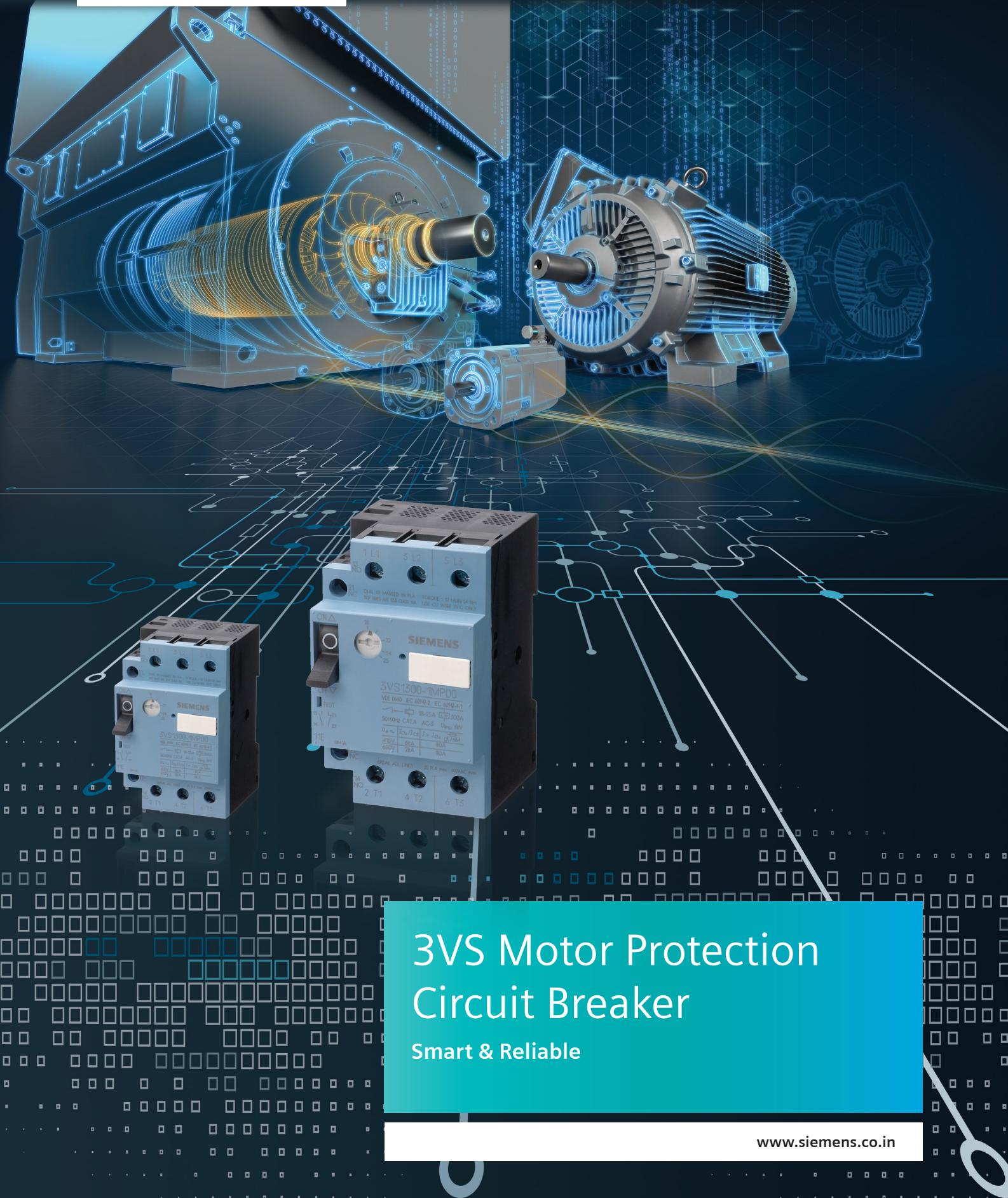


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## 3VS Motor Protection Circuit Breaker

Smart & Reliable

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## Overview

### Description

The 3VS13, 3VS16 motor starter protectors are compact motor starter protectors for currents up to 52 A which operate according to the current limiting principle. The devices are used for switching and protecting motors or other loads. They are fitted with instantaneous overcurrent releases and inverse-time delayed overload relay. Motor starter protectors and contactors can be combined to form fuseless starter combinations.

The 3VS13, 3VS16 motor starter protectors are suitable for use in any climate.

### Motor Starter Protectors

- for motor protection
  - 3VS13: 0.4~25 A
  - 3VS16: 6~52 A

The characteristic curves of these motor starter protectors are specially laid-out for the overload and short-circuit protection of motors.

The inverse-time delayed releases ("a releases") are adjustable for setting the rated current of the motors to be protected.

The instantaneous short-circuit releases ("n releases") are fixed-set to 12 times the value so as to assure faultless starting of the motors.

