

# FUSE SWITCH DISCONNECTOR



## Vertical Type Fuse Switch Disconnecter

FVS160



FVS250  
FVS400  
FVS630



FVS800  
FVS1000  
FVS1250



VERTICAL TYPE FUSE  
RAIL



FUSE SWITCH  
DISCONNECTOR  
(1 Pole)



FUSE SWITCH  
DISCONNECTOR  
(3 Pole)



IEC / EN 60269-2  
CE

**Mounting Position** : Vertical  
**Altitude** : 2000 m (max)  
**Relative Humidity** : 90% (55°C)  
**Ambient Temperature** : between -25°C and +60°C  
**Pollution Degree** : III  
**Protection Degree** : IP20 - IP30  
**Over Voltage Class** : IV (IEC 60664)

## FUSE SWITCH DISCONNECTORS (IEC / EN 60947-3)

Federal Electric vertical type switch fuses are manufactured in AC 22-B class in accordance with IEC 60947-3 standard according to CE. Federal FVS vertical type switch fuses are used in electricity distribution for protection against short circuit and overloads.

### Features:

- Each pole may open-close independently from other poles and all the poles can be opened-closed simultaneously with a single lever if required.
- It is designed to assemble in vertical position to horizontal busbars.
- Wear-out of contacts as a result of opening-closing under load is avoided thanks to use of arc separators.
- They have high short circuit breaking capacity.
- They are easy to assemble.
- They have high electrical and mechanical resistance.
- Modern technology and compact design.
- Low power loss.
- Melting of fuse wire can be seen with naked eye from outside.
- They are suitable for opening and closing load currents under normal circuit conditions and can be closed on short circuit.
- At open position, they fulfill the separation condition set out for the separators on both terminal sides of each pole.
- Insulating sections are insulated from voltage sections at rated insulation level.
- Fuse holders are made of an insulating material against extraordinary heat and flames and sections under voltage are insulated at rated insulation level.
- Fuse holders can be easily mounted to and demounted from the housing. No auxiliary apparatus is needed for these works.
- Fuse holders are located on the housing on the front of the device and bear NH buttons.
- A single person can mount it by using insulated equipments on the front of the panel under voltage.
- All the plastic parts used in manufacture of the load separators are self-extinguishing and halogen-free and do not contain heavy metals.
- The case is made of an insulating material resistant against extraordinary heat and flames and insulated from voltage sections at rated insulation level.
- Contacts are made of electrolytic copper and coated with silver.

### FVS160



Three phase  
can open  
together

Three phase  
can open  
individual.

Body

Case



Fuse holder



Terminal  
cover

### FVS250 / FVS400 / FVS630



Three phase  
can open  
together

Three phase  
can open  
individual.

Body

Case

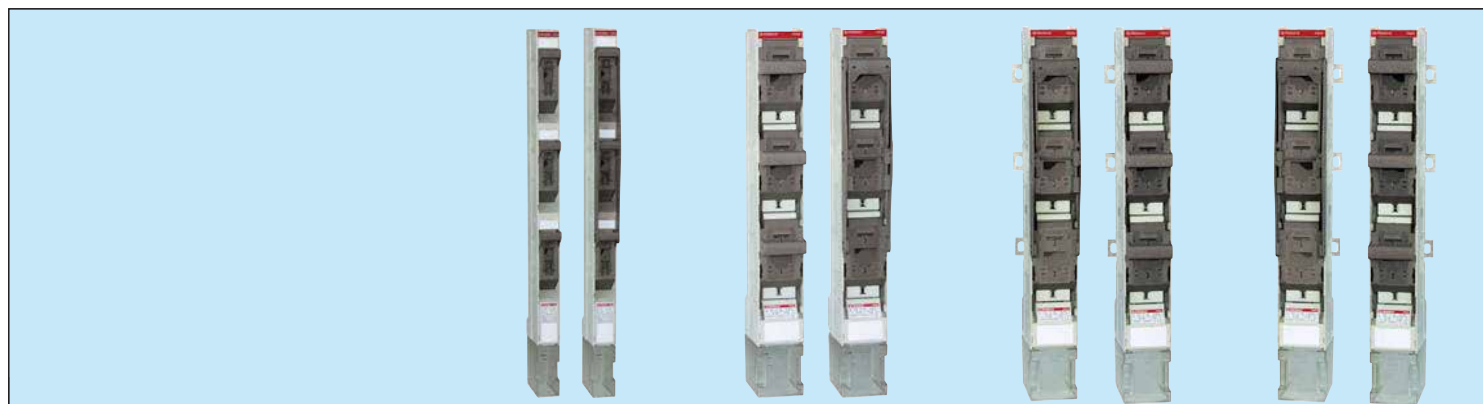


Fuse holder



Terminal  
cover

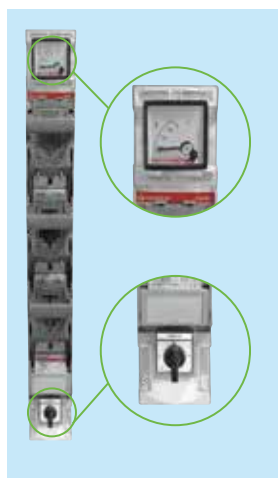
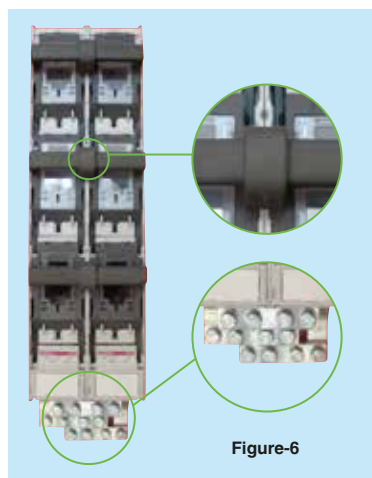
## FUSE SWITCH DISCONNECTORS (IEC / EN 60947-3)



