General data

Overview

S0 circuit-breakers

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

Construction

The circuit-breakers are available in four sizes:

- Size S00 - overall width 45 mm,
  max. rated current 12 A,
  at AC 400 V suitable for 3-phase induction motors up to 5.5 kW.
- Size S0 - overall width 45 mm,
  max. rated current 25 A,
  at AC 400 V suitable for 3-phase induction motors up to 11 kW.
- Size S2 - overall width 55 mm,
  max. rated current 50 A,
  at AC 400 V suitable for 3-phase induction motors up to 22 kW.
- Size S3 - overall width 70 mm,
  max. rated current 100 A,
  at AC 400 V suitable for 3-phase induction motors up to 45 kW.

Area of application

Operating conditions

3RV1 circuit-breakers are suitable for use in any climate. They are intended for use in enclosed areas where no severe operating conditions (e.g. dust, corrosive vapors, damaging gases) are present. When installed in dusty and damp areas, suitable enclosures must be provided.

3RV circuit-breakers can optionally be fed from the top or from below.

The permissible ambient temperatures, the maximum switching capacities, the tripping currents and other boundary conditions can be found in the technical specifications and tripping characteristics.

3RV1 circuit-breakers are suitable for use in IT systems (IT networks). In this case, the different short-circuit breaking capacity in the IT system must be taken into account.

Since operational currents, starting currents and current peaks are different even for motors with identical power ratings due to the inrush current, the motor ratings in the selection tables are only guide values. The specific rated and start-up data of the motor to be protected is always paramount to the choice of the most suitable circuit-breaker. This also applies to circuit-breakers for transformer protection.

In order to prevent premature tripping due to the integrated phase failure sensitivity, circuit-breakers should always be connected to ensure current flows through all three main conducting paths.

Short-circuit protection

If a short-circuit occurs, the short-circuit releases of 3RV1 circuit-breakers isolate the faulty load feeder from the mains supply and thus prevent further damage.

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

Motor protection

The tripping characteristics of 3RV10/3RV11 circuit-breakers are designed mainly to protect three-phase induction motors.

The circuit-breakers are therefore also referred to as motor 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 circuit-breaker. This permits trouble-free start-up and ensures that the motor is properly protected.

The phase failure sensitivity of the circuit-breaker 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.

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

Motor protection with overload relay function (automatic reset)

Circuit-breakers for motor protection with overload relay function are designed for the protection of three-phase induction motors.

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

The circuit-breaker 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 circuit-breaker itself only trips if a short-circuit occurs downstream.

Plant protection

The 3RV10/3RV11 circuit-breakers 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.

Short-circuit protection for starter combinations

The 3RV13 circuit-breakers 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 circuit-breakers 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 circuit-breakers. They are not equipped with overload releases.

On overload, the overload relay triggers the contactor, the circuit-breaker remains closed.

Only when a short-circuit occurs in the feeder does the circuit-breaker trip as well.

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

Transformer protection

When control-power 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 circuit-breakers in sizes S0 and S2 for protecting transformers are therefore fitted with overcurrent releases which are permanently set in the factory to a value equivalent to 20 times the rated current.

Circuit-breakers 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.

This type of circuit-breaker is not necessary in the case of control-power transformers with low inrush currents, such as control transformers from Siemens. 3RV1 circuit-breakers for motor protection can be used in this case.

Main and EMERGENCY-STOP switches

The circuit-breakers 3RV10, 3RV11, 3RV13, 3RV14 and 3RV16 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 conform with the requirements for the isolating function.

Fuse monitoring

The 3RV16 11-0BD10 circuit-breaker size S00 is used for fuse monitoring.

A fuse is connected in parallel with each conducting path of the circuit-breaker. When a fuse blows, the current flows through the parallel conducting path and trips the circuit-breaker.

The 3RV16 11-0BD10 circuit-breaker must be equipped with a transverse or lateral auxiliary switch (accessories) that signals a tripping operation of the circuit-breaker 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.

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 via 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:

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

Circuit-breaker for fuse monitoring

The 3RV16 11-0BD10 circuit-breaker for fuse monitoring is suitable for the following voltages: 50Hz/60 Hz from AC 24 V to 690 V and up to DC 450 V. Fuse monitoring with 3RV16 11-0BD10 circuit-breakers 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 circuit-breaker will only trip, and a signal will be output to indicate this, if the voltage difference across the circuit-breaker is at least 24 V.

Use of IT systems (IT networks)

3RV1 circuit-breakers are suitable for use in IT systems acc. toIEC 60947-2. In the event of a 3-pole short-circuit, their response in this system is the same as in others:
Therefore, the same short-circuit breaking capacity applies, see technical specifications of I_{cu} and I_{cs}.

An initial fault (ground fault) does not necessarily force immediate shutdown of the network when operating IT systems. If a second independent error occurs (ground fault), the switching capacity of the circuit-breaker 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 line-side and the other on the secondary side of the circuit-breaker.

In order to maintain the short-circuit function of the circuit-breaker 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.

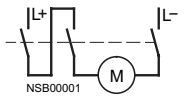
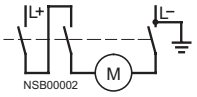
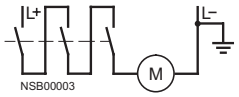
Switching of DC currents

3RV1 circuit-breakers for alternating currents are also suitable for DC switching.

The maximum permissible DC current per conducting path must, however, be adhered to. Higher voltages require a series circuit 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 recommended circuits for DC switching can be seen in the table below.

General data

Recommended circuit for size S00 to S3 3RV1 circuit-breakers	Max. permissible DC voltage U_e	Note
	DC 150 V	**2-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.
	DC 300 V	**2-pole switching, grounded system** The grounded pole is always assigned to the individual current path, so that there are always 2 current paths in series in the event of a ground fault.
	DC 450 V	**1-pole switching, grounded system** 3 current paths in series. The grounded pole is assigned to the unconnected current path.

1) It is assumed that this circuit always provides safe cut-out 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 protective devices 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 erratic triggering of the distance protection.

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

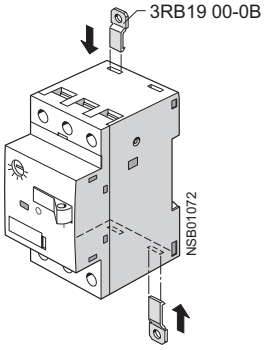
Design

Assembly

The circuit-breakers are snap-mounted on a 35 mm mounting rail to EN 50022. A mounting rail with a height of 15 mm is required for size S3 circuit-breakers. A 75 mm rail can be used as an alternative for size S3.

S2 and S3 circuit-breakers can also be screwed directly onto a baseplate.

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



Screw connection

3RV1 circuit-breakers 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 circuit-breakers also enable 2 conductors with different cross-sections to be connected. With the exception of S3 circuit-breakers which are equipped with 4 mm hexagon socket screws, all terminal screws are tightened with a Pozidriv screwdriver size 2.

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

Cage Clamp connection

As an alternative to screw terminals, S00 circuit-breakers are also available with Cage Clamp connection.

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

Circuit-breakers with Cage Clamp connection allow independent connection of two conductors per terminal.

Circuit-breakers with Cage Clamp connection.

3RV16 voltage transformer circuit-breakers up to 3 A

The voltage transformer circuit-breaker widely corresponds with the SIRIUS 3RV1 circuit-breaker, 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 cut-out within only a few milliseconds.

To prevent this fault response, 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 functions. They cannot be used for blocking the distance protection device.

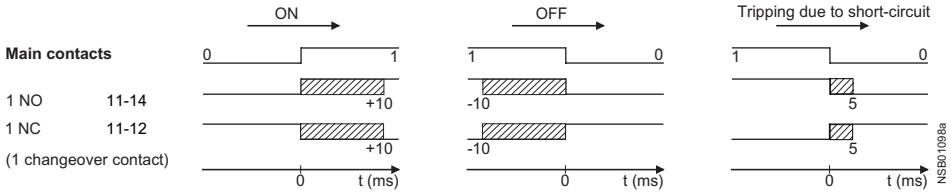
Impedance across the main contacts

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 service life of the circuit-breaker.

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

Mounting

The circuit-breakers are snap-mounted on a 35 mm mounting rail to EN 50022. Push-in lugs are available for screw connection of the circuit-breakers (see Accessories for SIRIUS 3RV1 circuit-breakers).



Timing diagram of auxiliary switches for blocking distance protection

Functions

Releases

3RV1 circuit-breakers are equipped with inverse-time delayed overload releases based on the bimetal principle and with instantaneous overcurrent releases (electromagnetic short-circuit releases).

The overload releases can be set in accordance with the load current. The overcurrent releases are permanently set to a value 13 times the rated current and thus enable trouble-free start-up of motors.

Circuit-breakers 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 releases are based on the tripping time (t_A) at 7.2 times the operational 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 circuit-breaker must trip within this time!

Operating mechanisms

S00 circuit-breakers are activated by a rocker operating mechanism and S0, S2 and S3 circuit-breakers by a rotary operating mechanism. If the circuit-breaker trips, the rotary operating mechanism switches to the tripped position to indicate this. Before the circuit-breaker is reclosed, the rotary operating mechanism must be reset manually to the 0 position to prevent the breaker from closing by mistake before the fault has been cleared. The circuit-breaker can then only be set to the I position afterwards.

In the case of circuit-breakers with rotary operating mechanisms, an electrical signal can be output by an alarm switch to indicate that the circuit-breaker 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 circuit-breaker isolating function conforms to IEC 60947-2.

General data

Technical specifications

Rated short-circuit breaking capacity I_{cn} 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 circuit-breakers with different inception voltages dependent of the rated current I_n of the circuit-breakers.

Circuit-breaker infeed is permissible at the upper or lower terminals without restricting the rated data. If the short-circuit current at the installation point exceeds that rated short-circuit breaking capacity of the circuit-breaker as specified in the table, a back-up fuse is required. Alternatively, a circuit-breaker 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

Circuit-breaker contactor combinations for short-circuit currents up to 50 kA can be ordered in the form of fuseless load feeders in accordance with Part 6.

Circuit-breaker	Rated current I_n	up to AC 240 V[1]			up to AC 400 V[1]/415 V[2]			up to AC 440 V[1]/460 V[2]			up to AC 500 V[1]/525 V[2]			up to AC 690 V[1]		
		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
3RV10 1, 3RV16 11-0BD10 Size S00	0.16 ... 0.8	100	100	°	100	100	°	100	100	°	100	100	°	100	100	°
	1	100	100	°	100	100	°	100	100	°	100	100	°	100	100	°
	1.25	100	100	°	100	100	°	100	100	°	100	100	°	2	2	20
	1.6	100	100	°	100	100	°	100	100	°	100	100	°	2	2	20
	2	100	100	°	100	100	°	100	100	°	10	10	35	2	2	35
	2.5	100	100	°	100	100	°	100	100	°	10	10	35	2	2	35
	3.2	100	100	°	100	100	°	50	10	40	3	3	40	2	2	40
	4	100	100	°	100	100	°	50	10	40	3	3	40	2	2	40
	5	100	100	°	100	100	°	50	10	50	3	3	50	2	2	50
	6.3	100	100	°	100	100	°	50	10	50	3	3	50	2	2	50
	8	100	100	°	50	12.5	80	50	10	63	3	3	63	2	2	63
	10	100	100	°	50	12.5	80	10	10	63	3	3	63	2	2	63
	12	100	100	°	50	12.5	80	10	10	80	3	3	80	2	2	80
3RV1. 2 Size S0	0.16 ... 1.25	100	100	°	100	100	°	100	100	°	100	100	°	100	100	°
	1.6	100	100	°	100	100	°	100	100	°	100	100	°	100	100	°
	2	100	100	°	100	100	°	100	100	°	100	100	°	8	8	25
	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	100	100	°	100	100	°	100	100	°	100	100	°	6	3	32
	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	100	100	°	50	25	125	50	10	100	10	5	80	4	2	63
	25	100	100	°	50	25	125	50	10	100	10	5	80	4	2	63
3RV1. 3 Size S2	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	100	100	°	50	25	160	50	15	125	10	5	100	4	2	63
	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
3RV1. 41 Size S3	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	°	50	25	160	50	20	160	8	4	125	5	3	125
	100	100	100	°	50	25	160	50	20	160	8	4	125	5	3	125
3RV1. 42 Size S3 with increased switching capacity	16	100	100	°	100	50	°	100	50	°	30	15	80	12	7	63
	20	100	100	°	100	50	°	100	50	°	30	15	80	12	7	63
	25	100	100	°	100	50	°	100	50	°	30	15	80	12	7	63
	32	100	100	°	100	50	°	100	50	°	22	11	100	12	7	63
	40	100	100	°	100	50	°	100	50	°	18	9	160	12	6	80
	50	100	100	°	100	50	°	100	50	°	15	7.5	160	10	5	100
	63	100	100	°	100	50	°	70	50	200	15	7.5	160	7.5	4	100
	75	100	100	°	100	50	°	70	50	200	10	5	160	6	3	125
	90	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 proof up to at 50 kA.