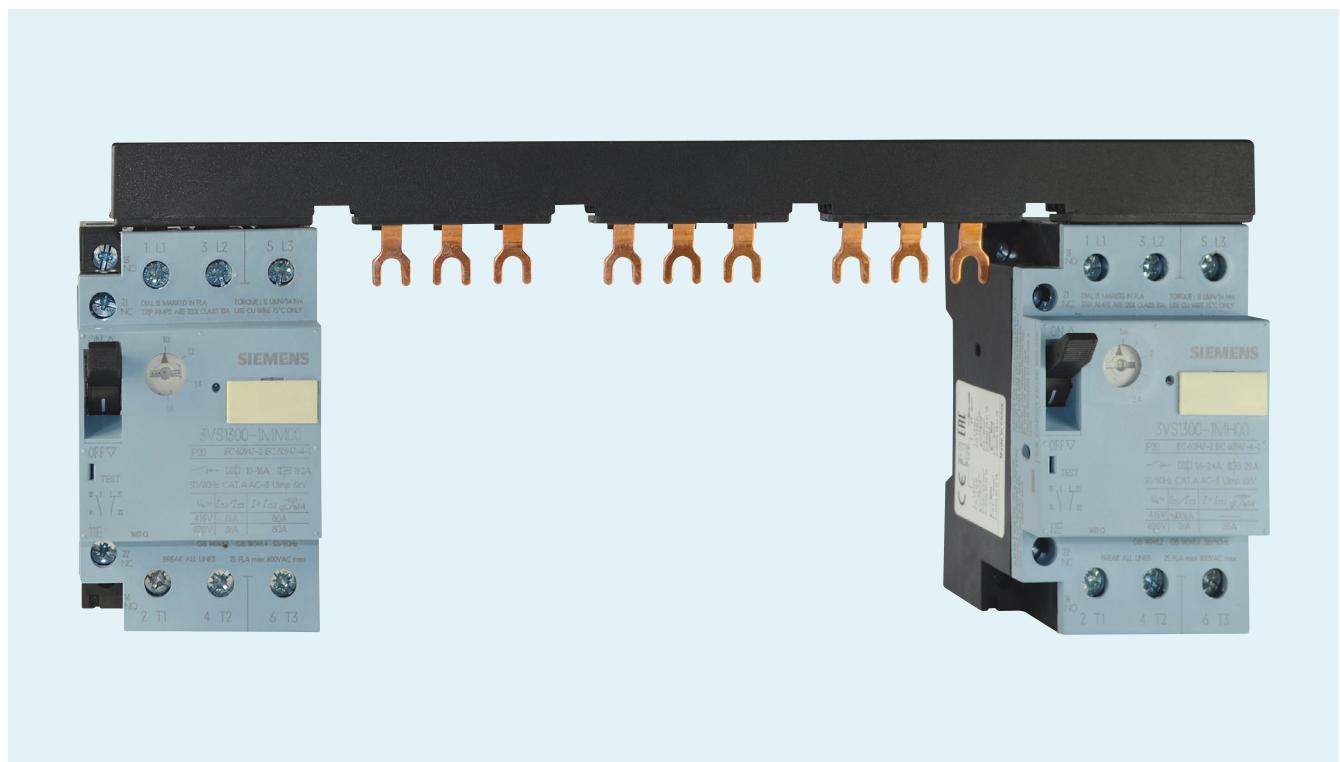
### Current Limiting is achieved in 3VS as follows

In case of a short circuit, the contacts are opened electrodynamically by the short circuit current. The instantaneous overcurrent release, through the switching mechanism, trips all the three poles of the breaker. A large arc voltage is quickly built up in the arc chamber limiting the short circuit current. Thus ensures faster fault clearing

Ambient temperature compensation upto 55°C hence no derating required upto 55°C.

### Safety

- Trip Free Mechanism  
The breakers have a trip-free mechanism. Even by holding the toggle, tripping operation can not be stopped or blocked once it is started. Thus ensure positive opening in the event of fault.
- Positive ON/OFF indication through toggle switch
- Compact and space saving



3VS Busbar Mounting

# 3VS Motor Starter Protectors

## Selection and ordering data

### Motor starter protectors

Rated current $I_n$	Motor output kW	Setting range A	DT	Order No.	Weight per PU approx. kg
		Thermal overload releases 	Instantaneous overcurrent releases 		
<b>3VS13 Motor Starter Protectors, up to 25 A</b>					
0.6	0.12/0.18	0.4 ... 0.6	7.2	3VS13 00-□ME00	0,280
1	0.25	0.6 ... 1	12	3VS13 00-□MF00	0,280
1.6	0.37/0.55	1 ... 1.6	19	3VS13 00-□MG00	0,280
2.4	0.75	1.6 ... 2.4	29	3VS13 00-□MH00	0,280
3.2	1.1	2 ... 3.2	38	3VS13 00-□NH00	0,280
4	1.1/1.5	2.4 ... 4	48	3VS13 00-□MJ00	0,280
5	1.5/2.2	3.2 ... 5	60	3VS13 00-□NJ00	0,280
6	2.2	4 ... 6	72	3VS13 00-□MK00	0,280
8	3	5 ... 8	96	3VS13 00-□NK00	0,280
10	3/4	6 ... 10	120	3VS13 00-□ML00	0,280
13	4/5.5	8 ... 13	156	3VS13 00-□NL00	0,280
16	7.5	10 ... 16	190	3VS13 00-□MM00	0,280
20	7.5	14 ... 20	240	3VS13 00-□MN00	0,280
25	11	18 ... 25	300	3VS13 00-□MP00	0,280
No auxiliary contacts with auxiliary contacts integrated in the motor starter protector				0 1	
<b>3VS16 Motor Starter Protectors, up to 52 A</b>					
10	3/4	6 ... 10	120	3VS16 00-□ML00	0,740
16	5.5/7.5	10 ... 16	190	3VS16 00-□MM00	0,740
25	11	16 ... 25	300	3VS16 00-□MN00	0,740
32	15	22 ... 32	380	3VS16 00-□MP00	0,740
40	18.5	28 ... 40	480	3VS16 00-□MQ00	0,740
52	22	36 ... 52	600	3VS16 00-□MR00	0,740
No auxiliary contacts with auxiliary contacts integrated in the motor starter protector				0 1	