TYPE		FVS160	FVS250	FVS400	FVS630	FVS800	FVS1000	FVS1250
Conventional Thermal Current ( $I_{th}$ ) 60°C	A	160	250	400	630	800	1000	1250
Number of Poles		3	3	3	3	3	3	3
Insulation Voltage ( $U_i$ )	V	1000	1000	1000	1000	1000	1000	1000
Impulse Withstand Voltage ( $U_{imp}$ )	kV	12	12	12	12	12	12	12
Operational Voltage ( $U_e$ ) (50-60Hz)	415V	AC23B	AC23B	AC23B	AC22B	AC22B	AC22B	AC22B
	500V	AC22B	AC22B	AC22B	AC22B	AC22B	AC22B	AC22B
	690V	AC21B	AC21B	AC21B	AC21B	AC21B	AC21B	AC21B
Utilization Category								
Operational Current ( $I_e$ )	A	160	250	400	630	800	1000	1250
Conditional Short-Circuit Current (with NH Fuse)	kA	85	85	85	70	85	70	70
Fuse Type (dispatched without fuse)	NH	000, 00	1,2	1,2	1,2,3	1,2	1,2,3	1,2,3
Mechanical Durability	operation	>30000	>20000	>20000	>20000	>20000	>20000	>20000
Electrical Durability	operation	>200	>200	>200	>200	>200	>200	>200
Connection Conductor Cross-Section	mm <sup>2</sup>	70	120	240	2x185	2x240	4x150	4x185
Power Loss per Pole	W	9	11	19	36	40	46	75
Min. - Max. Tightening Torques	Nm	7 ... 10	14 ... 20	17 ... 25	28 ... 40	17 ... 25	28 ... 40	28 ... 40
Hole Diameter	Ø	M8	M10	M10	M12	M10	M12	M12
Distance Between Main Busbar Terminals	mm	185	185 - 210	185 - 210	185 - 210	185 - 210	185 - 210	185 - 210
Weight	kg	2,4	5,6	5,6	6,9	12	15	15
Protection Degree		IP20	IP20	IP20	IP20	IP20	IP20	IP20

**FVS 800A - 1000A - 1250A :** Vertical Switch fuses are parallel connected. (Figure-6)

**FVS 160A - 250A - 400A** vertical type fuse switch disconnectors become measurable by placing current transformers (Figure-7) in each 3 phase separately. Current transformers are embedded in the fuse switch disconnectors and thus the volume of the disconnectors is maintained.

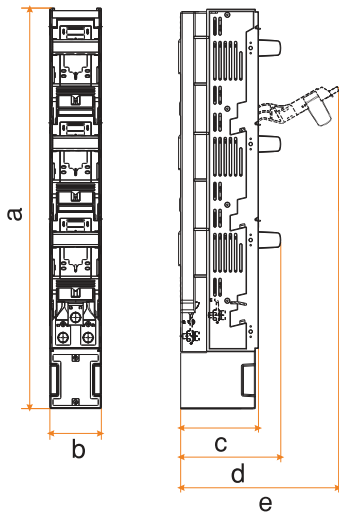


**FUSE RAIL (IEC / EN 60269-1) (IEC / EN 60269-2)**

Federal Electric vertical type fuse bases are designed to be installed vertically easily and quickly on horizontal bars with 185 mm spacing. Body material is made of fiberglass polyester resin (BMC) from thermoset material group and has very high electrical and mechanical properties. Resistant to flame and heat. The contacts used in the fuse bases are made of electrolyte copper and coated with silver. The covers located at the front and preventing contact with the contacts are made of external heat and fire resistant polyamide reinforced with fiberglass

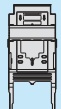
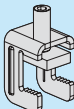





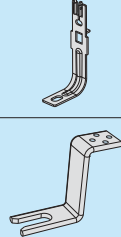


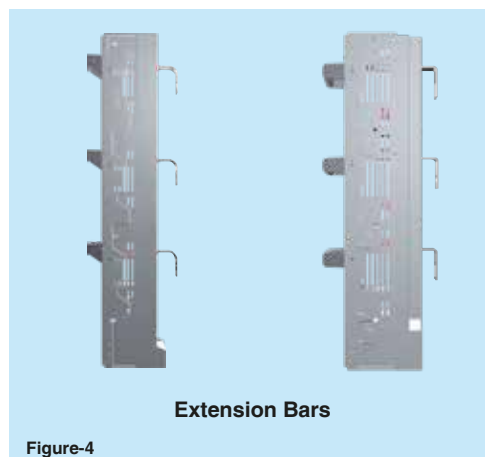
TYPE		FVSB250	FVSB400	FVSB630
Conventional Thermal Current ( $I_{th}$ ) 60°C	A	200 - 250	400	630
Number of Poles		3	3	3
Insulation Voltage ( $U_i$ )	V	1000	1000	1000
Impulse Withstand Voltage ( $U_{imp}$ )	kV	12	12	12
Operational Current ( $I_e$ )	50-60Hz 415V A	200 - 250	400	630
	50-60Hz 500V A	200 - 250	400	630
	50-60Hz 690V A	200 - 250	400	630
Conditional Short-Circuit Current (with NH Fuse)	kA	85	85	70
Fuse Type (dispatched without fuse)	NH	1,2,3	1,2,3	1,2,3
Connection Conductor Cross-Section	mm <sup>2</sup>	95 - 120	240	2x185
Power Loss per Pole	W	7 - 11	19	36
Min. - Max. Tightening Torques	Nm	14 ... 20	17 ... 25	28 ... 40
Hole Diameter	Ø	M10	M10	M12
Distance Between Main Busbar Terminals	mm	185 - 210	185 - 210	185 - 210
Weight	kg	3	3,2	4,3
Protection Degree		IP20	IP20	IP20