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

1) 10% overvoltage.

2) 5% overvoltage.

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

4) Alternatively, fuseless limiter combinations for AC 690 V can also be used (see page 4/10).

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

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

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

If the short-circuit current at the installation point exceeds that rated short-circuit breaking capacity of the circuit-breaker 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.

Circuit-breaker	Rated current I_n	up to AC 240 V[1]		up to AC 400 V[1] / 415 V[2]		up to AC 500 V[1] / 525 V[2]		up to AC 690 V[1]	
		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
3RV10 1	0.16 ... 0.63	100	°	100	°	100	°	100	°
3RV16 11-0BD10	0.8	100	°	100	°	100	°	2	16
Size S00	1	100	°	100	°	100	°	2	16
	1.25	100	°	2	20	2	20	2	20
	1.6	100	°	2	20	2	20	2	20
	2	100	°	2	35	2	35	2	35
	2.5	100	°	2	35	2	35	2	35
	3.2	100	°	2	40	2	40	2	40
	4	100	°	2	40	2	40	2	40
	5	100	°	2	50	2	50	2	50
	6.3	100	°	2	50	2	50	2	50
	8	50	80	2	63	2	63	2	63
	10	50	80	2	63	2	63	2	63
	12	50	80	2	80	2	80	2	80
3RV1. 2	0.16 ... 0.63	100	°	100	°	100	°	100	°
Size S0	0.8	100	°	100	°	100	°	6	16
	1	100	°	100	°	100	°	6	16
	1.25	100	°	100	°	8	20	6	20
	1.6	100	°	100	°	8	20	6	20
	2	100	°	8	25	8	25	6	25
	2.5	100	°	8	25	8	25	6	25
	3.2	100	°	8	32	8	32	6	32
	4	100	°	6	32	4	32	3	32
	5	100	°	6	32	4	32	3	32
	6.3	100	°	6	50	4	50	3	50
	8	100	°	6	50	4	50	3	50
	10	100	°	6	50	4	50	3	50
	12.5	100	°	6	63	4	63	3	63
	16	50	80	4	63	3	63	2	63
	20	50	80	4	63	3	63	2	63
	22	50	80	4	63	3	63	2	63
	25	50	80	4	63	3	63	2	63
3RV1. 3	16	50	100	8	100	6	80	5	63
Size S2	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	160	6	125	4	100	3	80
	45	50	160	6	125	4	100	3	80
	50	50	160	6	125	4	100	3	80
3RV1. 41	40	50	125	10	63	5	50	5	50
Size S3	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	50	160	5	125	2	100	2	100
	100	50	160	5	125	2	100	2	100
3RV1. 42	16	100	°	12	63	6	50	6	50
Size S3	20	100	°	12	63	6	50	6	50
with increased	25	100	°	12	63	6	50	6	50
switching	32	100	°	12	63	6	50	6	50
capacity	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 proof down to min. 50 kA.

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

1) 10% overvoltage.

2) 5% overvoltage.

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

4) Alternatively, fuseless limiter combinations for AC 690 V can also be used (see page 4/10).

General data

Limiter function with standard devices for AC 500 V and AC 690 V 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 circuit-breaker that fulfils the limiter function at AC 500 V and AC 690 V. The short-circuit breaking capacity can be increased significantly with an upstream standard circuit-breaker.

The circuit-breaker which is connected downstream must be set to the rated current of the load.

With circuit-breaker combination assemblies, note the clearance to grounded parts and between the circuit-breakers. Short-circuit proof wiring between the circuit-breakers must be ensured. The circuit-breakers can be mounted side-by-side in a modular arrangement.

Standard circuit-breaker	Standard circuit-breaker with limiter function	Rated current I_n	**up to AC 500 V[1] / 525 V[2]**		**up to AC 690 V[1]**	
			I_{cu}	I_{cs}	I_{cu}	I_{cs}
Type	Type Rated current I_n	A	kA	kA	kA	kA
3RV10 2 Size S0	**3RV13 21-4DC10** Size S0 I_n = 25 A	up to 1	°	°	°	°
		1.25	°	°	°	°
		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
3RV10 3 Size S2	**3RV13 31-4HC10** Size S2 I_n = 50 A	16	100	50	50	25
		20	100	50	50	25
		25	100	50	50	25
		32	100	50	50	25
		40	100	50	50	25
		50	100	50	50	25
3RV10 4 Size S3	**3RV13 41-4HC10** Size S3 I_n = 50 A	32	100	50	50	25
		40	100	50	50	25
		50	100	50	50	25
3RV10 4 Size S3	**3RV13 41-4MC10** Size S3 I_n = 100 A	50	100	50	50	25
		63	100	50	50	25
		75	100	50	50	25
		90	100	50	50	25
		100	100	50	50	25

Short-circuit proof up to at least 100 kA.

° No upstream circuit-breaker required since short-circuit proof up to 100 kA.

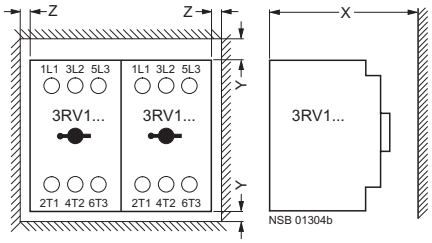
1) 10% overvoltage.

2) 5% overvoltage.

Rules for mounting circuit-breakers

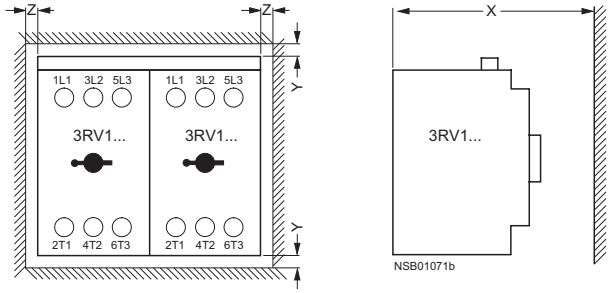
When mounting circuit-breakers, the following clearances must be maintained to grounded or live parts.

Circuit-breaker			Clearances to grounded or live parts acc. to IEC 60947-2		
Type	Size	U_e	Y	X	Z
		V	mm	mm	mm
3RV1. 1	S00	up to 690	20	70	9
3RV1. 2	S0	up to 500	30	90	9
		up to 690	50	90	30
3RV1. 3	S2	up to 690	50	140	30
3RV1. 4	S3	up to 240	50	167	10
		up to 440	70	167	10
		up to 500	110	167	10
		up to 690	150	167	30

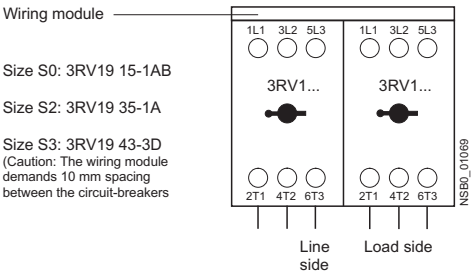


Rules for mounting circuit-breakers with limiter function

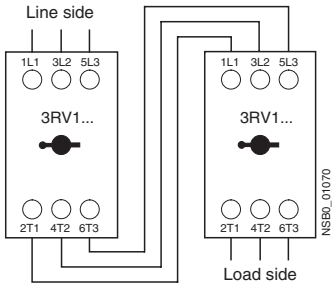
Circuit-breaker			Clearances to grounded or live parts acc. to IEC 60947-2		
Type	Size	U_e	Y	X	Z
		V	mm	mm	mm
3RV1. 2	S0	up to 500	40	90	10
		up to 690	50	90	30
3RV1. 3	S2	up to 690	50	140	10
3RV1. 4	S3	up to 500	110	167	10
		up to 690	150	167	30



Standard mounting for S0, S2 and S3



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



General data

General technical specifications

Type			3RV1.1[1]	3RV1.2	3RV1.3	3RV1.4
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			
Size			S00	S0	S2	S3
Number of poles			3			
Max. rated current I_{nmax} (= max. rated operating current I_e)		A	12	25	50	100
Permissible ambient temperature						
• Storage/transport		°C	-50 ... + 80			
• Operation		°C	-20 ... + 70[2]			
Permissible rated current at inside temperature of cubicle:						
• +60 °C		%	100			
• +70 °C		%	87			
Circuit-breaker inside enclosure						
Permissible rated current at inside temperature of enclosure						
• +35 °C		%	100			
• +60 °C		%	87			
Rated operating voltage U_e		V	690[3]			
Rated frequency		Hz	50/60			
Rated insulation voltage U_i		V	690			
Rated impulse withstand voltage U_{imp}		kV	6			
Utilization category						
• IEC 60947-2 (circuit-breaker)			A			
• IEC 60947-4-1 (motor starter)			AC-3			
Trip CLASS	acc. to IEC 60947-4-1		10		10/20	
DC short-circuit breaking capacity (time constant τ = 5 ms)						
• 1 conducting path DC 150 V		kA	10			
• 2 conducting paths in series DC 300 V		kA	10			
• 3 conducting paths in series DC 450 V		kA	10			
Power loss P_v per circuit-breaker dependent on rated current I_n (upper setting range)	I_n: up to 1.25 A	W	5	-	-	-
	I_n: 1.6 ... 6.3 A	W	6	-	-	-
	I_n: 8 ... 12 A	W	7	-	-	-
$R_{\text{per conducting path}} = P/I^2 \times 3$	I_n: up to 0.63 A	W	-	5	-	-
	I_n: 0.8 ... 6.3 A	W	-	6	-	
	I_n: 8 ... 16 A	W	-	7	-	-
	I_n: 20 ... 25 A	W	-	8	-	-
	I_n: up to 25 A	W	-	-	12	-
	I_n: 32 A	W	-	-	15	-
	I_n: 40 ... 50 A	W	-	-	20	-
	I_n: up to 63 A	W	-	-	-	20
	I_n: 75 and 90 A	W	-	-	-	30
	I_n: up to 100 A	W	-	-	-	38
Shock resistance	acc. to IEC 60068-2-27	g/ms	25/11 (square and sinusoidal pulse)			
Degree of protection	acc. to IEC 60529		IP20		IP20[4]	
Touch protection	acc. to DIN VDE 0106-100		Finger-safe			
Temperature compensation	acc. to IEC 60947-4-1	°C	-20 ... +60			
Phase-failure sensitivity	acc. to IEC 60947-4-1		yes			
Explosion protection	ATEX license to EU guideline 94/9/EG		yes, for 3RV10 (CLASS 10), 3RV11 (CLASS 10)			
Isolating function	acc. to IEC 60947-2		yes			
Main and EMERGENCY-STOP switch characteristics [5]	acc. to IEC 60204-1 (VDE 0113)		yes			
Safe isolation between main and auxiliary circuits, required for PELV applications	acc. to DIN VDE 0106-101					
• up to 400 V + 10 %			yes			
• up to 415 V + 5 % (higher voltages on request)			yes			
Mechanical endurance		Operating cycles	100000		50000	
Electrical endurance		Operating cycles	100000		25000	
Max. operating frequency per hour (motor starts)		1/h	15			

1) Technical specifications on 3RV16 voltage transformer circuit-breaker is given on page 4/17.