3VS Padlock in OFF position

# 3VS Motor Starter Protectors

## Technical data

according to DIN VDE 0660; IEC 60947-1; IEC 60947-2; IEC 60947-4-1

Type		3VS13	3VS16	
Number of poles		3	3	
Max. rated current $I_n$				
• motor protection	A	25	52	
• starter combinations	A	25	52	
Permissible ambient temperature				
• at full rated current	°C	-20 ... +55		
• in storage	°C	-50 ... +80		
Rated operational voltage $U_e$	AC V	690		
Rated frequency	Hz	50/60		
Rated insulation voltage $U_i$	AC V	750		
Rated impulse withstand voltage $U_{imp}$	kV	6		
Utilization category				
• to IEC 60947-2 (motor starter protectors)	A			
• to IEC 60947-4-1 (motor starters)	AC-3			
Mechanical endurance				
• up to 25 A	Operating cycles	100,000	100,000	
• 25 A upwards			30,000	
Number of operating cycles/h (on load)	1/h	25	25	
Degree of protection with open terminals/with conductors connected		IP00/IP20		
Temperatures compensation	to IEC 60947-4-1	Yes		
Phase failure sensitivity	To IEC 60947-4-1	Yes		
<b>Auxiliary contact</b>				
Rated operational voltage $U_e$	AC V	230	400	500
Rated operational current $I_e$	A	3	1.5	1
Utilization category		AC-15	AC-15	AC-15
Rated operational voltage $U_e$ DC L/R200 ms	DC V	24	60	220
Rated operational current $I_e$	A	2.3	0.7	0.3
Utilization category		DC-13	DC-13	DC-13

# 3VS Motor Starter Protectors

## Technical data

Type		3VS13	3VS16
<b>Cross-section for main conductors</b>			
Solid or stranded	mm <sup>2</sup>	2 x (1 ... 6)	1 x 1.5 ... 2 x 16 or 1 x 25+1 x 10
Finely stranded with end sleeve	mm <sup>2</sup>	2 x (1 ... 4)	1 x 1.5 ... 2 x 10 or 1 x 16+1 x 10
<b>Cross-sections for auxiliary and control connecting leads</b>			
Solid or stranded	mm <sup>2</sup>	1 x 0.5 ... 2 x 2.5	--
Finely stranded with end sleeve	mm <sup>2</sup>	1 x 0.5 ... 2 x 1.5	--

### Rated short-circuit breaking capacity

The table shows the rated ultimate short-circuit breaking capacity  $I_{cu}$  and the rated service short-circuit breaking capacity  $I_{cs}$  for the 3VS motor starter protectors with respect to rated current  $I_n$  and rated operational voltage  $U_e$ .

Infeed is permitted at top or bottom without reduction of rated data. In the short-circuit proof areas,  $I_{cu}$  is at least 100 kA. A backup fuse is therefore not necessary.

In the other areas, when the short-circuit current at the installation point exceeds the rated short-circuit breaking capacity given in the table for the motor starter protectors,

the motor starter protector must be protected by a backup fuse. See the following table for the maximum rated current for the backup fuse. With a backup fuse according to the table, the maximum short-circuit current is permitted to equal the rated breaking capacity of the backup fuse.

### Fuseless construction

In fuseless construction, for the 3VS13 motor starter protectors, the limiter 3VU9 138-2AB00 is connected to the input instead of a backup fuse. This increases the short-circuit breaking capacity at AC 415 V to 50 kA. For other voltages, the values are given in brackets.

Motor Starter Protectors	Rated current $I_n$	Up to AC 240 V			Up to AC 415 V			Up to AC 440 V			Up to AC 500 V			Up to AC 690 V			
		$I_{cu}$	$I_{cs}$	Max. backup fuse (gL/gG)	$I_{cu}$	$I_{cs}$	Max. backup fuse (gL/gG)	$I_{cu}$	$I_{cs}$	Max. backup fuse (gL/gG)	$I_{cu}$	$I_{cs}$	Max. backup fuse (gL/gG)	$I_{cu}$	$I_{cs}$	Max. backup fuse (gL/gG)	
Type	A	kA	kA	A	kA	kA	A	kA	kA	A	kA	kA	A	kA	kA	A	
3VS13	Up to 1 A	Short-circuit proof up to 100 kA, backup fuse is not necessary														2    2    20	
	1.6 A															2    2    35	
	2.4 A															2    2    50	
	3.2 and 4 A							10 (50)	10 (50)	50	3 (50)	3 (50)	50	2	2	63	
	5 and 6 A							5 (50)	5 (50)	63	3 (50)	3 (50)	63	2	2	80	
	8 and 10 A			10 (50) 10 (50) 80			5 (50) 5 (50) 80			3 (5) 3 (5) 80			2	2	80		
	13 and 16 A			6 (50) 6 (50) 80			5 (30) 5 (30) 80			3 (5) 3 (5) 80			2	2	80		
	20 and 25 A	10 (50) 10 (50) 100	6 (50) 6 (50) 80		5 (30) 5 (30) 80			5 (30) 5 (30) 80			3 (5) 3 (5) 80			2	2	80	
3VS16	Up to 2.4 A	Short-circuit proof up to 100 kA, backup fuse is not necessary														4    4    80	
	4 A															4    4    100	
	6 A															4    4    125	
	10 A							50		10	5	160					
	16 A							25	13	200	10	5	160			4    4    125	
	25 A							25	13	200	10	5	200			4    4    160	
	32 and 52 A			50			25	13	200	10	5	200				4    4    160	

Note: ( ) Values in brackets: short-circuit breaking capacity for 3VS13 with limiter

Relation between short-circuit breaking capacity $I$ , related power factor $\cos \varphi$ and minimum short-circuit making capacity to IEC 60947-2		
Short-circuit breaking capacity	Power factor $\cos \varphi$	Short-circuit making capacity
A		
$I \leq 3000$	0.9	$1.42 \times I$
$3000 < I \leq 4500$	0.8	$1.47 \times I$
$4500 < I \leq 6000$	0.7	$1.5 \times I$
$6000 < I \leq 10000$	0.5	$1.7 \times I$
$10000 < I \leq 20000$	0.3	$2.0 \times I$
$20000 < I \leq 50000$	0.25	$2.1 \times I$
$50000 < I$	0.2	$2.2 \times I$