**FUSES SWITCH DISCONNECTOR / FUSE RAIL DIMENSIONS**

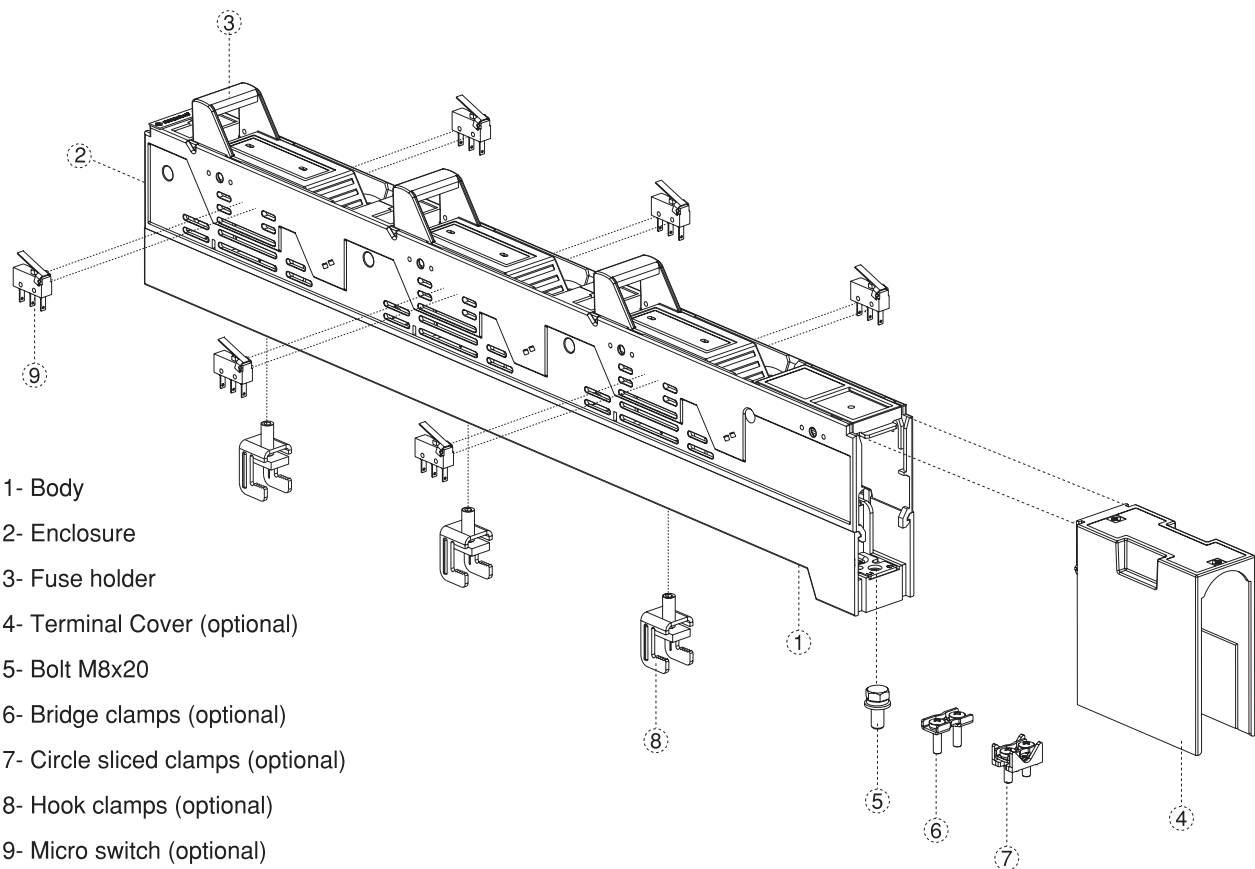
TYPE	Dimensions (mm)				
	a	b	c	d	e
FVS160 (With Three Seperate Handles)	765	49	126	137	205
FVS160 (With One Handle)	765	49	126	147	212
FVS250 / FVS400 / FVS630 (With Three Seperate Handles)	770	99	150	197	308
FVS250 / FVS400 / FVS630 (With One Handle)	770	99	150	204	457
FVSB200-250 / FVSB400 / FVSB630	668	99	150	-	-

## FUSE SWITCH DISCONNECTORS AND FUSE RAIL ACCESSORIES

	<b>Fuse Holder</b>	Insulates and cuts the contact with the base by inserting it inside the fuse.
	<b>Terminal Cover</b>	It is used to prevent touching to connection terminals
	<b>Hook Clamp</b>	Used to assemble the body directly to the bar.
	<b>Bridge Clamp</b>	Used to connect wires with cross section between 4 to 70 mm <sup>2</sup> by two M5 bolts.
	<b>Circle Sliced Clamp</b>	Used to fixed wire of sector shoped condutor with bore and cross-section 1,5 - 70 mm <sup>2</sup> by two M5 bolts.
	<b>V Clamp</b>	It is used to connect bare-ended wires in the cross section of 35 - 240 mm <sup>2</sup> with one M16 bolt, V-shaped body and cable tightener.
	<b>Micro Switch</b>	Used to assemble the body directly to the bar
	<b>Padlock</b>	Vertical type fuse-switch disconnectors can be locked in opened (Figure-1), closed (Figure-2) and parked (Figure-3) positions with padlock. This way prevents the product to be operated without discretion of qualified person.
	<b>Extension Bars</b>	The length of terminals can be arranged in different forms. This will help you to assemble all units by the same depth. (Figure-4)







1- Body

2- Enclosure

3- Fuse holder

4- Terminal Cover (optional)






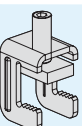

5- Bolt M8x20

6- Bridge clamps (optional)

7- Circle sliced clamps (optional)

8- Hook clamps (optional)

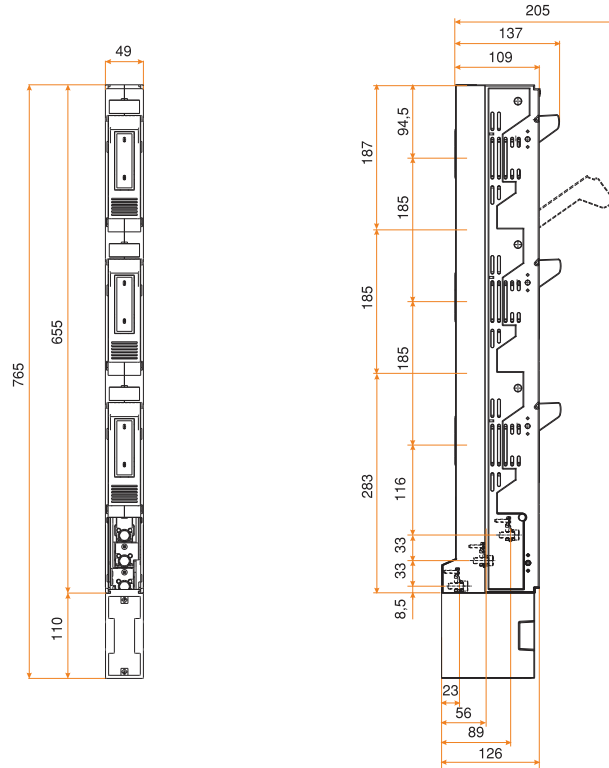
9- Micro switch (optional)

