Protection Equipment

Circuit Breakers • Molded-Case Circuit Breakers

Reference Manual · March 2010

Industrial Controls

SIEMENS

Protection Equipment

Introduction

Overview








Type		3RV10	3RV11	3RV13	3RV14	3RV16	3RV16	3RV17	3RV18
3RV1 motor starter protectors/circuit breakers up to 100 A									
Applications									
System protection		✓[1]	✓[1]	--	--	--	--	✓	✓
Motor protection		✓	--	--	--	--	--	--	--
Motor protection with overload relay function		--	✓	--	--	--	--	--	--
Starter combinations		--	--	✓	--	--	--	--	--
Transformer protection		--	--	--	✓	--	--	✓	✓
Fuse monitoring		--	--	--	--	✓	--	--	--
Voltage transformer circuit breakers for distance protection		--	--	--	--	--	✓	--	--
Size		S00, S0, S2, S3	S0, S2, S3	S0, S2, S3	S0, S2	S00	S00	S0, S3	S0
Rated current I_n									
Size S00	A	Up to 12	--	--	--	0.2	Up to 3	--	--
Size S0	A	Up to 25	Up to 25	Up to 25	Up to 20	--	--	Up to 22	Up to 20
Size S2	A	Up to 50	Up to 50	Up to 50	Up to 40	--	--	--	--
Size S3	A	Up to 100	Up to 100	Up to 100	--	--	--	Up to 70	--
Rated operational voltage U_e acc. to IEC	V	690 AC[2]	690 AC[2]	690 AC[2]	690 AC[2]	690 AC[2]	400 AC	690 AC	690 AC
Rated frequency	Hz	50/60	50/60	50/60	50/60	50/60	$16^2/_3$ ... 60	50/60	50/60
Trip classes		CLASS 10 CLASS 20	CLASS 10	--	CLASS 10	--	--	--	--
Thermal overload releases	A	0.11 ... 0.16 to	0.11 ... 0.16 to	None[3]	0.11 ... 0.16 to	0.2	1.4 ... 3	0.16 ... 70 non-adjustable	0.16 ... 20 non-adjustable
	A	80 ... 100	80 ... 100		28 ... 40				
Electronic trip units A multiple of the rated current		13 times	13 times	13 times	20 times	6 times	4 ... 7 times	13 times	20 times
Short-circuit breaking capacity I_{cu} at 400 V AC	kA	50/100	50/100	50/100	50/100	100	50	[4]	[4]

Accessories													
For sizes	S00	S0	S2	S3	S0	S2	S3	S0	S2	S3	S0	S2	S00	S00	S0, S3	S0
Auxiliary switches	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓[5]	✓[5]
Signal switches	--	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	--	--	--	--
Undervoltage trip units	✓	✓	✓	✓	--	--	--	✓	✓	✓	✓	✓	✓	✓	✓	✓
Shunt trip units	✓	✓	✓	✓	--	--	--	✓	✓	✓	✓	✓	✓	✓	✓	✓
Isolator modules	--	✓	✓	--	✓	✓	--	✓	✓	--	✓	✓	--	--	--	--
Insulated three-phase busbar system	✓	✓	✓	--	--	✓	--	✓	✓	--	✓	✓	✓	✓	--	--
Busbar adapters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	--	--
Door-coupling rotary operating mechanisms	--	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	--	--	✓	✓
Remote motorized operating mechanisms	--	--	✓	✓	--	✓	✓	--	✓	✓	--	✓	--	--	--	--
Link modules	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	--	--
Enclosures for surface mounting	✓	✓	✓	--	✓	✓	--	✓	✓	--	✓	✓	✓	✓	--	--
Enclosures for flush mounting	✓	✓	--	--	✓	--	--	✓	--	--	✓	--	✓	✓	--	--
Front plates	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	--	--
Infeed systems	✓	✓	--	--	--	--	--	✓	--	--	✓	--	--	--	--	--

1) For symmetrical loading of the three phases.
2) 500 V AC with molded-plastic enclosure.
3) For overload protection of the motors, appropriate overload relays must be used.
4) According to UL 489
-at 480 Y/277 V AC: for size S0 50 kA, for size S3 65 kA;
-at 480 V AC: for size S3 (10 A up to 30 A) 65 kA.
5) Only lateral auxiliary switches can be fitted.

✓ Has this function or can use this accessory
-- Does not have this function or cannot use this accessory

Type		3RV10			3RV13					
3RV1 molded case motor starter protectors up to 800 A										
Applications										
Motor protection		✓			--					
Starter combinations		--			✓					
Switching capacity		Standard switching capacity			Standard switching capacity				Increased switching capacity	
Size		3RV10 63	3RV10 73	3RV10 83	3RV13 53	3RV13 63	3RV13 73	3RV13 83	3RV13 64	3RV13 74
Rated current I_n	A	100, 160, 200	400	630	1 ... 32	100, 160, 250	400, 630	630, 800	100, 160, 250	400
Rated operational voltage U_e acc. to IEC	V	690 AC			690 AC					
Rated frequency	Hz	50/60			50/60					
Trip classes		CLASS 10A CLASS 10 CLASS 20 CLASS 30			--[1]					
Thermal overload releases	A A	40 ... 100 to 252 ... 630			None[1]					
Electronic trip units A multiple of the rated current		Adjustable, 6 ... 13 times			Non-adjustable 1 A ... 12.5 A: 13 times; adjustable 20 A, 32 A: 6 ... 12 times	1 ... 10 times				
Short-circuit breaking capacity I_{cu} at 400 V AC	kA	120	120	100	85	120	120	100	200	200
Trip units		TU 4			TU 1: 1 A ... 12.5 A; TU 2: 20 A, 32 A	TU 3				

Accessories										
For molded case motor starter protectors		3RV10 63	3RV10 73	3RV10 83	3RV13 53	3RV13 63	3RV13 73	3RV13 83	3RV13 64	3RV13 74
Auxiliary switches		✓	✓	✓	✓	✓	✓	✓	✓	✓
Undervoltage trip units		✓	✓	✓	✓	✓	✓	✓	✓	✓
Shunt trip units		✓	✓	✓	✓	✓	✓	✓	✓	✓
Rotary operating mechanisms		✓	✓	✓	✓	✓	✓	✓	✓	✓
Connection methods										
• Front-extended terminals		✓	✓	--	✓	✓	✓	--	✓	✓
• Front-accessible cable terminals		✓	✓	✓	✓	✓	✓	✓	✓	✓
• Rear-accessible terminals		✓	✓	✓	✓	✓	✓	✓	✓	✓

1) For overload protection of the motors, appropriate overload relays must be used; see Catalog LV 1 "Low-Voltage Controls", Chapter 5.

✓ Has this function or can use this accessory

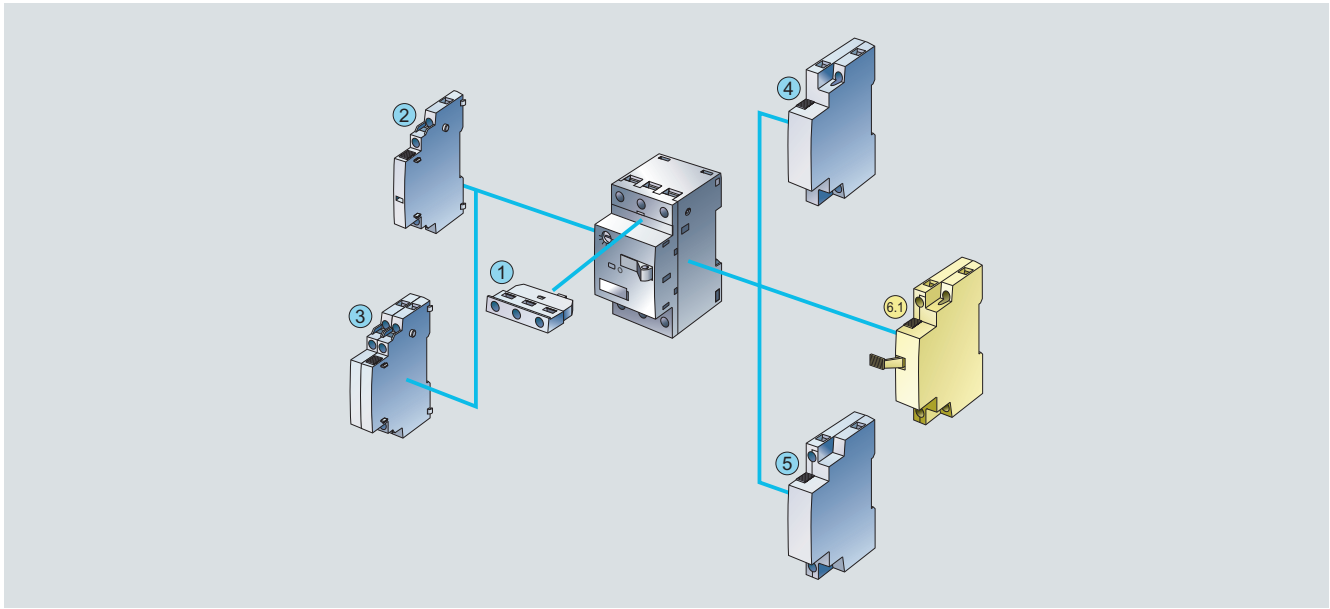
-- Does not have this function or cannot use this accessory

General data

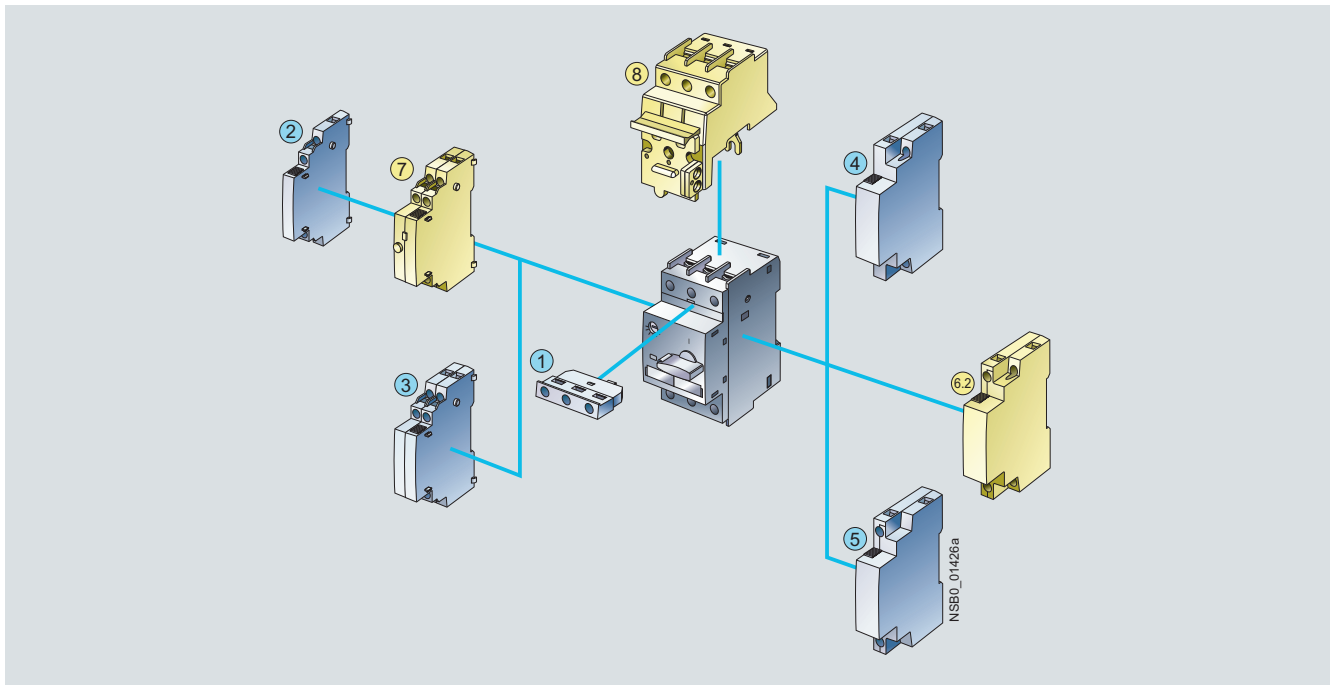
Overview

The following illustrations show our 3RV1 motor starter protectors with the accessories which can be mounted for the various sizes, see also "Introduction" --> "Overview".

S00 motor starter protectors with mountable accessories



Motor starter protectors, sizes S0, S2 or S3, with mountable accessories



Mountable accessories for all sizes S00 ... S3

1. Transverse auxiliary switch (can not be used with 3RV17 and 3RV18 circuit breakers)
2. Lateral auxiliary switch with 2 contacts
3. Lateral auxiliary switch with 4 contacts
4. Shunt release
5. Undervoltage release

Mountable accessories	for sizes
6.1 Undervoltage release with leading auxiliary contacts	S00
6.2 Undervoltage release with leading auxiliary contacts	S0 ... S3
7 Alarm switch	S0 ... S3
8 Isolator module	S0 and S2

For accessories, see page 26.

Size S0 motor starter protector

3RV1 motor starter protectors are compact, current limiting motor starter protectors which are optimized for load feeders. The motor starter protectors are used for switching and protecting induction motors of up to 45 kW at 400 V AC and for other loads with rated currents of up to 100 A.

Type of construction

The motor starter protectors are available in four sizes:

- Size S00 - width 45 mm,
  max. rated current 12 A,
  at 400 V AC suitable for induction motors up to 5.5 kW.
- Size S0 – width 45 mm,
  max. rated current 25 A,
  at 400 V AC suitable for induction motors up to 11 kW.
- Size S2 – width 55 mm,
  max. rated current 50 A,
  at 400 V AC suitable for induction motors up to 22 kW.
- Size S3 – width 70 mm,
  max. rated current 100 A,
  at 400 V AC suitable for induction motors up to 45 kW.

Note

⊕	Screw terminals
	Cage Clamp terminals
	These connections are indicated in the Technical specifications by orange backgrounds.

"Increased safety" type of protection EEx e according to ATEX directive 94/9/EC

The 3RV10 motor starter protectors are suitable for the overload protection of explosion-proof motors with "increased safety" type of protection EEx e;
see Catalog LV 1 , Chapter 20 "Appendix" --> "Standards and Approvals" --> "Type Overview of Approved Devices for Explosion-Protected Areas (ATEX Explosion Protection)".

Design

Screw terminals

3RV1 motor starter protectors of sizes S00 and S0 are fitted with terminals with captive screws and clamping pieces, allowing the connection of 2 conductors with different cross-sections.

The box terminals of the S2 and S3 motor starter protectors also enable 2 conductors with different cross-sections to be connected. With the exception of S3 motor starter protectors which are equipped with 4 mm Allen screws, all terminal screws are tightened with a Pozidriv screwdriver size 2.

The box terminals of the S3 motor starter protectors can be removed in order to connect conductors with cable lugs or connecting bars. A terminal cover is available as touch protection and to ensure that the required clearances and creepage distances are maintained if the box terminals are removed.

Cage Clamp terminals

As an alternative to screw terminals, S00 motor starter protectors are also available with Cage Clamp terminals.

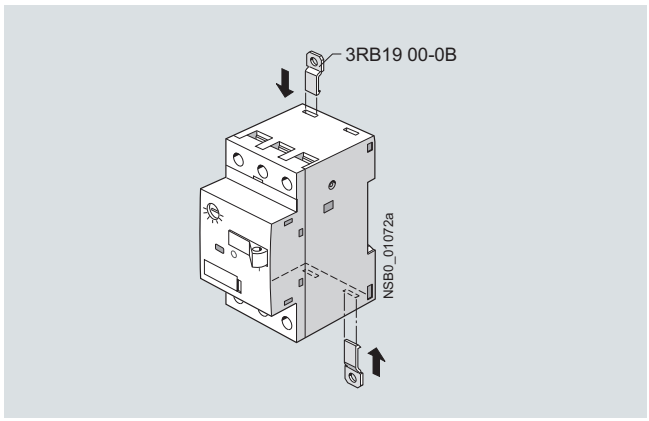
Motor starter protector size S00 with Cage Clamp terminals

This screwless connection method, already familiar from terminal blocks, clamps the conductors using a spring-type terminal and is shock-proof and vibration-proof.

Motor starter protectors with Cage Clamp terminals allow independent connection of two conductors per terminal.

Mounting

The motor starter protectors are snap-fitted on a 35 mm standard mounting rail to EN 60715.



Push-in lugs for screwing the motor starter protector onto mounting plates.

A standard mounting rail with a height of 15 mm is required for size S3 motor starter protectors. A 75 mm standard mounting rail can be used as an alternative for size S3.

S2 and S3 motor starter protectors can also be screwed directly onto a base plate.

The 3RB19 00-0B push-in lugs are available for screw mounting of S00 and S0 motor starter protectors.

General data

3RV16 voltage transformer circuit breakers up to 3 A

The voltage transformer circuit breaker widely corresponds with the SIRIUS 3RV1 motor starter protector, size S00. Two special features are taken into account for safe prevention of false tripping of the distance protection device.

Auxiliary switch for blocking the distance protection

The main contacts of the circuit breaker are opened if the voltage transformer circuit breaker is tripped or switched off. The distance protection would falsely interpret low impedance as a fault, which results in immediate power disconnection within only a few milliseconds.

To prevent this false tripping, special auxiliary contacts with a time-dependent assignment to the circuit breaker's main contacts (see timing diagram) must be provided. The distance protection is blocked with the help of these auxiliary contacts and thus prevents false tripping.

An auxiliary switch for blocking the distance protection device is available as 1 changeover contact fitted permanently in the voltage transformer circuit breaker. This changeover contact can be used as 1 NO (11-14) or 1 NC (11-12). Thanks to the high contact stability of these auxiliary contacts at the lowest possible rated operational currents, they are also suitable for modern solid-state distance protection devices.

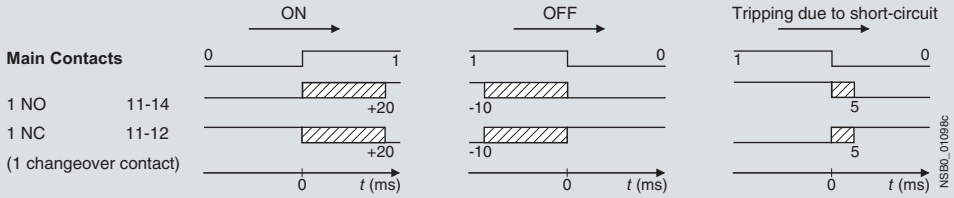
The laterally mounted auxiliary switches of the SIRIUS range can be used for signaling purposes. They cannot be used for blocking the distance protection device.

Impedance across the main contacts

There is only minor current flow across the main contacts of the voltage transformer circuit breaker.

To ensure reliable functioning of the distance protection, transfer resistance of the main contacts must be minimal and nearly constant throughout the endurance of the circuit breaker.

This is implemented with suitable contacts and contact materials for the 3RV16 voltage transformer circuit breaker.

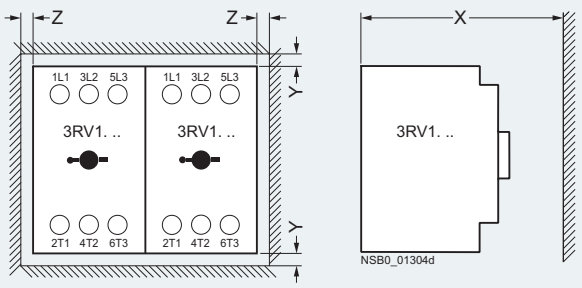


Timing diagram of auxiliary switches for blocking distance protection

Installation guidelines for motor starter protectors/circuit breakers

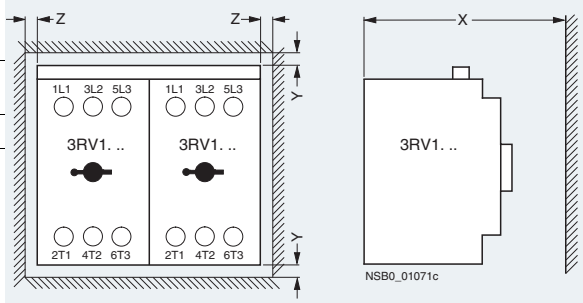
When mounting the motor starter protectors, the following clearances must be maintained to grounded or live parts and to cable ducts made of molded plastic.

Motor starter protectors/circuit breakers			Distance to grounded or live parts and to molded-plastic cable ducts acc. to IEC 60947-2		
Type	Size	U_e V	Y mm	X mm	Z mm
3RV1. 1, 3RV16 1.	S00	Up to 690	20	70	9
3RV1. 2, 3RV17 21, 3RV18 21	S0	Up to 500 Up to 690	30 50	90 90	9 30
3RV1. 3	S2	Up to 690	50	140	10
3RV1. 4	S3	Up to 240 Up to 440 Up to 500 Up to 690	50 70 110 150	167 167 167 167	10 10 10 30
3RV17 42	S3	Up to 240 Up to 400	90 90	167 167	10 10



Installation guidelines for motor starter protectors/circuit breakers with limiter function

Motor starter protectors/circuit breakers			Distance to grounded or live parts and to molded-plastic cable ducts acc. to IEC 60947-2		
Type	Size	U_e V	Y mm	X mm	Z mm
3RV1. 2	S0	Up to 500 Up to 690	40 50	90 90	10 30
3RV1. 3	S2	Up to 690	50	140	10
3RV1. 4	S3	Up to 500 Up to 690	110 150	167 167	10 30

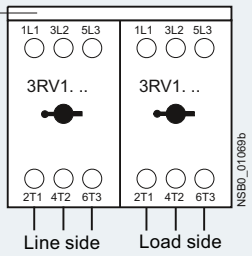


Standard mounting for S0, S2 and S3

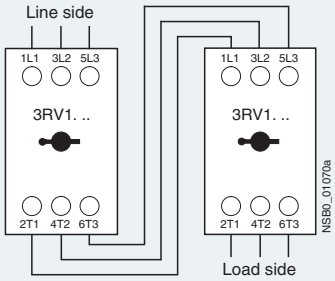
Wiring module

Size S0: 3RV19 15-1AB
Size S2: 3RV19 35-1A
Size S3: 3RV19 43-3D

Size S3 only:
Caution:
The wiring module demands 10 mm spacing between the motor starter protectors



Structure for S0 for the setting ranges 5.5 A ... 8 A up to 20 A ... 25 A for 690 V



Function

Trip units

3RV1 motor starter protectors are equipped with inverse-time delayed overload release based on the bimetal principle and with instantaneous electronic trip units (electromagnetic short-circuit releases).

The overload releases can be adjusted in accordance with the load current. The electronic trip units are permanently set to a value 13 times the rated current and thus enable trouble-free starting of motors.

Motor starter protectors for line-side transformer protection are set to 20 times the rated current to prevent tripping as a result of high transformer inrush current.

The scale cover can be sealed to prevent unauthorized adjustments to the set current.

Trip classes

The trip classes of thermally delayed trip units are based on the tripping time (t_A) at 7.2 times the set current in cold state (excerpt from IEC 60947-4):

- CLASS 10A: 2 s < t_A < 10 s
- CLASS 10: 4 s < t_A < 10 s
- CLASS 20: 6 s < t_A < 20 s
- CLASS 30: 9 s < t_A < 30 s

The motor starter protector must trip within this time!

Operating mechanisms

S00 motor starter protectors are actuated by a rocker operating mechanism and S0, S2 and S3 motor starter protectors by a rotary operating mechanism. If the motor starter protector trips, the rotary operating mechanism switches to the tripped position to indicate this. Before the motor starter protector is reclosed, the rotary operating mechanism must be reset manually to the 0 position. Only then can the motor starter protector be set again to the I position.

In the case of motor starter protectors with rotary operating mechanisms, an electrical signal can be output by a signal switch to indicate that the motor starter protector has tripped.

All operating mechanisms can be locked in the 0 position with a padlock (shackle diameter 3.5 mm to 4.5 mm).

The motor starter protector isolating function complies with IEC 60947-2.

Configuration

Prevention of unintended tripping

In order to prevent premature tripping due to the integrated phase failure sensitivity, motor starter protectors should always be connected to ensure current flows through all three main current paths.

Short-circuit protection

If a short-circuit occurs, the short-circuit releases of 3RV1 motor starter protectors isolate the faulty load feeder from the network and thus prevent further damage.

Motor starter protectors with a short-circuit breaking capacity of 50 kA or 100 kA are virtually short-circuit resistant at a voltage of 400 V AC, since higher short-circuit currents are not to be expected in practice.

Motor protection

The tripping characteristics of 3RV10/3RV11 motor starter protectors are designed mainly to protect induction motors.

The motor starter protectors are therefore also referred to as motor-protective circuit breakers.

The rated current I_n of the motor to be protected is set on the setting scale. Factory setting of the short-circuit release is 13 times the rated current of the motor starter protector. This permits trouble-free starting and ensures that the motor is properly protected.

The phase failure sensitivity of the motor starter protector ensures that it is tripped in time in the event of a phase failure and overcurrents that occur as a result in the other phases.

Motor starter protectors with thermal overload releases are normally designed in accordance with trip class 10 (CLASS 10). Motor starter protectors of sizes S2 and S3 are also available in trip class 20 (CLASS 20) and therefore allow motors to be started up under arduous conditions.

Motor protection with overload relay function (automatic RESET)

The 3RV11 motor starter protectors for motor protection with overload relay function are designed for the protection of induction motors.

They are equipped with the same short-circuit release and overload release as motor starter protectors for motor protection without overload relay function.

The motor starter protector always remains closed in the event of an overload. The overload release activates only two auxiliary contacts (1 NO + 1 NC). The overload trip can be signaled to a higher-level control with the help of these auxiliary contacts. Generally, it is also possible to open a downstream contactor directly.

The overload signal is reset automatically. The motor starter protector itself only trips if a short-circuit occurs downstream.

General data

System protection

The 3RV10 and 3RV11 motor starter protectors for motor protection are also suitable for plant protection.

In order to prevent premature tripping due to phase failure sensitivity, the three conducting paths must always be uniformly loaded. The conducting paths must be connected in series in the case of single-phase loads.

The 3RV17 and 3RV18 circuit breakers are suitable for system protection and at the same time they are approved as circuit breakers according to UL 489 and CSA C22.2 No. 5-02 for 100 % rated current (100 % rated breaker).

Short-circuit protection for starter combinations

The 3RV13 motor starter protectors for starter combinations in sizes S0, S2 and S3 provide short-circuit protection with the help of a contactor and overload relay combination.

Like the motor starter protectors for motor protection, they are equipped with short-circuit releases which are permanently set to a value equivalent to 13 times the rated current of the motor starter protectors. They are not equipped with overload releases.

On overload, the overload relay triggers the contactor, the motor starter protector remains closed.

Only when a short-circuit occurs in the feeder does the motor starter protector trip as well.

The motor starter protector for starter combinations must always be used in combination with an overload relay because the motor starter protector alone cannot protect the motor and itself against overload.

Transformer protection

When control transformers are protected on the line side, the high inrush currents generated at the time the transformers are switched on often cause spurious tripping in the protection mechanisms.

3RV14 motor starter protectors in sizes S0 and S2 and 3RV18 circuit breakers in size S0 for protecting transformers are therefore fitted with electronic trip units which are permanently set in the factory to a value equivalent to 20 times the rated current. For the 3RV17 circuit breakers in sizes S0 and S3 these electronic trip units are set in the factory to approximately 13 times the rated current.

Motor starter protectors can thus be used to provide line-side protection for transformers, the inrush peak currents of which are up to 30 times the rated current.

The 3RV17 and 3RV18 are approved as circuit breakers according to UL 489 and CSA 22.2 No. 5-02 for the protection of transformers, the 3RV18 circuit breakers size S0 are designed specially for the protection of transformers with high inrush current.

This version of motor starter protector is not necessary in the case of control-power transformers with low inrush currents, such as control transformers from Siemens. 3RV1 motor starter protectors for motor protection can be used in this case.

Main and EMERGENCY-STOP switches

The 3RV10, 3RV11, 3RV13, 3RV14 and 3RV16 motor starter protectors comply with the isolating function to IEC 60947-2, therefore they can be used – taking IEC 60204-1 into account – as main and EMERGENCY-STOP switches.

3RV19 .6-2. door-coupling rotary operating mechanisms for heavy duty also comply with the requirements for the isolating function.

Fuse monitoring

The 3RV16 11-0BD10 motor starter protector size S00 is used for fuse monitoring.

A fuse is connected in parallel with each conducting path of the motor starter protector. When a fuse blows, the current flows through the parallel conducting path and trips the motor starter protector.

The 3RV16 11-0BD10 motor starter protector for fuse monitoring must be equipped with a transverse or lateral auxiliary switch (see "Accessories") that signals a tripping operation of the motor starter protector and thus the tripping of the fuse, or switches off all poles of the disrupted electric circuit with the help of an appropriate switching device.

Motor starter protector for fuse monitoring

Notes on safety

When monitoring fuses with safety isolating functions, a warning sign must be affixed near the fuses indicating that voltage may still be present through the parallel circuit of the monitoring equipment assumed to be isolated after the fuse has been removed and if the monitoring equipment is not switched off.

We recommend the following text for this warning:

Caution!
For safety isolation, also switch off fuse monitoring equipment with the item code .....

The 3RV16 11-0BD10 motor starter protector for fuse monitoring is suitable for the following voltages: AC 50 Hz/60 Hz from 24 V to 690 V and up to 450 V DC. Fuse monitoring with 3RV16 11-0BD10 motor starter protector is not permissible in feeders with power controllers that can induce DC feedback of higher values when an error occurs.

With parallel cables and meshed systems, the motor starter protector will only trip, and a signal will be output to indicate this, if the voltage difference across the motor starter protector is at least 24 V.

Use of IT systems (IT networks)

3RV1 motor starter protectors are suitable for operation in IT systems according to IEC 60947-2. In the event of a three-pole short-circuit, their response in this system is the same as in others: Therefore, the same short-circuit breaking capacity I_{cu} and I_{cs} applies, (see "Technical specifications").

An initial fault (ground fault) does not necessarily force immediate disconnection of the network when operating IT systems. If a second independent error occurs (ground fault), the switching capacity of the motor starter protector might be reduced.

This is the case if both ground faults occur in different phases and if one of the ground faults occurs on the input side and the other on the outgoing terminal of the motor starter protector.

In order to maintain the short-circuit function of the motor starter protector even with two independent ground faults (double ground faults), the reduced short-circuit breaking capacity with double ground faults must be taken into account in IT systems I_{cuIT} (see "Technical specifications"). If a ground fault is instantaneously recognized and remedied (ground-fault monitoring), the risk of double ground fault and thus reduced short-circuit breaking capacity I_{cuIT} can be minimized.

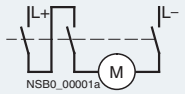
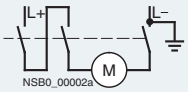
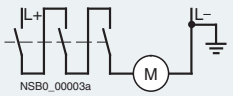
Switching of direct current

3RV1 motor starter protectors for alternating currents are also suitable for DC switching.

The maximum permissible DC voltage per conducting path must, however, be adhered to. Higher voltages require a series connection with 2 or 3 conducting paths.

The response values of the overload release remain unchanged; the response values of a short-circuit release increase by approximately 30 % for DC. The example circuits for DC switching can be seen in the table below.

Example circuit for size S00 to S3 3RV1 motor starter protectors

Example circuit for size S00 to S3 3RV1 motor starter protectors	Maximum permitted DC voltage U_e	Notes
	150 V DC	Three-pole switching, non-grounded system[1)] If there is no possibility of a ground fault, or if every ground fault is rectified immediately (ground-fault monitoring), then the maximum permitted DC voltage can be tripled.
	300 V DC	Two-pole switching, grounded system The grounded pole is always assigned to the individual conducting path, so that there are always 2 conducting paths in series in the event of a ground fault.
	450 V DC	Single-pole switching, grounded system 3 conducting paths in series. The grounded pole is assigned to the unconnected conducting path.

1) It is assumed that this circuit always provides safe disconnection even in the event of a double ground fault that bridges two contacts.

3RV16 voltage transformer circuit breakers up to 3 A

The voltage transformer circuit breaker protects the secondary side of voltage transformers used to connect protection equipment with voltage-dependent starting. The circuit breaker is used for distance protection with low-impedance starting. Special auxiliary contacts reliably prevent low-impedance starting from triggering distance protection if only one fault has occurred in the transformer line.

The voltage transformer circuit breaker can also be used to safely disconnect the distance protection device from the voltage transformer. In this case, the special auxiliary contacts also prevent false tripping of the distance protection.

Additional fuses are not required. A "Fuse Failure Monitor" (FFM) is also not required.

General data

Technical specifications

Short-circuit breaking capacity I_{cu}, I_{cs} acc. to IEC 60947-2

This table shows the rated ultimate short-circuit breaking capacity I_{cu} and the rated service short-circuit breaking capacity I_{cs} of the 3RV1 motor starter protectors with different inception voltages dependent of the rated current I_n of the motor starter protectors.

Motor starter protector infeed is permissible at the upper or lower terminals without restricting the rated data. If the short-circuit current at the place of installation exceeds the rated short-circuit breaking capacity of the motor starter protector as specified in the table, a back-up fuse is required. Alternatively, a motor starter protector with a limiter function can be connected upstream.

The maximum rated current for the back-up fuse is specified in the tables. The rated ultimate short-circuit breaking capacity then applies as specified on the fuse.

Fuseless construction

Motor starter protector contactor combinations for short-circuit currents up to 50 kA can be ordered in the form of fuseless load feeders according to Chapter 6.

Motor starter protectors/circuit breakers	Rated current I_n	Up to 240 V AC[1]			Up to 400 V[1]/415 V AC[2]			Up to 440 V[1]/460 V AC[2]			Up to 500 V[1]/525 V AC[2]			Up to 690 V AC[1]		
		(these values do not apply to 3RV17 42 circuit breakers)														
		I_{cu}	I_{cs}	Max. fuse (gL/gG)	I_{cu}	I_{cs}	Max. fuse (gL/gG)[3]	I_{cu}	I_{cs}	Max. fuse (gL/gG)[3]	I_{cu}	I_{cs}	Max. fuse (gL/gG)[3]	I_{cu}	I_{cs}	Max. fuse (gL/gG)[3][4]
Type	A	kA	kA	A	kA	kA	A	kA	kA	A	kA	kA	A	kA	kA	A
Size S00																
3RV10, 3RV16 11-0BD10	0.16 ... 1	100	100	°	100	100	°	100	100	°	100	100	°	100	100	°
	1.25; 1.6	100	100	°	100	100	°	100	100	°	100	100	°	2	2	20
	2; 2.5	100	100	°	100	100	°	100	100	°	10	10	35	2	2	35
	3.2; 4	100	100	°	100	100	°	50	10	40	3	3	40	2	2	40
	5; 6.3	100	100	°	100	100	°	50	10	50	3	3	50	2	2	50
	8	100	100	°	53	12.5	80	50	10	63	3	3	63	2	2	63
	10	100	100	°	53	12.5	80	6	4	63	3	3	63	2	2	63
	12	100	100	°	53	12.5	80	6	4	80	3	3	80	2	2	80
Size S0																
3RV1. 2, 3RV17 21, 3RV18 21	0.16 ... 1.6	100	100	°	100	100	°	100	100	°	100	100	°	100	100	°
	2; 2.5	100	100	°	100	100	°	100	100	°	100	100	°	8	8	25
	3.2	100	100	°	100	100	°	100	100	°	100	100	°	8	8	32
	4; 5	100	100	°	100	100	°	100	100	°	100	100	°	6	3	32
	6.3	100	100	°	100	100	°	100	100	°	100	100	°	6	3	50
	8	100	100	°	100	100	°	50	25	63	42	21	63	6	3	50
	10	100	100	°	100	100	°	50	25	80	42	21	63	6	3	50
	12.5	100	100	°	100	100	°	50	25	80	42	21	80	6	3	63
	16	100	100	°	50	25	100	50	10	80	10	5	80	4	2	63
	20	100	100	°	50	25	125	50	10	80	10	5	80	4	2	63
	22; 25	100	100	°	50	25	125	50	10	100	10	5	80	4	2	63
Size S2																
3RV1. 3	16	100	100	°	50	25	100	50	25	100	12	6	63	5	3	63
	20	100	100	°	50	25	100	50	25	100	12	6	80	5	3	63
	25	100	100	°	50	25	100	50	15	100	12	6	80	5	3	63
	32	100	100	°	50	25	125	50	15	125	10	5	100	4	2	63
	40; 45	100	100	°	50	25	160	50	15	125	10	5	100	4	2	63
	50	100	100	°	50	25	160	50	15	125	10	5	100	4	2	80
Size S3																
3RV1. 41	40	100	100	°	50	25	125	50	20	125	12	6	100	6	3	63
	50	100	100	°	50	25	125	50	20	125	12	6	100	6	3	80
	63	100	100	°	50	25	160	50	20	160	12	6	100	6	3	80
	75	100	100	°	50	25	160	50	20	160	8	4	125	5	3	100
	90; 100	100	100	°	50	25	160	50	20	160	8	4	125	5	3	125
Size S3, with increased switching capacity																
3RV1. 42 / 3RV17 42[5]	16/10	100	100	°	100	50	°	100	50	°	30	15	80	12	7	63
	20/15	100	100	°	100	50	°	100	50	°	30	15	80	12	7	63
	25/20	100	100	°	100	50	°	100	50	°	30	15	80	12	7	63
	32/25	100	100	°	100	50	°	100	50	°	22	11	100	12	7	63
	40/30	100	100	°	100	50	°	100	50	°	18	9	160	12	6	80
	50/35 ... 40	100	100	°	100	50	°	100	50	°	15	7.5	160	10	5	100
	63/45 ... 50	100	100	°	100	50	°	70	50	200	15	7.5	160	7.5	4	100
	75/60	100	100	°	100	50	°	70	50	200	10	5	160	6	3	125
	90/70	100	100	°	100	50	°	70	50	200	10	5	160	6	3	160
	100/ --	100	100	°	100	50	°	70	50	200	10	5	160	6	3	160

Short-circuit resistant up to at least 50 kA

° No back-up fuse required, since short-circuit resistant up to 100 kA

1) 10 % overvoltage.

2) 5 % overvoltage.

3) Back-up fuse only required if the short-circuit current at the place of installation > I_{cu}.

4) Alternatively, fuseless limiter combinations for 690 V AC can also be used.

5) The values for the 3RV17 42 circuit breakers have been tested only up to 400 V/415 V AC; values > 440 V AC on request.

Short-circuit breaking capacity I_{cuIT} in the IT system (IT network) according to IEC 60947-2

3RV1 motor starter protectors are suitable for operation in IT systems. Values valid for triple-pole short-circuit are I_{cu} up to I_{cs}. In case of double ground fault on different phases at the input and output side of a motor starter protector, the special short-circuit breaking capacity I_{cuIT} applies. The specifications in the table below apply to 3RV1 motor starter protectors.

In the colored areas, I_{cuIT} is 100 kA, or in some ranges it is 50 kA. Therefore the motor starter protectors are short-circuit resistant in these ranges.

If the short-circuit current at the place of installation exceeds the rated short-circuit breaking capacity of the motor starter protector as specified in the table, a back-up fuse is required. The maximum rated current for the back-up fuse is specified in the tables. The rated short-circuit breaking capacity then applies as specified on the fuse.

Motor starter protectors	**Rated current I_n**	**Up to 240 V AC**[1]		**Up to 400 V**[1]**/415 V AC**[2]		**Up to 500 V**[1]**/525 V AC**[2]		**Up to 690 V AC**[1] [4] [5]	
		I_{cuIT}	Max. fuse (gL/gG)[3]	I_{cuIT}	Max. fuse (gL/gG)[3][4]	I_{cuIT}	Max. fuse (gL/gG)[3]	I_{cuIT}	Max. fuse (gL/gG)[3]
Type	A	kA	A	kA	A	kA	A	kA	A
Size S00									
3RV10 1, 3RV16 11-0BD10	0,16 ... 0,4	100	°	100	°	100	°	100	°
	0,5	100	°	100	°	100	°	0,5	4
	1,63	100	°	100	°	100	°	0,5	6
	0,8	100	°	100	°	100	°	0,5	6
	1	100	°	100	°	2	10	0,5	10
	1,25	100	°	2	20	2	16	0,5	16
	1,6	100	°	2	20	2	20	1	16
	2	100	°	2	35	2	25	1	20
	2,5	100	°	2	35	2	25	1	25
	3,2	100	°	2	40	2	35	1	25
	4	100	°	2	40	2	35	1	35
	5	100	°	2	50	2	35	1	35
	6,3	100	°	2	50	2	40	1	40
	8	50	80	2	63	2	40	1	40
	10	50	80	2	63	2	50	1	50
	12	50	80	2	80	2	50	1	50
Size S0									
3RV1. 2,	0,16 ... 0,4	100	°	100	°	100	°	100	°
	0,5	100	°	100	°	100	°	0,5	4
	1,63	100	°	100	°	100	°	0,5	6
	0,8	100	°	100	°	100	°	0,5	6
	1	100	°	100	°	8	10	2	10
	1,25	100	°	100	°	8	16	2	16
	1,6	100	°	100	°	8	20	2	16
	2	100	°	8	25	8	25	2	20
	2,5	100	°	8	25	8	25	2	20
	3,2	100	°	8	32	8	32	2	25
	4	100	°	6	32	2	32	2	25
	5	100	°	6	32	2	32	2	25
	6,3	100	°	6	50	2	40	1,5	35
	8	100	°	6	50	2	40	1,5	35
	10	100	°	6	50	2	40	1,5	40
	12	100	°	6	63	2	50	1,5	40
	16	50	80	4	63	2	50	1,5	40
	20	50	80	4	63	2	50	1,5	50
	22	50	80	4	63	2	50	1,5	50
	25	50	80	4	63	2	50	1,5	50
Size S2									
3RV1. 3	16	50	100	8	100	6	80	5	63
	20	50	125	8	100	6	80	5	63
	25	50	125	8	100	6	80	5	63
	32	50	125	6	125	4	100	3	80
	40 ... 50	50	160	6	125	4	100	3	80

General data

Motor starter protectors	Rated current I_n	Up to 240 V AC[1]		Up to 400 V[1]/415 V AC[2]		Up to 500 V[1]/525 V AC[2]		Up to 690 V AC[1) 4) 5)]	
		I_{cuIT}	Max. fuse (gL/gG)[3]	I_{cuIT}	Max. fuse (gL/gG)[3)4)]	I_{cuIT}	Max. fuse (gL/gG)[3]	I_{cuIT}	Max. fuse (gL/gG)[3]
Type	A	kA	A	kA	A	kA	A	kA	A
Size S3									
3RV1. 41	40	50	125	10	63	5	50	5	50
	50	50	125	8	80	3	63	3	63
	63	50	160	6	80	3	63	3	63
	75	50	160	5	100	2	80	2	80
	90; 100	50	160	5	125	2	100	2	100
Size S3, with increased switching capacity									
3RV1. 42	16	100	°	12	63	6	50	6	50
	20	100	°	12	63	6	50	6	50
	25	100	°	12	63	6	50	6	50
	32	100	°	12	63	6	50	6	50
	40	100	°	12	80	6	63	6	63
	50	100	°	10	100	4	80	4	80
	63	100	°	7.5	100	4	80	4	80
	75	100	°	6	125	3	100	3	100
	90	100	°	6	160	3	125	3	125
	100	100	°	6	160	3	125	3	125

Short-circuit resistant up to at least 50 kA

° No back-up fuse required, since short-circuit resistant up to 100 kA

1) 10 % overvoltage.

2) 5 % overvoltage.

3) Back-up fuse only required, if short-circuit current at the place of installation > I_{cuIT}.

4) Alternatively, fuseless limiter combinations for 690 V AC can also be used.

5) Overvoltage category II applies for applications in IT networks > 600 V

Limiter function with standard devices for 500 V AC and 690 V AC acc. to IEC 60947-2

The table shows the rated ultimate short-circuit breaking capacity I_{cu} and the rated service short-circuit breaking capacity I_{cs} with an upstream standard motor starter protector that fulfills the limiter function at 500 V AC and 690 V AC. The short-circuit breaking capacity can be increased significantly with an upstream standard motor starter protector.

The motor starter protector which is connected downstream must be set to the rated current of the load.

With motor starter protector combination assemblies, note the clearance to grounded parts and between the motor starter protectors. Short-circuit resistant wiring between the motor starter protectors must be ensured. The motor starter protectors can be mounted side by side in a modular arrangement.

Standard motor starter protectors		**Rated current I_n**	**Up to 500 V[1]/525 V AC[2]**		**Up to 690 V AC[1]**	
	With limiter function rated current I_n		I_{cu}	I_{cs}	I_{cu}	I_{cs}
Type	Type	A	kA	kA	kA	kA
Size S0						
3RV10 2	**3RV13 21-4DC10**	Up to 1	°	°	°	°
		1.25	°	°	°	°
	I_n = 25 A	1.6	°	°	°	°
		2	°	°	50	25
		2.5	°	°	50	25
		3.2	°	°	50	25
		4	°	°	50	25
		5	°	°	50	25
		6.3	°	°	50	25
		8	100	50	20	10
		10	100	50	20	10
		12.5	100	50	20	10
		16	100	50	20	10
		20	100	50	20	10
		22	100	50	20	10
		25	100	50	20	10
Size S2						
3RV10 3	**3RV13 31-4HC10**	16	100	50	50	25
		20	100	50	50	25
	I_n = 50 A	25	100	50	50	25
		32	100	50	50	25
		40	100	50	50	25
		50	100	50	50	25
Size S3						
3RV10 4	**3RV13 41-4HC10**	32	100	50	50	25
		40	100	50	50	25
	I_n = 50 A	50	100	50	50	25
	3RV13 41-4MC10	50	100	50	50	25
		63	100	50	50	25
	I_n = 100 A	75	100	50	50	25
		90	100	50	50	25
		100	100	50	50	25

Short-circuit resistant up to 100 kA

° No back-up fuse required, since short-circuit resistant up to 100 kA

1) 10 % overvoltage.

2) 5 % overvoltage.

General data

General technical specifications

Type			3RV1. 1[1]	3RV1. 2	3RV1. 3	3RV1. 4	3RV17 21	3RV17 42	3RV18 21
Standards									
• IEC 60947-1, EN 60947-1 (VDE 0660 Part 100)			Yes						
• IEC 60947-2, EN 60947-2 (VDE 0660 Part 101)			Yes						
• IEC 60947-4-1, EN 60947-4-1 (VDE 0660 Part 102)			Yes				No		
• UL 489, CSA C22.2-No.5-02			No				Yes		
Size			S00	S0	S2	S3	S0	S3	S0
Number of poles			3						
Max. rated current $I_{n\ max}$ (= max. rated operational current I_e)		A	12	25	50	100	22	70	20
Permissible ambient temperature									
• Storage/transport		°C	–50 ... +80						
• Operation		°C	–20 ... +70[2]						
Permissible rated current at inside temperature of control cabinet									
• +60 °C		%	100						
• +70 °C		%	87						
Motor starter protectors/circuit breakers inside enclosure									
Permissible rated current at ambient temperature of enclosure									
• +35 °C		%	100						
• +60 °C		%	87						
Rated operational voltage U_e									
• Acc. to IEC		V AC	690[3]						
• Acc. to UL/CSA		V AC	600						
Rated frequency		Hz	50/60						
Rated insulation voltage U_i		V	690						
Rated impulse withstand voltage U_{imp}		kV	6						
Utilization categories									
• IEC 60947-2 (motor starter protector/circuit breaker)			A						
• IEC 60947-4-1 (motor starter)			AC -3				--		
Trip classes CLASS	Acc. to IEC 60947-4-1		10		10/20		--		
DC short-circuit breaking capacity (time constant t = 5 ms)									
• 1 conducting path 150 V DC		kA	10						
• 2 conducting paths in series 300 V DC		kA	10						
• 3 conducting paths in series 450 V DC		kA	10						
Power loss P_v per motor starter protector/circuit breaker Dependent on rated current I_n (upper setting range)	I_n: ... 1.25 A	W	5	--					
	I_n: 1.6 ... 6.3 A	W	6	--					
	I_n: 8 ... 12 A	W	7	--					
$R_{per\ conducting\ path} = P/I^2 \times 3$	I_n: ... 0.63 A	W	--	5	--		5	--	5
	I_n: 0.8 ... 6.3 A	W	--	6	--		6	--	6
	I_n: 8 ... 16 A	W	--	7	--		7	--	7
	I_n: 20 ... 25 A	W	--	8	--		8	--	8
	I_n: ... 25 A	W	--		12	--			
	I_n: 32 A	W	--		15	--			
	I_n: 40 ... 50 A	W	--		20	--			
	I_n: ... 63 A	W	--			20	--		
	I_n: 75 and 90 A	W	--			30	--		
	I_n: ... 100 A	W	--			38	--		
	I_n: ... 10 A	W	--					8	--
	I_n: ... 35 A	W	--					12	--
	I_n: ... 70 A	W	--					21	--
Shock resistance	Acc. to IEC 60068-2-27	g/ms	25/11 (square and sine pulse)						
Degree of protection	Acc. to IEC 60529		IP20[4]						
Touch protection	Acc. to EN 50274		Finger-safe						
Temperature compensation	Acc. to IEC 60947-4-1	°C	–20 ... +60						
Phase failure sensitivity	Acc. to IEC 60947-4-1		Yes				No		
Explosion protection – safe operation of motors with "increased safety" type of protection			Yes, for 3RV10 (CLASS 10)				No		
EC type test certificate number acc. to directive 94/9/EC (ATEX)			DMT 02 ATEX F 001 Ex II (2) GD, DMT 02 ATEX F 001 N1 Ex II (2) GD						
Isolating function	Acc. to IEC 60947-2		Yes						
Main and EMERGENCY-STOP switch characteristics[5]	Acc. to IEC 60204-1 (VDE 0113)		Yes						
Protective separation between main and auxiliary circuits, required for PELV applications	Acc. to EN 60947-1								
• Up to 400 V + 10 %			Yes						
• Up to 415 V + 5 % (higher voltages on request)			Yes						
Permissible mounting positions			Any, acc. to IEC 60447 start command "I" right-hand side or top						
Mechanical endurance		Operating cycles	100 000		50 000		100 000	50 000	100 000
Electrical endurance		Operating cycles	100 000		25 000		100 000	25 000	100 000
Max. switching frequency per hour (motor starts)		1/h	15						

For footnotes see page 15.

For short-circuit breaking capacity I_{cu}, I_{cs} see table of same name.

Conductor cross-sections of main circuit

Type		3RV1.	3RV1. 2	3RV1. 3	3RV1. 4/ 3RV17 42	3RV17 21, 3RV18 21
Connection type		**Screw terminals**		**Screw terminals with box terminal**		
Terminal screw		Pozidriv size 2		Pozidriv size 2	4 mm Allen screw	Pozidriv size 2
Prescribed tightening torque	Nm	0.8 ... 1.2	2 ... 2.5	3 ... 4.5	4 ... 6	2.5 ... 3
Conductor cross-sections (1 or 2 conductors connectable)						
• Solid	mm^2	2 x (0.5 ... 1.5)[4], 2 x (0.75 ... 2.5)[4]	2 x (1 ... 2.5)[4], 2 x (2.5 ... 6)[4]	2 x (0.75 ... 16)	2 x (2.5 ... 16)	1 ... 10, max. 2 x 10
• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5)[4], 2 x (0.75 ... 2.5)[4]	2 x (1 ... 2.5)[4], 2 x (2.5 ... 6)[4]	2 x (0.75 ... 16), 1 x (0.75 ... 25)	2 x (2.5 ... 35), 1 x (2.5 ... 50)	1 ... 16, max. 6 + 16
• Stranded	mm^2	2 x (0.5 ... 1.5)[4], 2 x (0.75 ... 2.5)[4]	2 x (1 ... 2.5)[4], 2 x (2.5 ... 6)[4]	2 x (0.75 ... 25), 1 x (0.75 ... 35)	2 x (10 ... 50), 1 x (10 ... 70)	1.5 ... 25, max. 10 + 25
• AWG cables, solid or stranded	AWG	2 x (18 ... 14)	2 x (14 ... 10)	2 x (18 ... 2), 1 x (18 ... 2)	2 x (10 ... 1/0), 1 x (10 ... 2/0)	2 x (14 ... 10)
Ribbon cable conductors (number x width x thickness)	mm	--		2 x (6 x 9 x 0.8)		--
Removable box terminals[1]						
• With copper bars[2]		--	--		18 x 10	--
• With cable lugs[3]		--	--		Up to 2 x 70	--
Connection type		**Cage Clamp terminals**[5][6]				
Conductor cross-sections (1 or 2 conductors connectable)						
• Solid	mm^2	2 x (0.25 ... 2.5)	--			
• Finely stranded with end sleeve	mm^2	2 x (0.25 ... 1.5)	--			
• Finely stranded without end sleeve	mm^2	2 x (0.25 ... 2.5)	--			
• AWG cables, solid or stranded	AWG	2 x (24 ... 14)	--			
Max. external diameter of the conductor insulation	mm	3.6				

Footnotes for page 14:

1) For 3RV16 voltage transformer circuit breakers see more "Technical specifications".
2) Above +60 °C current reduction.
3) 500 V with molded-plastic enclosure.
4) Terminal compartment IP00 (exception: 3RV10 11-..2. motor starter protectors with Cage Clamp terminals degree of protection IP20).
5) With appropriate accessories.

Footnotes for page 15:

1) Cable lug and busbar connection possible after removing the box terminals.
2) If bars larger than 12 mm x 10 mm are connected, a 3RT19 46-4EA1 terminal cover is needed to comply with the phase clearance.
3) If conductors larger than 25 mm^2 are connected, a 3RT19 46-4EA1 terminal cover is needed to comply with the phase clearance.
4) If two different conductor cross-sections are connected to one clamping point, both cross-sections must lie in the range specified. If identical cross-sections are used, this restriction does not apply.
5) For corresponding 8WA2 803 or 8WA2 880 opening tools see Catalog LV 1, Chapter 5 "Protection Equipment" --> "3RV Motor Starter Protectors up to 100 A" --> "Accessories".
6) With conductor cross-sections of ≤ 1 mm^2 an "insulation stop" must be used (see Catalog LV 1, Chapter 3, "Accessories and Spare Parts".

General data

Permissible rated data of devices approved for North America (UL/CSA)

Motor starter protectors of the 3RV1 series are approved for UL/CSA and according to UL 508 and CSA C22.2 No. 14 they can be used on their own or as a load feeder in combination with a contactor.

These motor starter protectors can be used as "Manual Motor Controllers" for "Group Installations", as "Manual Motor Controllers Suitable for Tap Conductor Protection in Group Installations" and as "Self-Protected Combination Motor Controllers" (Type E).

3RV1 motor starter protectors as "Manual Motor Controllers"

If used as a "Manual Motor Controller", the motor starter protector is always operated in combination with an upstream short-circuit protection device. Approved fuses or a circuit breaker according to UL 489/CSA C22.2 No. 5-02 can be used. These devices must be dimensioned according to the National Electrical Code (UL) or Canadian Electrical Code (CSA).

Approval of the 3RV as a Manual Motor Controller can be found under the following file numbers:

- UL File No. 47705, CCN: NLRV,
- CSA Master Contract 165071, Product Class: 3211 05.

Motor starter protectors		**hp rating[1] for FLA[2] max.**		**Rated current I_n**	**240 V AC**		**480 V AC**		**600 V AC**	
					UL I_{bc}[3]	CSA I_{bc}[3]	UL I_{bc}[3]	CSA I_{bc}[3]	UL I_{bc}[3]	CSA I_{bc}[3]
Type	V	1-phase	3-phase	A	kA	kA	kA	kA	kA	kA
Size S00										
3RV10 11, 3RV16 11-0BD10				0.16 ... 2	65	65	65	65	10	10
				2.5	65	65	65	65	10	10
FLA[2] max. 12 A,	115	1/2	--	3.2	65	65	65	65	10	10
600 V	200	1 1/2	3	4	65	65	65	65	10	10
NEMA size 00	230	2	3	5	65	65	65	65	10	10
	460	--	7 1/2	6.3	65	65	65	65	10	10
	575/600	--	10	8	65	65	65	65	10	10
				10	65	65	65	65	10	10
				12	65	65	65	65	10	10
Size S0										
3RV10 21/3RV11 21, 3RV13 21				0.16 ... 3.2	65	65	65	65	30	30
				4	65	65	65	65	30	30
FLA[2] max. 25 A,	115	2	--	5	65	65	65	65	30	30
600 V	200	3	5	6.3	65	65	65	65	30	30
NEMA size 1	230	3	7 1/2	8	65	65	65	65	30	30
	460	--	15	10	65	65	65	65	30	30
	575/600	--	20	12.5	65	65	65	65	30	30
				16	65	65	65	65	10	10
				20	65	65	65	65	10	10
				22	65	65	65	65	10	10
				25	65	65	65	65	10	10
Size S2										
3RV10 31/3RV11 31, 3RV13 31				16	65	65	65	65	30	25
				20	65	65	65	65	30	25
FLA[2] max. 50 A,	115	3	--	25	65	65	65	65	30	25
600 V	200	7 1/2	15	32	65	65	65	65	30	25
NEMA size 2	230	10	20	40	65	65	65	65	30	25
	460	--	40	45	65	65	65	65	30	25
	575/600	--	50	50	65	65	65	65	30	25
Size S3										
3RV10 41/3RV10 42, 3RV11 42, 3RV13 41/3RV13 42				16	65	65	65	65	30	30
				20	65	65	65	65	30	30
FLA[2] max. 99 A,	115	7 1/2	--	25	65	65	65	65	30	30
600 V	200	20	30	32	65	65	65	65	30	30
NEMA size 3	230	20	40	40	65	65	65	65	30	30
	460	--	75	50	65	65	65	65	30	30
	575/600	--	100	63	65	65	65	65	30	30
				75	65	65	65	65	30	30
				90	65	65	65	65	10	10
				100	65	65	65	65	10	10

1) hp rating = Power rating in horse power (maximum motor rating).

2) FLA = Full Load Amps/Motor full load current.

3) Complies with "short-circuit breaking capacity" according to UL/CSA.

3RV10 motor starter protectors as "Manual Motor Controllers Suitable for Tap Conductor Protection in Group Installations"

The application as "Manual Motor Controllers Suitable for Tap Conductor Protection in Group Installations" is only available from UL.
CSA does not recognize this approval! When the motor starter protector is used as a "Manual Motor Controller Suitable for Tap Conductor Protection in Group Installations", it must always be combined with upstream short-circuit protection. As short-circuit-protection device, approved fuses or a motor starter protector according to UL 489 can be used.
These devices must be dimensioned according to the National Electrical Code.

The 3RV10 motor starter protectors are approved as "Manual Motor Controllers Suitable for Tap Conductor Protection in Group Installations" under the following file number:

- UL File No. 47705, CCN: NLRV.

Motor starter protectors		**hp rating[1] for FLA[2] max.**		**Rated current I_n**	**240 V AC** UL I_{bc}[3]	**Up to 480 Y/277 V AC** UL I_{bc}[3]	**Up to 600 Y/347 V AC** UL I_{bc}[3]
Type	V	1-phase	3-phase	A	kA	kA	kA
Size S00							
3RV10 11				0.16 ... 0.8	65	65	--
				1	65	65	--
FLA[2] max. 8 A,	115	1/3	--	1.25	65	65	--
480 V	200	3/4	2	2	65	65	--
NEMA size 0	230	1	2	2.5	65	65	--
	460	--	5	3.2	65	65	--
	575/600	--	--	4	65	65	--
				5	65	65	--
				6.3	65	65	--
				8	65	65	--
Size S0							
3RV10 21				0.16 ... 1.6	65	65	30
				2	65	65	30
FLA[2] max.	115	2	--	2.5	65	65	30
22 A, 480 V	200	3	5	3.2	65	65	30
12.5 A, 600 V	230	3	7 1/2	4	65	65	30
	460	--	15	5	65	65	30
NEMA size 1	575/600	--	10	6.3	65	65	30
				8	65	65	30
				10	65	65	30
				12,5	65	65	30
				16	65	65	--
				20	65	65	--
				22	65	65	--
Size S2							
3RV10 31				16	65	65	25
				20	65	65	25
FLA[2] max.	115	3	--	25	65	65	25
50 A, 600 V	200	7 1/2	15	32	65	65	25
NEMA size 2	230	10	20	40	65	65	25
	460	--	40	45	65	65	25
	575/600	--	50	50	65	65	25
Size S3							
3RV10 4.				16	65	65	30
				20	65	65	30
FLA[2] max.	115	7 1/2	--	25	65	65	30
100 A, 480 V	200	20	30	32	65	65	30
75 A, 600 V	230	20	40	40	65	65	30
	460	--	75	50	65	65	30
NEMA size 3	575/600	--	75	63	65	65	30
				75	65	65	30
				90	65	65	--
				100	65	65	--

1) hp rating = Power rating in horse power (maximum motor rating).
2) FLA = Full Load Amps/Motor full load current.
3) Complies with "short-circuit breaking capacity" according to UL.

General data

3RV10 motor starter protectors as "Self-Protected Combination Motor Controllers (Type E)"

A line-side 1-inch clearance in air and 2-inch creepage distance is required for "Self-Protected Combination Motor Controllers" for approval according to UL 508.

Therefore, 3RV10 motor starter protectors of size S0 and S3 are approved to UL 508 in combination with the terminal blocks listed below.

The basic units of the 3RV10 motor starter protectors size S2 comply with the required clearance in air and creepage distances.

CSA does not demand these extended air/creepage distances. According to CSA, these terminal blocks can be omitted when the device is used as a "Self-Protected Combination Motor Controller".

The 3RV10 motor starter protectors are approved as "Self-Protected Combination Motor Controllers" under the following file numbers:

- UL File No. E156943, CCN: NKJH,
- CSA Master Contract 165071, Product Class: 3211 08.

Motor starter protectors		**hp rating[1] for FLA[2] max.**		**Rated current I_n**	**Up to 240 V AC**		**Up to 480 Y/277 V AC**		**Up to 600 Y/347 V AC**	
					UL I_{bc}[3]	CSA I_{bc}[3]	UL I_{bc}[3]	CSA I_{bc}[3]	UL I_{bc}[3]	CSA I_{bc}[3]
Type	V	1-phase	3-phase	A	kA	kA	kA	kA	kA	kA
Size S0										
3RV10 21 + 3RV19 28-1H[4]				0.16 ... 1.6	65	65	65	65	30	30
				2	65	65	65	65	30	30
FLA[2] max.	115	2	--	2.5	65	65	65	65	30	30
22 A, 480 V	200	3	5	3.2	65	65	65	65	30	30
12.5 A, 600 V	230	3	7 1/2	4	65	65	65	65	30	30
	460	--	15	5	65	65	65	65	30	30
NEMA size 1	575/600	--	10	6.3	65	65	65	65	30	30
				8	65	65	65	65	30	30
				10	65	65	65	65	30	30
				12.5	65	65	65	65	30	30
				16	65	65	65	65	--	--
				20	65	65	65	65	--	--
				22	65	65	65	65	--	--
Size S2										
3RV10 31				16	65	65	65	65	25	25
				20	65	65	65	65	25	25
FLA[2] max.	115	3	--	25	65	65	65	65	25	25
50 A, 600 V	200	7 1/2	15	32	65	65	65	65	25	25
NEMA size 2	230	10	20	40	65	65	65	65	25	25
	460	--	40	45	65	65	65	65	25	25
	575/600	--	50	50	65	65	65	65	25	25
Size S3										
3RV10 41 + 3RT19 46-4GA07[4]				16	65	65	65	65	30	30
				20	65	65	65	65	30	30
FLA[2] max.	115	10	--	25	65	65	65	65	30	30
100 A, 480 V	200	20	30	32	65	65	65	65	30	30
75 A, 600 V	230	20	40	40	65	65	65	65	30	30
	460	--	75	50	65	65	65	65	30	30
NEMA size 3	575/600	--	75	63	65	65	65	65	30	30
				75	65	65	65	65	30	30
				90	65	65	65	65	--	--
				100	65	65	65	65	--	--

1) hp rating = Power rating in horse power (maximum motor rating).
2) FLA = Full Load Amps/Motor full load current.
3) Complies with "short-circuit breaking capacity" according to UL/CSA.
4) Not required for CSA.

3RV17 and 3RV18 circuit breakers

These circuit breakers are approved according to UL 489 and CSA C22.2 No. 5-02 for 100 % rated current (100 % rated breaker). They can be used therefore as upstream short-circuit protective devices for "Manual Motor Controllers" and "Manual Motor Controllers Suitable for Tap Conductor Protection in Group Installations".

The 3RV17 and 3RV18 circuit breakers are approved under the following file numbers:

- UL File No. E235044, CCN: DIVQ,
- CSA Master Contract 165071, Product Class: 1432 01.

Circuit breakers	Rated current I_n	240 V AC		480 Y/277 V AC		480 V AC		600 Y/347 V AC	
		UL I_{bc} 1)	CSA I_{bc} 1)	UL I_{bc} 1)	CSA I_{bc} 1)	UL I_{bc} 1)	CSA I_{bc} 1)	UL I_{bc} 1)	CSA I_{bc} 1)
Type	A	kA	kA	kA	kA	kA	kA	kA	kA
Size S0									
3RV17 21	0.16	50	50	50	50	--	--	10	10
	0.2	50	50	50	50	--	--	10	10
	0.25	50	50	50	50	--	--	10	10
	0.32	50	50	50	50	--	--	10	10
	0.4	50	50	50	50	--	--	10	10
	0.5	50	50	50	50	--	--	10	10
	0.63	50	50	50	50	--	--	10	10
	0.8	50	50	50	50	--	--	10	10
	1	50	50	50	50	--	--	10	10
	1.25	50	50	50	50	--	--	10	10
	1.6	50	50	50	50	--	--	10	10
	2	50	50	50	50	--	--	10	10
	2.5	50	50	50	50	--	--	10	10
	3.2	50	50	50	50	--	--	10	10
	4	50	50	50	50	--	--	10	10
	5	50	50	50	50	--	--	10	10
	6.3	50	50	50	50	--	--	10	10
	8	50	50	50	50	--	--	10	10
	10	50	50	50	50	--	--	--	--
	12.5	50	50	50	50	--	--	--	--
	15	50	50	50	50	--	--	--	--
	20	50	50	50	50	--	--	--	--
	22	50	50	50	50	--	--	--	--
3RV18 21	0.16	50	50	50	50	--	--	10	10
	0.2	50	50	50	50	--	--	10	10
	0.25	50	50	50	50	--	--	10	10
	0.32	50	50	50	50	--	--	10	10
	0.4	50	50	50	50	--	--	10	10
	0.5	50	50	50	50	--	--	10	10
	0.63	50	50	50	50	--	--	10	10
	0.8	50	50	50	50	--	--	10	10
	1	50	50	50	50	--	--	10	10
	1.25	50	50	50	50	--	--	10	10
	1.6	50	50	50	50	--	--	10	10
	2	50	50	50	50	--	--	10	10
	2.5	50	50	50	50	--	--	10	10
	3.2	50	50	50	50	--	--	10	10
	4	50	50	50	50	--	--	10	10
	5	50	50	50	50	--	--	10	10
	6.3	50	50	50	50	--	--	10	10
	8	50	50	50	50	--	--	--	--
	10	50	50	50	50	--	--	--	--
	12.5	50	50	50	50	--	--	--	--
	15	50	50	50	50	--	--	--	--
	20	50	50	50	50	--	--	--	--
Size S3									
3RV17 42	10	65	65	65	65	65	65	20	20
	15	65	65	65	65	65	65	20	20
	20	65	65	65	65	65	65	20	20
	25	65	65	65	65	65	65	20	20
	30	65	65	65	65	65	65	20	20
	35	65	65	65	65	--	--	20	20
	40	65	65	65	65	--	--	20	20
	45	65	65	65	65	--	--	20	20
	50	65	65	65	65	--	--	20	20
	60	65	65	65	65	--	--	20	20
	70	65	65	65	65	--	--	10	10

1) Complies with "short-circuit breaking capacity" according to UL.

General data

Rated data of the auxiliary switches and signal switches				
Type 3RV19		**Lateral auxiliary switch with 1 NO + 1 NC, 2 NO, 2 NC, 2 NO + 2 NC Signal switches**	**Transverse auxiliary switches with 1 CO contact**	**1 NO + 1 NC, 2 NO**
Max. rated voltage				
Acc. to NEMA (UL)	V AC	600		250
Acc. to NEMA (CSA)	V AC	600		250
Uninterrupted current	A	10	5	2.5
Switching capacity		A600	B600	C300
		Q300	R300	R300

Voltage transformer circuit breakers

General technical specifications				
Type		**3RV16 11-1AG14**	**3RV16 11-1CG14**	**3RV16 11-1DG14**
Rated current I_n	A	1.4	2.5	3
Ambient temperature				
• During storage/transport	°C	–50 ... +80		
• During operation	°C	–20 ... +60 (up to +70 °C is possible with current reduction)		
Rated operational voltage U_e	V	400		
Rated frequency	Hz	16.66 ... 60		
Rated insulation voltage U_i	V	690		
Short-circuit breaking capacity I_{cu} at 400 V AC	kA	50		
Set value of the thermal overload release	A	1.4	2.5	3
Response value of the instantaneous electronic trip unit	A	6 ± 20 %	10.5 ± 20 %	20 ± 20 %
Tripping time of the instantaneous electronic trip unit	ms	Approx. 6 at 12 A	Approx. 6 at 20 A	Approx. 6 at 40 A
Internal resistance				
• In cold state	Ω	> 0.25 ± 6.5 %		
• In heated state	Ω	> 0.30 ± 6.5 %		
Shock resistance acc. to IEC 68 Part 2-27	*g*	15		
Degree of protection acc. to IEC 60529		IP20		
Touch protection acc. to EN 50274		Finger-safe		
Endurance				
• Mechanical	Operating cycles	10000		
• Electrical	Operating cycles	10000		
Permissible mounting positions		Any		

Type		3RV16 11-1AG14	3RV16 11-1CG14	3RV16 11-1DG14
Conductor cross-sections, main circuit, 1 or 2 conductors				
Connection type		**Screw terminals**		
Terminal screw		Pozidriv size 2		
Conductor cross-sections				
• Solid	mm^2	2 x (0.5 ... 1.5)[1], 2 x (0.75 ... 2.5)[1], max. 4		
• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5)[1], 2 x (0.75 ... 2.5)[1]		
• Stranded	mm^2	2 x (0.5 ... 1.5)[1], 2 x (0.75 ... 2.5)[1], max. 4		
Auxiliary switch for blocking the distance protection				
• With defined time-related assignment for blocking a distance relay		1 changeover contact (for use as 1 NO or 1 NC)		
• Rated operational voltage U_e (AC voltage)	V	250		
• Rated operational current I_e /AC-14 at U_e = 250 V	A	0.5		
• Rated operational current I_e /AC-14 at U_e = 125 V	A	1		
• Rated operational voltage U_e (DC voltage *L/R* 200 ms)	V	250		
• Rated operational current I_e /DC-13 at U_e = 250 V	A	0.27		
• Rated operational current I_e /DC-13 at U_e = 125 V	A	0.44		
Short-circuit protection for auxiliary circuit				
• Melting fuse gL/gG	A	10		
• Miniature circuit breaker, C characteristic	A	6 (prospective short-circuit current < 0.4 kA)		
Auxiliary switches for other signaling purposes				

For technical specifications see "Mountable Accessories"

1) If two different conductor cross-sections are connected to one clamping point, both cross-sections must lie in the range specified. If identical cross-sections are used, this restriction does not apply.

Characteristic curves

The time/current characteristic, the current limiting characteristics and the I^2t characteristic curves were determined according to EN/IEC 60947.

The tripping characteristic of the inverse-time delayed overload release (thermal overload releases, 'a' releases) for DC and AC with a frequency of 0 Hz to 400 Hz applies for the time/current characteristic.

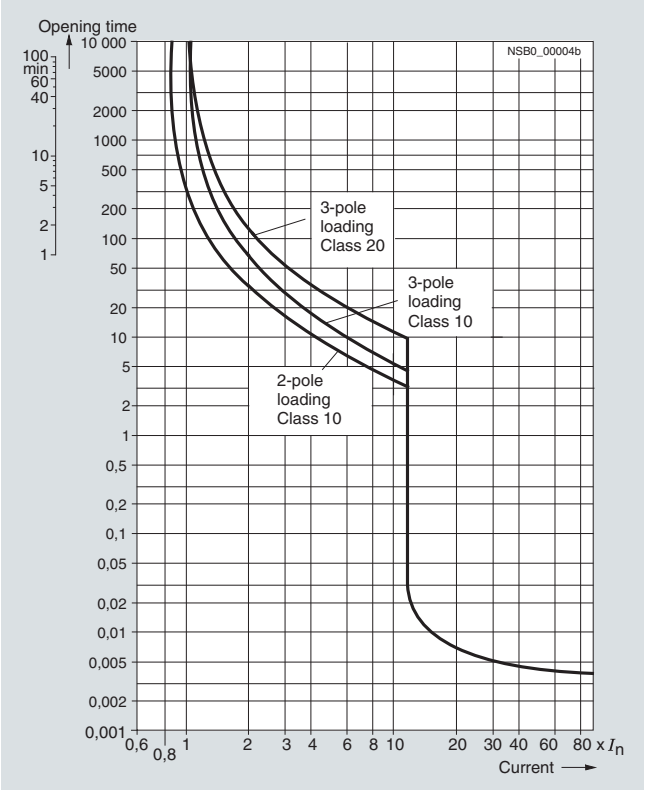
The characteristic curves apply to the cold state; at operating temperature, the tripping times of the thermal releases are reduced to approximately 25 %.

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

With two-pole and three-pole loading, the maximum deviation in the tripping time of 3 times the setting current and upwards is ±20 % and thus in accordance with EN 60079.

The tripping characteristics for the instantaneous, electromagnetic electronic trip units (short-circuit releases, 'n' releases) are based on the rated current I_n that also represents the maximum value of the setting range for motor starter protectors with adjustable overload releases. If the current is set to a lower value, the tripping current of the 'n' release is increased by a corresponding factor.

The characteristic curves of the electromagnetic electronic trip units apply to frequencies of 50 Hz/60 Hz. Appropriate correction factors must be used for lower frequencies down to 16 $^2/_3$ Hz, for higher frequencies up to 400 Hz and for DC.



Schematic representation of typical time/current characteristic of 3RV10

The above characteristic curve for the motor starter protector relates to a specific setting range. It is, however, also valid as a schematic representation of motor starter protectors with other current ranges.

Time/current characteristic curves, current limiting characteristic curves and I^2t curves can be ordered from "Technical Assistance":

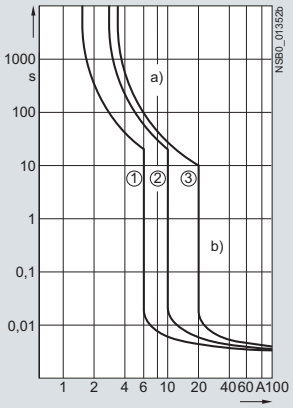
- Either by e-mail to: technical-assistance@siemens.com
- Or on the Internet: http:/www.siemens.com/automation/service&support

3RV16 voltage transformer circuit breakers up to 3 A

The specified tripping characteristics of the thermal overload release (a) correspond to the mean value of the scatter band in the cold state. At operating temperature, these times are reduced to approximately 25 % of the specified values.

The characteristic curves below are schematic representations. Precise characteristic curves can be ordered from "Technical Assistance":

- Either by e-mail to: technical-assistance@siemens.com
- Or on the Internet: http:/www.siemens.com/automation/service&support



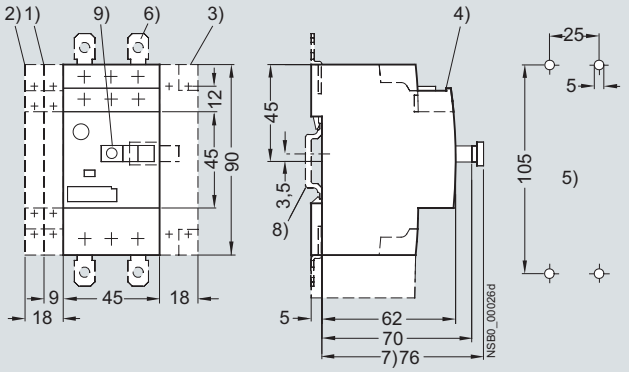
① 1.4 A / 6 A
② 2.5 A / 10.5 A
③ 3 A / 20 A
a) Thermal overload release
b) Instantaneous electromagnetic trip unit

General data

Dimensional drawings

3RV1 motor starter protectors, size S00

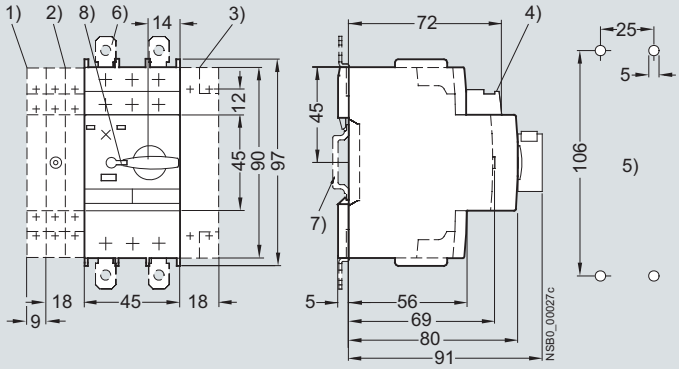
3RV10 11, 3RV16



1) Lateral auxiliary switch, 2-pole.
2) Lateral auxiliary switch, 4-pole.
3) Auxiliary releases.
4) Transverse auxiliary switch.
5) Drilling pattern.
6) Push-in lugs for screw mounting.
7) Only for undervoltage release with leading auxiliary switch.
8) Standard mounting rail TH 35 according to EN 60715.
9) Lockable in neutral position with shackle diameter 3.5 mm ... 4.5 mm.

3RV1 motor starter protectors, size S0

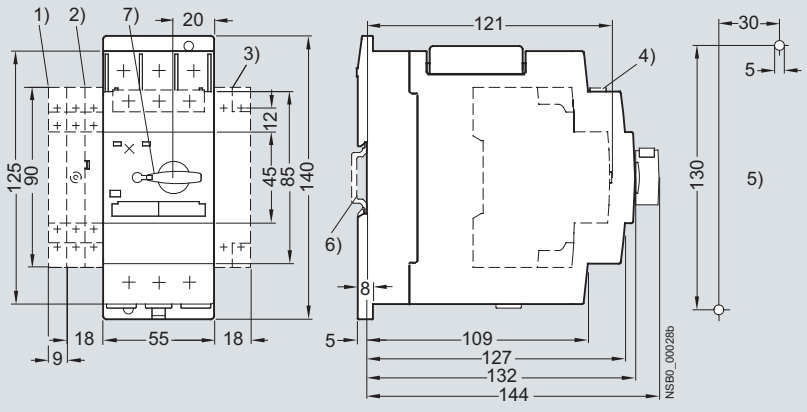
3RV10 21, 3RV13 21, 3RV14 21



1) Lateral auxiliary switch, 2-pole.
2) Signal switch or lateral auxiliary switch, 4-pole.
3) Auxiliary releases.
4) Transverse auxiliary switch.
5) Drilling pattern.
6) Push-in lugs for screw mounting.
7) Standard mounting rail TH 35 according to EN 60715.
8) Lockable in neutral position with shackle diameter 3.5 mm ... 4.5 mm.

3RV1 motor starter protectors, size S2

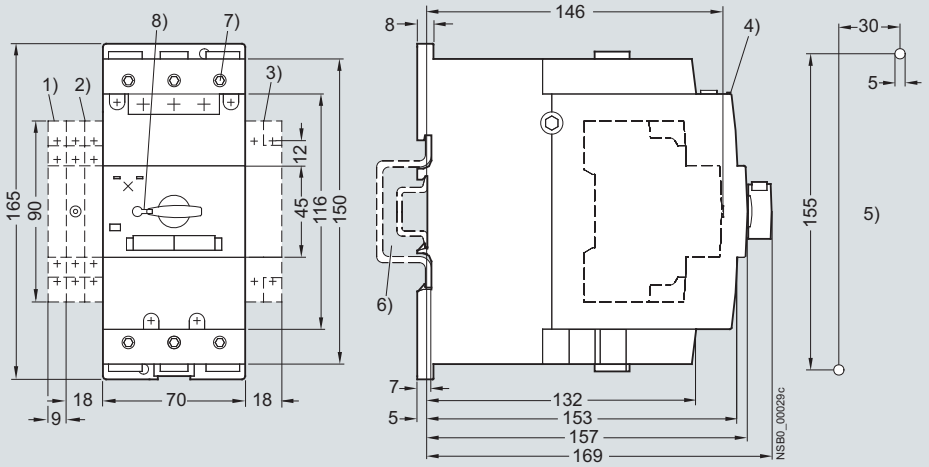
3RV10 31, 3RV13 31, 3RV14 31



1) Lateral auxiliary switch, 2-pole.
2) Signal switch or lateral auxiliary switch, 4-pole.
3) Auxiliary releases.
4) Transverse auxiliary switch.
5) Drilling pattern.
6) Standard mounting rail TH 35 according to EN 60715.
7) Lockable in neutral position with shackle diameter 3.5 mm ... 4.5 mm.

3RV1 motor starter protectors, size S3

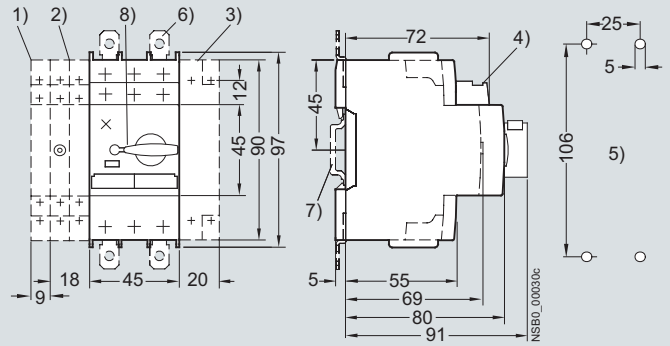
3RV10 4, 3RV13 4



1) Lateral auxiliary switch, 2-pole.
2) Signal switch or lateral auxiliary switch, 4-pole.
3) Auxiliary releases.
4) Transverse auxiliary switch.
5) Drilling pattern.
6) Mounting according to EN 60715 to standard mounting rail TH 35, 15 mm high, or standard mounting rail TH 75.
7) 4 mm Allen screw.
8) Lockable in neutral position with shackle diameter 3.5 mm ... 4.5 mm.

3RV11 motor starter protectors, size S0

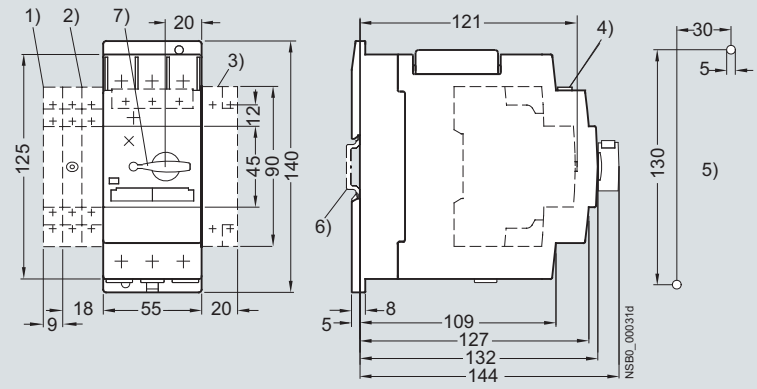
3RV11 21



1) Lateral auxiliary switch, 2-pole.
2) Signal switch or lateral auxiliary switch, 4-pole.
3) Block for overload relay function.
4) Transverse auxiliary switch.
5) Drilling pattern.
6) Push-in lugs for screw mounting.
7) Standard mounting rail TH 35 according to EN 60715.
8) Lockable in neutral position with shackle diameter 3.5 mm ... 4.5 mm.

3RV11 motor starter protectors, size S2

3RV11 31

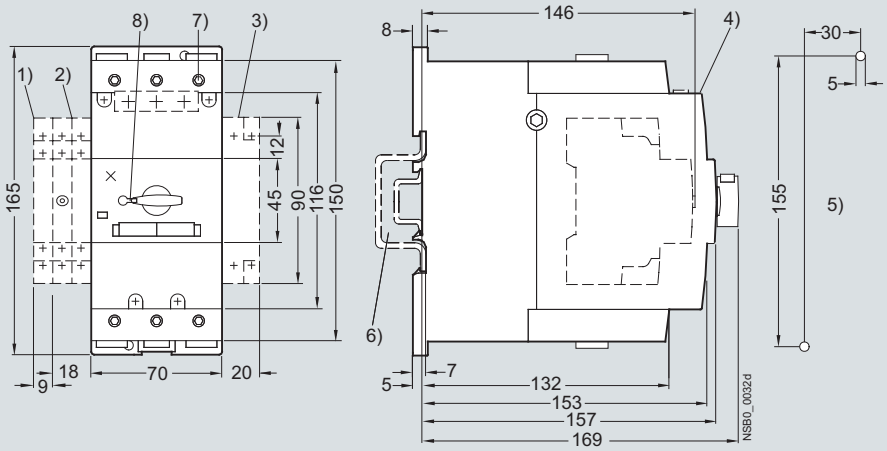


1) Lateral auxiliary switch, 2-pole.
2) Signal switch or lateral auxiliary switch, 4-pole.
3) Block for overload relay function.
4) Transverse auxiliary switch.
5) Drilling pattern.
6) Standard mounting rail TH 35 according to EN 60715.
7) Lockable in neutral position with shackle diameter 3.5 mm ... 4.5 mm.

General data

3RV11 motor starter protectors, size S3

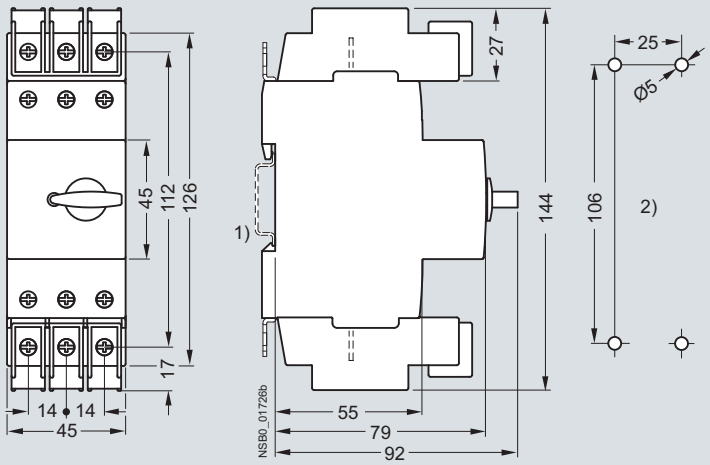
3RV11 42



1) Lateral auxiliary switch, 2-pole.
2) Signal switch or lateral auxiliary switch, 4-pole.
3) Block for overload relay function.
4) Transverse auxiliary switch.
5) Drilling pattern.
6) Mounting according to EN 60715 to standard mounting rail TH 35, 15 mm high, or standard mounting rail TH 75.
7) 4 mm Allen screw.
8) Lockable in neutral position with shackle diameter 3.5 mm ... 4.5 mm.

3RV17 and 3RV18 circuit breakers, size S0

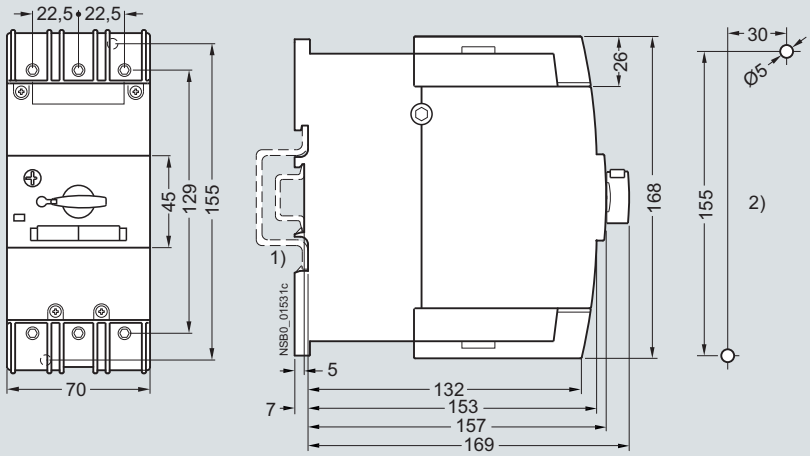
3RV17 21, 3RV18 21



1) Mounting according to EN 60715 to standard mounting rail TH 35.
2) Drilling pattern.

3RV17 circuit breakers, size S3

3RV17 42



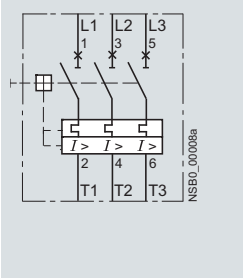
1) Mounting according to EN 60715 on TH 35 standard mounting rail, 15 mm deep, or TH 75 standard mounting rail.
2) Drilling pattern.

Schematics

Internal circuit diagrams

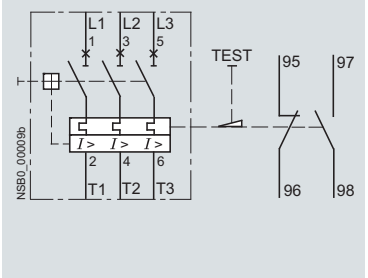
Motor starter protector/ circuit breaker

3RV10 ..,
3RV14 ..,
3RV16 11-0BD10,
3RV17 ..,
3RV18 ..



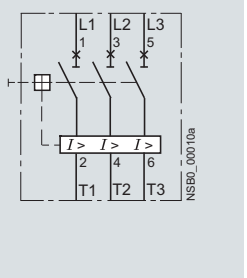
Motor starter protector with overload relay function

3RV11 ..



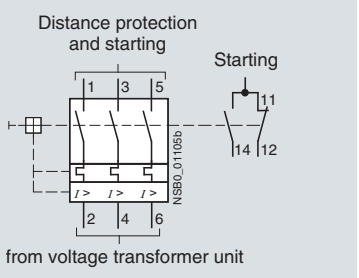
Motor starter protector

3RV13 ..



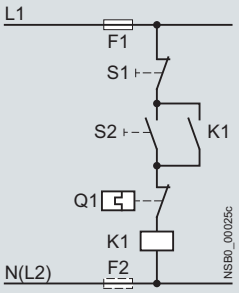
Voltage transformer circuit breaker

3RV16 11-1.G14



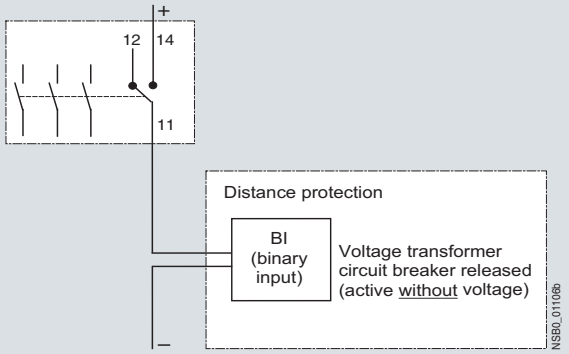
Switching examples

3RV11 motor starter protector with overload relay function



S1	OFF Button
S2	ON Button
K1	Self-holding contact
F1, F2	Fuse (gL/gG) 6 A
Q1	Undervoltage trip unit 3RV11

3RV16 11-1.G14 voltage transformer circuit breaker



Note:

When using the NO contact to connect the voltage transformer circuit breaker, the binary input of the distance protection device (Siemens 7 SA xxx) should be set to "active without voltage". This connection type is used for additional monitoring of correct wiring.

More information

Conversion of voltage transformer circuit breakers 3VU13 to 3RV1

The 3VU13 voltage transformer motor starter protectors previously available have been discontinued. The 3RV1 voltage transformer motor starter protectors are offered as replacement types.

Previous type	Replacement type
3VU13 11-6HR00	3RV16 11-1CG14
3VU13 21-6HR00	3RV16 11-1CG14 + 3RV19 01-1A
3VU13 11-6JR00	3RV16 11-1DG14

Accessories

Mountable accessories

Overview

Mounting location and function

The 3RV1 motor starter protectors/circuit breakers have three main contact elements. In order to achieve maximum flexibility, auxiliary switches, signal switches, auxiliary trip units and isolator modules can be supplied separately.

These components can be fitted as required on the circuit breakers/motor starter protectors without using tools.

For overview graphic see "General Data" --> "Overview".

Front side Notes: • *A maximum of 4 auxiliary contacts with auxiliary switches can be attached to each motor starter protector.* • *Transverse auxiliary switches must not be used for the 3RV17 and 3RV18 circuit breakers.*	**Transverse auxiliary switches** 1 NO + 1 NC or 2 NO or 1 CO contact	An auxiliary switch block can be inserted transversely on the front. The overall width of the motor starter protectors remains unchanged.
Left-hand side Notes: • *A maximum of 4 auxiliary contacts with auxiliary switches can be attached to each motor starter protector/circuit breaker.* • *Auxiliary switches (2 contacts) and signal switches can be mounted separately or together.* • *The signal switch cannot be used for the 3RV17 and 3RV18 circuit breakers.*	**Lateral auxiliary switches (2 contacts)** 1 NO + 1 NC or 2 NO or 2 NC	One of the three auxiliary switches can be mounted laterally for each motor starter protector/circuit breaker. The contacts of the auxiliary switch close and open together with the main contacts of the motor starter protector. The overall width of the lateral auxiliary switch with 2 contacts is 9 mm.
	Lateral auxiliary switches (4 contacts) 2 NO + 2 NC	One auxiliary switch can be mounted laterally for each motor starter protector. The contacts of the auxiliary switch close and open together with the main contacts of the motor starter protector/circuit breaker. The overall width of the lateral auxiliary switch with 4 contacts is 18 mm.
	Signal switches for sizes S0, S2 and S3 Tripping 1 NO + 1 NC Short-circuit 1 NO + 1 NC	One signal switch can be mounted at the side of each motor starter protector with a rotary operating mechanism. The signal switch has two contact systems. One contact system always signals tripping irrespective of whether this was caused by a short-circuit, an overload or an auxiliary trip unit. The other contact system only switches in the event of a short-circuit. There is no signaling as a result of switching off with the handle. In order to be able to switch on the motor starter protector again after a short-circuit, the signal switch must be reset manually after the error cause has been eliminated. The overall width of the signal switch is 18 mm.
Right-hand side Notes: • *One auxiliary trip unit can be mounted per motor starter protector/circuit breaker.* • *Accessories cannot be mounted at the right-hand side of the 3RV11 motor starter protectors with overload relay function.*	**Auxiliary trip units**	
	Shunt trip units	For remote-controlled tripping of the motor starter protector/circuit breaker. The trip unit coil should only be energized for short periods (see schematics).
	or	
	Undervoltage trip units	Trips the motor starter protector when the voltage is interrupted and prevents the motor from being restarted accidentally when the voltage is restored. Used for remote-controlled tripping of the circuit breaker/motor starter protector. Particularly suitable for EMERGENCY-STOP disconnection by way of the corresponding EMERGENCY-STOP pushbutton according to EN 60204-1.
	or	
	Undervoltage trip unit with leading auxiliary contacts (2 NO)	Function and use as for the undervoltage trip unit without leading auxiliary contacts, but with the following additional function: the auxiliary contacts will open in switch position OFF to deenergize the coil of the undervoltage trip unit, thus interrupting energy consumption. In the "tripped" position, these auxiliary contacts are not guaranteed to open. The leading contacts permit the motor starter protector/circuit breaker to reclose. The overall width of the auxiliary trip unit is 18 mm.
Top Notes: • *The isolator module cannot be used for the 3RV17 and 3RV18 circuit breakers.* • *The isolator module covers the terminal screws of the transverse auxiliary switch. If the isolator module is used, we therefore recommend that either the lateral auxiliary switches be fitted or that the isolator module not be mounted until the auxiliary switch has been wired.*	**Isolator modules for sizes S0 and S2**	Isolator modules can be mounted to the upper terminal end of motor starter protectors of sizes S0 and S2. The supply cable is connected to the motor starter protector through the isolator module. The plug can only be unplugged when the motor starter protector is open and isolates all 3 poles of the motor starter protector from the network. The shock-protected isolation point is clearly visible and secured with a padlock to prevent reinsertion of the plug.

For a complete overview of which accessories can be used for the various motor starter protectors see "Introduction" --> "Overview" --> "Motor Starter Protectors".

Technical specifications

Front transverse auxiliary switches

			Switching capacity for different voltages	
			1 CO contact	1 NO + 1 NC, 2 NO
Rated operational current I_e				
• At AC-15, alternating voltage				
- 24 V		A	4	2
- 230 V		A	3	0.5
- 400 V		A	1.5	--
- 690 V		A	0.5	--
• At AC-12 = I_{th}, alternating voltage				
- 24 V		A	10	2.5
- 230 V		A	10	2.5
- 400 V		A	10	--
- 690 V		A	10	--
• At DC-13, direct voltage *L/R* 200 ms				
- 24 V		A	1	1
- 48 V		A	--	0.3
- 60 V		A	--	0.15
- 110 V		A	0.22	--
- 220 V		A	0.1	--
Minimum load capacity		V	17	
		mA	1	

Front transverse solid-state compatible auxiliary switches

			1 CO contact
• **Rated operational voltage U_e**	Alternating voltage	V	250
• **Rated operational current I_e/AC-14** at U_e = 250 V		A	0.5
• **Rated operational current I_e/AC-14** at U_e = 125 V		A	1
• **Rated operational voltage U_e**	Direct voltage *L/R* 200 ms	V	250
• **Rated operational current I_e/DC-13** at U_e = 250 V		A	0.27
• **Rated operational current I_e/DC-13** at U_e = 125 V		A	0.44
Minimum load capacity		V	5
		mA	1

Lateral auxiliary switches with signal switch

			Switching capacity for different voltages: Lateral auxiliary switch with 1 NO + 1 NC, 2 NO, 2 NC, 2 NO + 2 NC; signal switch
Rated operational current I_e			
• At AC-15, alternating voltage			
- 24 V		A	6
- 230 V		A	4
- 400 V		A	3
- 690 V		A	1
• At AC-12 = I_{th}, alternating voltage			
- 24 V		A	10
- 230 V		A	10
- 400 V		A	10
- 690 V		A	10
• At DC, direct voltage *L/R* 200 ms			
- 24 V		A	2
- 110 V		A	0.5
- 220 V		A	0.25
- 440 V		A	0.1
Minimum load capacity		V	17
		mA	1

Auxiliary trip units

			Undervoltage trip units	Shunt trip units
Power consumption				
• During pick-up				
- AC voltages		VA/W	20.2/13	20.2/13
- DC voltages		W	20	13 ... 80
• During uninterrupted duty				
- AC voltages		VA/W	7.2/2.4	--
- DC voltages		W	2.1	--
Response voltage				
• Tripping		V	0.35 ... 0.7 x U_s	0.7 ... 1.1 x U_s
• Pickup		V	0.85 ... 1.1 x U_s	--
Maximum opening time		ms	20	

Accessories

Mountable accessories

Short-circuit protection for auxiliary and control circuits		
Melting fuses gL/gG	A	10
Miniature circuit breaker, C characteristic	A	6[1]

1) Prospective short-circuit current < 0.4 kA.

Conductor cross-sections for auxiliary and control circuits		
Connection type		**Screw terminals**
Terminal screw		Pozidriv size 2
Prescribed tightening torque	Nm	0.8 ... 1.2
Conductor cross-sections (1 or 2 conductors)		
• Solid	mm^2	2 x (0.5 ... 1.5)[1]/2 x (0.75 ... 2.5)[1]
• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5)[1]/2 x (0.75 ... 2.5)[1]
• Stranded	mm^2	2 x (0.5 ... 1.5)[1]/2 x (0.75 ... 2.5)[1]
• AWG cables	AWG	2 x (18 ... 14)
Connection type		**Cage Clamp terminals**[2)3)]
Conductor cross-sections (1 or 2 conductors connectable)		
• Solid	mm^2	2 x (0.25 ... 2.5)
• Finely stranded with end sleeve	mm^2	2 x (0.25 ... 1.5)
• Finely stranded without end sleeve	mm^2	2 x (0.25 ... 2.5)
• AWG cables, solid or stranded	AWG	2 x (24 ... 14)
Max. external diameter of the conductor insulation	mm	3.6

1) If two different conductor cross-sections are connected to one clamping point, both cross-sections must lie in the range specified. If identical cross-sections are used, this restriction does not apply.

2) With conductor cross-sections of ≤ 1 mm^2 an "insulation stop" must be used; see "Accessories", "Contactors and Contactor Assemblies".

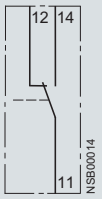
3) For corresponding 8WA2 803 or 8WA2 880 opening tools see "Accessories".

Schematics

Internal circuit diagrams

Transverse auxiliary switches

1 CO
3RV19 01-1D,
3RV19 01-1G



1 NO + 1 NC
3RV19 01-1E,
3RV19 01-2E

2 NO
3RV19 01-1F,
3RV19 01-2F

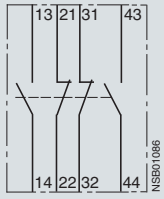
Lateral auxiliary switches

1 NO + 1 NC
3RV19 01-1A,
3RV19 01-2A

2 NO
3RV19 01-1B,
3RV19 01-2B

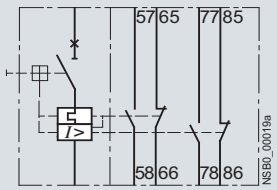
2 NC
3RV19 01-1C,
3RV19 01-2C

2 NO + 2 NC
3RV19 01-1J



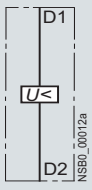
Signal switches

3RV19 21-1M

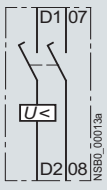


Auxiliary trip units

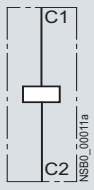
Undervoltage trip units
3RV19 02-1A..



Undervoltage trip units
with leading auxiliary contacts 2 NO
3RV19 12-1C..,
3RV19 22-1C..



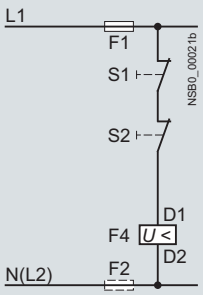
Shunt trip units
3RV19 02-1D.0



Circuit diagrams

Undervoltage trip unit

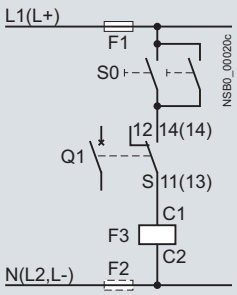
3RV19 02-1A.., 3RV19 .2-1C..



S1, S2	OFF button in the system
F1, F2	Fuse (gL/gG), max. 10 A
F4	Undervoltage trip unit

Shunt trip unit

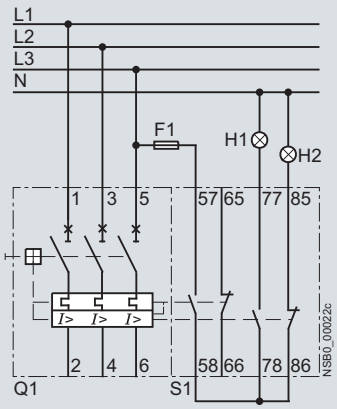
3RV19 02-1D.0



S0	OFF button in the system
Q1	Motor starter protector
S	Auxiliary switch of the molded case motor starter protector Q1
F1, F2	Fuse (gL/gG), max. 10 A
F3	Shunt trip unit

Switching examples

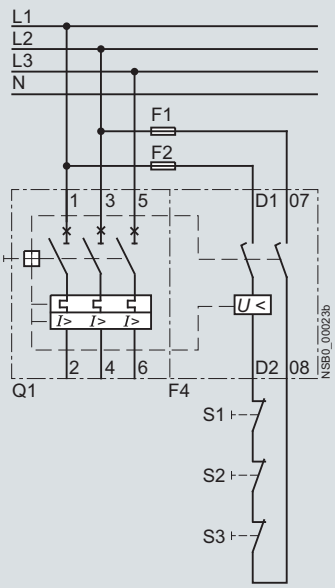
3RV1 motor starter protector with 3RV19 21-1M signal switch



Seperate "tripped" and "short-circuit" signals

S1	Signaling switch
Q1	Motor starter protector
F1	Fuse (gL/gG) max. 10 A
H1	Signal lamp "Short-circuit"
H2	Signal lamp "Overload" or "Tripping by auxiliary trip unit"

Motor starter protectors tripped by means of pushbutton or EMERGENCY-STOP pushbutton in the system



The leading auxiliary contacts will open in switch position "OFF" to deenergize the coil of the undervoltage release, thus avoiding power consumption in the switched off state.

In the "tripped" position of the motor starter protector, these contacts are not guaranteed to open.

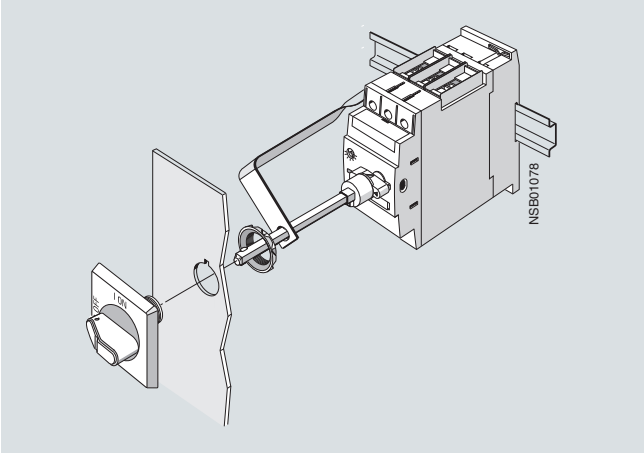
S1, S2, S3	OFF pushbutton
Q1	Motor starter protector
F1, F2	Fuse (gL/gG) max. 10 A
F4	Undervoltage trip unit

Rotary operating mechanisms

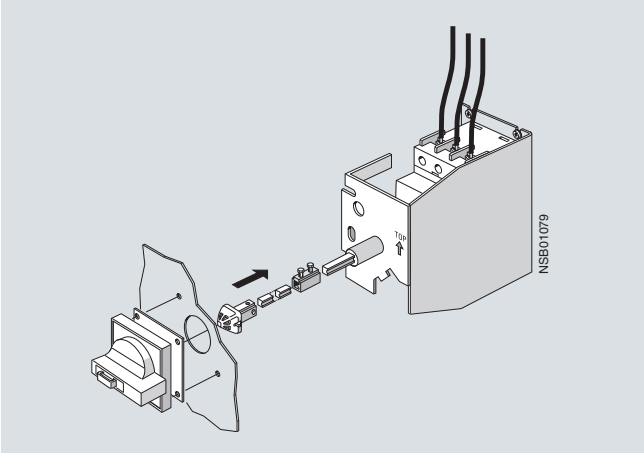
Overview

Door-coupling rotary operating mechanisms

Motor starter protectors with a rotary operating mechanism can be mounted in a control cabinet and operated externally by means of a door-coupling rotary operating mechanism. When the cabinet door with motor starter protector is closed, the operating mechanism is coupled. When the motor starter protector closes, the coupling is locked which prevents the door from being opened unintentionally. This interlock can be defeated by the maintenance personnel. In the Open position, the rotary operating mechanism can be secured against reclosing with up to 3 padlocks. Inadvertent opening of the door is not possible in this case either.



3RV19 26-0K door-coupling rotary operating mechanism



3RV29 26-2B door-coupling rotary operating mechanism for arduous conditions

Remote motorized operating mechanisms

3RV1 motor starter protectors are manually operated controls. They automatically trip in case of an overload or short-circuit. Intentional remote-controlled tripping is possible by means of a shunt trip unit or an undervoltage trip unit. Reclosing is only possible directly at the motor starter protector.

The remote motorized operating mechanism allows the motor starter protectors to be opened and closed by electrical commands. This enables a load or an installation to be isolated from the network or reconnected to it from an operator panel.

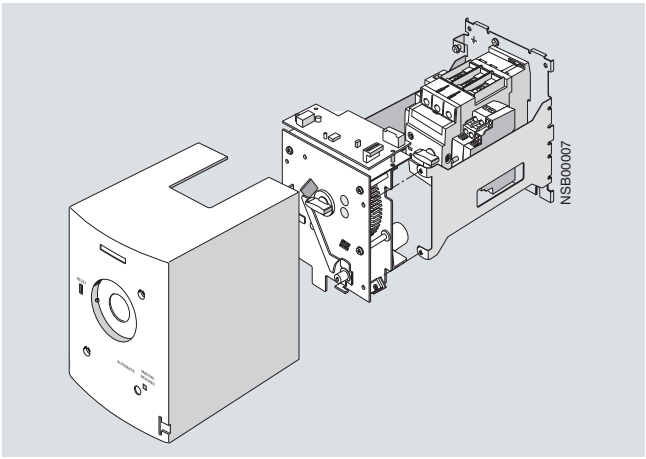
If the motor starter protector is tripped as a result of overload or short-circuit, it will be in tripped position. For reclosing, the remote motorized operating mechanism must first be set manually or electrically to the 0 position (electrically by means of the Open command). Then it can be reclosed.

The remote motorized operating mechanism is available for motor starter protectors of size S2 ($I_{n\ max}$ = 50 A) and S3 ($I_{n\ max}$ = 100 A) that are designed for control voltages of 230 V AC and 24 V DC. The motor starter protector is fitted into the remote motorized operating mechanism as shown in the drawing.

In the "MANUAL" position, the motor starter protector in the remote motorized operating mechanism can continue to be switched manually on site. In the "AUTOMATIC" position, the motor starter protector is switched by means of electrical commands. The switching command must be applied for a minimum of 100 ms. The remote motorized operating mechanism closes the motor starter protector after a maximum of 1 second. On voltage failure during the switching operation it is ensured that the motor starter protector remains in the OPEN or CLOSED position. In the "MANUAL" and "OFF" position, the remote motorized operating mechanism can be locked with a padlock.

RESET function

The RESET button on the motorized operating mechanism serves to reset any 3RV19 21-1M signal switch that might be installed.



3RV19 .6-3A.. remote motorized operating mechanism

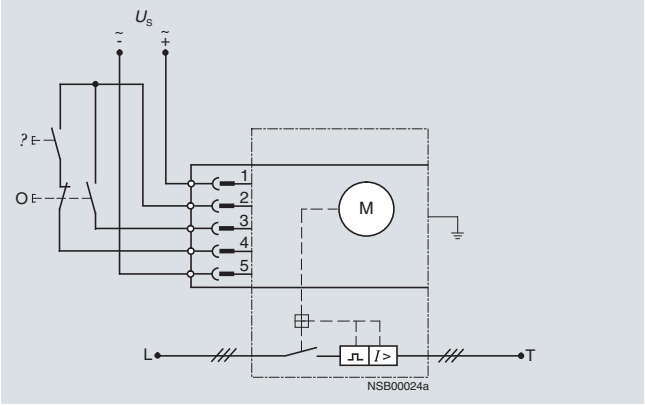
Technical specifications

Remote motorized operating mechanisms		
Type		**3RV19 36, 3RV19 46**
Max. power consumption	W	48
• At U_S = 24 V DC		
• At U_S = 230 V AC	VA	170
Operating range		0.85 ... 1.1 x U_S
Minimum command duration at U_S	s	0.1
Max. command duration		Unlimited (uninterrupted operation)
Max. total break time, remote-controlled	s	2
Ready to reclose after approx.	s	2.5
Switching frequency	1/h	25
Internal back-up fuse		
• 230 V AC	A	0.8
• 24 V DC	A	1.6
Connection type of control cables		Plug-in connectors with screw terminals
Shock resistance acc. to IEC 60068-2-27	*g*/ms	25/11 (square and sine pulse)

Schematics

Switching examples

3RV1 motor starter protector with 3RV19 36/3RV19 46 remote motorized operating mechanisms



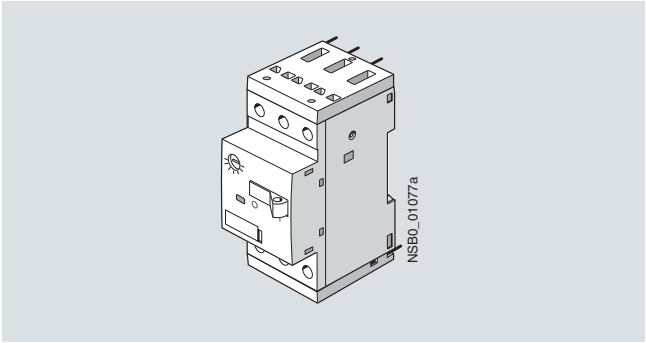
Mounting accessories

Overview

Solder pin connections

Solder pin terminals are available for the main contacts and transverse auxiliary switches of size S00 motor starter protectors.

The prepared terminal parts are clamped to the upper and lower screw terminals of the motor starter protectors which allows them to be soldered into printed circuit boards.



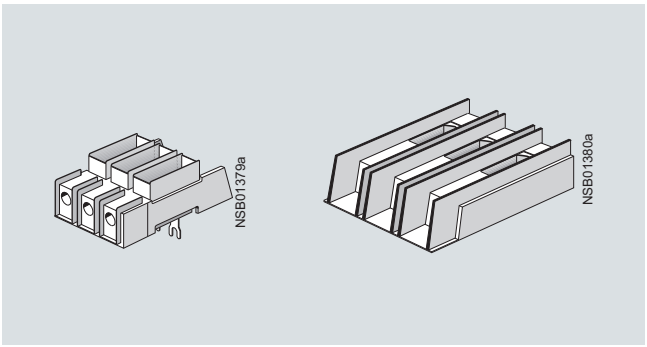
3RV19 18-5A

Terminals for "Self-Protected Combination Motor Controllers (Type E)" acc. to UL 508

The 3RV10 motor starter protectors size S0 and higher are approved according to UL 508 as "Self-Protected Combination Motor Controllers (Type E)".

This requires increased clearance and creepage distances (1 inch and 2 inches respectively) at the input side of the device, which are achieved by mounting terminal blocks.

- Size S0: The 3RV19 28-1H terminal block is simply screwed onto the basic unit.
- Size S2: The basic unit is already compliant with the new clearance and creepage distance requirements.
- Size S3: The standard box terminal must be replaced by the 3RT19 46-4GA07 terminal block.



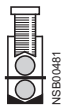
3RV19 28-1H (left), 3RT19 46-4GA07 (right)

According to CSA, these terminal blocks can be omitted when the device is used as a "Self-Protected Combination Motor Controller" (Type E).

Three-phase feeder terminals are required for constructing "Type E Starters" with an insulated busbar system (see "Busbar Accessories").

Technical specifications

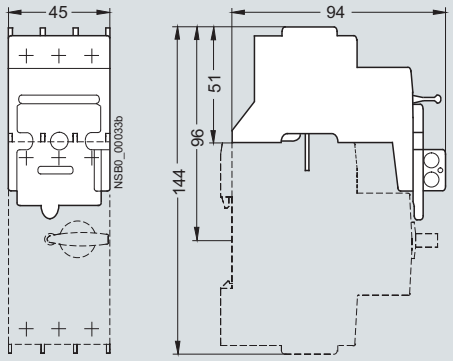
Terminals for "Self-Protected Combination Motor Controllers (Type E)" acc. to UL 508

Type			3RV19 28-1H	3RT19 46-4GA07
Prescribed tightening torque		Nm	2.5 ... 3	See data for 3RV1. 4 motor starter protectors
Conductor cross-sections				
• Front clamping point connected				
 NSB00479	- Solid	mm²	1 ... 10	See data for 3RV1. 4 motor starter protectors
	- Finely stranded with end sleeve	mm²	1 ... 16	
	- Stranded	mm²	2.5 ... 25	
	- AWG cables, solid or stranded	mm²	14 ... 3	
	- Terminal screw		M4	
• Rear clamping point connected				
 NSB00480	- Solid	mm²	1 ... 10	See data for 3RV1. 4 motor starter protectors
	- Finely stranded with end sleeve	mm²	1 ... 16	
	- Stranded	mm²	1.5 ... 25	
	- AWG cables, solid or stranded	mm²	16 ... 3	
	- Terminal screw		M4	
• Both clamping points connected				
 NSB00461	- Front clamping point:			See data for 3RV1. 4 motor starter protectors
	Solid	mm²	1 ... 10	
	Finely stranded with end sleeve	mm²	1 ... 10	
	Stranded	mm²	2.5 ... 10	
	AWG cables, solid or stranded	mm²	14 ... 6	
	Terminal screw		M4	
	- Rear clamping point:			
	Solid	mm²	1 ... 10	
	Finely stranded with end sleeve	mm²	1 ... 10	
	Stranded	mm²	5 ... 25	
	AWG cables, solid or stranded	mm²	16 ... 3	
	Terminal screw		M4	

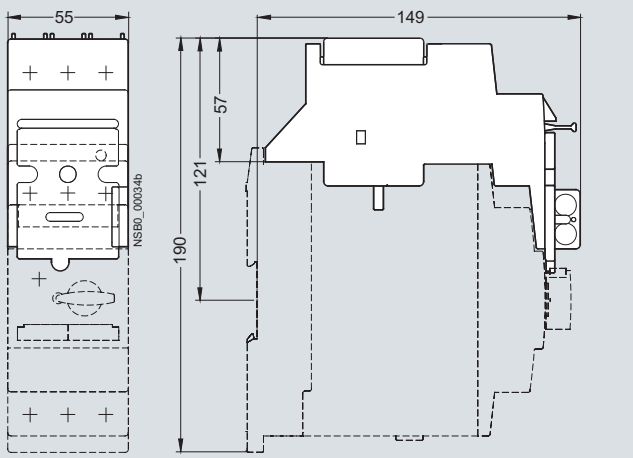
Dimensional drawings

Isolator modules

3RV19 28-1A
For motor starter protector size S0

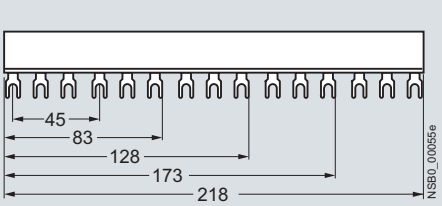


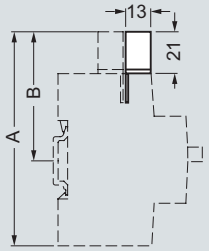
3RV19 38-1A
For motor starter protector size S2



Busbars

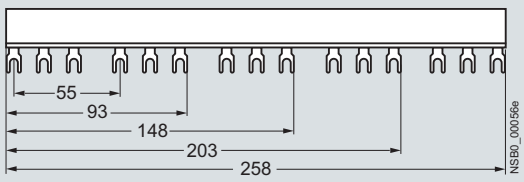
3RV19 15-1.. 3-phase busbar
For motor starter protector sizes S00 and S0, modular spacing 45 mm
For two 3RV19 15-1AB motor starter protectors
For three 3RV19 15-1BB motor starter protectors
For four 3RV19 15-1CB motor starter protectors
For five 3RV19 15-1DB motor starter protectors

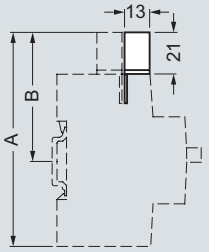




Size	A	B
S00	111	67
S0	119	70

3RV19 15-2.. 3-phase busbar
For motor starter protector sizes S00 and S0, modular spacing 55 mm
For two 3RV19 15-2AB motor starter protectors with accessory
For three 3RV19 15-2BB motor starter protectors with accessory
For four 3RV19 15-2CB motor starter protectors with accessory
For five 3RV19 15-2DB motor starter protectors with accessory



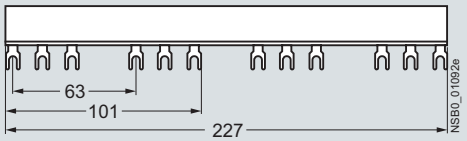


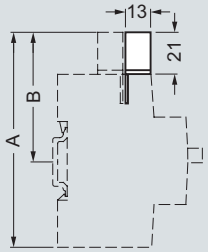
Size	A	B
S00	111	67
S0	119	70

Accessories

Project planning aids

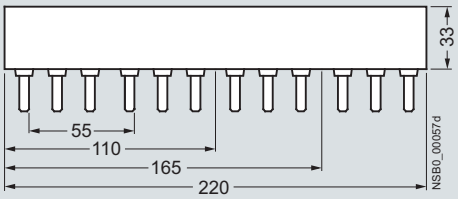
3RV19 15-3.. 3-phase busbar
For motor starter protector sizes S00 and S0, modular spacing 63 mm
For two 3RV19 15-3AB motor starter protectors with accessory
For four 3RV19 15-3CB motor starter protectors with accessory

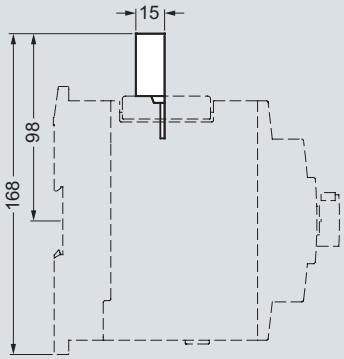




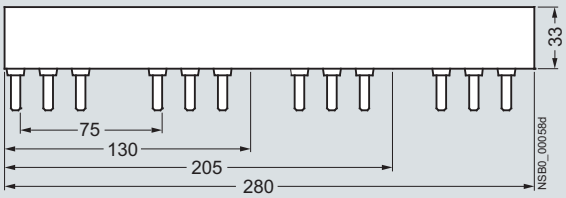
Size	A	B
S00	111	67
S0	119	70

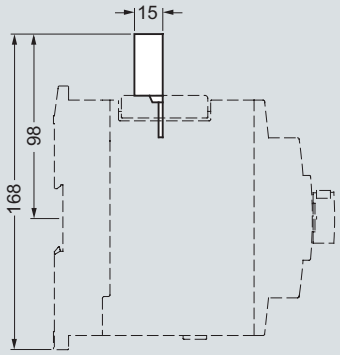
3RV19 35-1. 3-phase busbar
For motor starter protector size S2, modular spacing 55 mm
For two 3RV19 35-1A motor starter protectors
For three 3RV19 35-1B motor starter protectors
For four 3RV19 35-1C motor starter protectors



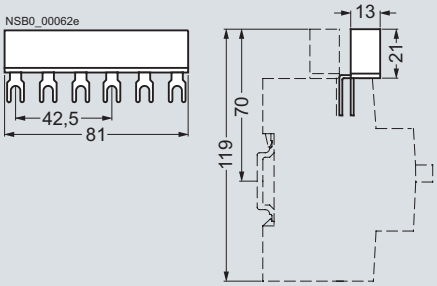


3RV19 35-3. 3-phase busbar
For motor starter protector size S2, modular spacing 75 mm
For two 3RV19 35-3A motor starter protectors with accessory
For three 3RV19 35-3B motor starter protectors with accessory
For four 3RV19 35-3C motor starter protectors with accessory



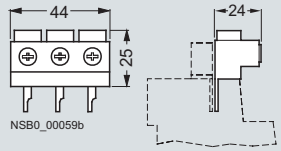


3RV19 15-5DB connecting piece
For connecting 3-phase busbars for motor starter protector size S0 (left) to size S00 (right)

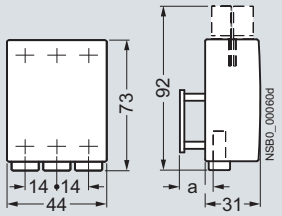


3RV19 .5 three-phase feeder terminals

3RV19 15-5A
Connected from top,
for motor starter protector size S00

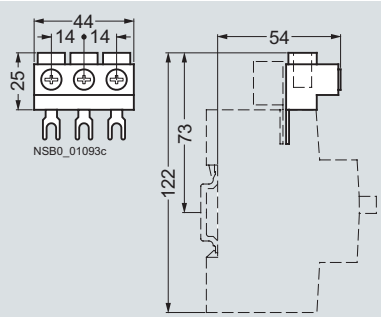


3RV19 35-5B
Connected from bottom,
for motor starter protector size S00 and S0

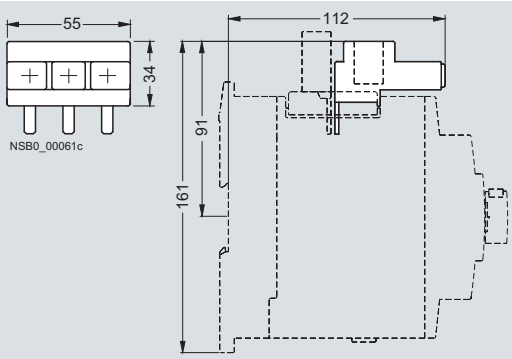


Typ	a
3RV1. 1	19
3RV1. 2	23

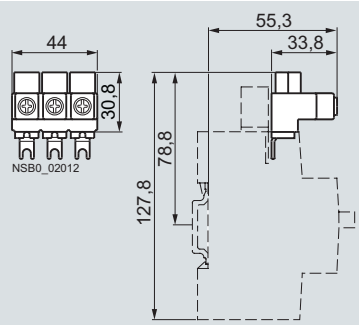
3RV19 25-5AB
Connected from top,
for motor starter protector size S0



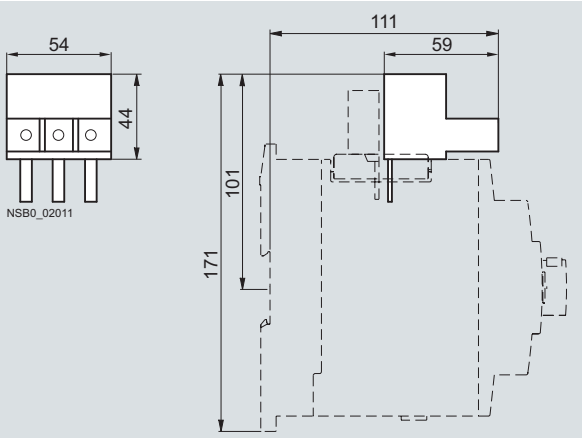
3RV19 35-5A
Connected from top,
for motor starter protector size S2



3RV19 25-5EB to construct "Type E Starters"
Connected from top,
for motor starter protector size S0



3RV19 35-5E
Connected from top,
for motor starter protector size S2

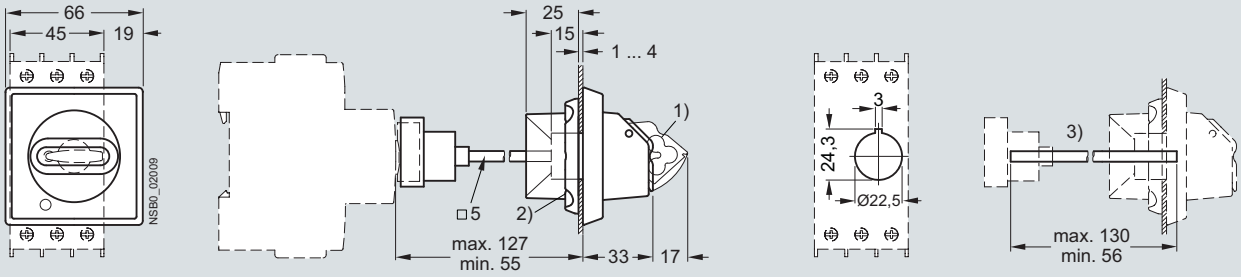


Accessories

Project planning aids

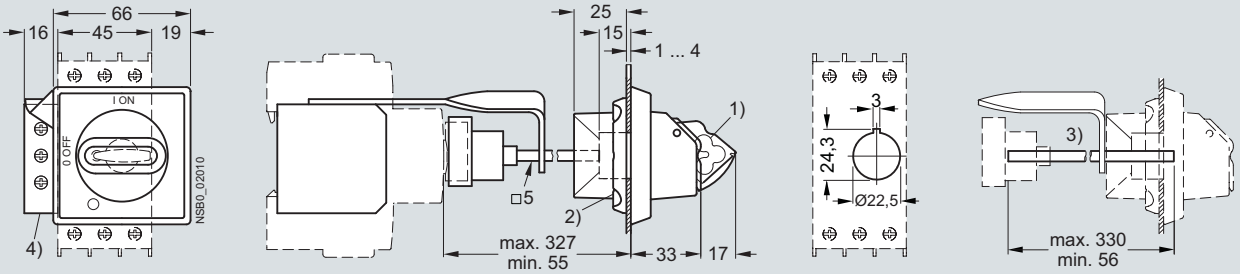
3RV19 26-0. door-coupling rotary operating mechanisms

3RV19 26-0B, 3RV19 26-0C
Short shaft[3], for motor starter protector sizes S0, S2, S3



1) Lockable in neutral position with max. 8 mm shackle diameter.
2) Mounting with screw cap.
3) Supplied with a shaft length of 130 mm; can be adjusted by shortening the shaft.

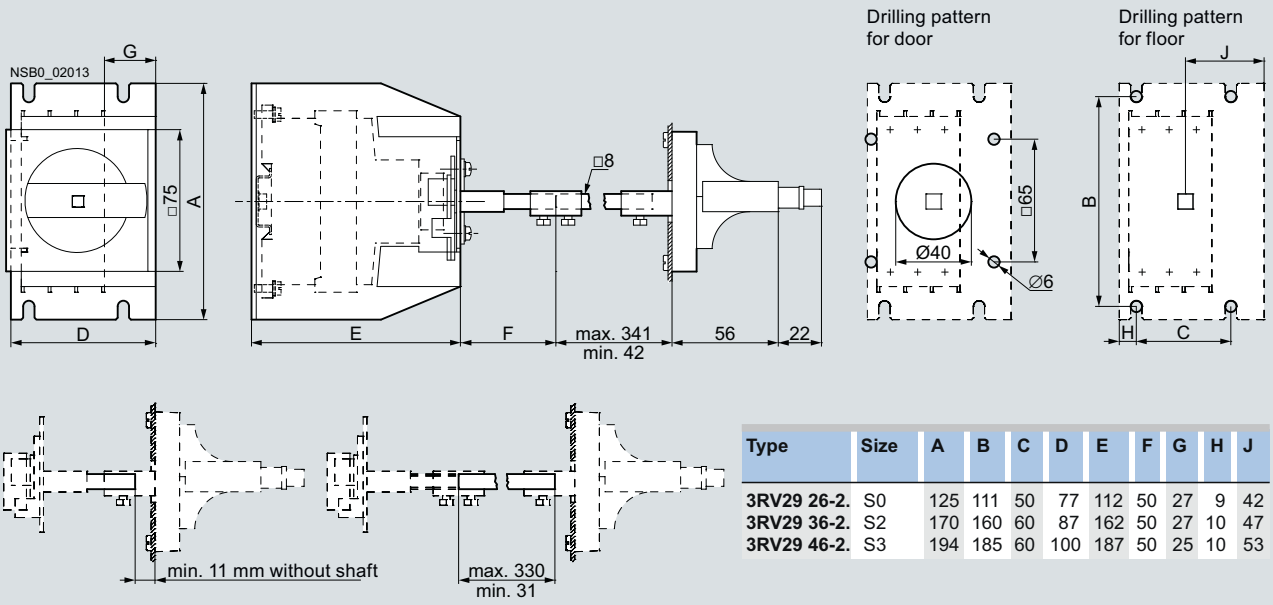
3RV19 26-0K, 3RV19 26-0L
Long shaft (with bracket)[3], for motor starter protector sizes S0, S2, S3



1) Lockable in neutral position with max. 8 mm shackle diameter.
2) Mounting with screw cap.
3) Supplied with a shaft length of 330 mm; can be adjusted by shortening the shaft.
4) Grounding terminal 35 mm^2 and fixing bracket for 330 mm shaft.

3RV29 .6-2. door-coupling rotary operating mechanisms for arduous conditions

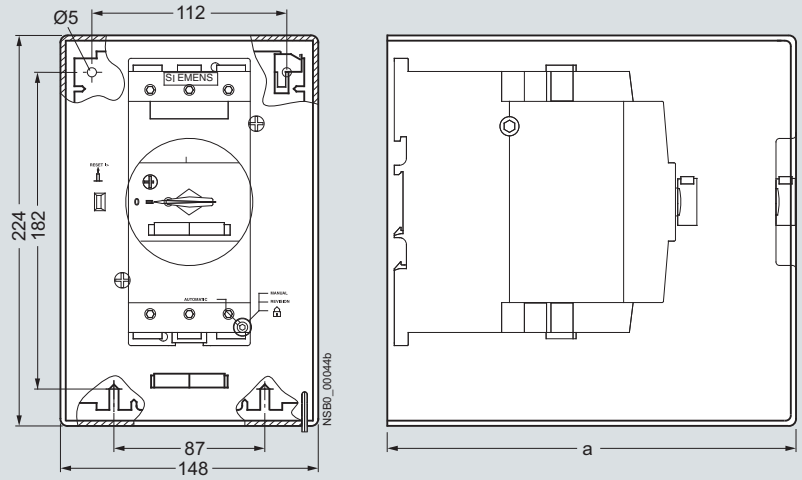
3RV29 26-2., 3RV29 36-2., 3RV29 46-2.
For motor starter protector size S0, S2 and S3



Type	Size	A	B	C	D	E	F	G	H	J
3RV29 26-2.	S0	125	111	50	77	112	50	27	9	42
3RV29 36-2.	S2	170	160	60	87	162	50	27	10	47
3RV29 46-2.	S3	194	185	60	100	187	50	25	10	53

Remote motorized operating mechanisms

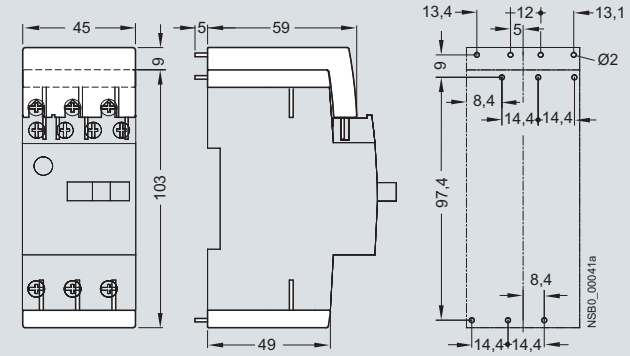
3RV19. 6-3A..
For motor starter protector size S2 and S3



Type	a
3RV19 36-3AP0, 3RV19 36-3AB4	211
3RV19 46-3AP0, 3RV19 49-3AB4	236

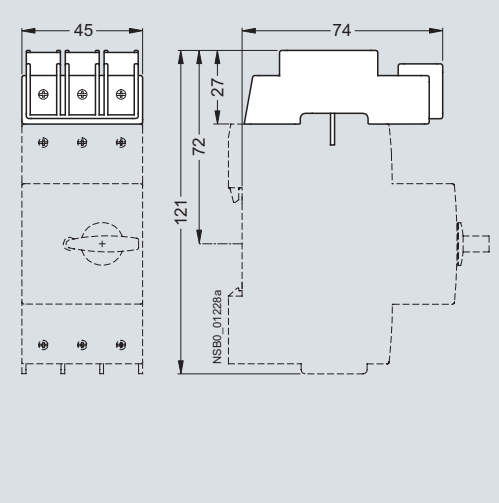
3RV19 18-5. solder pin connections

3RV19 18-5A, 3RV19 18-5B
For motor starter protector size S00

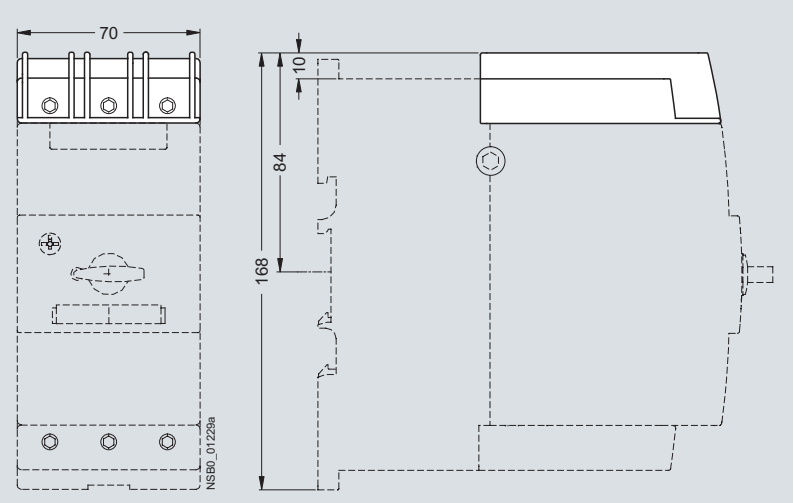


Terminals for "Self-Protected Combination Motor Controllers (Type E)" acc. to UL 508

3RV19 28-1H
For motor starter protector size S0



3RT19 46-4GA07
For motor starter protector size S3

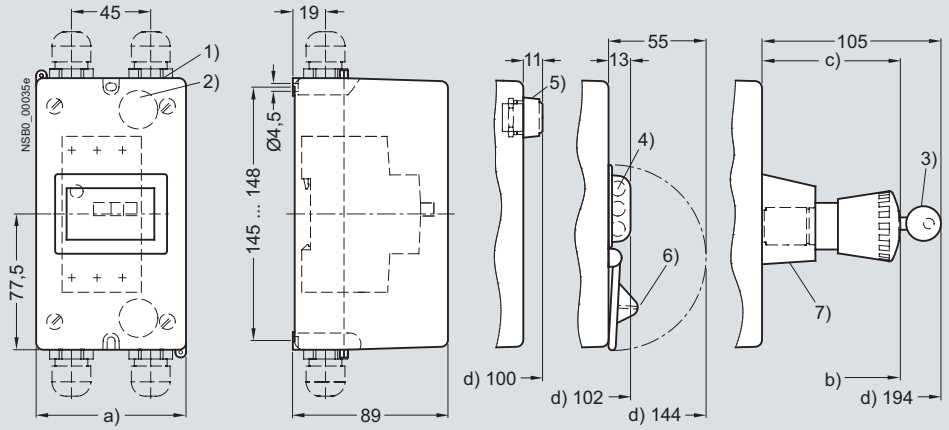


Accessories

Project planning aids

3RV19 .3-1.A00 molded-plastic enclosures for surface mounting

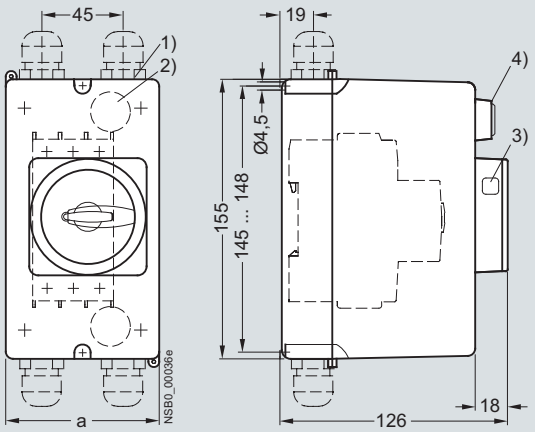
3RV19 13-1.A00
For motor starter protector size S00



1) Knock-outs for M25 cable glands.
2) Knock-outs for rear cable entry M20.
3) With safety lock.
4) Max. shackle diameter for padlock 8 mm.
5) 3RV19 03-5 indicator light.
6) 3RV19 13-6B locking device.
7) 3RV19 13-7 EMERGENCY-STOP mushroom button.

a) 3RV19 13-1CA00: 85 mm,
3RV19 13-1DA00: 105 mm.
b) With EMERGENCY-STOP mushroom button:
- 3RV19 13-7D: 153 mm,
- 3RV19 13-7E: 173 mm.
Dimensions refer to mounting surface.
b) With EMERGENCY-STOP mushroom button:
- 3RV19 13-7D: 64 mm,
- 3RV19 13-7E: 84 mm.
d) Dimensions refer to mounting surface.

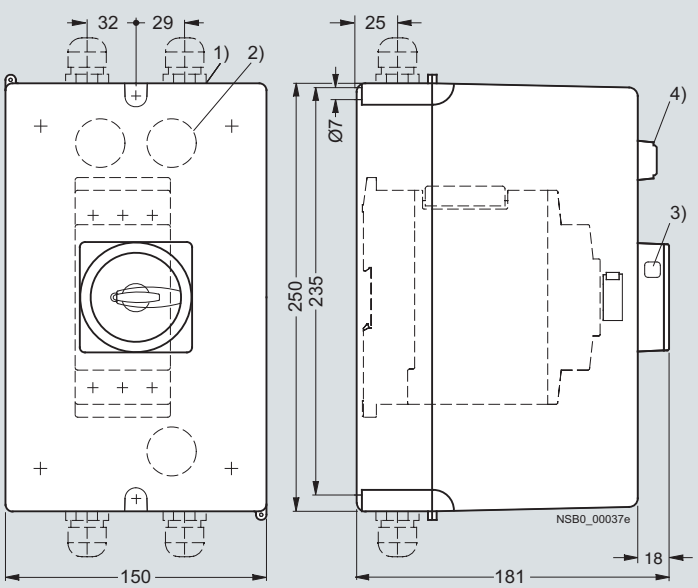
3RV19 23-1.A00
For motor starter protector size S0



Type	a
3RV19 23-1CA00	85
3RV19 23-1DA00	105

1) Knock-outs for M25 cable glands.
2) Knock-outs for rear cable entry M20.
3) Opening for padlock with shackle diameter max. 6 mm ... 8 mm.
4) 3RV19 03-5 indicator light.

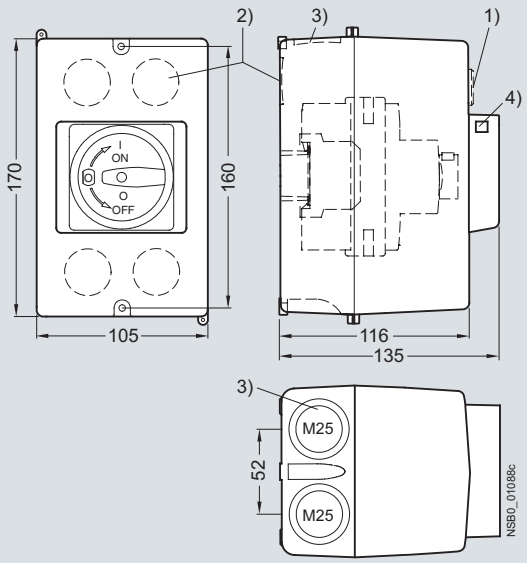
3RV19 33-1.A00
For motor starter protector size S2



1) Knock-outs for M32 (left) and M40 (right).
2) Knock-outs for rear cable entry M32.
3) Opening for padlock with shackle diameter max. 6 mm ... 8 mm.
4) Indicator light 3RV19 03-5.

3RV19 23-1.A01 cast aluminum enclosures for surface mounting

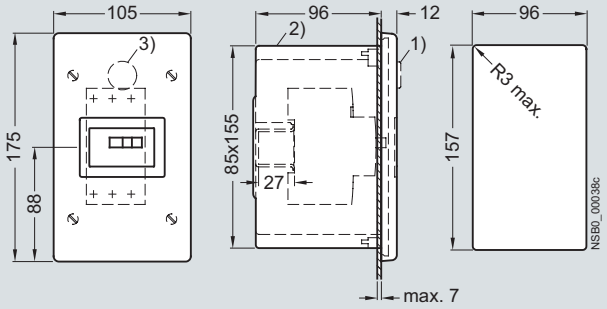
3RV19 23-1DA01, 3RV19 23-1GA01
For motor starter protector size S0



1) 3RV19 03-5 indicator light.
2) Knock-outs for rear cable entry M20.
3) Knock-outs for M25 cable glands.
4) Opening for padlock with shackle diameter from 6 mm ... 8 mm.

3RV19 13-2DA00 molded-plastic enclosures for flush mounting

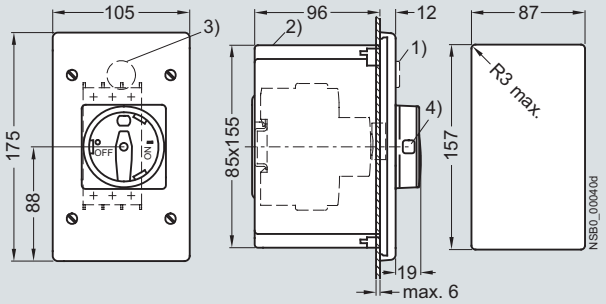
3RV19 13-2DA00
For motor starter protector size S00



1) 3RV19 03-5 indicator light.
2) Knock-outs for M25 cable glands.
3) Knock-outs for rear cable entry M20.

3RV19 23-2.A00 molded-plastic enclosures for flush mounting

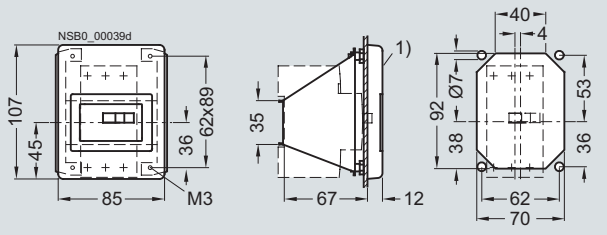
3RV19 23-2DA00, 3RV19 23-2GA00
For motor starter protector size S0



1) 3RV19 03-5 indicator light.
2) Knock-outs for M25 cable glands.
3) Knock-outs for rear cable entry M20.
4) Opening for padlock with shackle diameter from 6 mm ... 8 mm.

3RV19 13-4C molded-plastic front plates

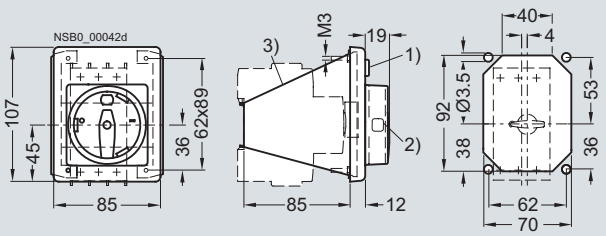
3RV19 13-4C
For motor starter protector size S00



1) 3RV19 03-5 indicator light.

3RV19 23-4. molded-plastic front plates

3RV19 23-4B, 3RV19 23-4E
For motor starter protector sizes S0, S2, S3;
3RV19 23-4G holders
Only for motor starter protectors size S0



1) 3RV19 03-5 indicator light.
2) Opening for padlock with shackle diameter from 6 mm ... 8 mm.
3) 3RV19 23-4G holder.

General data

Overview

3RV10 63-7AL10 molded case motor starter protector

The 3RV10 and 3RV13 molded case motor starter protectors for up to 800 A are compact, current-limiting motor starter protectors which can be used above all in load feeders for special voltages of 440 V, 480 V, 550 V and 690 V. They are used for switching and protecting induction motors and other loads with rated currents up to 800 A.

Type of construction

The molded case motor starter protectors are available in 4 widths:

- 3RV13 53 – width 90 mm,
  max. rated current 32 A,
  at 400 V AC suitable for induction motors up to 22 kW.
- 3RV1. 6. – width 105 mm,
  max. rated current 250 A,
  at 400 V AC suitable for induction motors up to 110 kW.
- 3RV1. 7. – width 140 mm,
  max. rated current 630 A,
  at 400 V AC suitable for induction motors up to 200 kW.
- 3RV1. 83 – width 210 mm,
  max. rated current 800 A,
  at 400 V AC suitable for induction motors up to 355 kW.

The 3RV1 molded case motor starter protectors for up to 800 A can be mounted in horizontal, vertical or lying arrangement directly on a mounting plate or mounting rail. Their rated data are adversely affected as the result.

The phase barriers for better insulation between the phases are included in the scope of supply.

The motor starter protectors can be supplied through top and bottom terminals without impairing their function, enabling them to be installed in any type of switchgear without any further steps.

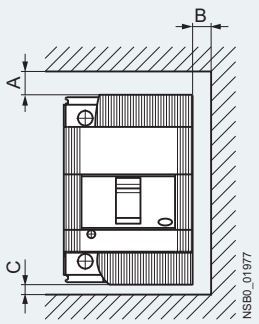
Design

Installation guidelines for 3RV1 molded case motor starter protectors

Installation clearances

When mounting the molded case motor starter protectors, the following clearances must be maintained to grounded or live parts and to cable ducts made of molded plastic.

Molded case motor starter protectors		Mandatory distances		
Type	Rated operational voltage U_e	A	B	C
	V	mm	mm	mm
3RV13 53	Up to 690	25	20	20
3RV1. 6.	Up to 400 440 ... 690	30 100	25	25
3RV1. 7.	Up to 400 440 ... 690	30 100	25	25
3RV1. 83	Up to 690	100	25	20

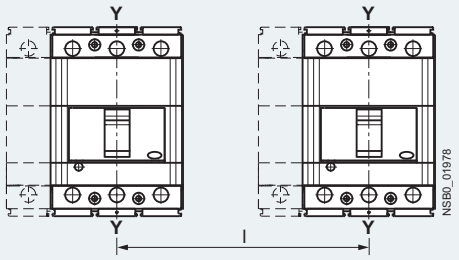


Minimum distance between two molded case motor starter protectors installed alongside or on top of each other

When molded case motor starter protectors are installed alongside or on top of each other it is important to make sure that neither the busbars nor connection cables reduce the clearance.

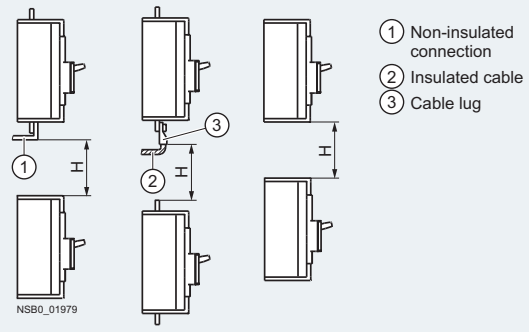
Minimum distance between two molded case motor starter protectors installed alongside each other

Molded case motor starter protectors			Mandatory distances
Type	Rated operational voltage U_e	Width	Minimum distance between axes I
	V	mm	mm
3RV13 53	Up to 690	90	90
3RV1. 6.	Up to 690	105	105
3RV1. 7.	Up to 440 500 ... 690	140	140 180
3RV1. 83	Up to 690	210	210



Minimum distance between two molded case motor starter protectors installed on top of each other

Molded case motor starter protectors		Mandatory distances
Type	Rated operational voltage U_e	Minimum distance between axes H
	V	mm
3RV13 53	Up to 690	90
3RV1. 6.	Up to 690	160
3RV1. 7.	Up to 690	160
3RV1. 83	Up to 690	180



Note:
The quoted voltages apply for operational voltages U_b up to 690 V. The mandatory distances must be added to the maximum dimensions of the molded case motor starter protectors in their various versions, including terminals.

General data

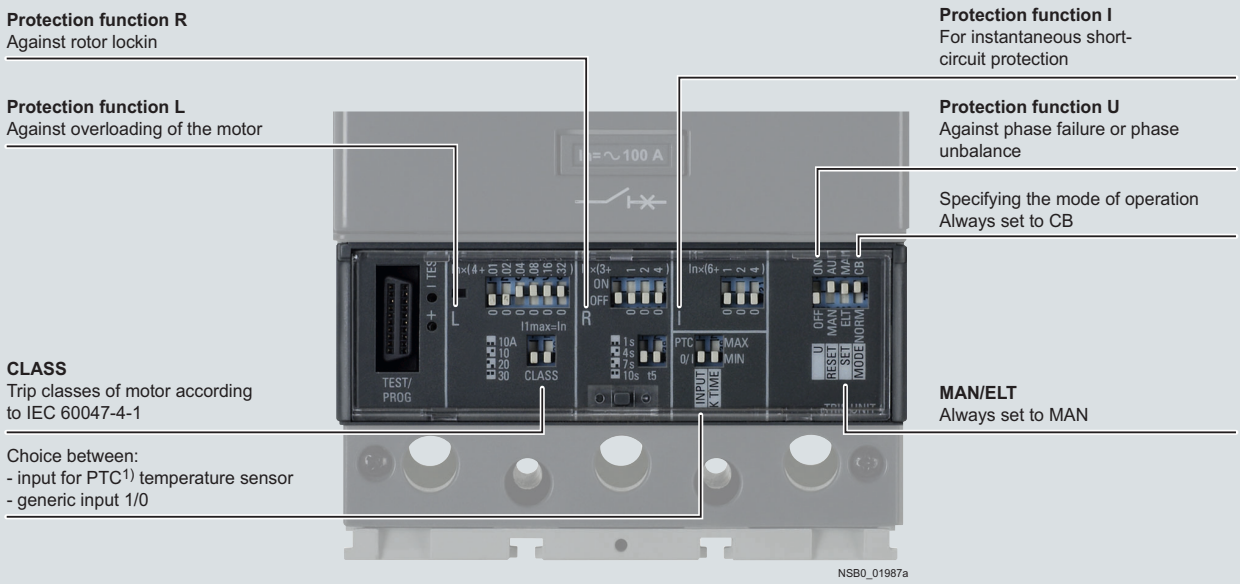
Function

Trip units

The 3RV1 molded case motor starter protectors for up to 800 A are available with four different trip units.

Type[1)]	Tripping method	For molded case motor starter protectors	Function	Setting range	External overload relay required for overload protection
TU 1	Purely magnetic	1 ... 12.5 A	Short-circuit protection	Non-adjustable: 13 x I_N	Yes
TU 2	Purely magnetic	20 A, 32 A	Short-circuit protection	Adjustable: 6 ... 13 x I_N	Yes
TU 3	Electronic (for starter combinations)	100 ... 800 A	Short-circuit protection	Adjustable: 1 ... 10 x I_N	Yes
TU 4	Electronic (for motor protection)	100 ... 630 A		Adjustable:	No
			Overload protection	I_1 = 0.4 ... 1 x I_N	
			Short-circuit protection	6 ... 13 x I_N	
			Protection in the event of rotor blockage	3 ... 10 x I_1	

1) TU = Trip unit



1) A special input is available for connecting a PTC temperature sensor which can be inserted in the motor to be protected.

3RV10 molded case motor starter protectors with trip unit TU 4

Trip classes

The trip classes of thermally delayed trip units are based on the tripping time (t_A) at 7.2 times the set current in cold state (excerpt from IEC 60947-4):

- CLASS 10A: 2 s < t_A < 10 s
- CLASS 10: 4 s < t_A < 10 s
- CLASS 20: 6 s < t_A < 20 s
- CLASS 30: 9 s < t_A < 30 s

The molded case motor starter protector must trip within this time!

With the 3RV1 molded case motor starter protectors (100 A to 630 A) which are equipped with the TU 4 trip unit, all four trip classes are possible.

Safe switch position

The toggle lever indicates tripping by adopting the "Tripped" position. To prevent switching onto an existing fault, the lever must be moved by hand to the 0 position prior to switching on again. Only then can the molded case motor starter protector be switched on again.

Configuration

The 3RV1 molded case motor starter protectors for up to 800 A are optimally coordinated and tested for combinations with 3RT contactors and, in starter combinations, with Sirius 3RU/3RB overload relays and SIMOCODE 3UF7. Detailed assignment tables for the special voltages 440 V, 480 V, 550 V and 690 V are included in the Configuration Manual „SIRIUS Configuration - Selection data for Fuseless Load Feeders“, Order No. 3ZX1012-0RA21-0AC0“

or as a PDF file on the Internet at http://support.automation.siemens.com/WW/view/en/40625241

Prevention of unintended tripping

In order to prevent unwanted tripping of the molded case motor starter protectors, they should always be connected such that current flows through all 3 main current paths.

Short-circuit protection

If a short-circuit occurs, the short-circuit releases of the 3RV1 molded case motor starter protectors isolate the faulty load feeder from the network and thus prevent further damage.

Motor starter protectors with a short-circuit breaking capacity of 50 kA or 100 kA are virtually short-circuit resistant at a voltage of 400 V AC, since higher short-circuit currents are not to be expected in practice.

Motor protection

The tripping characteristics of the 3RV10 molded case motor starter protectors are designed mainly to protect induction motors.

The motor starter protectors are therefore also referred to as motor-protective circuit breakers.

Short-circuit protection for starter combinations

The 3RV13 molded case motor starter protectors for starter combinations provide short-circuit protection for combinations of a contactor and overload relay.

- On overload, the overload relay triggers the contactor, the motor starter protector remains closed.
- Only when a short-circuit occurs in the feeder does the motor starter protector trip as well.

The molded case motor starter protectors for starter combinations must always be used in combination with an overload relay because the motor starter protector alone cannot protect the motor and itself against overload.

Altitude

The molded case motor starter protectors can be used without restriction at altitudes up to 2000 meters. At higher altitudes it is important to take account of the amended characteristics of the motor starter protector according to the following table.

Altitude	**Max. rated operational voltage U_e**	**Max. rated operational current I_e**
m	V AC	in % of I_n
2000	690	100
3000	600	96
4000	500	93
5000	440	90

Temperature characteristic

At higher temperatures it is necessary to take account of a reduction in the maximum permissible rated uninterrupted current (derating).

The maximum rated operational currents for the different 3RV1 molded case motor starter protectors are listed in the following table. These permissible loads apply for the molded case motor starter protectors with standard terminals, with front-extended terminals (see "Accessories") and with front-extended cable terminals (see "Accessories").

Molded case motor starter protectors	**Max. rated current I_e**	**Max. rated operational current I_e at**					
		45 °C	50 °C	55 °C	60 °C	65 °C	70 °C
	A	A	A	A	A	A	A
3RV1. 5	32	32	32	32	32	32	32
3RV1. 6	250	250	250	250	250	230	220
3RV1. 7	400	400	400	400	400	376	352
	630	630	580	552	530	504	479
3RV1. 8	630	630	630	565	598	583	567
	800	800	800	780	760	740	720

If required, derating values for rear-accessible terminals (see "Accessories")
can be obtained from "Technical Assistance":

- Either by e-mail to: technical-assistance@siemens.com
- Or on the Internet: http:/www.siemens.com/automation/service&support

General data

Technical specifications

General technical specifications

Type		3RV10 63	3RV10 73	3RV10 83	3RV13 53	3RV13 63	3RV13 64	3RV13 73	3RV13 74	3RV13 83
Standard		IEC 60947-2, EN 60947-2								
Motor protection		3			--					
Starter combinations		--			3					
Rated current I_n	A	160	400	630	160	250		400, 630		630, 800
Number of poles		3								
Rated operational voltage U_e AC 50 ... 60 Hz	V	690								
Rated impulse withstand voltage U_{imp}	V	8								
Rated insulation voltage U_i	V	1 000			800	1 000				
Test voltage at industrial frequency for 1 min	V	3 500			3 000	3 500				
Rated ultimate short-circuit breaking capacity I_{cu}										
• At 220/230 V AC, 50 ... 60 Hz	kA	200			120	200				
• At 380/415 V AC, 50 ... 60 Hz	kA	120		100	85	120	200	120	200	100
• At 440 V AC, 50 ... 60 Hz	kA	100		80	75	100	180	100	180	80
• At 500 V AC, 50 ... 60 Hz	kA	85		65	50	85	150	85	150	65
• At 550 V AC, 50 ... 60 Hz	kA	--			35	--				
• At 690 V AC, 50 ... 60 Hz	kA	70		30	10	70	80	70	80	30
Rated short-circuit breaking capacity I_{cs} (% of I_{cu})										
• At 220/230 V AC, 50 ... 60 Hz	%	100		75	100					75
• At 380/415 V AC, 50 ... 60 Hz	%	100		75		100				75
• At 440 V AC, 50 ... 60 Hz	%	100		75		100				75
• At 500 V AC, 50 ... 60 Hz	%	100		75		100		100[1]/ 75[2]	100	75
• At 690 V AC, 50 ... 60 Hz	%	100		75		100		100[1]/ 50[2]	100	75
Rated short-circuit making capacity (415 V)	kA	264		220	187	264	440	264	440	220
Break time (415 V at I_{cu})	ms	5	6	7	3	5		6		7
Category (EN 60947-2)		A	B (400 A), A (630 A)	B	A			B (400 A), A (630 A)		B
Isolating features		✓								
Trip classes CLASS		10A, 10, 20, 30			--					
Trip units										
• Magnetic-type		--			✓	--				
• Electronic (motor protection)		3			--[3]					
• Electronic (starter combinations)		--				✓				
Permissible ambient temperature										
• Operation	°C	-25 ... +70[4]								
• Storage	°C	-40 ... +70								
Mechanical endurance										
• Operating cycles		20 000			25 000	20 000				
• Operating cycles per hour		240	120		240			120		
Electrical endurance										
• Operating cycles		8 000	7 000	5 000	8 000			7 000		5 000
• Operating cycles per hour (415 V AC)		120	60		120			60		

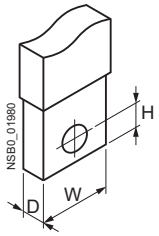
1) Value applies for 3RV13 73-7GN10 molded case motor starter protectors.

2) Value applies for 3RV13 73-7JN10 molded case motor starter protectors.

3) For overload protection of the motors, appropriate overload relays must be used.

4) From 50 °C derating must be observed in some cases, see table in page 43.

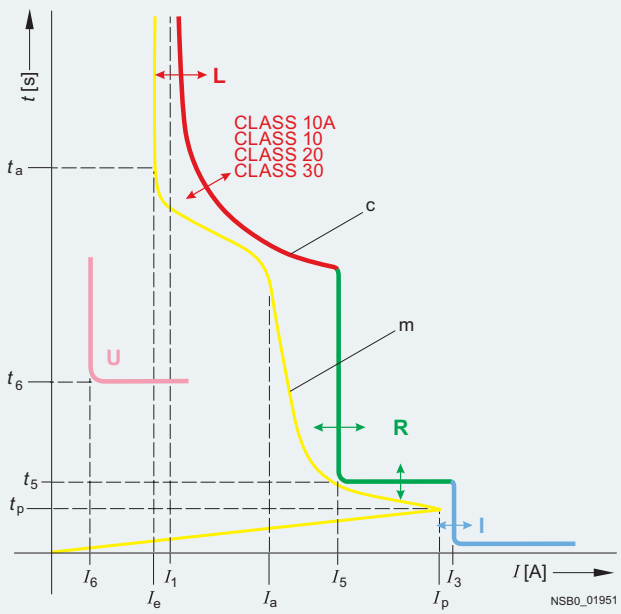
Main circuit terminals

Type		3RV13 53	3RV1. 6.	3RV1. 7.	3RV10 83-7JL10, 3RV13 83-7JN10	3RV13 83-7KN10
Terminal dimensions						
Front-accessible standard terminals						
Busbars/cable lug						
Number	Units	11			2	
Dimensions						
• W	mm	20	25	35	40	50
• D	mm	5	8	10	5	
• H	mm	7.5	9.5	11	12	
• Hole diameter	mm	6.5	8.5	10.5	7	
Front-extended terminals						
Busbars						
Number	Units	1		2		
Dimensions						
• W	mm	20		30	40	50
• D	mm	4	10	7	5	5
• Hole diameter	mm	8.5	10	11		14
Cable lug						
Number	Units	1		2		
Dimensions						
• B	mm	20		30	40	50
• Hole diameter	mm	8.5	10	11		14
Front-extended cable terminals for copper cable						
Busbars, flexible						
Number	Units	1			--	
Dimensions W x D x N						
• W	mm	13	15.5	24	--	
• D	mm	0.5	0.8	1	--	
• N (= number of laminations)	mm	10			--	
Cable lug, flexible						
Number	Units	1 or 2			--	
Dimensions						
• For 1 unit	mm^2	1 ... 70	2.5 ... 120	16 ... 240	--	
• For 2 units	mm^2	1 ... 50	2.5 ... 95	16 ... 150	--	
Cable lug, rigid						
Number	Units	1		1 or 2	--	
Dimensions						
• For 1 unit	mm^2	1 ... 95	2.5 ... 185	16 ... 300	--	
• For 2 units (for outside mounting)	mm^2	--		120 ... 240	--	
Rear-mounting terminals						
Busbars						
Number	Units	1		2		
Dimensions						
• W	mm	20		30	40	50
• D	mm	4	10	7	5	
• Hole diameter	mm	8.5		11	14	

General data

Characteristic curves

Example characteristic of a 3RV10 molded case motor starter protector with electronic trip unit for motor protection (TU 4)



I_1 = Tripping current for protection function L
I_3 = Tripping current for protection function I
I_5 = Tripping current for protection function R
t_5 = Tripping time for protection function R
I_6 = Tripping current for protection function U
t_6 = Tripping time for protection function U
I_e = Rated operational current of motor
I_a = Starting current of motor
I_p = Peak value of subtransient starting current
t_a = Starting time of motor
t_p = Duration of subtransient starting phase
m = Typical starting characteristic of the motor
c = Example of a tripping characteristic for a motor starter protector with electronic trip unit

TU = trip unit

Protection from overload (L trip unit)

The L protection function protects the motor from overload and is temperature-compensated according to IEC 60947-4-1 and sensitive to phase failure and phase unbalance. With the DIP switches on the trip unit the function can be set by hand to between 0.4 and 1 times the rated current. The trip class can also be set here.

A pre-alarm LED and an alarm LED indicate violation of the pre-alarm threshold (0.9 times the tripping current) and the alarm threshold (1.05 times the tripping current).

Protection from short-circuits (I trip unit)

This function protects the motor from short-circuits between two phases. It always responds when a phase exceeds the set tripping value (6 to 12 times the rated current). Safe start-up is guaranteed.

Protection in the event of rotor blockage (R trip unit), can be switched off

With this function the motor is protected in the event of rotor blockage during operation. During motor start-up, this function is blocked for the time defined by the trip class. Thereafter the trip unit trips after 1 to 10 s at 3 to 10 times the tripping current for the overload (each can be set by means of DIP switches).

Protection in the event of phase failure or phase unbalance (U trip unit), can be switched off

This function protects the motor when it is important to check in particular for phase failure and phase unbalance. The function responds when the rms value of the current in one or two phases remains 4 seconds long below the limit threshold of 0.4 times the tripping current for the overload.

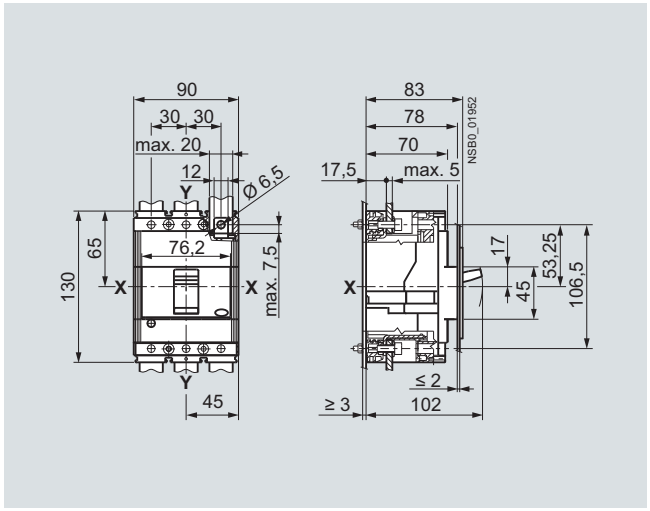
Time/current characteristic curves, current limiting characteristic curves and I^2t curves can be ordered from "Technical Assistance":

- Either by e-mail to: technical-assistance@siemens.com
- Or on the Internet: http://www.siemens.com/automation/service&support

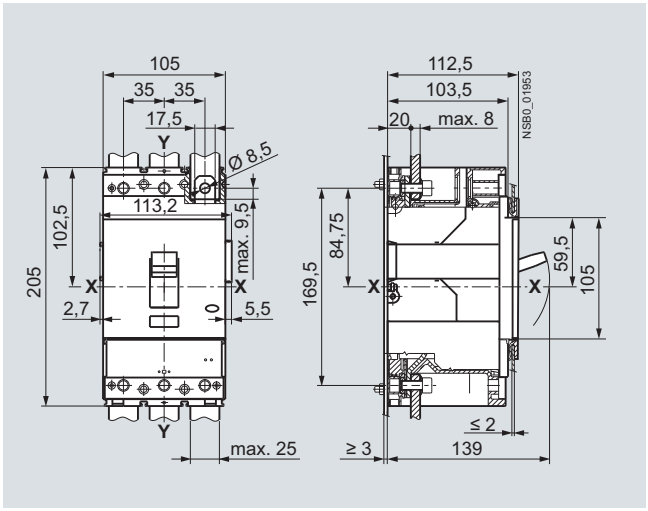
Dimensional drawings

3RV10 molded case motor starter protectors for motor protection,
3RV13 molded case motor starter protectors for starter combinations

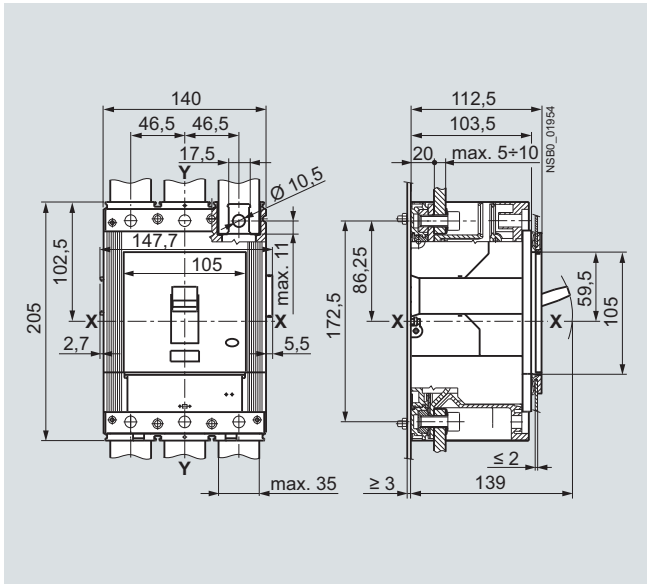
3RV13 53



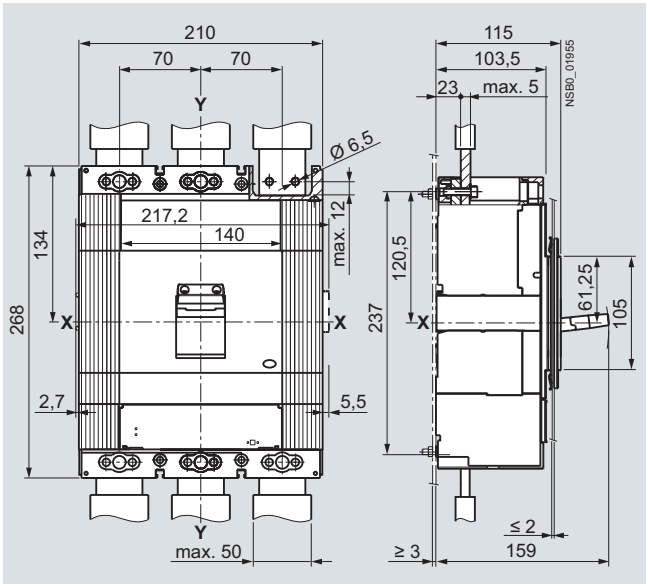
3RV10 63, 3RV13 6.



3RV10 73, 3RV13 7.



3RV10 83, 3RV13 83



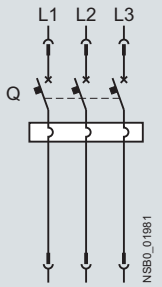
General data

Schematics

Internal circuit diagrams

Molded case motor starter protectors with electronic trip unit

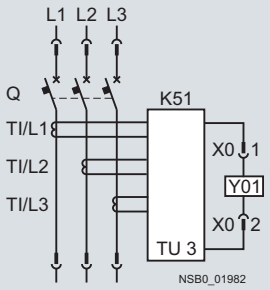
3RV13 53



Symbol according to IEC 60617
Q Auxiliary contacts of the molded case motor starter protector

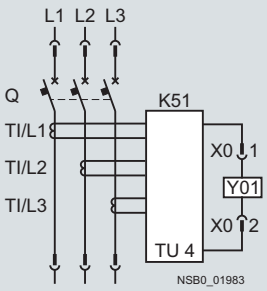
Molded case motor starter protectors with electronic trip unit

TU 3: 3RV13 63, 3RV13 64, 3RV13 73, 3RV13 74, 3RV13 83



Symbol according to IEC 60617
K51 Electronic protection trip unit
Y01 Breaking coil of the solid-state overcurrent trip unit
X0 Plug-in connector for the Y01 breaking coil
TI/L1 Current transformer on phase L1
TI/L2 Current transformer on phase L2
TI/L3 Current transformer on phase L3
Q Auxiliary contacts of the molded case motor starter protector
TU 3 Trip unit

TU 4: 3RV10 63, 3RV10 73, 3RV10 83



Symbol according to IEC 60617
K51 Electronic protection trip unit
Y01 Breaking coil of the solid-state overcurrent trip unit
X0 Plug-in connector for the Y01 breaking coil
TI/L1 Current transformer on phase L1
TI/L2 Current transformer on phase L2
TI/L3 Current transformer on phase L3
Q Auxiliary contacts of the molded case motor starter protector
TU 4 Trip unit

Technical specifications

Auxiliary switches

Type		3RV19 91-1.A0
Rated operational current I_e		
• At 250 V AC/DC		
- At AC-14 (utilization category acc. to IEC 60947-5-1)		
Supply voltage 125 V	A	6
Supply voltage 250 V	A	5
- At DC-14 (utilization category acc. to IEC 60947-5-1)		
Supply voltage 125 V	A	0.3
Supply voltage 250 V	A	0.15
• At 24 V DC		
- Supply voltage 24 V	mA	≥ 0.75
- Supply voltage 5 V	mA	≥ 1

Auxiliary trip units

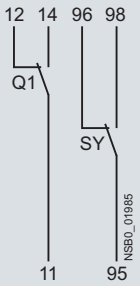
		Power consumption during pick-up			
Molded case motor starter protectors		**3RV13 53**		**3RV1. 6, 3RV1. 7, 3RV1. 83**	
Version		AC	DC	AC	DC
Undervoltage trip units		**3RV19 52-1A.0**		**3RV19 82-1A.0**	
• 24 ... 30 V AC/DC		1.5 VA	1.5 W	6 VA	150 W
• 110 ... 127 V AC/110 ... 125 V DC		2 VA	2 W	6 VA	150 W
• 220 ... 240 V AC/220 ... 250 V DC		2.5 VA	2.5 W	6 VA	150 W
Opening times	ms	15	15	≤ 25	≤ 15
Shunt trip units		**3RV19 52-1E.0**		**3RV19 82-1E.0**	
• 24 ... 30 V AC/DC		50 VA	50 W	150 VA	150 W
• 110 ... 127 V AC/110 ... 125 V DC		50 VA	50 W	150 VA	150 W
• 220 ... 240 V AC/220 ... 250 V DC		50 VA	50 W	150 VA	150 W
Opening times	ms	15	15	15	15

Schematics

Internal circuit diagrams

Auxiliary switches

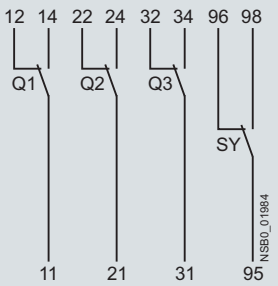
3RV19 91-1AA0



Symbol acc. to IEC 60617

Q1	Indication of the switch position of the main contacts
SY	Tripping indicated via one of the protection functions of the molded case motor starter protector

3RV19 91-1BA0, 3RV19 91-1CA0



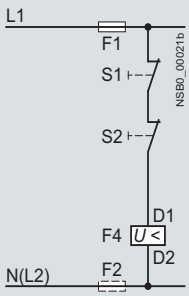
Symbol acc. to IEC 60617

Q1, Q2, Q3	Indication of the switch position of the main contacts
SY	Tripping indicated via one of the protection functions of the molded case motor starter protector

Circuit diagrams

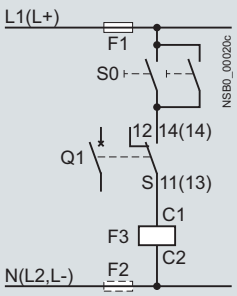
Auxiliary trip units

3RV19 .2-1A.0
Undervoltage trip unit



S1, S2	OFF button in the system
F1, F2	Fuse (gL/gG), max. 10 A
F4	Undervoltage trip unit

3RV19 .2-1E.0
Shunt trip unit



S0	OFF button in the system
Q1	Motor starter protector
S	Auxiliary switch of the molded case motor starter protector Q1
F1, F2	Fuse (gL/gG), max. 10 A
F3	Shunt trip unit

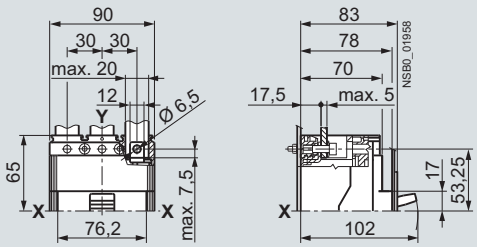
Project planning aids

Dimensional drawings

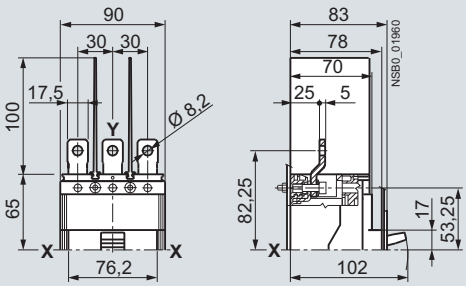
3RV13 53 molded case motor starter protectors

Mountable accessories

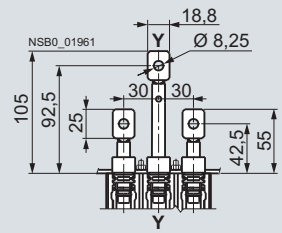
Front-accessible standard terminals



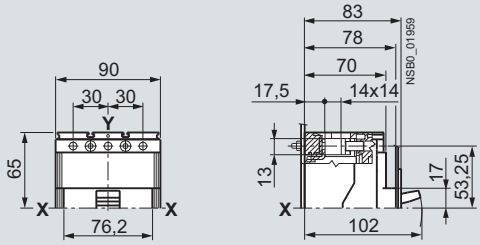
Front-extended terminals
3RV19 55-1AA0



Rear-accessible terminals
3RV19 55-3AA0

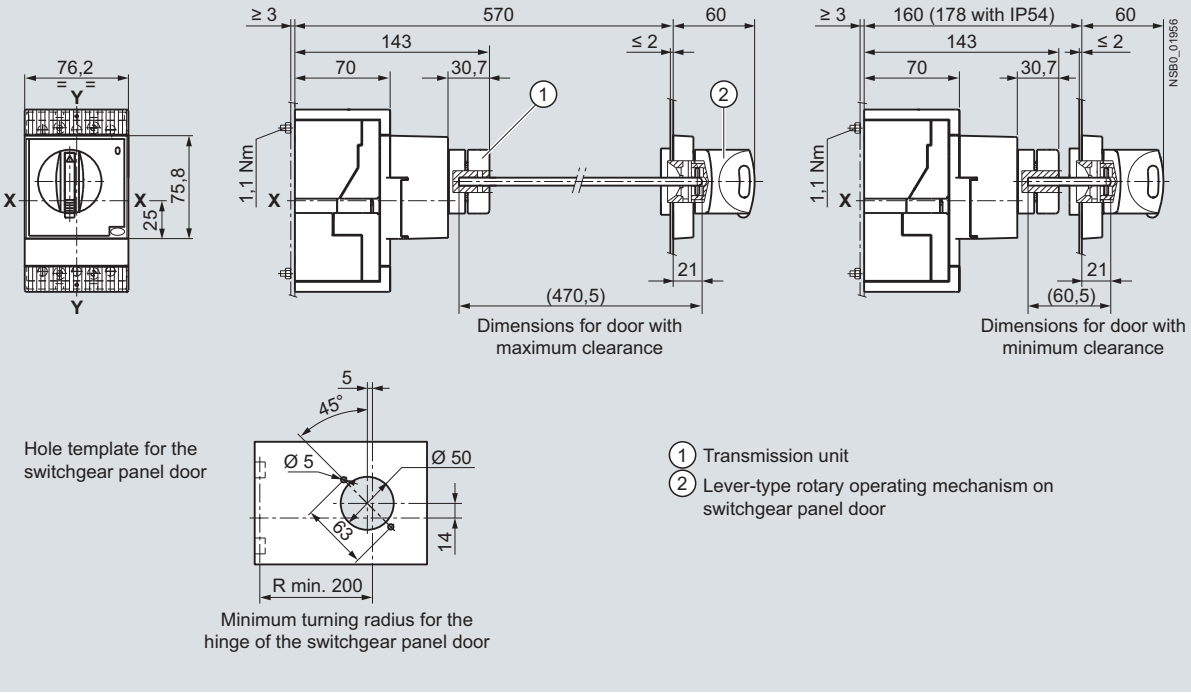


Front-extended cable terminals
3RV19 55-2AA0



Rotary operating mechanisms

3RV19 56-0BA0 lever-type rotary operating mechanism on switchgear panel door

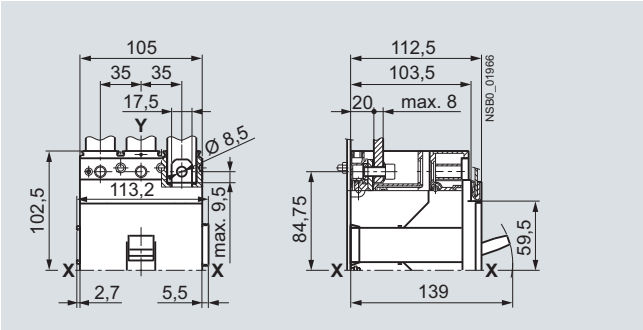


3RV1. 6. and 3RV1. 7. molded case motor starter protectors

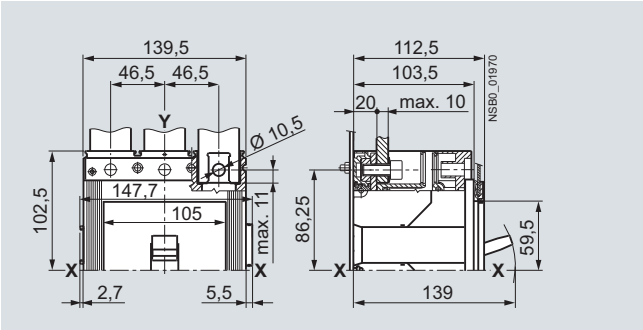
Mountable accessories

Front-accessible standard terminals

For 3RV1. 6. molded case motor starter protectors

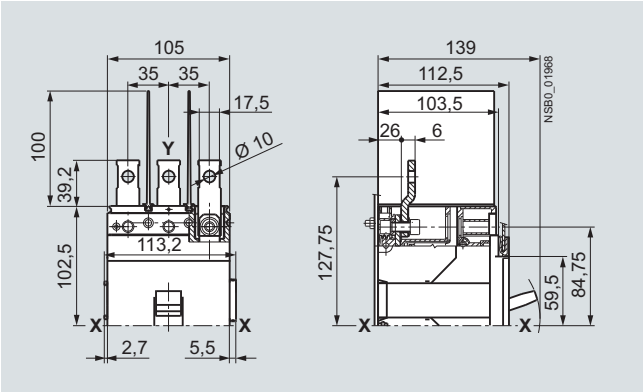


For 3RV1. 7. molded case motor starter protectors

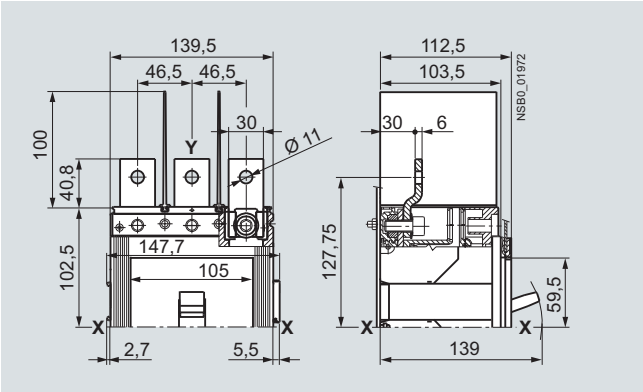


Front-extended terminals

3RV19 65-1BA0 for 3RV1. 6. molded case motor starter protectors

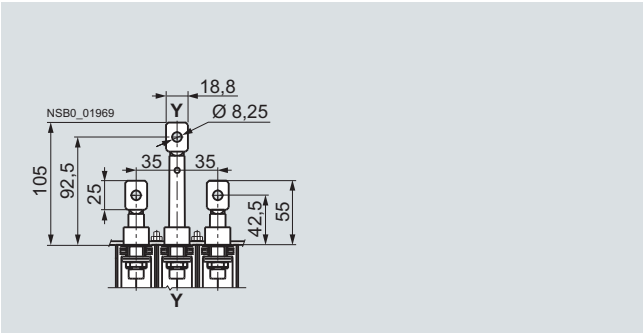


3RV19 75-1CA0 for 3RV1. 7. molded case motor starter protectors

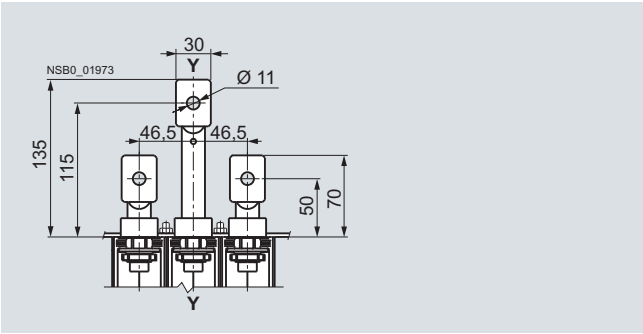


Rear-accessible terminals

3RV19 65-3AA0 for 3RV1. 6. molded case motor starter protectors

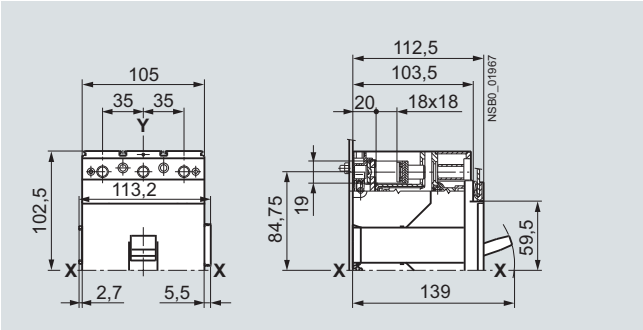


3RV19 75-3AA0 for 3RV1. 7. molded case motor starter protectors

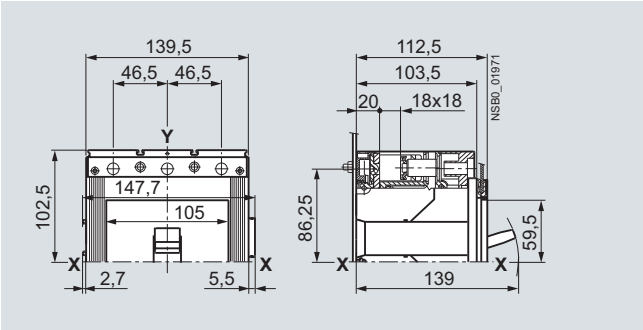


Front-extended cable terminals

3RV19 65-2BA0 for 3RV1. 6. molded case motor starter protectors



3RV19 75-2CA0 for 3RV1. 7. molded case motor starter protectors

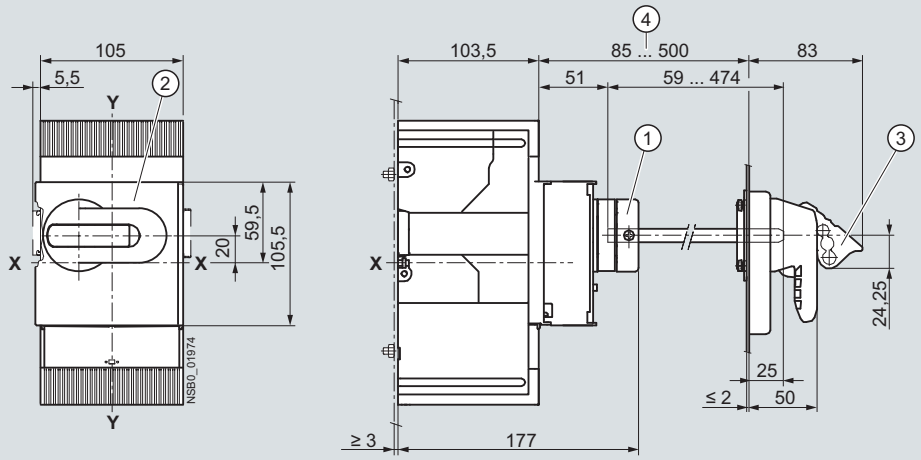


Accessories

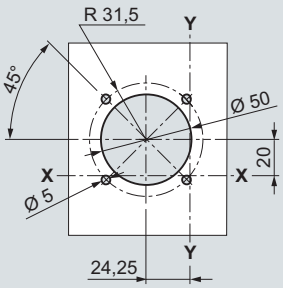
Project planning aids

Rotary operating mechanisms

3RV19 76-0BA0 lever-type rotary operating mechanism on switchgear panel door



Cut-out in the switchgear panel door

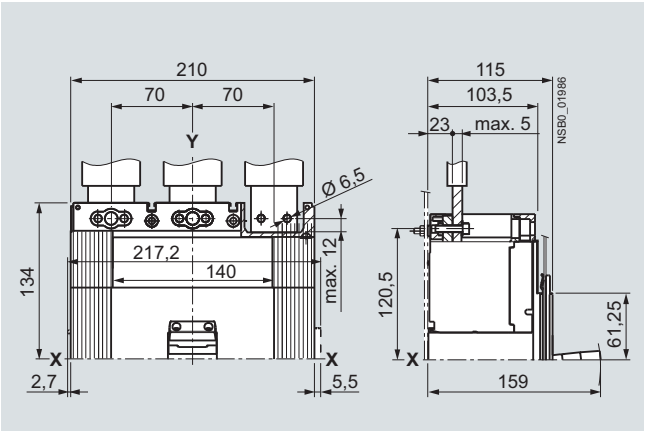


1. Transmission unit
2. Rotary lever set with door interlocking device
3. Lock interlocking in OFF position (max. 3 padlocks; not included in the scope of supply)
4. Min. and max. distance from the front side of the switchgear panel door

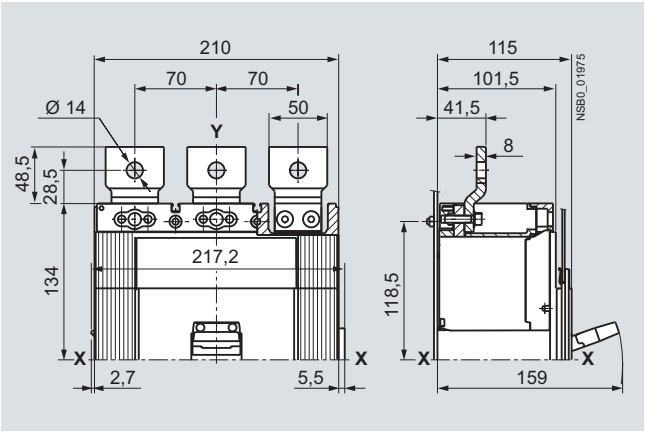
3RV1. 83 molded case motor starter protectors

Mountable accessories

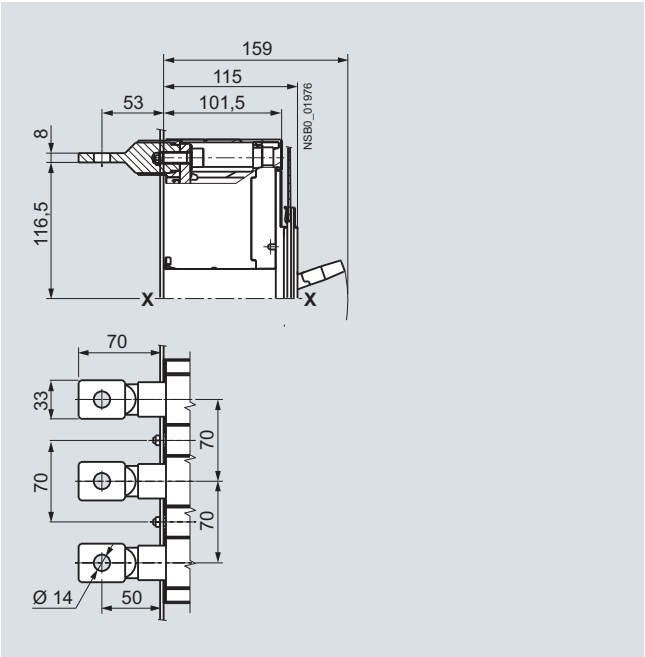
Front-accessible standard terminals



Front-extended terminals
3RV19 85-1DA0, 3RV19 85-1EA00



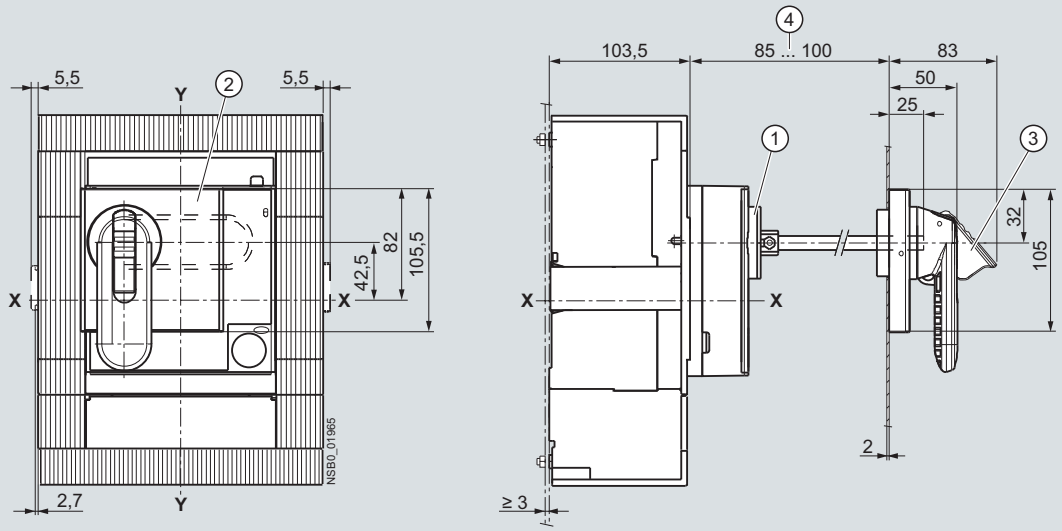
Rear-accessible terminals
3RV19 85-3AA0



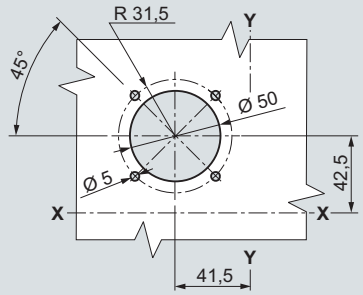
Project planning aids

Rotary operating mechanisms

3RV19 86-0BA0 lever-type rotary operating mechanism on switchgear panel door



Cut-out in the switchgear panel door



1. Transmission unit
2. Rotary lever set with door interlocking device
3. Lock interlocking in OFF position (max. 3 padlocks; not included in the scope of supply)
4. Min. and max. distance from the front side of the switchgear panel door

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