2) Over +60 °C current reduction.

3) 500 V with molded-plastic enclosure.

4) Terminal compartment IP00.

5) With appropriate accessories.

Rated short-circuit breaking capacity I_{cn} see table on page 4/8.

Conductor cross-sections for main circuit

Type		3RV1.	3RV1. 2	3RV1. 3	3RV1. 4
Type of connection		Screw connection		Screw connection with box terminal	
Terminal screw		Pozidriv size 2		Pozidriv size 2	Hexagon socket screw 4 mm
Prescribed tightening torque	Nm	0.8 ... 1.2	2 ... 2.5	3 ... 4.5	4 ... 6
Conductor cross-sections, 1 or 2 conductors					
Solid	mm^2	2 x (0.5 ... 1.5), 2 x (0.75 ... 2.5)	2 x (1 ... 2.5), 2 x (2.5 ... 6)	2 x (0.75 ... 16)	2 x (2.5 ... 16)
Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5), 2 x (0.75 ... 2.5)	2 x (1 ... 2.5), 2 x (2.5 ... 6)	2 x (0.75 ... 16), 1 x (0.75 ... 25)	2 x (2.5 ... 35), 1 x (2.5 ... 50)
Stranded	mm^2	2 x (0.5 ... 1.5), 2 x (0.75 ... 2.5)	2 x (1 ... 2.5), 2 x (2.5 ... 6)	2 x (0.75 ... 25), 1 x (0.75 ... 35)	2 x (10 ... 50), 1 x (10 ... 70)
AWG cables, solid or stranded	AWG	2 x (18 ... 14)	2 x (14 ... 10)	2 x (18 ... 3), 1 x (18 ... 2)	2 x (10 ... 1/0), 2 x (10 ... 2/0)
Ribbon cable conductors (number x width x circumference)	mm	-	-	2 x (6 x 9 x 0.8)	2 x (6 x 9 x 0.8)
Removable box terminal [1]					
With copper bars		-	-	-	18 x 10
With cable lug		-	-	-	up to 2 x 70
Cage Clamp connections [2] [3] (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 cable insulation: 3.6 mm.					
Permissible mounting position		any, acc. to IEC 60447 start command "I" right-hand side or top			

1) Cable lug and bar connection is also possible, after removal of the box terminals.

2) With conductor cross-sections of ≤ 1 mm^2 an "insulation stopper" must be used (see accessories for "Contactors and contactor combinations").

3) Corresponding opening tool 8WA2803/8WA2804, see accessories.

General data

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

Circuit-breakers of the 3RV1 series are approved for UL/CSA and according to UL 508 and CSA 22.2 No. 14 they can also be used as a load feeder in combination with a contactor.

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

3RV1 circuit-breaker as "Manual Motor Controller"

If used as a "Manual Motor Controller", the circuit-breaker is always operated in combination with an upstream short-circuit protection device. As short-circuit-protection device, approved fuses or a circuit-breaker compliant with UL489/CSA 22.2 No.5 can be used. These devices must be dimensioned in accordance with 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, CSA Master Contract 165071, Product Class 3211 05.

Circuit-breaker		hp rating[1] for FLA[2] max.		Rated current I_n	**AC 240 V**		**AC 480 Y/277 V**		**AC 600 Y/347 V**	
					UL	CSA	UL	CSA	UL	CSA
					I_{cc}[3]	I_{cc}[3]	I_{cc}[3]	I_{cc}[3]	I_{cc}[3]	I_{cc}[3]
Type	V	single-phase	three-phase	A	kA	kA	kA	kA	kA	kA
3RV10 11				0.16 ... 2	65	50	65	50	30	10
3RV16 11-0BD10				2.5	65	50	65	50	30	10
	115	1/2	-	3.2	65	50	65	50	30	10
Size S00	200	1 1/2	3	4	65	50	65	50	30	10
	230	2	3	5	65	50	65	50	30	10
FLA[2] max. 12 A, 600 V	460	-	7 1/2	6.3	65	50	65	50	30	10
	575/600	-	10	8	65	50	65	50	30	10
NEMA Size 00				10	65	50	65	50	30	10
				12	65	50	65	50	30	10
3RV10 21 / 3RV11 21				0.16 ... 3.2	65	50	65	50	30	30
3RV13 21				4	65	50	65	50	30	30
				5	65	50	65	50	30	30
Size S0	115	2	-	6.3	65	50	65	50	30	30
	200	3	7 1/2	8	65	50	65	50	30	30
FLA[2] max. 25 A, 600 V	230	5	7 1/2	10	65	50	65	50	30	30
	460	-	15	12.5	65	50	65	50	30	30
NEMA Size 1	575/600	-	20	16	65	50	65	50	30	30
				20	65	50	65	50	30	30
				22	65	50	65	50	30	30
				25	65	50	65	50	30	30
3RV10 31 / 3RV11 31				16	65	50	65	50	25	25
3RV13 31				20	65	50	65	50	25	25
	115	3	-	25	65	50	65	50	25	25
Size S2	200	7 1/2	15	32	65	50	65	50	25	25
	230	10	20	40	65	50	65	50	25	25
FLA[2] max. 50 A,600 V	460	-	40	45	65	50	65	50	25	25
NEMA Size 2	575/600	-	50	50	65	50	65	50	25	25
3RV10 41 / 3RV10 42				16	65	50	65	50	30	30
3RV11 42				20	65	50	65	50	30	30
3RV13 41 / 3RV13 42	115	10	-	25	65	50	65	50	30	30
	200	20	30	32	65	50	65	50	30	30
Size S3	230	20	40	40	65	50	65	50	30	30
	460	-	75	50	65	50	65	50	30	30
FLA[2] max. 100 A, 600 V	575/600	-	100	63	65	50	65	50	30	30
				75	65	50	65	50	30	30
NEMA Size 3				90	65	50	65	50	30	30
				100	65	50	65	50	30	30

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" to UL/CSA.

3RV10 circuit-breaker as "Manual Motor Controller Suitable for Tap Conductor Protection in Group Installations"

The application as "Manual Motor Controller Suitable for Tap Conductor Protection in Group Installations" is only available from UL. CSA does not recognize this approval! When the circuit-breaker 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 circuit-breaker compliant with UL489 can be used.

These devices must be dimensioned in accordance with the National Electrical Code. The 3RV10 motor protection circuit-breakers are approved as "Manual Motor Controller Suitable for Tap Conductor Protection in Group Installations" under the following file number: UL File No. 47705.

Circuit-breaker		hp rating[1] for FLA[2] max.		Rated current I_n	**AC 240 V** UL I_{cc}[3]	**AC 480 Y/277 V** UL I_{cc}[3]	**AC 600 Y/347 V** UL I_{cc}[3]
Type	V	single-phase	three-phase	A	kA	kA	kA
3RV10 11				0.16 ... 0.8	65	65	-
				1	65	65	-
	115	1/3	-	1.25	65	65	-
Size S00	200	3/4	2	2	65	65	-
	230	1	2	2.5	65	65	-
FLA[2] max. 8A, 480 V	460	-	5	3.2	65	65	-
	575/600	-	-	4	65	65	-
NEMA Size 00				5	65	65	-
				6.3	65	65	-
				8	65	65	-
3RV10 21				0.16 ... 1.6	65	65	30
				2	65	65	30
				2.5	65	65	30
Size S0	115	2	-	3.2	65	65	30
	200	3	7 1/2	4	65	65	30
FLA[2] max. 22 A, 480 V	230	3	7 1/2	5	65	65	30
12.5 A, 600 V	460	-	15	6.3	65	65	30
	575/600	-	10	8	65	65	30
NEMA Size 1				10	65	65	30
				12.5	65	65	30
				16	65	65	-
				20	65	65	-
				22	65	65	-
3RV10 31				16	65	65	25
				20	65	65	25
Size S2	115	3	-	25	65	65	25
	200	7 1/2	15	32	65	65	25
FLA[2] max. 50 A,600 V	230	10	20	40	65	65	25
NEMA Size 2	460	-	40	45	65	65	25
	575/600	-	50	50	65	65	25
3RV10 4.				16	65	65	30
				20	65	65	30
Size S3	115	10	-	25	65	65	30
	200	20	30	32	65	65	30
FLA[2] max. 100 A, 480 V	230	20	40	40	65	65	30
75 A, 600 V	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" to UL.

General data

3RV10 circuit-breaker as "Self-Protected Combination Motor Controller (Type E)"

As of 16 July 2001, UL 508 demands a line-side 1-inch air distance and 2-inch creepage distance for "Self-Protected Combination Motor Controller".

Therefore, 3RV10 circuit-breakers of size S0 and S3 are approved to UL 508 in combination with the terminal blocks listed below.

The basic unit of 3RV10 circuit-breaker in size S2 conforms with the required air/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 "Self-Protected Combination Motor Controller".

The 3RV10 motor protection circuit-breakers are approved as "Self-Protected Combination Motor Controller" under the following file numbers:
UL File No. E156943, Product Class NKJH,
CSA Master Contract 165071, Product Class 3211 08.

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

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" to UL/CSA.
4) Not required for CSA.

Ratings of the auxiliary switches and alarm switches

Type		Lateral auxiliary switch with 1 NO + 1 NC, 2 NO, 2 NC, 2 NO + 2 NC and alarm switch	Transverse auxiliary switch with 1 changeover contact	Transverse auxiliary switch with 1 NO + 1 NC, 2 NC
Max. rated voltage				
• to NEMA (UL)	AC V	600		250
• to NEMA (CSA)	AC V	600		250
Continuous current	A	10	5	2.5
Switching capacity		A600	B600	C300
		Q300	R300	R300

Voltage converter 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				
• Storage/transport	°C	-50 ... + 80		
• Operation	°C	-20 ... + 60 (up to + 70 °C is possible with derating)		
Rated operating voltage U_e	V	400		
Rated frequency	Hz	16 $^2/_3$ ... 60		
Rated insulation voltage U_i	V	690		
Short-circuit breaking capacity I_{cu} at AC 400 V	kA	50		
Set value of the thermal overload release	A	1.4	2.5	3
Operating value of the instantaneous overcurrent release	A	6 ± 20%	10.5 ± 20%	20 ± 20%
Tripping time of the instantaneous overcurrent release	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 60068 Part 2-27	g	15		
Degree of protection acc. to IEC 60529		IP20		
Touch protection acc. to DIN VDE 0106-100		Finger-safe		
Endurance				
• mechanical	Operating cycles	10 000		
• electrical	Operating cycles	10 000		
Permissible mounting position		any		

Conductor cross-sections, main circuit, 1 or 2 conductors

Type		3RV16 11-1AG14	3RV16 11-1CG14	3RV16 11-1DG14
Terminal type		Screw connection		
Terminal screw		Pozidriv size 2		
Solid	mm^2	2 x (0.5 ... 1.5), 2 x (0.75 ... 2.5), max. 4		
Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5), 2 x (0.75 ... 2.5)		
Stranded	mm^2	2 x (0.5 ... 1.5), 2 x (0.75 ... 2.5), max. 4		

Auxiliary switches for blocking the distance protection

• with defined lateral assignment for blocking distance protection		1 changeover contact (for use as 1 NO or 1 NC), solid-state compatible		
• Rated operating voltage U_e Alternating voltage	V	250		
• Rated operating current I_e / AC-14 at U_e = 250 V	A	0.5		
• Rated operating current I_e / AC-14 at U_e = 125 V	A	1		
• Rated operating voltage U_e Direct voltage *L/R* 200 ms	V	250		
• Rated operating current I_e / DC-13 at U_e = 250 V	A	0.27		
• Rated operating current I_e / DC-13 at U_e = 125 V	A	0.44		

Short-circuit protection for auxiliary circuit

• Fuse gL/gG	A	10
• Miniature circuit-breaker, C characteristic	A	6 (prospective short-circuit current < 0.4 kA)

Auxiliary switches for other signaling functions

For technical specifications, see "Mountable accessories"

General data

4

Characteristics

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

The characteristics 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 conducting paths must be connected in series in order to protect single-phase or DC loads.

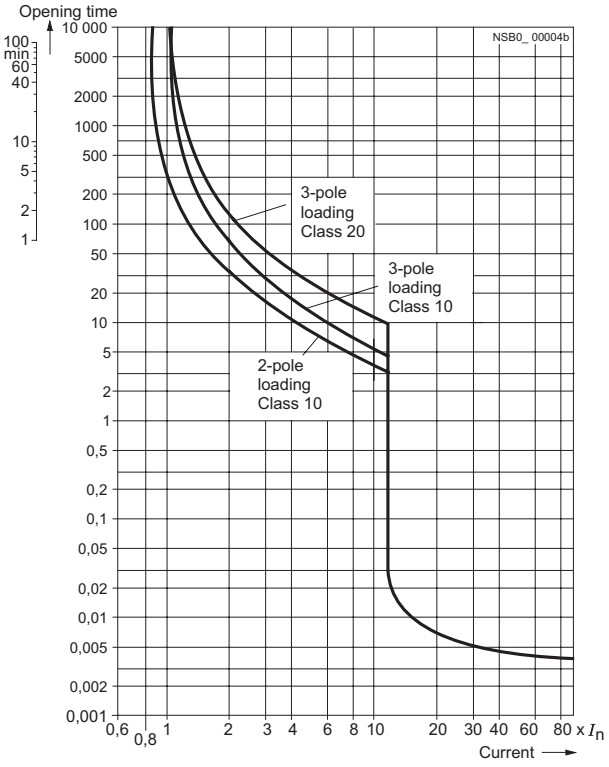
With 2-pole and 3-pole loading, the maximum deviation in the tripping time of 3 times the setting current and upwards is ± 20 % and thus in accordance with VDE 0165.

The tripping characteristics for the instantaneous, electromagnetic overcurrent releases (short-circuit releases, 'n' releases) are based on the rated current I_n that also represents the maximum value of the setting range for circuit-breakers 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 characteristics of the electromagnetic overcurrent releases 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.

The shown characteristic curve for the circuit-breaker relates to a specific setting range. It is, however, also valid as a schematic representation of circuit-breakers with other current ranges.

Time/current characteristics, current limiting characteristics and I^2t curves can be ordered from "Technical Assistance" (e-mail: nst.technical-assistance@siemens.com).

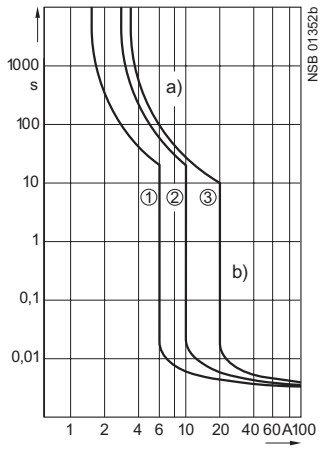


Schematic representation of typical time/current characteristic of 3RV10

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 are available from "Technical Assistance" (e-mail: nst.technical-assistance@siemens.com).



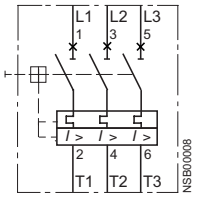
① 1.4 A / 6 A
② 2.5 A / 10.5 A
③ 3 A / 20 A
a) Thermal overload release
b) Instantaneous electromagnetic overcurrent release

Circuit diagrams

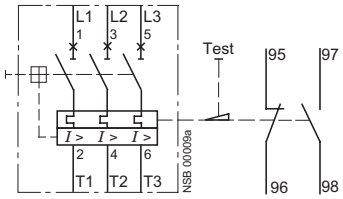
Internal circuit diagrams

Circuit-breakers

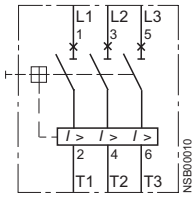
3RV10 ..
3RV14 ..
3RV16 11-0BD10



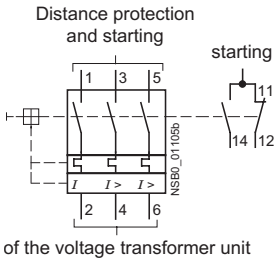
3RV11 ..



3RV13 ..



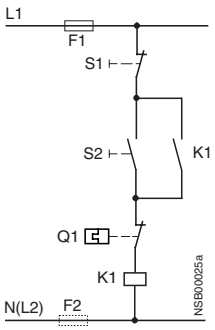
3RV16 voltage transformer circuit-breakers up to 3 A



of the voltage transformer unit

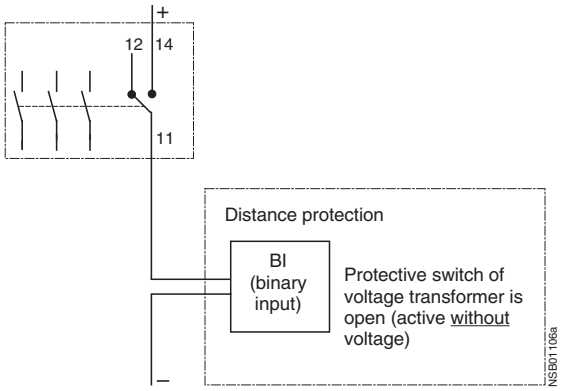
Typical circuits

3RV11 circuit-breaker with overload relay function



S1 OFF pushbutton
S2 ON pushbutton
K1 Latching contact
F1; F2 Fuses gL/gG 6A
Q1 3RV11 circuit-breaker

3RV16 voltage transformer circuit-breakers up to 3 A



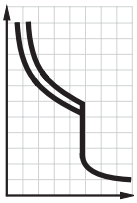
Note:

When using the NC 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 type of connection is used for additional monitoring of correct wiring.

For motor protection

Selection and ordering data

Class 10, without/with auxiliary switch



Rated current	Suitable for three-phase induction motors[1] with P	Current setting range for thermal overload release	Instantaneous overcurrent release	Short-circuit breaking capacity at AC 400 V	DT	**Screw connection**	PS*	Weight per PU approx.[2]	DT	**Cage Clamp connection**	PS*	Weight per PU approx.[2]
I_n		⊏	I >	I_{cu}		Order No.				Order No.		
A	kW	A	A	kA				kg				kg
Size S00												
0.16	0.04	0.11 ... 0.16	2.1	100	▶	**3RV10 11-0AA1☐**	1 unit	0.245	▶	**3RV10 11-0AA2☐**	1 unit	0.253
0.2	0.06	0.14 ... 0.2	2.6	100	▶	**3RV10 11-0BA1☐**	1 unit	0.246	▶	**3RV10 11-0BA2☐**	1 unit	0.254
0.25	0.06	0.18 ... 0.25	3.3	100	▶	**3RV10 11-0CA1☐**	1 unit	0.246	▶	**3RV10 11-0CA2☐**	1 unit	0.254
0.32	0.09	0.22 ... 0.32	4.2	100	▶	**3RV10 11-0DA1☐**	1 unit	0.247	▶	**3RV10 11-0DA2☐**	1 unit	0.254
0.4	0.09	0.28 ... 0.4	5.2	100	▶	**3RV10 11-0EA1☐**	1 unit	0.250	▶	**3RV10 11-0EA2☐**	1 unit	0.256
0.5	0.12	0.35 .. .0.5	6.5	100	▶	**3RV10 11-0FA1☐**	1 unit	0.247	▶	**3RV10 11-0FA2☐**	1 unit	0.252
0.63	0.18	0.45 ... 0.63	8.2	100	▶	**3RV10 11-0GA1☐**	1 unit	0.249	▶	**3RV10 11-0GA2☐**	1 unit	0.254
0.8	0.18	0.5 5... 0.8	10	100	▶	**3RV10 11-0HA1☐**	1 unit	0.250	▶	**3RV10 11-0HA2☐**	1 unit	0.257
1	0.25	0.7 ... 1	13	100	▶	**3RV10 11-0JA1☐**	1 unit	0.249	▶	**3RV10 11-0JA2☐**	1 unit	0.255
1.25	0.37	0.9 ... 1.25	16	100	▶	**3RV10 11-0KA1☐**	1 unit	0.297	▶	**3RV10 11-0KA2☐**	1 unit	0.301
1.6	0.55	1.1 ... 1.6	21	100	▶	**3RV10 11-1AA1☐**	1 unit	0.298	▶	**3RV10 11-1AA2☐**	1 unit	0.303
2	0.75	1.4 ... 2	26	100	▶	**3RV10 11-1BA1☐**	1 unit	0.297	▶	**3RV10 11-1BA2☐**	1 unit	0.302
2.5	0.75	1.8 ... 2.5	33	100	▶	**3RV10 11-1CA1☐**	1 unit	0.298	▶	**3RV10 11-1CA2☐**	1 unit	0.304
3.2	1.1	2.2 ... 3.2	42	100	▶	**3RV10 11-1DA1☐**	1 unit	0.299	▶	**3RV10 11-1DA2☐**	1 unit	0.305
4	1.5	2.8 ... 4	52	100	▶	**3RV10 11-1EA1☐**	1 unit	0.296	▶	**3RV10 11-1EA2☐**	1 unit	0.304
5	1.5	3.5 ... 5	65	100	▶	**3RV10 11-1FA1☐**	1 unit	0.301	▶	**3RV10 11-1FA2☐**	1 unit	0.306
6.3	2.2	4.5 ... 6.3	82	100	▶	**3RV10 11-1GA1☐**	1 unit	0.303	▶	**3RV10 11-1GA2☐**	1 unit	0.308
8	3	5.5 ... 8	104	50	▶	**3RV10 11-1HA1☐**	1 unit	0.304	▶	**3RV10 11-1HA2☐**	1 unit	0.310
10	4	7 ... 10	130	50	▶	**3RV10 11-1JA1☐**	1 unit	0.300	▶	**3RV10 11-1JA2☐**	1 unit	0.306
12	5.5	9 ... 12	156	50	▶	**3RV10 11-1KA1☐**	1 unit	0.297	▶	**3RV10 11-1KA2☐**	1 unit	0.302
Size S0												
0.16	0.04	0.11 ... 0.16	2.1	100	▶	**3RV10 21-0AA1☐**	1 unit	0.300		-		
0.2	0.06	0.14 ... 0.2	2.6	100	▶	**3RV10 21-0BA1☐**	1 unit	0.304		-		
0.25	0.06	0.18 ... 0.25	3.3	100	▶	**3RV10 21-0CA1☐**	1 unit	0.302		-		
0.32	0.09	0.22 ... 0.32	4.2	100	▶	**3RV10 21-0DA1☐**	1 unit	0.303		-		
0.4	0.09	0.28 ... 0.4	5.2	100	▶	**3RV10 21-0EA1☐**	1 unit	0.303		-		
0.5	0.12	0.35 ... 0.5	6.5	100	▶	**3RV10 21-0FA1☐**	1 unit	0.304		-		
0.63	0.18	0.45 ... 0.63	8.2	100	▶	**3RV10 21-0GA1☐**	1 unit	0.366		-		
0.8	0.18	0.55 ... 0.8	10	100	▶	**3RV10 21-0HA1☐**	1 unit	0.367		-		
1	0.25	0.7 ... 1	13	100	▶	**3RV10 21-0JA1☐**	1 unit	0.368		-		
1.25	0.37	0.9 ... 1.25	16	100	▶	**3RV10 21-0KA1☐**	1 unit	0.369		-		
1.6	0.55	1.1 ... 1.6	21	100	▶	**3RV10 21-1AA1☐**	1 unit	0.371		-		
2	0.75	1.4 ... 2	26	100	▶	**3RV10 21-1BA1☐**	1 unit	0.371		-		
2.5	0.75	1.8 ... 2.5	33	100	▶	**3RV10 21-1CA1☐**	1 unit	0.372		-		
3.2	1.1	2.2 ... 3.2	42	100	▶	**3RV10 21-1DA1☐**	1 unit	0.375		-		
4	1.5	2.8 ... 4	52	100	▶	**3RV10 21-1EA1☐**	1 unit	0.370		-		
5	1.5	3.5 ... 5	65	100	▶	**3RV10 21-1FA1☐**	1 unit	0.376		-		
6.3	2.2	4.5 ... 6.3	82	100	▶	**3RV10 21-1GA1☐**	1 unit	0.374		-		
8	3	5.5 ... 8	104	100	▶	**3RV10 21-1HA1☐**	1 unit	0.374		-		
10	4	7 ... 10	130	100	▶	**3RV10 21-1JA1☐**	1 unit	0.375		-		
12.5	5.5	9 ... 12.5	163	100	▶	**3RV10 21-1KA1☐**	1 unit	0.374		-		
16	7.5	11 ... 16	208	50	▶	**3RV10 21-4AA1☐**	1 unit	0.382		-		
20	7.5	14 ... 20	260	50	▶	**3RV10 21-4BA1☐**	1 unit	0.376		-		
22	11	17...22	286	50	▶	**3RV10 21-4CA1☐**	1 unit	0.378		-		
25	11	20...25	325	50	▶	**3RV10 21-4DA1☐**	1 unit	0.382		-		
Order No. supplement for transverse auxiliary switch												
without					▶	**0**			▶	**0**		
1 NO + 1 NC					▶	**5**			B	**5**		

1) Recommended values for standard 4-pole motors at AC 50 Hz 400 V. The actual start-up data and ratings for the motor to be protected are relevant.

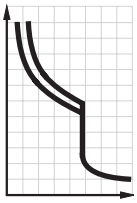
2) Weights are specified for the variant with auxiliary switch.

Auxiliary switches can also be ordered separately (see "Mountable accessories").

For multi-unit packing and reusable packaging, see "Appendix".

*** This quantity or a multiple thereof can be ordered.**

Class 10, without auxiliary switch



Rated current	Suitable for three-phase induction motors[1] with P	Current setting range Thermal overload release	Instantaneous overcurrent release	Short-circuit breaking capacity at AC 400 V	DT	Screw connection	PS*	Weight per PU approx.
I_n		⊏	I >	I_{cu}		Order No.		
A	kW	A	A	kA				kg
Size S2								
16	7.5	11 ... 16	208	50	▶	**3RV10 31-4AA10**	1 unit	1.040
20	7.5	14 ... 20	260	50	▶	**3RV10 31-4BA10**	1 unit	1.040
25	11	18 ... 25	325	50	▶	**3RV10 31-4DA10**	1 unit	1.030
32	15	22 ... 32	416	50	▶	**3RV10 31-4EA10**	1 unit	1.020
40	18.5	28 ... 40	520	50	▶	**3RV10 31-4FA10**	1 unit	1.040
45	22	36 ... 45	585	50	▶	**3RV10 31-4GA10**	1 unit	1.030
50	22	40 ... 50	650	50	▶	**3RV10 31-4HA10**	1 unit	1.020
Size S3								
40	18.5	28 ... 40	520	50	▶	**3RV10 41-4FA10**	1 unit	2.210
50	22	36 ... 50	650	50	▶	**3RV10 41-4HA10**	1 unit	2.240
63	30	45 ... 63	819	50	▶	**3RV10 41-4JA10**	1 unit	2.240
75	37	57 ... 75	975	50	▶	**3RV10 41-4KA10**	1 unit	2.250
90	45	70 ... 90	1170	50	▶	**3RV10 41-4LA10**	1 unit	2.280
100	45	80 ... 100	1235	50	▶	**3RV10 41-4MA10**	1 unit	2.290
Size S3, with increased switching capacity								
16	7.5	11 ... 16	208	100	▶	**3RV10 42-4AA10**	1 unit	2.170
20	7.5	14 ... 20	260	100	▶	**3RV10 42-4BA10**	1 unit	2.180
25	11	18 ... 25	325	100	▶	**3RV10 42-4DA10**	1 unit	2.210
32	15	22 ... 32	416	100	▶	**3RV10 42-4EA10**	1 unit	2.210
40	18.5	28 ... 40	520	100	▶	**3RV10 42-4FA10**	1 unit	2.200
50	22	36 ... 50	650	100	▶	**3RV10 42-4HA10**	1 unit	2.230
63	30	45 ... 63	819	100	▶	**3RV10 42-4JA10**	1 unit	2.250
75	37	57 ... 75	975	100	▶	**3RV10 42-4KA10**	1 unit	2.260
90	45	70 ... 90	1170	100	▶	**3RV10 42-4LA10**	1 unit	2.280
100	45	80 ... 100	1235	100	▶	**3RV10 42-4MA10**	1 unit	2.270

Class 20, without auxiliary switch

Size S2								
16	7.5	11 ... 16	208	50	A	**3RV10 31-4AB10**	1 unit	1.060
20	7.5	14 ... 20	260	50	A	**3RV10 31-4BB10**	1 unit	1.070
25	11	18 ... 25	325	50	A	**3RV10 31-4DB10**	1 unit	1.050
32	15	22 ... 32	416	50	A	**3RV10 31-4EB10**	1 unit	1.060
40	18.5	28 ... 40	520	50	A	**3RV10 31-4FB10**	1 unit	1.070
45	22	36 ... 45	585	50	A	**3RV10 31-4GB10**	1 unit	1.070
50	22	40 ... 50	650	50	A	**3RV10 31-4HB10**	1 unit	1.070
Size S3, with increased switching capacity								
40	18.5	28 ... 40	520	100	A	**3RV10 42-4FB10**	1 unit	2.220
50	22	36 ... 50	650	100	A	**3RV10 42-4HB10**	1 unit	2.260
63	30	45 ... 63	819	100	A	**3RV10 42-4JB10**	1 unit	2.270
75	37	57 ... 75	975	100	A	**3RV10 42-4KB10**	1 unit	2.260
90	45	70 ... 90	1170	100	A	**3RV10 42-4LB10**	1 unit	2.310
100	45	80 ... 100	1235	100	A	**3RV10 42-4MB10**	1 unit	2.320

1) Recommended values for standard 4-pole motors at AC 50 Hz 400 V. The actual start-up data and ratings for the motor to be protected are relevant.

Auxiliary switches can be ordered separately (see "Mountable accessories").

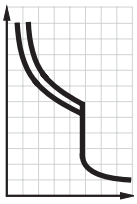
Multi-unit/reusable packaging, see "Appendix".

*** This quantity or a multiple thereof can be ordered.**

For motor protection with overload relay function

Selection and ordering data

CLASS 10, with overload relay function (automatic reset), without auxiliary switch



Rated current	Suitable for three-phase induction motors[1] with P	Current setting range Thermal overload release	Instantaneous overcurrent release	Short-circuit breaking capacity at AC 400 V	DT	Screw connection	PS*	Weight per PU approx.
I_n		⊏	I >	I_{cu}		Order No.		
A	kW	A	A	kA				kg
Size S0[2]								
0.16	0.04	0.11 ... 0.16	2.1	100	A	**3RV11 21-0AA10**	1 unit	0.354
0.2	0.06	0.14 ... 0.2	2.6	100	A	**3RV11 21-0BA10**	1 unit	0.358
0.25	0.06	0.18 ... 0.25	3.3	100	A	**3RV11 21-0CA10**	1 unit	0.352
0.32	0.09	0.22 ... 0.32	4.2	100	A	**3RV11 21-0DA10**	1 unit	0.352
0.4	0.09	0.28 ... 0.4	5.2	100	A	**3RV11 21-0EA10**	1 unit	0.355
0.5	0.12	0.35 ... 0.5	6.5	100	A	**3RV11 21-0FA10**	1 unit	0.356
0.63	0.18	0.45 ... 0.63	8.2	100	A	**3RV11 21-0GA10**	1 unit	0.423
0.8	0.18	0.55 ... 0.8	10	100	A	**3RV11 21-0HA10**	1 unit	0.421
1	0.25	0.7 ... 1	13	100	A	**3RV11 21-0JA10**	1 unit	0.416
1.25	0.37	0.9 ... 1.25	16	100	A	**3RV11 21-0KA10**	1 unit	0.426
1.6	0.55	1.1 ... 1.6	21	100	A	**3RV11 21-1AA10**	1 unit	0.422
2	0.75	1.4 ... 2	26	100	A	**3RV11 21-1BA10**	1 unit	0.427
2.5	0.75	1.8 ... 2.5	33	100	A	**3RV11 21-1CA10**	1 unit	0.422
3.2	1.1	2.2 ... 3.2	42	100	A	**3RV11 21-1DA10**	1 unit	0.428
4	1.5	2.8 ... 4	52	100	A	**3RV11 21-1EA10**	1 unit	0.420
5	1.5	3.5 ... 5	65	100	A	**3RV11 21-1FA10**	1 unit	0.429
6.3	2.2	4.5 ... 6.3	82	100	A	**3RV11 21-1GA10**	1 unit	0.426
8	3	5.5 ... 8	104	100	A	**3RV11 21-1HA10**	1 unit	0.425
10	4	7 ... 10	130	100	A	**3RV11 21-1JA10**	1 unit	0.428
12.5	5.5	9 ... 12.5	163	100	A	**3RV11 21-1KA10**	1 unit	0.426
16	7.5	11 ... 16	208	50	A	**3RV11 21-4AA10**	1 unit	0.436
20	7.5	14 ... 20	260	50	A	**3RV11 21-4BA10**	1 unit	0.430
22	11	17 ... 22	286	50	A	**3RV11 21-4CA10**	1 unit	0.427
25	11	20 ... 25	325	50	A	**3RV11 21-4DA10**	1 unit	0.432
Size S2[2]								
16	7.5	11 ... 16	208	50	A	**3RV11 31-4AA10**	1 unit	1.120
20	7.5	14 ... 20	260	50	A	**3RV11 31-4BA10**	1 unit	1.130
25	11	18 ... 25	325	50	A	**3RV11 31-4DA10**	1 unit	1.110
32	15	22 ... 32	416	50	A	**3RV11 31-4EA10**	1 unit	1.110
40	18.5	28 ... 40	520	50	A	**3RV11 31-4FA10**	1 unit	1.120
45	22	36 ... 45	585	50	A	**3RV11 31-4GA10**	1 unit	1.130
50	22	40 ... 50	650	50	A	**3RV11 31-4HA10**	1 unit	1.100
Size S3, with increased switching capacity[2]								
16	7.5	11 ... 16	208	100	A	**3RV11 42-4AA10**	1 unit	2.240
20	7.5	14 ... 20	260	100	A	**3RV11 42-4BA10**	1 unit	2.250
25	11	18 ... 25	325	100	A	**3RV11 42-4DA10**	1 unit	2.280
32	15	22 ... 32	416	100	A	**3RV11 42-4EA10**	1 unit	2.290
40	18.5	28 ... 40	520	100	A	**3RV11 42-4FA10**	1 unit	2.280
50	22	36 ... 50	650	100	A	**3RV11 42-4HA10**	1 unit	2.320
63	30	45 ... 63	819	100	A	**3RV11 42-4JA10**	1 unit	2.330
75	37	57 ... 75	975	100	A	**3RV11 42-4KA10**	1 unit	2.360
90	45	70 ... 90	1170	100	A	**3RV11 42-4LA10**	1 unit	2.350
100	45	80 ... 100	1235	100	A	**3RV11 42-4MA10**	1 unit	2.340

1) Recommended values for standard 4-pole motors at AC 50 Hz 400 V. The actual start-up data and ratings for the motor to be protected are relevant.

2) Accessories for mounting on the right (for series S0 to S3) and 3RV19 15 three-phase busbars (for size S0) cannot be used.

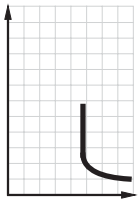
Auxiliary switches can be ordered separately (see "Mountable accessories").

Multi-unit/reusable packaging, see "Appendix".

*** This quantity or a multiple thereof can be ordered.**

Selection and ordering data

Without auxiliary switch



Rated current	Suitable for three-phase induction motors[1] with P	Current setting range Thermal overload release[2]	Instantaneous overcurrent release	Short-circuit breaking capacity at AC 400 V	DT	Screw connection	PS*	Weight per PU approx.
I_n			$I >$	I_{cu}		Order No.		
A	kW	A	A	kA				kg
Size S0								
0.16	0.04	without	2.1	100	A	**3RV13 21-0AC10**	1 unit	0.282
0.2	0.06	without	2.6	100	A	**3RV13 21-0BC10**	1 unit	0.284
0.25	0.06	without	3.3	100	A	**3RV13 21-0CC10**	1 unit	0.285
0.32	0.09	without	4.2	100	A	**3RV13 21-0DC10**	1 unit	0.282
0.4	0.09	without	5.2	100	A	**3RV13 21-0EC10**	1 unit	0.286
0.5	0.12	without	6.5	100	A	**3RV13 21-0FC10**	1 unit	0.283
0.63	0.18	without	8.2	100	A	**3RV13 21-0GC10**	1 unit	0.348
0.8	0.18	without	10	100	A	**3RV13 21-0HC10**	1 unit	0.347
1	0.25	without	13	100	A	**3RV13 21-0JC10**	1 unit	0.345
1.25	0.37	without	16	100	A	**3RV13 21-0KC10**	1 unit	0.351
1.6	0.55	without	21	100	A	**3RV13 21-1AC10**	1 unit	0.352
2	0.75	without	26	100	A	**3RV13 21-1BC10**	1 unit	0.352
2.5	0.75	without	33	100	A	**3RV13 21-1CC10**	1 unit	0.352
3.2	1.1	without	42	100	A	**3RV13 21-1DC10**	1 unit	0.353
4	1.5	without	52	100	A	**3RV13 21-1EC10**	1 unit	0.349
5	1.5	without	65	100	A	**3RV13 21-1FC10**	1 unit	0.354
6.3	2.2	without	82	100	A	**3RV13 21-1GC10**	1 unit	0.355
8	3	without	104	100	A	**3RV13 21-1HC10**	1 unit	0.354
10	4	without	130	100	A	**3RV13 21-1JC10**	1 unit	0.357
12.5	5.5	without	163	100	A	**3RV13 21-1KC10**	1 unit	0.354
16	7.5	without	208	50	A	**3RV13 21-4AC10**	1 unit	0.362
20	7.5	without	260	50	A	**3RV13 21-4BC10**	1 unit	0.357
22	11	without	286	50	A	**3RV13 21-4CC10**	1 unit	0.358
25	11	without	325	50	A	**3RV13 21-4DC10**	1 unit	0.359
Size S2								
16	7.5	without	208	50	A	**3RV13 31-4AC10**	1 unit	1.030
20	7.5	without	260	50	A	**3RV13 31-4BC10**	1 unit	1.030
25	11	without	325	50	A	**3RV13 31-4DC10**	1 unit	1.010
32	15	without	416	50	A	**3RV13 31-4EC10**	1 unit	1.010
40	18.5	without	520	50	A	**3RV13 31-4FC10**	1 unit	1.030
45	22	without	585	50	A	**3RV13 31-4GC10**	1 unit	1.040
50	22	without	650	50	A	**3RV13 31-4HC10**	1 unit	1.010
Size S3								
40	18.5	without	520	50	A	**3RV13 41-4FC10**	1 unit	2.190
50	22	without	650	50	A	**3RV13 41-4HC10**	1 unit	2.220
63	30	without	819	50	A	**3RV13 41-4JC10**	1 unit	2.240
75	37	without	975	50	A	**3RV13 41-4KC10**	1 unit	2.240
90	45	without	1170	50	A	**3RV13 41-4LC10**	1 unit	2.260
100	45	without	1235	50	A	**3RV13 41-4MC10**	1 unit	2.290
Size S3, with increased switching capacity								
16	7.5	without	208	100	A	**3RV13 42-4AC10**	1 unit	2.170
20	7.5	without	260	100	A	**3RV13 42-4BC10**	1 unit	2.180
25	11	without	325	100	A	**3RV13 42-4DC10**	1 unit	2.210
32	15	without	416	100	A	**3RV13 42-4EC10**	1 unit	2.200
40	18.5	without	520	100	A	**3RV13 42-4FC10**	1 unit	2.210
50	22	without	650	100	A	**3RV13 42-4HC10**	1 unit	2.210
63	30	without	819	100	A	**3RV13 42-4JC10**	1 unit	2.240
75	37	without	975	100	A	**3RV13 42-4KC10**	1 unit	2.270
90	45	without	1170	100	A	**3RV13 42-4LC10**	1 unit	2.260
100	45	without	1235	100	A	**3RV13 42-4MC10**	1 unit	2.290

1) Recommended values for standard 4-pole motors at AC 50 Hz 400 V. The actual start-up data and ratings for the motor to be protected are relevant.

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

Auxiliary switches can be ordered separately (see "Mountable accessories").

Multi-unit/reusable packaging, see "Appendix".

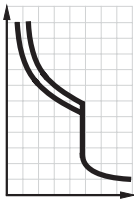
*** This quantity or a multiple thereof can be ordered.**

For protection of transformers

Selection and ordering data

Class 10, without auxiliary switch

Circuit-breakers for the protection of transformers with high in-rush current.



Rated current	Current setting range Thermal overload release	Instanta-neous over-current release	Short-circuit breaking capacity at AC 400 V	DT	**Screw connection**	PS*	Weight per PU approx.
I_n	⊏	$I >$	I_{cu}		Order No.		
A	A	A	kA				kg
Size S0							
0.16	0.11 ... 0.16	3.3	100	▶	**3RV14 21-0AA10**	1 unit	0.286
0.2	0.14 ... 0.2	4.2	100	▶	**3RV14 21-0BA10**	1 unit	0.287
0.25	0.18 ... 0.25	5.2	100	▶	**3RV14 21-0CA10**	1 unit	0.286
0.32	0.22 ... 0.32	6.5	100	▶	**3RV14 21-0DA10**	1 unit	0.288
0.4	0.28 ... 0.4	8.2	100	▶	**3RV14 21-0EA10**	1 unit	0.287
0.5	0.35 ... 0.5	10	100	▶	**3RV14 21-0FA10**	1 unit	0.286
0.63	0.45 ... 0.63	13	100	▶	**3RV14 21-0GA10**	1 unit	0.348
0.8	0.55 ... 0.8	16	100	▶	**3RV14 21-0HA10**	1 unit	0.352
1	0.7 ... 1	21	100	▶	**3RV14 21-0JA10**	1 unit	0.353
1.25	0.9 ... 1.25	26	100	▶	**3RV14 21-0KA10**	1 unit	0.354
1.6	1.1 ... 1.6	33	100	▶	**3RV14 21-1AA10**	1 unit	0.353
2	1.4 ... 2	42	100	▶	**3RV14 21-1BA10**	1 unit	0.358
2.5	1.8 ... 2.5	52	100	▶	**3RV14 21-1CA10**	1 unit	0.354
3.2	2.2 ... 3.2	65	100	▶	**3RV14 21-1DA10**	1 unit	0.358
4	2.8 ... 4	82	100	▶	**3RV14 21-1EA10**	1 unit	0.354
5	3.5 ... 5	104	100	▶	**3RV14 21-1FA10**	1 unit	0.357
6.3	4.5 ... 6.3	130	100	▶	**3RV14 21-1GA10**	1 unit	0.356
8	5.5 ... 8	163	100	▶	**3RV14 21-1HA10**	1 unit	0.358
10	7 ... 10	208	100	▶	**3RV14 21-1JA10**	1 unit	0.362
12.5	9 ... 12.5	260	100	▶	**3RV14 21-1KA10**	1 unit	0.360
16	11 ... 16	286	50	▶	**3RV14 21-4AA10**	1 unit	0.365
20	14 ... 20	325	50	▶	**3RV14 21-4BA10**	1 unit	0.365
Size S2							
16	11 ... 16	325	50	▶	**3RV14 31-4AA10**	1 unit	1.020
20	14 ... 20	416	50	▶	**3RV14 31-4BA10**	1 unit	1.030
25	18 ... 25	520	50	▶	**3RV14 31-4DA10**	1 unit	1.030
32	22 ... 32	660	50	▶	**3RV14 31-4EA10**	1 unit	1.020
40	28 ... 40	836	50	▶	**3RV14 31-4FA10**	1 unit	1.030

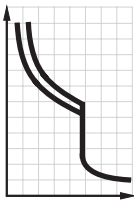
Auxiliary switches can be ordered separately (see "Mountable accessories").

Multi-unit/reusable packaging, see "Appendix".

*** This quantity or a multiple thereof can be ordered.**

Selection and ordering data

Without auxiliary switch



	Rated current	Thermal overload release	Instantaneous overload release	Short-circuit breaking capacity at AC 400 V	DT	Screw connection	PS*	Weight per PU approx.
	I_n		I >	I_{cu}		Order No.		
	A	A	A	kA				kg
Size S00								
	0.2	0.2	1.2	100	▶	**3RV16 11-0BD10**	1 unit	0.289

Multi-unit/reusable packaging, see "Appendix".

The auxiliary release required for signaling can be ordered separately.

	Type	Version	DT	Order No.	PS*	Weight per PU approx.
						kg
Mountable auxiliary switches						
 3RV19 01-1E	**Transverse auxiliary switch** with screw connection	1 NO + 1 NC	▶	**3RV19 01-1E**	1 unit	0.018
 3RV19 01-1A	**Lateral auxiliary switch** with screw connection	1 NO + 1 NC	▶	**3RV19 01-1A**	1 unit	0.045

For further auxiliary switches, see "Mountable accessories".

*** This quantity or a multiple thereof can be ordered.**

For distance protection

Selection and ordering data

Voltage transformer circuit-breaker with auxiliary switch

Rated current	Thermal overload release	Instantaneous overcurrent release	Auxiliary switch integrated in the switch, transverse	Short-circuit breaking capacity at AC 400 V	DT	Screw connection	PS*	Weight per PU approx.
I_n	⊏	$I >$		I_{cu}		Order No.		
A	A	A		kA				kg
Size S00								
1.4	1.4	6	1 CO	50	B	**3RV16 11-1AG14**	1 unit	0.314
2.5	2.5	10.5	1 CO	50	B	**3RV16 11-1CG14**	1 unit	0.318
3	3	20	1 CO	50	B	**3RV16 11-1DG14**	1 unit	0.315

Type	Version	DT	Order No.	PS*	Weight per PU approx.
					kg
Laterally mountable auxiliary switches for other signaling purposes					
Lateral auxiliary switch[1)]	1 NO + 1 NC	►	**3RV19 01-1A**	1 unit	0.045

3RV19 01-1A

1) For further lateral auxiliary switches, see "Mountable accessories".

Further information

Conversion of voltage transformer circuit-breakers 3VU13 to 3RV1

The previous version of the 3VU13 voltage circuit-breakers are no longer available.

The 3RV1 voltage transformer circuit-breakers will be 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

*** This quantity or a multiple thereof can be ordered.**

Overview

Mounting location and function

The 3RV1 circuit-breakers have three main contact elements. In order to achieve maximum flexibility, auxiliary switches, alarm switches, auxiliary releases and isolator modules can be supplied separately.

