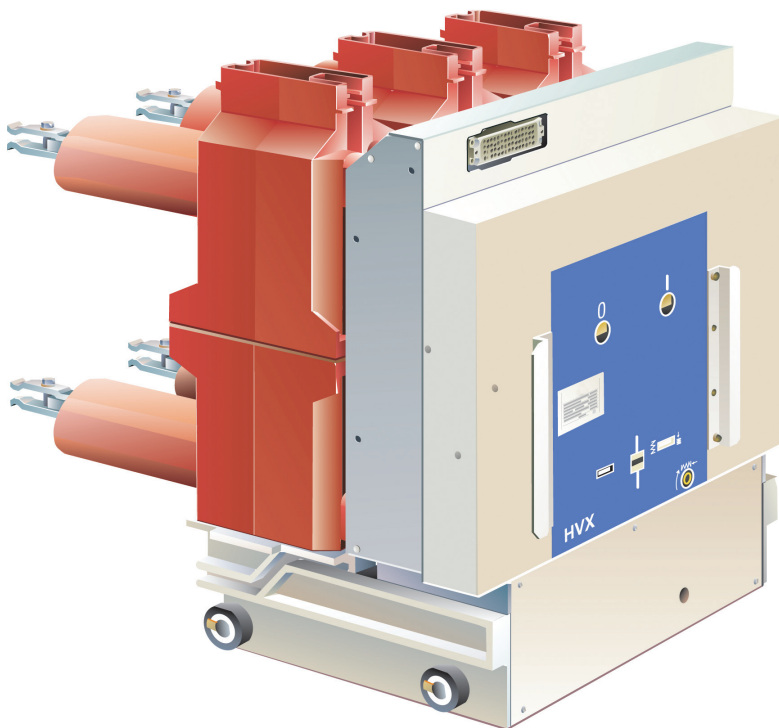


# HVX

Vacuum circuit-breaker up to 36 kV

## Medium-Voltage Switching Devices Selection List 2011



**Conditions of Delivery**

The General Conditions of Delivery as amended shall apply.

**Illustrations**

The illustrations are not binding.

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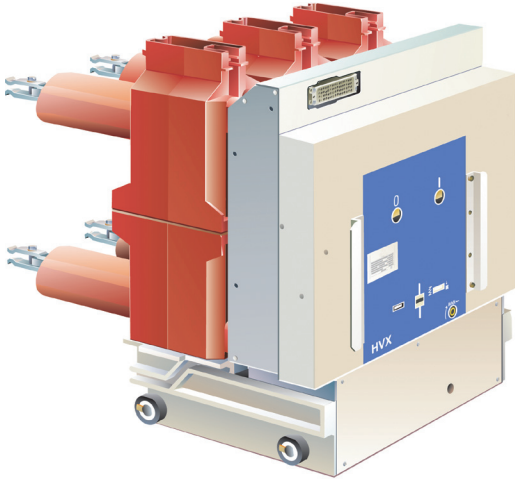
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The result of consistent further development for application in modern air-insulated switchgear units

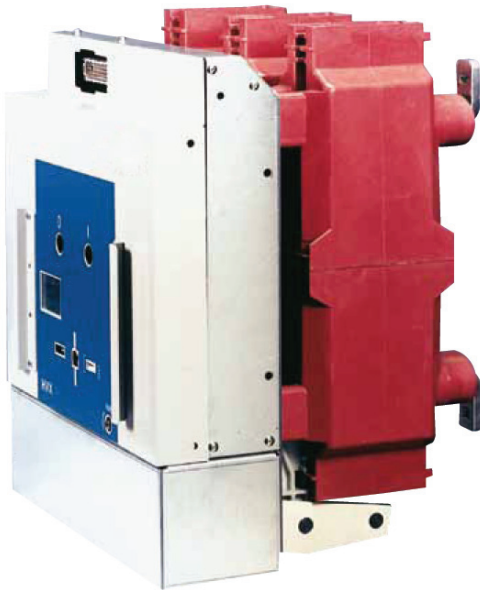
## General Description

The HVX vacuum circuit-breaker is the result of consistent further development for application in modern air-insulated switchgear units. It is characterized by compact dimensions, good operator guidance and a modern functional industrial design.

Thus, the market requirements, especially regarding small functional compartments without additional solid insulating material in the panel to ensure dielectric strength, can be satisfied optimally.



Drawing unit with vacuum circuit-breaker



Vacuum circuit-breaker HVX-F Fixed-type model with 64-pole connector

## Essential Features

- compact design
- good operator guidance thanks to the functional arrangement of operating and signalling elements
- no free-standing pole column
- vacuum interrupter chamber suspended free of external forces
- pole envelope with supporting and insulating functions
- high mechanical protection thanks to pole envelope
- flexible application options:
  - for fixed installation
  - for mounting on isolating truck
  - for drawer-type use

- high reliability and availability thanks to mature vacuum switching technology and proven single-shaft spring drive
- world-wide application for all standards
- maintenance-free

### Fields of application:

- Overhead cables
- Cables
- Motors
- Transformers
- Generators

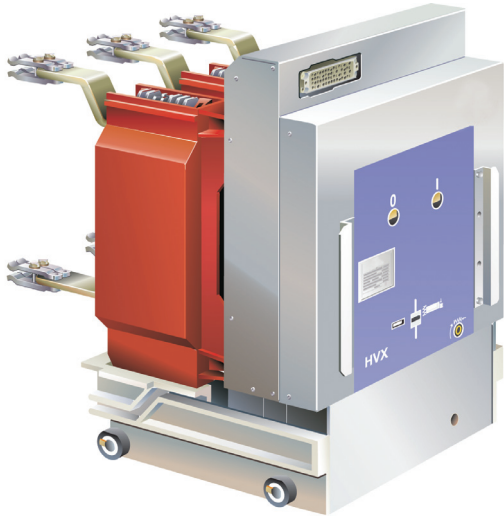
### Performance characteristics

Rated voltage	Rated lightning impulse withstand voltage	Rated short-time power frequency withstand voltage	Rated short-circuit making current	Rated short-circuit breaking current	Rated current
kV	kV	kV	kA	kA <sup>1)</sup>	A
12	75	28	40	16	630 - 1250
			63	25	630 - 2500
			80	31.5	630 - 2500
			100	40	800 - 2500
17.5	95	38	125	50	800 - 3150
			40	16	630 - 1250
			63	25	630 - 2500
			80	31.5	630 - 2500
24	125	50	100	40	800 - 2500
			40	16	630 - 2500
			63	25	630 - 2500
			80	31.5	630 - 2500

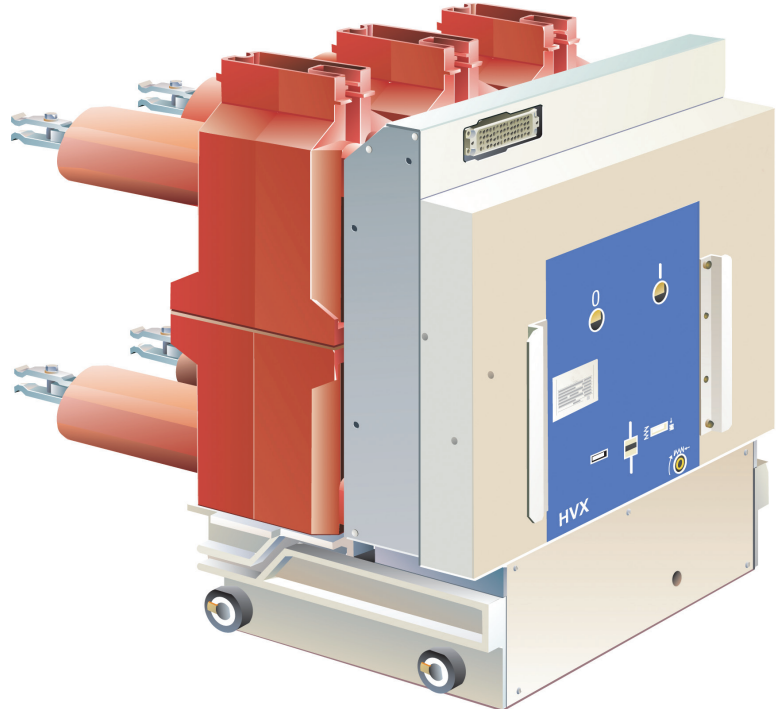
<sup>1)</sup>Also corresponds to a rated short-time current of 3 seconds.

## Design

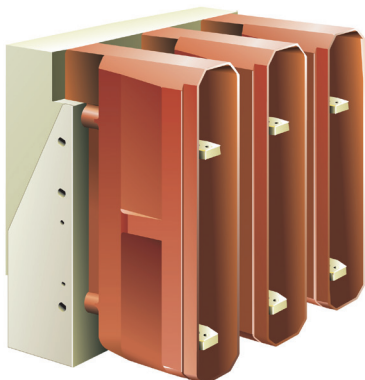
The HVX vacuum circuit-breaker was designed on the basis of the proven post insulator switch principle, i.e. the pole section is secured to the drive casing in two places. In addition to providing insulation between the poles and to the ground, the multifunction pole section performs all supporting and protection functions.



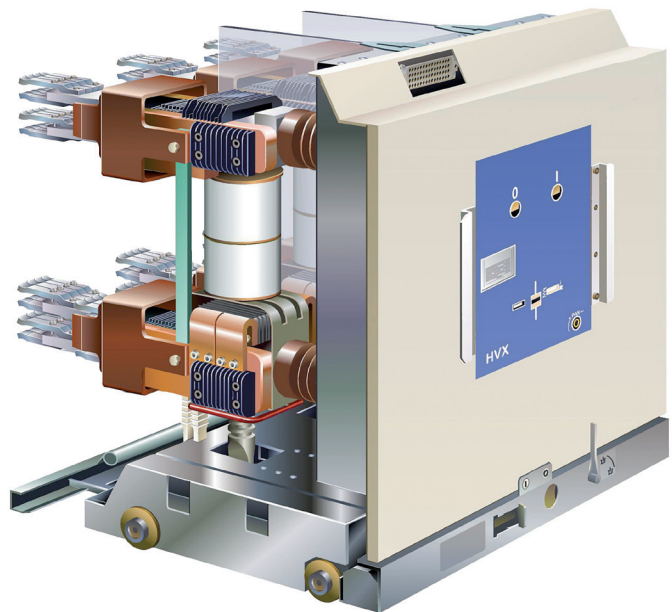
Drawing unit with vacuum circuit-breaker HVX-E  $\leq$  1250 A with 64-pole connector attachment



Drawing unit with vacuum circuit-breaker HVX-E  $\leq$  2500 A with 64-pole connector attachment



HVX 36 kV fixed-type model



Drawing unit with vacuum circuit-breaker HVX-E  $>$  2500 A, 50 kA with 64-pole connector attachment

## Module

### Drive unit

#### Essential features

- Single-shaft system with a single spiral spring for ON and OFF
- Optimum adaptation to the small contact travel of the vacuum interrupter chamber
- Minimum energy requirement

#### Description

Thanks to the use of modern vacuum interrupter chambers, vacuum circuit-breakers make for an optimization of the entire drive kinematics.