Accessories	Description	Type	Quantity (Pcs)	Order Code
Fuse holder		Insulates and cuts the contact with the base by inserting it inside the fuse.	FVS160 / 00 FVS250 / 1 FVS400 / 2 FVS630 / 3	1
				YP-069 (with three separate handle) YP-071 (with one handle)
				1
				YP-070 (separate opening) YP-073 (must open together)
Terminal cover		It is used to prevent touching through connection terminals.	FVS160 / 00 FVS250 / 1 FVS400 / 2 FVS630 / 3	1
				8BE-I0000-0000
				1
V clamps		It is used to connect bare-ended wires in the cross section of 35 - 240 mm² with one M16 bolt, V-shaped body and cable tightener.	FVS250 / 1 FVS400 / 2	1
				1
				YP-0096-Y
Bridge clamps		Used to connect wires with cross section between 4 to 70 mm² by two M5 bolts	FVS160 / 00	3
Circle sliced clamps		Used to fix wire of sector shaped conductor with bore and cross-section 1,5 - 70 mm² by two M5 bolts.	FVS160 / 00	3
Hook clamps		Used to assemble the body directly to the bar.	FVS160 / 00	3
Micro switch		Used to control open and close position of fuse holder.	FVS160 / 00 FVS250 / 1 FVS400 / 2 FVS630 / 3	3 and 6
				8BE-A0000-0003

### 160A Vertical Type Switch Fuses

Three phase can open individual.

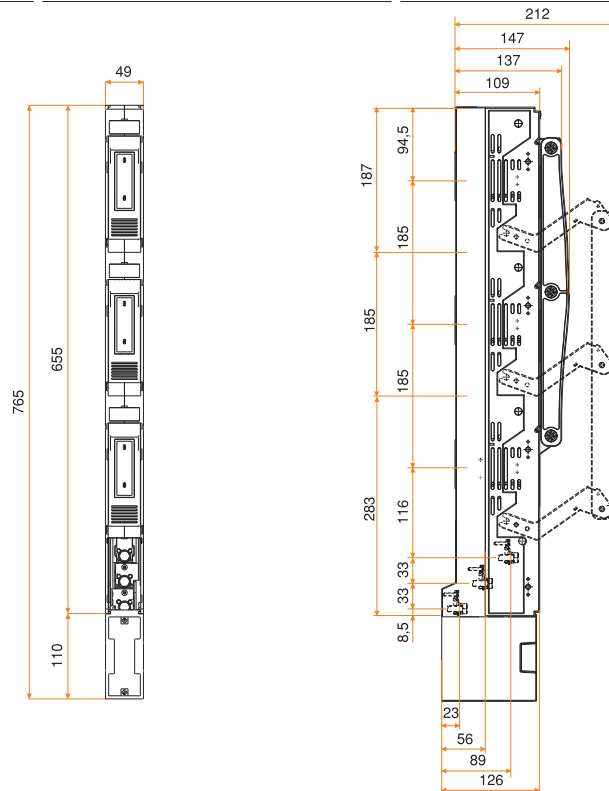
Type	Rated Current (A)	Product Structure	NH Fuse Type / Size	Order Code
FVS160	160A	Three phase can open individual.	NH00 / NH000	9BE-E1213-0160



### 160A Vertical Type Switch Fuses

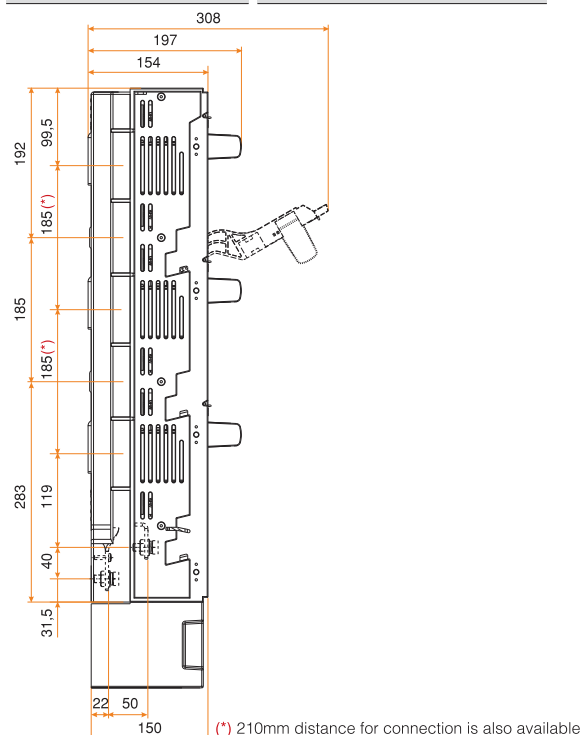
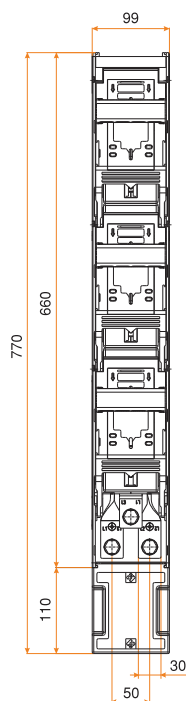
Three phase can open together

Type	Rated Current (A)	Product Structure	NH Fuse Type / Size	Order Code
FVS160	160A	Three phase can open together	NH00 / NH000	9BE-E1233-0160