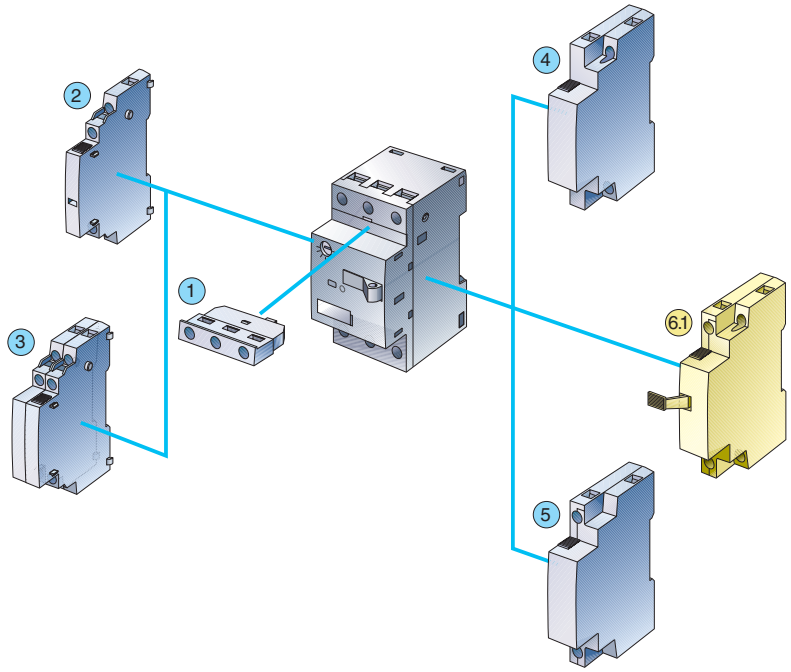
These components can be fitted as required on the switches without using tools.

Front *Note:* *A maximum of 4 auxiliary contacts with auxiliary switches can be attached to each circuit-breaker.*	**Transverse auxiliary switch** 1 NO + 1 NC or 2 NO or 1 changeover contact	An auxiliary contact block can be inserted transversely on the front. The overall width of the circuit-breakers remains unchanged.29
Left-hand side	**Lateral auxiliary switch (2 contacts)** 1 NO + 1 NC or 2 NO or 2 NC	One of the three auxiliary switches can be mounted laterally for each circuit-breaker. The contacts of the auxiliary switch close and open together with the main contacts of the circuit-breaker. The overall width of the lateral auxiliary switch with 2 contacts is 9 mm.
	Lateral auxiliary switch (4 contacts) 2 NO + 2 NC	One auxiliary switch can be mounted laterally for each circuit-breaker. The contacts of the auxiliary switch close and open together with the main contacts of the circuit-breaker. The overall width of the lateral auxiliary switch with 4 contacts is 18 mm.
Notes: • *Auxiliary switches (2 contacts) and alarm switches can be mounted separately or together.* • *A maximum of 4 auxiliary contacts with auxiliary switches can be attached to each circuit-breaker.*	**Alarm switch for sizes S0, S2 and S3** Trip 1 NO + 1 NC Short-circuit 1 NO + 1 NC	One alarm switch can be mounted at the side of each circuit-breaker with a rotary operating mechanism. The alarm 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 release. 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 circuit-breaker again after a short-circuit, the alarm switch must be reset manually after the error cause has been eliminated. The overall width of the alarm switch is 18 mm.
Right-hand side	**Shunt release**	For remote-controlled tripping of the circuit-breaker. The release coil should only be energized for short periods (see circuit diagrams).
	or	
	Undervoltage release	Trips the circuit-breaker 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. Particularly suitable for EMERGENCY-STOP disconnection via the appropriate EMERGENCY-STOP button in accordance with IEC 60204-1.
	or	
Notes: • *One auxiliary release can be mounted per circuit-breaker.* • *Accessories cannot be mounted at the right-hand side of the 3RV11 circuit-breakers with overload relay function.*	**Undervoltage release with leading auxiliary contacts** (2 NO)	Function and use as for the undervoltage release 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 release, thus interrupting power consumption. In the "tripped" position of the breaker, these auxiliary contacts are not guaranteed to open. The leading contacts permit the circuit-breaker to reclose. The overall width of the auxiliary release is 18 mm.
Top *Note:* *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 circuit-breakers** Size S0 and S2	Isolator modules can be mounted to the upper terminal end of circuit-breakers of sizes S0 and S2. The supply cable is connected to the circuit-breaker via the isolator module. The plug can only be unplugged when the circuit-breaker is open and isolates all 3 poles of the circuit-breaker from the network. The shock-protected isolation point is clearly visible and secured with a padlock to prevent reinsertion of the plug.

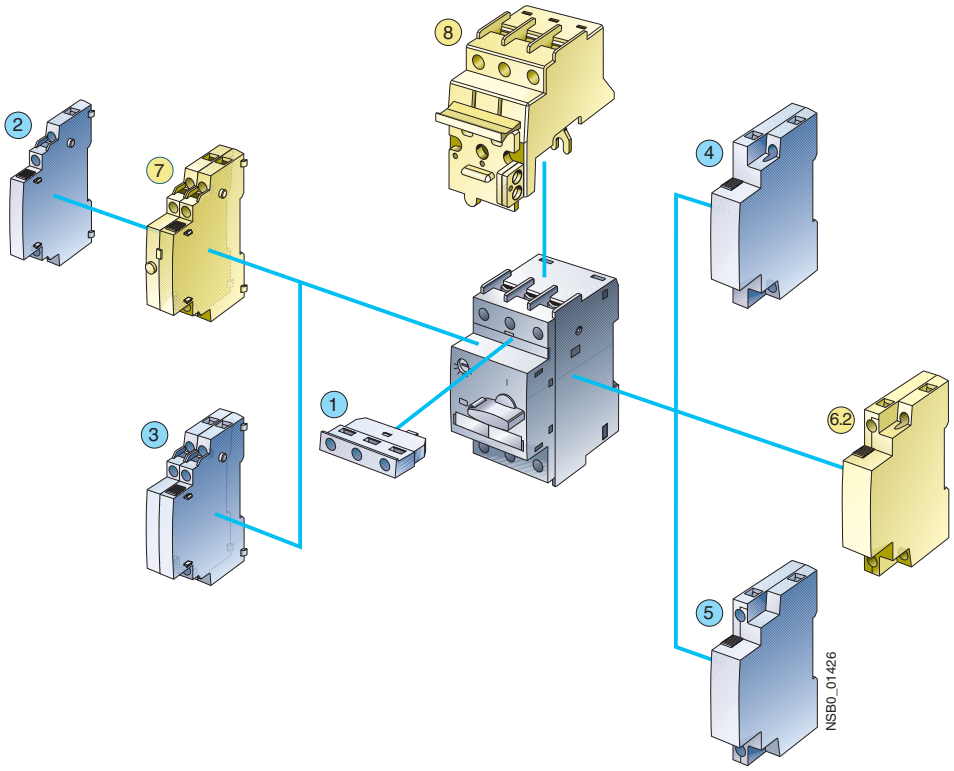
Accessories

Mountable accessories

S00 circuit-breakers with mountable accessories



Circuit-breakers, sizes S0, S2 or S3, with mountable accessories



Mountable accessories for all sizes S00 ... S3

- (1) Transverse auxiliary switch
- (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

Mountable accessories	for sizes
(7) Signalling switch	S0 ... S3
(8) Isolator module	S0 and S2

Technical specifications

Front transverse auxiliary switches

		Switching capacity for different voltages	
		1 changeover contact	1 NO + 1 NC, 2 NO
Rated operating voltage 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	-

Front transverse solid-state compatible auxiliary switches

			1 changeover contact
Rated operating voltage U_e	Alternating voltage	V	250
Rated operating current I_e / AC-14 at U_e = 250 V		A	0.5
Rated operating current I_e / AC-14 at U_e = 125 V		A	1
Rated operating voltage U_e	Direct voltage L/R 200 ms	V	250
Rated operating current I_e / DC-13 at U_e = 250 V		A	0.27
Rated operating current I_e / DC-13 at U_e = 125 V		A	0.44

Lateral auxiliary switches

		Switching capacity for different voltages 1 NO+1 NC, 2 NO, 2 NC, 2 NO + 2 NC and alarm switch
Rated operating voltage 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

Auxiliary releases

		Undervoltage release	Shunt release
Power consumption			
• during pick-up			
- AC voltages	VA / W	20.2 / 13	20.2 / 13
- DC voltages	W	20	13 ... 80
• with continuous operation			
- AC voltages	VA / W	7.2 / 2.4	-
- DC voltages	W	2.1	-
Response voltage			
• Trip	V	0.35 ... 0.7 x U_s	0.7 ... 1.1 x U_s
• Pick-up	V	0.85 ... 1.1 x U_s	-
Max. opening time	ms	20	20

Short-circuit protection for auxiliary and control circuits

• Fuses gL/gG	A	10
• Miniature circuit-breaker, C characteristic	A	6[1)]

1) Prospective short-circuit current < 0.4 kA

Accessories

Mountable accessories

Conductor cross-sections for auxiliary and control circuits

Type of connection **Terminal screw**		**Screw connection** Pozidriv size 2
Conductor cross-sections 1 or 2 conductors		
• Solid	mm^2	2 x (0.5 ... 1.5) / 2 x (0.75 ... 2.5)
• Finely stranded with end sleeve	mm^2	2 x (0.5 ... 1.5) / 2 x (0.75 ... 2.5)
• Stranded	mm^2	2 x (0.5 ... 1.5) / 2 x (0.75 ... 2.5)
• AWG cables	AWG	2 x (18 ... 14)
Terminal type		**Cage Clamp terminals** 1) 2)
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 and stranded	AWG	2 x (24 ... 14)
Max. external diameter of the cable insulation: 3.6 mm.		

1) With conductor cross-sections of ≤ 1 mm^2 an "insulation stopper" must be used, see accessories for "Contactors and contactor combinations".

2) Corresponding opening tool 8WA2803/8WA2804, see accessories.

Selection and ordering data

Type	Version	For circuit-breakers Size	DT	Screw connection Order No.	PS*	Weight per PU approx. kg
Auxiliary switches[1]						
 3RV19 01-1E **Transverse auxiliary switch** with screw connection	1 CO 1 NO + 1 NC 2 NO[2]	S00, S0, S2, S3	▶ ▶ ▶	**3RV19 01-1D** **3RV19 01-1E** **3RV19 01-1F**	1 unit 1 unit 1 unit	0.015 0.018 0.018
 3RV19 01-1G **Transverse solid-state compatible auxiliary switch** with screw connection for use in dusty environments and in solid-state circuits with low operating currents	1 CO	S00, S0, S2, S3	A	**3RV19 01-1G**	1 unit	0.016
 3RV19 01-0H **Covering caps for transverse auxiliary switches**		S00, S0, S2, S3	▶	**3RV19 01-0H**	10 units	0.006
  3RV19 01-1A 3RV19 01-1J **Lateral auxiliary switch** with screw connection	1 NO + 1 NC 2 NO 2 NC 2 NO + 2 NC	S00, S0, S2, S3	▶ ▶ ▶ A	**3RV19 01-1A** **3RV19 01-1B** **3RV19 01-1C** **3RV19 01-1J**	1 unit 1 unit 1 unit 1 unit	0.045 0.045 0.045 0.083

1) Each circuit-breaker can be fitted with one transverse and one lateral auxiliary switch. The lateral auxiliary switch with 2 NO + 2 NC is used without transverse auxiliary switch.

2) Compatible with the following circuit-breakers:
3RV1.1 (size S00) as of version E01
3RV1.2 (size S0) as of version E04
3RV1.3 (size S2) as of version E04
3RV1.4 (size S3) as of version E04.