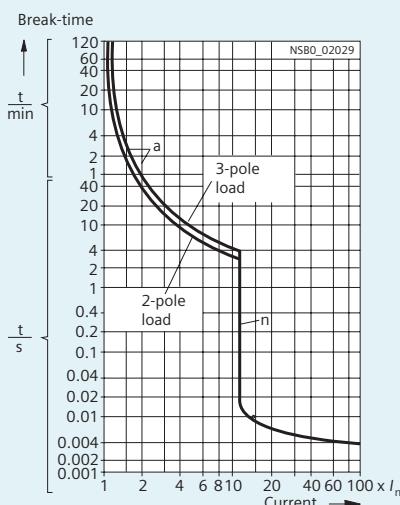
## Characteristic curves

The characteristic curves are obtained in the cold state and 3-pole loading.

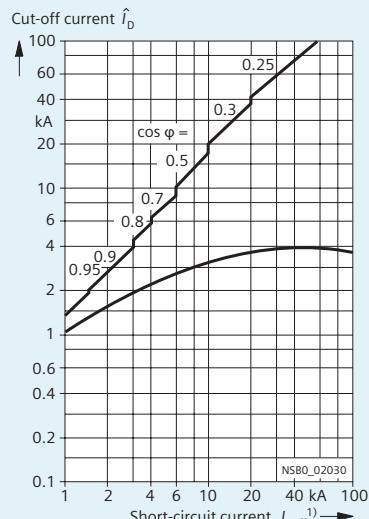
At operating temperature, the tripping time of the thermal releases drops by about 25 %. With 3-pole loading, the deviation in tripping time for 3 times the current and upwards is  $\pm 20\%$  in accordance with DIN VDE 0165

### Characteristic curves for 3VS13

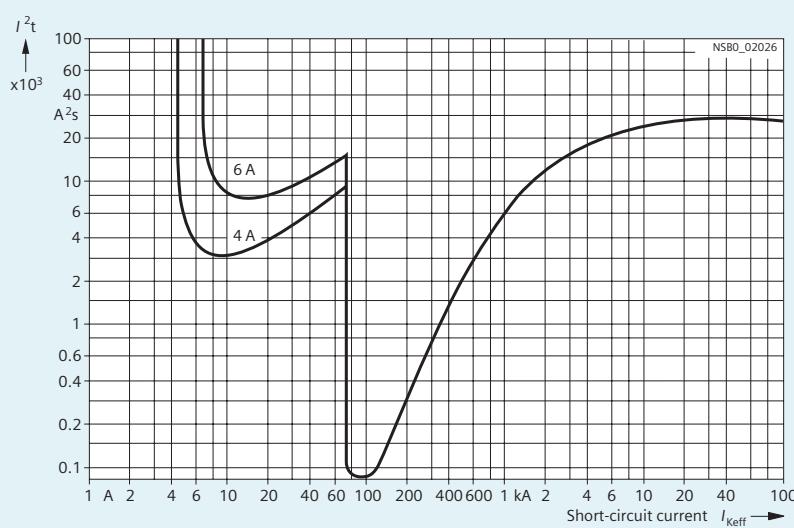
The characteristic curves shown here apply for a 3VS1300-0MK00 motor starter protector with a rated current of 6 A, a current setting range of 4 to 6 A and a tripping current for the instantaneous overcurrent release of 72 A, at a rated voltage of AC 50 Hz, 400 V.



Schematic representation of the time/current characteristic for 3VS13



Current limiting characteristic for 3VS1300-0MK00



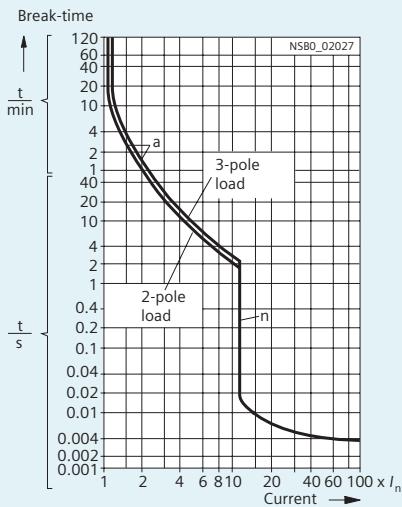
$I^2t$  characteristic for 3VS1300-0MK00