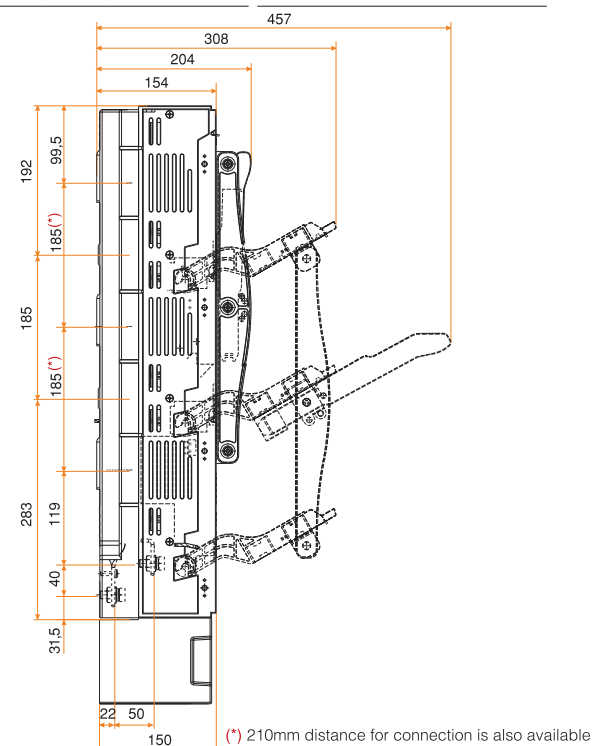
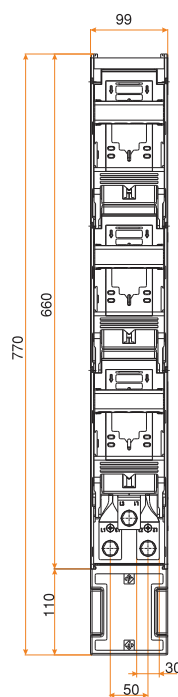


**250A - 400A - 630A Vertical Type Switch Fuses:** Three phase can open individual.

Type	Rated Current (A)	Product Structure	NH Fuse Type / Size	Order Code
FVS250	250	Three phase can open individual.	NH1 / NH2	9BE-E1213-0250
FVS400	400		NH1 / NH2 / NH3	9BE-E1213-0400
FVS630	630		NH1 / NH2 / NH3	9BE-E1213-0630
FVS800	800		NH1 / NH2 / NH3	9BE-E1213-0800
FVS1000	1000		NH1 / NH2 / NH3	9BE-E1213-1000
FVS1250	1250		NH1 / NH2 / NH3	9BE-E1213-1250


**250A - 400A - 630A Vertical Type Switch Fuses** Three phase can open together

Type	Rated Current (A)	Product Structure	NH Fuse Type / Size	Order Code
FVS250	250	Three phase can open together	NH1 / NH2	9BE-E1233-0250
FVS400	400		NH1 / NH2 / NH3	9BE-E1233-0400
FVS630	630		NH1 / NH2 / NH3	9BE-E1233-0630



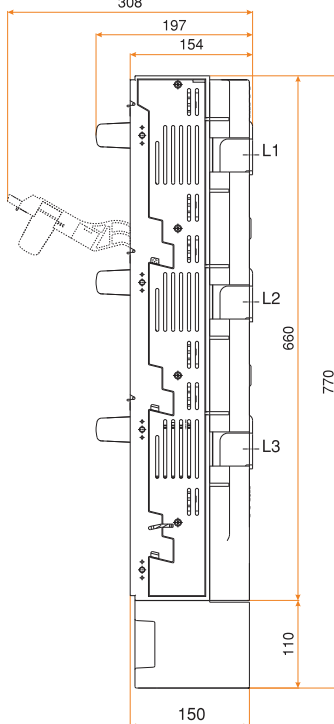
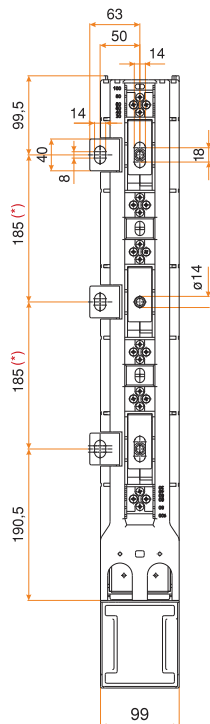




## 250A - 400A - 630A Vertical Type Switch Fuses

With right side output single phase can be opened separately

Type	Rated Current (A)	Product Structure	NH Fuse Type / Size	Order Code
FVS250-RS	250	With right side output single	NH1 / NH2	9BE-E3213-0250
FVS400-RS	400	phase can be opened	NH1 / NH2 / NH3	9BE-E3213-0400
FVS630-RS	630	separately	NH1 / NH2 / NH3	9BE-E3213-0630

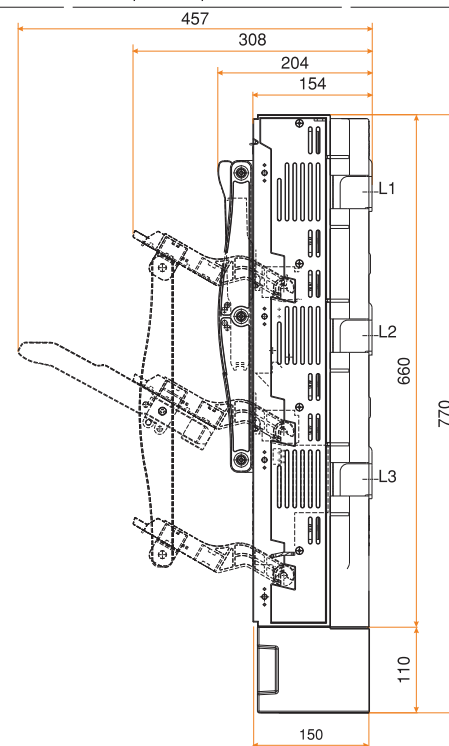
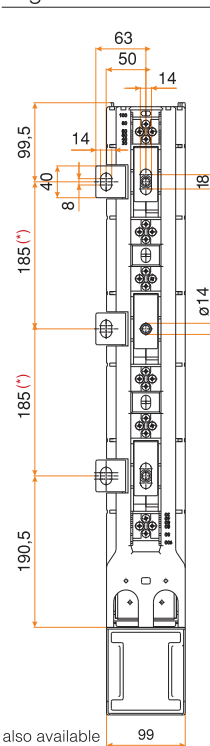