Method of operation:

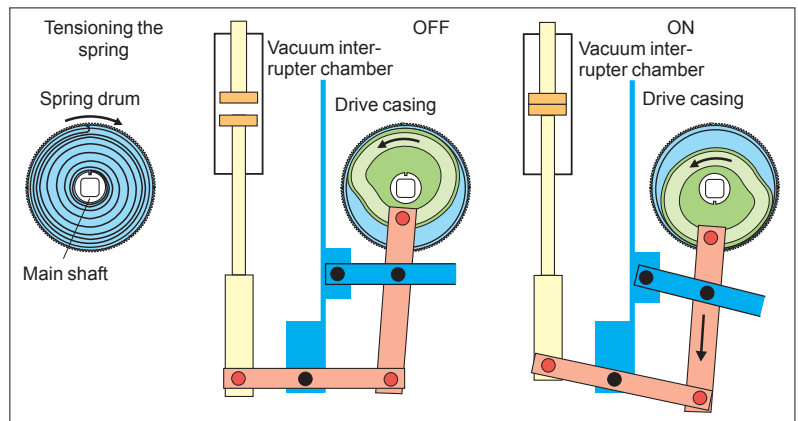
The energy for a complete switching cycle can be stored in the spiral spring. The ON and OFF movement of the vacuum interrupter chamber is controlled via the cam discs. Once closing (ON) has been effected, the spring can be tensioned further, storing the energy for a complete automatic reclosing cycle.

The drive mechanism is available in two basic models, i.e. as manual spring mechanism FH 2-01 or the motorized spring mechanism FK 2-01. Appropriate interlocks rule out faulty switching operations.

In addition to the mechanical actuation of the manual ON/OFF pushbuttons, the drives can be remote-controlled electrically or actuated via primary relays.

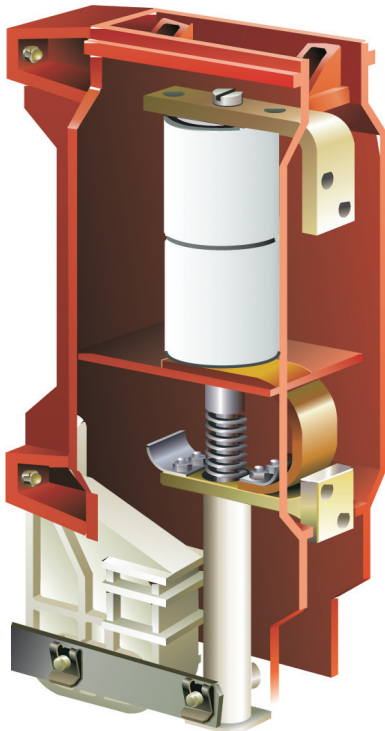
#### Spring-charging mechanism of the drive using a crank

Approx. 15 turns per C-O operating cycle are required.



#### Basic equipment

Type	FH 2-01 (Manual drive)	FK 2-01 (Motor-operated drive mechanism)
<b>Mechanical elements</b>		
OFF push-button	■	■
ON push-button	■	■
Switch position indicator	■	■
Mechanical operations counter	■	■
Switching spring position indicator	■	■
<b>Electrical equipment</b>		
Spring charging motor		■
Closing coil		■
Opening coil		■
8 auxiliary contacts	■	■



Pole section HVX ≤ 1250 A

**Pole section HVX ≤ 2500 A**

The supporting component of the entire pole section is the multifunctional pole shell. Its functions comprise those of a mechanical supporting device for the top and bottom terminal contacts between which the vacuum interrupter chamber is suspended free of mechanical constraints. In this case, there are no insulating bridges between the phases.

Integrating a wide variety of functions within the pole envelope helped minimize the number of individual parts significantly.

**Pole section > 2500 A**

The pole section is of extremely robust design. The solid support provides a constraint-free suspension for the interrupter chamber. Due to this statically closed support system, the axial forces produced on closing and opening only act on the contact system, whereas the vacuum interrupter chamber remains free of constraints.

**Drawing unit**

The drawing unit is the supporting element for:

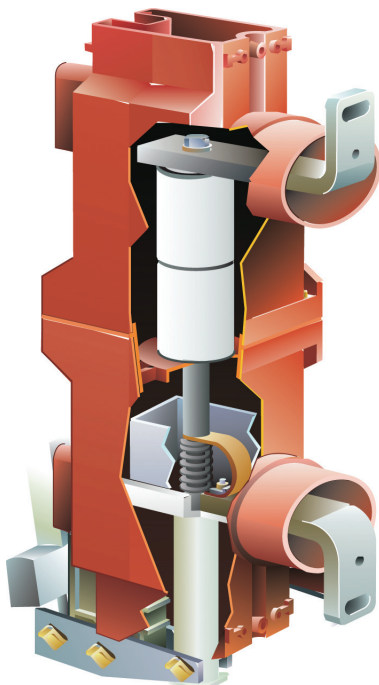
- the drive unit to move the vacuum circuit-breaker HVX-E into its operating / isolating position
- secondary terminals (64/36-pole)
- interface elements for
  - panel interlocks
  - drawing unit position indications
- drawing unit coding

**Drive design**

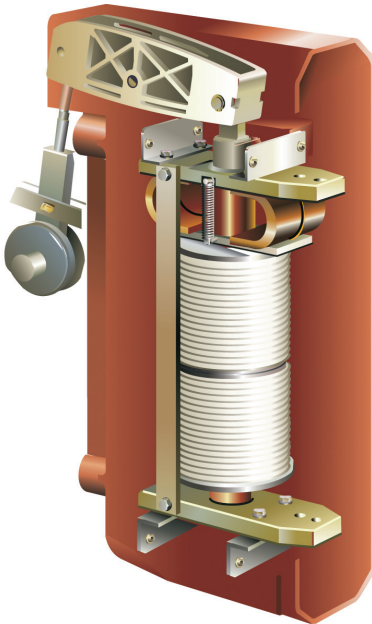
The basic design according to the Table on page 8 can be supplemented optionally by:

- 8 additional auxiliary contacts
- 2nd shunt tripping coil
- undervoltage release
- transformer-operated release
- OFF button\*
- ON button\*
- primary relay release
- primary relay pulse contact
- anti-pumping relay

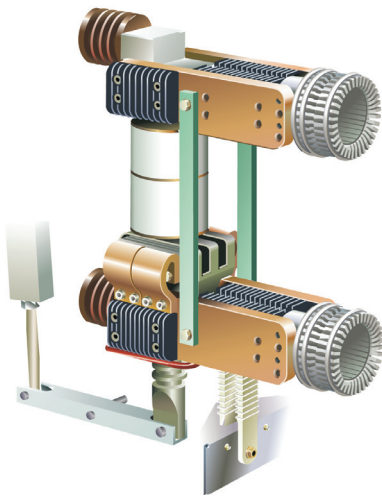
\* Breaker contact in passing contact circuit



Pole section HVX 12/24 kV > 1250 A



Pole section HVX 36 kV



Pole section HVX 12 kV &gt; 2500 A

## Secondary Equipment

### Releases

#### Auxiliary release (Shunt releases)

The coil of the auxiliary release is supplied with exciter voltage from an auxiliary supply source via a release contact. Pulsing can be initiated by hand, via control switches, overcurrent releases or undervoltage releases. In case of AC voltage, the coil is supplied via a rectifier installed in the switch housing. As the coil is designed for short-term excitation only, the exciter circuit is routed via an auxiliary switch contact controlled by the circuit-breaker shaft, thus - once released - interrupting the current circuit.

#### Secondary release (Transformer-operated release)

Secondary releases are used for automatic release of switching devices in case of short-circuits and overcurrent. Once the protector reacts, the release is excited by the transformer current, thus causing the switch to be tripped. These releases are supplied for transformer secondary currents of 0.5 A, 1 A and 5 A.

#### Undervoltage release

Undervoltage releases are supplied by the auxiliary source permanently. Whenever the auxiliary current is interrupted or its voltage drops essentially, the switching device is tripped straight away.

### Auxiliary switches

#### Auxiliary switches

Auxiliary switches are always actuated directly by the switch shaft via an intermediate linkage, their position always corresponding to the position of the main contacts. The circuit-breakers are equipped on general with an auxiliary switch with 8 contact elements.

For further current circuits, 8 contact elements can be arranged additionally. Optionally, an electronic pulse stretcher can be supplied.

#### Electronic pulse stretcher

The electronic pulse stretcher, type C27 900, extends the momentary pulses to 50 ms, which offers the following advantages:

- suitable for short passing contact input signals > 1 ms
- independent of the input voltage, i.e. 24 V – 240 V AC/DC
- independent of climatic and environmental influences
- constantly reproduced momentary pulse
- potential-free momentary pulse
- straightforward retrofit; i.e. no intervention in the mechanical switching system

#### Push switches

The push switches are snap-action switches mounted to the drive mechanism. Unlike auxiliary switches, push switches are not necessarily dependent on the switching device's position, but are actuated e.g. via cams or via various elements installed on the switch.

The control switches are wired to the terminal strip; on request, a plug-and-socket connection (with connector and connector base) is also available.

### Relay

#### Anti-pumping relay

If both an ON and OFF command are permanently present on the circuit-breaker at the same time, the latter returns to its initial position after closing. It remains in this initial position until the ON command is issued again. This prevents continuous closing and opening (=“pumping”).

#### Operation counter

An operations counter has been integrated into the operator interface to furnish proof of the number of switching operations actually performed by the circuit-breaker. The number of switching cycles can be used to draw conclusions about the service life or the operating cycles.

### Power consumption and tripping ranges of the releases

Release	Designation	Rated supply voltage $U_a$ in [V]	Tripping voltage		Power consumption	
			Tripping voltage at AC	Tripping voltage at AC 50/60 Hz	at DC approx. [W]	at AC 50/60 Hz approx. [VA]
Closing coil	F2	24 48; 60 110; 120; 125 220; 230	16 V to 40 V 33 V to 66 V 60 V to 140 V 130 V to 260 V		250	250
Opening coil	F11 F12 F13	24 48;60 110; 120; 125 220; 230	16 V to 40 V 33 V to 66 V 60 V to 140 V 130 V to 260 V		≤ 250	250
Undervoltage release	F4	24 48 60	35 to 0 % $U_a$		12	12
Secondary release		110 125 230	70 to 35 % $U_a$		-	12

Release	Designation	Rated current $I_a$ in [A]	Tripping ranges	
				Tripping current at AC 50/60 Hz
Transformer-operated release	F3	0.5 1 5		90 at 100 % $I_a$

### Power consumption and voltage ranges of the motor-actuated drive mechanisms

Rated supply voltage $U_a$ in [V]	Voltage range		Power consumption		
	max.	min.	at DC approx. [W]	at AC 50/60 Hz approx. [VA]	Starting Current [A]
DC 24 48 60 110 220	85 at 110 % $U_a$		100 120 <sup>2)</sup>	-	1)
AC (110) 120 (220) 230	132 V 253 V	93 V 187 V	-	100 120 <sup>2)</sup>	1)

<sup>1)</sup> The inrush current in the drive motor is negligible due to the fact that it occurs for a very short time only, if protection is provided by miniature circuit-breakers with C characteristics.