# 3VS Motor Starter Protectors

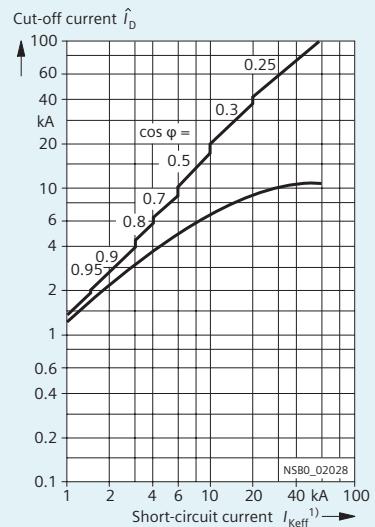
## Characteristic curves

### Characteristic curves for 3VS16

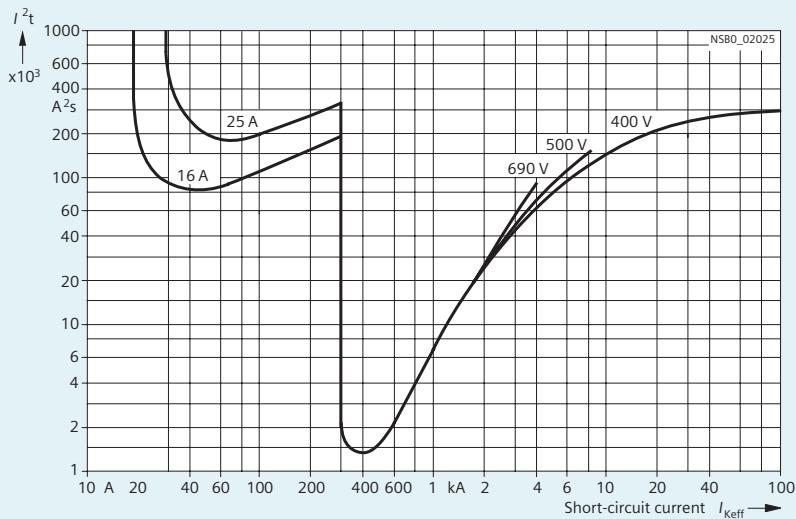
The characteristic curves shown here apply for a 3VS1600-0MN00 motor starter protector with a rated current of 25 A and a tripping current for the instantaneous overcurrent release of 300 A, at a rated voltage of AC 50 Hz, 400 V.



Schematic representation of the time/current characteristic for 3VS16



Current limiting characteristic for 3VS1600-0MN00



I<sup>2</sup>t characteristic for 3VS1600-0MN00

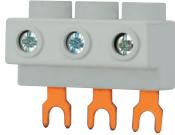
# 3VS Motor Starter Protectors

## Accessories for 3VS13/16

3VU9	Description	Width (modules) 1=18mm	Information		Order Number	Wt. (Kg)
	Auxiliary contact block 1NO+1NC	0.5	1NO+1NC side mounted auxiliary contact blocks for 3VS		3VU9138 -2AB00	0.04
	Signaling Switch 1NO+1NC	0.5	1NO+1NC side mounted signaling switch. Contacts changeover when MPCB trips. Useful for remote tripping indication.		3VU9131 -7AA00	0.04
	Under-voltage Release	1	AC 50Hz	AC 60Hz	3VU9 132	0.11
			230V			
			240V			
			400V			
			415V			
				120V		
				208V		
	Undervoltage Release with two leading Aux contacts	1	AC 50Hz	AC 60Hz	3VU9132	0.13
			230V			
			240V			
			400V			
			415V			
				120V		
				208V		
	Shunt Release	1	AC 50Hz	AC 60Hz	3VU9 132	0.11
			24V			
			42V			
			230V			
			240V			
			400V			
			415V			
				120V	3VU9 132	0.11
				208V		
				240V		
			DC			
			24-60V		3VU9 132	0.11
			110-240V			

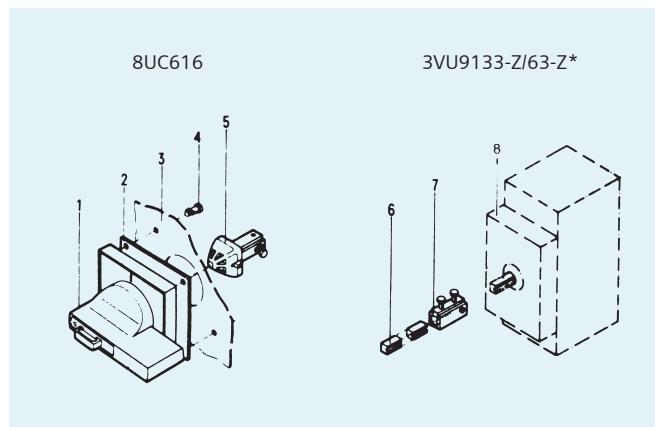
# 3VS Motor Starter Protectors

## Accessories for 3VS13/16

3VU9	Description	Width (modules) 1=18mm	Information	Order Number	Wt. (Kg)
	Padlocking device	–	Padlocking in OFF position to avoid accidental ON command during maintenance work	3VU9168-OKA00	0.02
	3VS-3TS connector for Direct mounting of Contactor on MPCB	3	Up to 12A, with 3TF30/31 OR 3TS30/31	3TS9001-8K	0.04
			Up to 22A, with 3TF32/33 OR 3TS33/34	3TS9002-8K	
	3-Phase Feed in Terminal Only for 3VS13	–	To be used with 3 Phase bus bar for cable connection. For use with cables 4-16 Sq.mm with Sleeve 6-25 Sq.mm without Sleeve	3VU9 135-1BB01	0.03
	3-Phase Bus bars <sup>1</sup> Only for 3VS13	–	To be used with 3VU9135-1BB01 for cable entry with 1st MPCB. For 63A max, 690V.	2MPCB 3VU9135-1AB02 3MPCB 3VU9135-1AB03 4MPCB 3VU9135-1AB04 5 MPCB 3VU9135-1AB05	0.05 0.05 0.10 0.12
	Cover Caps for - Empty slots of 3 Phase bus bars	–	Cover caps provide touch protection for reserve/empty slots.	3VU9 135-1GB00	0.01

1) 3 Phase Bus bar are also available for MPCB with Auxiliary switches

## Door operating mechanism for 3VS13/16



- 1. Handle with masking frame
- 2. Gasket
- 3. Fixing screws
- 4. Drive coupling
- 5. Extension shaft - 300 mm
- 6. Adapter
- 7. Breaker operator

\* 1 set consisting of breaker operator kit and 8UC front drive together

Breaker Operator Kit for 3VS13 - 3VU9133-Z

Breaker Operator Kit for 3VS16 - 3VU9163-Z

Note: All the above accessories have standard package no. = 1

For maximum flexibility, accessories can be added to the motor starter protector as required, easily

