time delayed overcurrent trip units apply to the non-preloaded (cold) state. In the operating/warm state (after application of a load at the rated current), the tripping times are reduced to approx. 33 %. After a tripping operation due to overcurrent, the tripping times 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 characteristics 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" trip unit



Dynamic tripping response (thermal image)

3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

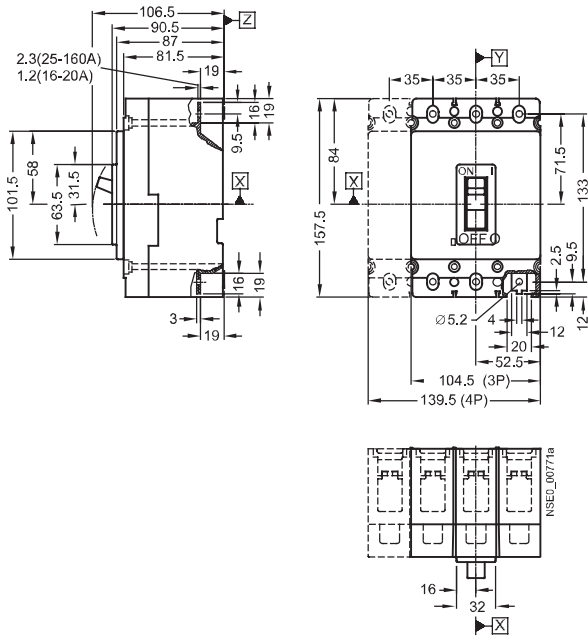
Project planning aids

Dimensional drawings

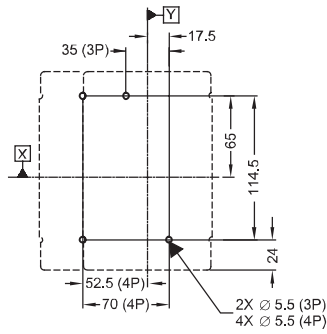
**VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3),
3- and 4-pole, up to 250 A**

Circuit-breakers

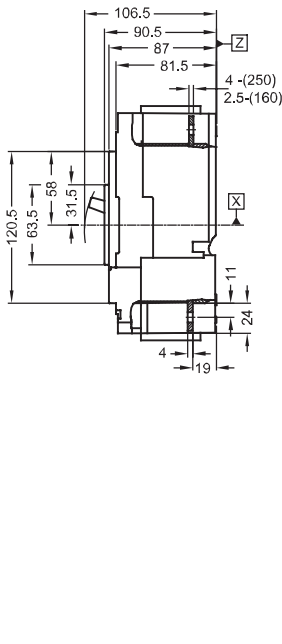
SENTRON VL160X (3VL1) circuit-breakers



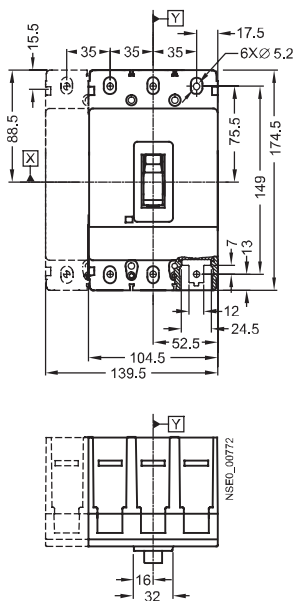
Circuit-breaker installation instructions



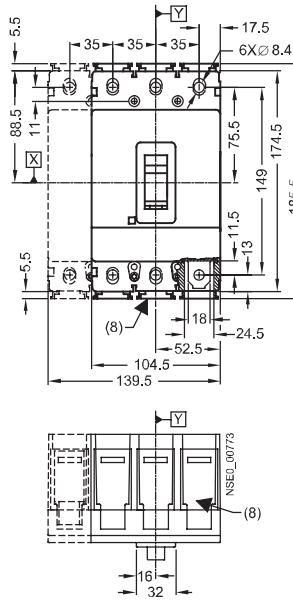
SENTRON VL160/VL250 (3VL2/3VL3) circuit-breakers



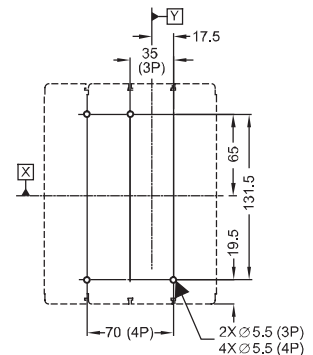
SENTRON VL160 (3VL2) circuit-breakers



SENTRON VL250 (3VL3) circuit-breakers



SENTRON VL160 and VL250 (3VL2 and 3VL3) circuit-breakers mounting notes



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

3VL Molded Case Circuit-Breakers

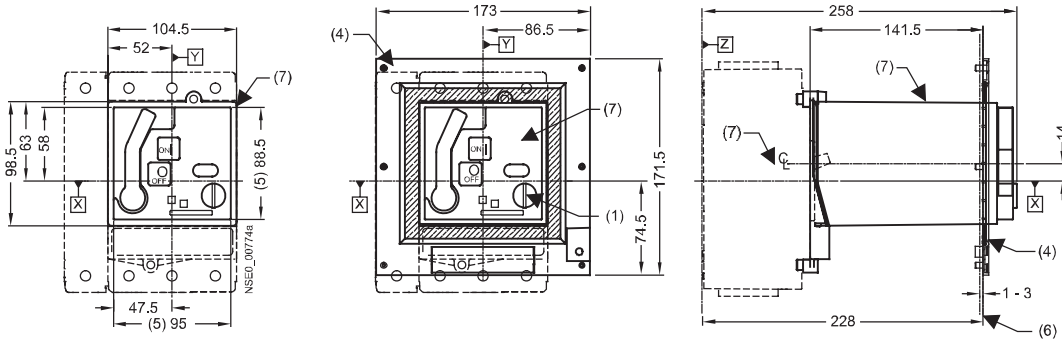
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

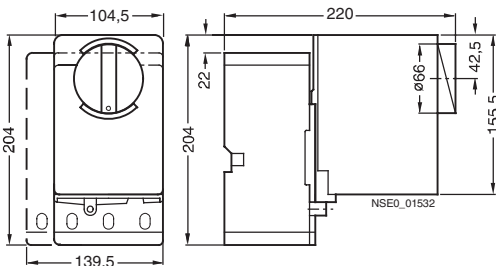
VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3),
3- and 4-pole, up to 250 A

Operating mechanisms

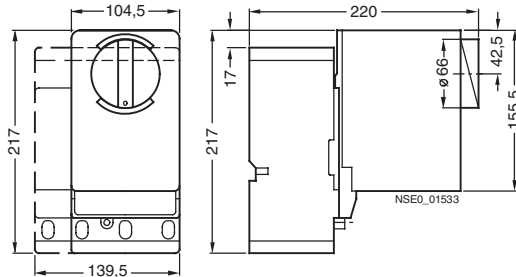
Motorized operating mechanism with spring energy store



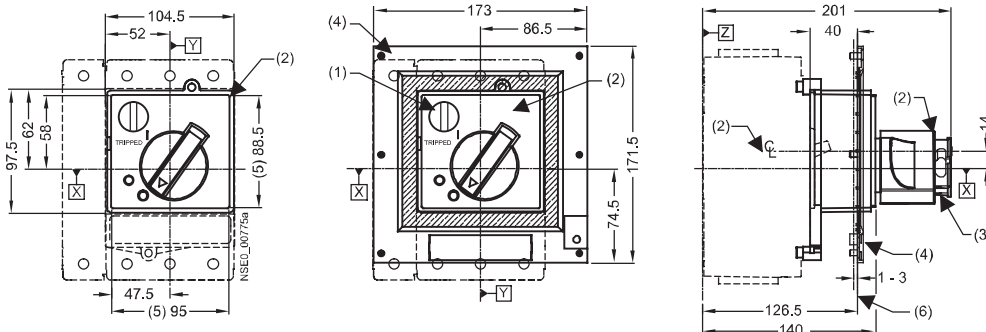
Motorized operating mechanism for VL160X (3VL1)



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 spring energy store
- (8) Terminal insulation

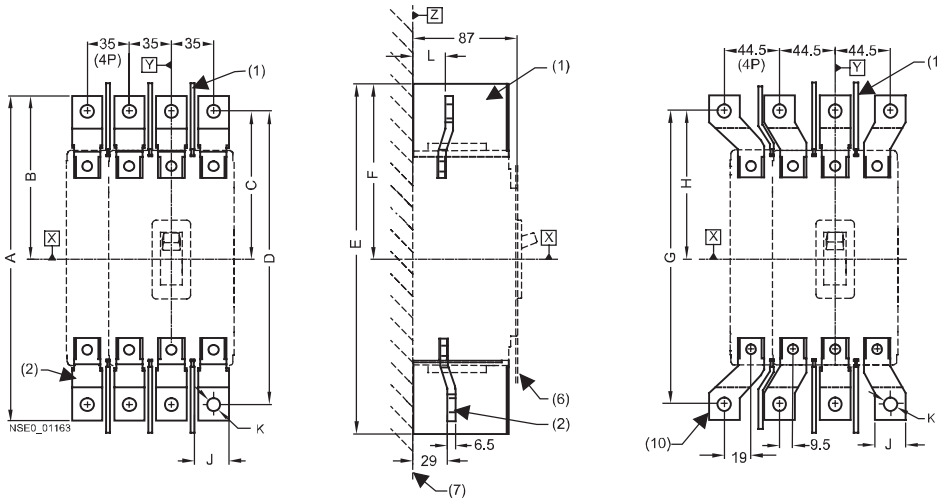
3VL Molded Case Circuit-Breakers

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

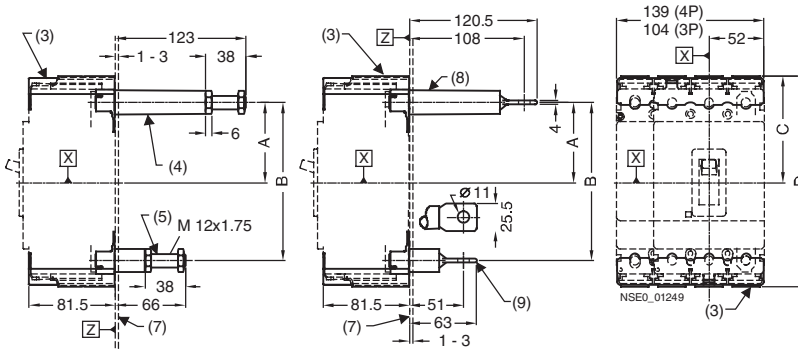
Terminals and phase barriers



	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, round stock (long)
- (5) Threaded rear terminals, round stock (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



	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

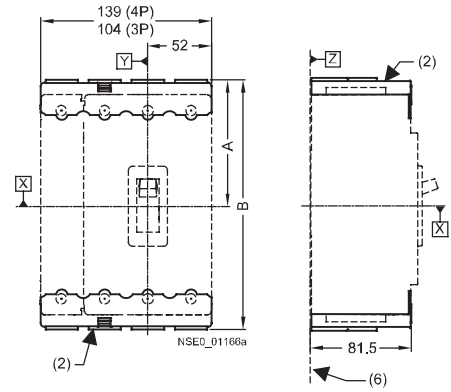
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

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

Terminal covers

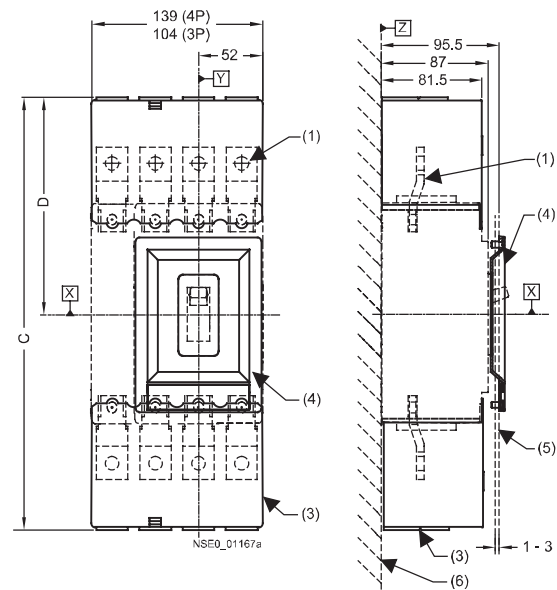
Terminal covers, standard



- (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

	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



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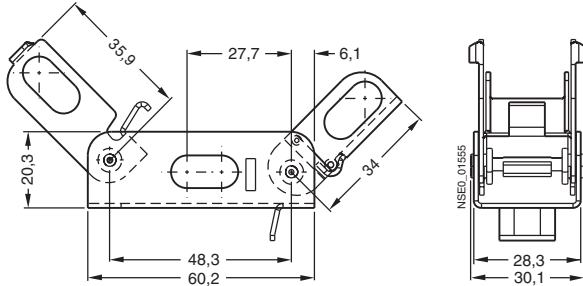
3VL Molded Case Circuit-Breakers

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

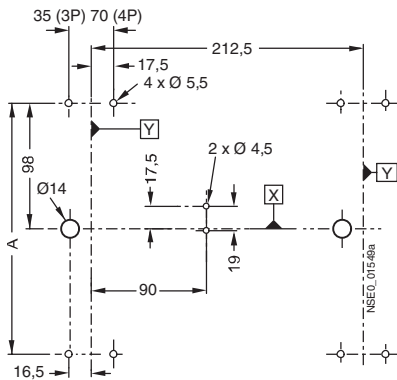
Locking device for toggle handle



Rear interlocking module

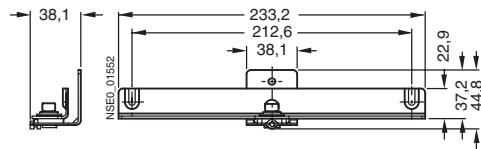
Rear interlocking module for plug-in/withdrawable circuit-breakers, with front connection, without/with RCD module (withdrawable version only without RCD module)

For more detailed dimensional drawings see installation instructions for rear interlocking module.

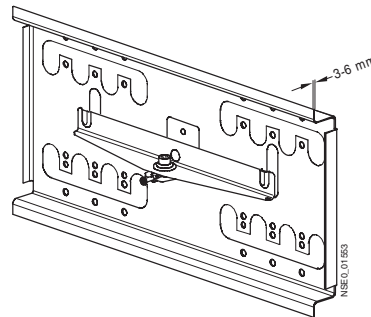


	Without RCD module	With RCD module – only "plug-in version"
	VL160X (3VL1), VL160 (3VL2) VL250 (3VL3)	VL160X (3VL1), VL160 (3VL2) VL250 (3VL3)
A	194	315

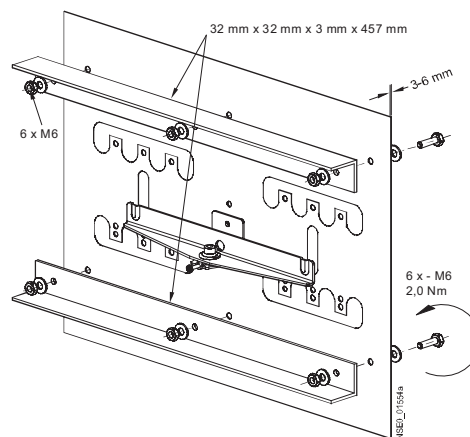
Rear interlocking module



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

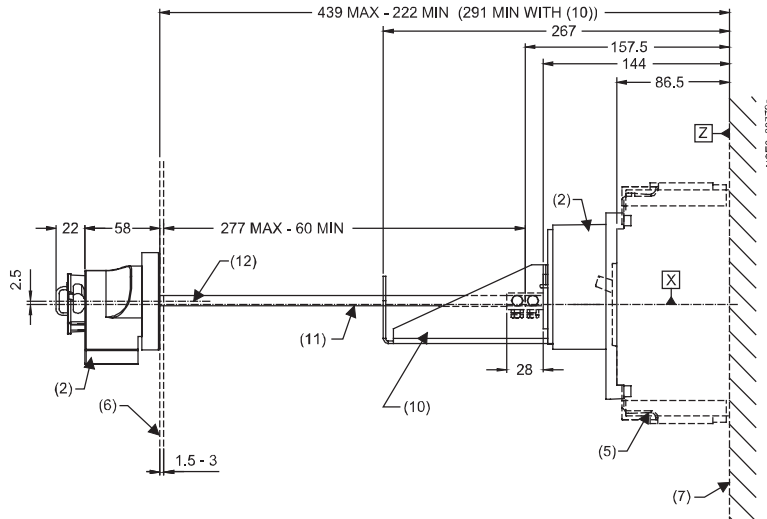
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

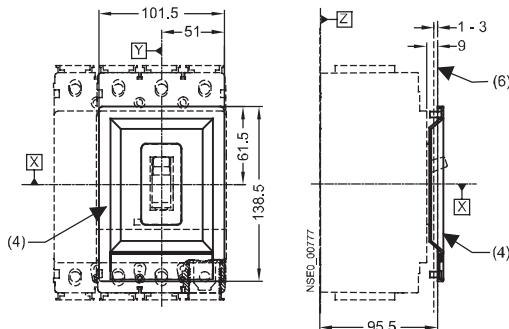
VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3),
3- and 4-pole, up to 250 A

Accessories

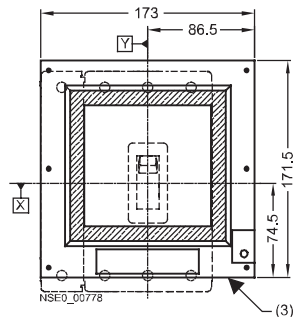
Circuit-breaker with door-coupling rotary operating mechanism



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 operating shaft

3VL Molded Case Circuit-Breakers

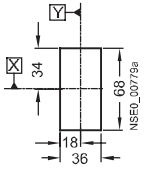
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

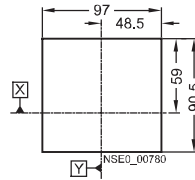
VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3),
3- and 4-pole, up to 250 A

Door cut-outs

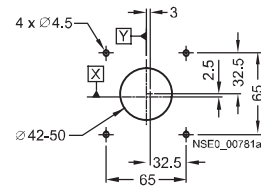
Door cut-out for toggle lever
(without masking frame)



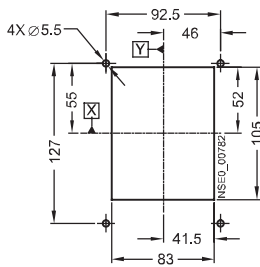
Door cut-out for front-operated rotary operating mechanism and motorized operating mechanism with spring energy store (without masking frame)



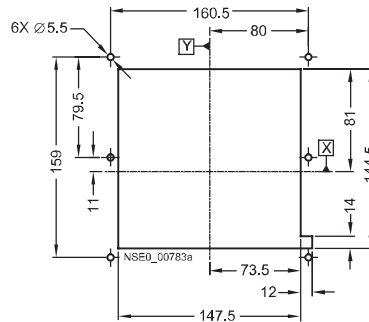
Door cut-out for door-coupling rotary operating mechanism



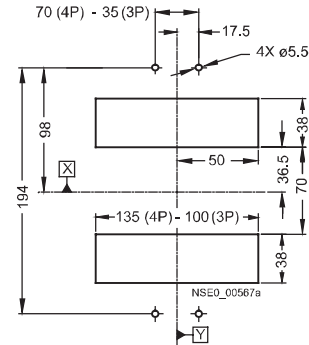
Door cut-out for toggle lever
(with masking frame)



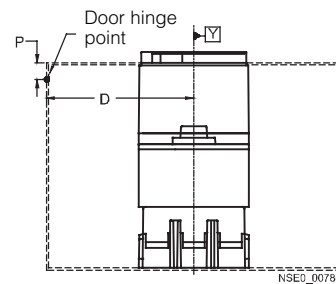
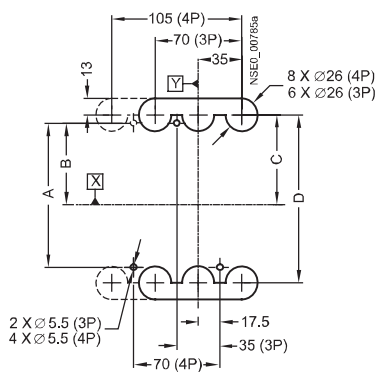
Door cut-out for front-operated rotary operating mechanism, motorized operating mechanism with spring energy store and extended escutcheon (with masking frame)



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



Hole pattern and cut-out for rear terminals



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

	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

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

3VL Molded Case Circuit-Breakers

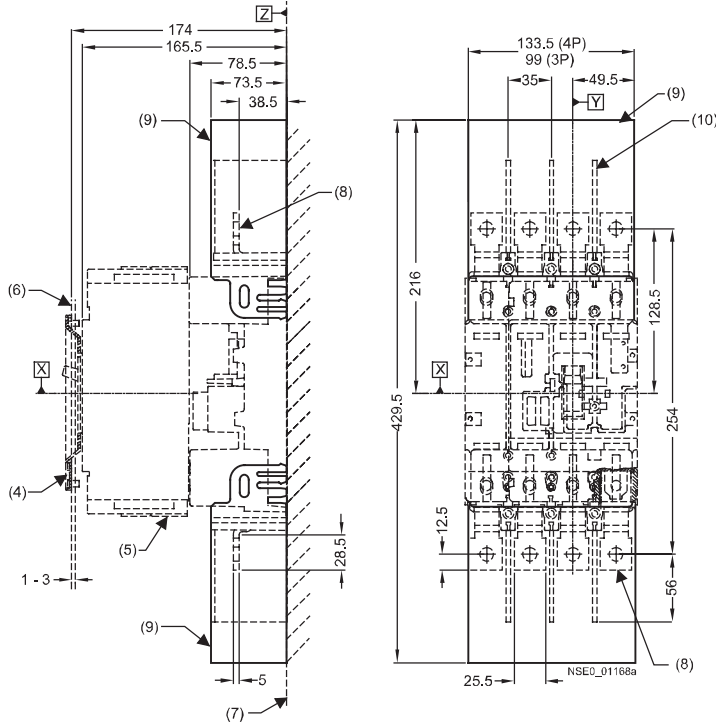
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

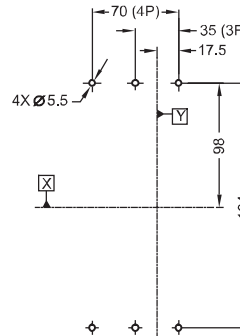
VL160X (3VL1), VL160 (3VL2) and VL250 (3VL3),
3- and 4-pole, up to 250 A

Plug-in bases and accessories

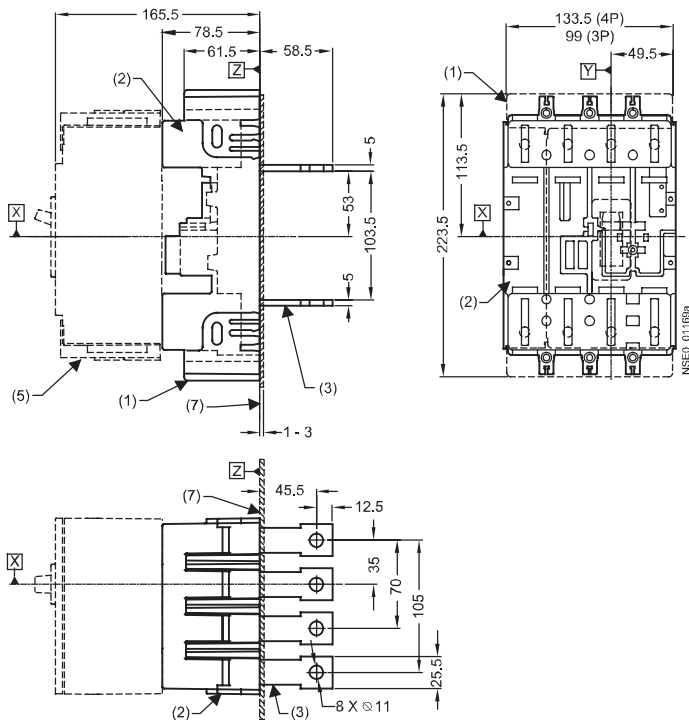
Plug-in base with front connecting bars



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

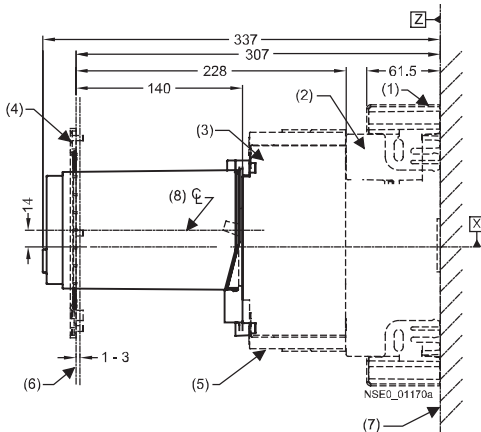
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

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

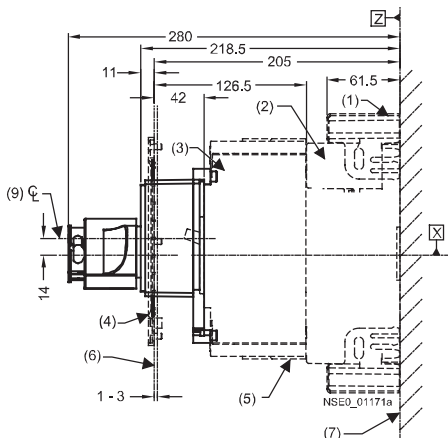
Plug-in bases and accessories

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

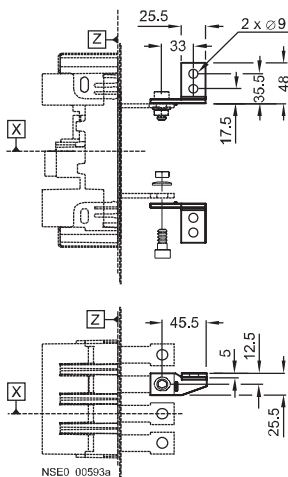


- (1) Plug-in base with terminal covers
- (2) Plug-in base
- (3) Circuit-breaker
- (4) Masking frame for door cut-out (for circuit-breaker with toggle lever)
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Motorized operating mechanism with spring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



16

3VL Molded Case Circuit-Breakers

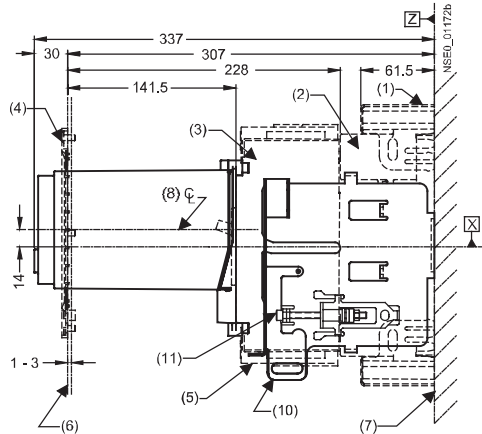
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

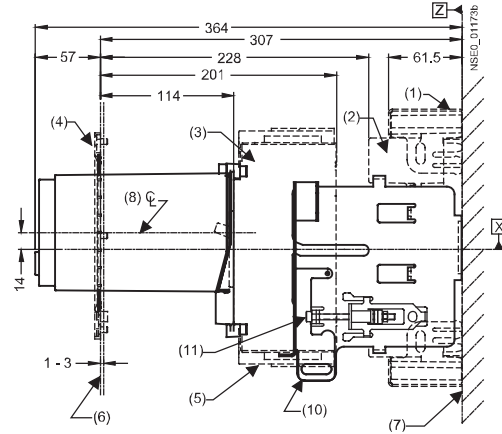
VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole, up to 250 A

Withdrawable version and accessories

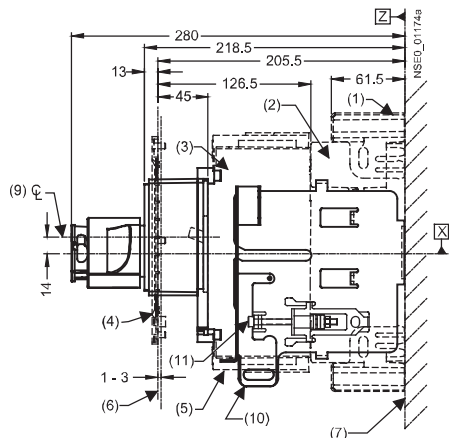
SENTRON VL160 (3VL2) and VL250 (3VL3) circuit-breakers with motorized operating mechanism with spring energy store (connected position)



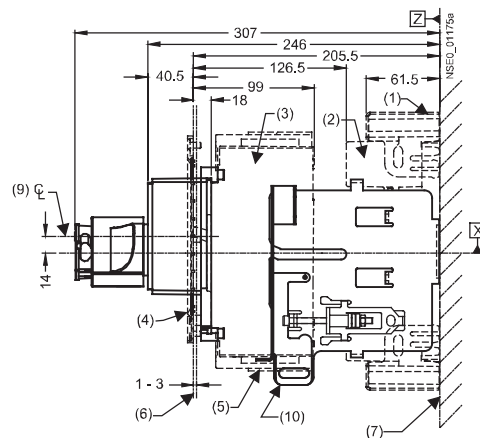
SENTRON VL160 (3VL2) and VL250 (3VL3) circuit-breakers with motorized operating mechanism with spring energy store (disconnected position)



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 spring energy store
- (9) Front-operated rotary operating mechanism
- (10) Locking device for racking mechanism
- (11) Racking mechanism