<sup>2)</sup> Motor for drawing unit actuation

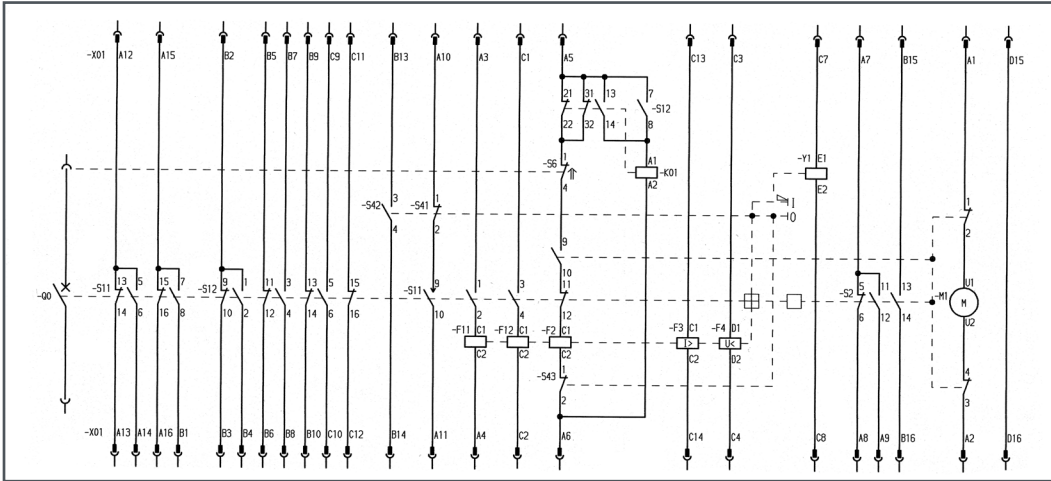
### Auxiliary switches and motor limit switches

Designation	Number of switching elements	Rated (normal) current	Breaking capacity
S11	8	15A	at 48V DC, L/R = 10ms 10 A at 125V DC, L/R = 10ms 3.8 A at 220V DC, L/R = 10ms 2 A
S12	8		at (110) 120/(220) 230 V AC 10 A

One NC contact and one NO contact of the auxiliary switch respectively are required for each closing or opening coil respectively.

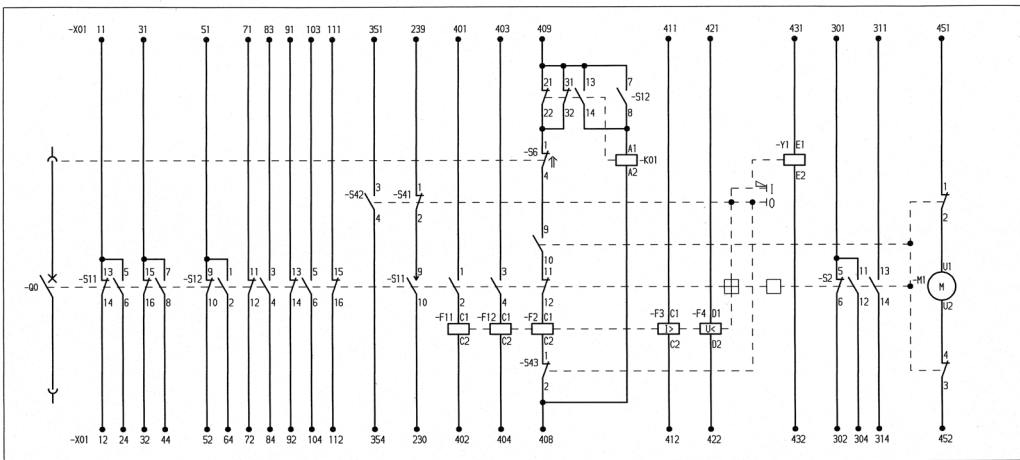
## Electric Circuit Diagram For HVX Circuit-Breaker

### 64-pole connector with anti-pumping relay



## Electric Circuit Diagram For HVX Circuit-Breaker

### Terminal strip with anti-pumping relay



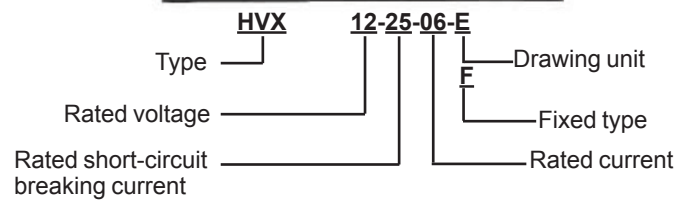
These circuit diagrams show the possible secondary equipment. Depending on the order volume, components shown may not be included.

Operating equipment which may be installed in the circuit-breaker -QO depending on the order specification

- F11, -F12 Shunt opening release (shunt release)
- F2 Shunt closing release (shunt release)
- F3 Secondary coil (transformer-operated release)
- F4 Undervoltage release
- K01 Anti-pumping relay
- M1 Motor to charge the energy storing device
- S11, S12 Auxiliary switchgear
- S2 Push switch actuated by energy-storing device
- S41, S42 Push switch actuated by ON/OFF pushbutton
- S43 Push switch actuated by OFF pushbutton
- S6 Push switch actuated by drawing unit
- X01 Terminal strip
- Y1 Blocking coil

## Type Designation

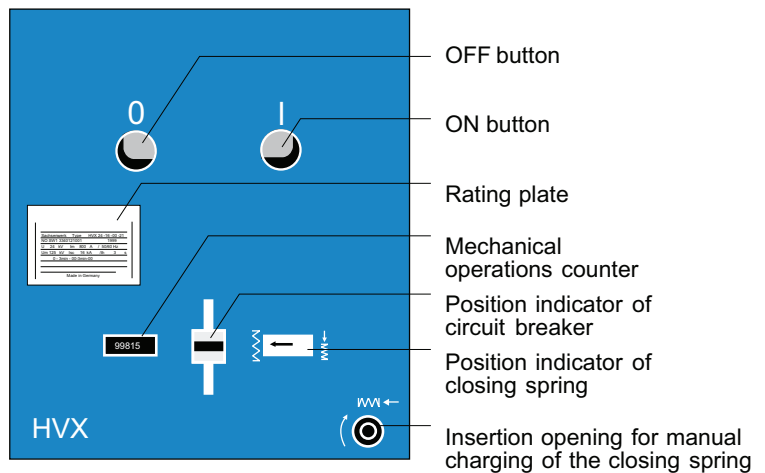
The type designation of the vacuum circuit breaker (refer to rating plate) specifies the essential technical data. The example shows the composition of the type designation.



**Example:**

**HVX 12-31-25-E**

Rated (normal) current	12 kV
Rated short-circuit breaking current	31.5 kV
Rated (normal) current on drawing unit	2500 A



# Switching tasks and applications

**All HVX vacuum circuit-breakers can be supplied with reclosing facility.**

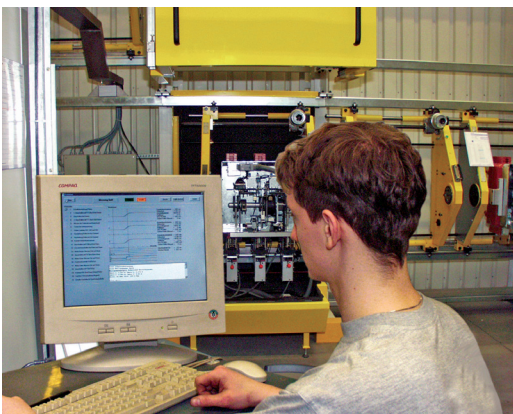
## Rated operating sequences

Rated operating sequence	Designation	Specifications	Remarks
0–3 min – CO – 3 min – CO	without reclosing facility	IEC 62271-100	see Selection Tables
0–0.3s – CO – 3 min – CO	with reclosing facility	IEC 62271-100	see Selection Tables
CO – 15s – CO	with reclosing facility	IEC 62271-100 ANSI C37	see Selection Tables column "with reclosing facility"
0–0.3s – CO – 15s – CO		ANSI C37	subject to order

C Switching ON by means of rated short-circuit making current  
 O Switching OFF by means of rated short-circuit breaking current

## Applications

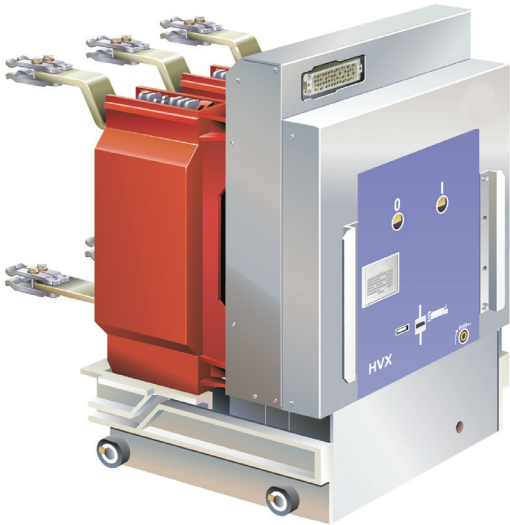
- Rated short-circuit breaking current and part-load currents
- Unsymmetrical breaking currents
- Auto-reclosing
- Switching of idle cables and overhead lines
- Switching under phase opposition conditions
- Switching of idle transformers
- Switching under phase earth phase fault conditions
- Switching OFF short-circuit currents with very high initial steepnesses of the transient recovery voltage
- Switching of motors and air gap inductions



„Test bench“ for vacuum circuit-breakers with testing and evaluation system for

- speed measurement
- tolerance of pole simultaneity and of
- make and break times

# Specifications and tests



Drawing unit with vacuum circuit-breaker

## Standards

The three-pole HVX vacuum circuit-breaker

- corresponds to the requirements for AC switchgear for voltages above 1 kV acc. to IEC 62271-100.
- complies, regarding its switching capacity and insulating level, with ANSI C37.04,06,09 1).
- corresponds, as drawer-type HVX-E, to IEC 62271-102

<sup>1)</sup> further standards available on request

## Environmental And Operating Conditions

HVX circuit-breakers may only be operated under normal operating conditions acc. to IEC 60694. Operation under conditions deviating from these is only admissible subject to consultation with and written approval from the manufacturer.

## Tests

Vacuum circuit-breakers have proved their suitability in type testing according to the applicable standards and during development in extensive test series. The tests were performed in neutral institutes, such as IPH and KEMA. Reliability, operator safety and the mechanical functions of the switching devices have been proved in endurance tests or under regular operating conditions.

### Ambient temperatures

Temperature class: "minus 5 indoors" <sup>1)</sup>	
Min./max. ambient temperature	-5 / 40 °C <sup>1)</sup>
Average value over 24 hours (max.)	35 °C <sup>1)</sup>
Maximum installation altitude above sea-level	1000 m <sup>1)</sup>

<sup>1)</sup> higher values on request

## Insulating Level (Tested According to IEC 60694 or EN 60694)

HVX vacuum circuit-breakers are suitable for installation at high altitudes. They can be used in buildings with low thermal insulation or low thermal capacity, heated or cooled, without temperature monitoring. The heating or cooling systems may fail to operate for a period lasting several days. The values specified for the insulating level are referred to sea-level.

In case of installation at altitudes above 1000 m, a reduction of the insulation level must be considered using an altitude correction factor (ka = correction factor).

Thus, the following applies to the selection of devices and switchgear:

$$\frac{\text{Rated withstand voltage to be selected}^{1)}}{ka} \geq \text{Required rated withstand voltage}^{1)}$$

# Specifications and tests (contd.)

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However, if the actual insulating level at the site of installation - the withstand voltage – is to be determined, the reduction of the insulating level starting at 0 m (sea-level) must be taken into consideration as follows:

Withstand voltage <sup>2)</sup> =  $k_a \cdot$  Rated withstand voltage <sup>1)</sup> of the selected device.