(\*) 210mm distance for connection is also available

## 250A - 400A - 630A Vertical Type Switch Fuses

With right side output single phase can be opened together

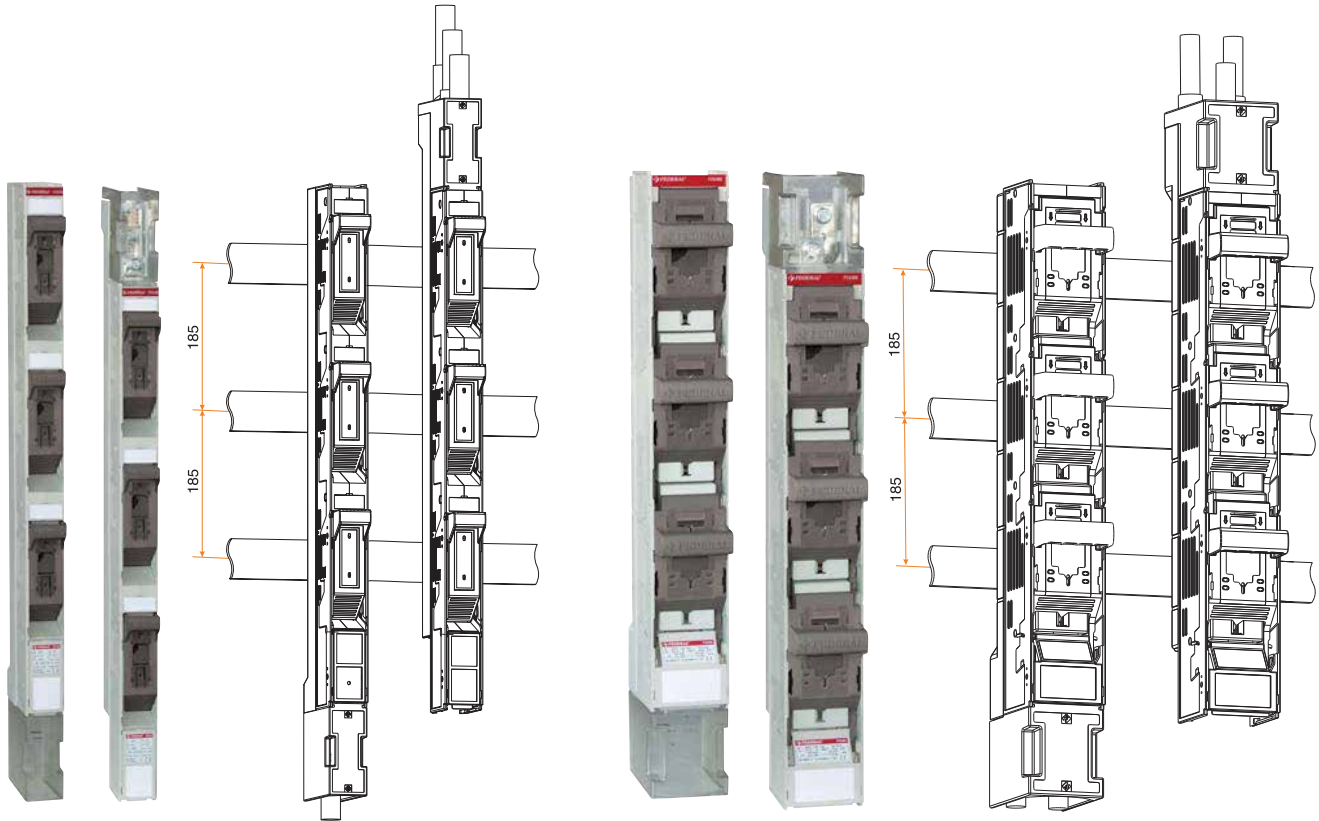
Type	Rated Current (A)	Product Structure	NH Fuse Type / Size	Order Code
FVS250-RS	250	With right side output single phase can be opened together	NH1 / NH2	9BE-E3233-0250
FVS400-RS	400		NH1 / NH2 / NH3	9BE-E3233-0400
FVS630-RS	630		NH1 / NH2 / NH3	9BE-E3233-0630



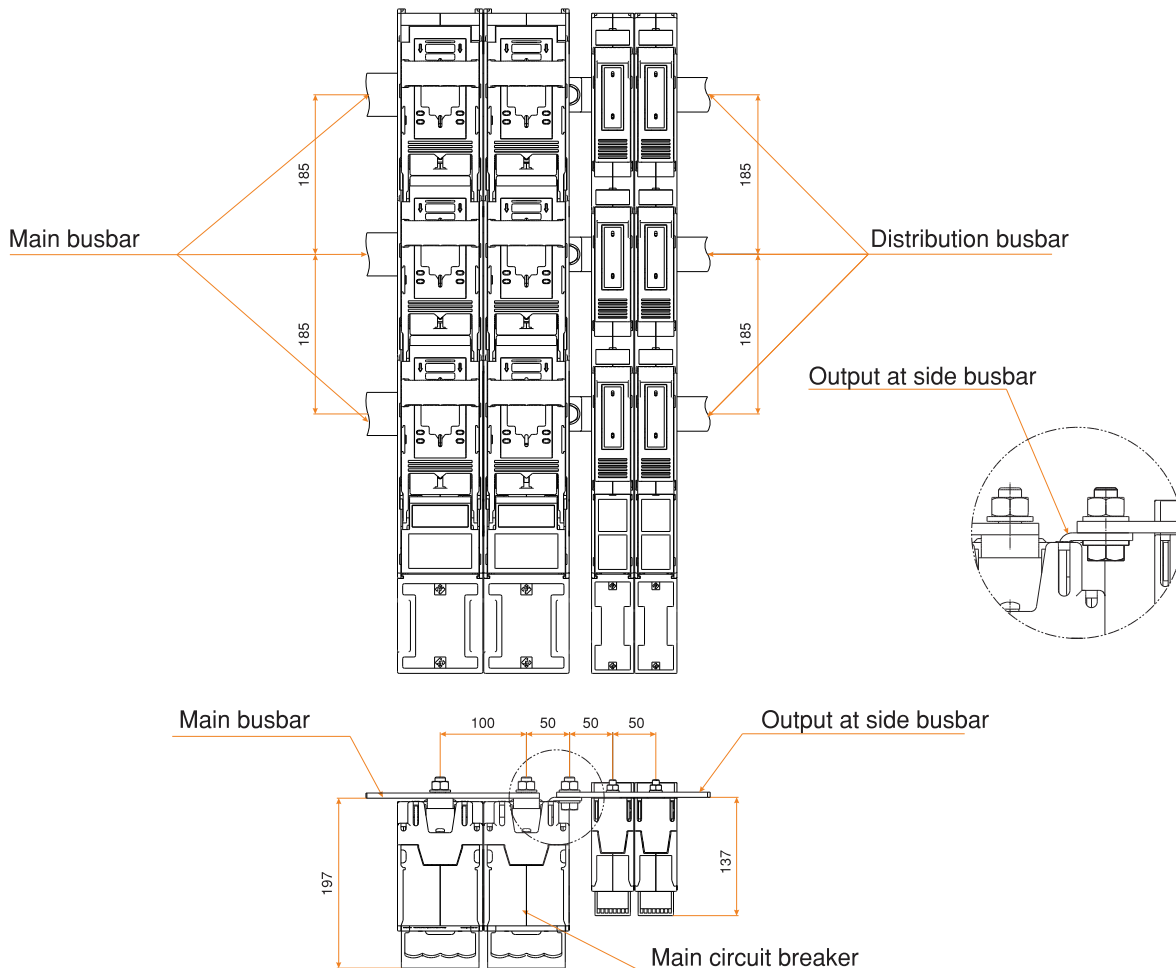
(\*) 210mm distance for connection is also available

### Symmetrical Design

In case of cable input is from top side, Vertical Type Switch Fuse was design symmetrical as the body is suitable to turn 180°.