# 3VS Motor Starter Protectors

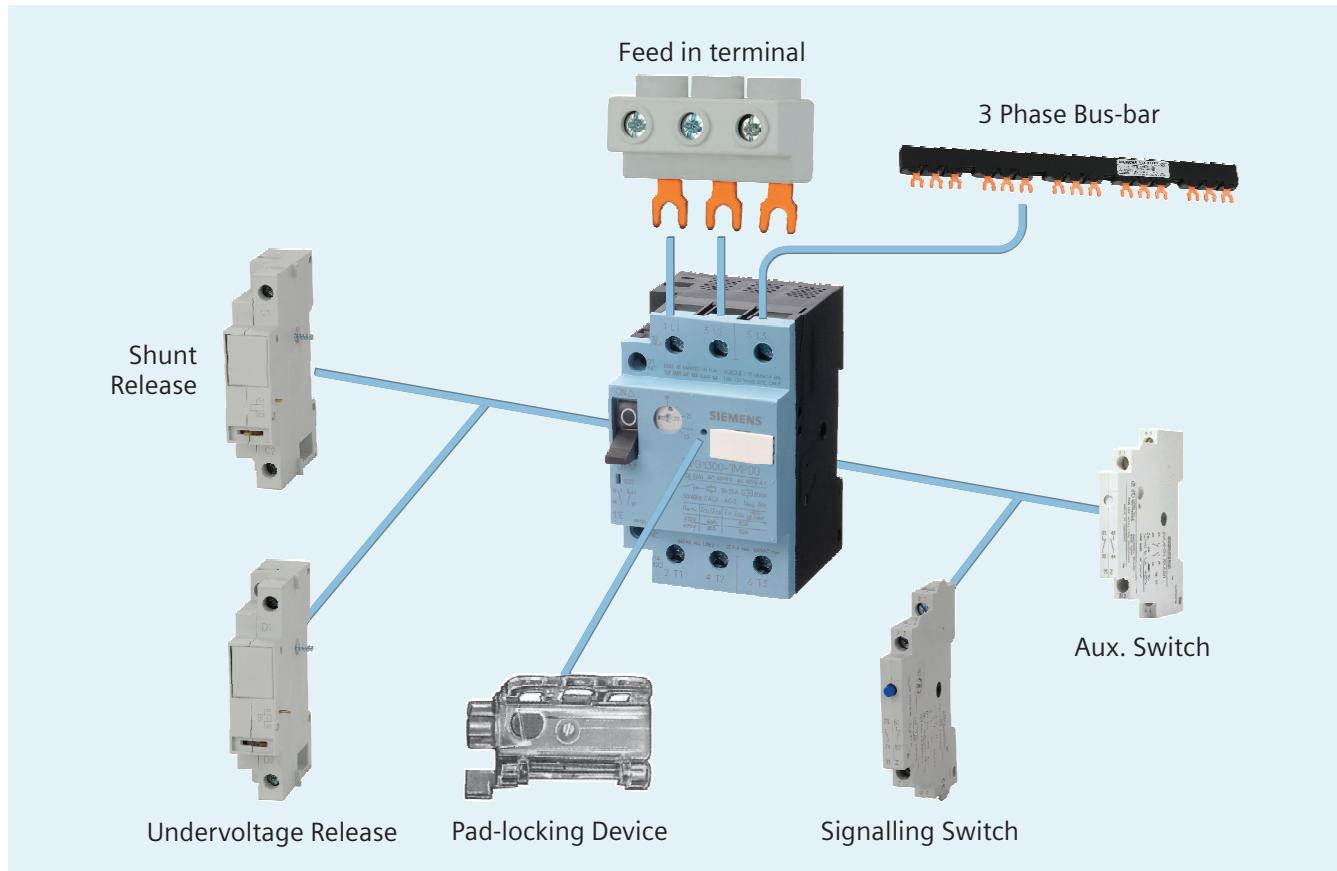
## Accessories for 3VS13/16

### 3VS Accessory compatibility table

Accessory 1 \ Accessory 2	MLFB	3VS13	3VS16	Aux Switch 3VU9 131-3AA00	Signaling Switch 3VU9 131-7AA00	UV Rel. 3VU9132-0AB35	UV Rel. with 2 Lead contacts + 3VU9132-0AB35	Shunt Rel. 3VU9132-0AB55	Pad locking 3VU9168-OKA00	Connector 3TS9001-8K/02
Aux Switch	3VU9 131-3AA00	✓	✓	X	X	✓	✓	✓	✓	✓
Signaling Switch	3VU9 131-7AA00	✓	✓	X	X	✓	✓	✓	✓	✓
Undervoltage Rel	3VU9 132-0AB15	✓	✓	✓	✓	X	X	X	✓	✓
Undervoltage Rel with 2 Leading contacts	3VU9 132-0AB35	✓	✓	✓	✓	X	X	X	✓	✓
Shunt Release	3VU9 132-0AB55	✓	✓	✓	✓	X	X	X	✓	✓
Pad locking device	3VU9168-OKA00	✓	✓	✓	✓	✓	✓	✓	X	✓
Connector for Direct mounting of contactor	3TS9001-8K/02	✓	X	✓	✓	✓	✓	✓	✓	X
3 Phase Feed in Terminal	3VU9 135-1BB01	✓	X	✓	✓	✓	✓	✓	✓	✓
3 Phase Busbars	3VU9135-1AB02/3I/4/5	✓	X	X	X	X	X	X	✓	✓
3 Phase Busbars with Aux /Accessories	3VU9135-1KA02/4	✓	X	✓	✓	✓	✓	✓	✓	✓
Cover caps for empty slots	3VU9 135-1GB00	✓	X	✓	✓	✓	✓	✓	✓	✓

✓ Recommended combination of accessory 1 & 2

X Combination not recommended of accessory 1 & 2



# 3VS Motor Starter Protectors

## Technical data for accessories

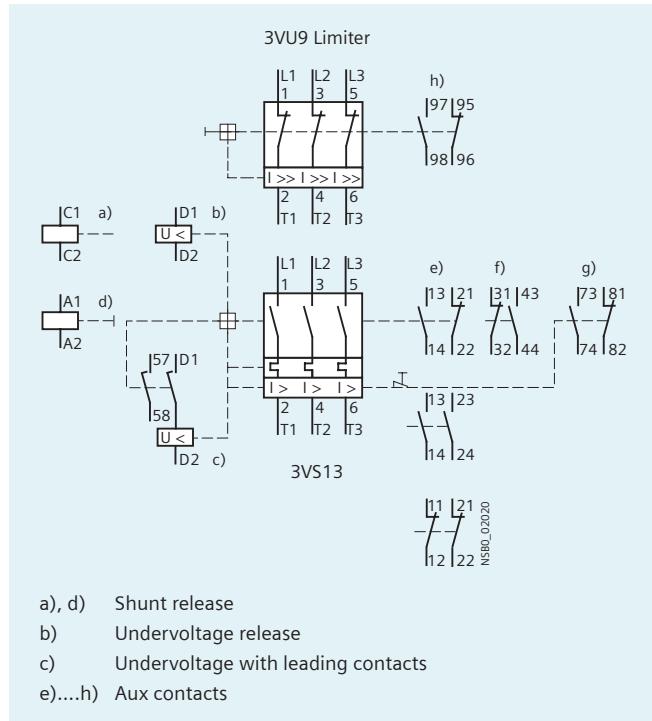
Type		3VS13	3VS16
<b>Undervoltage Release</b>			
Consumption During Pick-up	VA/W	10/6	
Consumption During Running	VA/W	4.7/2	
Dropout	V	0.7 to 0.35 X Ue	
Pickup	V	0.85 to 1.1 X Ue	
Max Operating Time	ms	20	
<b>Shunt Release</b>			
Consumption	VA/W	10/6	
Max Continuous Rating	Sec	5	
Pickup	V	0.7 to 1.1 X Ue	
<b>Current Limiter for 3VS13</b>			
Rated Current In		56 Amps	
Rated Voltage Ue		500 V, 50 / 60 Hz	
Power Connection	mm <sup>2</sup>	2 x (1 to 6)	
<b>Mounting</b>			
Mounting method		on DIN Rail in any position	

# 3VS Motor Starter Protectors

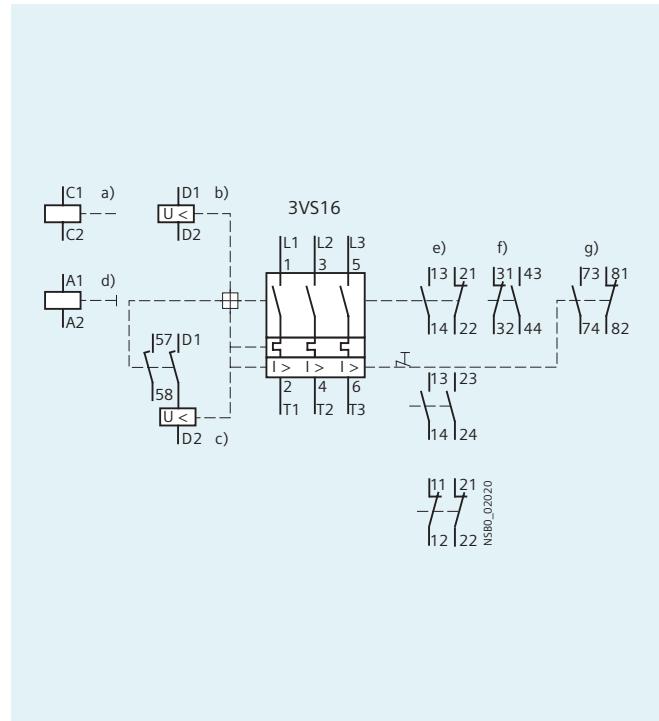
## Circuit diagrams & dimension drawings

As defined by DIN 40 713, the graphical symbols in the equipment circuit diagrams only provide information about the type, connection and operation of the devices, but not about their construction.

### Equipment circuit diagrams



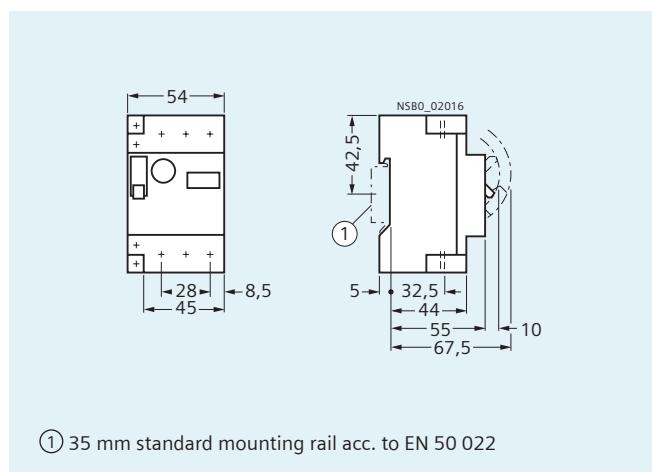
3VS13 motor starter protectors and 3VU9 limiter



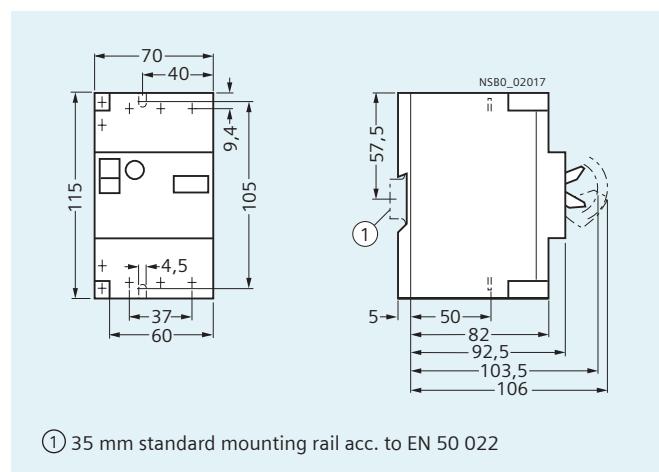
3VS16 motor starter protectors

## Dimension drawings

### 3VS13



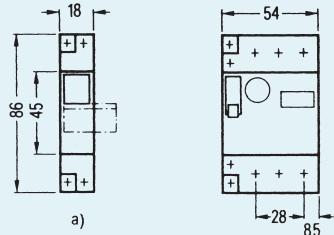
### 3VS16



# 3VS Motor Starter Protectors

## Dimension drawings

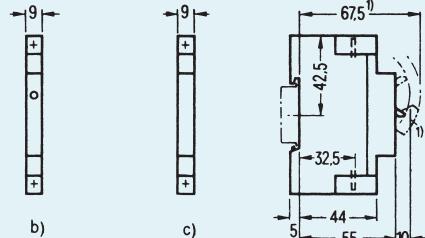
### 3VS13 circuit-breakers and accessories



#### 3VS13 circuit-breakers

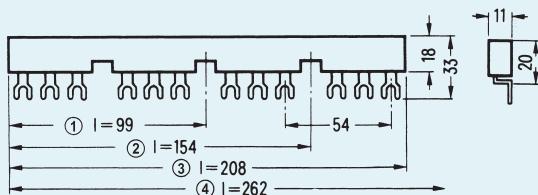
can be combined with

- a) undervoltage or shunt release and/or
- b) short-circuit signalling switch and/or
- c) auxiliary contacts



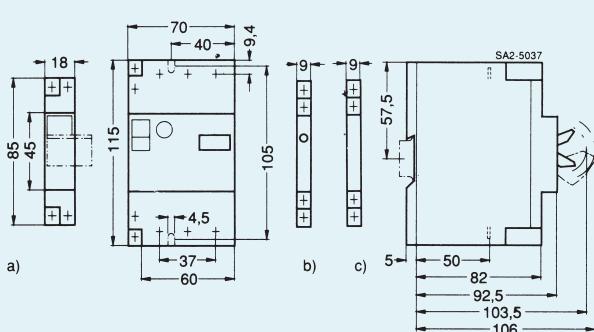
#### 3VU9 138-2AB00 limiter

The limiter has the same dimensions as the standard version of the 3VS13 circuit-breaker



#### 3VU9 135-1AB02, 3VU9 135-1AB03, 3VU9 135-1AB04, 3VU9 135-1AB05 three-phase busbar

- ① For 2 devices: 3VU9 135-1AB02
- ② For 3 devices: 3VU9 135-1AB03
- ③ For 4 devices: 3VU9 135-1AB04
- ④ For 5 devices: 3VU9 135-1AB05

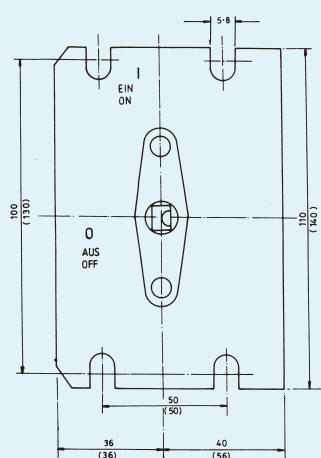


#### 3VS16 circuit-breakers

can be combined with

- a) undervoltage or shunt release and/or
- b) short-circuit signalling switch and/or
- c) auxiliary contacts

**Door operating mechanism with extension shaft (300mm)  
with door interlock & padlocking facilities.**



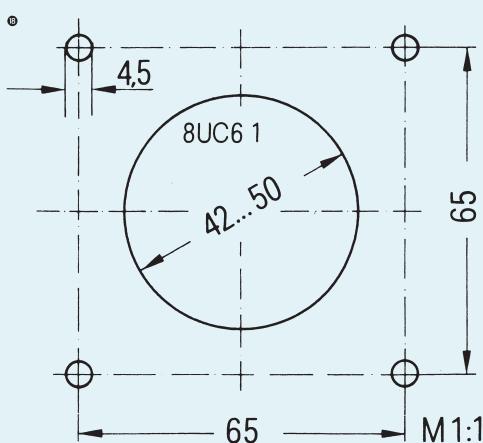
Mounting bracket of 3VS 13/16

3VU9133-1PA01 for 3VS 13

3VU9163-1PA02 for 3VS 16

(Figures in bracket are for 3VS 16)

**Mounting bracket**



**Front door cutout for Handle**

# 3VS Motor Starter Protectors

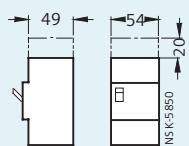
## Dimension drawings

### Space required above arc chutes for 3VS motor starter protectors

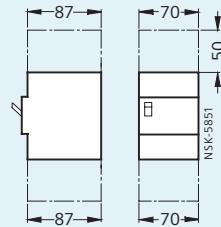
Minimum clearance with rated voltage to adjacent parts as well as non-insulated live parts.

The spacing of minimum 1 cm with 3VS13 and minimum 2 cm with 3VS16 between large-surface covers and arc openings should be observed.

**3VS13**



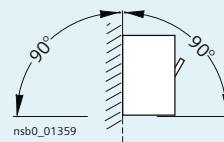
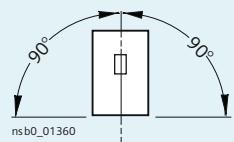
**3VS13**



Uninsulated conductors must be insulated within the space required above arc chutes.

### 3VS Permissible mounting position

3VS13, 3VS16 motor starter protectors permissible mounting position due to position of the operating parts, note DIN 43 602.



3VS13 motor starter protectors and 3VU9 limiter