The following is defined:

Rated withstand ....voltage <sup>1)</sup> = Rated value according to IEC, EN etc. referred to sea-level.

Withstand....voltage 2) = actual value at the altitude concerned.

Altitude correction factor  $k_a$  acc. to IEC 60694 or EN 60694.

<sup>1)</sup> Rated lightning impulse withstand voltage Rated power frequency withstand voltage

<sup>2)</sup> Lightning impulse withstand voltage

Power frequency withstand voltage

## Environmental Conditions

Vacuum circuit-breakers HVX comply with the environmental conditions defined in IEC 60 721-3-3, 1990.

## Disposal Concept

A disposal manual is available on request.

## HVX Vacuum Circuit-Breaker 12 KV with Drawing Unit for Schneider Electric Switchgear Panels

Type	Pole center spacing mm	Rated voltage kV	Rated insulation level		Rated frequency Hz	Rated (normal) current A	Rated peak withstand current kA	Rated short-time current 3 s kA	Rated short-circuit breaking current		Cable breaking current A	Breaking current under out-of-phase conditions Ak
			Rated power frequency withstand voltage kV	Rated lightning impulse withstand voltage kV					Rated short-circuit current kA	Percentage value of the DC component %		
HVX 12-16-06-E	185/210					630						
HVX 12-16-08-E	185/210	12	28	75	50/60	800	40	16	16	33	25	4
HVX 12-16-12-E	185/210					1250						
HVX 12-20-06-E	185/210					630						
HVX 12-20-08-E	185/210	12	28	75	50/60	800	50	20	20	33	25	5
HVX 12-20-12-E	185/210					1250						
HVX 12-25-06-E	185/210					630						
HVX 12-25-08-E	185/210					800						
HVX 12-25-12-E	185/210					1250						
HVX 12-25-16-E	210	12	28	75	50/60	1600	63	25	25	33	25	6.3
HVX 12-25-20-E	210					2000						
HVX 12-25-25-E	210					2500 <sup>2)</sup>						
HVX 12-25-25-E	254					2500						
HVX 12-31-08-E	185/210					800						
HVX 12-31-12-E	185/210					1250						
HVX 12-31-16-E	210					1600						
HVX 12-31-20-E	210	12	28	75	50/60	2000	80	31.5	31.5	33	25	8
HVX 12-31-25-E	210					2500 <sup>2)</sup>						
HVX 12-31-25-E	254					2500						
HVX 12-31-31-E	254					3150						
HVX 12-40-12-E	185/210					1250						
HVX 12-40-12-E	254					1250						
HVX 12-40-16-E	210	12	28	75	50/60	1600	100	40	40	33	25	10
HVX 12-40-20-E	210					2000						
HVX 12-40-25-E	210/254					2500 <sup>2)</sup>						
HVX 12-40-31-E	254					3150						
HVX 12-50-12-E	210					1250						
HVX 12-50-25-E	210	12	28	75 (95)	50/60	2500 <sup>2)</sup>	125	50	50	33	25	12.5
HVX 12-50-31-E	254					3150	(130)					

<sup>1)</sup> adm. tolerance range, no manufacturing tolerance, current value of one specimen, see routine test report

<sup>2)</sup> in case of PMA 210 mm panel with motor-driven fan

Rated operating sequence				Number of operating cycles without overhaul				Breaker operating times			Arc duration	Minimum command time for release coils	Charging time for motor drive mechanism	Weight
O-3 min-CO	O-0.3 s-CO	CO-15 s	CO-15 s-CO	mechanical	electrical	100% Un	100% Un	100% Un						
				Drive mechanism	Interrupter chamber	Rated (normal) current	With rated short-circuit current	Opening time <sup>1)</sup>	Closing time <sup>1)</sup>	Break time				
								ms	ms	ms	ms	ms	ms	kg
■	■	■	■	10000	30000	10000	100	35-53	45-63	55-62	2-12	20	4-12	135
														135
														135
■	■	■	■	10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
														135
														135
■	■	■	■	10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
														160
														160
														160
■	■	■	■	10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
														160
														160
														230
■	■	■	■	10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
														135
														135
														160
														160
■	■	■	■	10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	230
														230
														230

**HVX Vacuum Circuit-Breaker 17.5 KV with Drawing Unit for Schneider Electric Switchgear Panels**

Type	Pole center spacing mm	Rated voltage kV	Rated insulation level		Rated frequency Hz	Rated (normal) current A	Rated peak withstand current kA	Rated short-time current 3 s kA	Rated short-circuit breaking current		Cable breaking current A	Breaking current under out-of-phase conditions kA	Rated operating sequence			
			Rated power frequency withstand voltage kV	Rated lightning impulse withstand voltage kV					Rated short-circuit current kA	Percentage value of the DC component %			O-3 min-CO-3 min-CO	O-0.3 s-CO-3 min-CO	CO-15 s-CO	O-0.3 s-CO-15 s-CO
HVX 17-25-06-E	210	17.5	38	95	50/60	630	63	25	25	33	31.5	6.3	■	■	■	■
HVX 17-25-08-E	210					800										
HVX 17-25-12-E	210					1250										
HVX 17-25-20-E	210					2000										
HVX 17-25-25-E	210					2500 <sup>2)</sup>										
HVX 17-25-25-E	254					2500										
HVX 17-31-08-E	210	17.5	38	95	50/60	800	80	31.5	31.5	33	31.5	8	■	■	■	■
HVX 17-31-12-E	210					1250										
HVX 17-31-20-E	210					2000										
HVX 17-31-25-E	210					2500 <sup>2)</sup>										
HVX 17-31-25-E	254					2500										
HVX 17-31-31-E	254					3150										
HVX 17-40-12-E	210	17.5	38	95	50/60	1250	100	40	40	33	31.5	10	■	■	■	■
HVX 17-40-20-E	210					2000										
HVX 17-40-25-E	210					2500 <sup>2)</sup>										
HVX 17-40-25-E	254					2500										
HVX 17-40-31-E	254					3150										

<sup>1)</sup> adm. tolerance range, no manufacturing tolerance, current value of one specimen, see routine test report

<sup>2)</sup> in case of PMA 210 mm panel with motor-driven fan

Number of operating cycles without overhaul				Breaker operating times			Arc duration	Minimum command time for release coils	Charging time for motor drive mechanism	Weight
mechanical		electrical		100% Un	100% Un	100% Un				
Drive mechanism	Interrupter chamber	Rated (normal) current	Rated short-circuit current	Opening time <sup>1)</sup>	Closing time <sup>1)</sup>	Break time	ms	ms	ms	kg
				ms	ms	ms				
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
										160
										160
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										160
										160
										230
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										160
										160
										160
										230

**HVX Vacuum Circuit-Breaker 24 KV with Drawing Unit for Schneider Electric Switchgear panels**

Type	Pole center spacing mm	Rated voltage kV	Rated insulation level		Rated frequency Hz	Rated (normal) current A	Rated peak withstand current kA	Rated short-time current 3 s kA	Rated short-circuit breaking current		Cable breaking current A	Breaking current under out-of-phase conditions kA	Rated operating sequence			
			Rated power frequency withstand voltage kV	Rated lightning impulse withstand voltage kV					Rated short-circuit current kA	Percentage value of the DC component %			O-3 min-CO-3 min-CO	O-0.3 s-CO-3 min-CO	CO-15 s-CO	O-0.3 s-CO-15 s-CO
HVX 24-16-06-E	210	24	50	125	50/60	630	40	16	16	33	31.5	-	■	■	■	■
HVX 24-16-08-E	210					800										
HVX 24-16-12-E	210					1250										
HVX 24-25-06-E	210	24	50	125	50/60	630	63	25	25	33	31.5	-	■	■	■	■
HVX 24-25-08-E	210					800										
HVX 24-25-12-E	210					1250										
HVX 24-25-16-E	210					1600										
HVX 24-25-20-E	210					2000										
HVX 24-25-20-E	254					2000										
HVX 24-25-25-E	210/254					2500 <sup>2)</sup>										
HVX 24-31-08-E	210	24	50	125	50/60	800	80	31.5	31.5	33	31.5	-	■	■	■	■
HVX 24-31-12-E	210					1250										
HVX 24-31-16-E	210					1600										
HVX 24-31-20-E	210/254					2000										
HVX 24-31-25-E	210/254					2500 <sup>2)</sup>										

<sup>1)</sup> adm. tolerance range, no manufacturing tolerance, current value of one specimen, see routine test report

<sup>2)</sup> in case of PMA 210 mm panel with motor-driven fan

Number of operating cycles without overhaul				Breaker operating times			Arc duration	Minimum command time for release coils	Charging time for motor drive mechanism	Weight
mechanical	electrical	100% Un	100% Un	100% Un						
Drive mechanism	Interruption chamber	Rated (normal) current	Rated short-circuit current	Opening time <sup>1)</sup>	Closing time <sup>1)</sup>	Break time	ms	ms	ms	kg
				ms	ms	ms				
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										160
										160
										230
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
										160
										160

**Vacuum Circuit-Breaker HVX-E 36 KV with Drawing Unit for Schneider Electric Switchgear Panels and HVX-F 36 KV Fixed-Type Model**

Type	Pole center spacing mm	Rated voltage kV	Rated insulation level		Rated frequency Hz	Rated (normal) current A	Rated peak withstand current kA	Rated short-time current 3 s kA	Rated short-circuit breaking current		Cable breaking current A	Low ind. currents A	Breaking current under out-of-phase conditions kA	Rated operating sequence			
			Rated power frequency withstand voltage kV	Rated lightning impulse withstand voltage kV					Rated short-circuit current kA	Percentage value of the DC component %				O-3 min-CO-3 min-CO	O-0.3 s-CO-3 min-CO	CO-15 s-CO	O-0.3 s-CO-15 s-CO
HVX 36-25-12-E	300	36	70	170	50/60	1250	65	25	25	33	50	10	6.25	■	■	■	■
HVX 36-25-20-E	300	36	70	170	50/60	2000	65	25	25	33	50	10	6.25	■	■	■	■
HVX 36-25-25-E	300	36	70	170	50/60	2500	65	25	25	33	50	10	6.25	■	■	■	■
HVX 36-25-12-F	300	36	70	170	50/60	1250	65	25	25	33	50	10	6.25	■	■	■	■
HVX 36-25-20-F	300	36	70	170	50/60	2000	65	25	25	33	50	10	6.25	■	■	■	■
HVX 36-25-25-F	300	36	70	170	50/60	2500	65	25	25	33	50	10	6.25	■	■	■	■

<sup>1)</sup> adm. tolerance range, no manufacturing tolerance, current value of one specimen, see routine test report

Number of operating cycles without overhaul				Breaker operating times			Arc duration	Minimum command time for release coils	Charging time for motor drive mechanism	Weight
mechanical		electrical		100% Un	100% Un	100% Un				
Drive mechanism	Interrupter chamber	Rated (normal) current	Rated short-circuit current	Opening time <sup>1)</sup>	Closing time <sup>1)</sup>	Break time	ms	ms	ms	kg
				ms	ms	ms				
10000	30000	10000	100	40-53	45-63	47-65	7-12	20	4-9	155
10000	30000	10000	100	40-53	45-63	47-65	7-12	20	4-9	155
10000	30000	10000	100	40-53	45-63	47-65	7-12	20	4-9	155
10000	30000	10000	100	40-53	45-63	47-65	7-12	20	4-9	155
10000	30000	10000	100	40-53	45-63	47-65	7-12	20	4-9	155
10000	30000	10000	100	40-53	45-63	47-65	7-12	20	4-9	155