3VL Molded Case Circuit-Breakers

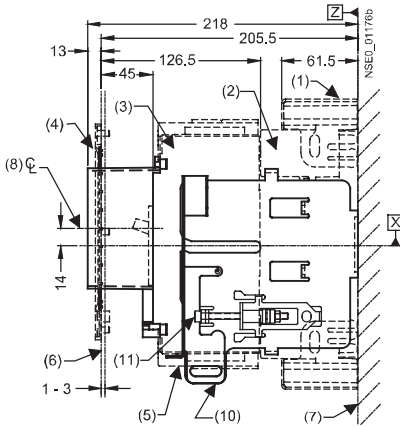
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

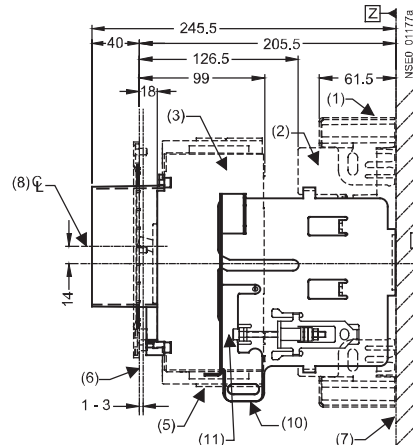
VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole, up to 250 A

Withdrawable version and accessories

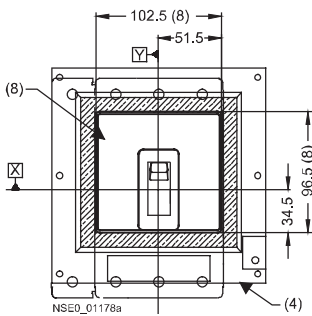
SENTRON VL160 (3VL2) and VL250 (3VL3) circuit-breakers with extended escutcheon (connected position)



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

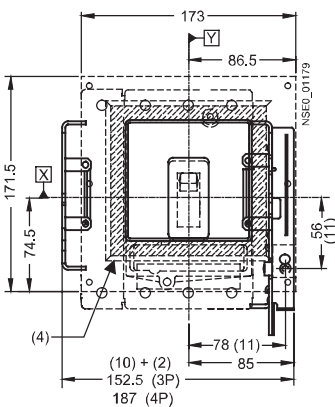


Dimensions of extended escutcheon



- (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

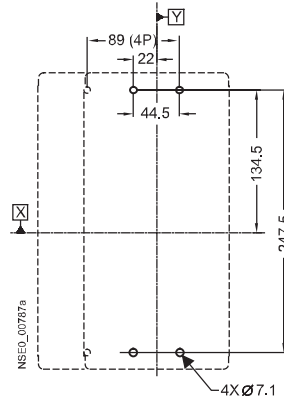
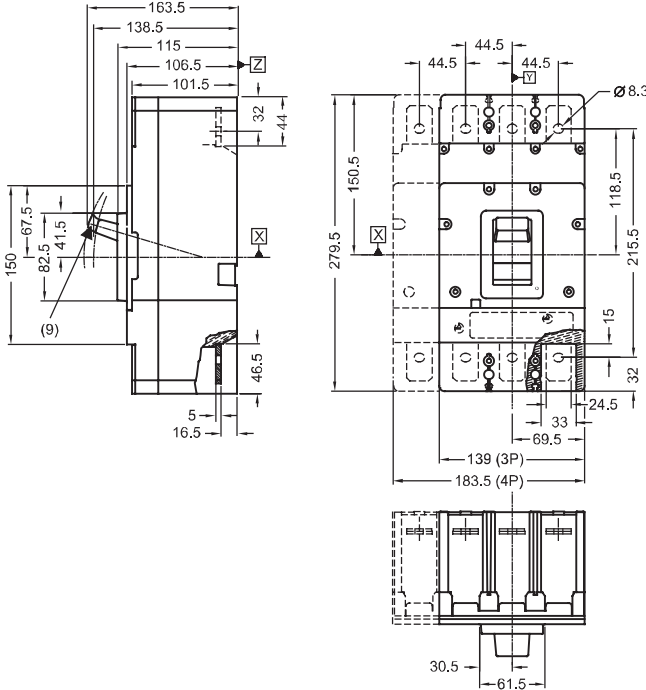
Project planning aids

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

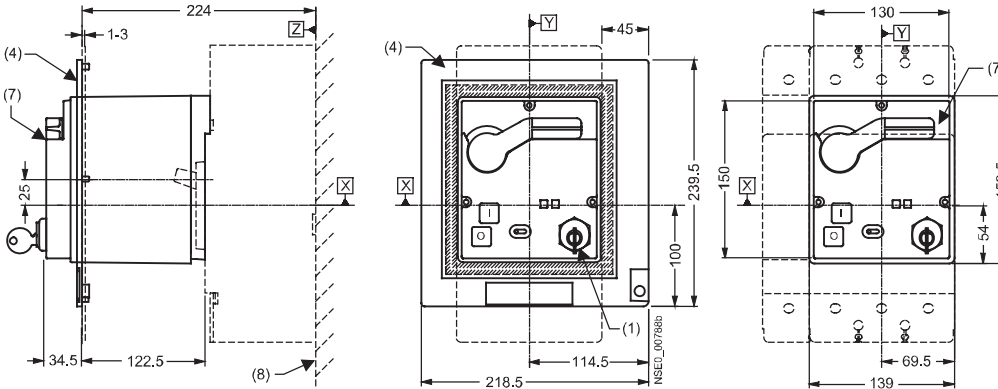
Circuit-breakers

SENTRON VL400 (3VL4) circuit-breakers

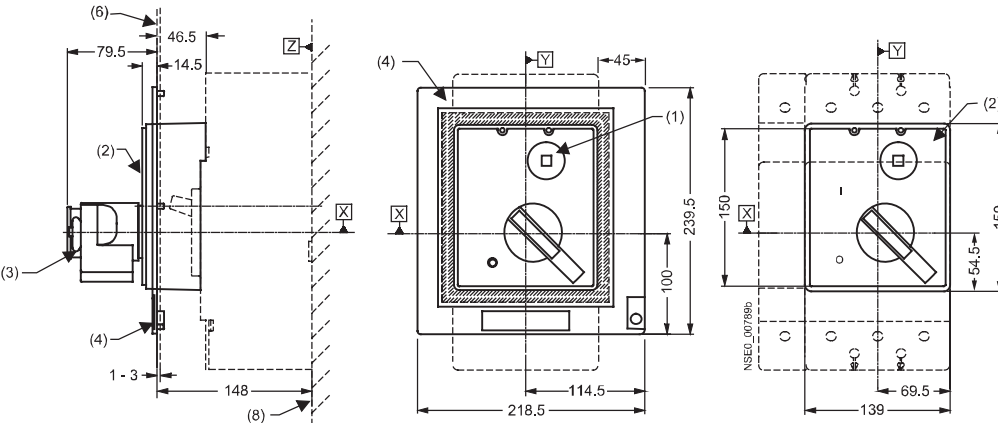
Circuit-breaker installation instructions



Motorized operating mechanism with spring energy store



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 spring energy store
- (8) Installation level
- (9) Toggle lever extension

16

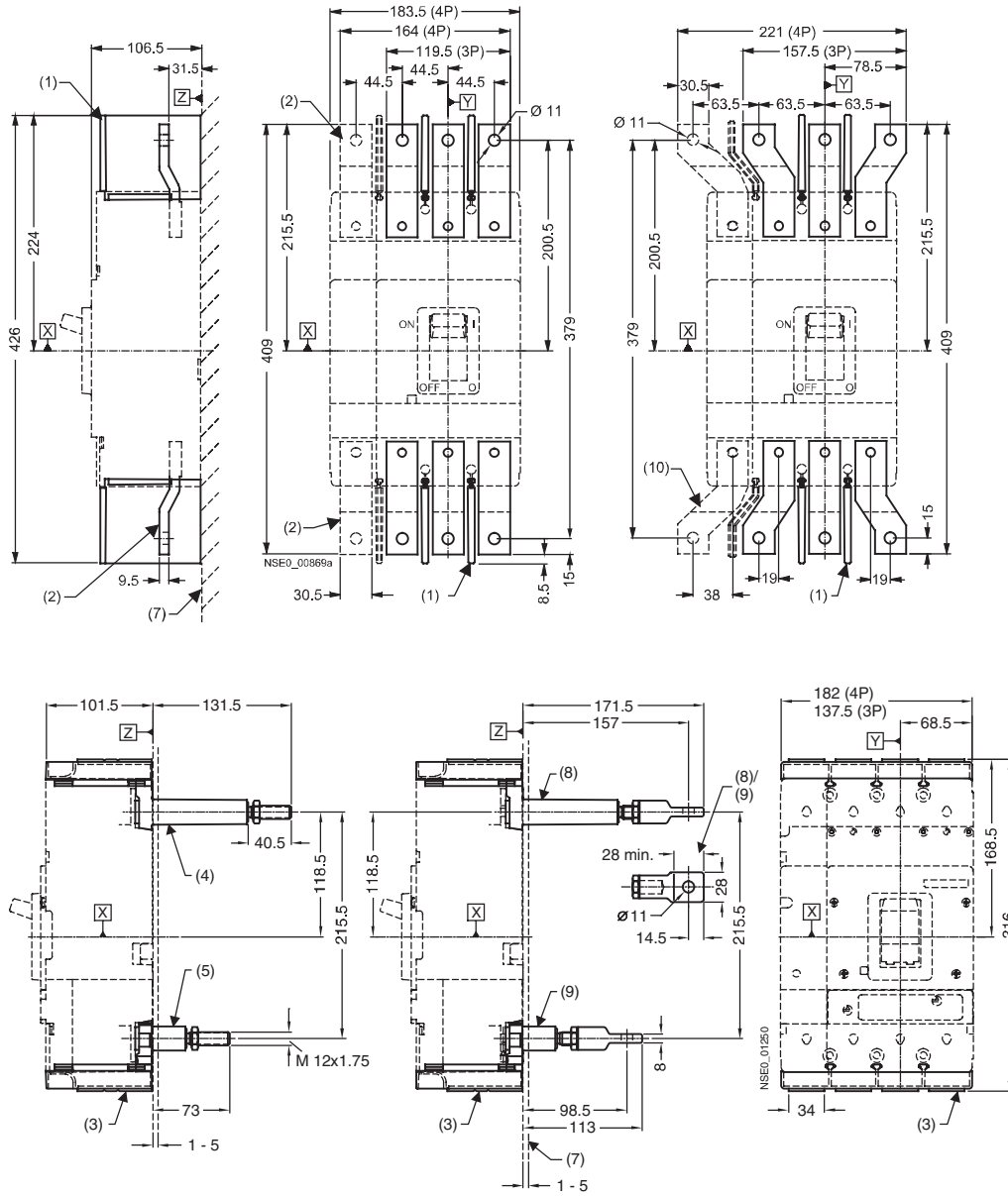
3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

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

Terminals and phase barriers



- (1) Phase barrier
- (2) Front connecting bars
- (3) Terminal covers (standard)
- (4) Rear terminal (long)
- (5) Rear terminal (short)
- (7) Installation level
- (8) Rear flat connector (long)
- (9) Rear flat connector (short)
- (10) Flared front busbar connecting bars

3VL Molded Case Circuit-Breakers

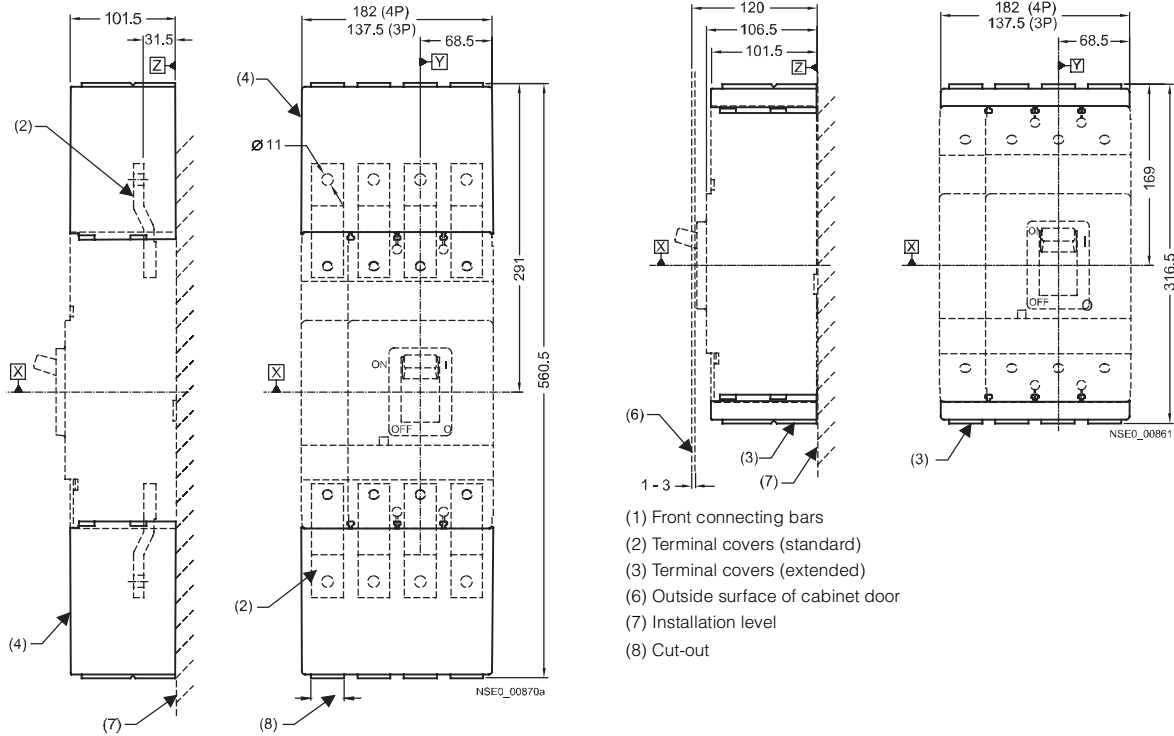
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

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

Terminal covers

Circuit-breaker installation instructions Front connecting bars



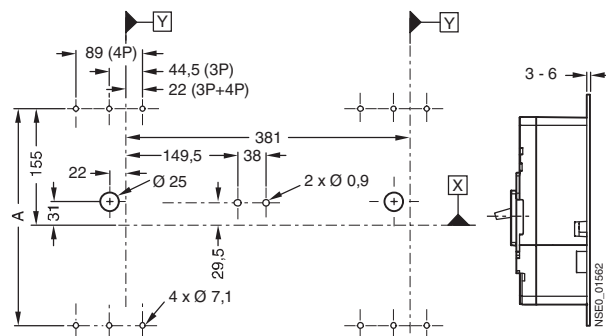
- (1) Front connecting bars
- (2) Terminal covers (standard)
- (3) Terminal covers (extended)
- (6) Outside surface of cabinet door
- (7) Installation level
- (8) Cut-out

16

Rear interlocking module

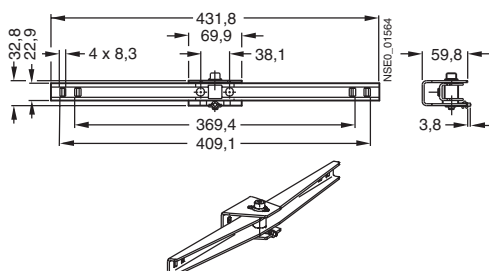
Rear interlocking module for plug-in/withdrawable circuit-breakers for front connection, without/with RCD module

For more detailed dimensional drawings see installation instructions for rear interlocking module



	Without RCD module	With RCD module
	VL400 (3VL4)	VL400 (3VL4)
A	289	449

Rear interlocking module



3VL Molded Case Circuit-Breakers

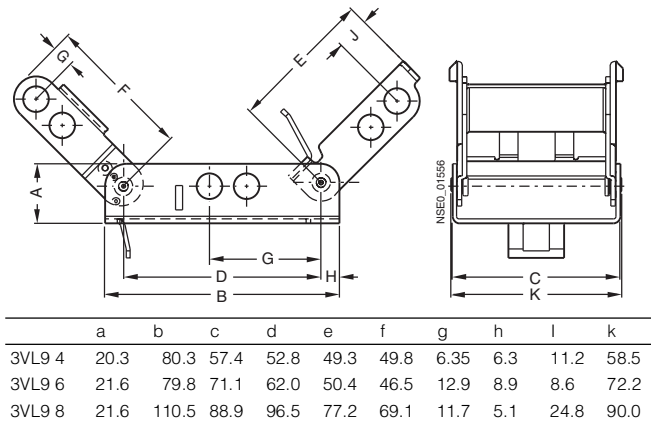
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

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

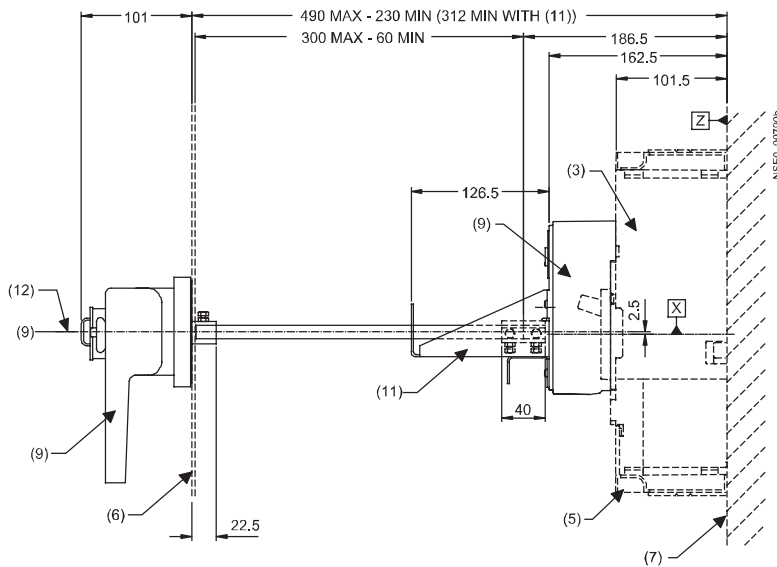
Interlocks

Locking device for toggle lever

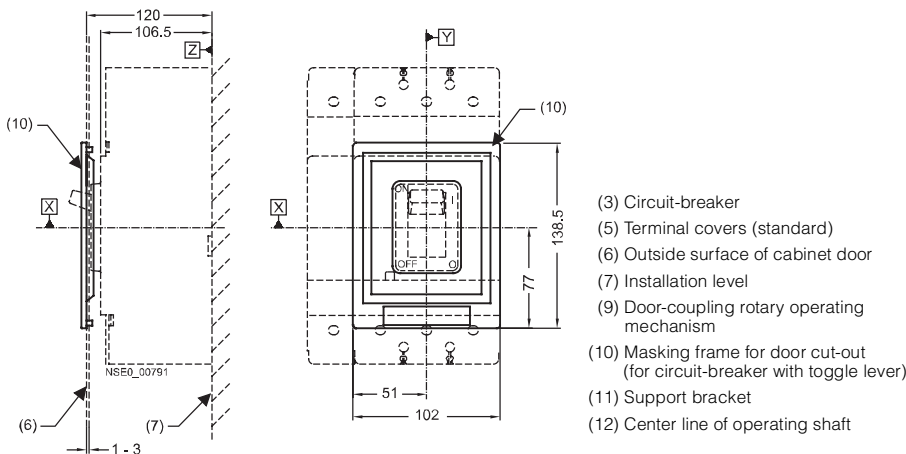


Accessories

Plug-in base for door-coupling rotary operating mechanism



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



3VL Molded Case Circuit-Breakers

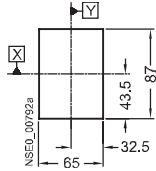
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

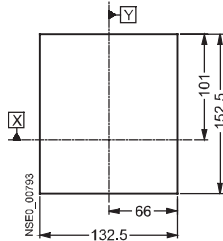
VL400 (3VL4), 3- and 4-pole, up to 400 A

Door cut-outs

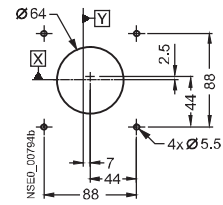
Door cut-out for toggle lever operating mechanism (without masking frame)



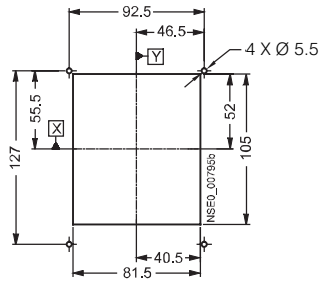
Door cut-out for front-operated rotary operating mechanism and motorized operating mechanism with spring energy store (without masking frame)



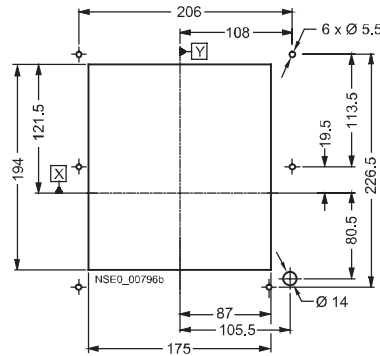
Door cut-out for door-coupling rotary operating mechanism



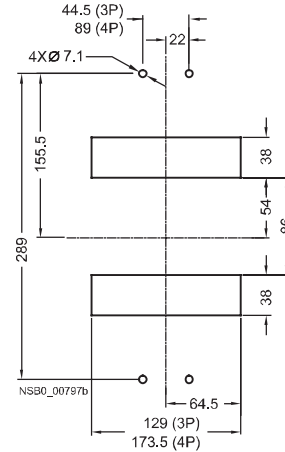
Door cut-out for toggle lever operating mechanism (with masking frame)



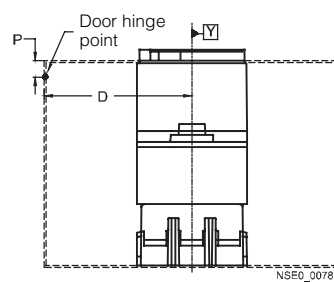
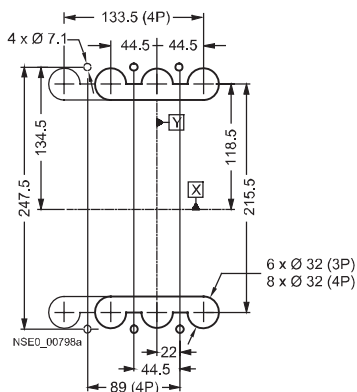
Door cut-out for front-operated rotary operating mechanism, motorized operating mechanism with spring energy store and extended escutcheon (with masking frame)



Hole pattern and cut-out for plug-in base with rear flat connecting 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.

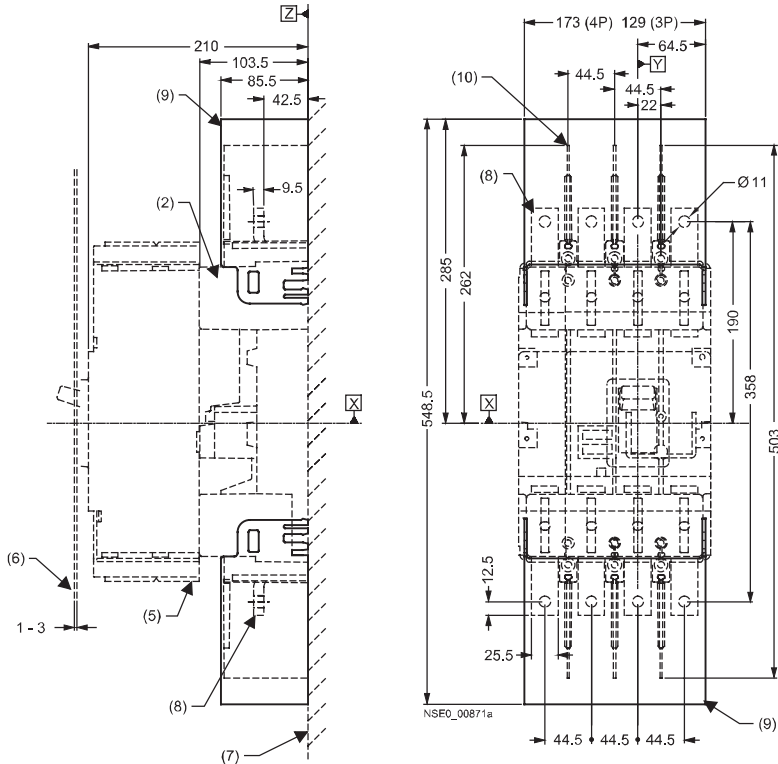
	A
Circuit-breaker only	150
Circuit-breaker + plug-in base + motorized operating mechanism with store	150
Circuit-breaker + plug-in base + front-operated rotary operating mechanism	200
Circuit-breaker + withdrawable version	200

3VL Molded Case Circuit-Breakers

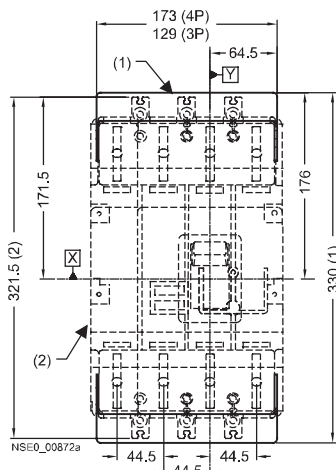
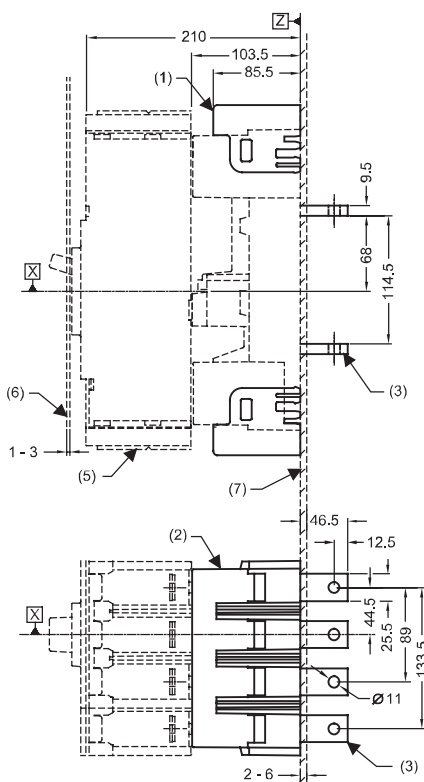
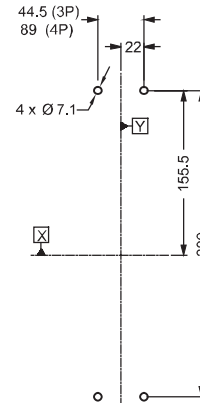
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

VL400 (3VL4), 3- and 4-pole, up to 400 A
 Plug-in bases and accessories



Hole pattern for plug-in base for front connecting bars



- (1) Plug-in base with rear terminal covers
- (2) Plug-in base
- (3) Plug-in base with rear flat connecting bars
- (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

3VL Molded Case Circuit-Breakers

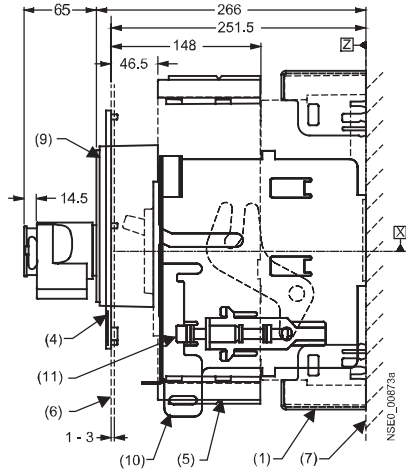
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

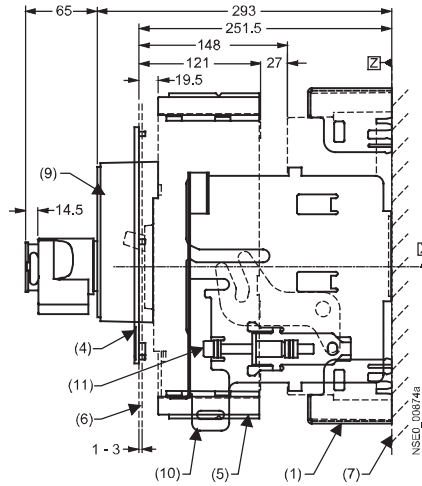
VL400 (3VL4), 3- and 4-pole, up to 400 A

Plug-in bases and accessories

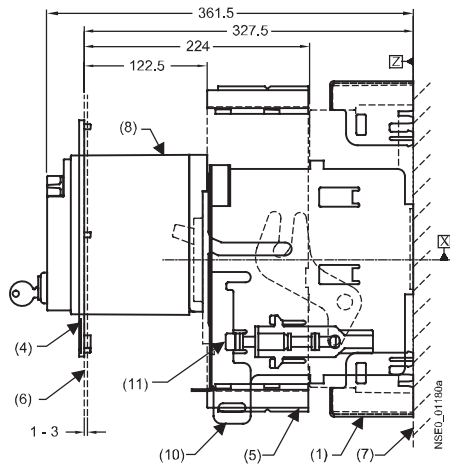
Plug-in base for front-operated rotary operating mechanism (connected position)



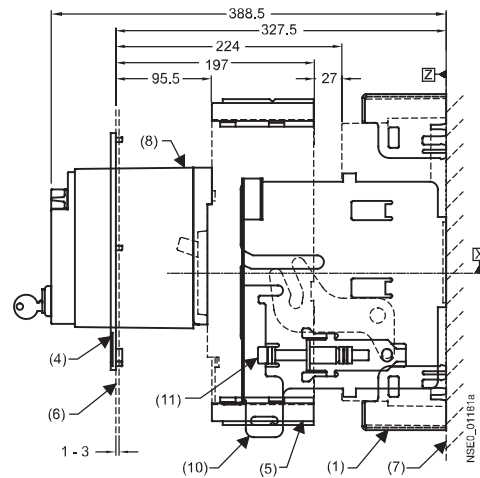
Plug-in base for front-operated rotary operating mechanism (disconnected position)