*** This quantity or a multiple thereof can be ordered.**

Alarm switch[1)]


3RV19 21-1M

Type	Version	For circuit-breakers Size	DT	Screw connection Order No.	PS*	Weight per PU approx. kg
Alarm switch	Separate tripped and short-circuit alarms, 1 NO + 1 NC.	S0, S2, S3	▶	**3RV19 21-1M**	1 unit	0.094

Isolator module


3RV19 38-1A with padlock

Type	Version	For circuit-breakers Size	DT	Screw connection Order No.	PS*	Weight per PU approx. kg
Isolator module	Visible isolating distance for isolating individual circuit-breakers from the network, lockable in isolating position.	S0	▶	**3RV19 28-1A**	1 unit	0.157
		S2		**3RV19 38-1A**	1 unit	0.324

1) One alarm switch can be mounted to the left of each circuit-breaker.

Auxiliary releases[3)]


3RV19 02-1DP0


3RV19 12-1CP0

Rated control supply voltage U_s AC 50 Hz	AC 60 Hz	AC 50/60 Hz 100 % ON [1)]	AC 50/60 Hz, DC 5 s ON [2)]	DC	For circuit-breakers Size	DT	Screw connection Order No.	PS*	Weight per PU approx. kg
V	V	V	V	V					
Undervoltage releases									
-	-	-	-	24	S00, S0, S2, S3	A	**3RV19 02-1AB4**	1 unit	0.138
24	-[4)]	-	-	-		A	**3RV19 02-1AB0**	1 unit	0.134
110	120	-	-	-		A	**3RV19 02-1AF0**	1 unit	0.134
-[4)]	208	-	-	-		A	**3RV19 02-1AM1**	1 unit	0.128
230	240	-	-	-		▶	**3RV19 02-1AP0**	1 unit	0.131
400	-[4)]	-	-	-		▶	**3RV19 02-1AV0**	1 unit	0.127
415	480	-	-	-		A	**3RV19 02-1AV1**	1 unit	0.129
500	575	-	-	-		A	**3RV19 02-1AS0**	1 unit	0.128
Undervoltage release with early-make auxiliary contacts 2 NO									
230	240	-	-	-	S00	A	**3RV19 12-1CP0**	1 unit	0.140
400	-[4)]	-	-	-		A	**3RV19 12-1CV0**	1 unit	0.137
415	480	-	-	-		A	**3RV19 12-1CV1**	1 unit	0.139
230	240	-	-	-	S0, S2, S3	A	**3RV19 22-1CP0**	1 unit	0.139
400	-[4)]	-	-	-		A	**3RV19 22-1CV0**	1 unit	0.136
415	480	-	-	-		A	**3RV19 22-1CV1**	1 unit	0.138
Shunt releases									
-	-	20 ... 24	20 ... 70	-	S00, S0, S2, S3	▶	**3RV19 02-1DB0**	1 unit	0.133
-	-	90 ... 110	70 ... 190	-		A	**3RV19 02-1DF0**	1 unit	0.135
-	-	210 ... 240	190 ... 330	-		▶	**3RV19 02-1DP0**	1 unit	0.130
-	-	350... 415	330 ... 500	-		A	**3RV19 02-1DV0**	1 unit	0.126
-	-	500	500	-		A	**3RV19 02-1DS0**	1 unit	0.126

1) The voltage range is valid for 100 % (infinite) duty cycle.
The response voltage is at 0.9 the lower limit of the voltage range.

2) The voltage range is valid for 5 s duty cycle at AC 50 Hz/60 Hz and DC.
The response voltage is at 0.85 the lower limit of the voltage range.

3) One auxiliary release can be mounted to the right of each circuit-breaker.

4) Not a usual mains voltage.

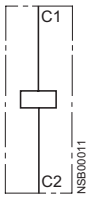
Mountable accessories

Circuit diagrams

Internal connections

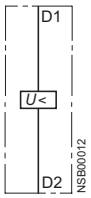
Shunt release

3RV19 02-1D



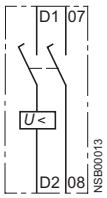
Undervoltage release

3RV19 02-1A



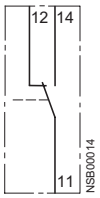
Undervoltage release with leading auxiliary contacts

3RV19 12-1C
3RV19 22-1C

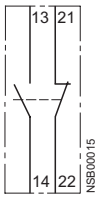


Transverse auxiliary switches

3RV19 01-1D
3RV19 01-1G



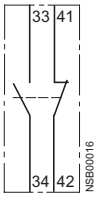
3RV19 01-1E
3RV19 01-2E



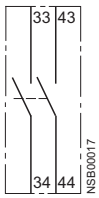
3RV19 01-1F

Lateral auxiliary switches with 2 contacts

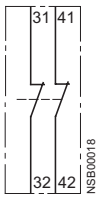
3RV19 01-1A
3RV19 01-2A



3RV19 01-1B
3RV19 01-2B

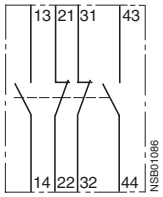


3RV19 01-1C
3RV19 01-2C



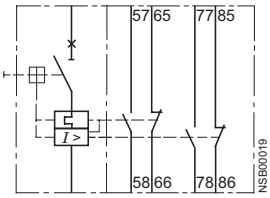
Lateral auxiliary switch with 4 contacts

3RV19 01-1J



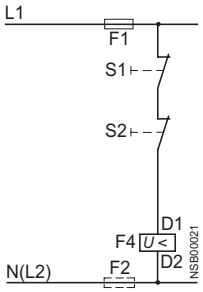
Alarm switch

3RV19 21-1M



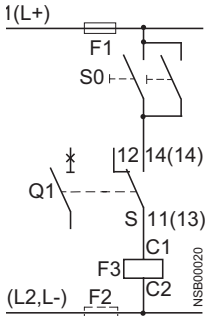
Circuit diagrams

Undervoltage release



S0; S1; S2	OFF button in the plant
F1; F2	Fuse (gL/gG) max. 10 A
F4	Undervoltage trip unit

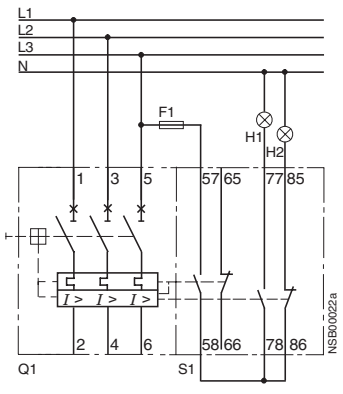
Shunt release



S0; S1; S2	OFF button in the plant
Q1	Circuit-breaker
S	Auxiliary switch of the circuit-breaker Q1 (transverse or lateral)
F1; F2	Fuse (gL/gG) max. 10 A
F3	Voltage trip unit

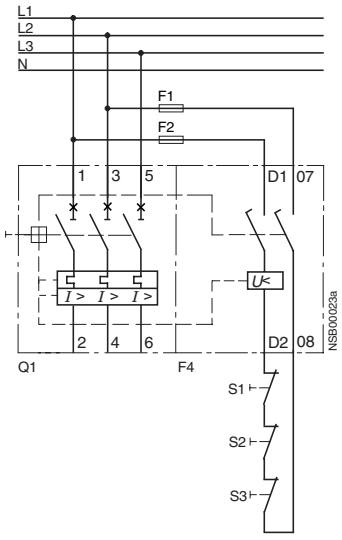
Typical circuits

3RV1 circuit-breaker with 3RV19 21-1M alarm switch



Separate "tripped" and "short-circuit" signals.

Circuit-breakers tripped by means of pushbutton or EMERGENCY-STOP button in the system



The early-make auxiliary contacts will open in switch position "OFF" to deenergize the coil of the under-voltage release, thus avoiding power consumption in the switched off state. In the "tripped" position of the circuit-breaker, these contacts are not guaranteed to open.

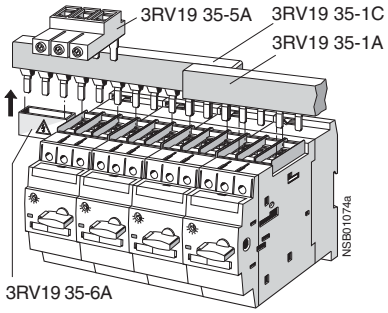
Overview

Insulated three-phase busbar system

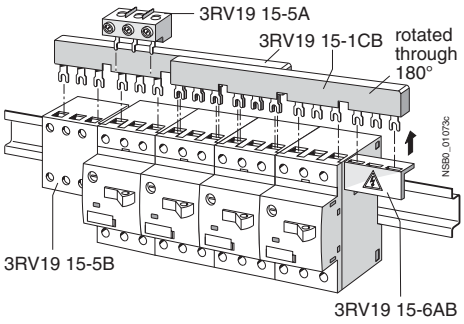
Three-phase busbar systems provide an easy and time-saving means of feeding 3RV1 circuit-breakers with screw-type terminals. Different designs are available for sizes S00, S0 and S2 and can be used for the various different types of circuit-breakers. The only exceptions are the 3RV19 15 three-phase busbar systems, which are not suitable for the 3RV11 circuit-breakers with overload relay function.

The busbars are suitable for between 2 and 5 circuit-breakers. However, any kind of extension is possible by clamping the tags of an additional busbar (rotated by 180°) underneath the terminals of the respective last circuit-breaker. Different sized circuit-breakers cannot be clamped together due to the different dimensions. Special connectors are available for connecting three-phase busbars for S0 circuit-breakers to busbars for S00 circuit-breakers.

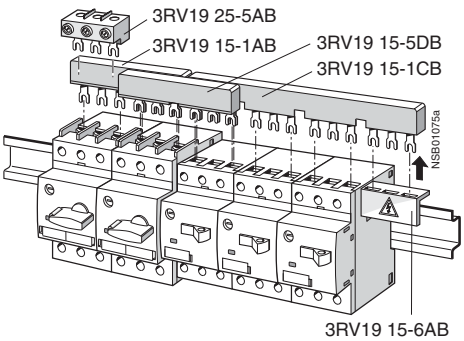
Busbars with larger modular spacing can be used for circuit-breakers with laterally mounted accessories. The circuit-breakers are supplied by appropriate line-side terminals.



3-phase busbar system, size S2



3-phase busbar system, size S00



3-phase busbar system, with example for combining sizes S00 and S0

The three-phase busbar systems are finger-safe. They are designed for any short-circuit stress which can occur at the load side of connected circuit-breakers.

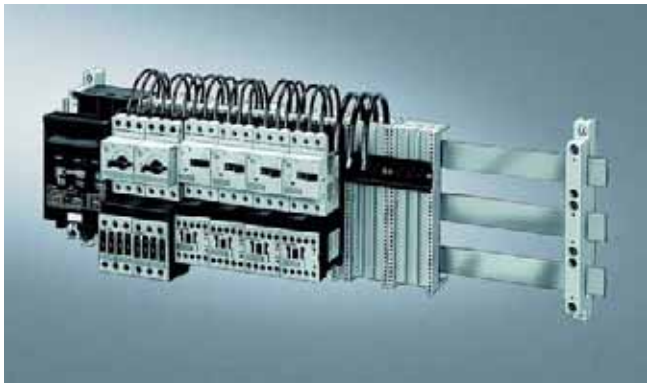
For 3-phase busbar systems for Cage Clamp connection, see "Cage Clamp infeed system".

Busbar adapters

The circuit-breakers are mounted directly with the aid of busbar adapters on busbar systems with 40 mm and 60 mm center-line spacing in order to save space and to reduce infeed times and costs.

Busbar adapters for busbar systems with 40 mm center-line spacing are suitable for copper busbars with a width of 12 mm to 15 mm, while those with 60 mm center-line spacing are suitable for copper busbars with a width of 12 mm to 30 mm. The busbars can be 4 to 5 mm or 10 mm thick. The circuit-breakers are snapped onto the adapter and connected on the line side. This prepared unit is then plugged directly onto the busbar system, and is thus connected both mechanically and electrically at the same time.

Further busbar adapters for snap-mounting direct-on-line starters and reversing starters as well as additional accessories such as line terminals and outgoing terminals, busbar copper, etc., can be found under "Distribution/busbar systems and controlgear".



SIRIUS circuit-breakers and load feeders with busbar adapters snapped onto busbars