Vacuum Circuit-Breaker HVX-F 12 KV, Fixed-Type Model

Type	Pole center spacing mm	Rated voltage kV	Rated insulation level		Rated frequency Hz	Rated (normal) current A	Rated peak withstand current kA	Rated short-time current 3 s kA	Rated short-circuit breaking current		Cable breaking current A	Breaking current under out-of-phase condition kA	Rated operating sequence				
			Rated power frequency withstand voltage kV	Rated lightning impulse withstand voltage kV					Rated short-circuit current kA	Percentage value of the DC component %			O-3 min-CO-3 min-CO	O-0.3 s-CO-3 min-CO	CO-15 s-CO	O-0.3 s-CO-15 s-CO	
HVX 12-16-06-F	165					630											
HVX 12-16-08-F	165	12	28	75	50/60	800	40	16	16	33	25	4	■	■	■	■	
HVX 12-16-12-F	165					1250											
HVX 12-16-06-F	185/210					630											
HVX 12-16-08-F	185/210	12	28	75	50/60	800	40	16	16	33	25	4	■	■	■	■	
HVX 12-16-12-F	185/210					1250											
HVX 12-20-06-F	165/185/210					630											
HVX 12-20-08-F	165/185/210	12	28	75	50/60	800	50	20	20	33	25	5	■	■	■	■	
HVX 12-20-12-F	165/185/210					1250											
HVX 12-25-06-F	165					630											
HVX 12-25-08-F	165					800											
HVX 12-25-12-F	165					1250											
HVX 12-25-06-F	185/210					630											
HVX 12-25-08-F	185/210	12	28	75	50/60	800	63	25	25	33	25	6.3	■	■	■	■	
HVX 12-25-12-F	185/210					1250											
HVX 12-25-16-F	210					1600											
HVX 12-25-20-F	210					2000											
HVX 12-25-25-F	210					2500											

<sup>1)</sup> adm. tolerance range, no manufacturing tolerance, current value of one specimen, see routine test report

Number of operating cycles without overhaul				Breaker operating times			Arc duration	Minimum command time for release coils	Charging time for motor drive mechanism	Weight
Drive mechanism	mechanical	electrical		100% Un	100% Un	100% Un				
	Interrupter chamber	Rated (normal) current	with rated short-circuit current	Opening time <sup>1)</sup>	Closing time <sup>1)</sup>	Break time				
				ms	ms	ms	ms	ms	ms	kg
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
										135
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
										160
										160

Vacuum Circuit-Breaker HVX-F 12 KV, Fixed-Type Model

Type	Pole center spacing mm	Rated voltage kV	Rated insulation level		Rated frequency Hz	Rated (normal) current A	Rated peak withstand current kA	Rated short-time current 3 s kA	Rated short-circuit breaking current		Cable breaking current A	Breaking current under out-of-phase conditions kA	Rated operating sequence				
			Rated power frequency withstand voltage kV	Rated lightning impulse withstand voltage kV					Rated short-circuit current kA	Percentage value of the DC component %			O-3 min-CO-3 min-CO	O-0.3 s-CO-3 min-CO	CO-15 s-CO	O-0.3 s-CO-15 s-CO	
HVX 12-31-06-F	165					630											
HVX 12-31-08-F	165					800											
HVX 12-31-12-F	165					1250											
HVX 12-31-06-F	185/210					630											
HVX 12-31-08-F	185/210	12	28	75	50/60	800	80	31.5	31.5	33	25	8	■	■	■	■	
HVX 12-31-12-F	185/210					1250											
HVX 12-31-16-F	210					1600											
HVX 12-31-20-F	210					2000											
HVX 12-31-25-F	210					2500											
HVX 12-31-31-F	254	12	28	75	50/60	3150	80	31.5	31.5	33	25	8	■	■	■	■	
HVX 12-40-08-F	185/210					800											
HVX 12-40-12-F	185/210					1250											
HVX 12-40-16-F	210	12	28	75	50/60	1600	100	40	40	33	25	10	■	■	■	■	
HVX 12-40-20-F	210					2000											
HVX 12-40-25-F	210					2500											
HVX 12-40-31-F	254	12	28	75	50/60	3150	100	40	40	33	25	10	■	■	■	■	
HVX 12-50-31-F	254	12	28	75	50/60	3150	125	50	50	33	25	12.5	■	■	■	■	

<sup>1)</sup> adm. tolerance range, no manufacturing tolerance, current value of one specimen, see routine test report

Number of operating cycles without overhaul				Breaker operating times			Arc duration	Minimum command time for release coils	Charging time for motor drive mechanism	Weight
mechanical	electrical			100% Un	100% Un	100% Un				
Drive mechanism	Interruption chamber	Rated (normal) current	with rated short-circuit current	Opening time <sup>1)</sup>	Closing time <sup>1)</sup>	Break time	ms	ms	ms	kg
				ms	ms	ms				
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
										135
										135
										135
										160
										160
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	230
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
										160
										160
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	230
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	230

Vacuum Circuit-Breaker HVX-F 17.5 KV, Fixed-Type Model

Type	Pole center spacing mm	Rated voltage kV	Rated insulation level		Rated frequency Hz	Rated (normal) current A	Rated peak withstand current kA	Rated short-time current 3 s kA	Rated short-circuit breaking current		Cable breaking current A	Breaking current under out-of-phase conditions kA	Rated operating sequence								
			Rated power frequency withstand voltage kV	Rated lightning impulse withstand voltage kV					Rated short-circuit current kA	Percentage value of the DC component %			O-3 min-CO	O-0.3 s-CO-3 min-CO	CO-15 s-CO	O-0.3 s-CO-15 s-CO					
HVX 17-16-06-F	165/210	17.5	38	95	50/60	630	40	16	16	33	31.5	4	■	■	■	■					
HVX 17-16-08-F	165/210					800							16	16	33	31.5	4	■	■	■	■
HVX 17-16-12-F	165/210					1250							16	16	33	31.5	4	■	■	■	■
HVX 17-20-06-F	165/210	17.5	38	95	50/60	630	50	20	20	33	31.5	5	■	■	■	■					
HVX 17-20-08-F	165/210					800							20	20	33	31.5	5	■	■	■	■
HVX 17-20-12-F	165/210					1250							20	20	33	31.5	5	■	■	■	■
HVX 17-25-06-F	165/210	17.5	38	95	50/60	630	63	25	25	33	31.5	6.3	■	■	■	■					
HVX 17-25-08-F	165/210					800							25	25	33	31.5	6.3	■	■	■	■
HVX 17-25-12-F	165/210					1250							25	25	33	31.5	6.3	■	■	■	■
HVX 17-25-16-F	210					1600							25	25	33	31.5	6.3	■	■	■	■
HVX 17-25-20-F	210					2000							25	25	33	31.5	6.3	■	■	■	■
HVX 17-25-25-F	210					2500							25	25	33	31.5	6.3	■	■	■	■
HVX 17-31-06-F	165/210	17.5	38	95	50/60	630	80	31.5	31.5	33	31.5	8	■	■	■	■					
HVX 17-31-08-F	165/210					800							31.5	31.5	33	31.5	8	■	■	■	■
HVX 17-31-12-F	165/210					1250							31.5	31.5	33	31.5	8	■	■	■	■
HVX 17-31-16-F	210					1600							31.5	31.5	33	31.5	8	■	■	■	■
HVX 17-31-20-F	210					2000							31.5	31.5	33	31.5	8	■	■	■	■
HVX 17-31-25-F	210					2500							31.5	31.5	33	31.5	8	■	■	■	■
HVX 17-31-31-F	254	3150	31.5	31.5	33	31.5	8	■	■	■	■										
HVX 17-40-08-F	210/254	17.5	38	95	50/60	800	100	40	40	33	31.5	-	■	■	■	■					
HVX 17-40-12-F	210					1250							40	40	33	31.5	-	■	■	■	■
HVX 17-40-16-F	210					1600							40	40	33	31.5	-	■	■	■	■
HVX 17-40-20-F	210/254					2000							40	40	33	31.5	-	■	■	■	■
HVX 17-40-25-F	210					2500							40	40	33	31.5	-	■	■	■	■
HVX 17-40-31-F	254					3150							40	40	33	31.5	-	■	■	■	■

<sup>1)</sup> adm. tolerance range, no manufacturing tolerance, current value of one specimen, see routine test report

Number of operating cycles without overhaul				Breaker operating times			Arc duration	Minimum command time for release coils	Charging time for motor drive mechanism	Weight
mechanical	electrical	100% Un	100% Un	100% Un						
Drive mechanism	Interrupter chamber	Rated (normal) current	ith rated short-circuit current	Opening time <sup>1)</sup>	Closing time <sup>1)</sup>	Break time	ms	ms	ms	kg
				ms	ms	ms				
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										160
										160
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
										160
										160
										230
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
										160
										160
										230