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



Plug-in base for motorized operating mechanism with spring energy store (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 spring energy store
- (9) Front-operated rotary operating mechanism
- (10) Locking device for racking mechanism
- (11) Racking mechanism

3VL Molded Case Circuit-Breakers

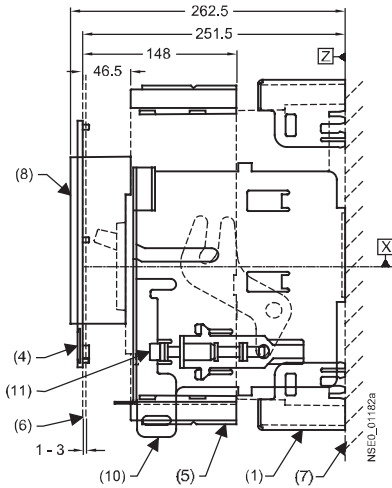
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

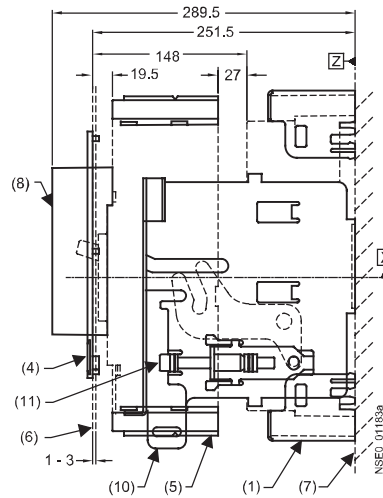
VL400 (3VL4), 3- and 4-pole, up to 400 A

Plug-in bases and accessories

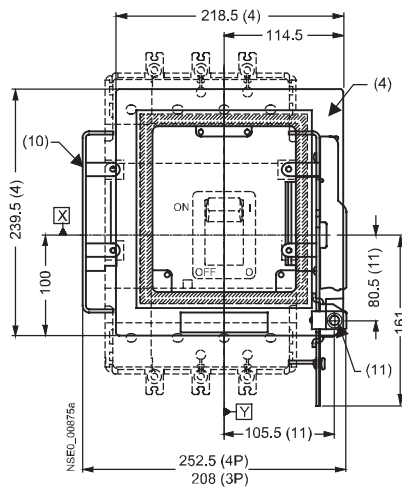
Plug-in base for extended escutcheon
(connected position)



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

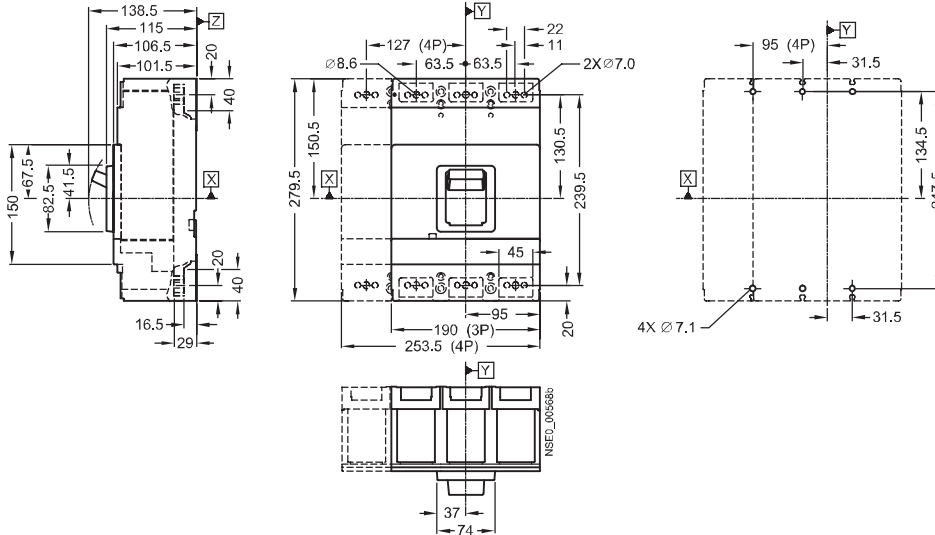
Project planning aids

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

Circuit-breakers

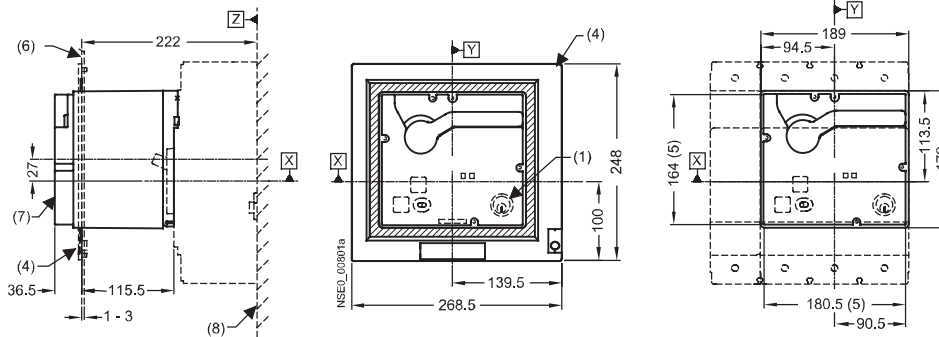
SENTRON VL630 (3VL5) circuit-breakers

Circuit-breaker installation instructions

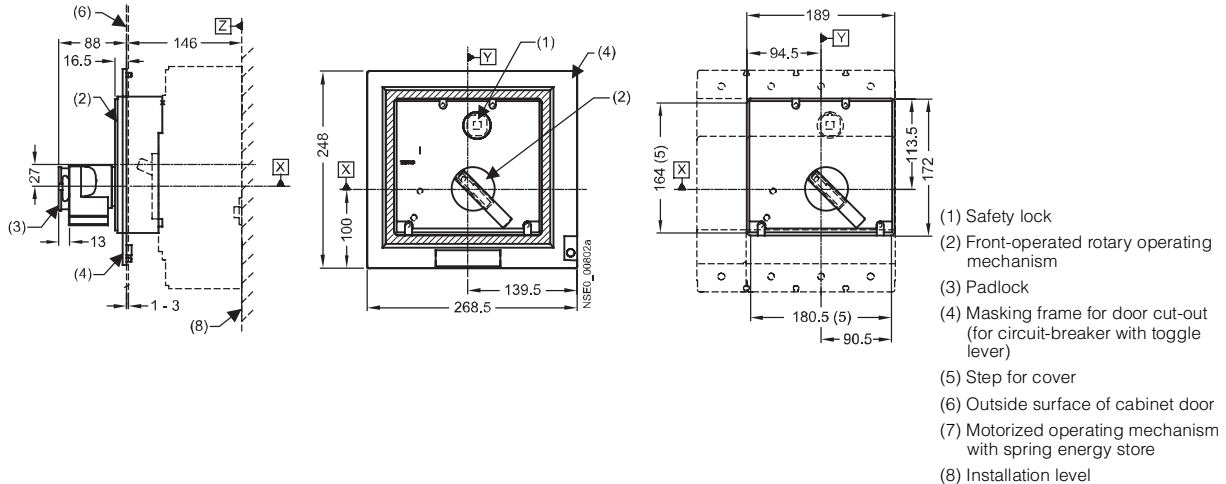


Operating mechanisms

Motorized operating mechanism with spring energy store



Front-operated rotary operating mechanism



16

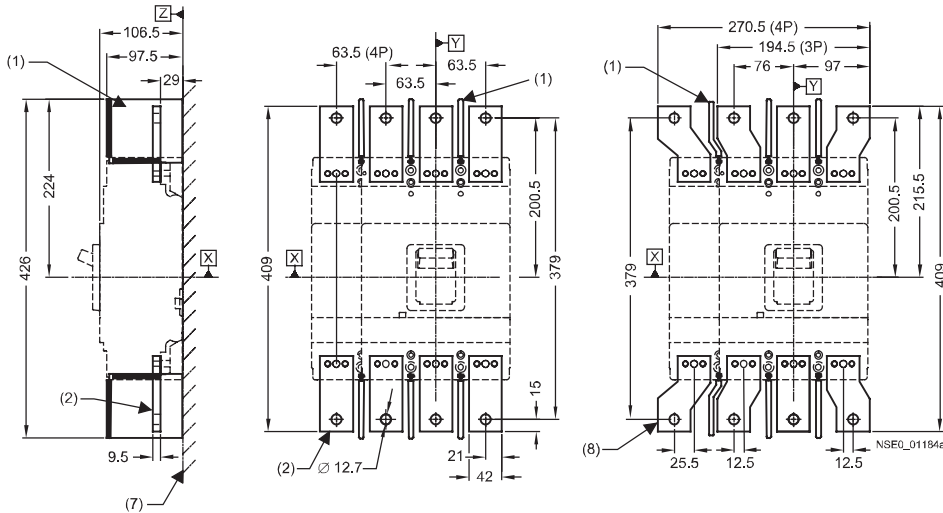
3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

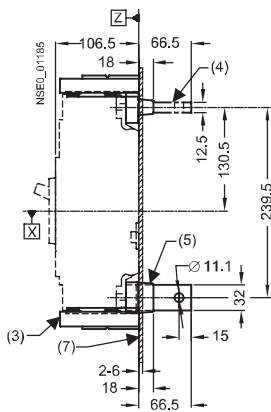
Project planning aids

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

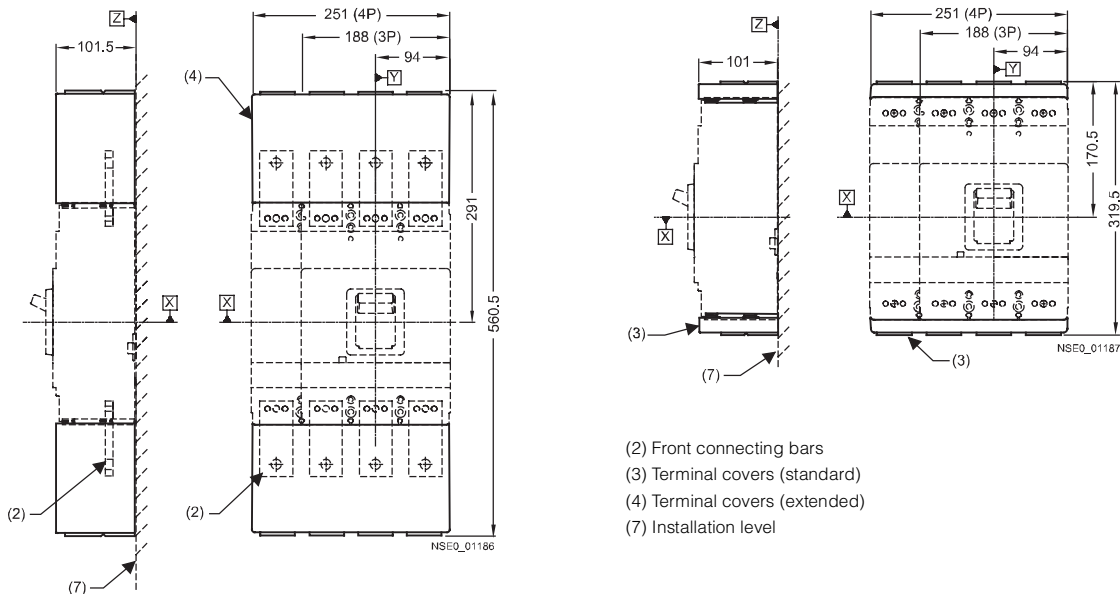
Terminals and phase barriers



- (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

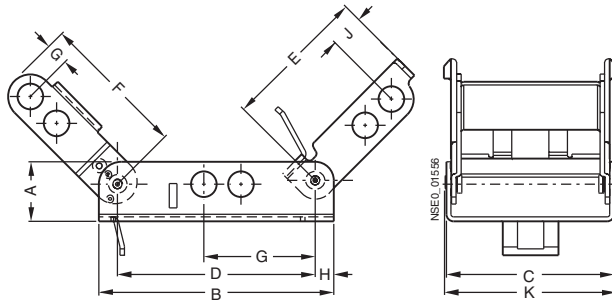
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

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

Interlocks

Locking device for toggle lever

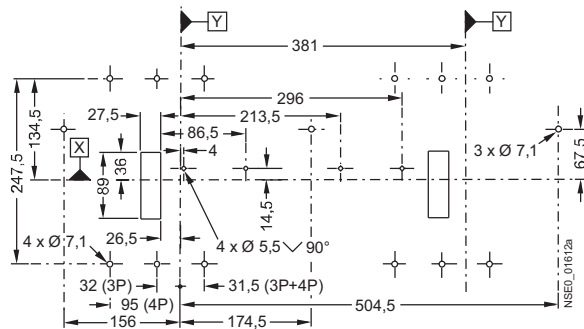


	a	b	c	d	e	f	g	h	l	k
3VL9 4	20.3	80.3	57.4	52.8	49.3	49.8	6.35	6.3	11.2	58.5
3VL9 6	21.6	79.8	71.1	62.0	50.4	46.5	12.9	8.9	8.6	72.2
3VL9 8	21.6	110.5	88.9	96.5	77.2	69.1	11.7	5.1	24.8	90.0

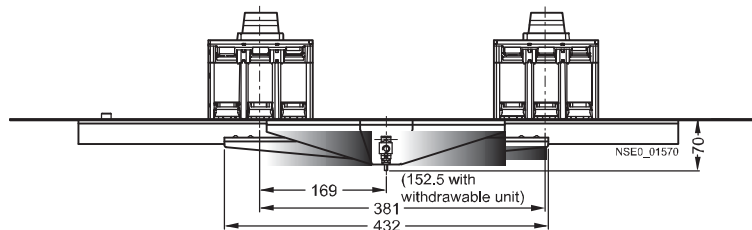
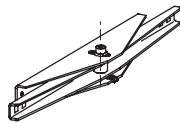
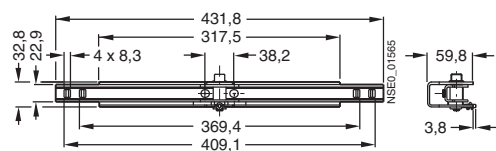
Rear interlocking module

Rear interlocking module for plug-in/withdrawable circuit-breakers for front-accessible terminals.

For more detailed dimensional drawings see installation instructions for rear interlocking module.



Rear interlocking module



3VL Molded Case Circuit-Breakers

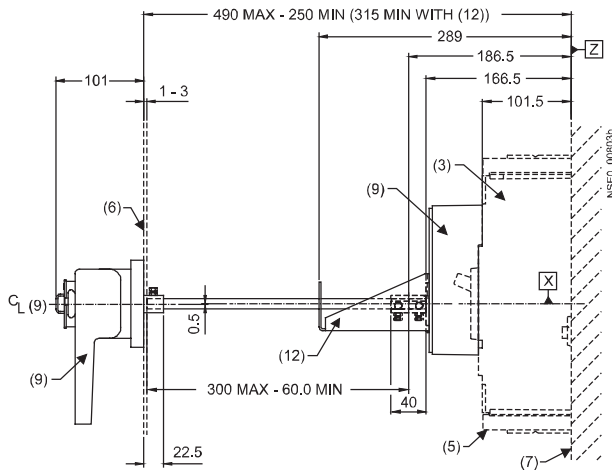
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

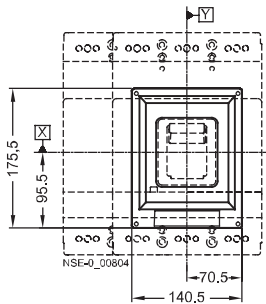
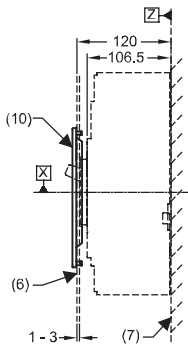
VL630 (3VL5), 3- and 4-pole, up to 630 A

Accessories

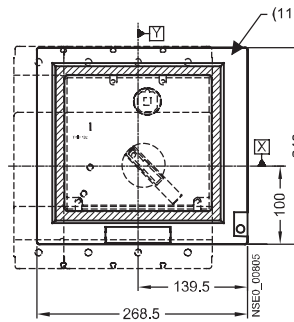
Door-coupling rotary operating mechanism



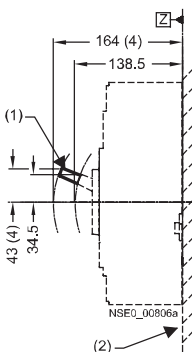
Masking frame for door cut-out for circuit-breaker with toggle lever



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



Toggle lever extension



- (1) Toggle lever extension
- (2) Installation level
- (3) Circuit-breaker
- (4) Toggle lever extension
- (5) Terminal covers (standard)
- (6) Outside surface of cabinet door
- (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 toggle lever)
- (12) Support bracket

3VL Molded Case Circuit-Breakers

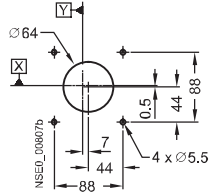
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

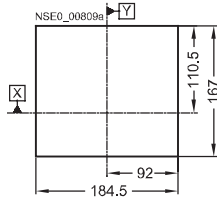
VL630 (3VL5), 3- and 4-pole, up to 630 A

Door cut-outs

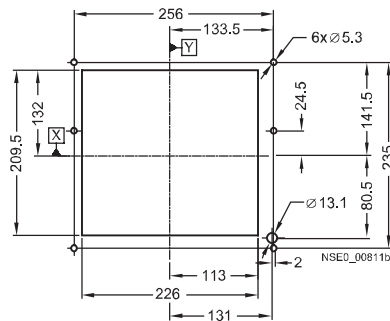
Door cut-out for door-coupling rotary operating mechanism



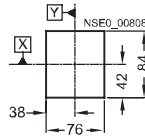
Door cut-out for front-operated rotary operating mechanism, motorized operating mechanism with spring energy store and extended escutcheon (without masking frame)



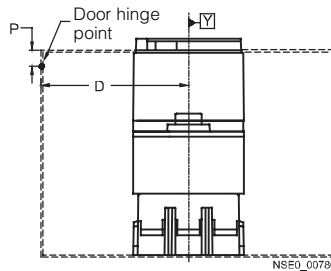
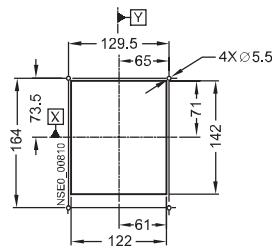
Door cut-out for front-operated rotary operating mechanism, motorized operating mechanism with spring energy store and extended escutcheon (with masking frame)



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



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

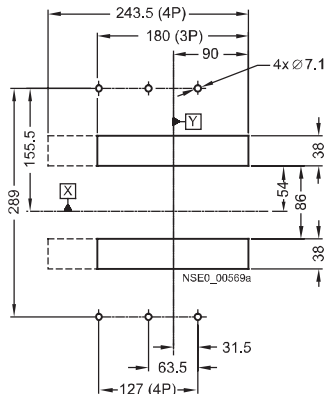


Note:
A minimum distance between reference point Y and the door hinge is required for the door cut-outs.

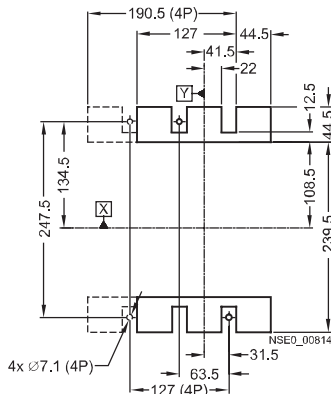
D > A from table + (P x 5)

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

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



Hole pattern and cut-out for circuit-breaker (with rear flat bar connection)



3VL Molded Case Circuit-Breakers

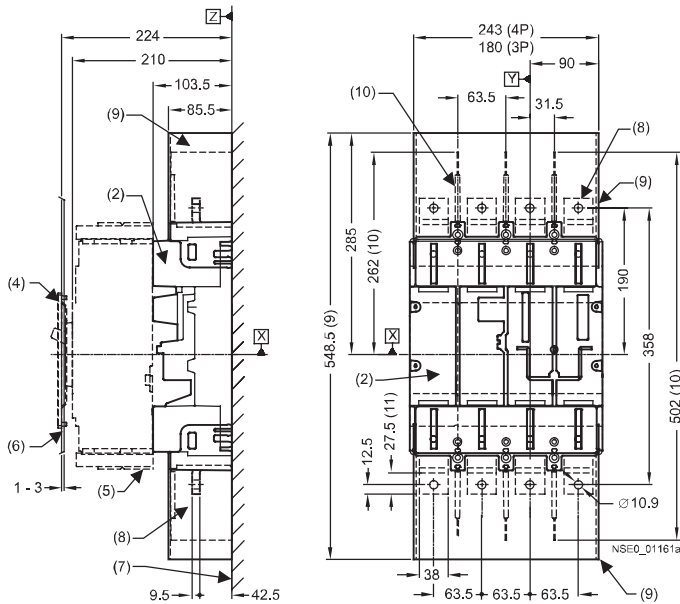
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

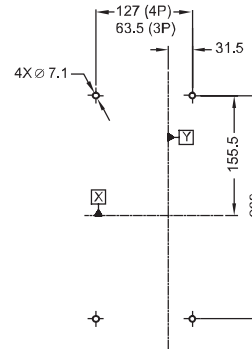
VL630 (3VL5), 3- and 4-pole, up to 630 A

Plug-in bases and accessories

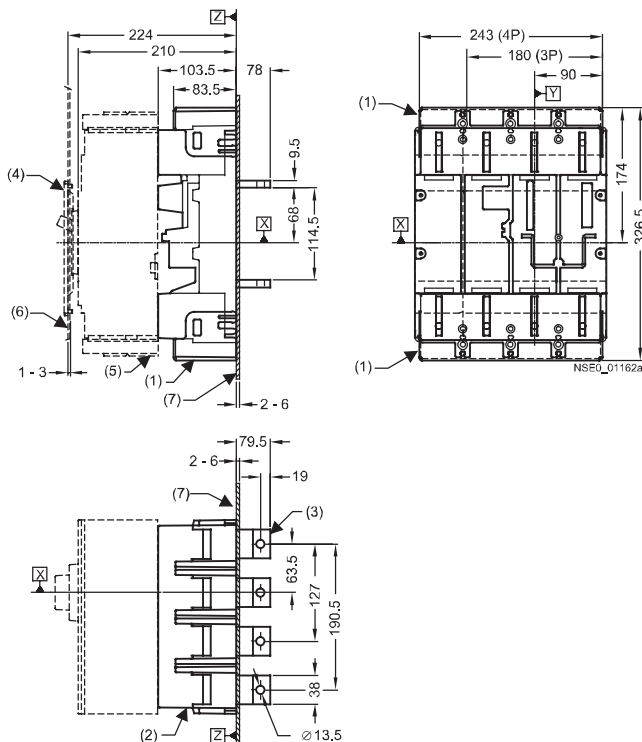
Plug-in base with terminal covers on the front



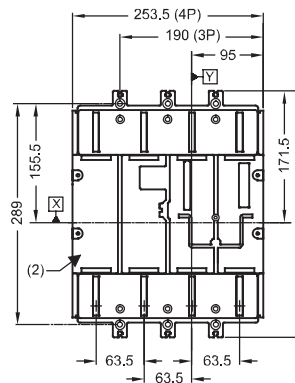
Hole pattern for plug-in base for front connecting bars



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



Sockets



- (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

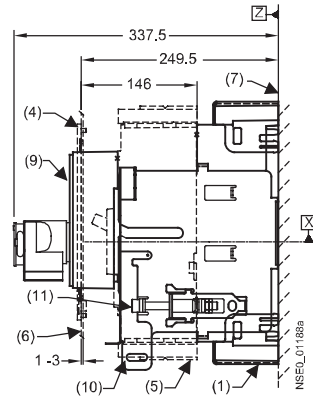
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

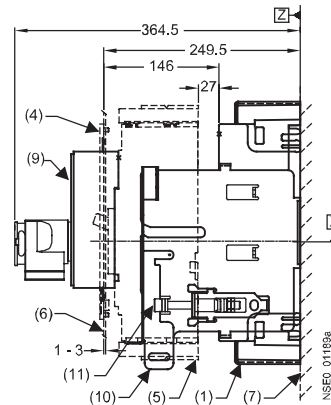
VL630 (3VL5), 3- and 4-pole, up to 630 A

Withdrawable version and accessories

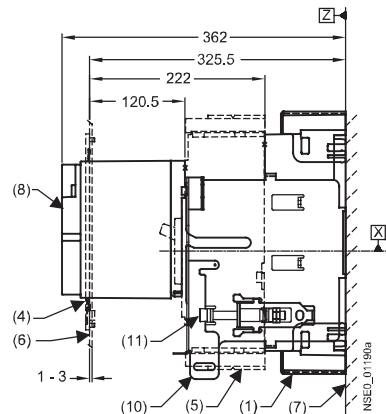
SENTRON VL630 (3VL5) circuit-breakers with rotary operating mechanism, withdrawable version (connected position)



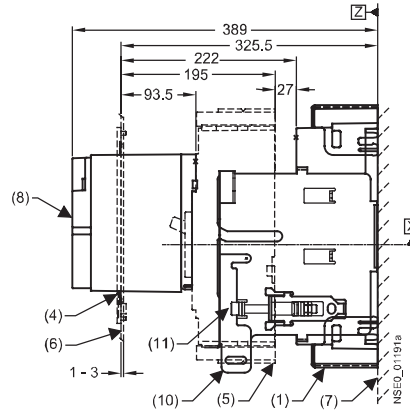
SENTRON VL630 (3VL5) circuit-breakers with rotary operating mechanism, withdrawable version (disconnected position)



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



SENTRON VL630 (3VL5) circuit-breakers with motorized operating mechanism with spring energy store, 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 energy store
- (9) Front-operated rotary operating mechanism
- (10) Locking device for racking mechanism
- (11) Racking mechanism

3VL Molded Case Circuit-Breakers

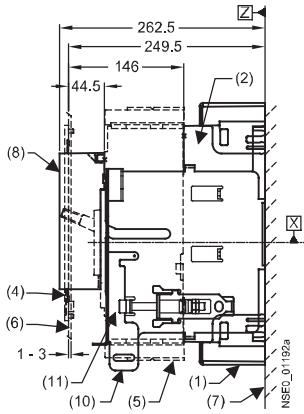
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

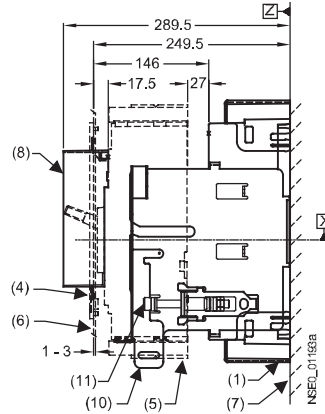
VL630 (3VL5), 3- and 4-pole, up to 630 A

Withdrawable version and accessories

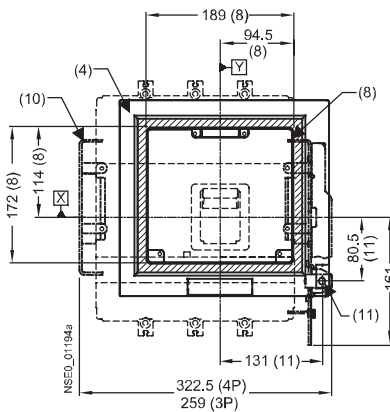
SENTRON VL630 (3VL5) circuit-breakers with extended escutcheon, withdrawable version (connected position)



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

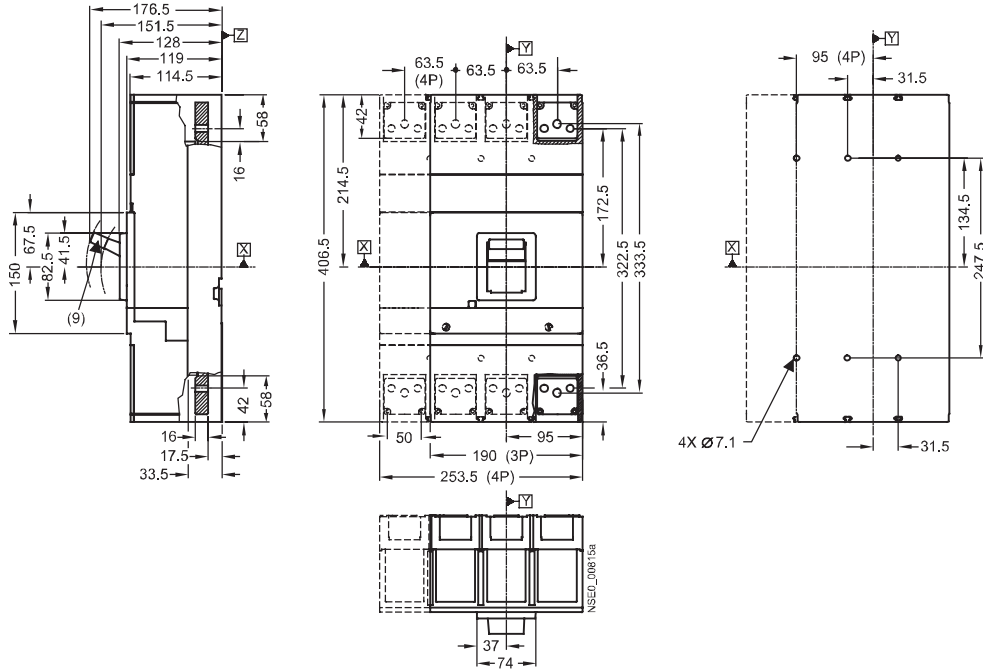
Project planning aids

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

Circuit-breakers

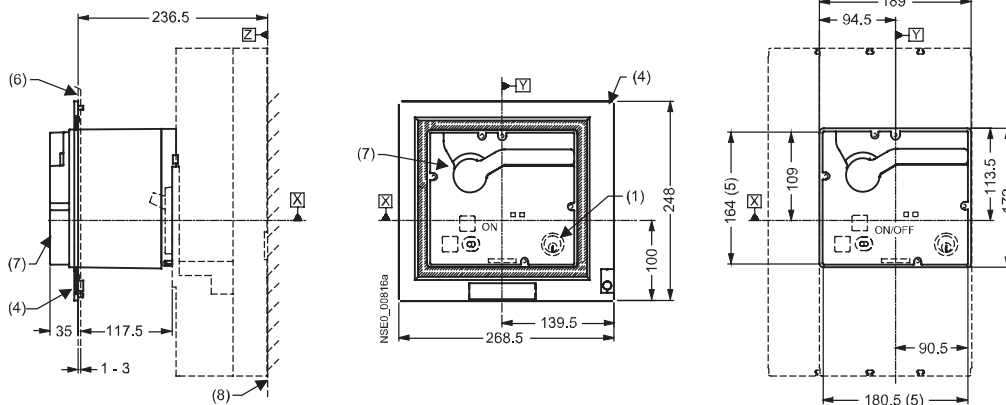
SENTRON VL800 (3VL6) circuit-breakers

Circuit-breaker installation instructions

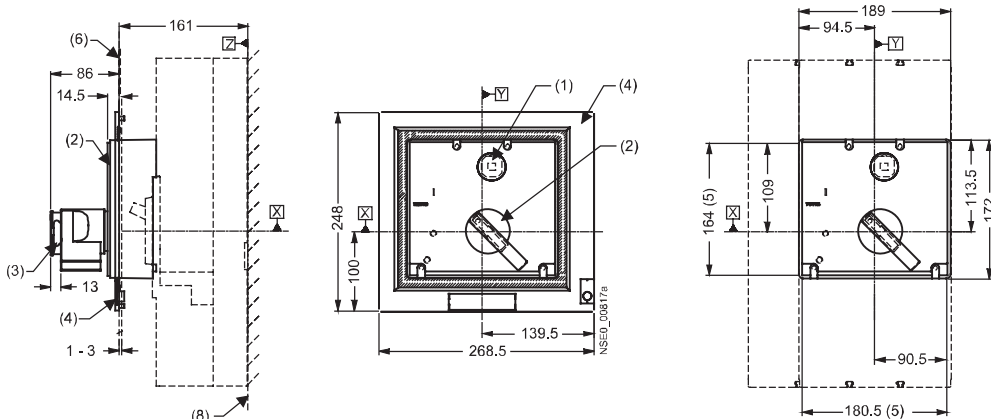


Operating mechanisms

Motorized operating mechanism with spring energy store



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 spring energy store
- (8) Installation level
- (9) Toggle lever extension

3VL Molded Case Circuit-Breakers

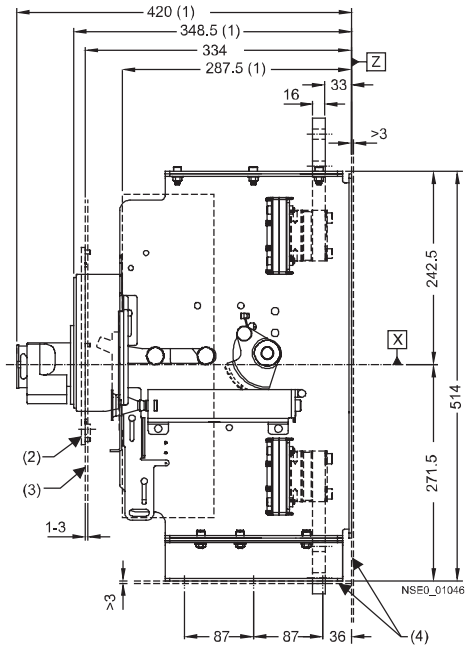
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

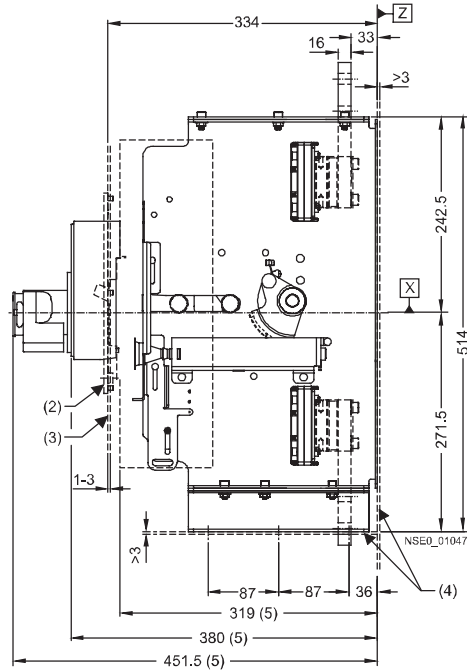
VL800 (3VL6), 3- and 4-pole, up to 800 A

Withdrawable version

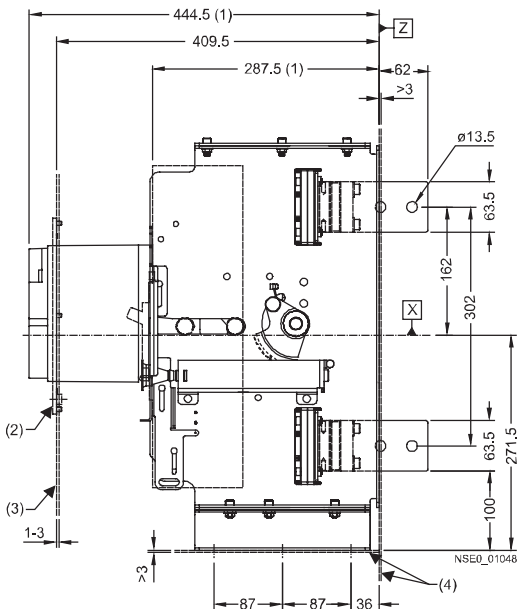
Withdrawable version with front-operated rotary operating mechanism
Insert position



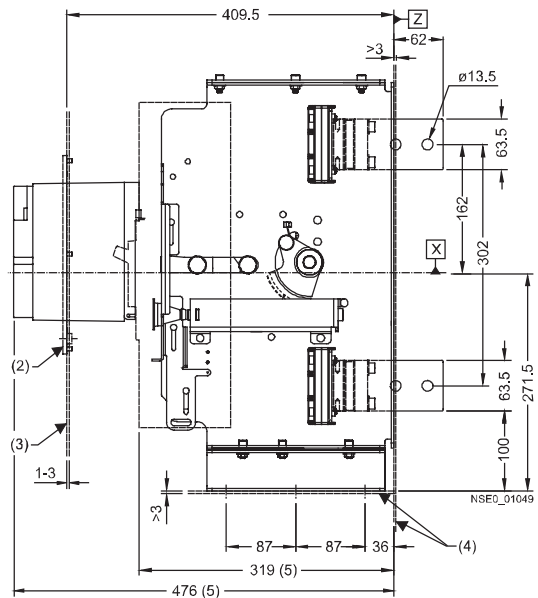
Withdrawable version with front-operated rotary operating mechanism
Withdraw position



Withdrawable version with motorized operating mechanism with spring energy store
Insert position



Withdrawable version with motorized operating mechanism with spring energy store
Withdraw position



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

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3VL Molded Case Circuit-Breakers

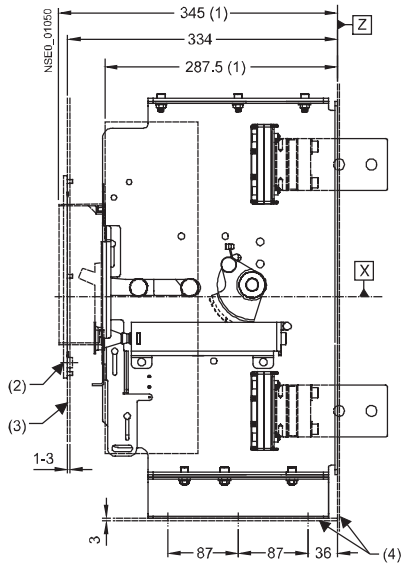
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

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

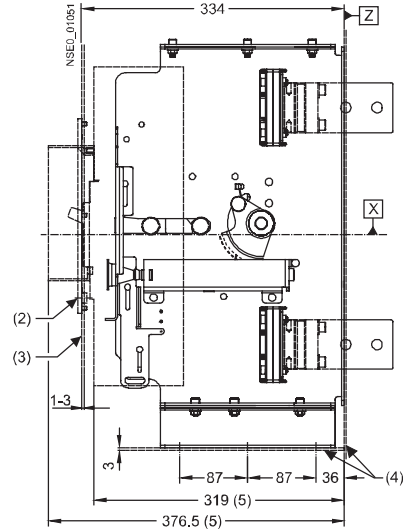
Withdrawable version with extended escutcheon
(without masking frame)

Insert position



Withdrawable version with extended escutcheon
(without masking frame)

Withdraw position



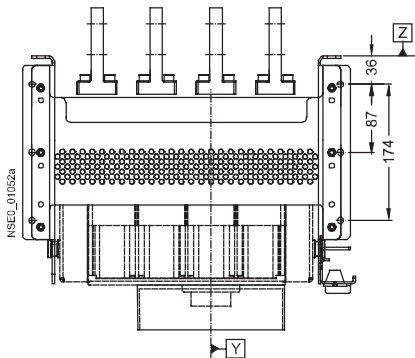
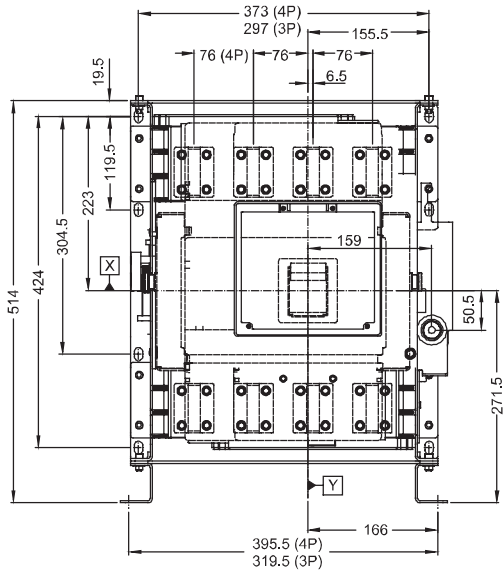
- (1) Connected position
- (2) Masking frame for door cut-out
- (3) Outside surface of cabinet door
- (4) Installation level
- (5) Disconnected position

3VL Molded Case Circuit-Breakers

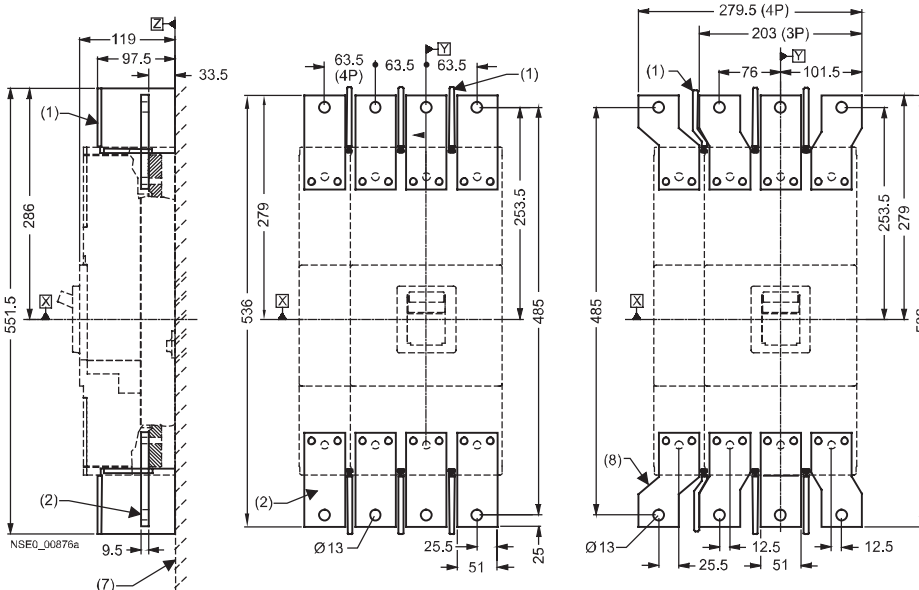
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

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



Terminals and phase barriers



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

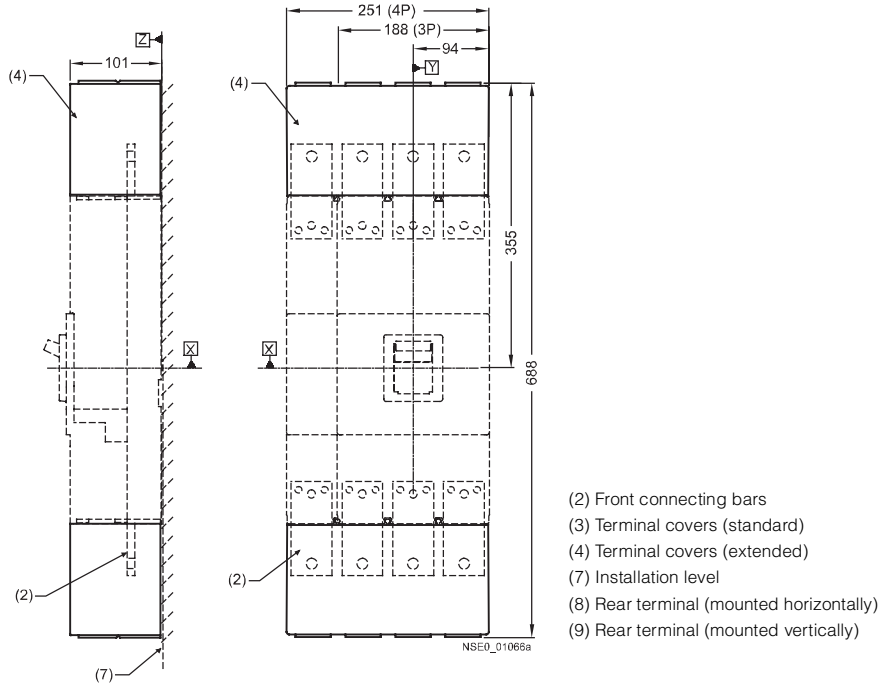
3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

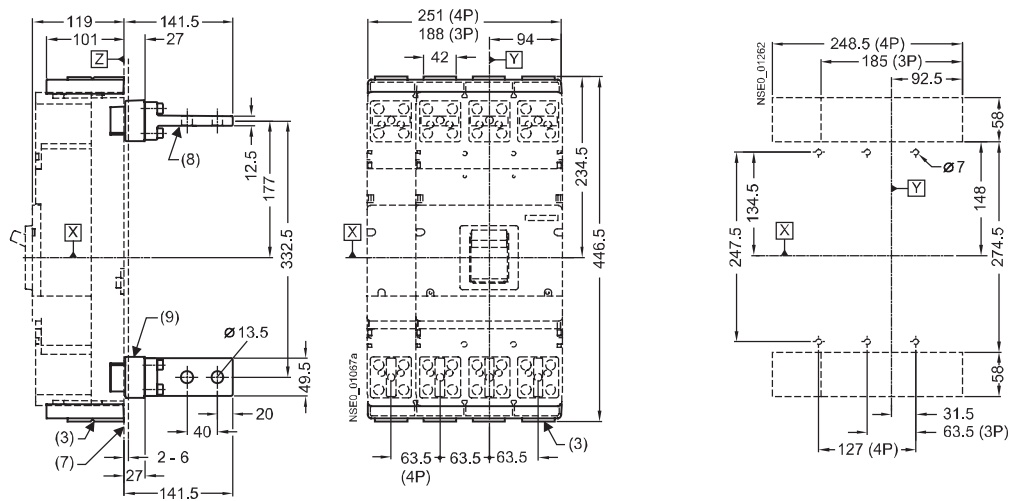
Project planning aids

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

Terminal covers

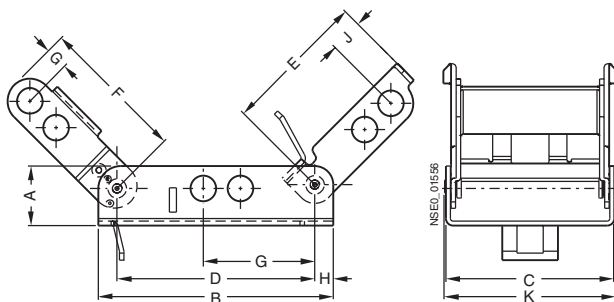


16



Interlocks

Locking device for toggle lever



	a	b	c	d	e	f	g	h	l	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

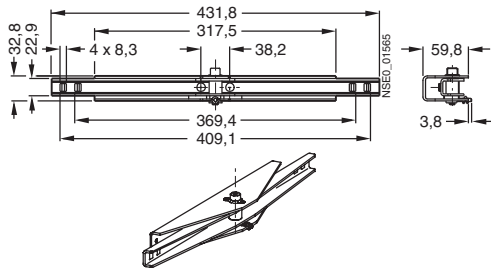
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

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

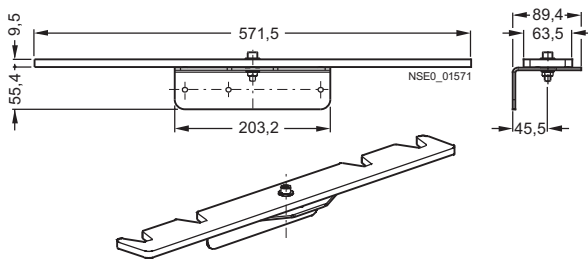
Rear interlocking module

Rear interlocking module 3-pole circuit-breaker

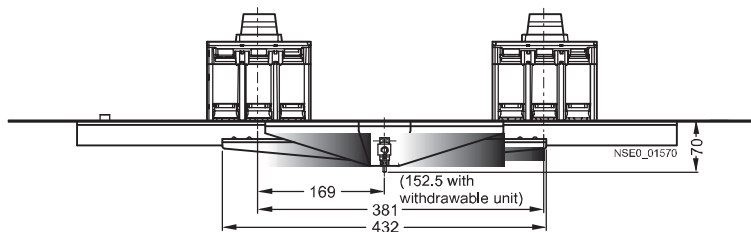


For more detailed dimensional drawings see installation instructions for rear interlocking module

Rear interlocking module 4-pole circuit-breaker



Rear interlocking module



3VL Molded Case Circuit-Breakers

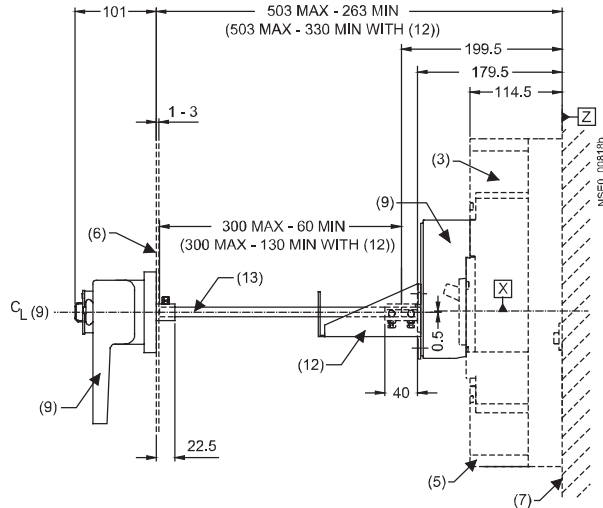
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

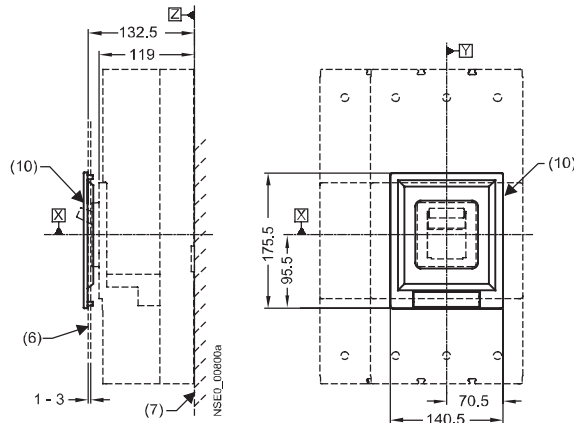
VL800 (3VL6), 3- and 4-pole, up to 800 A

Accessories

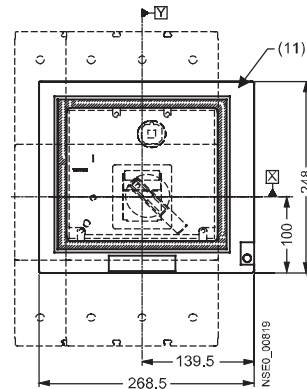
Door-coupling rotary operating mechanism



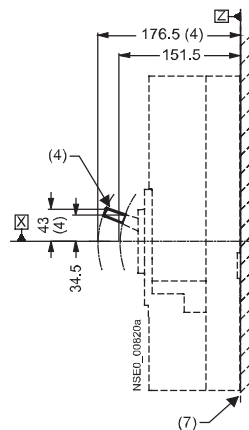
Masking frame for door cut-out for circuit-breaker with toggle lever



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



Toggle lever extension



- (3) Circuit-breaker
- (4) Toggle lever 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

3VL Molded Case Circuit-Breakers

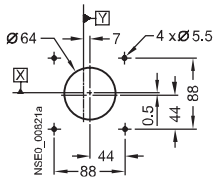
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

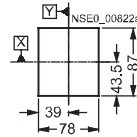
VL800 (3VL6), 3- and 4-pole, up to 800 A

Door cut-outs

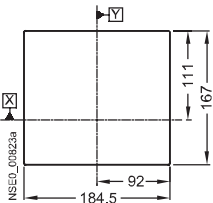
Door cut-out Door-coupling rotary operating mechanism



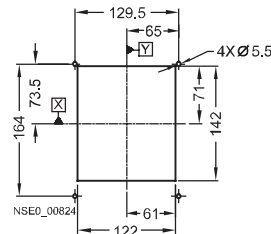
Door cut-out for toggle lever (without masking frame)



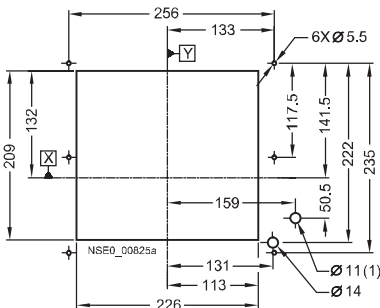
Door cut-out for front-operated rotary operating mechanism, motorized operating mechanism with spring energy store and extended escutcheon (without masking frame)



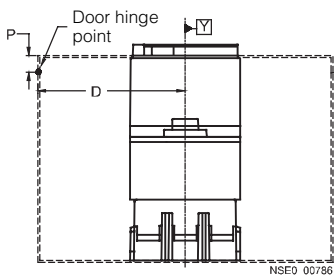
Door cut-out for toggle lever (with masking frame)



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



(1) Withdrawable version only



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

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

	A
Circuit-breaker only	150
Circuit-breaker + plug-in base + motorized operating mechanism with store	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

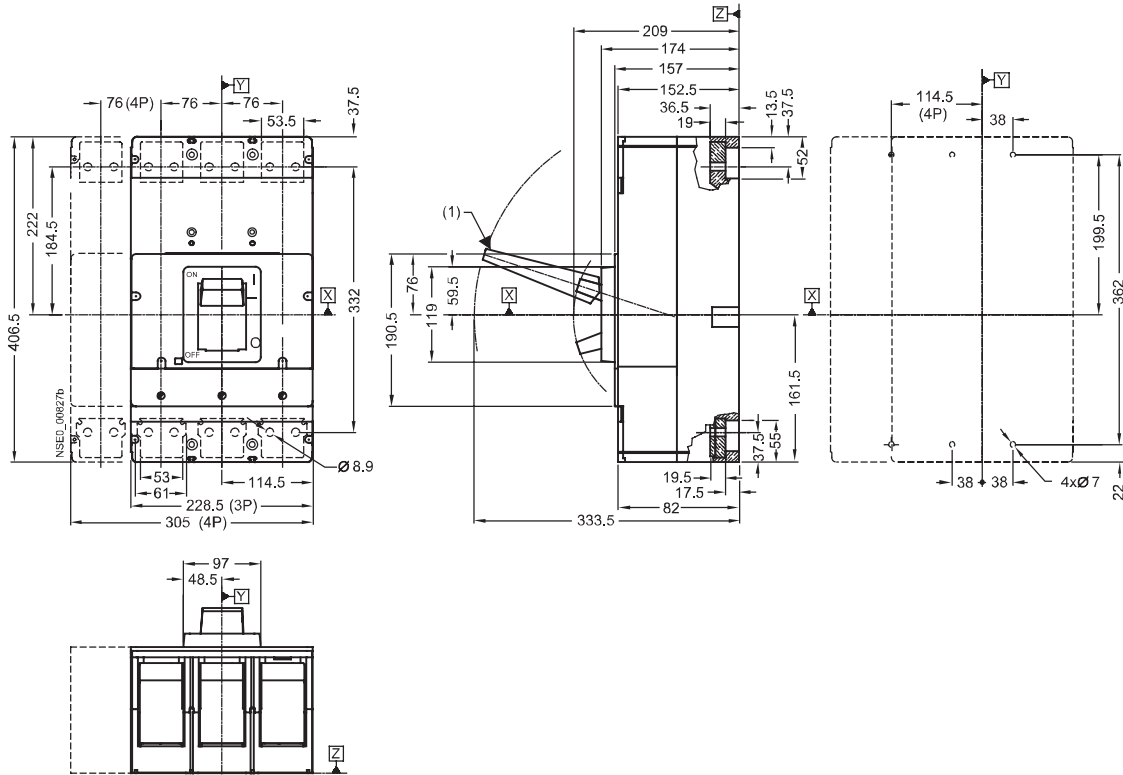
Project planning aids

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

Circuit-breakers

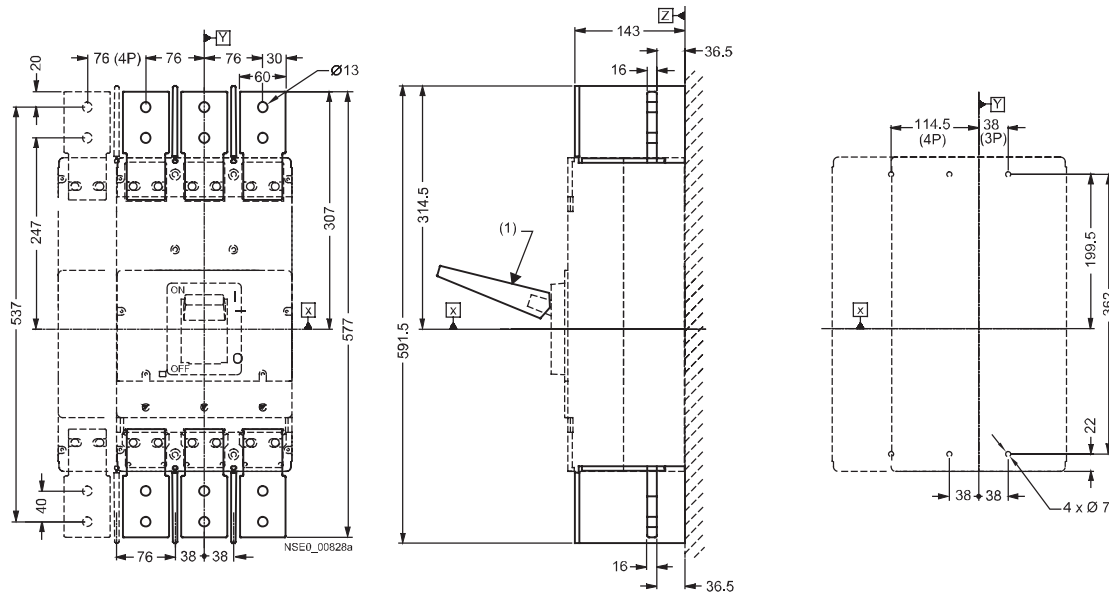
SENTRON VL1250 (3VL7) circuit-breakers

Circuit-breaker installation instructions



SENTRON VL1600 (3VL8) circuit-breakers

Circuit-breaker installation instructions



(1) Toggle lever extension

3VL Molded Case Circuit-Breakers

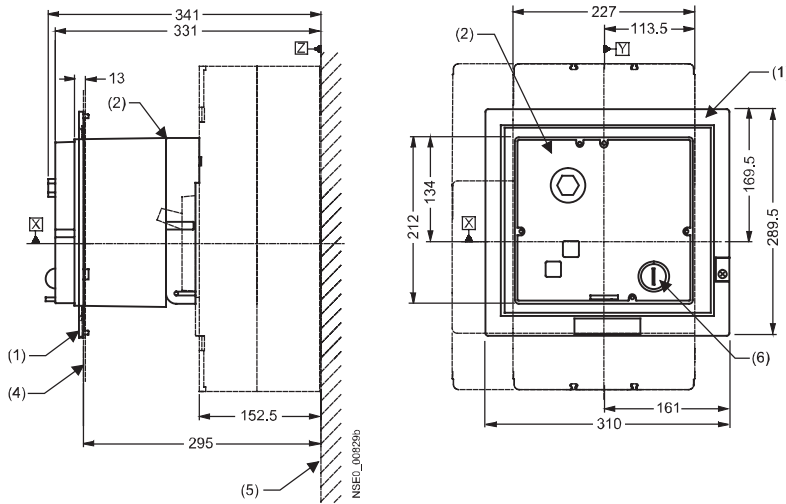
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

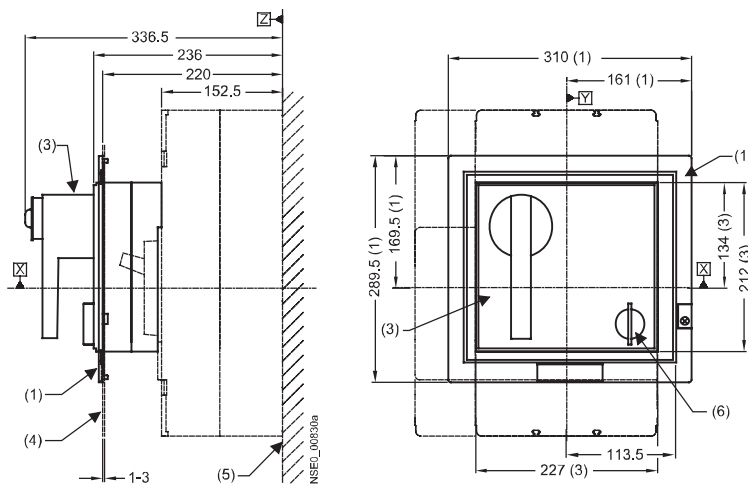
VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

Operating mechanisms

Motorized operating mechanisms



Front-operated rotary operating mechanism



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

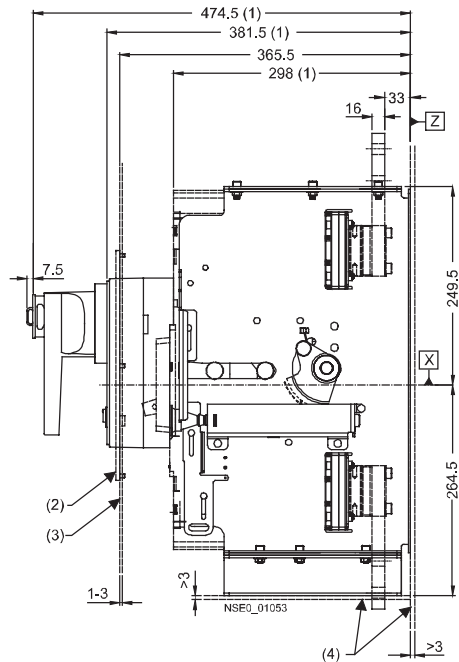
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

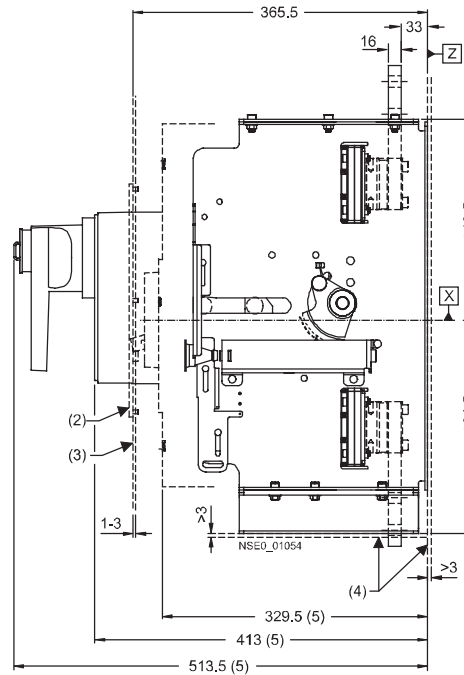
VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

Withdrawable version

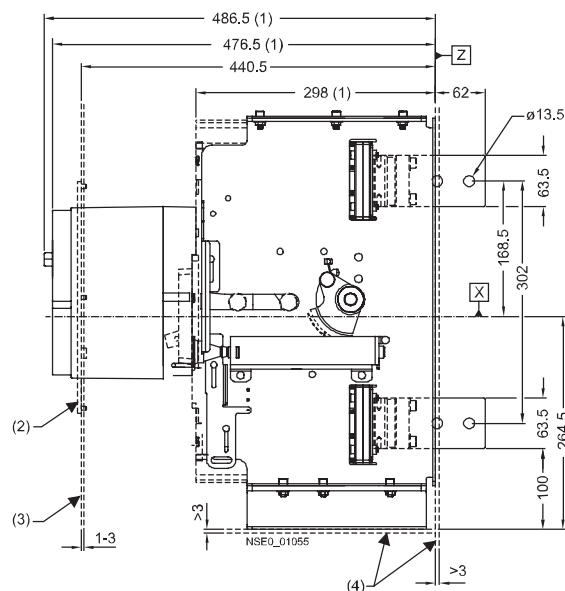
Withdrawable version with front-operated rotary operating mechanism
Insert position



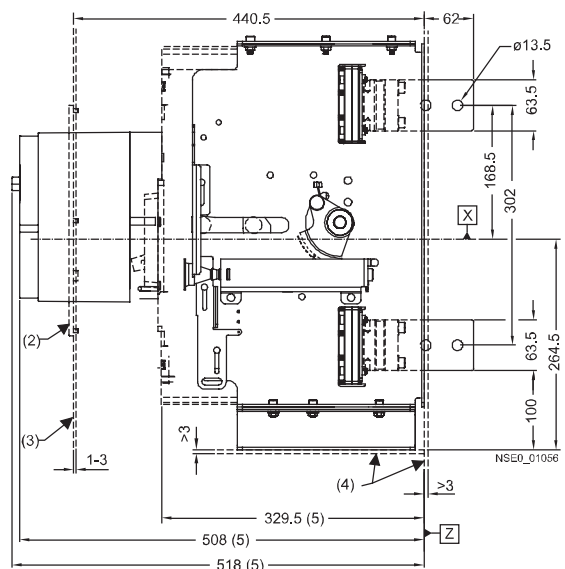
Withdrawable version with front-operated rotary operating mechanism
Withdraw position



Withdrawable version with motorized operating mechanism with spring energy store
Insert position



Withdrawable version with motorized operating mechanism with spring energy store
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

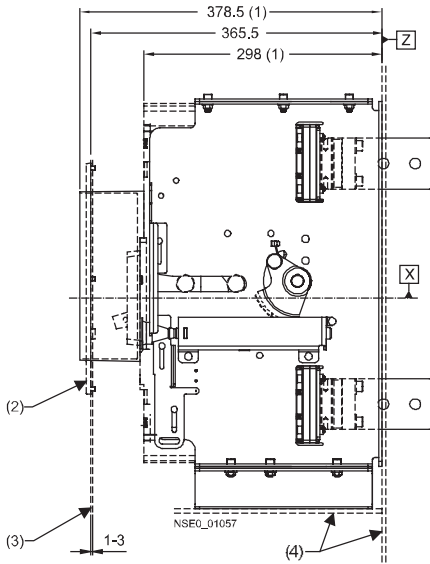
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

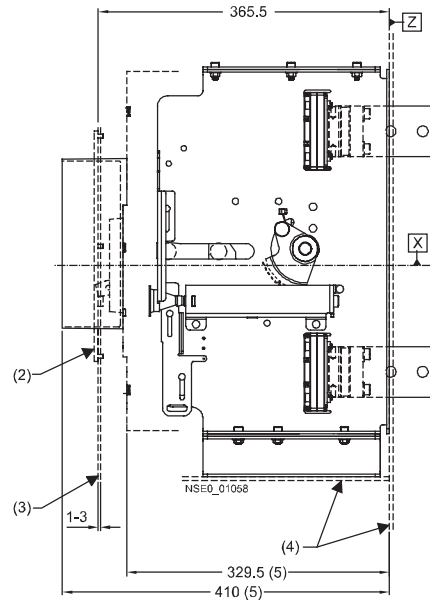
VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

Withdrawable version

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

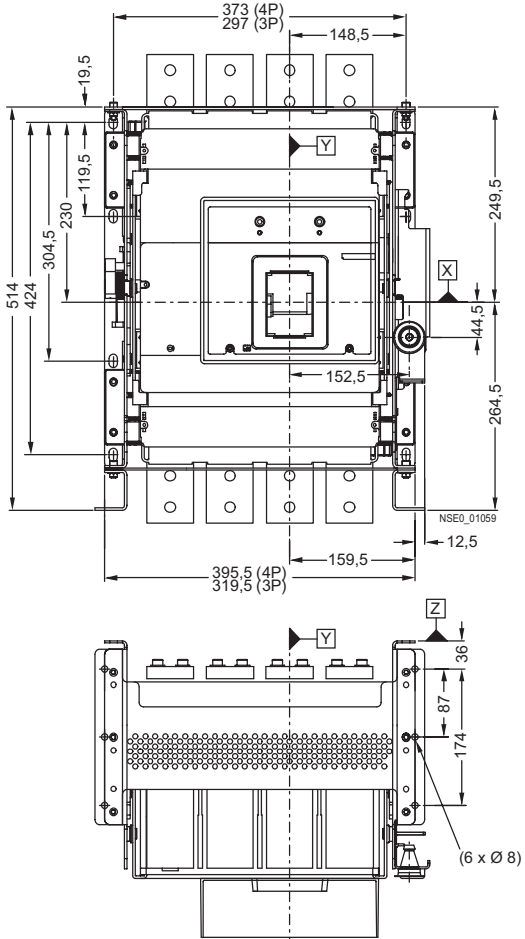


Withdrawable version with extended escutcheon (without masking frame)
Withdraw position



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

Withdrawable version



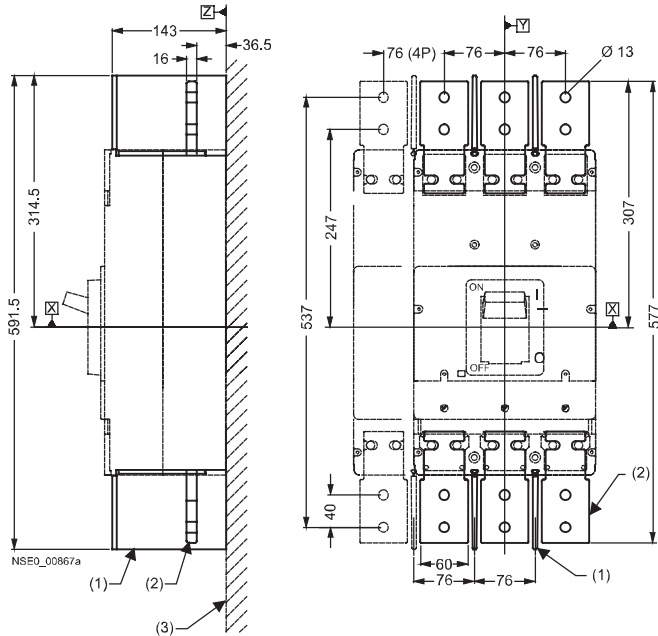
3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

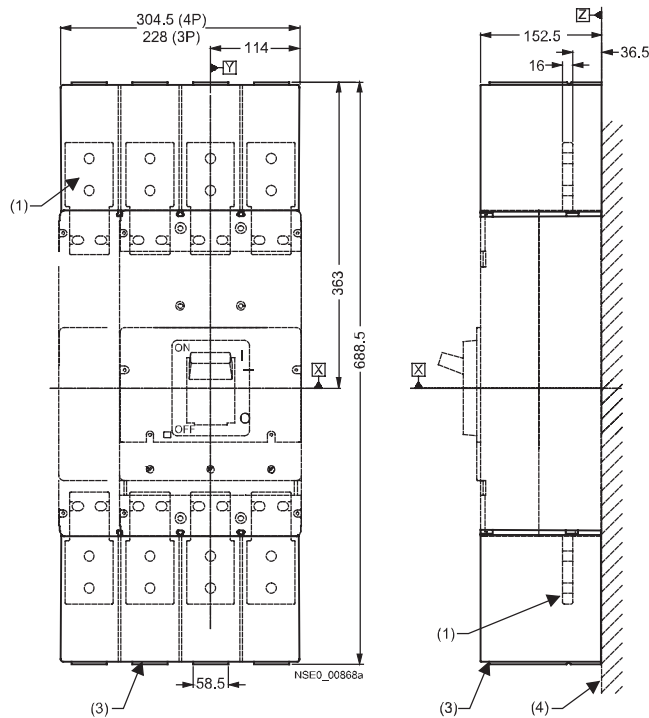
VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

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

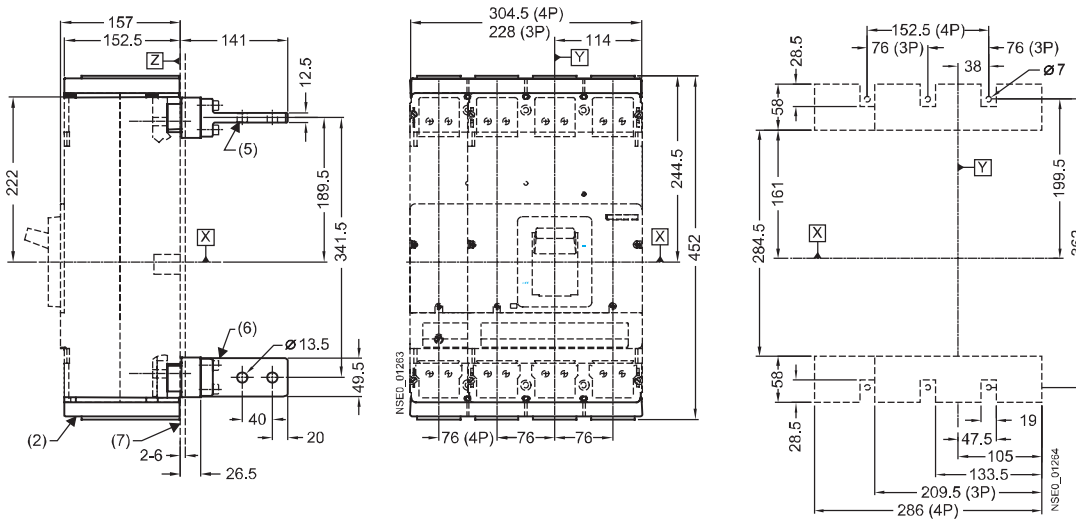
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

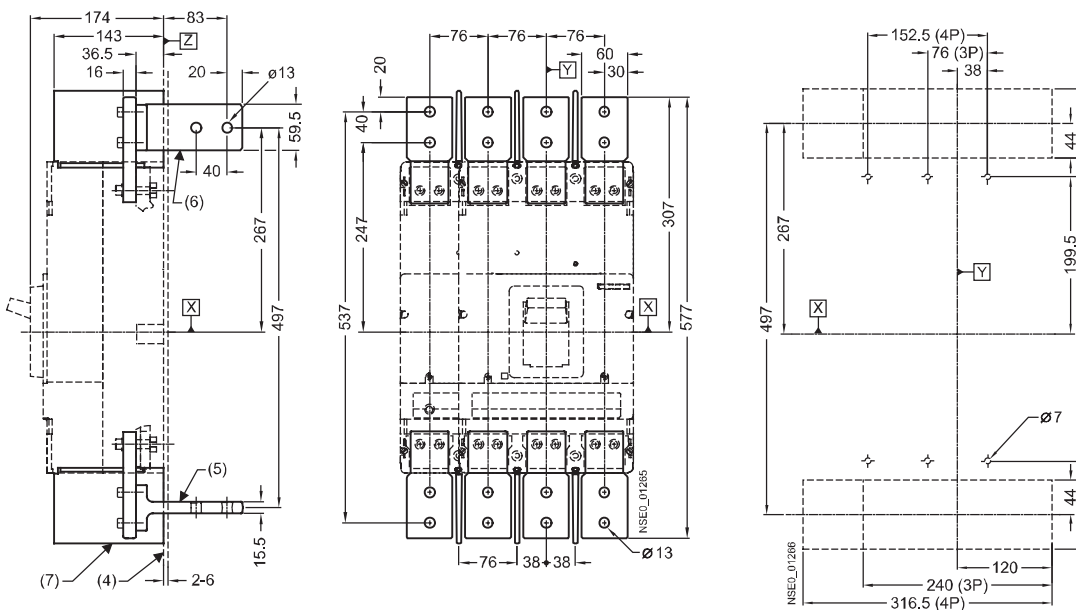
VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

Terminal covers

Only SENTRON VL1250 (3VL7) circuit-breakers



Only SENTRON VL1600 (3VL8) circuit-breakers



- (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

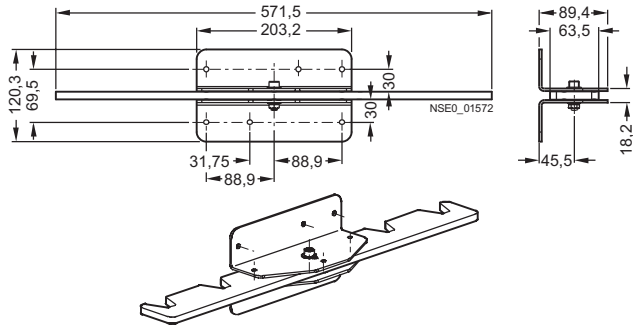
Project planning aids

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

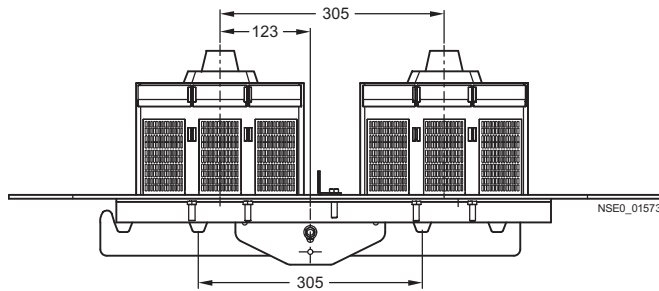
Rear interlocking module

Rear interlocking module

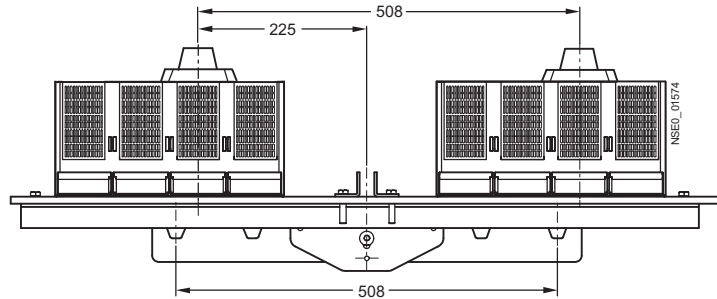
For more detailed dimensional drawings see installation instructions for rear interlocking module.



3-pole version



4-pole version



3VL Molded Case Circuit-Breakers

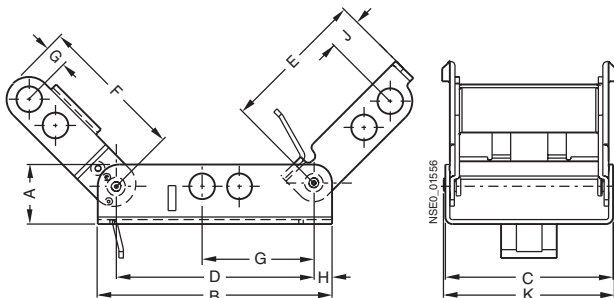
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

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

Interlocks

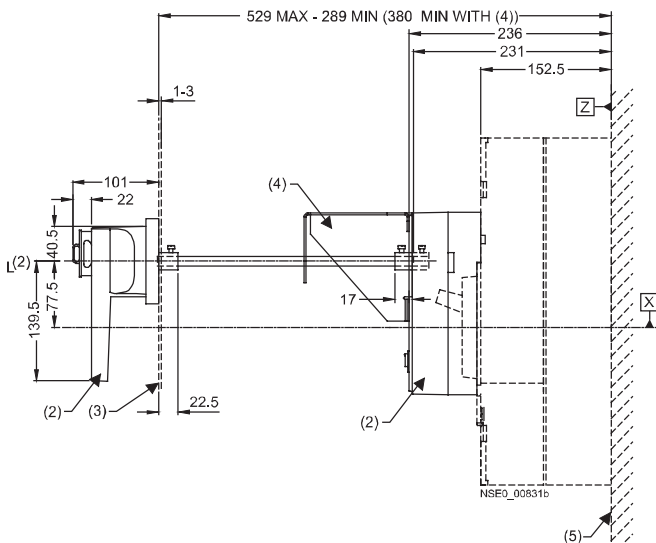
Locking device for toggle lever



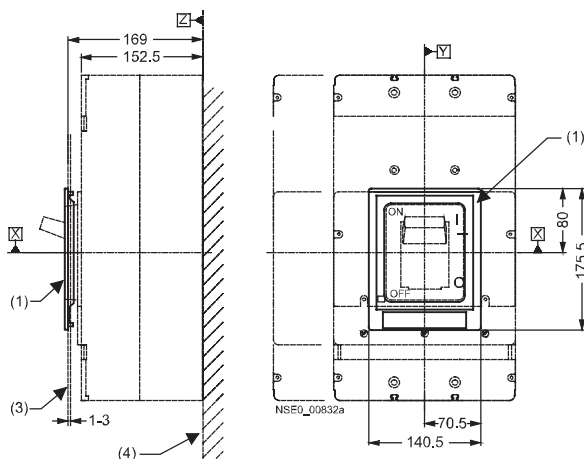
	a	b	c	d	e	f	g	h	l	k
3VL9 4	20.3	80.3	57.4	52.8	49.3	49.8	6.35	6.3	11.2	58.5
3VL9 6	21.6	79.8	71.1	62.0	50.4	46.5	12.9	8.9	8.6	72.2
3VL9 8	21.6	110.5	88.9	96.5	77.2	69.1	11.7	5.1	24.8	90.0

Accessories

SENTRON VL1250 (3VL7) circuit-breakers 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) Installation level
- (5) Support bracket

3VL Molded Case Circuit-Breakers

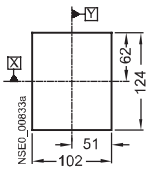
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

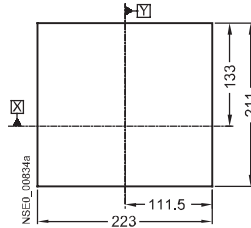
VL1250 (3VL7) and VL1600 (3VL8), 3- and 4-pole, up to 1600 A

Door cut-outs

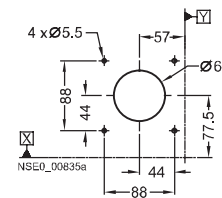
Door cut-out for toggle lever (without masking frame)



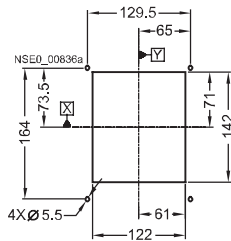
Door cut-out for front-operated rotary operating mechanism and motorized operating mechanism (without masking frame)



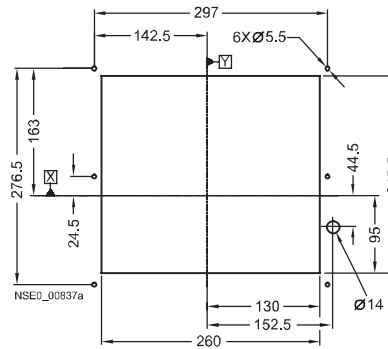
Door cut-out for door-coupling rotary operating mechanism



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

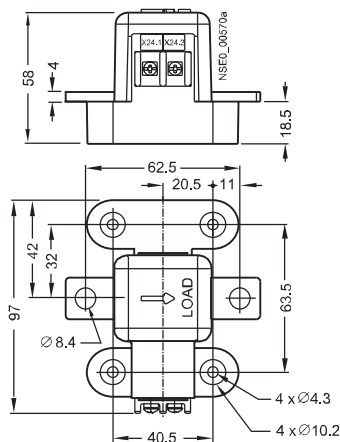


Door cut-out for front-operated rotary operating mechanism, motorized operating mechanism and extended escutcheon (with masking frame)

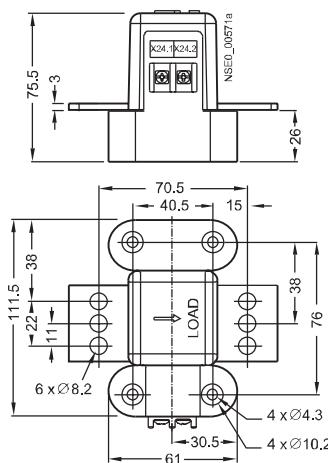


Current transformers

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



Current transformers for neutral conductors for ground-fault protection in 4-wire three-phase systems for SENTRON VL630 (3VL5)/VL800 (3VL8) circuit breakers



3VL Molded Case Circuit-Breakers

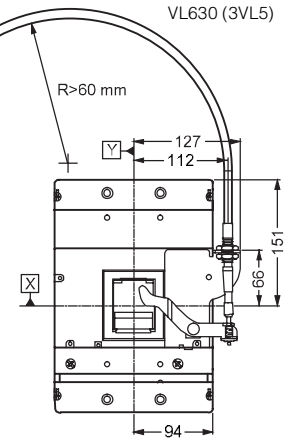
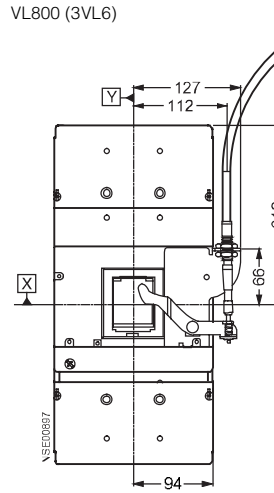
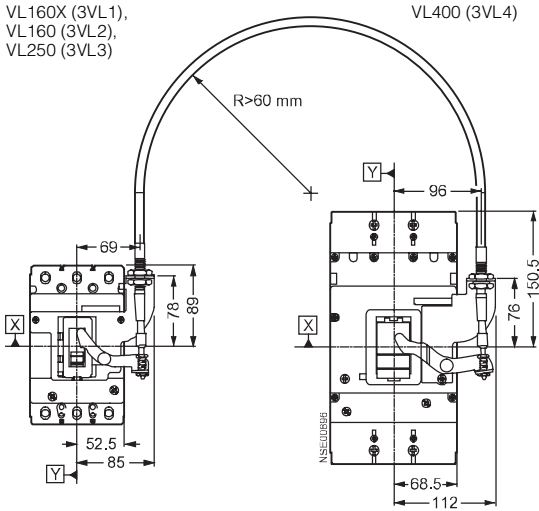
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

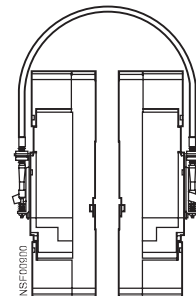
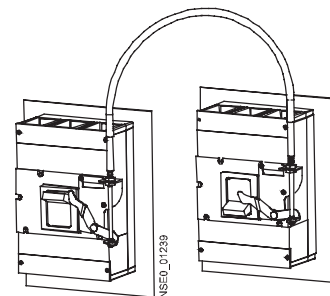
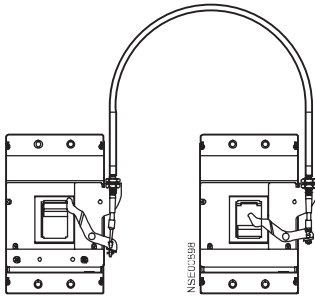
VL160X (3VL1) to VL800 (3VL6), 3- and 4-pole, up to 800 A

Interlock with Bowden wire

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



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)
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

3VL Molded Case Circuit-Breakers

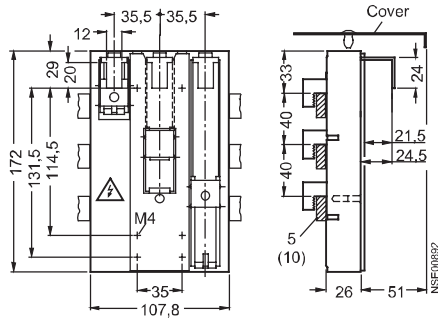
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

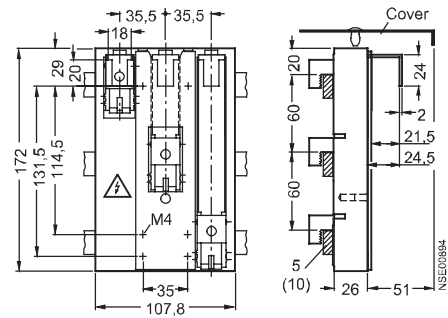
VL160X (3VL1) to VL400 (3VL4), 3- and 4-pole, up to 400 A

8US1 busbar adapter system

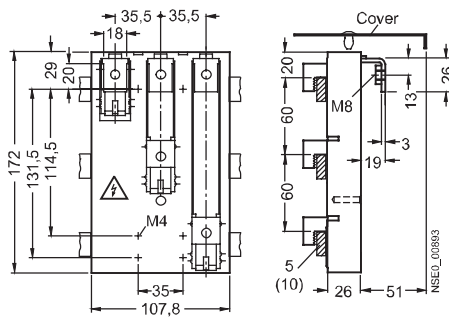
8US10 11-4SL01
(40 mm system)



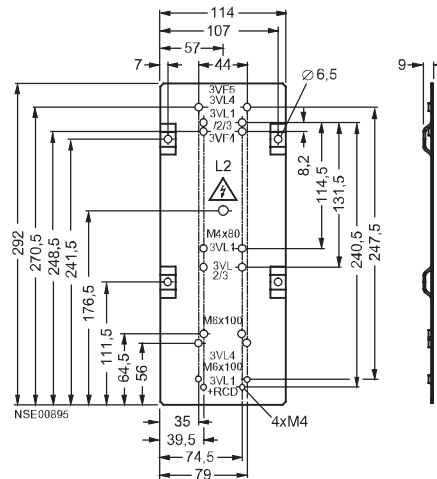
8US12 11-4SL01
(60 mm system)



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

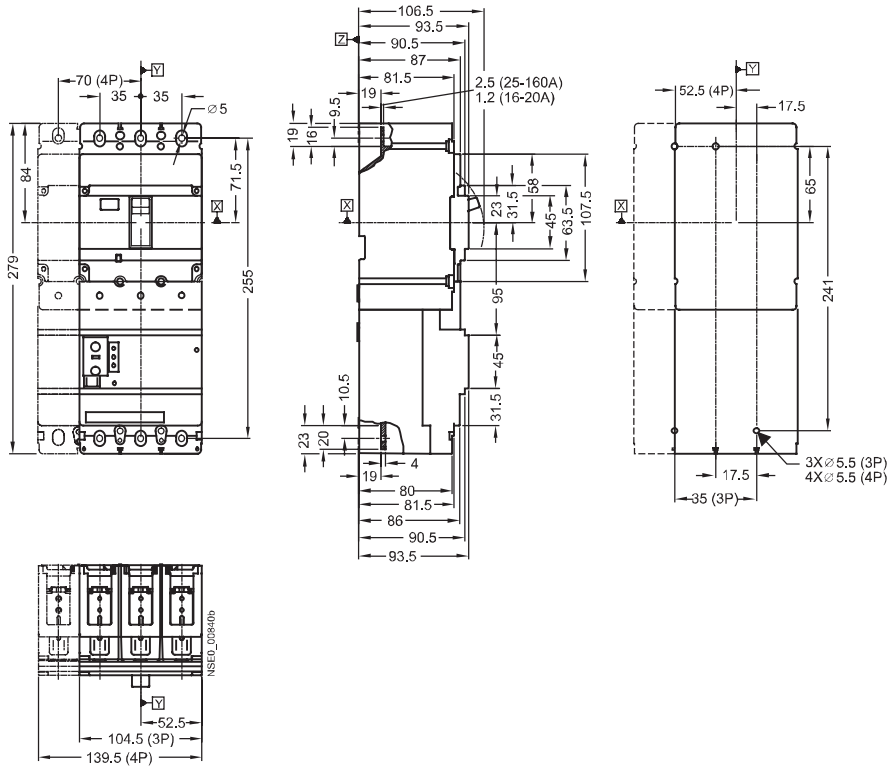
Project planning aids

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

Circuit-breakers

SENTRON VL160X (3VL1) circuit-breakers with RCD module

Circuit-breaker installation instructions



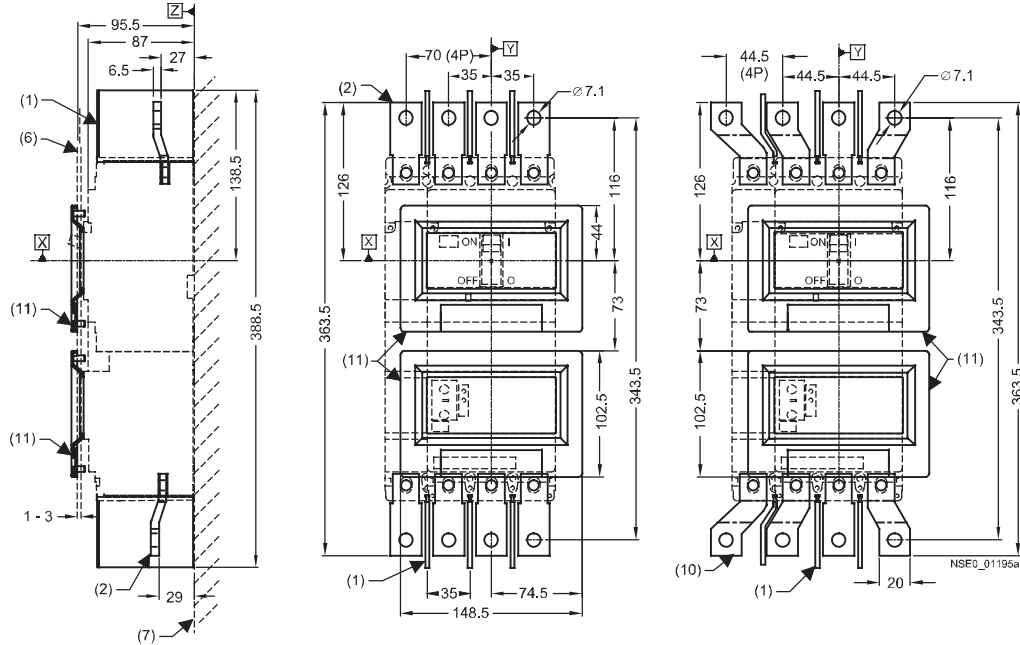
3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

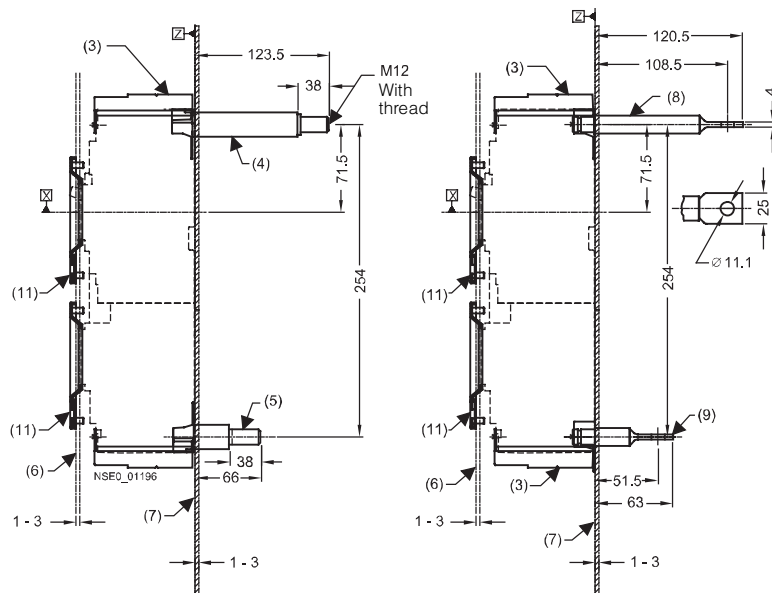
Project planning aids

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

Terminals and phase barriers



16



- (1) Phase barrier
- (2) Front connecting bars
- (3) Terminal covers (standard)
- (4) Threaded rear terminals, round stock (long)
- (5) Threaded rear terminals, round stock (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)

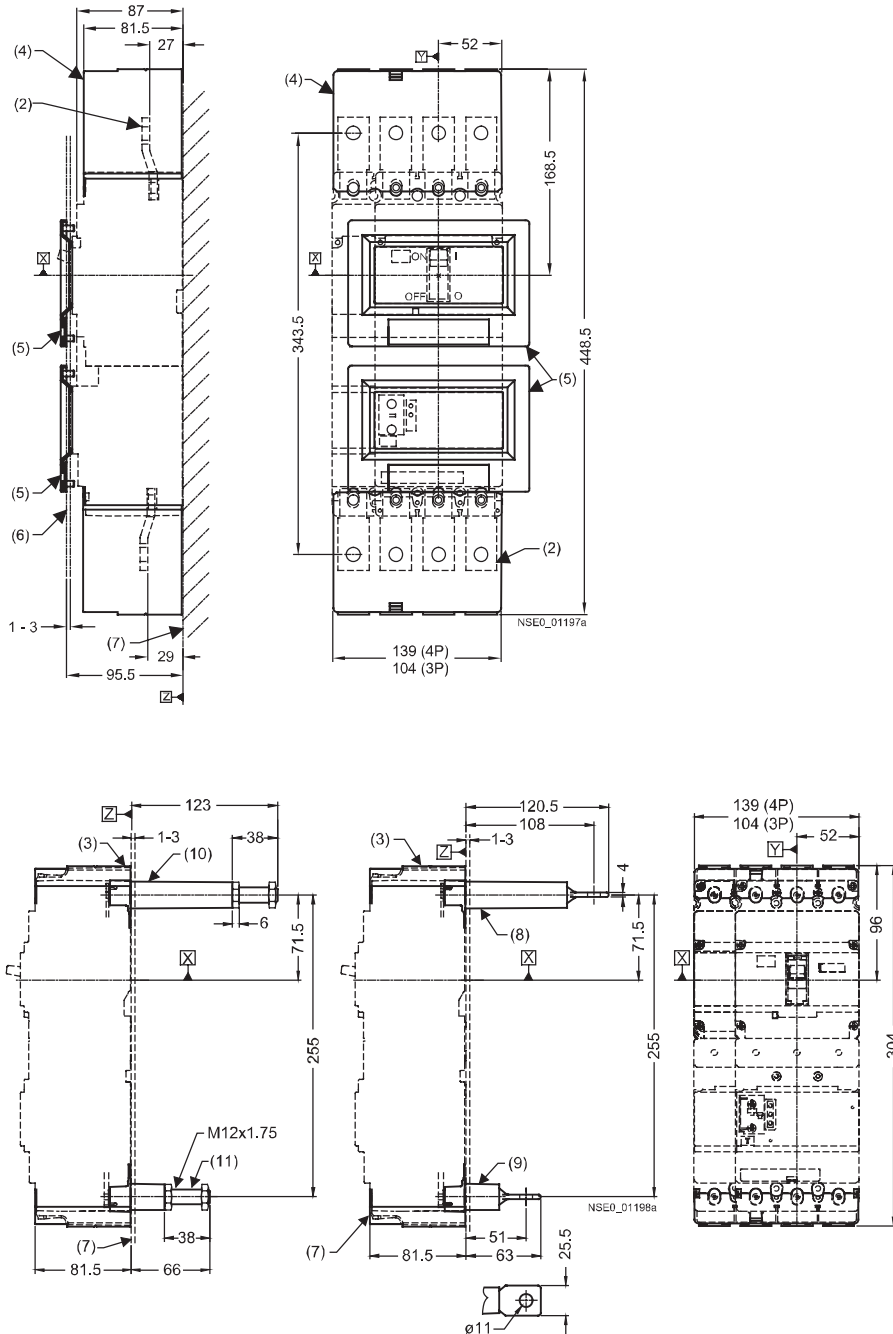
3VL Molded Case Circuit-Breakers

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

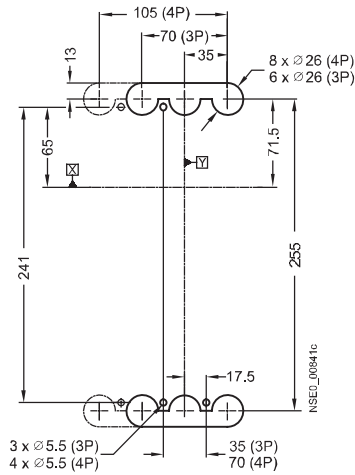
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

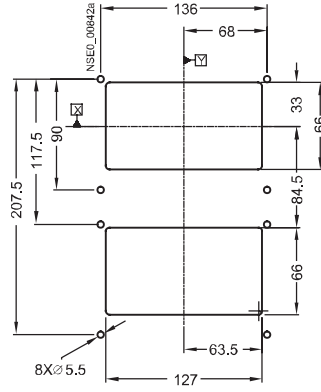
VL160X (3VL1) with RCD module, 3- and 4-pole, up to 160 A

Door cut-outs

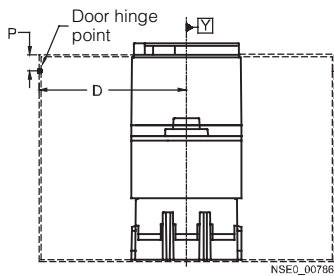
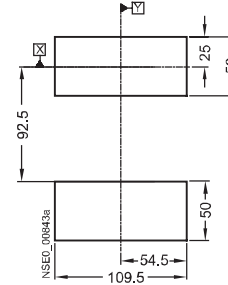
Hole pattern, cut-out for rear terminals



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



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



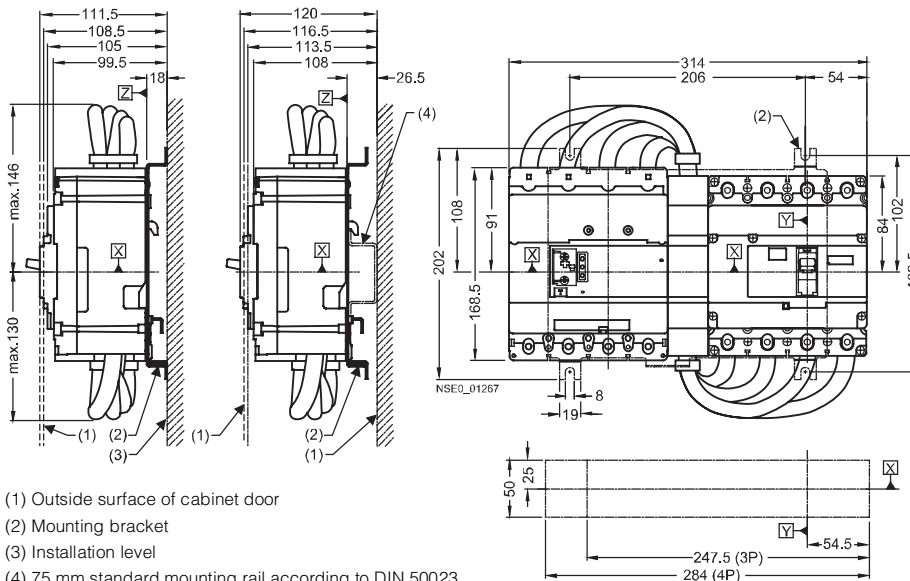
Note:
A minimum distance between reference point Y and the door hinge is required for the door cut-outs.

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

D > A from table + (P × 5)

16

Circuit-breaker with laterally attached RCD module



- (1) Outside surface of cabinet door
- (2) Mounting bracket
- (3) Installation level
- (4) 75 mm standard mounting rail according to DIN 50023 (to be provided by the customer)

3VL Molded Case Circuit-Breakers

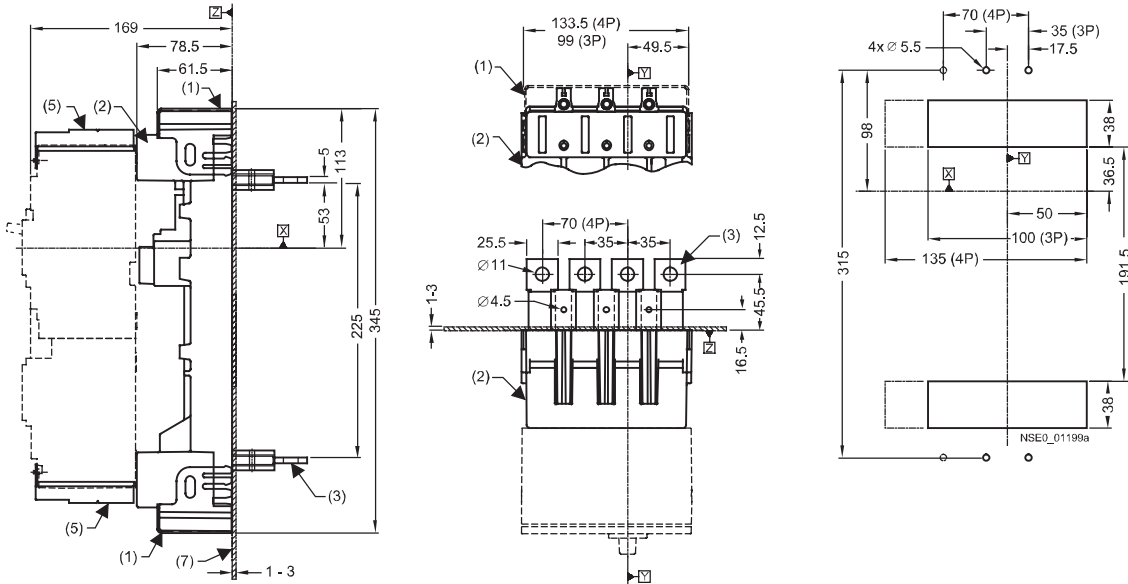
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

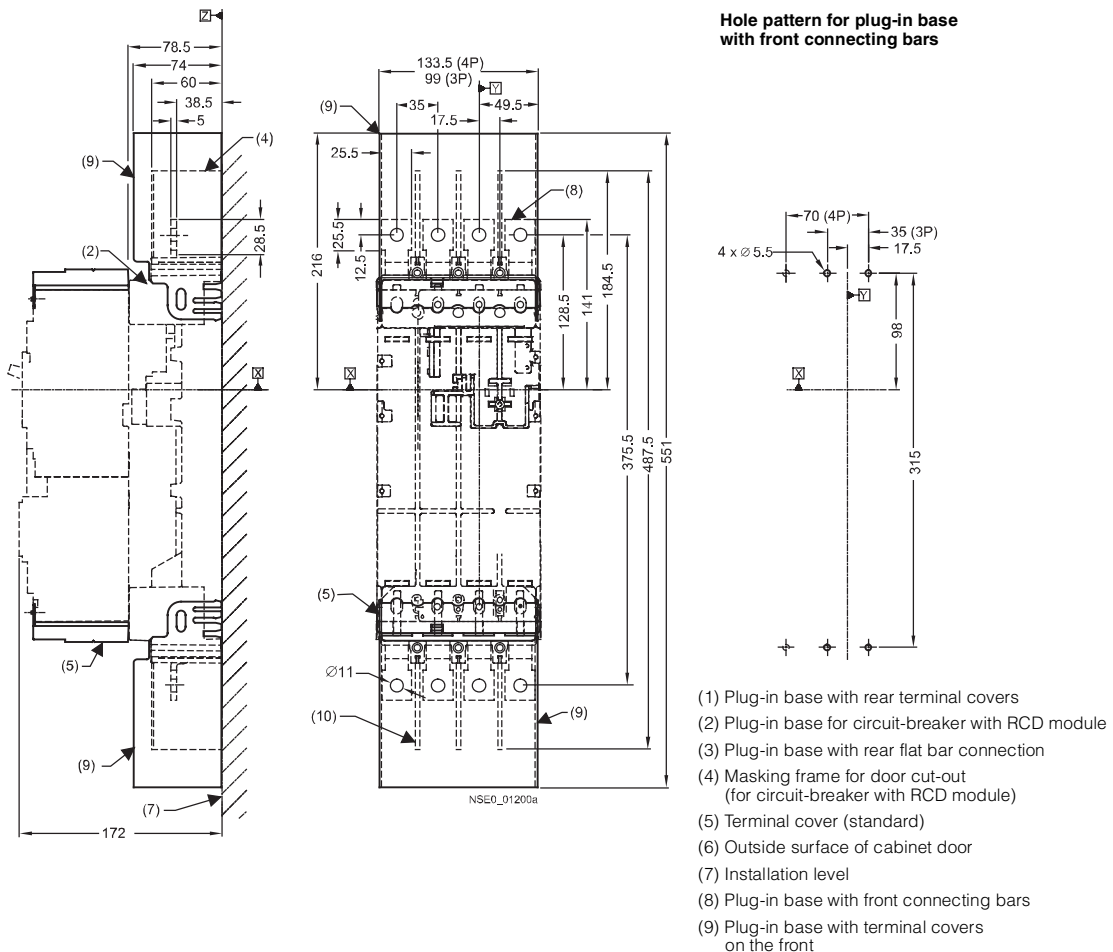
VL160X (3VL1) with RCD module, 3- and 4-pole, up to 160 A

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

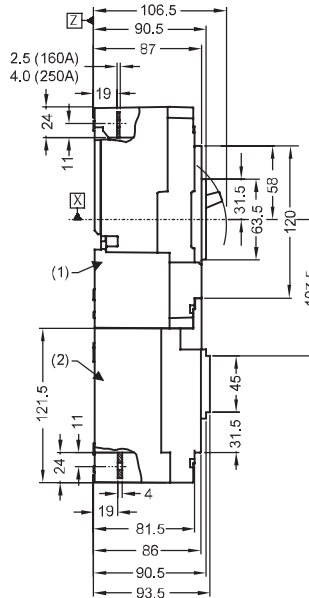
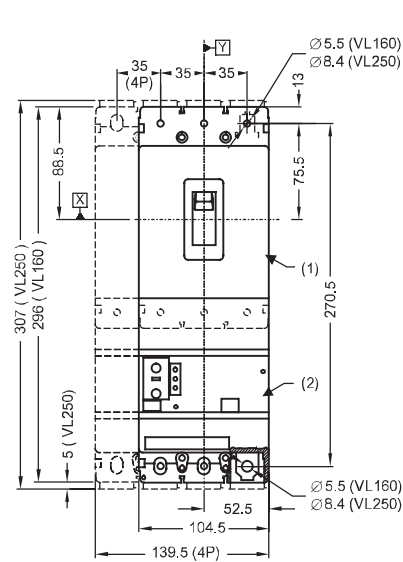
3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

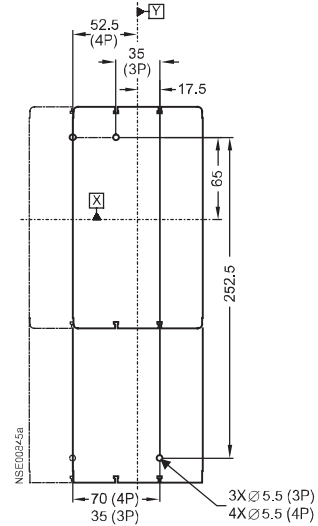
Project planning aids

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



Circuit-breaker installation instructions



- (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 round cable terminals.

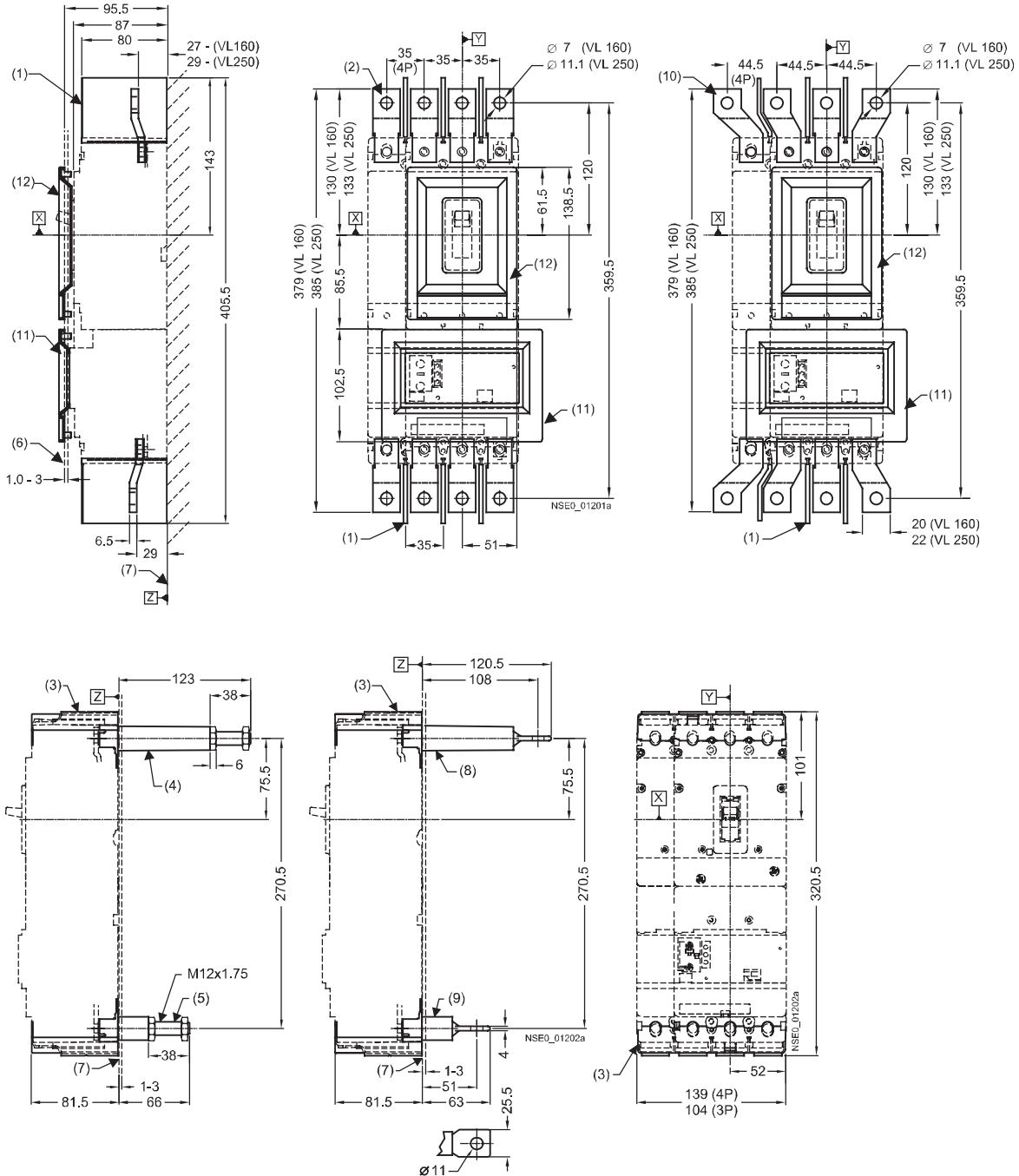
3VL Molded Case Circuit-Breakers

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)

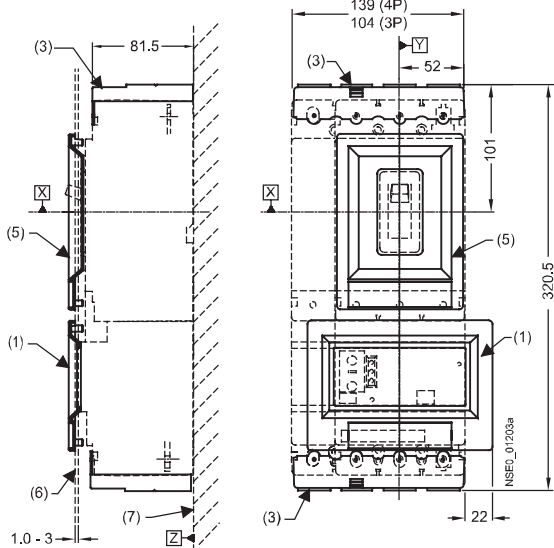
3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

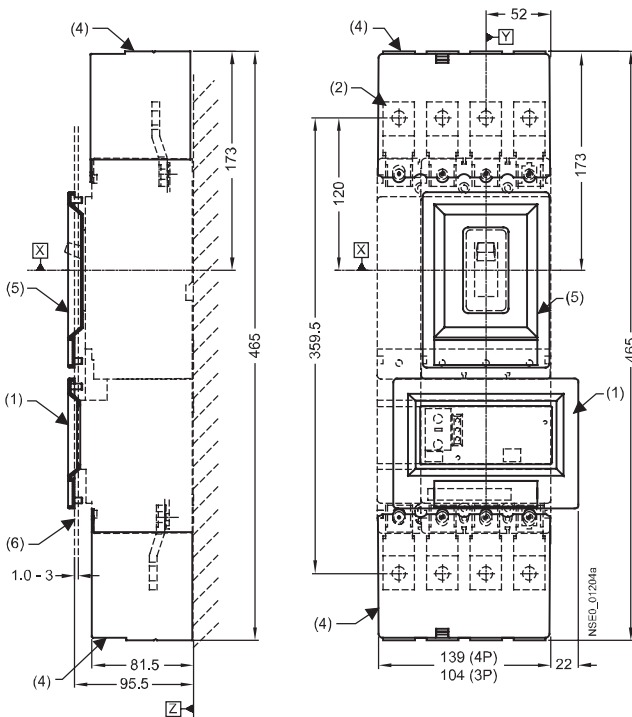
Project planning aids

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 page 16/71 bottom.



- (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

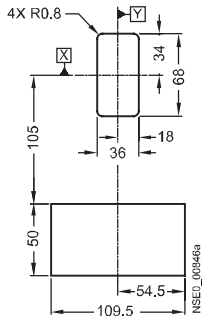
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

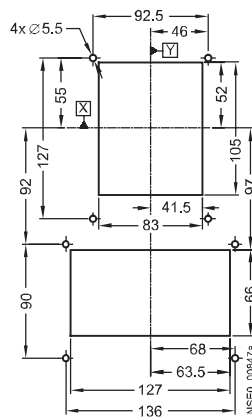
VL160 (3VL2) and VL250 (3VL3) with RCD module, 3- and 4-pole, up to 250 A

Door cut-outs

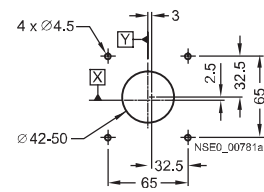
Door cut-out for toggle lever (without masking frame)



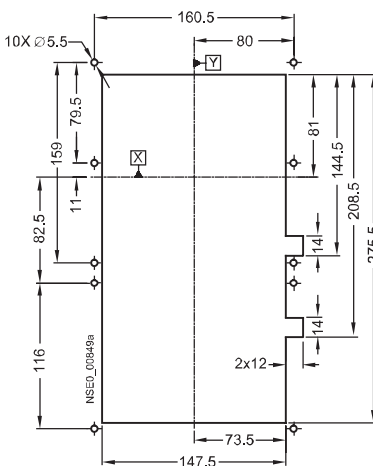
Door cut-out for toggle lever (with masking frame)



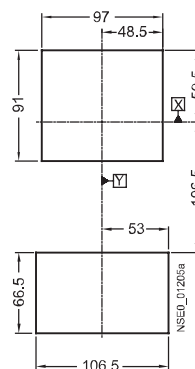
Door cut-out for door-coupling rotary operating mechanism



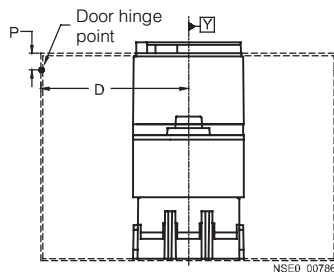
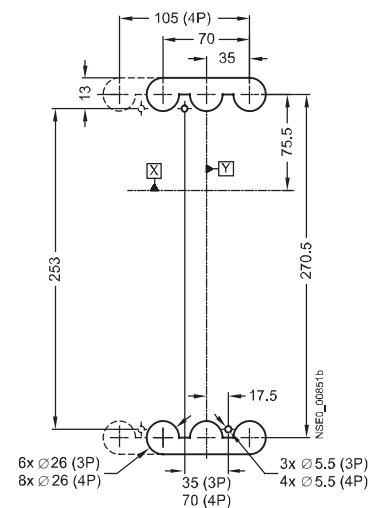
Door cut-out for front-operated rotary operating mechanism and motorized operating mechanism with spring energy store (with masking frame)



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 + $(P \times 5)$

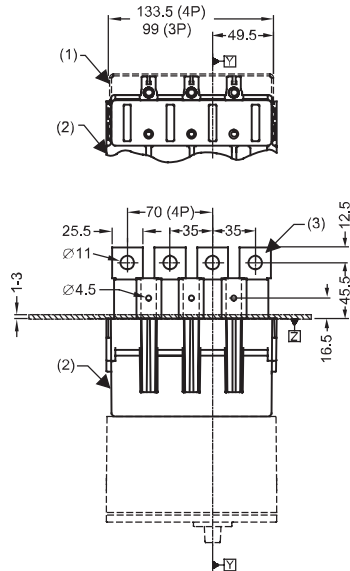
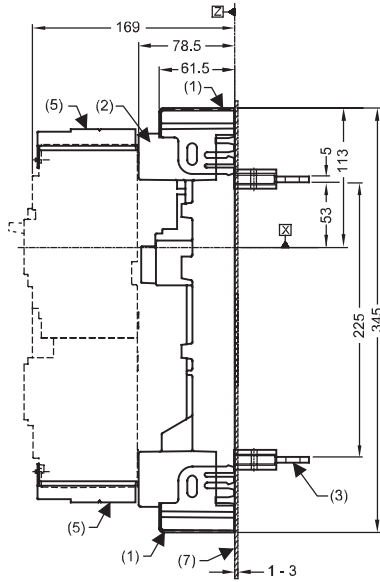
	A
Circuit-breaker only	100
Circuit-breaker + plug-in base + motorized operating mechanism with store	100
Circuit-breaker + plug-in base + front-operated rotary operating mechanism	200
Circuit-breaker + withdrawable version	200

3VL Molded Case Circuit-Breakers

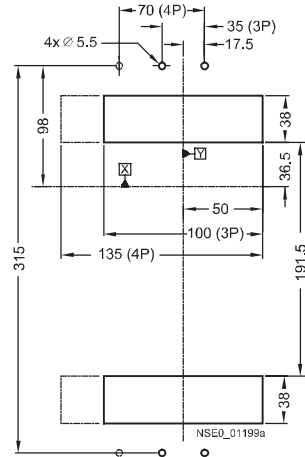
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

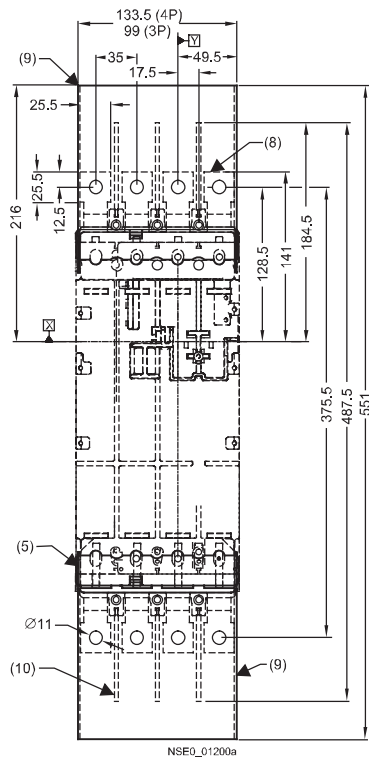
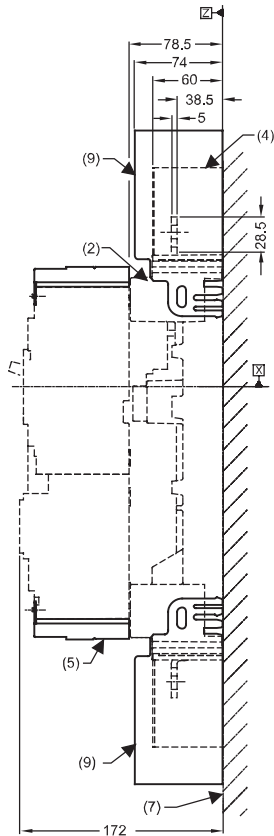
VL160 (3VL2) and VL250 (3VL3) with RCD module, 3- and 4-pole, up to 250 A
 Plug-in bases and accessories



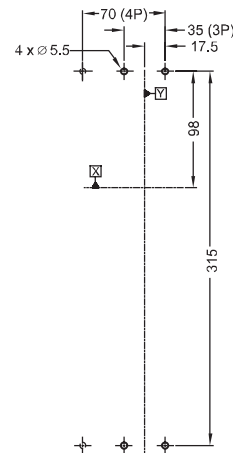
Hole pattern and cut-out for plug-in base with rear flat bar connection



16



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

3VL Molded Case Circuit-Breakers

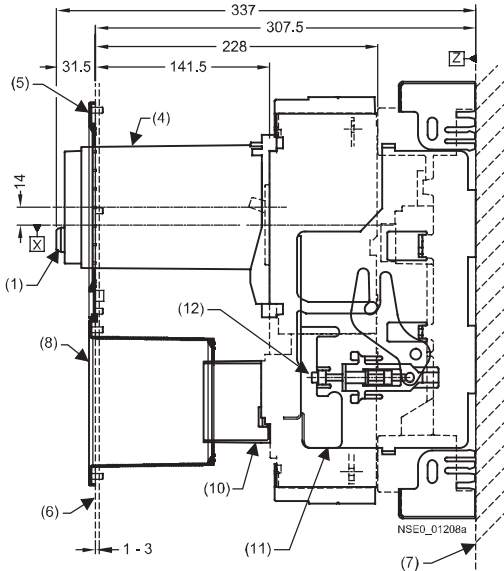
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

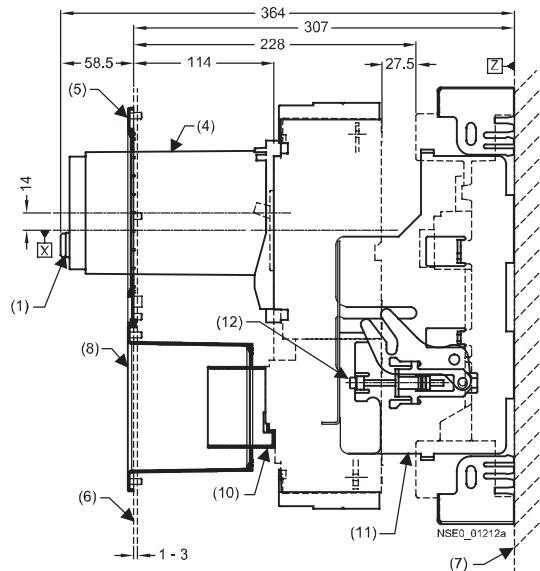
VL160 (3VL2) and VL250 (3VL3) with RCD module, 3- and 4-pole, up to 250 A

Plug-in bases and accessories

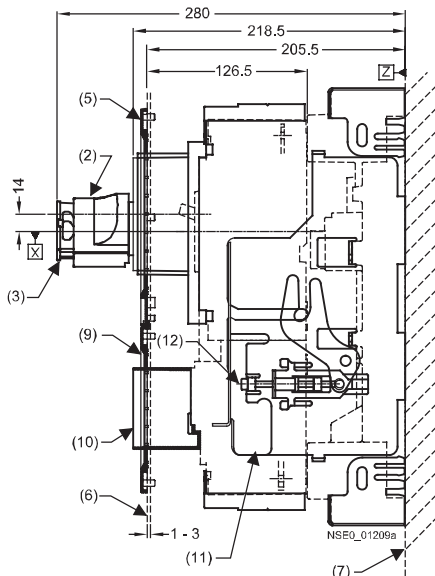
SENTRON VL160 (3VL2) and VL250 (3VL3) circuit-breakers with RCD module and motorized operating mechanism with spring energy store (connected position)



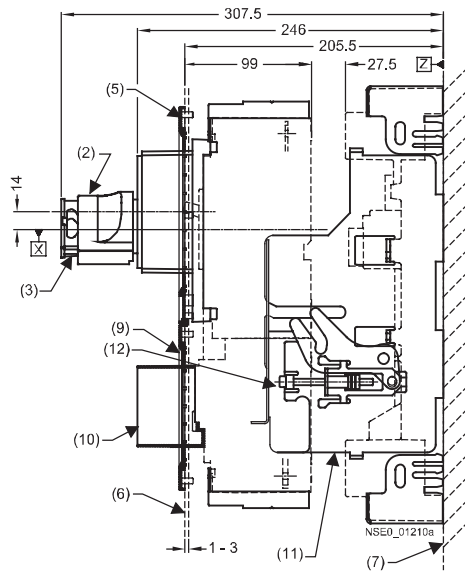
SENTRON VL160 (3VL2) and VL250 (3VL3) circuit-breakers with RCD module and motorized operating mechanism with spring energy store (disconnected position)



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 energy store
- (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

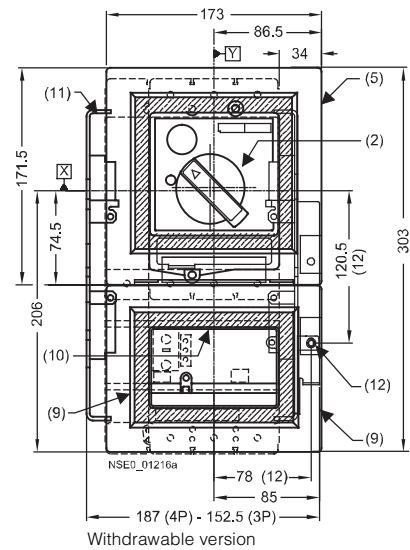
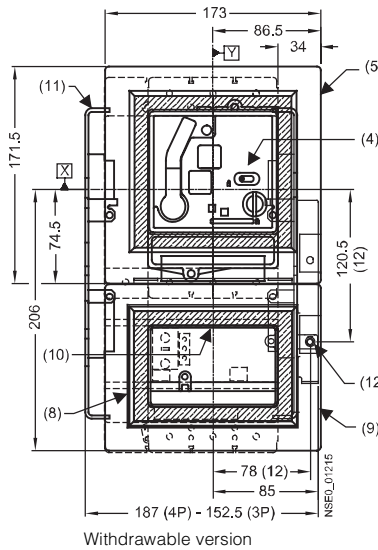
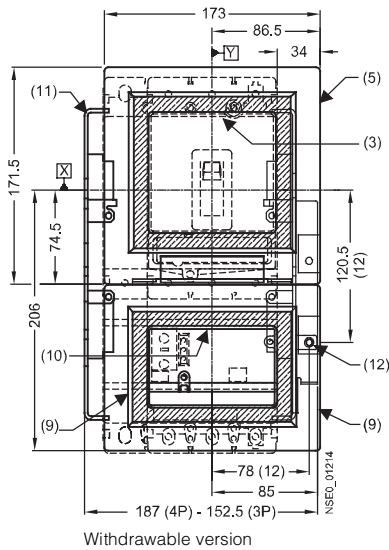
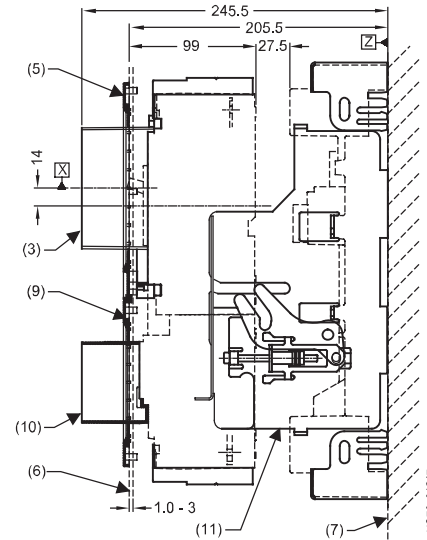
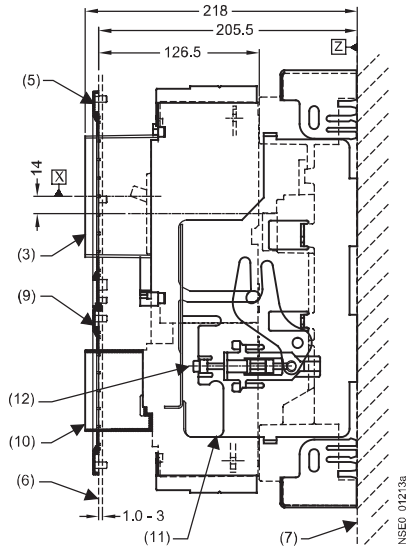
Project planning aids

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 spring energy store
- (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

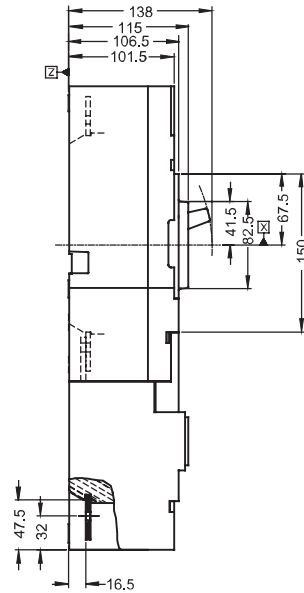
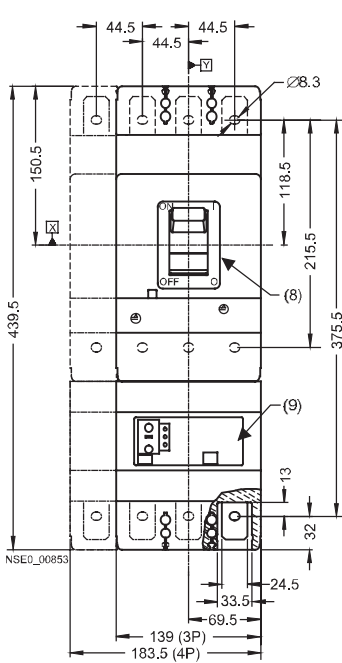
3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

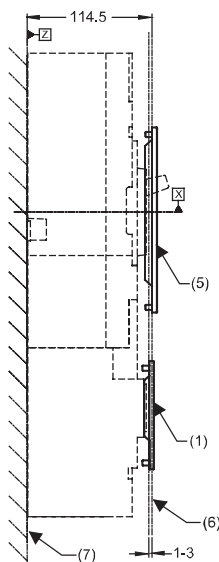
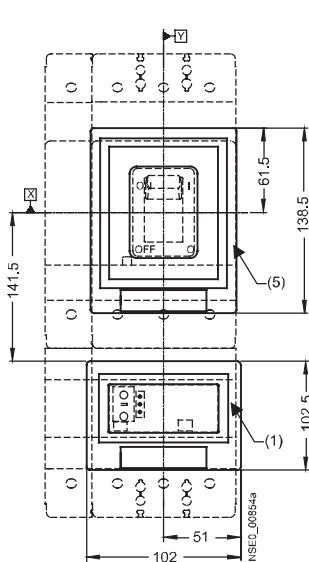
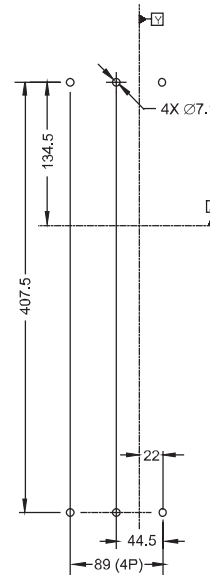
Project planning aids

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

SENTRON VL400 (3VL4) circuit-breakers with RCD module



Mounting hole pattern for SENTRON VL400 (3VL4) circuit-breakers 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

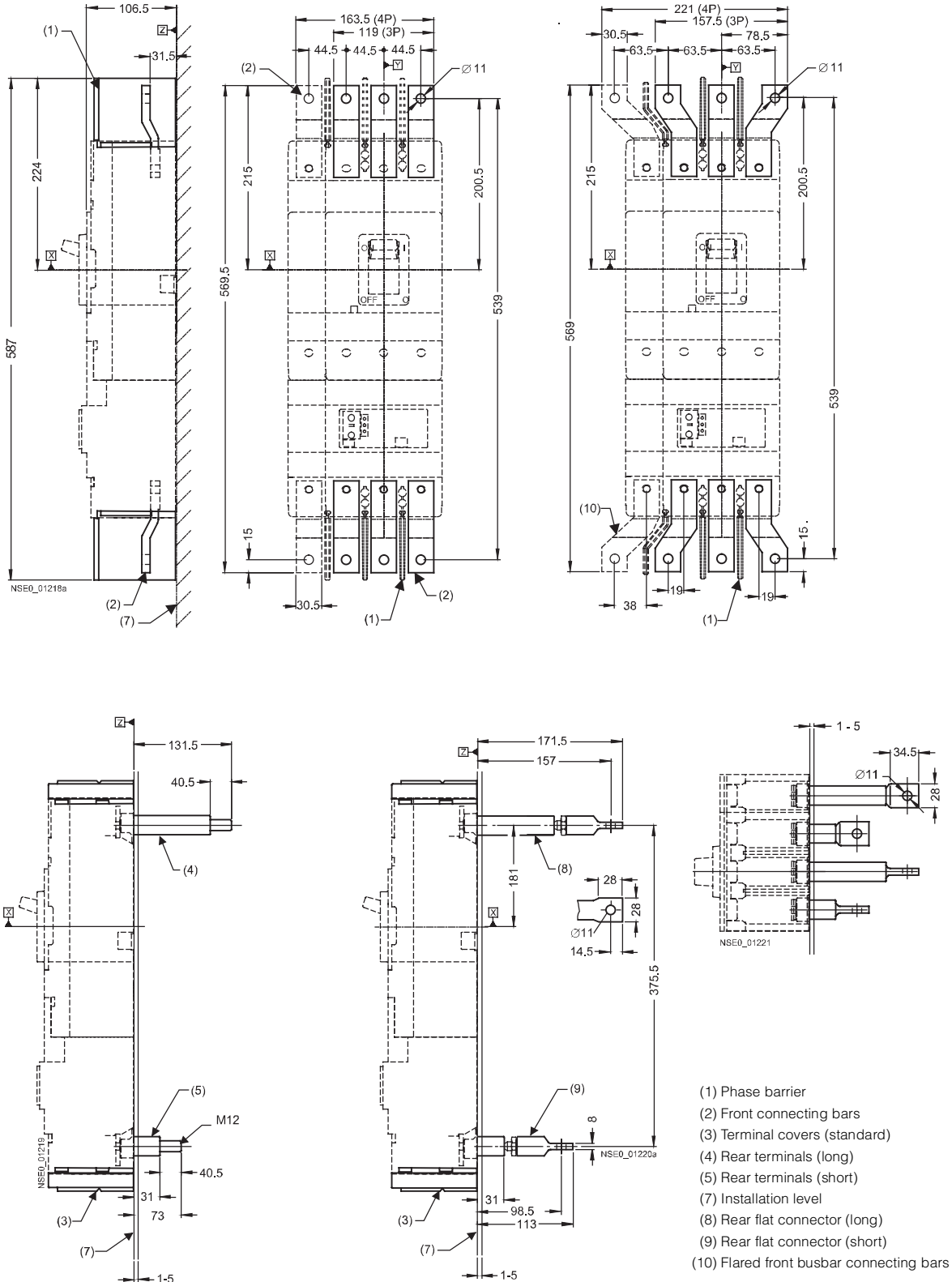
3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

VL400 (3VL4) with RCD module, 3- and 4-pole, up to 630 A

Terminals and phase barriers



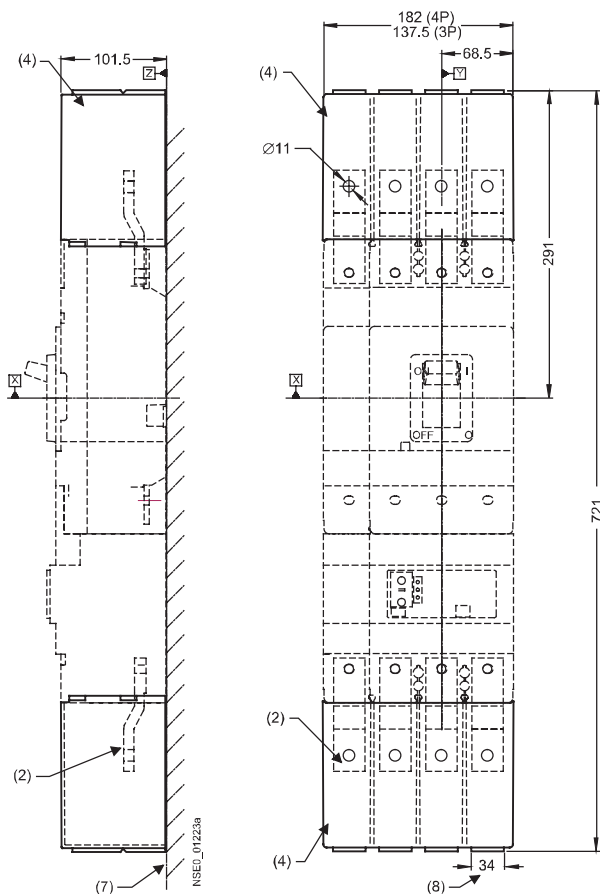
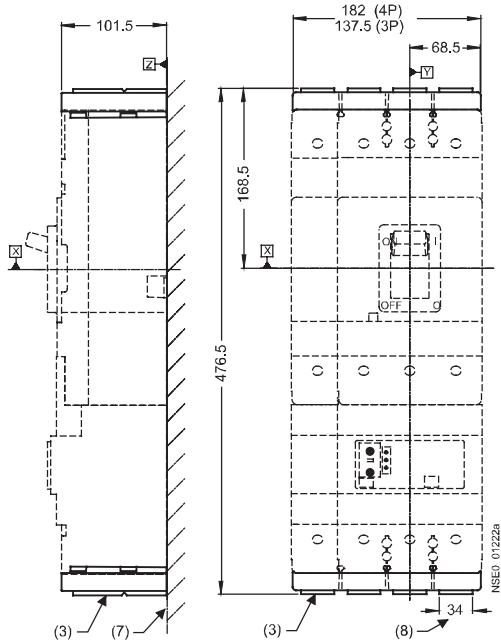
3VL Molded Case Circuit-Breakers

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

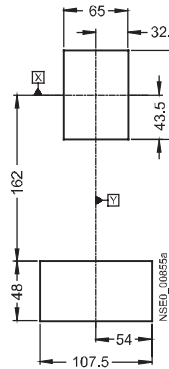
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

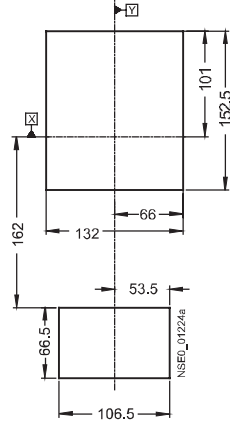
VL400 (3VL4) with RCD module, 3- and 4-pole, up to 400 A

Door cut-outs

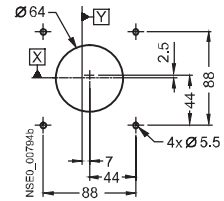
Door cut-out for toggle lever (with masking frame)



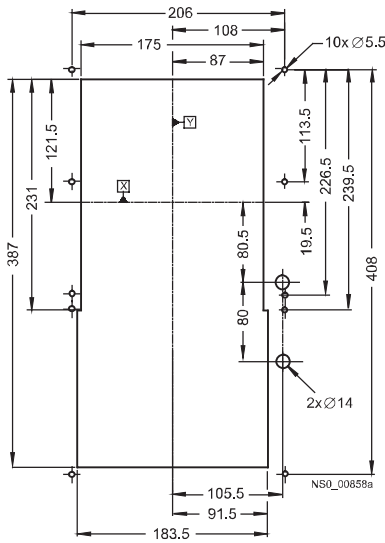
Door cut-out for front-operated rotary operating mechanism (without masking frame)



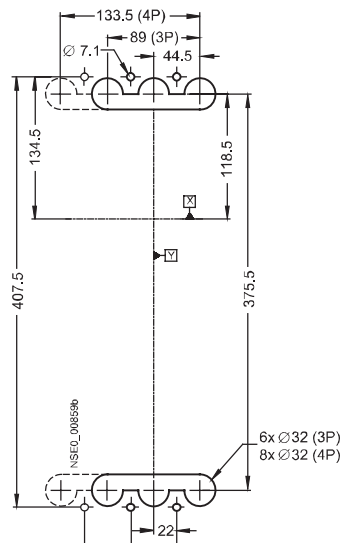
Door cut-out for door-coupling rotary operating mechanism



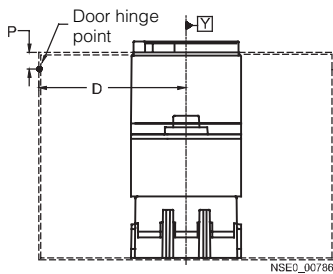
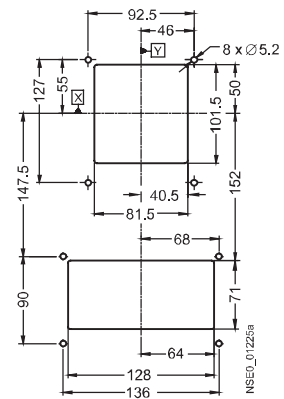
Door cut-out for front-operated rotary operating mechanism, motorized operating mechanism with spring energy store and extended escutcheon (with masking frame)



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.

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

D > A from table + (P × 5)

16

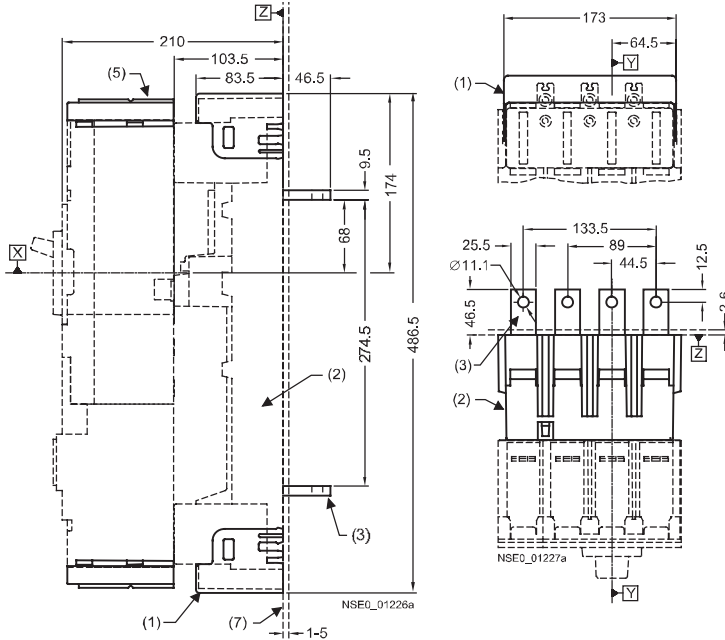
3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

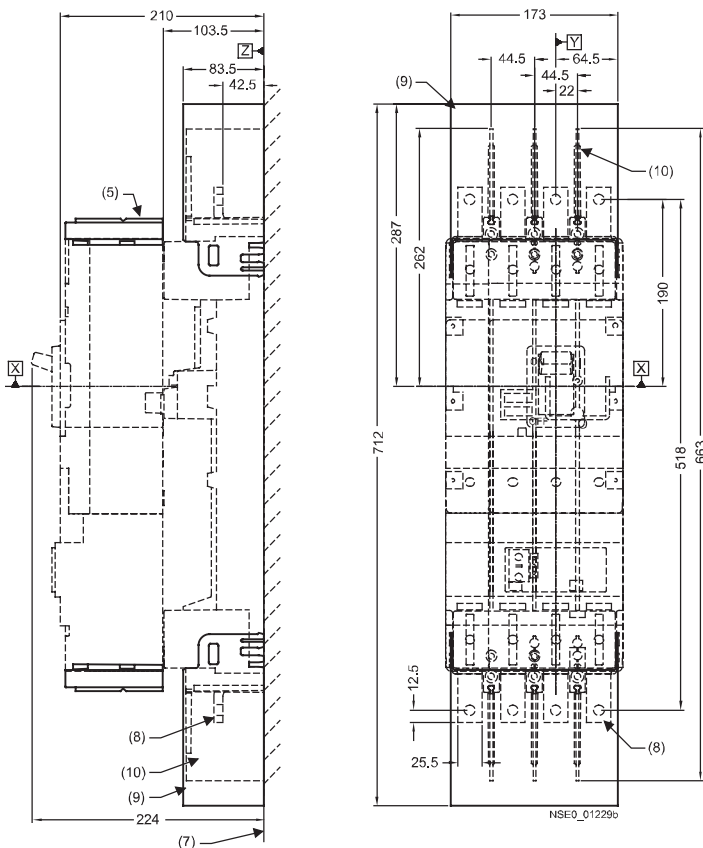
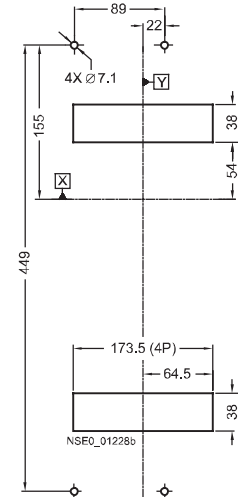
Project planning aids

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

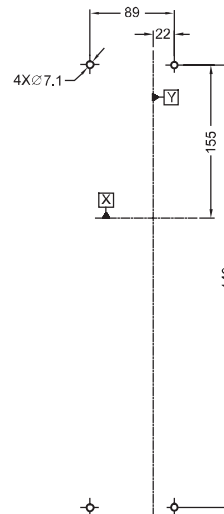
Plug-in bases and accessories



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



Hole pattern for plug-in base for 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

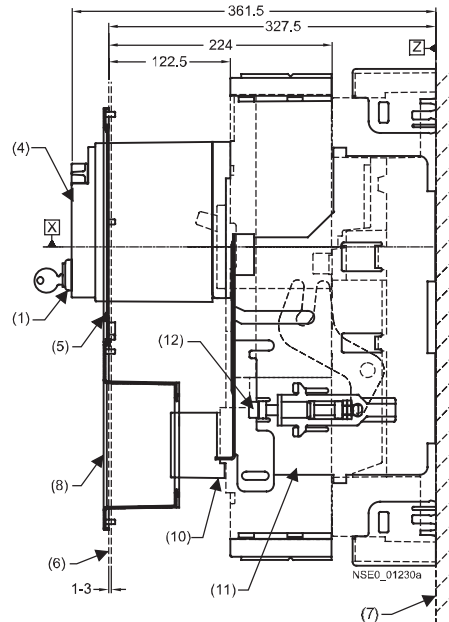
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

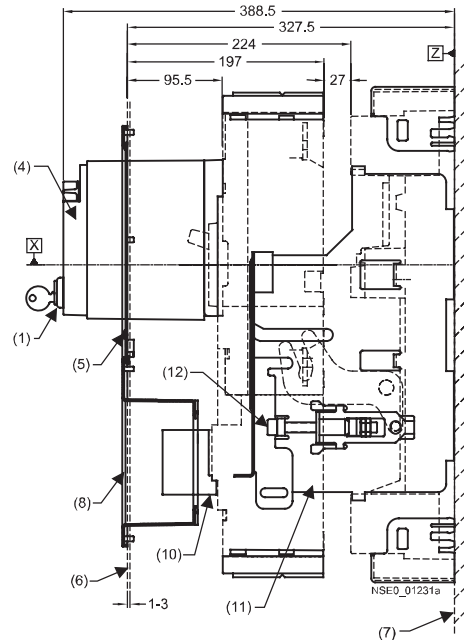
VL400 (3VL4) with RCD module, 3- and 4-pole, up to 400 A

Plug-in bases and accessories

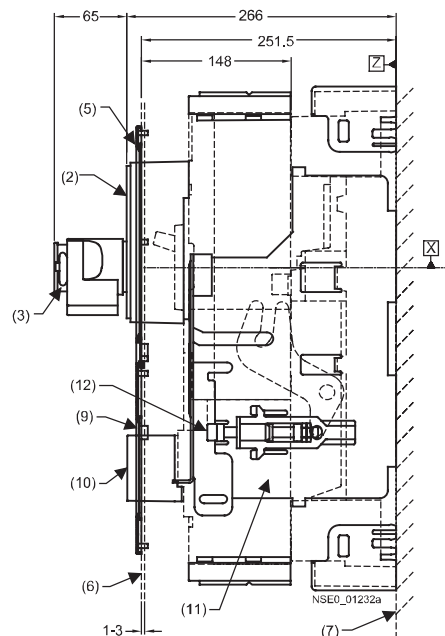
SENTRON VL400 (3VL4) circuit-breakers with RCD module, withdrawable, with motorized operating mechanism with spring energy store (connected position)



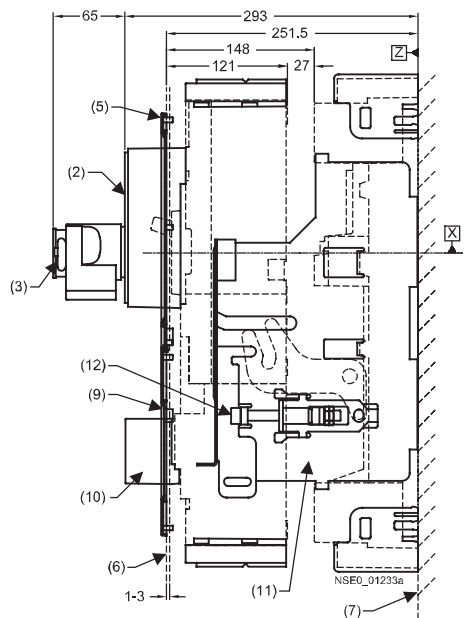
SENTRON VL400 (3VL4) circuit-breakers with RCD module, withdrawable, with motorized operating mechanism with spring energy store (disconnected position)



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 spring energy store | (10) RCD extended escutcheon |
| (5) Masking frame for door cut-out (for circuit-breaker with toggle lever) | (11) Locking device for racking mechanism |
| (6) Outside surface of cabinet door | (12) Racking mechanism |

3VL Molded Case Circuit-Breakers

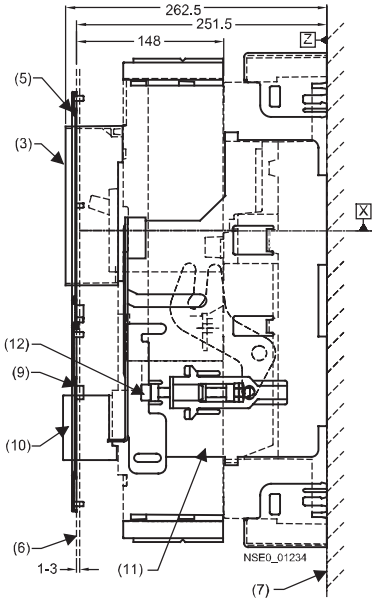
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

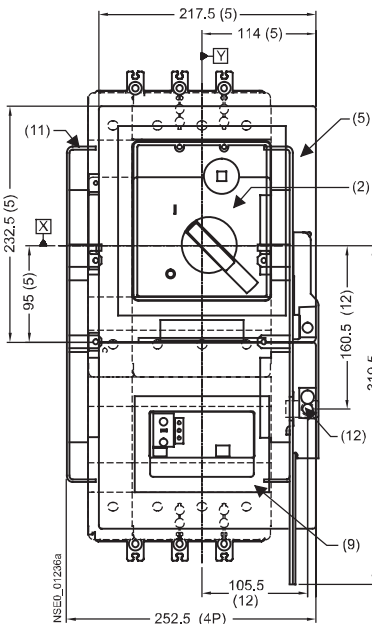
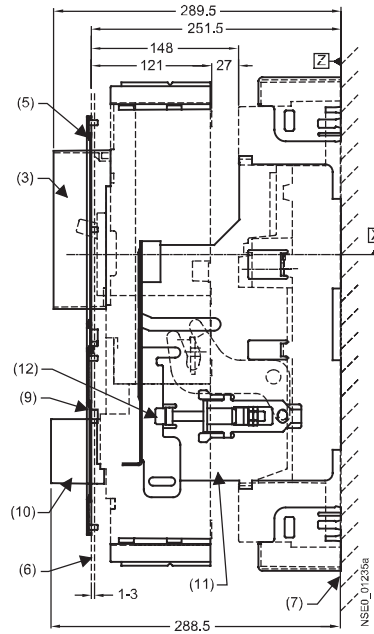
VL400 (3VL4) with RCD module, 3- and 4-pole, up to 400 A

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 energy store
- (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

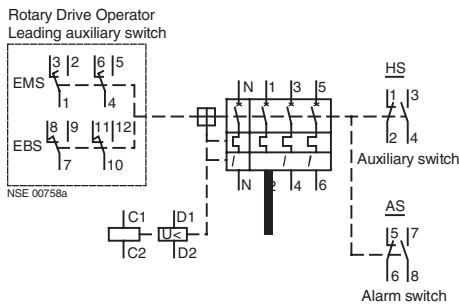
Project planning aids

Schematics

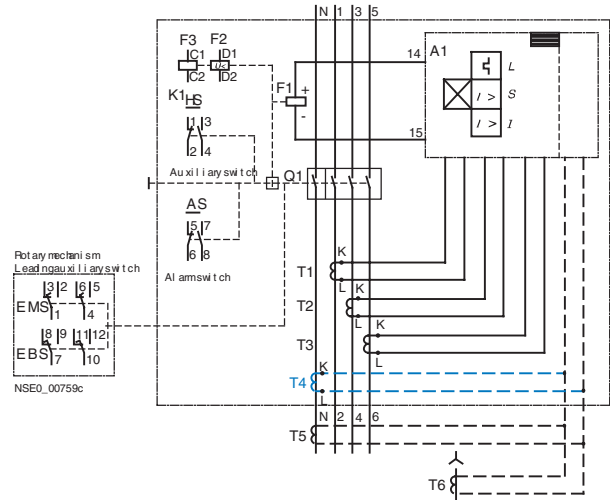
The graphical symbols used in the circuit diagrams provide information about the type, circuit and mode of operation of the devices according to DIN 40713, but contain no information about the design.

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.

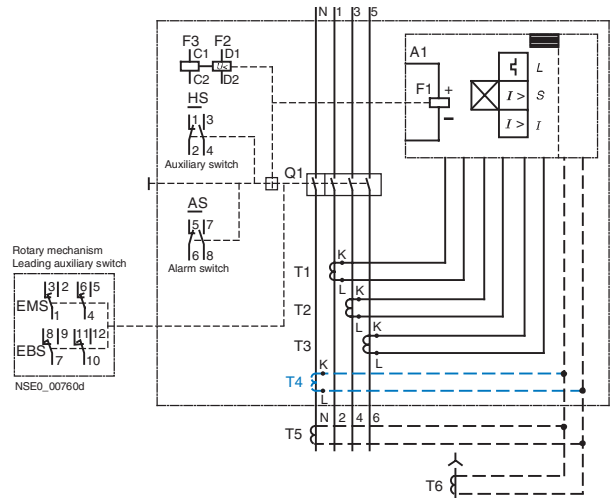
The purpose of these circuit diagrams is merely to help improve the understanding of way in which the devices function.



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



Internal circuit diagram for SENTRON VL160 (3VL2) and VL250 (3VL3), 3- and 4-pole circuit-breakers for system protection and motor protection with electronic overcurrent trip units



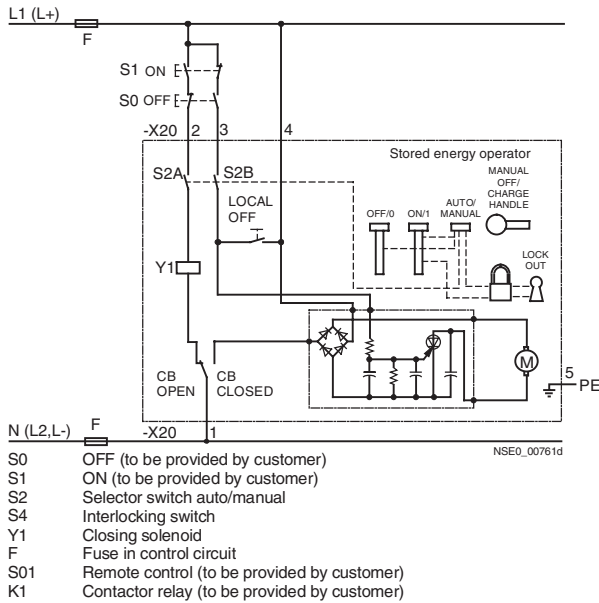
Internal circuit diagram for SENTRON VL400 (3VL4) circuit-breaker for motor protection and SENTRON VL400 (3VL4) to VL1600 (3VL8), 3- and 4-pole circuit-breakers for system protection with electronic overcurrent trip units

- Q1 Main contacts
- A1 Electronic overcurrent trip unit
- F1 Tripping solenoid for A1
- F2 Undervoltage trip unit
- F3 Shunt trip unit
- HS Auxiliary switch
- 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

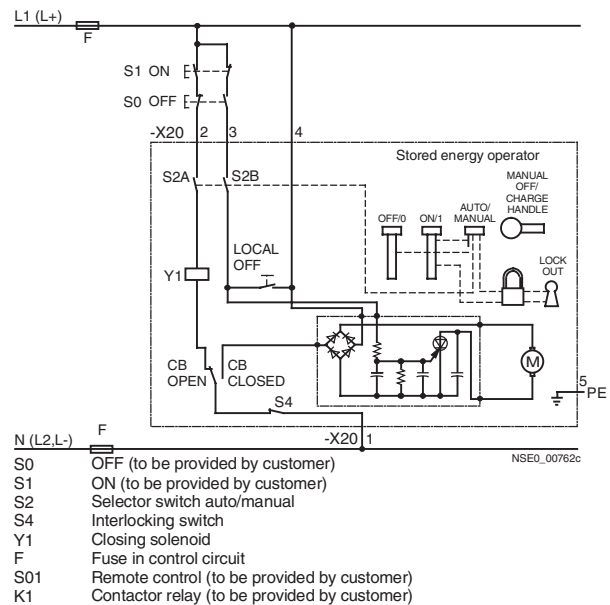
3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

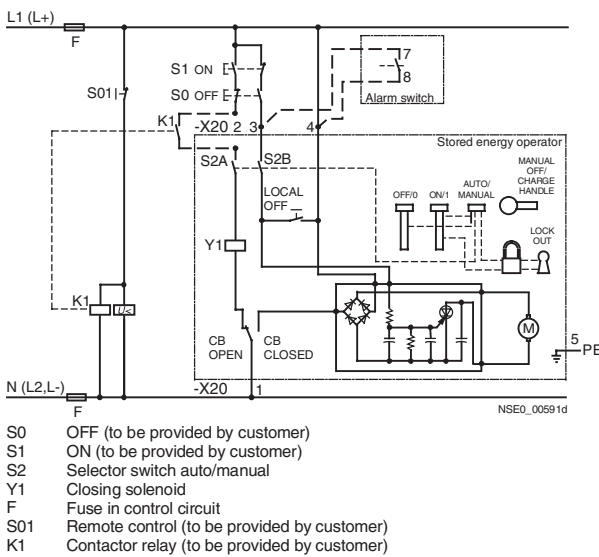
Project planning aids



Motorized operating mechanism with spring energy store for SENTRON VL160X (3VL1) to VL250 (3VL3) circuit-breakers without undervoltage trip unit

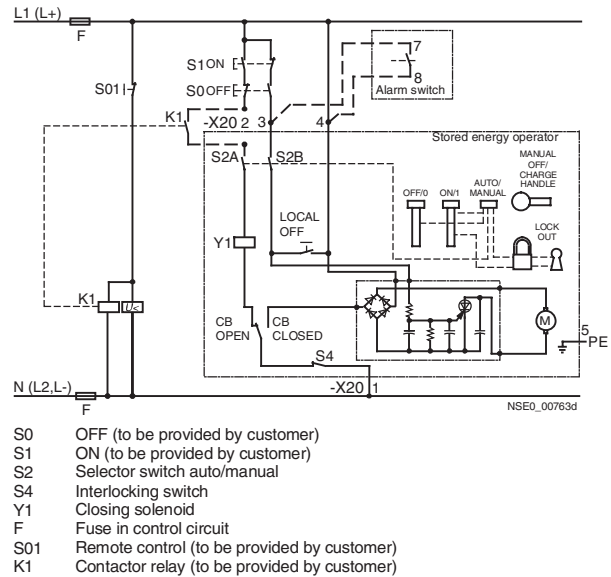


Motorized operating mechanism with spring energy store for SENTRON VL400 (3VL4) to VL800 (3VL6) circuit-breakers without undervoltage trip unit



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 spring energy store for SENTRON VL160X (3VL1) to VL250 (3VL3) circuit-breakers with undervoltage trip unit



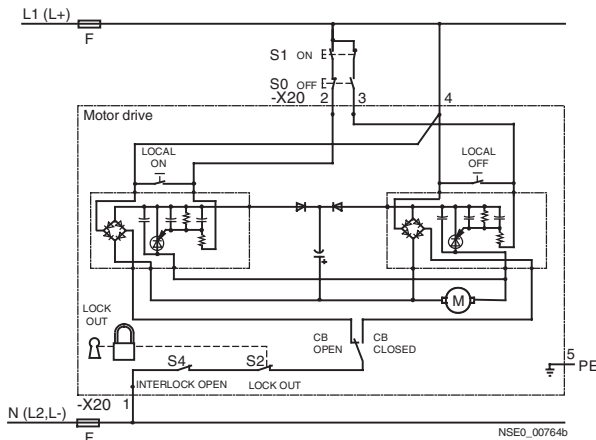
Note: a separate alarm switch (7-8) can be incorporated for automatic charging after a release. Automatic closing of a tripped circuit-breaker is not recommended, in order to prevent a switch of the circuit-breaker to a fault in the protected circuit.

Motorized operating mechanism with spring energy store for SENTRON VL400 (3VL4) to VL800 (3VL6) circuit-breakers with undervoltage trip unit

3VL Molded Case Circuit-Breakers

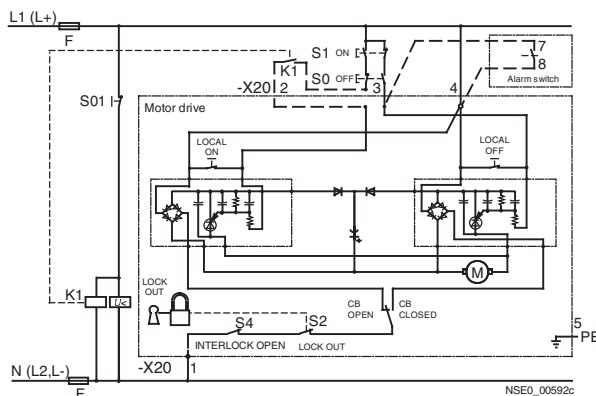
3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids



- S0 OFF (to be provided by customer)
- S1 ON (to be provided by customer)
- S2 Lock out
- S4 Interlock open
- F Fuse in control circuit
- S01 Remote control
- K1 Contactor relay

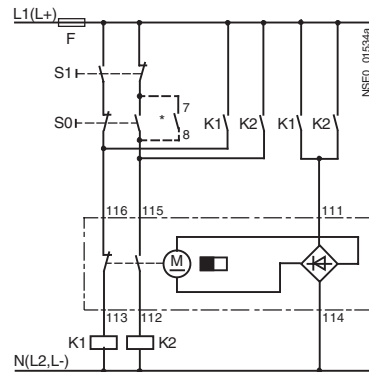
Motorized operating mechanism for SENTRON VL1250 (3VL7) and VL1600 (3VL8) circuit-breakers without undervoltage trip unit



- S0 OFF (to be provided by customer)
- S1 ON (to be provided by customer)
- S2 Lock out
- S4 Interlock open
- F Fuse in control circuit
- S01 Remote control
- K1 Contactor relay

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.

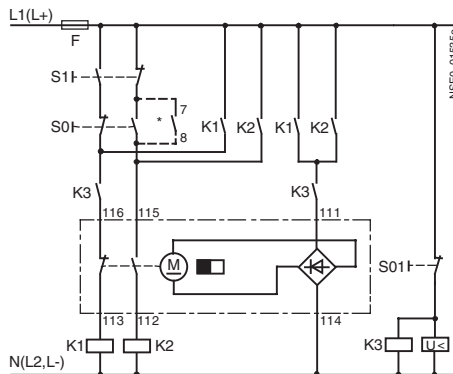
Motorized operating mechanism for SENTRON VL1250 (3VL7) and VL1600 (3VL8) circuit-breakers with undervoltage trip unit



- S0 OFF (to be provided by customer)
- S1 ON (to be provided by customer)
- K1, K2 Contactor relays for motor control
- F Fuse in control circuit

* 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 trip unit



- S0 OFF (to be provided by customer)
- S1 ON (to be provided by customer)
- S01 EMERGENCY-STOP or remote tripping
- K1, K2, K3 Contactor relays for motor control
- F Fuse in control circuit

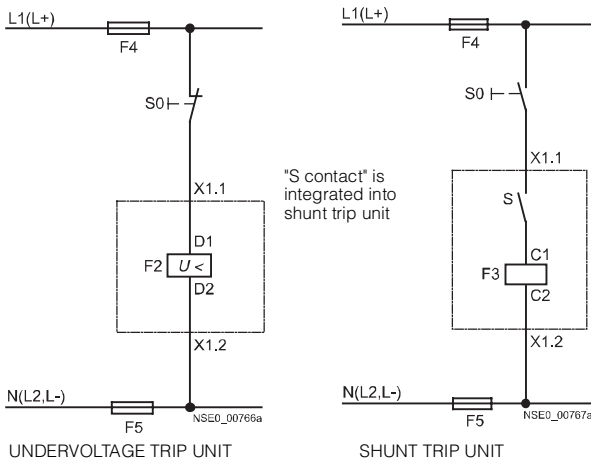
* Alarm switch contact 7-8 causes a switch reset to RESET, i.e. reclosing capability after tripping. Without this contact the result would be a "closing lockout", i.e. reconnection after a trip is not possible until the switch is reset to RESET by the "OFF" command (S0).

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

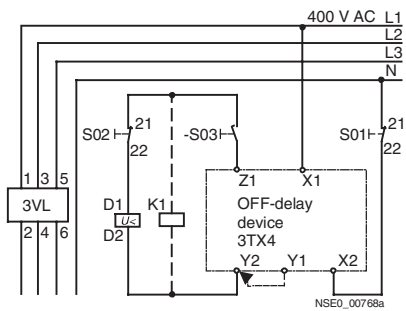
3VL Molded Case Circuit-Breakers

3VL Molded Case Circuit-Breakers up to 1600 A

Project planning aids

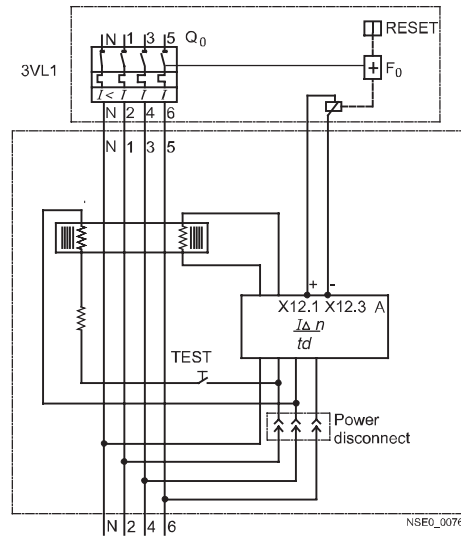


Undervoltage trip unit and shunt trip unit for SENTRON VL160X (3VL1) to VL1600 (3VL8) circuit-breakers



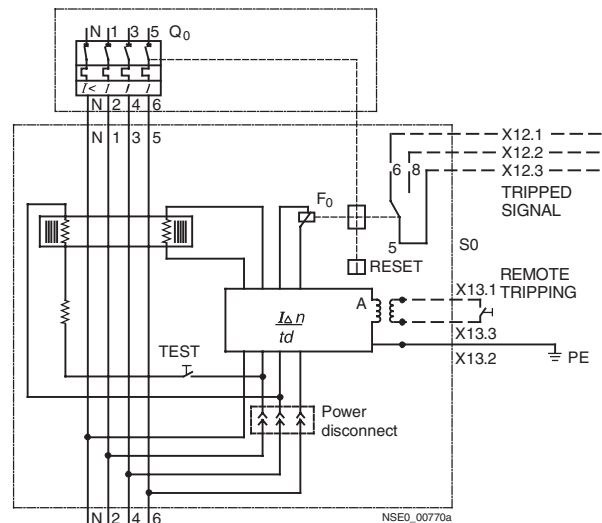
- S01 Delayed tripping
- S02 Instantaneous tripping for EMERGENCY-STOP circuit (if required)
- S03 Early-make auxiliary contact, e.g. 3VL9300-3AS10 "OFF to ON" in the front-operated rotary operating mechanism of the circuit-breaker (if required)
- K1 3RH11 contactor relay (if required)

Time-delay device for undervoltage trip unit 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

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



- 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-controlled tripping and RCD alarm switch. 3-pole version similar, but without N-pole.

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.de/niederspannungs-schalttechnik/handbuecher>

SETRON manual for communication solutions

Free download at

<http://www.siemens.de/niederspannungs-schalttechnik/handbuecher>

See also the chapter "Air Circuit-Breakers" under "3VL 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, EN 60947	
Max. rated current I_n	A	16 ... 100
Rated insulation voltage U_i		
Main circuits	V AC	415
Control circuits	V AC	415
Rated impulse withstand voltage U_{imp}		
Main circuits	kV	6
Control circuits	kV	4
Rated operational voltage U_e, 50/60 Hz		
IEC	V AC	... 415
Permissible ambient temperature	°C	-20 ... +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_{Uj}	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	Yes	
According to IEC 60947-2		
In conjunction with lockable rotary operating mechanisms		
EMERGENCY-STOP switch properties	Yes	
According to DIN VDE 0113		
Mechanical endurance	Operating cycles	10000
Operating frequency	1/h	120
Conductor cross-sections and types of connection for main conductors (copper or aluminum)		
Connection type		
Solid or stranded	up to 40 A	mm ² 2.5 ... 6
	45 ... 100 A	mm ² 16 ... 50
	125 A	mm ² 70
Conductor cross-sections for control circuits	mm ²	0.5 ... 2.5
With terminal connection or terminal strip, solid		
Power loss per circuit-breaker		
At max. rated current I_n		
With AC symmetrical load		
– System protection	W	16
Permissible mounting position		
Auxiliary switch		
Continuous 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 (DC-13)		
– Rated operational voltage	V	125
– Rated operational current	A	0.5
Back-up fuse	A	4
Trip unit		
Shunt trip unit (f-release)		
Response voltage		
– Pick-up (circuit-breaker is tripped)		
Power input (short time) at:		
50/60 Hz 12–24 V AC	VA	108
50/60 Hz 48–60 V AC	VA	120
50/60 Hz 48–127 V AC	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 operating voltage	Interrupts automatically	
Max. opening time	ms	50

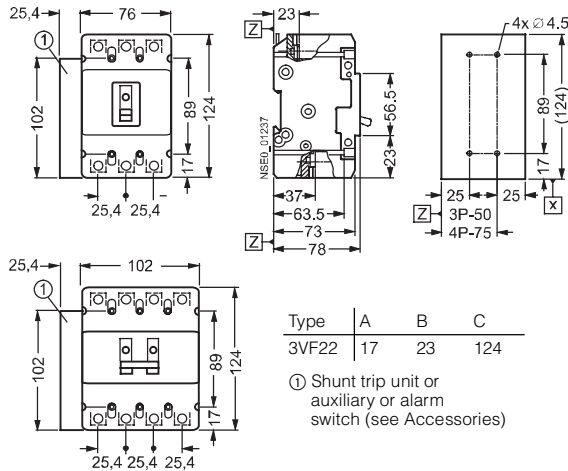
3VF2 Molded Case Circuit-Breakers

3VF2 Molded Case Circuit-Breakers up to 100 A

Project planning aids

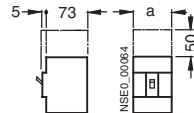
Dimensional drawings

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



Arcing spaces

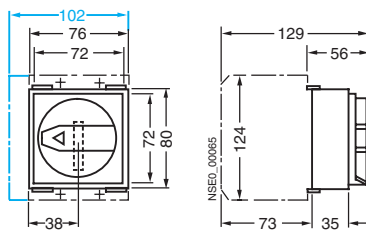
Minimum clearances from adjacent grounded parts and from non-insulated live parts at rated voltage. The distance of at least 2 cm between large covers and the arc chute openings should be observed for the 3VF2. Plain conductors and busbars must be insulated within the arcing space.



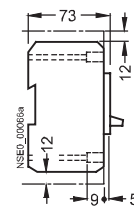
Type	a
3VF2, 3-pole	78
3VF2, 4-pole	101

3VF2

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



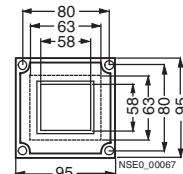
3VF9 223-1.A00 front rotary operating mechanism with knob for 3VF2



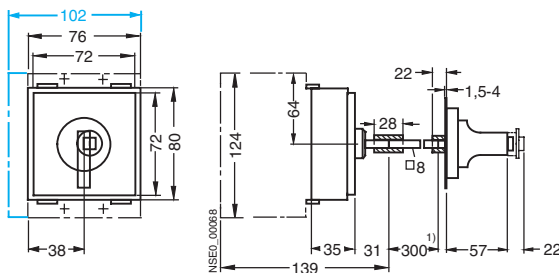
3VF9 224-1NB.0 terminal cover for 3VF2



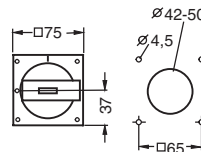
3VF9 220-1CA10 cover with cap dimension 45 mm for 3VF2



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



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



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

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

4-pole version

View A

View B

Note:

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

Center line

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

3VF2 Molded Case Circuit-Breakers

3VF2 Molded Case Circuit-Breakers up to 100 A

Notes

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