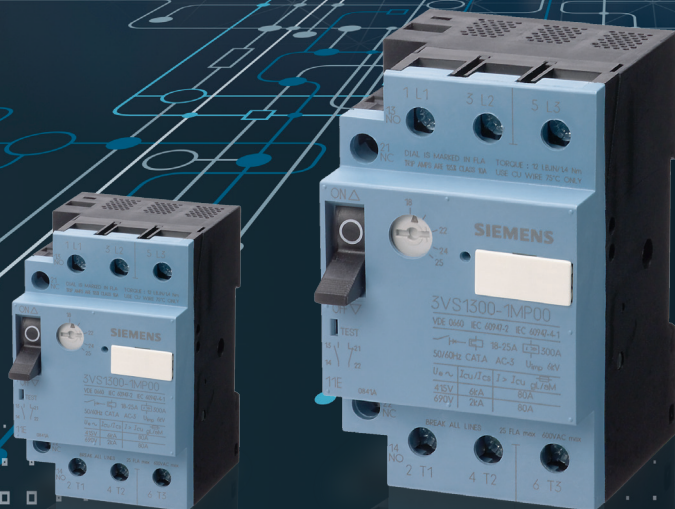


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3VS Motor Protection Circuit Breaker

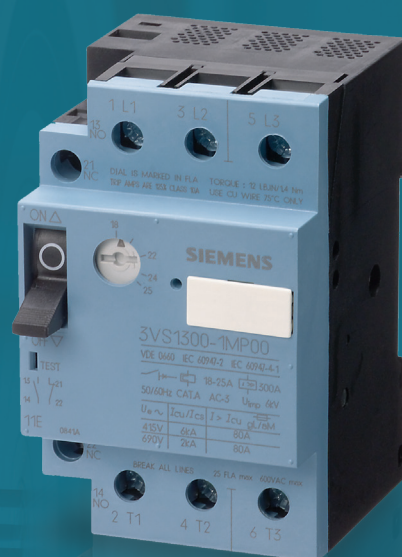
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3VS Motor Starter Protectors

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.

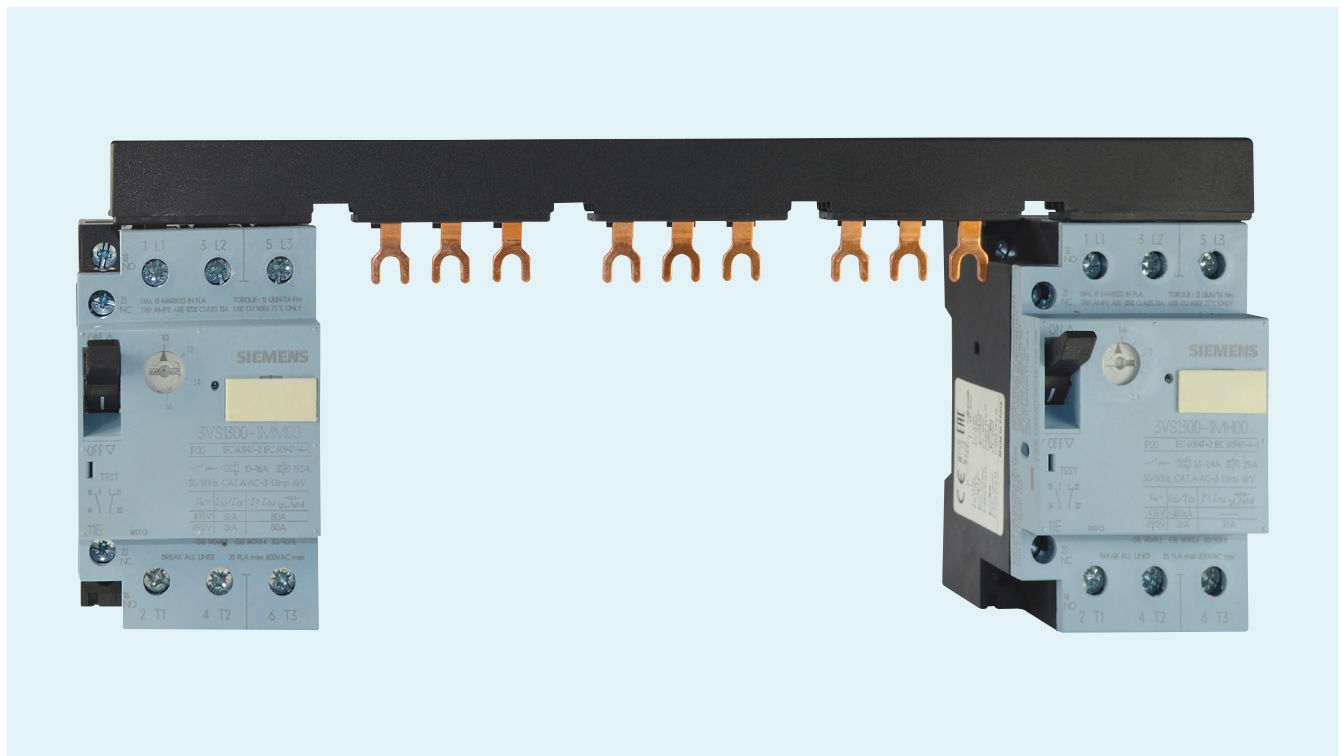
Current Limiting is achieved in 3VS as follows