Vacuum Circuit-Breaker HVX-F 24 KV, Fixed-Type Model

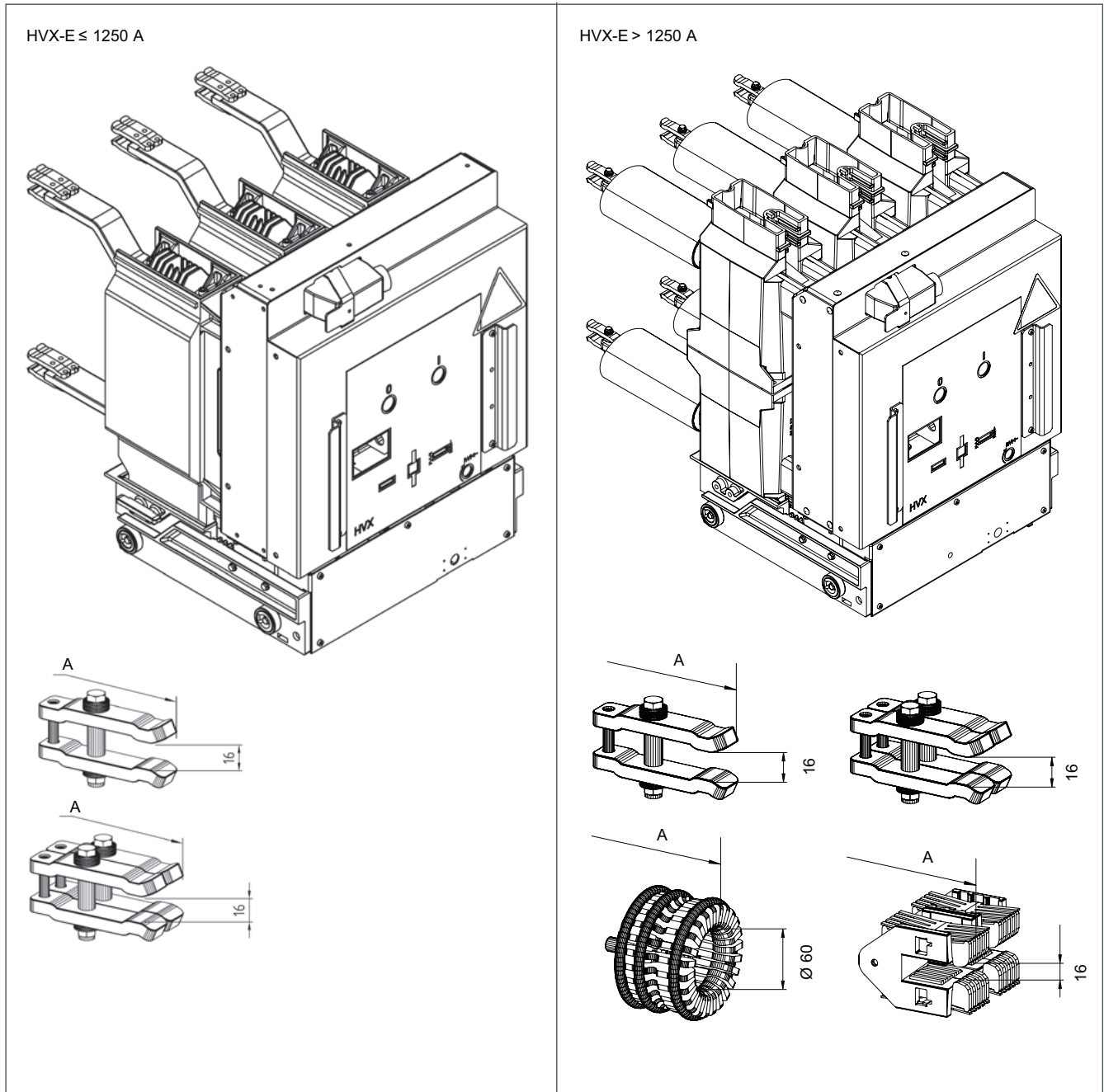
Type	Pole center spacing mm	Rated voltage kV	Rated insulation level		Rated frequency Hz	Rated (normal) current A	Rated peak withstand current kA	Rated short-time current 3 s kA	Rated short-circuit breaking current		Cable breaking current A	Breaking current under out-of-phase conditions kA	Rated operating sequence				
			Rated power frequency withstand voltage kV	Rated lightning impulse withstand voltage kV					Rated short-circuit current kA	Percentage value of the DC component %			O-3 min-CO-3 min-CO	O-0.3 s-CO-3 min-CO	CO-15 s-CO	O-0.3 s-CO-15 s-CO	
HVX 24-16-06-F	210/275					630											
HVX 24-16-08-F	210/275	24	50	125	50/60	800	40	16	16	33	31.5	-	■	■	■	■	
HVX 24-16-12-F	210/275					1250											
HVX 24-20-06-F	210/275					630											
HVX 24-20-08-F	210/275	24	50	125	50/60	800	50	20	20	33	31.5	-	■	■	■	■	
HVX 24-20-12-F	210/275					1250											
HVX 24-25-06-F	210/275					630											
HVX 24-25-08-F	210/275					800											
HVX 24-25-12-F	210/275	24	50	125	50/60	1250	63	25	25	33	31.5	-	■	■	■	■	
HVX 24-25-16-F	210/275					1600											
HVX 24-25-20-F	210/275					2000											
HVX 24-25-25-F	210/275					2500											
HVX 24-31-06-F	210/275					630											
HVX 24-31-08-F	210/275					800											
HVX 24-31-12-F	210/275	24	50	125	50/60	1250	80	31.5	31.5	33	31.5	-	■	■	■	■	
HVX 24-31-16-F	210/275					1600											
HVX 24-31-20-F	210/275					2000											
HVX 24-31-25-F	210/275					2500											

<sup>1)</sup> adm. tolerance range, no manufacturing tolerance, current value of one specimen, see routine test report

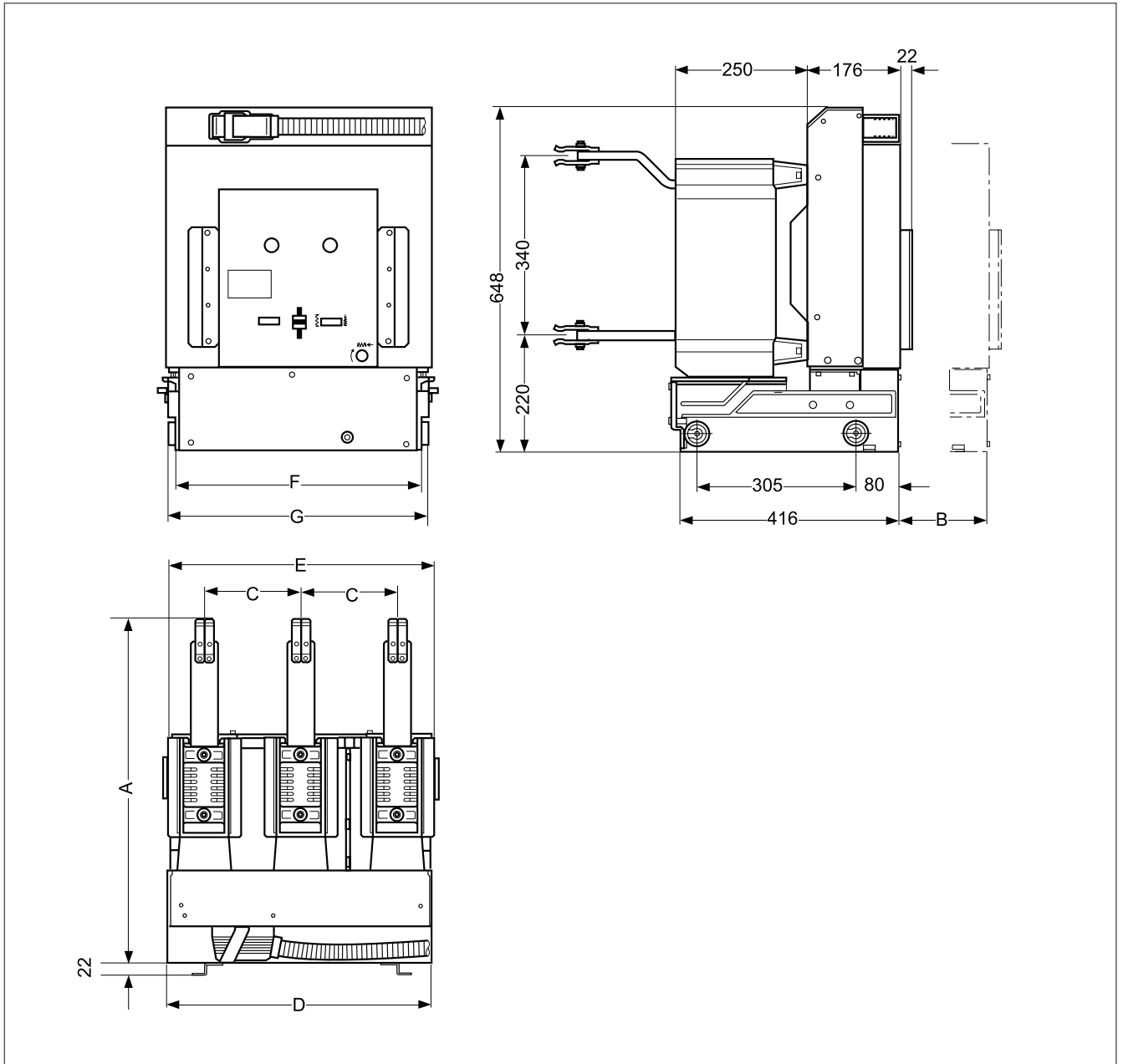
<sup>2)</sup> in case of PMA 210 mm panel with motor-driven fan

Number of operating cycles without overhaul				Breaker operating times			Arc duration	Minimum command time for release coils	Charging time for motor drive mechanism	Weight
mechanical	electrical	100% Un	100% Un	100% Un						
Drive mechanism	Interrupter chamber	Rated (normal) current	with rated short-circuit current	Opening time <sup>1)</sup>	Closing time <sup>1)</sup>	Break time	ms	ms	ms	kg
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135/260
										135/260
										135/260
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135/260
										135/260
										135/260
										160/260
										160/260
10000	30000	10000	100	35-53	45-63	55-62	2-15	20	4-12	135
										135
										135
										135
										160
										160

## Dimensions HVX-E / 25 kA 3s



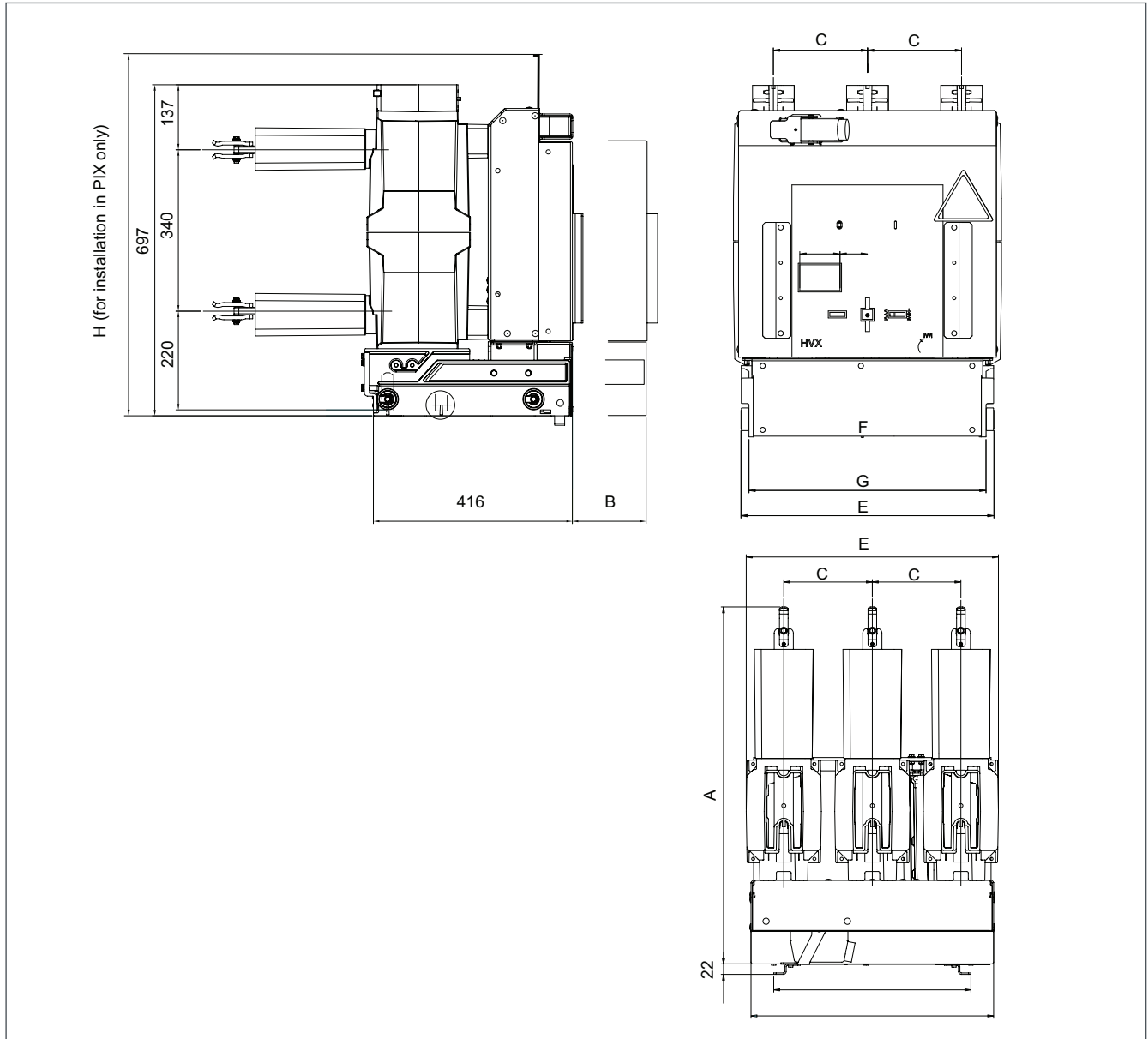
Dimensions HVX-E ≤ 1250 A / 25 kA 3s



U <sub>r</sub> [kV]	12 kV
I <sub>r</sub> [A]	≥1250
A	653
B	195/126
C	185
D	507
E	527
F	466
G	498