### Mounting Diagram for Vertical Type Switch Fuses With Outputs at Side



### Sealing Possibility

Sealing is possible in the aim of guarantee of fuse holder can not opened

### Additional Output Apparatus

Through the window capable to open and close placed on front of fuse holder, there is a possibility to get additional output as size 00 with optional additional output apparatus for necessary situation.

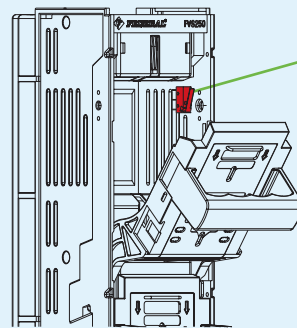
### Measurement under the voltage is possible.

Through the holes on the fuse holders, there is the possibility to measure under the voltage is possible.

### Sticker slot

Large sticker slot can be seen easily is placed on device when the device is mounted.

### Micro Switch



1 or 2 micro switch is available assembled to each phase is possible to control open and closed position of fuses holder.



Utilization categories with suffix B are appropriate for devices which, due to design or application, are only intended for infrequent operation. This could apply, for example, to disconnectors normally only operated to provide isolation from maintenance work or switching devices where the fuse-link blade forms the moving contact.

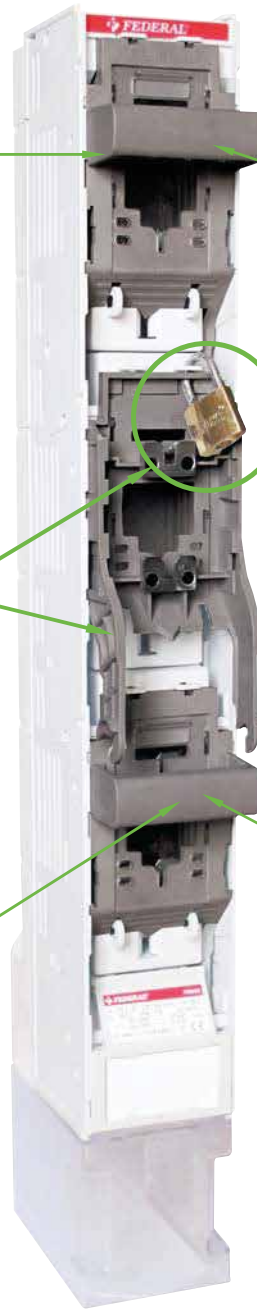
Nature of current	Utilization Category		Typical Applications
	Category A	Category B	
Alternative Current	AC-20A <sup>a</sup>	AC-20B <sup>a</sup>	- Connecting and disconnecting under no-load conditions
	AC-21A	AC-21B	- Switching of resistive loads including moderate overload
	AC-22A	AC-22B	- Switching of mixed resistive and inductive loads, including moderate overloads.
	AC-23A	AC-23B	- Switching of motor loads or other highly inductive loads

<sup>a</sup> The use of these utilization categories is not permitted in the USA.

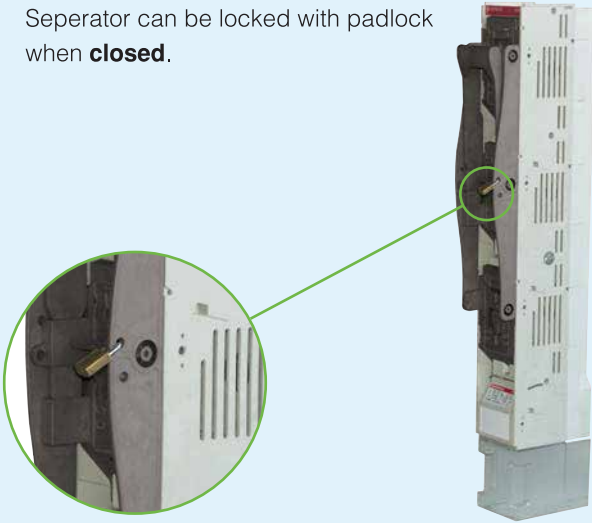
When the fuse holder arms are in closed position, they can be locked with the padlock.

The fuse holder arms can be locked with the padlock when parked (reverse).

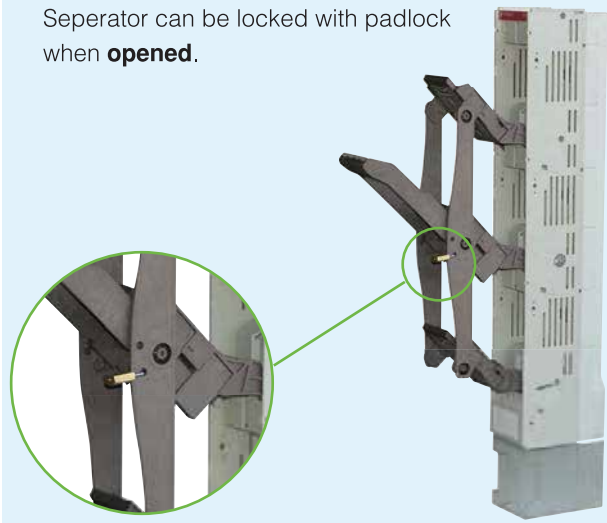
The fuse holder in the closed position is not affected by the fuse holder arm in the parking position when opening and closing the arm.



Separator can be locked with padlock when **closed**.



Separator can be locked with padlock when **opened**.





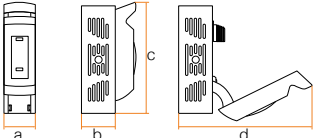
**FUSE SWITCH DISCONNECTORS (IEC / EN 60947-3)**


Single-pole fuse-switch disconnectors are used for AC protection as circuit breakers, disconnecting switch or emergency switches in motor circuits.

The load-breaker operates safely in a narrow working area, allowing fuses to be easily inserted and removed.

In addition to user safety, the products also protect machinery and equipment at the highest level. The product has the lowest power loss values in all sizes and current values and with the highest energy efficiency features.

Products consists of half-closed structures and load separator sockets and covers. On the front cover the nominal operating data and indicator information of the fuses are shown. Products manufactured in 160-250-400 and 630 amperes are compatible with NH00, NH1, NH2, NH3 type fuses

TYPE		FHS1 160			FHS1 250			FHS1 400			FHS1 630		
Conventional Thermal Current (Ith) 60°C	A	160			250			400			630		
Number of Poles		1			1			1			1		
Insulation Voltage (Ui)	V	800			800			800			800		
Impulse Withstand Voltage (Uimp)	kV	8			8			8			8		
Frequency		50-60Hz			50-60Hz			50-60Hz			50-60Hz		
Operational Voltage (Ue)(phase-neutral)	V	240	290	400	240	290	400	240	290	400	240	290	400
Utilization Category		AC22B	AC22B	AC21B	AC22B	AC22B	AC21B	AC22B	AC22B	AC21B	AC22B	AC22B	AC21B
Operational Current (Ie)	A	160			250			400			630		
Conditional Short-Circuit Current (with NH Fuse)	kA	65			65			65			65		
Fuse Type (Dispatched Without Fuse)	NH	000, 00			1			1,2			1,2,3		
Mechanical Durability	op.	> 30000			> 20000			> 20000			> 20000		
Electrical Durability	op.	> 200			> 200			> 200			> 200		
Connection Conductor Cross-Section	mm2	70			120			240			2 x 185		
Power Loss per Pole	W	4			8			14			25		
Max- Min Tightening Torques	Nm	5 ... 8			14 ... 20			17 ... 25			28 ... 40		
Hole Diameter	Ø	M6			M10			M10			M12		
Weight	kG	0,29			0,74			1,27			1,49		
Protection Degree		IP20			IP20			IP20			IP20		
Dimensions		width mm	a	40	62	90	90						
		depth mm	b	47	64	87	87						
		height mm	c	175	247	280	280						
		depth lever open mm	d	205	290	340	340						

**Accessories**



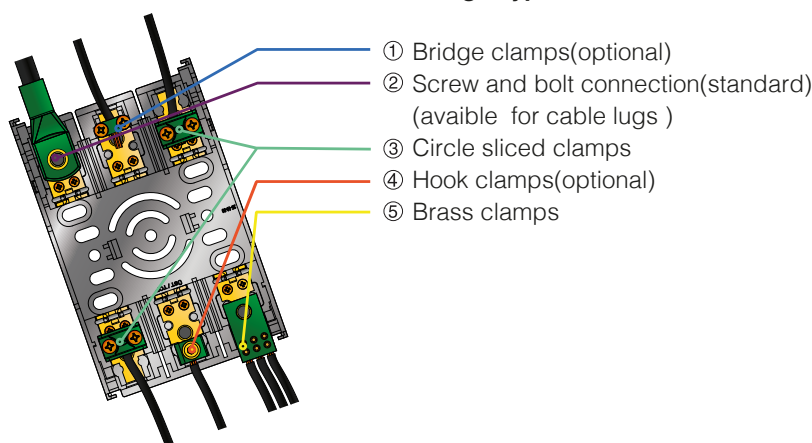

## FUSE SWITCH DISCONNECTORS (IEC / EN 60947-3)

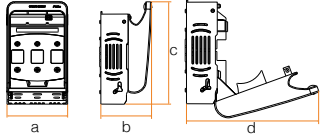


The load break switches with fuses are manufactured in accordance with EN 60947-3 standards and in accordance with VDE and IEC, from 160A to 630A. The load break switches with fuses can be used both inside the panel and at the front of the panel. It is possible to use the same switch in a multiple functions at desired rated current or different operational class by changing the fuses depending on the changes in load and current draw.

The fuse-switch disconnectors are made of reinforced thermoplastic and flame resistant materials to ensure a long and durable service in addition, the silver-plated contact feature reduces power loss.

### Flange Types



TYPE		FHS 160			FHS 250			FHS 400			FHS 630		
Conventional Thermal Current (I <sub>th</sub> ) 60°C	A	160			250			400			630		
Number of Poles		3			3			3			3		
Insulation Voltage (U <sub>i</sub> )	V	800			800			800			800		
Impulse Withstand Voltage (U <sub>imp</sub> )	kV	8			8			8			8		
Frequency		50-60Hz			50-60Hz			50-60Hz			50-60Hz		
Operational Voltage (U <sub>e</sub> )(phase-neutral)	V	415	500	690	415	500	690	415	500	690	415	500	690
Utilization Category		AC23B	AC22B	AC21B	AC22B	AC22B	AC21B	AC22B	AC22B	AC21B	AC22B	AC22B	AC21B
Operational Current (I <sub>e</sub> )	A	160	160	125	250	250	200	400	400	315	630	630	500
Conditional Short-Circuit Current (with NH Fuse)	kA	70			70			70			70		
Fuse Type (Dispatched Without Fuse)	NH	000, 00			1			1,2			1,2,3		
Mechanical Durability	op.	> 20000			> 20000			> 20000			> 20000		
Electrical Durability	op.	> 200			> 200			> 200			> 200		
Connection Conductor Cross-Section	mm <sup>2</sup>	70			120			240			2 x 185		
Power Loss per Pole	W	4			8			14			25		
Max- Min Tightening Torques	Nm	7 ... 10			14 ... 20			17 ... 25			28 ... 40		
Hole Diameter	Ø	M8			M10			M10			M12		
Weight	kG	0,70			1,51			3,27			3,85		
Protection Degree		IP20			IP20			IP20			IP20		
Dimensions 	width mm	a			106,5			187			250		
	depth mm	b			89			112			137		
	height mm	c			180			238			275		
	depth lever open mm	d			205,7			285			340		