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

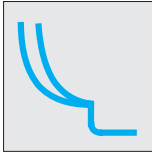






3VS Busbar Mounting

3VS Motor Starter Protectors

Selection and ordering data

Motor starter protectors

	Rated current I_n	Motor output	Setting range		DT	Order No.	Weight per PU approx.
			Thermal overload releases	Instantaneous overcurrent releases			
							
	A	kW	A	A			kg
3VS13 Motor Starter Protectors, up to 25 A							
	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						0	
with auxiliary contacts						1NO+1NC	1
integrated in the motor starter protector							
3VS16 Motor Starter Protectors, up to 52 A							
	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						0
with auxiliary contacts						1NO+1NC	1
integrated in the motor starter protector							



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			
Auxiliary contact					
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
Cross-section for main conductors			
Solid or stranded	mm ²	2 x (1 ... 6)	1 x 1.5 ... 2 x 16 or 1 x 25+1 x 10
Finely stranded with end sleeve	mm ²	2 x (1 ... 4)	1 x 1.5 ... 2 x 10 or 1 x 16+1 x 10
Cross-sections for auxiliary and control connecting leads			
Solid or stranded	mm ²	1 x 0.5 ... 2 x 2.5	--
Finely stranded with end sleeve	mm ²	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 reated 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														
	1.6 A													2	2	20
	2.4 A										10 (50)	10 (50)	35	2	2	35
	3.2 and 4 A							10 (50)	10 (50)	50	3 (50)	3 (50)	50	2	2	50
	5 and 6 A							5 (50)	5 (50)	63	3 (50)	3 (50)	63	2	2	63
	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	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 A													4	4	80
	6 A										50			4	4	100
	10 A							50			10	5	160	4	4	125
	16 A							25	13	200	10	5	160	4	4	125
	25 A					50		25	13	200	10	5	200	4	4	160
	32 and 52 A				35	17	200	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 and minimum short-circuit making capacity to IEC 60947-2		
Short-circuit breaking capacity	Power factor $\cos \phi$	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	$2.2 \times I$

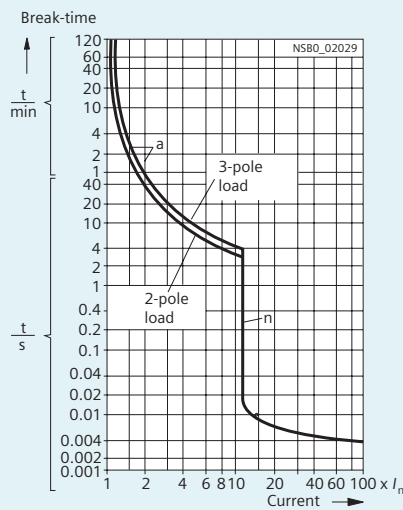
Characteristic curves

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

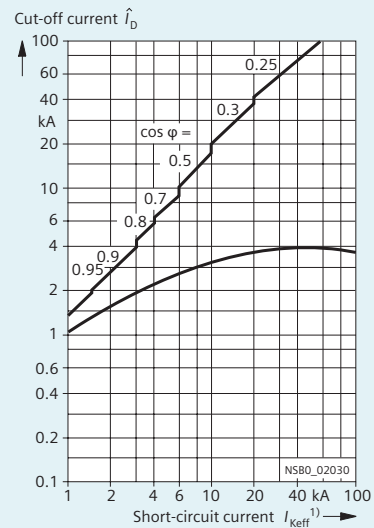
At operating temperature, the tripping time of the thermal releases drops by about 25 %. With 3-pole loading, the deviation in tripping time for 3 times the current and upwards is $\pm 20\%$ in accordance with DIN VDE 0165

Characteristic curves for 3VS13

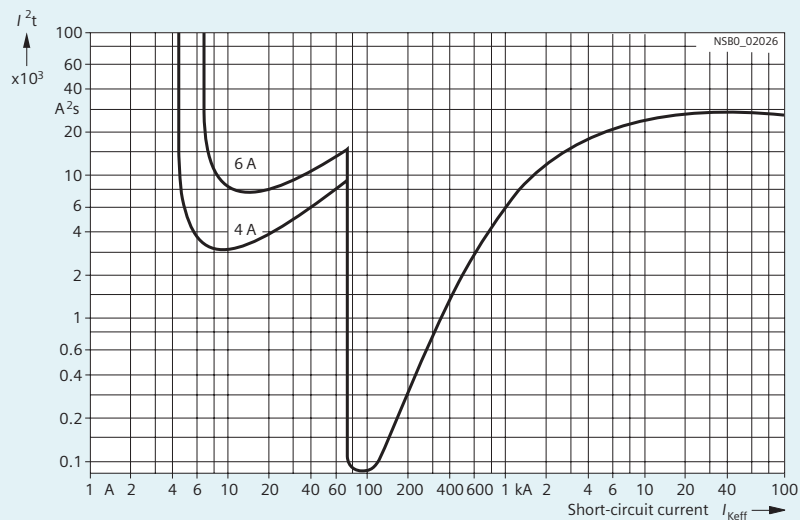
The characteristic curves shown here apply for a 3VS1300-0MK00 motor starter protector with a rated current of 6 A, a current setting range of 4 to 6 A and a tripping current for the instantaneous overcurrent release of 72 A, at a rated voltage of AC 50 Hz, 400 V.



Schematic representation of the time/current characteristic for 3VS13



Current limiting characteristic for 3VS1300-0MK00



I^2t characteristic for 3VS1300-0MK00