Dimensions in mm

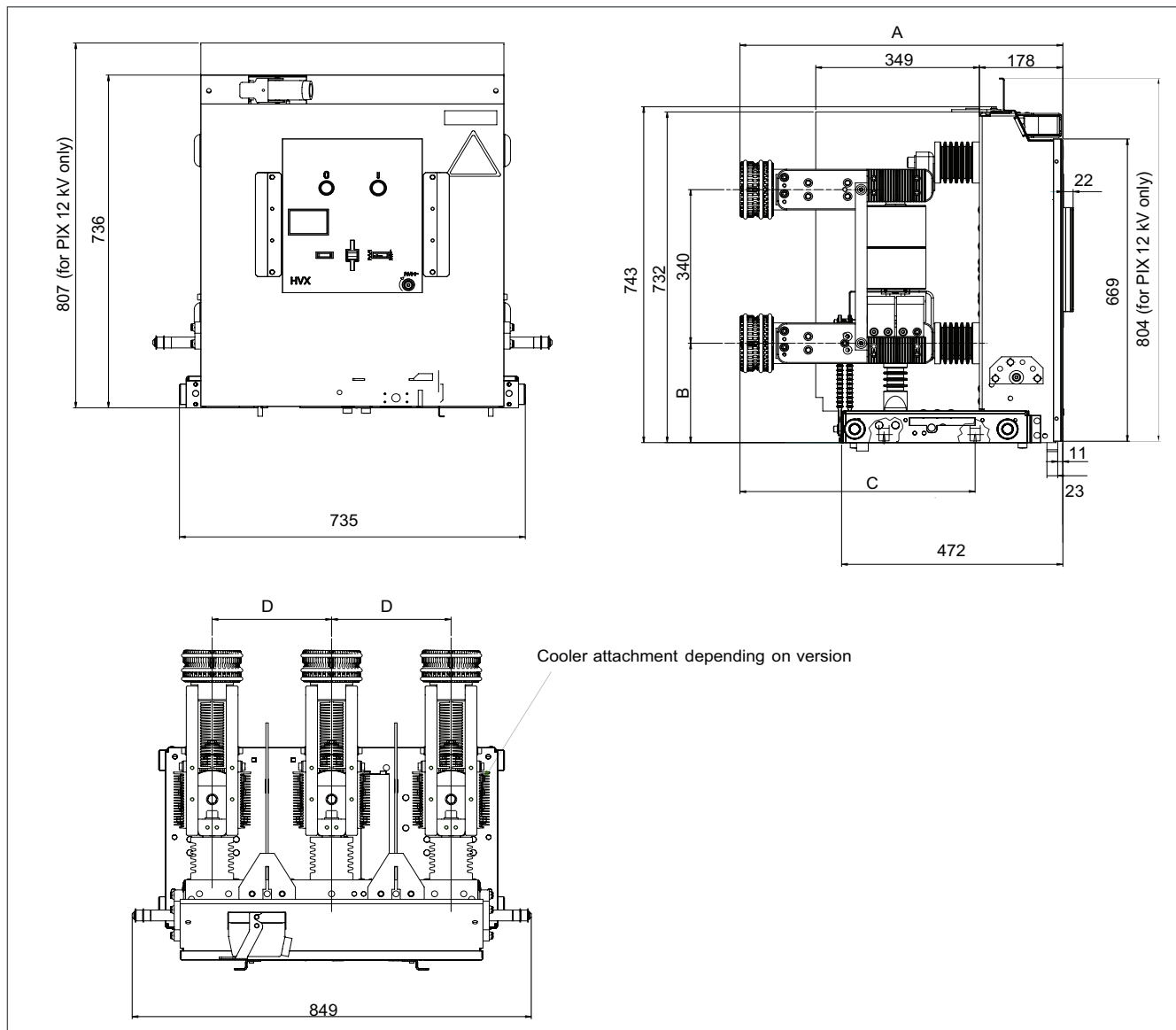
Dimensions HVX-E > 1250 A



Dimensions in mm

For panel	PN 104	PID 104	PI 104	PIX 12	PN 104/106	PIA106, PID106, PIN106	PID105, PID106	PI104	PI106	PIX 12	PIX 17	PIX 24	PIX-C	PIX-S	PIX 12	PIX 17	PIX 24			
A	563	653	569	653	563	653	753	569	569	653	753	763	653	763	653	653	763			
B	126	195	126	195	126	195	294	126	195	195	294	294	195	294	195	195	294			
H				805							805	735	805	735	735	805	735	805		
C	185									210									254	
D	507									570									658	
E	527									577									665	
F	466									516									604	
G	497.5									547.5									635.5	

Dimensions HVX-E 3150 A

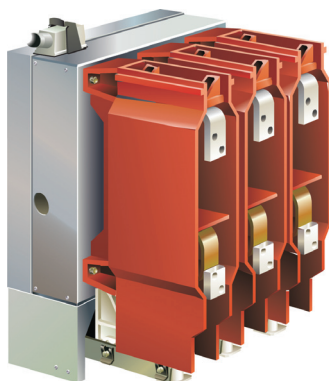
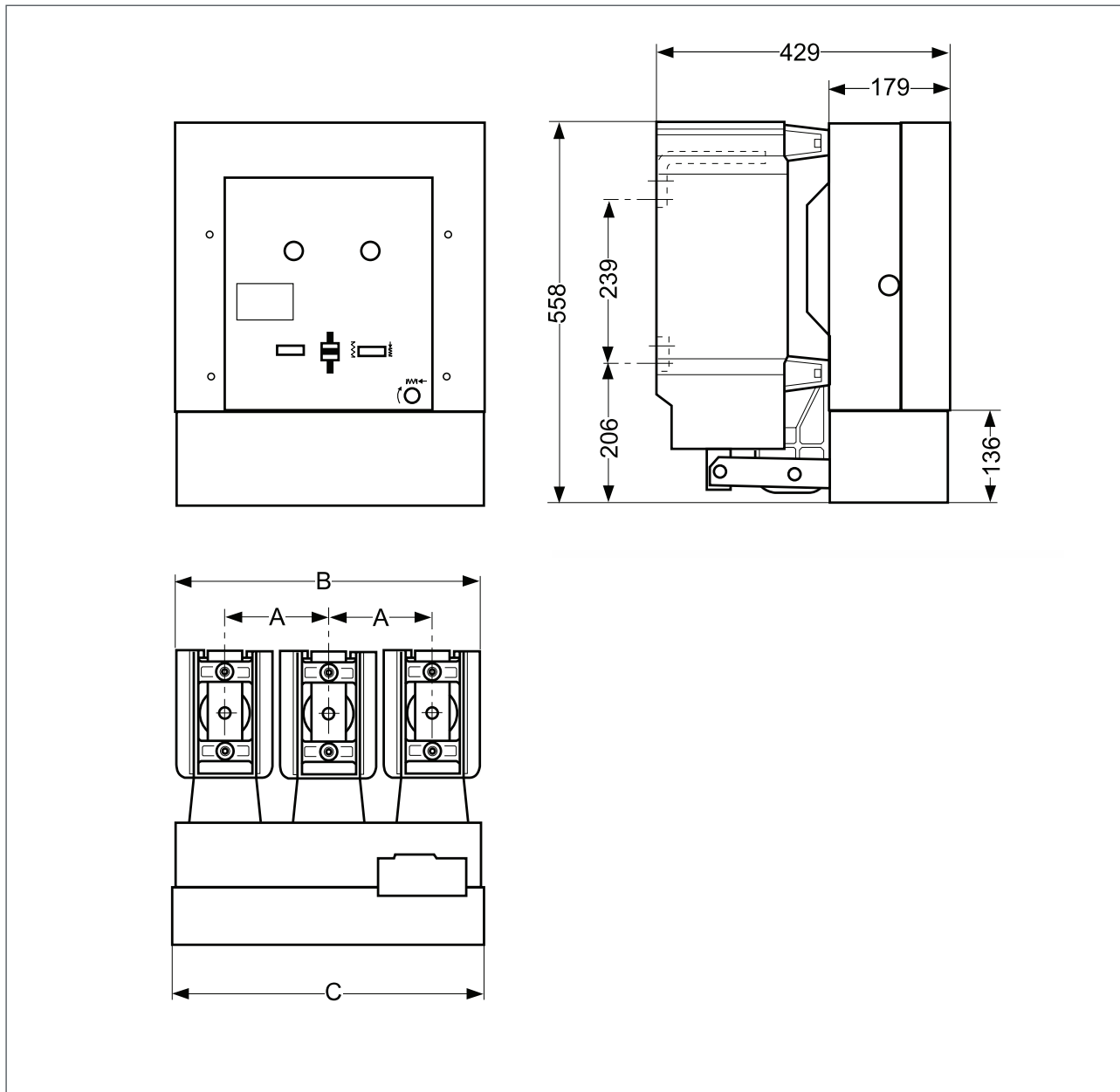


Additional dimension drawings available on request

kV	kV	I <sub>r</sub>	A	B	C	D
12	75	1250	688	220	502	254
12	75	2000	688	220	502	254
12	75	2500	688	220	502	254
12	75	3150	688	220	502	254
12	95	1250	723	239	537	254
12	95	2000	723	239	537	254
12	95	2500	723	239	537	254
12	95	3150	723	239	537	254
17.5	95	1250	723	239	537	254
17.5	95	2000	723	239	537	254
17.5	95	2500	723	239	537	254
17.5	95	3150	723	239	537	254

Dimensions in mm

Dimensions HVX-F  $\leq 1250$  A / 25 kA 3s



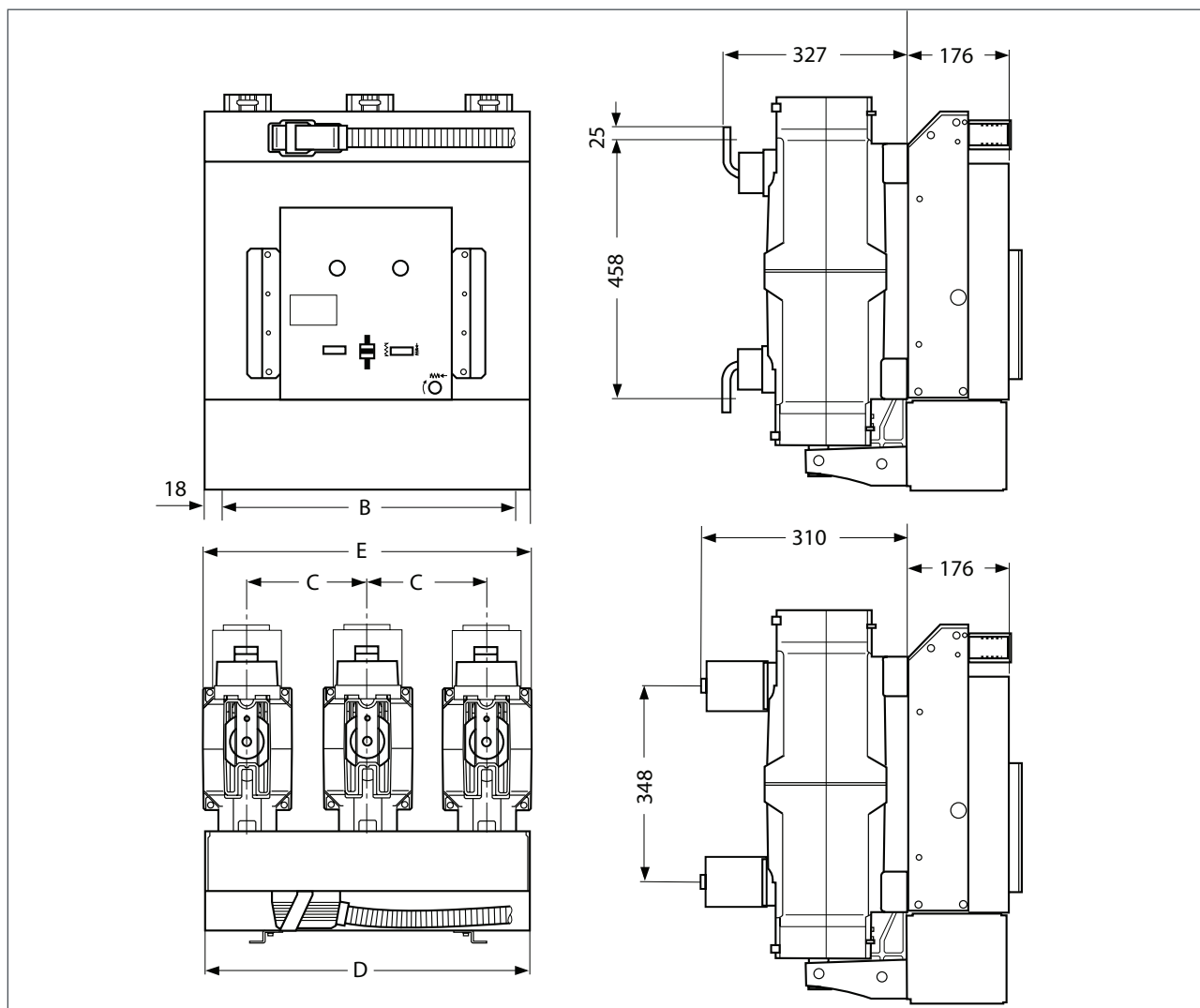
$\leq 1250$  A

Vacuum circuit-breaker HVX-F  $\leq 1250$  A

$U_r$ [kV]	12 kV
$I_r$ [A]	$\leq 1250$
A	150
B	440
C	450

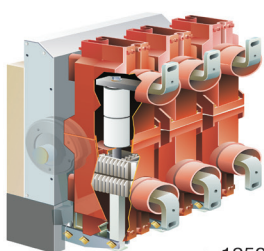
Dimensions in mm

Dimensions HVX-F > 1250 A

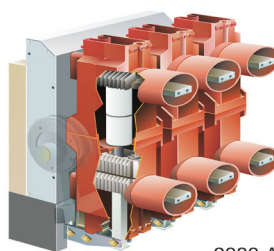


	$I_r \leq 1600 \text{ A}$				$I_r \geq 2000 \text{ A}$	
	$U_r = 12/17.5 \text{ kV}$	$U_r = 12 \text{ kV}$	$U_r = 12/17.5/24 \text{ kV}$	$U_r = 24 \text{ kV}$	$U_r = 12/17.5$	$U_r = 24 \text{ kV}$
C	165	185	210	275	210	275
D	507	507	570	700	570	700
E	487	527	577	707	577	707
B	471	471	534	664	534	664

Dimensions in mm



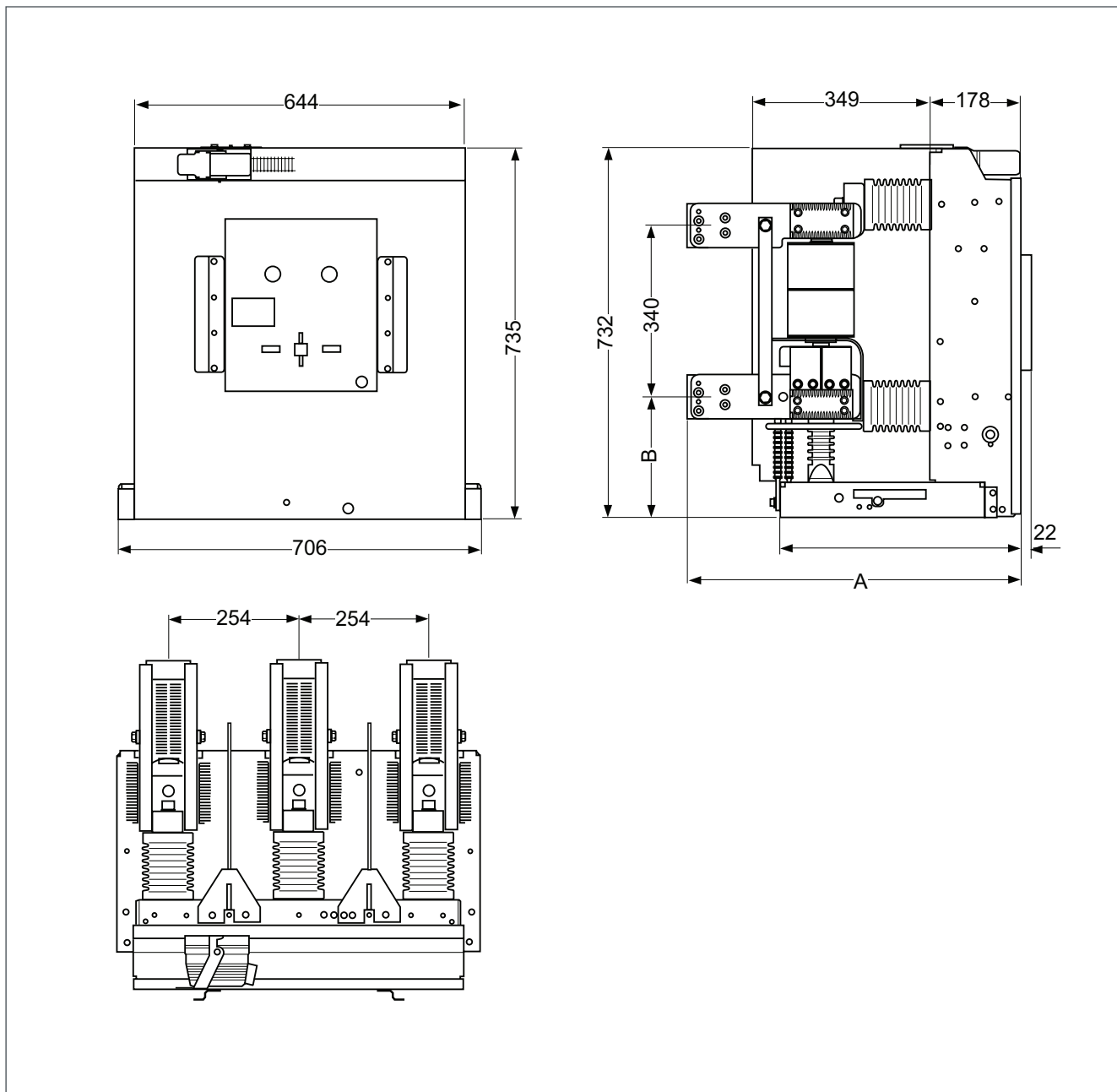
> 1250 A



2000 A

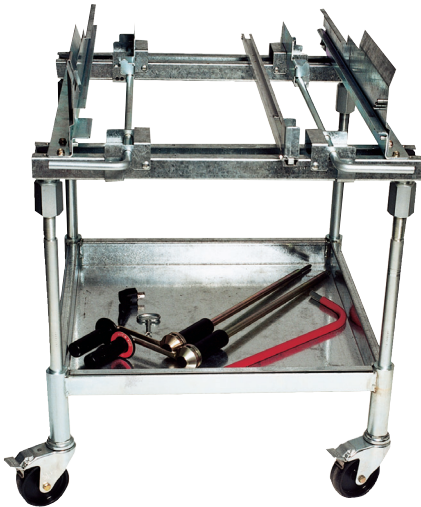
Vacuum circuit-breaker HVX-F

Dimensions HVX-F 3150 A



$U_r$ [kV]	$U_p$ [kV]	A	B
12	75	688	220
12	95	723	239
17.5	95	723	239

Dimensions in mm



Transport trolley (optional)

## Transport trolley

The vacuum circuit-breaker HVX-E can be transported by means of the transport trolley.



Moving crank handle (optional)

## Moving crank handle

The crank handle is used to move the switch with manual drawing module from its isolating into its racked-in position and back.



Emergency crank handle (optional)

## Emergency crank handle

The emergency crank handle can be used to move the HVX circuit-breaker with motor-driven drawing unit manually into its racked-in position and back.

## Spring charging crank

The spring charging crank is used to charge the circuit-breaker's energy-storing device.



Spring charging crank

## Chassis frame

A floor chassis frame can be used to transport the HVX.



Chassis frame (optional)

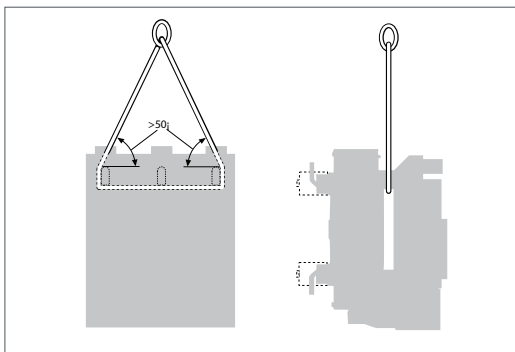
## Transport

The HVX vacuum circuit-breakers are shipped with packaging. The circuit-breaker's weight corresponds to the selection tables. On delivery, the circuit-breakers are fully assembled and adjusted.

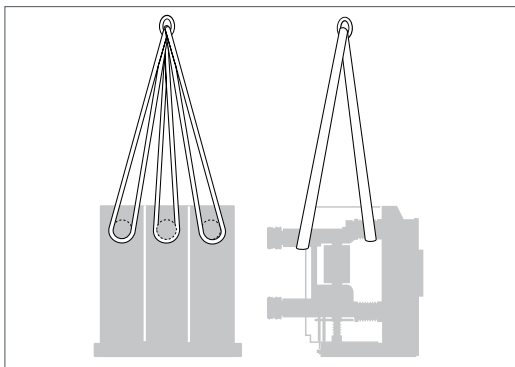
The HVX vacuum circuit-breaker must be lifted in accordance with the illustration. A rope with a diameter of 12 to 15 mm or a strap is required.



Shipping unit



Transport HVX ≤ 2500 A



Transport HVX > 2500 A







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HVX E

As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.



*This document has been printed  
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Publishing: Schneider Electric  
Design: Schneider Electric  
Printing: