

# Protection Equipment

Circuit Breakers • Molded Case Motor Starter Protectors

Reference Manual • April 2009



## Low-Voltage Controls and Distribution

**SIEMENS**



# Protection Equipment



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## Introduction

### Overview



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

|                                           |              |          |          |       |     |     |                 |                 |
|-------------------------------------------|--------------|----------|----------|-------|-----|-----|-----------------|-----------------|
| <b>Accessories</b>                        |              |          |          |       |     |     |                 |                 |
| <b>For sizes</b>                          | S00 S0 S2 S3 | S0 S2 S3 | S0 S2 S3 | S0 S2 | S00 | S00 | S0, S3          | S0              |
| Auxiliary switches                        | ✓ ✓ ✓ ✓      | ✓ ✓ ✓    | ✓ ✓ ✓    | ✓ ✓   | ✓   | ✓   | ✓ <sup>5)</sup> | ✓ <sup>5)</sup> |
| 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<br>CLASS 10<br>CLASS 20<br>CLASS 30 |          |          | -- <sup>1)</sup>                                                                              |                |          |          |                              |          |
| Thermal overload releases                                | A 40 ... 100 to<br>A 252 ... 630              |          |          | None <sup>1)</sup>                                                                            |                |          |          |                              |          |
| Electronic trip units<br>A multiple of the rated current | Adjustable, 6 ... 13 times                    |          |          | Non-adjustable<br>1 A ... 12.5 A:<br>13 times;<br>adjustable<br>20 A, 32 A:<br>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:<br>1 A ... 12.5 A;<br>TU 2:<br>20 A, 32 A                                               | TU 3           |          |          |                              |          |

|                                                 |          |          |          |          |          |          |          |          |          |
|-------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>Accessories</b>                              |          |          |          |          |          |          |          |          |          |
| <b>For molded case motor starter protectors</b> | 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

## Introduction



Type

3RU11

3RB20

3RB21

3RB22/3RB23

### Overload relays up to 630 A

#### Applications

|                                   |                 |                 |                 |                 |
|-----------------------------------|-----------------|-----------------|-----------------|-----------------|
| System protection                 | ✓ <sup>1)</sup> | ✓ <sup>1)</sup> | ✓ <sup>1)</sup> | ✓ <sup>1)</sup> |
| Motor protection                  | ✓               | ✓               | ✓               | ✓               |
| Alternating current, three-phase  | ✓               | ✓               | ✓               | ✓               |
| Alternating current, single-phase | ✓               | --              | --              | ✓               |
| Direct current                    | ✓               | --              | --              | --              |

#### Size of contactor

|  |                 |             |             |             |
|--|-----------------|-------------|-------------|-------------|
|  | S00, S0, S2, S3 | S00 ... S12 | S00 ... S12 | S00 ... S12 |
|--|-----------------|-------------|-------------|-------------|

#### Rated operational current $I_e$

|                                 |   |           |           |           |             |
|---------------------------------|---|-----------|-----------|-----------|-------------|
| Size S00                        | A | Up to 12  | Up to 12  | Up to 12  | } Up to 25  |
| Size S0                         | A | Up to 25  | Up to 25  | Up to 25  |             |
| Size S2                         | A | Up to 50  | Up to 50  | Up to 50  | } Up to 100 |
| Size S3                         | A | Up to 100 | Up to 100 | Up to 100 |             |
| Size S6                         | A | --        | Up to 200 | Up to 200 | Up to 200   |
| Size S10/S12,<br>Size 14 (3TF6) | A | --        | Up to 630 | Up to 630 | Up to 630   |

|                                 |   |                           |                           |                           |                           |
|---------------------------------|---|---------------------------|---------------------------|---------------------------|---------------------------|
| Rated operational voltage $U_e$ | V | 690/1000 AC <sup>2)</sup> | 690/1000 AC <sup>3)</sup> | 690/1000 AC <sup>3)</sup> | 690/1000 AC <sup>4)</sup> |
|---------------------------------|---|---------------------------|---------------------------|---------------------------|---------------------------|

|                 |    |       |       |       |       |
|-----------------|----|-------|-------|-------|-------|
| Rated frequency | Hz | 50/60 | 50/60 | 50/60 | 50/60 |
|-----------------|----|-------|-------|-------|-------|

|              |  |          |                       |                                   |                                   |
|--------------|--|----------|-----------------------|-----------------------------------|-----------------------------------|
| Trip classes |  | CLASS 10 | CLASS 10,<br>CLASS 20 | CLASS 5, 10, 20, 30<br>Adjustable | CLASS 5, 10, 20, 30<br>Adjustable |
|--------------|--|----------|-----------------------|-----------------------------------|-----------------------------------|

|                           |   |                                   |    |    |    |
|---------------------------|---|-----------------------------------|----|----|----|
| Thermal overload releases | A | 0.11 ... 0.16<br>to<br>80 ... 100 | -- | -- | -- |
|---------------------------|---|-----------------------------------|----|----|----|

|                               |   |    |                                  |                                  |                               |
|-------------------------------|---|----|----------------------------------|----------------------------------|-------------------------------|
| Solid-state overload releases | A | -- | 0.1 ... 0.4<br>to<br>160 ... 630 | 0.1 ... 0.4<br>to<br>160 ... 630 | 0.3 ... 3<br>to<br>63 ... 630 |
|-------------------------------|---|----|----------------------------------|----------------------------------|-------------------------------|

|                                        |    |                  |                                      |                                   |                                  |
|----------------------------------------|----|------------------|--------------------------------------|-----------------------------------|----------------------------------|
| Rating for induction motor at 400 V AC | kW | 0.04<br>to<br>45 | 0.04 ... 0.09<br>Up to<br>90 ... 450 | 0.04 ... 0.09<br>to<br>90 ... 450 | 0.09 ... 1.1<br>to<br>37 ... 450 |
|----------------------------------------|----|------------------|--------------------------------------|-----------------------------------|----------------------------------|

### Accessories

| For sizes                                      | S00                    | S0 | S2 | S3 | S00 | S0 | S2 | S3 | S6 | S10/<br>S12 | S00                    | S0 | S2 | S3 | S6 | S10/<br>S12 | S00                    | S0 | S2 | S3 | S6 | S10/<br>S12 |
|------------------------------------------------|------------------------|----|----|----|-----|----|----|----|----|-------------|------------------------|----|----|----|----|-------------|------------------------|----|----|----|----|-------------|
| Terminal brackets for stand-alone installation | ✓                      | ✓  | ✓  | ✓  | ✓   | ✓  | 5) | 5) | 5) | 5)          | ✓                      | ✓  | 5) | 5) | 5) | 5)          | 5)                     | 5) | 5) | 5) | 5) | 5)          |
| Mechanical RESET                               | ✓                      | ✓  | ✓  | ✓  | ✓   | ✓  | ✓  | ✓  | ✓  | ✓           | ✓                      | ✓  | ✓  | ✓  | ✓  | ✓           | --                     | -- | -- | -- | -- | --          |
| Cable releases for RESET                       | ✓                      | ✓  | ✓  | ✓  | ✓   | ✓  | ✓  | ✓  | ✓  | ✓           | ✓                      | ✓  | ✓  | ✓  | ✓  | ✓           | --                     | -- | -- | -- | -- | --          |
| Electrical remote RESET                        | ✓                      | ✓  | ✓  | ✓  | --  | -- | -- | -- | -- | --          | Integrated in the unit |    |    |    |    |             | Integrated in the unit |    |    |    |    |             |
| Terminal covers                                | --                     | -- | ✓  | ✓  | --  | -- | -- | ✓  | ✓  | ✓           | --                     | -- | -- | ✓  | ✓  | ✓           | --                     | -- | -- | ✓  | ✓  | ✓           |
| Sealable covers for setting knobs              | Integrated in the unit |    |    |    | ✓   | ✓  | ✓  | ✓  | ✓  | ✓           | ✓                      | ✓  | ✓  | ✓  | ✓  | ✓           | ✓                      | ✓  | ✓  | ✓  | ✓  | ✓           |

1) The units are responsible in the main circuit for overload protection of the assigned electrical loads (e. g. motors), feeder cable and other switching and protection devices in the respective load feeder.

2) Size S3 up to 1000 V AC.

3) Size S2 (only with straight-through transformer), S3, S6, S10, S12 up to 1000 V AC.

4) With reference to the 3RB29 .6 current measuring modules.

5) Stand-alone installation without accessories is possible.

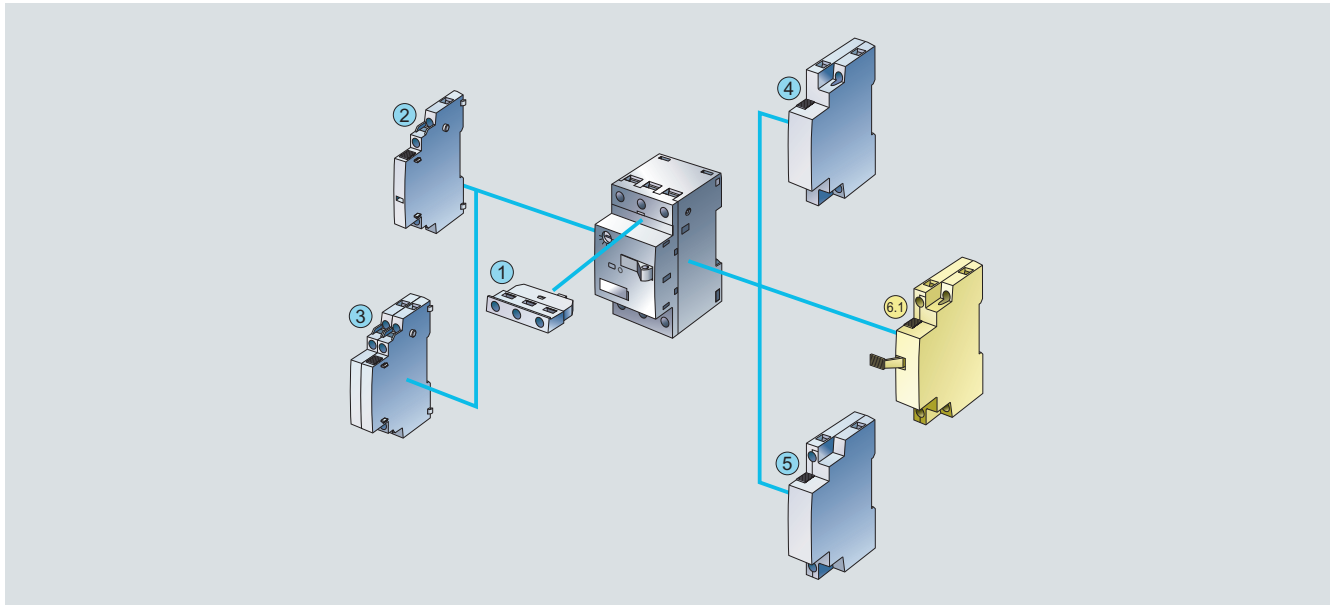
✓ Has this function or can use this accessory

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

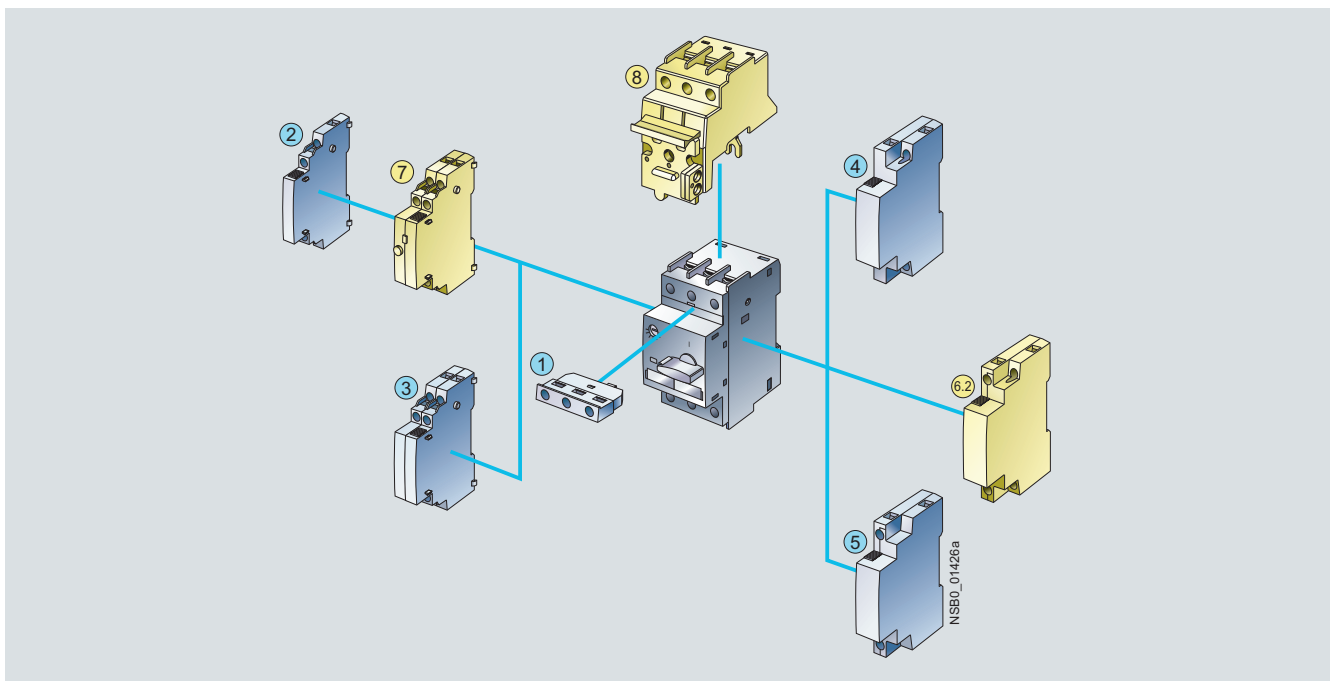
## Overview

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

- ⑥.1 Undervoltage release with leading auxiliary contacts
- ⑥.2 Undervoltage release with leading auxiliary contacts
- ⑦ Alarm switch
- ⑧ Isolator module

for sizes

- S00
- S0 ... S3
- S0 ... S3
- S0 and S2

For accessories, see page 5/28.

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data



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.



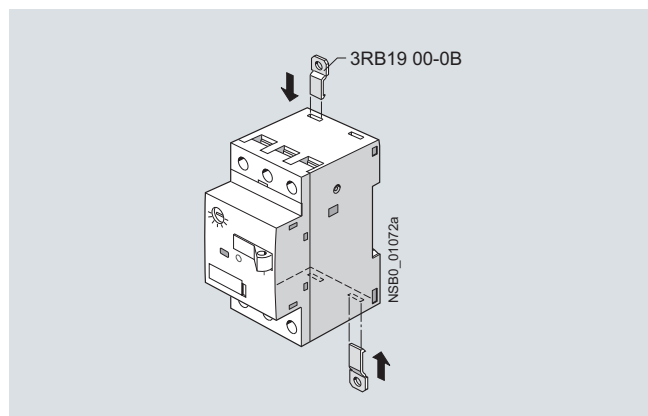
Motor starter protector size S00 with Cage Clamp terminals

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.



# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## 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.

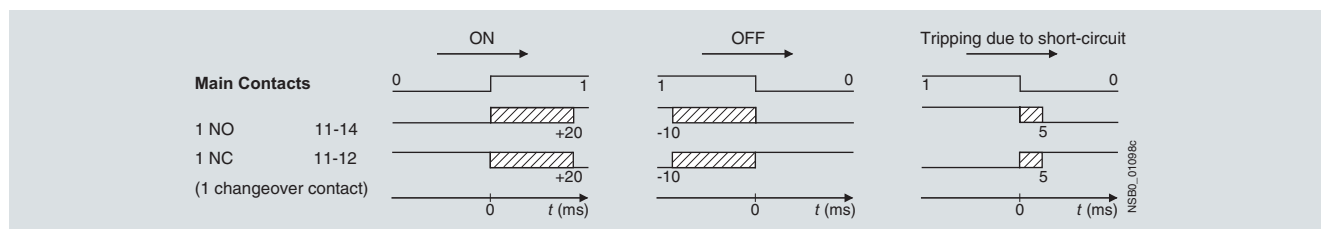
The laterally mounted auxiliary switches of the SIRIUS range can be used for signaling purposes. They cannot be used for blocking the distance protection device.

#### 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.

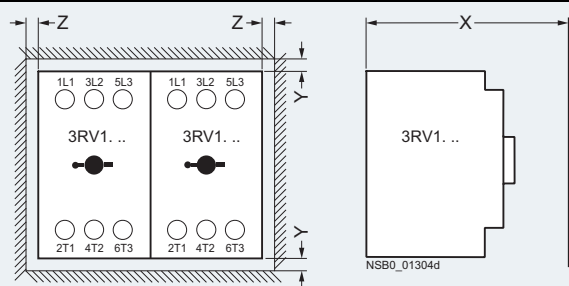


Timing diagram of auxiliary switches for blocking distance protection

### Installation guidelines for motor starter protectors/circuit breakers

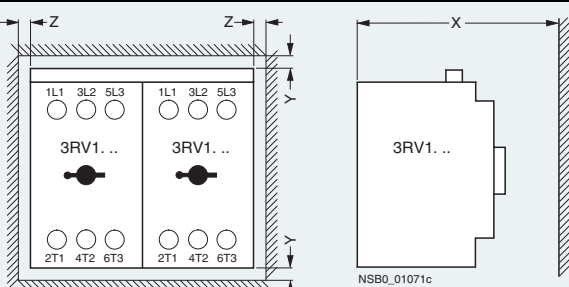
When mounting the motor starter protectors, the following clearances must be maintained to grounded or live parts and to cable ducts made of molded plastic.

| Motor starter protectors/circuit breakers |      |                                                  | Distance to grounded or live parts and to molded-plastic cable ducts acc. to IEC 60947-2 |                          |                      |
|-------------------------------------------|------|--------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------|----------------------|
| Type                                      | Size | $U_e$<br>V                                       | Y<br>mm                                                                                  | X<br>mm                  | Z<br>mm              |
| 3RV1. 1, 3RV16 1.                         | S00  | Up to 690                                        | 20                                                                                       | 70                       | 9                    |
| 3RV1. 2, 3RV17 21, 3RV18 21               | S0   | Up to 500<br>Up to 690                           | 30<br>50                                                                                 | 90<br>90                 | 9<br>30              |
| 3RV1. 3                                   | S2   | Up to 690                                        | 50                                                                                       | 140                      | 10                   |
| 3RV1. 4                                   | S3   | Up to 240<br>Up to 440<br>Up to 500<br>Up to 690 | 50<br>70<br>110<br>150                                                                   | 167<br>167<br>167<br>167 | --<br>--<br>10<br>30 |
| 3RV17 42                                  | S3   | Up to 240<br>Up to 400                           | 90<br>90                                                                                 | 167<br>167               | 10<br>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 | $U_e$<br>V             | Y<br>mm                                                                                  | X<br>mm    | Z<br>mm  |
| 3RV1. 2                                   | S0   | Up to 500<br>Up to 690 | 40<br>50                                                                                 | 90<br>90   | 10<br>30 |
| 3RV1. 3                                   | S2   | Up to 690              | 50                                                                                       | 140        | 10       |
| 3RV1. 4                                   | S3   | Up to 500<br>Up to 690 | 110<br>150                                                                               | 167<br>167 | 10<br>30 |



# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data

Standard mounting for S0, S2 and S3

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

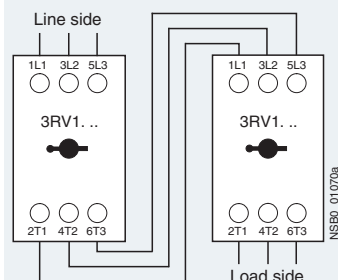
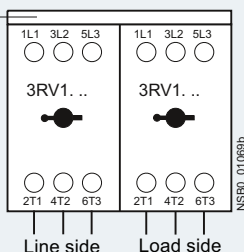
### Wiring module

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



## 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:  $2 \text{ s} < t_A < 10 \text{ s}$
- CLASS 10:  $4 \text{ s} < t_A < 10 \text{ s}$
- CLASS 20:  $6 \text{ s} < t_A < 20 \text{ s}$
- CLASS 30:  $9 \text{ s} < t_A < 30 \text{ s}$

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.

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## 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.

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data

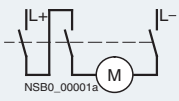
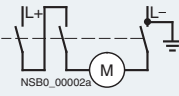
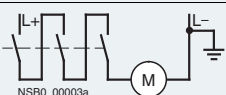
### Switching of direct current

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                           | <u>Three-pole switching, non-grounded system<sup>1)</sup></u><br>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                           | <u>Two-pole switching, grounded system</u><br>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                           | <u>Single-pole switching, grounded system</u><br>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.

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## 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 <sup>1)</sup> |          |                                 | Up to 400 V <sup>1)</sup> /415 V AC <sup>2)</sup> |          |                                 | Up to 440 V <sup>1)</sup> /460 V AC <sup>2)</sup> |          |                                 | Up to 500 V <sup>1)</sup> /525 V AC <sup>2)</sup> |          |                                 | Up to 690 V AC <sup>1)</sup> |          |                                   |
|----------------------------------------------------------|---------------------|------------------------------|----------|---------------------------------|---------------------------------------------------|----------|---------------------------------|---------------------------------------------------|----------|---------------------------------|---------------------------------------------------|----------|---------------------------------|------------------------------|----------|-----------------------------------|
|                                                          |                     | $I_{cu}$                     | $I_{cs}$ | Max. fuse (gL/gG) <sup>3)</sup> | $I_{cu}$                                          | $I_{cs}$ | Max. fuse (gL/gG) <sup>3)</sup> | $I_{cu}$                                          | $I_{cs}$ | Max. fuse (gL/gG) <sup>3)</sup> | $I_{cu}$                                          | $I_{cs}$ | Max. fuse (gL/gG) <sup>3)</sup> | $I_{cu}$                     | $I_{cs}$ | Max. fuse (gL/gG) <sup>3)4)</sup> |
| Type                                                     | A                   | kA                           | kA       | A                               | kA                                                | kA       | A                               | kA                                                | kA       | A                               | kA                                                | kA       | A                               | kA                           | kA       | A                                 |
| (these values do not apply to 3RV17 42 circuit breakers) |                     |                              |          |                                 |                                                   |          |                                 |                                                   |          |                                 |                                                   |          |                                 |                              |          |                                   |
| <b>Size S00</b>                                          |                     |                              |          |                                 |                                                   |          |                                 |                                                   |          |                                 |                                                   |          |                                 |                              |          |                                   |
| 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      | °                               | 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                                |
| <b>Size S0</b>                                           |                     |                              |          |                                 |                                                   |          |                                 |                                                   |          |                                 |                                                   |          |                                 |                              |          |                                   |
| 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                                |
| <b>Size S2</b>                                           |                     |                              |          |                                 |                                                   |          |                                 |                                                   |          |                                 |                                                   |          |                                 |                              |          |                                   |
| 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                                |
| <b>Size S3</b>                                           |                     |                              |          |                                 |                                                   |          |                                 |                                                   |          |                                 |                                                   |          |                                 |                              |          |                                   |
| 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                               |
| <b>Size S3, with increased switching capacity</b>        |                     |                              |          |                                 |                                                   |          |                                 |                                                   |          |                                 |                                                   |          |                                 |                              |          |                                   |
| 3RV1. 42 / 3RV17 42 <sup>5)</sup>                        | 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.

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data

### 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<br><i>I</i> <sub>n</sub> | Up to 240 V AC <sup>1)</sup>   |                                                                                                                         | Up to 400 V <sup>1)</sup> /415 V AC <sup>2)</sup> |                                                                                                                                | Up to 500 V <sup>1)</sup> /525 V AC <sup>2)</sup> |                                                                                                                                | Up to 690 V AC <sup>1)</sup>   |                                                                                                                                |
|--------------------------------------------|----------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Type                                       | A                                      | <i>I</i> <sub>cuIT</sub><br>kA | Max. fuse<br>(gL/gG) <sup>3)</sup><br> | <i>I</i> <sub>cuIT</sub><br>kA                    | Max. fuse<br>(gL/gG) <sup>3)4)</sup><br>A<br> | <i>I</i> <sub>cuIT</sub><br>kA                    | Max. fuse<br>(gL/gG) <sup>3)</sup><br>A<br> | <i>I</i> <sub>cuIT</sub><br>kA | Max. fuse<br>(gL/gG) <sup>3)</sup><br>A<br> |
| Size S00                                   |                                        |                                |                                                                                                                         |                                                   |                                                                                                                                |                                                   |                                                                                                                                |                                |                                                                                                                                |
| 3RV10,<br>3RV16 11-0BD10                   | 0.16 ... 0.63                          | 100                            | °                                                                                                                       | 100                                               | °                                                                                                                              | On request                                        | On request                                                                                                                     | On request                     | On request                                                                                                                     |
|                                            | 0.8; 1                                 | 100                            | °                                                                                                                       | 100                                               | °                                                                                                                              |                                                   |                                                                                                                                |                                |                                                                                                                                |
|                                            | 1.25; 1.6                              | 100                            | °                                                                                                                       | 2                                                 | 20                                                                                                                             |                                                   |                                                                                                                                |                                |                                                                                                                                |
|                                            | 2; 2.5                                 | 100                            | °                                                                                                                       | 2                                                 | 35                                                                                                                             |                                                   |                                                                                                                                |                                |                                                                                                                                |
|                                            | 3.2; 4                                 | 100                            | °                                                                                                                       | 2                                                 | 40                                                                                                                             |                                                   |                                                                                                                                |                                |                                                                                                                                |
|                                            | 5; 6.3                                 | 100                            | °                                                                                                                       | 2                                                 | 50                                                                                                                             |                                                   |                                                                                                                                |                                |                                                                                                                                |
|                                            | 8; 10                                  | 50                             | 80                                                                                                                      | 2                                                 | 63                                                                                                                             |                                                   |                                                                                                                                |                                |                                                                                                                                |
|                                            | 12                                     | 50                             | 80                                                                                                                      | 2                                                 | 80                                                                                                                             |                                                   |                                                                                                                                |                                |                                                                                                                                |
| Size S0                                    |                                        |                                |                                                                                                                         |                                                   |                                                                                                                                |                                                   |                                                                                                                                |                                |                                                                                                                                |
| 3RV1. 2                                    | 0.16 ... 0.63                          | 100                            | °                                                                                                                       | 100                                               | °                                                                                                                              | On request                                        | On request                                                                                                                     | On request                     | On request                                                                                                                     |
|                                            | 0.8; 1                                 | 100                            | °                                                                                                                       | 100                                               | °                                                                                                                              |                                                   |                                                                                                                                |                                |                                                                                                                                |
|                                            | 1.25; 1.6                              | 100                            | °                                                                                                                       | 100                                               | °                                                                                                                              |                                                   |                                                                                                                                |                                |                                                                                                                                |
|                                            | 2; 2.5                                 | 100                            | °                                                                                                                       | 8                                                 | 25                                                                                                                             |                                                   |                                                                                                                                |                                |                                                                                                                                |
|                                            | 3.2                                    | 100                            | °                                                                                                                       | 8                                                 | 32                                                                                                                             |                                                   |                                                                                                                                |                                |                                                                                                                                |
|                                            | 4; 5                                   | 100                            | °                                                                                                                       | 6                                                 | 32                                                                                                                             |                                                   |                                                                                                                                |                                |                                                                                                                                |
|                                            | 6.3 ... 10                             | 100                            | °                                                                                                                       | 6                                                 | 50                                                                                                                             |                                                   |                                                                                                                                |                                |                                                                                                                                |
|                                            | 12.5                                   | 100                            | °                                                                                                                       | 6                                                 | 63                                                                                                                             |                                                   |                                                                                                                                |                                |                                                                                                                                |
| 16 ... 25                                  | 50                                     | 80                             | 4                                                                                                                       | 63                                                |                                                                                                                                |                                                   |                                                                                                                                |                                |                                                                                                                                |
| 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                                                                                                                             |
| 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.

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data

### 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 <sup>1)</sup> /525 V AC <sup>2)</sup> |          | Up to 690 V AC <sup>1)</sup> |          |
|-----------------------------------|----------------------------------------------|---------------------|---------------------------------------------------|----------|------------------------------|----------|
|                                   | With limiter function<br>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<br><br>$I_n = 25$ 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       |
| Size S2                           |                                              |                     |                                                   |          |                              |          |
| 3RV10 3                           | 3RV13 31-4HC10<br><br>$I_n = 50$ 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       |
| Size S3                           |                                              |                     |                                                   |          |                              |          |
| 3RV10 4                           | 3RV13 41-4HC10<br><br>$I_n = 50$ A           | 32                  | 100                                               | 50       | 50                           | 25       |
|                                   |                                              | 40                  | 100                                               | 50       | 50                           | 25       |
|                                   |                                              | 50                  | 100                                               | 50       | 50                           | 25       |
|                                   | 3RV13 41-4MC10<br><br>$I_n = 100$ 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 resistant up to 100 kA

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

1) 10 % overvoltage.

2) 5 % overvoltage.



# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data

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

For footnotes see page 5/17.

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



# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data

| Conductor cross-sections of main circuit                    |                 |                                                                                                                        |                                                                |                                                                                                                         |                                       |                             |
|-------------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------|
| Type                                                        |                 | 3RV1.                                                                                                                  | 3RV1. 2                                                        | 3RV1. 3                                                                                                                 | 3RV1. 4/<br>3RV17 42                  | 3RV17 21,<br>3RV18 21       |
| Connection type                                             |                 |  Screw terminals                      |                                                                |  Screw terminals<br>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<br>(1 or 2 conductors connectable) |                 |                                                                                                                        |                                                                |                                                                                                                         |                                       |                             |
| • Solid                                                     | mm <sup>2</sup> | 2 x (0.5 ... 1.5) <sup>4)</sup><br>2 x (0.75 ... 2.5) <sup>4)</sup>                                                    | 2 x (1 ... 2.5) <sup>4)</sup><br>2 x (2.5 ... 6) <sup>4)</sup> | 2 x (0.75 ... 16)                                                                                                       | 2 x (2.5 ... 16)                      | 1 ... 10,<br>max. 2 x 10    |
| • Finely stranded with end sleeve                           | mm <sup>2</sup> | 2 x (0.5 ... 1.5) <sup>4)</sup><br>2 x (0.75 ... 2.5) <sup>4)</sup>                                                    | 2 x (1 ... 2.5) <sup>4)</sup><br>2 x (2.5 ... 6) <sup>4)</sup> | 2 x (0.75 ... 16),<br>1 x (0.75 ... 25)                                                                                 | 2 x (2.5 ... 35),<br>1 x (2.5 ... 50) | 1 ... 16,<br>max. 6 + 16    |
| • Stranded                                                  | mm <sup>2</sup> | 2 x (0.5 ... 1.5) <sup>4)</sup><br>2 x (0.75 ... 2.5) <sup>4)</sup>                                                    | 2 x (1 ... 2.5) <sup>4)</sup><br>2 x (2.5 ... 6) <sup>4)</sup> | 2 x (0.75 ... 25),<br>1 x (0.75 ... 35)                                                                                 | 2 x (10 ... 50),<br>1 x (10 ... 70)   | 1.5 ... 25,<br>max. 10 + 25 |
| • AWG cables, solid or stranded                             | AWG             | 2 x (18 ... 14)                                                                                                        | 2 x (14 ... 10)                                                | 2 x (18 ... 2),<br>1 x (18 ... 2)                                                                                       | 2 x (10 ... 1/0),<br>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 <sup>1)</sup>                       |                 |                                                                                                                        |                                                                |                                                                                                                         |                                       |                             |
| • With copper bars <sup>2)</sup>                            | --              | --                                                                                                                     |                                                                |                                                                                                                         | 18 x 10                               | --                          |
| • With cable lugs <sup>3)</sup>                             | --              | --                                                                                                                     |                                                                |                                                                                                                         | Up to 2 x 70                          | --                          |
| Connection type                                             |                 |  Cage Clamp terminals <sup>5)6)</sup> |                                                                |                                                                                                                         |                                       |                             |
| Conductor cross-sections<br>(1 or 2 conductors connectable) |                 |                                                                                                                        |                                                                |                                                                                                                         |                                       |                             |
| • Solid                                                     | mm <sup>2</sup> | 2 x (0.25 ... 2.5)                                                                                                     | --                                                             |                                                                                                                         |                                       |                             |
| • Finely stranded with end sleeve                           | mm <sup>2</sup> | 2 x (0.25 ... 1.5)                                                                                                     | --                                                             |                                                                                                                         |                                       |                             |
| • Finely stranded without end sleeve                        | mm <sup>2</sup> | 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 5/16:

- 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 5/17:

- 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<sup>2</sup> 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<sup>2</sup> an "insulation stop" must be used (see Chapter 3 "Contactors and Contactor Assemblies" --> "Accessories").

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## 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 <sup>1)</sup> for FLA <sup>2)</sup> max. |         | Rated current $I_n$ | 240 V AC          |                    | 480 V AC          |                    | 600 V AC          |                    |
|-------------------------------------------------------|---------|----------------------------------------------------|---------|---------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|
| Type                                                  | V       | 1-phase                                            | 3-phase | A                   | UL $I_{bc}^{(3)}$ | CSA $I_{bc}^{(3)}$ | UL $I_{bc}^{(3)}$ | CSA $I_{bc}^{(3)}$ | UL $I_{bc}^{(3)}$ | CSA $I_{bc}^{(3)}$ |
| <b>Size S00</b>                                       |         |                                                    |         |                     |                   |                    |                   |                    |                   |                    |
| <b>3RV10 11, 3RV16 11-0BD10</b>                       |         |                                                    |         |                     | 0.16 ... 2        | 65                 | 65                | 65                 | 10                | 10                 |
| FLA <sup>2)</sup> max. 12 A, 600 V                    | 115     | 1/2                                                | --      | 2.5                 | 65                | 65                 | 65                | 65                 | 10                | 10                 |
|                                                       | 200     | 1 1/2                                              | 3       | 3.2                 | 65                | 65                 | 65                | 65                 | 10                | 10                 |
|                                                       | 230     | 2                                                  | 3       | 4                   | 65                | 65                 | 65                | 65                 | 10                | 10                 |
|                                                       | 460     | --                                                 | 7 1/2   | 5                   | 65                | 65                 | 65                | 65                 | 10                | 10                 |
| NEMA size 00                                          | 575/600 | --                                                 | 10      | 6.3                 | 65                | 65                 | 65                | 65                 | 10                | 10                 |
|                                                       |         |                                                    |         | 8                   | 65                | 65                 | 65                | 65                 | 10                | 10                 |
|                                                       |         |                                                    |         | 10                  | 65                | 65                 | 65                | 65                 | 10                | 10                 |
|                                                       |         |                                                    |         | 12                  | 65                | 65                 | 65                | 65                 | 10                | 10                 |
| <b>Size S0</b>                                        |         |                                                    |         |                     |                   |                    |                   |                    |                   |                    |
| <b>3RV10 21/3RV11 21, 3RV13 21</b>                    |         |                                                    |         |                     | 0.16 ... 3.2      | 65                 | 65                | 65                 | 30                | 30                 |
| FLA <sup>2)</sup> max. 25 A, 600 V                    | 115     | 2                                                  | --      | 4                   | 65                | 65                 | 65                | 65                 | 30                | 30                 |
|                                                       | 200     | 3                                                  | 5       | 5                   | 65                | 65                 | 65                | 65                 | 30                | 30                 |
|                                                       | 230     | 3                                                  | 7 1/2   | 6.3                 | 65                | 65                 | 65                | 65                 | 30                | 30                 |
| NEMA size 1                                           | 460     | --                                                 | 15      | 8                   | 65                | 65                 | 65                | 65                 | 30                | 30                 |
|                                                       | 575/600 | --                                                 | 20      | 10                  | 65                | 65                 | 65                | 65                 | 30                | 30                 |
|                                                       |         |                                                    |         | 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                 |
| <b>Size S2</b>                                        |         |                                                    |         |                     |                   |                    |                   |                    |                   |                    |
| <b>3RV10 31/3RV11 31, 3RV13 31</b>                    |         |                                                    |         |                     | 16                | 65                 | 65                | 65                 | 30                | 25                 |
| FLA <sup>2)</sup> max. 50 A, 600 V                    | 115     | 3                                                  | --      | 20                  | 65                | 65                 | 65                | 65                 | 30                | 25                 |
|                                                       | 200     | 7 1/2                                              | 15      | 25                  | 65                | 65                 | 65                | 65                 | 30                | 25                 |
| NEMA size 2                                           | 230     | 10                                                 | 20      | 32                  | 65                | 65                 | 65                | 65                 | 30                | 25                 |
|                                                       | 460     | --                                                 | 40      | 40                  | 65                | 65                 | 65                | 65                 | 30                | 25                 |
|                                                       | 575/600 | --                                                 | 50      | 45                  | 65                | 65                 | 65                | 65                 | 30                | 25                 |
|                                                       |         |                                                    |         | 50                  | 65                | 65                 | 65                | 65                 | 30                | 25                 |
| <b>Size S3</b>                                        |         |                                                    |         |                     |                   |                    |                   |                    |                   |                    |
| <b>3RV10 41/3RV10 42, 3RV11 42, 3RV13 41/3RV13 42</b> |         |                                                    |         |                     | 16                | 65                 | 65                | 65                 | 30                | 30                 |
| FLA <sup>2)</sup> max. 99 A, 600 V                    | 115     | 7 1/2                                              | --      | 20                  | 65                | 65                 | 65                | 65                 | 30                | 30                 |
|                                                       | 200     | 20                                                 | 30      | 25                  | 65                | 65                 | 65                | 65                 | 30                | 30                 |
| NEMA size 3                                           | 230     | 20                                                 | 40      | 32                  | 65                | 65                 | 65                | 65                 | 30                | 30                 |
|                                                       | 460     | --                                                 | 75      | 40                  | 65                | 65                 | 65                | 65                 | 30                | 30                 |
|                                                       | 575/600 | --                                                 | 100     | 50                  | 65                | 65                 | 65                | 65                 | 30                | 30                 |
|                                                       |         |                                                    |         | 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.

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data

### 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 <sup>1)</sup> for FLA <sup>2)</sup> max. |         | Rated current $I_n$ | 240 V AC<br>UL<br>$I_{bc}$ <sup>3)</sup> | Up to 480 Y / 277 V AC<br>UL<br>$I_{bc}$ <sup>3)</sup> | Up to 600 Y / 347 V AC<br>UL<br>$I_{bc}$ <sup>3)</sup> |
|--------------------------------------------------------|---------|----------------------------------------------------|---------|---------------------|------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| Type                                                   | V       | 1-phase                                            | 3-phase | A                   | kA                                       | kA                                                     | kA                                                     |
| <b>Size S00</b>                                        |         |                                                    |         |                     |                                          |                                                        |                                                        |
| <b>3RV10 11</b>                                        |         |                                                    |         | 0.16 ... 0.8        | 65                                       | 65                                                     | 10                                                     |
| FLA <sup>2)</sup> max. 8 A,<br>480 V<br>NEMA size 0    | 115     | 1/3                                                | --      | 1                   | 65                                       | 65                                                     | 10                                                     |
|                                                        | 200     | 3/4                                                | 2       | 1.25                | 65                                       | 65                                                     | 10                                                     |
|                                                        | 230     | 1                                                  | 2       | 2                   | 65                                       | 65                                                     | 10                                                     |
|                                                        | 460     | --                                                 | 5       | 2.5                 | 65                                       | 65                                                     | 10                                                     |
|                                                        | 575/600 | --                                                 | --      | 3.2                 | 65                                       | 65                                                     | 10                                                     |
|                                                        |         |                                                    |         | 4                   | 65                                       | 65                                                     | 10                                                     |
|                                                        |         |                                                    |         | 5                   | 65                                       | 65                                                     | 10                                                     |
|                                                        |         |                                                    |         | 6.3                 | 65                                       | 65                                                     | 10                                                     |
|                                                        |         |                                                    |         | 8                   | 65                                       | 65                                                     | 10                                                     |
| <b>Size S0</b>                                         |         |                                                    |         |                     |                                          |                                                        |                                                        |
| <b>3RV10 21</b>                                        |         |                                                    |         | 0.16 ... 1.6        | 65                                       | 65                                                     | 30                                                     |
| FLA <sup>2)</sup> max.<br>22 A, 480 V<br>12.5 A, 600 V | 115     | 2                                                  | --      | 2                   | 65                                       | 65                                                     | 30                                                     |
|                                                        | 200     | 3                                                  | 5       | 2.5                 | 65                                       | 65                                                     | 30                                                     |
|                                                        | 230     | 3                                                  | 7 1/2   | 3.2                 | 65                                       | 65                                                     | 30                                                     |
|                                                        | 460     | --                                                 | 15      | 4                   | 65                                       | 65                                                     | 30                                                     |
|                                                        | 575/600 | --                                                 | 10      | 5                   | 65                                       | 65                                                     | 30                                                     |
| NEMA size 1                                            |         |                                                    |         | 6.3                 | 65                                       | 65                                                     | 30                                                     |
|                                                        |         |                                                    |         | 8                   | 65                                       | 65                                                     | 30                                                     |
|                                                        |         |                                                    |         | 10                  | 65                                       | 65                                                     | 30                                                     |
|                                                        |         |                                                    |         | 12.5                | 65                                       | 65                                                     | 30                                                     |
| <b>Size S2</b>                                         |         |                                                    |         |                     |                                          |                                                        |                                                        |
| <b>3RV10 31</b>                                        |         |                                                    |         | 16                  | 65                                       | 65                                                     | 25                                                     |
| FLA <sup>2)</sup> max.<br>50 A, 600 V                  | 115     | 3                                                  | --      | 20                  | 65                                       | 65                                                     | 25                                                     |
|                                                        | 200     | 7 1/2                                              | 15      | 25                  | 65                                       | 65                                                     | 25                                                     |
|                                                        | 230     | 10                                                 | 20      | 32                  | 65                                       | 65                                                     | 25                                                     |
|                                                        | 460     | --                                                 | 40      | 40                  | 65                                       | 65                                                     | 25                                                     |
|                                                        | 575/600 | --                                                 | 50      | 45                  | 65                                       | 65                                                     | 25                                                     |
| NEMA size 2                                            |         |                                                    |         | 50                  | 65                                       | 65                                                     | 25                                                     |
| <b>Size S3</b>                                         |         |                                                    |         |                     |                                          |                                                        |                                                        |
| <b>3RV10 4.</b>                                        |         |                                                    |         | 16                  | 65                                       | 65                                                     | 30                                                     |
| FLA <sup>2)</sup> max.<br>100 A, 480 V<br>75 A, 600 V  | 115     | 7 1/2                                              | --      | 20                  | 65                                       | 65                                                     | 30                                                     |
|                                                        | 200     | 20                                                 | 30      | 25                  | 65                                       | 65                                                     | 30                                                     |
|                                                        | 230     | 20                                                 | 40      | 32                  | 65                                       | 65                                                     | 30                                                     |
|                                                        | 460     | --                                                 | 75      | 40                  | 65                                       | 65                                                     | 30                                                     |
|                                                        | 575/600 | --                                                 | 75      | 50                  | 65                                       | 65                                                     | 30                                                     |
| NEMA size 3                                            |         |                                                    |         | 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.

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## 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 <sup>1)</sup> for FLA <sup>2)</sup> max. |         | Rated current<br>$I_n$ | Up to 240 V AC       |                       | Up to 480 Y/277 V AC |                       | Up to 600 Y/347 V AC |                       |
|-----------------------------------------------|---------|----------------------------------------------------|---------|------------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|
|                                               |         |                                                    |         |                        | UL<br>$I_{bc}^{(3)}$ | CSA<br>$I_{bc}^{(3)}$ | UL<br>$I_{bc}^{(3)}$ | CSA<br>$I_{bc}^{(3)}$ | UL<br>$I_{bc}^{(3)}$ | CSA<br>$I_{bc}^{(3)}$ |
| Type                                          | V       | 1-phase                                            | 3-phase | A                      | kA                   | kA                    | kA                   | kA                    | kA                   | kA                    |
| <b>Size S0</b>                                |         |                                                    |         |                        |                      |                       |                      |                       |                      |                       |
| <b>3RV10 21 + 3RV19 28-1H<sup>4)</sup></b>    |         |                                                    |         |                        | 0.16 ... 1.6         | 65                    | 65                   | 65                    | 30                   | 30                    |
| FLA <sup>2)</sup> max.                        | 115     | 2                                                  | --      | 2                      | 65                   | 65                    | 65                   | 65                    | 30                   | 30                    |
| 22 A, 480 V                                   | 200     | 3                                                  | 5       | 2.5                    | 65                   | 65                    | 65                   | 65                    | 30                   | 30                    |
| 12.5 A, 600 V                                 | 230     | 3                                                  | 7 1/2   | 3.2                    | 65                   | 65                    | 65                   | 65                    | 30                   | 30                    |
|                                               | 460     | --                                                 | 15      | 4                      | 65                   | 65                    | 65                   | 65                    | 30                   | 30                    |
| NEMA size 1                                   | 575/600 | --                                                 | 10      | 5                      | 65                   | 65                    | 65                   | 65                    | 30                   | 30                    |
|                                               |         |                                                    |         | 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                    | --                   | --                    |
| <b>Size S2</b>                                |         |                                                    |         |                        |                      |                       |                      |                       |                      |                       |
| <b>3RV10 31</b>                               |         |                                                    |         |                        | 16                   | 65                    | 65                   | 65                    | 25                   | 25                    |
| FLA <sup>2)</sup> max.                        | 115     | 3                                                  | --      | 20                     | 65                   | 65                    | 65                   | 65                    | 25                   | 25                    |
| 50 A, 480 V                                   | 200     | 7 1/2                                              | 15      | 25                     | 65                   | 65                    | 65                   | 65                    | 25                   | 25                    |
| NEMA size 2                                   | 230     | 10                                                 | 20      | 32                     | 65                   | 65                    | 65                   | 65                    | 25                   | 25                    |
|                                               | 460     | --                                                 | 40      | 40                     | 65                   | 65                    | 65                   | 65                    | 25                   | 25                    |
|                                               | 575/600 | --                                                 | 50      | 45                     | 65                   | 65                    | 65                   | 65                    | 25                   | 25                    |
|                                               |         |                                                    |         | 50                     | 65                   | 65                    | 65                   | 65                    | 25                   | 25                    |
| <b>Size S3</b>                                |         |                                                    |         |                        |                      |                       |                      |                       |                      |                       |
| <b>3RV10 41 + 3RT19 46-4GA07<sup>4)</sup></b> |         |                                                    |         |                        | 16                   | 65                    | 65                   | 65                    | 30                   | 30                    |
| FLA <sup>2)</sup> max.                        | 115     | 10                                                 | --      | 20                     | 65                   | 65                    | 65                   | 65                    | 30                   | 30                    |
| 100 A, 480 V                                  | 200     | 20                                                 | 30      | 25                     | 65                   | 65                    | 65                   | 65                    | 30                   | 30                    |
| 75 A, 600 V                                   | 230     | 20                                                 | 40      | 32                     | 65                   | 65                    | 65                   | 65                    | 30                   | 30                    |
|                                               | 460     | --                                                 | 75      | 40                     | 65                   | 65                    | 65                   | 65                    | 30                   | 30                    |
| NEMA size 3                                   | 575/600 | --                                                 | 75      | 50                     | 65                   | 65                    | 65                   | 65                    | 30                   | 30                    |
|                                               |         |                                                    |         | 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.

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data

### 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<br>$I_{bc}^{1)}$ | CSA<br>$I_{bc}^{1)}$ | UL<br>$I_{bc}^{1)}$ | CSA<br>$I_{bc}^{1)}$ | UL<br>$I_{bc}^{1)}$ | CSA<br>$I_{bc}^{1)}$ | UL<br>$I_{bc}^{1)}$ | CSA<br>$I_{bc}^{1)}$ |
| Type             | A                   | kA                  | kA                   | kA                  | kA                   | kA                  | kA                   | kA                  | kA                   |
| <b>Size S0</b>   |                     |                     |                      |                     |                      |                     |                      |                     |                      |
| <b>3RV17 21</b>  | 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                   | --                  | --                   | --                  | --                   |
| <b>3RV18 21</b>  | 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                   | --                  | --                   | --                  | --                   |
| <b>Size S3</b>   |                     |                     |                      |                     |                      |                     |                      |                     |                      |
| <b>3RV17 42</b>  | 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.

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data

| Rated data of the auxiliary switches and signal switches      |              |                                                                                             |                                                    |                   |
|---------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------|
| Type 3RV19                                                    |              | Lateral auxiliary switch with<br>1 NO + 1 NC, 2 NO,<br>2 NC, 2 NO + 2 NC<br>Signal switches | Transverse auxiliary switches with<br>1 CO contact | 1 NO + 1 NC, 2 NO |
| Max. rated voltage<br>Acc. to NEMA (UL)<br>Acc. to NEMA (CSA) | V AC<br>V AC | 600<br>600                                                                                  |                                                    | 250<br>250        |
| Uninterrupted current                                         | A            | 10                                                                                          | 5                                                  | 2.5               |
| Switching capacity                                            |              | A600<br>Q300                                                                                | B600<br>R300                                       | C300<br>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 <sup>2</sup> | 2 x (0.5 ... 1.5) <sup>1)</sup> , 2 x (0.75 ... 2.5) <sup>1)</sup> , max. 4                         |                |                |
| • Finely stranded with end sleeve                                  | mm <sup>2</sup> | 2 x (0.5 ... 1.5) <sup>1)</sup> , 2 x (0.75 ... 2.5) <sup>1)</sup>                                  |                |                |
| • Stranded                                                         | mm <sup>2</sup> | 2 x (0.5 ... 1.5) <sup>1)</sup> , 2 x (0.75 ... 2.5) <sup>1)</sup> , max. 4                         |                |                |
| Auxiliary switch for blocking the distance protection              |                 |                                                                                                     |                |                |
| • With defined lateral assignment for blocking distance protection |                 | 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.

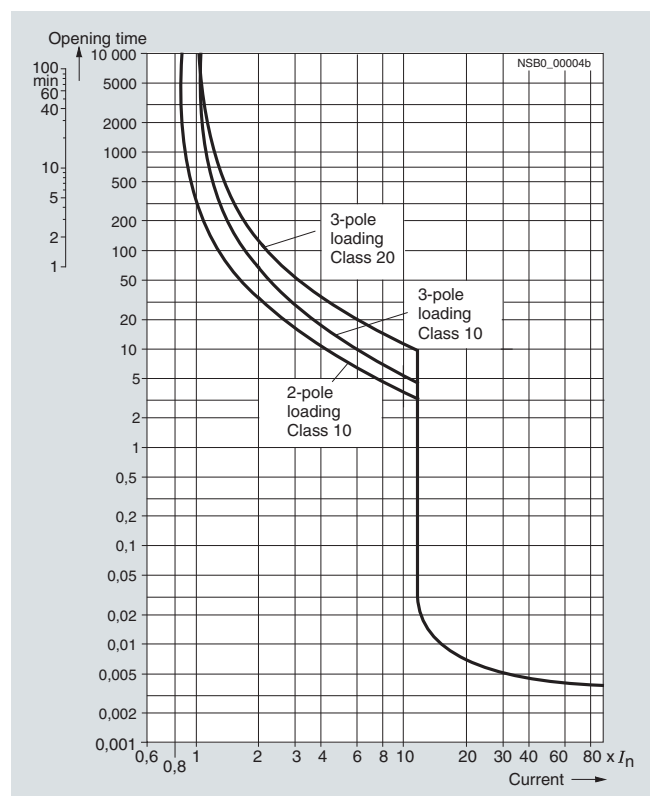
The characteristic curves apply to the cold state; at operating temperature, the tripping times of the thermal releases are reduced to approximately 25 %.

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  $\pm 20\%$  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  $16\frac{2}{3}$  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":

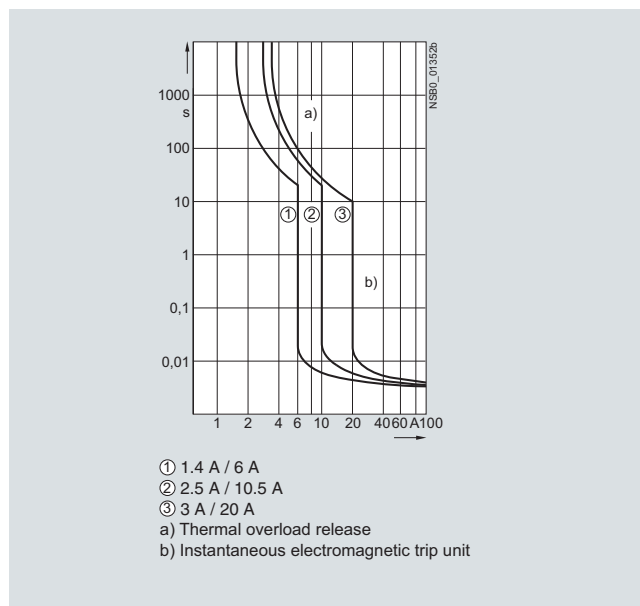
- Either by e-mail to: [technical-assistance@siemens.com](mailto:technical-assistance@siemens.com)
- Or on the Internet: <http://www.siemens.com/automation/service&support>

## 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](mailto:technical-assistance@siemens.com)
- Or on the Internet: <http://www.siemens.com/automation/service&support>



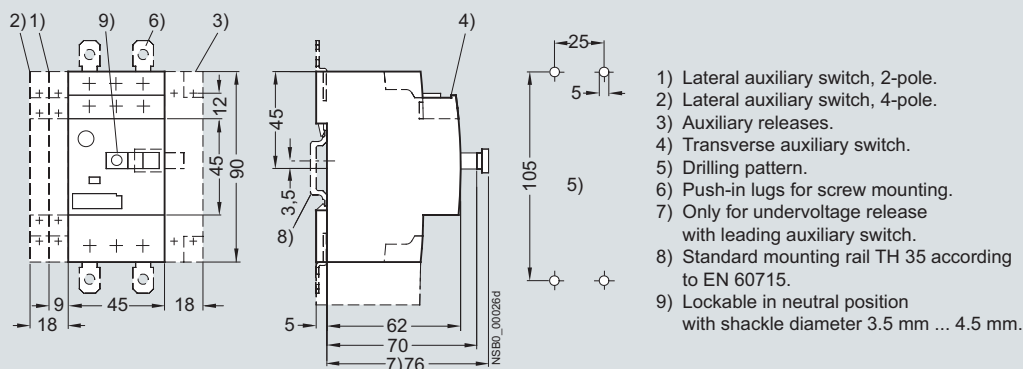
# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data

### Dimensional drawings

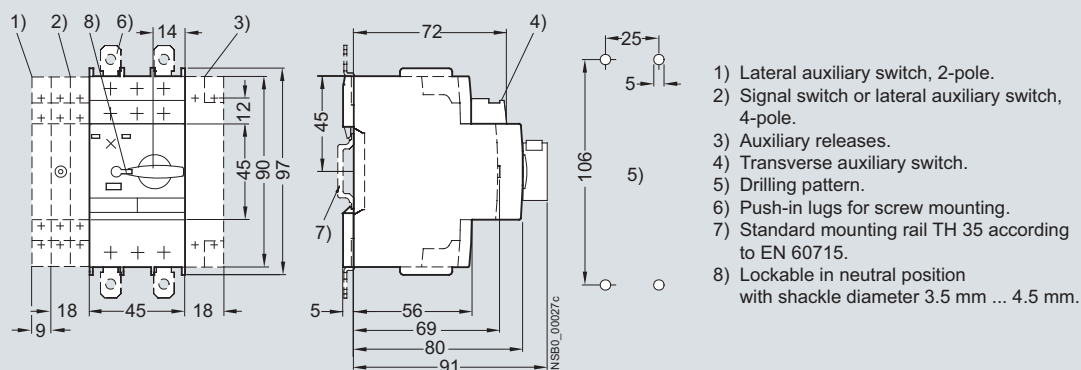
#### 3RV1 motor starter protectors, size S00

##### 3RV10 11, 3RV16



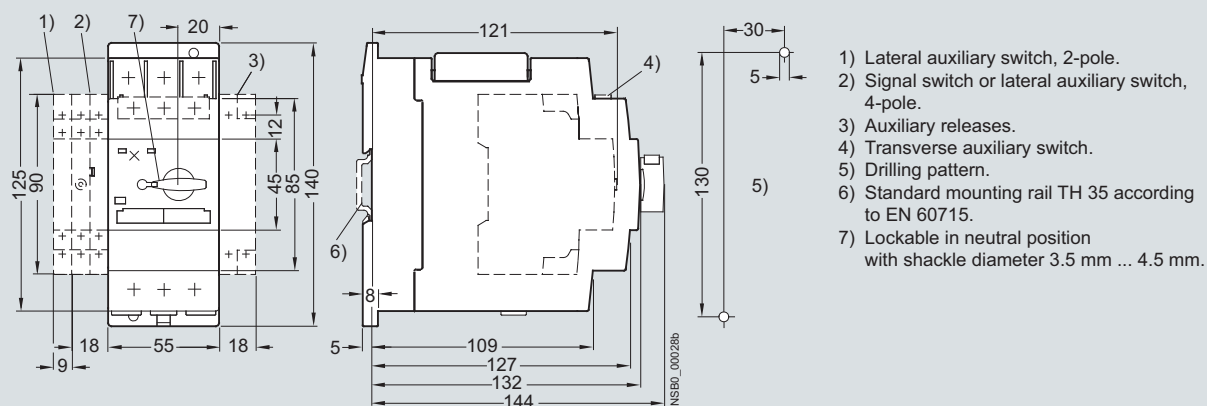
#### 3RV1 motor starter protectors, size S0

##### 3RV10 21, 3RV13 21, 3RV14 21



#### 3RV1 motor starter protectors, size S2

##### 3RV10 31, 3RV13 31, 3RV14 31



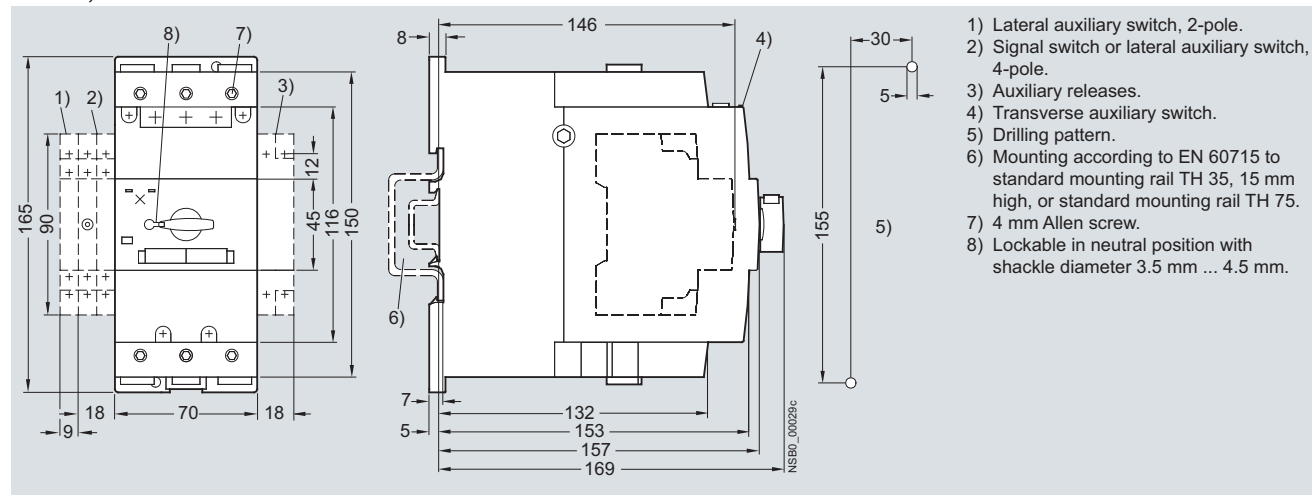


# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data

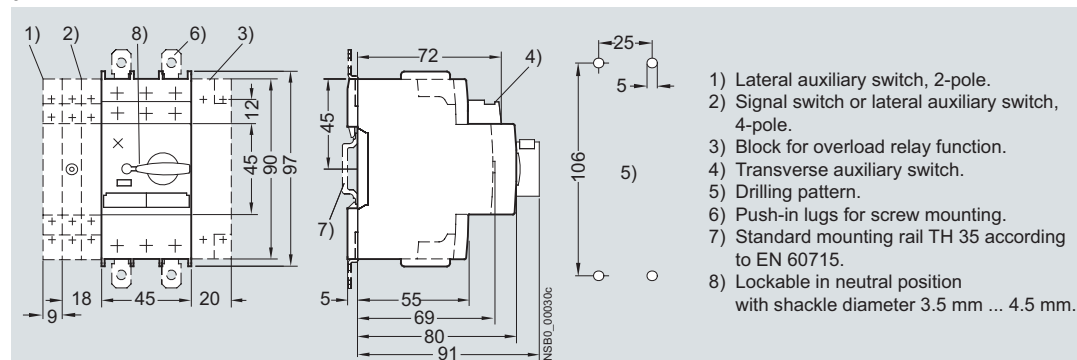
### 3RV1 motor starter protectors, size S3

#### 3RV10 4, 3RV13 4



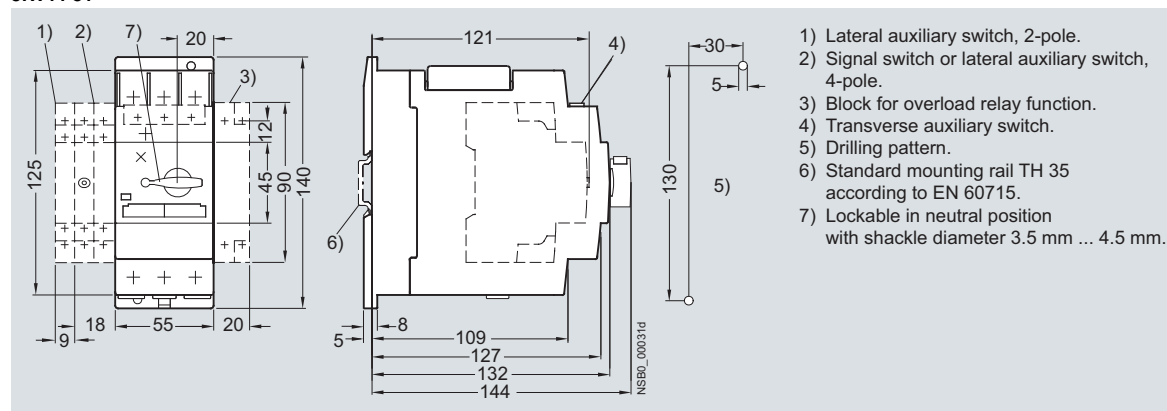
### 3RV11 motor starter protectors, size S0

#### 3RV11 21



### 3RV11 motor starter protectors, size S2

#### 3RV11 31

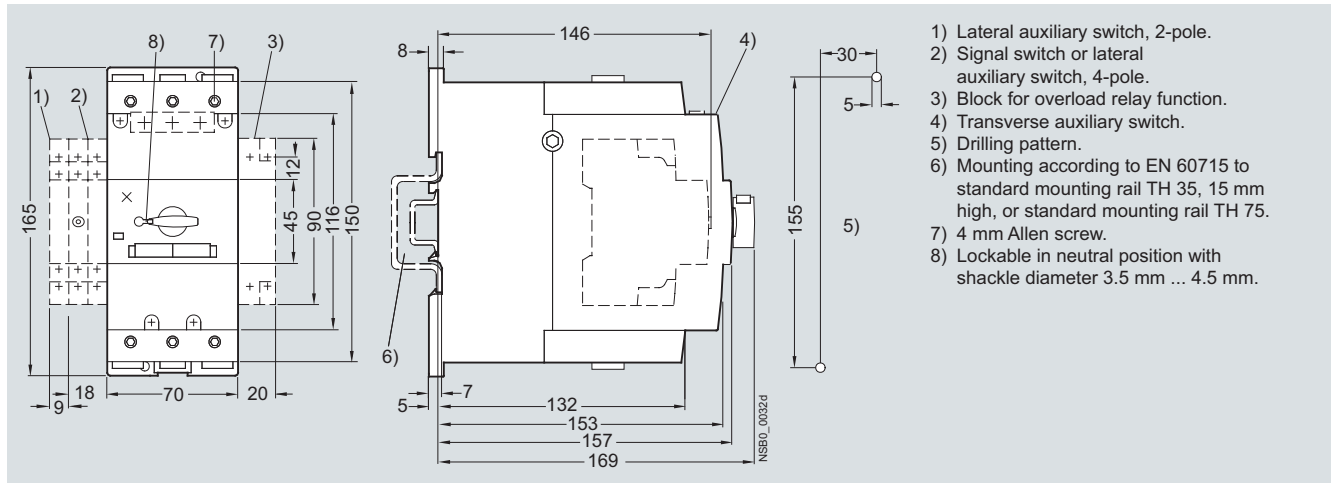


# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## General data

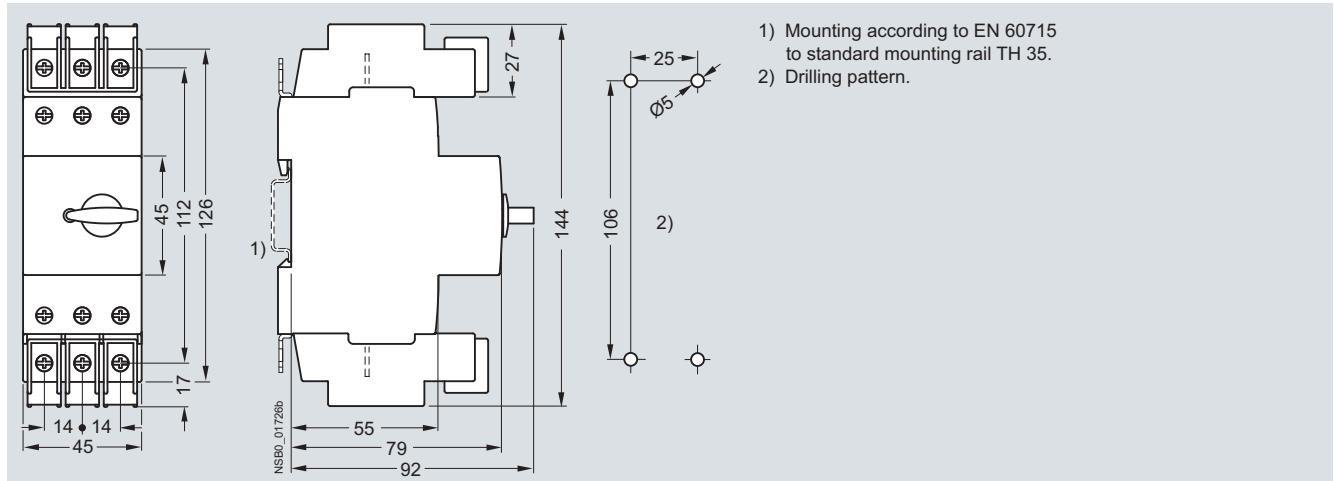
### 3RV11 motor starter protectors, size S3

#### 3RV11 42



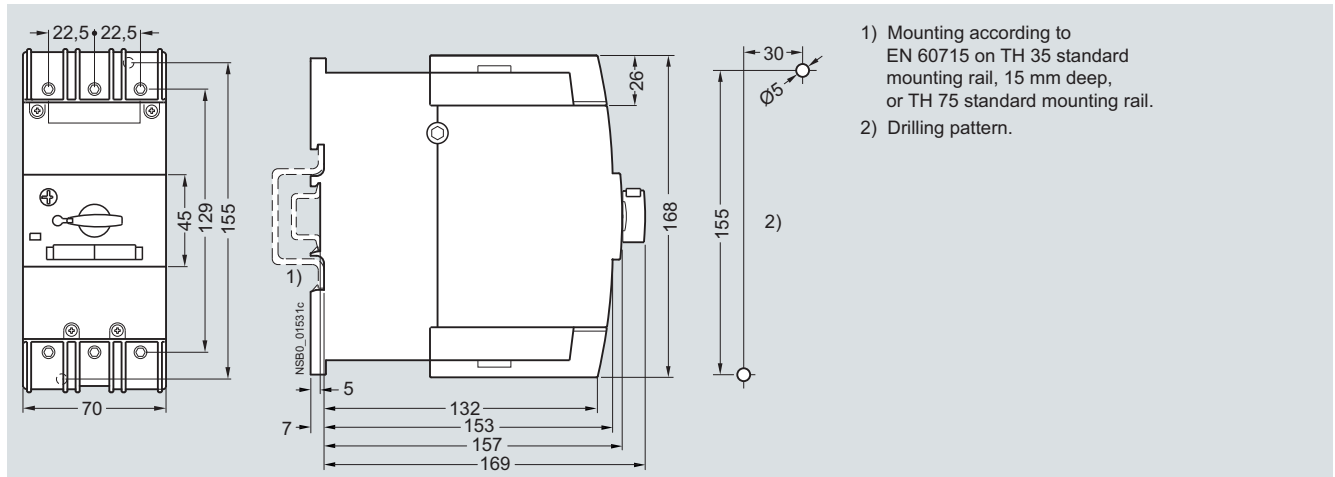
### 3RV17 and 3RV18 circuit breakers, size S0

#### 3RV17 21, 3RV18 21



### 3RV17 circuit breakers, size S3

#### 3RV17 42

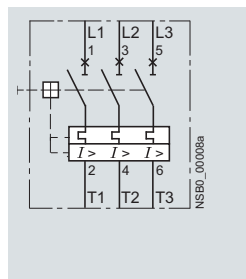


### Schematics

#### Internal circuit diagrams

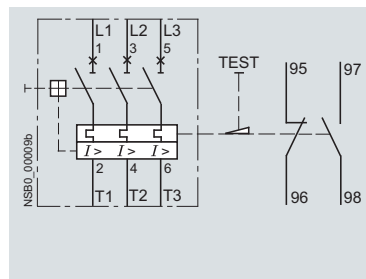
##### Motor starter protector/ circuit breaker

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



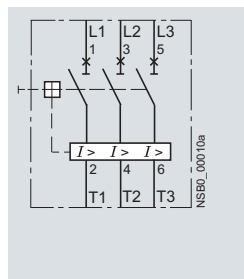
##### Motor starter protector with overload relay function

3RV11 ..



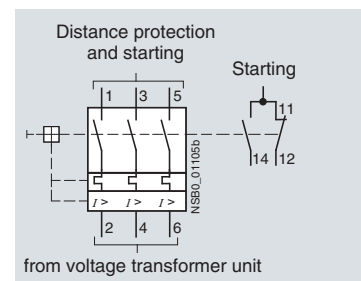
##### Motor starter protector

3RV13 ...



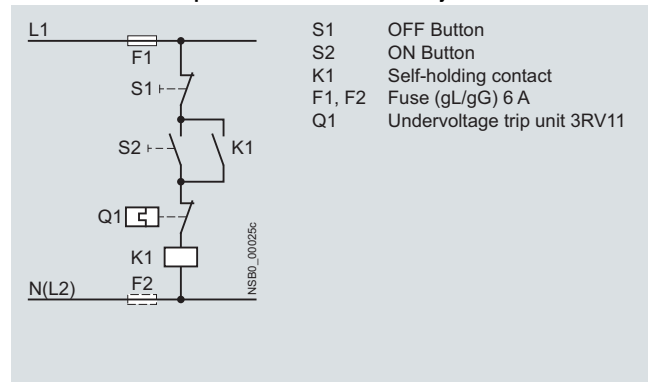
##### Voltage transformer circuit breaker

3RV16 11-1.G14

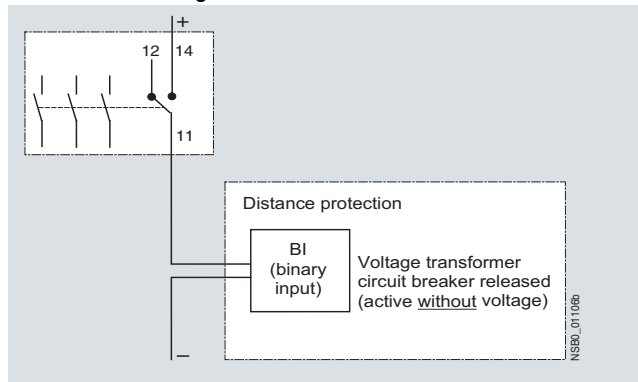


#### Switching examples

##### 3RV11 motor starter protector with overload relay function



##### 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               |

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## 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".

|                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Front side</b><br><u>Notes:</u> <ul style="list-style-type: none"> <li>A maximum of 4 auxiliary contacts with auxiliary switches can be attached to each motor starter protector.</li> <li>Transverse auxiliary switches must not be used for the 3RV17 and 3RV18 circuit breakers.</li> </ul>                                                                                                                                                        | <b>Transverse auxiliary switches</b><br>1 NO + 1 NC<br>or<br>2 NO<br>or<br>1 CO contact                                                                                                                                                                                   | An auxiliary switch block can be inserted transversely on the front. The overall width of the motor starter protectors remains unchanged.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Left-hand side</b><br><u>Notes:</u> <ul style="list-style-type: none"> <li>A maximum of 4 auxiliary contacts with auxiliary switches can be attached to each motor starter protector/circuit breaker.</li> <li>Auxiliary switches (2 contacts) and signal switches can be mounted separately or together.</li> <li>The signal switch cannot be used for the 3RV17 and 3RV18 circuit breakers.</li> </ul>                                              | <b>Lateral auxiliary switches (2 contacts)</b><br>1 NO + 1 NC<br>or<br>2 NO<br>or<br>2 NC<br><br><b>Lateral auxiliary switches (4 contacts)</b><br>2 NO + 2 NC<br><br><b>Signal switches for sizes S0, S2 and S3</b><br>Tripping 1 NO + 1 NC<br>Short-circuit 1 NO + 1 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.<br>The overall width of the lateral auxiliary switch with 2 contacts is 9 mm.<br><br>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.<br>The overall width of the lateral auxiliary switch with 4 contacts is 18 mm.<br><br>One signal switch can be mounted at the side of each motor starter protector with a rotary operating mechanism.<br>The signal switch has two contact systems.<br>One contact system always signals <u>tripping</u> 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 <u>switching off</u> with the handle.<br>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.<br>The overall width of the signal switch is 18 mm. |
| <b>Right-hand side</b><br><u>Notes:</u> <ul style="list-style-type: none"> <li>One auxiliary trip unit can be mounted per motor starter protector/circuit breaker.</li> <li>Accessories cannot be mounted at the right-hand side of the 3RV11 motor starter protectors with overload relay function.</li> </ul>                                                                                                                                          | <b>Auxiliary trip units</b><br><u>Shunt trip units</u><br><br>or<br><u>Undervoltage trip units</u><br><br>or<br><u>Undervoltage trip unit with leading auxiliary contacts</u><br>(2 NO)                                                                                   | For remote-controlled tripping of the motor starter protector/circuit breaker. The trip unit coil should only be energized for short periods (see schematics).<br><br>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.<br>Particularly suitable for EMERGENCY-STOP disconnection by way of the corresponding EMERGENCY-STOP pushbutton according to EN 60204-1.<br><br>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.<br>The overall width of the auxiliary trip unit is 18 mm.                                                                                                                                                                                                                                                         |
| <b>Top</b><br><u>Notes:</u> <ul style="list-style-type: none"> <li>The isolator module cannot be used for the 3RV17 and 3RV18 circuit breakers.</li> <li>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.</li> </ul> | <b>Isolator modules for sizes S0 and S2</b>                                                                                                                                                                                                                               | Isolator modules can be mounted to the upper terminal end of motor starter protectors of sizes S0 and S2.<br>The supply cable is connected to the motor starter protector through the isolator module.<br>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 |
| <b>Rated operational current <math>I_e</math></b> |    |                                           |                   |
| • 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                                       | --                |
| <b>Minimum load capacity</b>                      | V  | 17                                        |                   |
|                                                   | mA | 1                                         |                   |

##### Front transverse solid-state compatible auxiliary switches

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

##### Lateral auxiliary switches with signal switch

|                                                   |    | Switching capacity for different voltages:<br>Lateral auxiliary switch with 1 NO + 1 NC, 2 NO, 2 NC, 2 NO + 2 NC;<br>signal switch |  |
|---------------------------------------------------|----|------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Rated operational current <math>I_e</math></b> |    |                                                                                                                                    |  |
| • 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                                                                                                                                |  |
| <b>Minimum load capacity</b>                      | V  | 17                                                                                                                                 |  |
|                                                   | mA | 1                                                                                                                                  |  |

##### Auxiliary trip units

|                             |      | Undervoltage trip units   | Shunt trip units         |
|-----------------------------|------|---------------------------|--------------------------|
| <b>Power consumption</b>    |      |                           |                          |
| • 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                       | --                       |
| <b>Response voltage</b>     |      |                           |                          |
| • Tripping                  | V    | 0.35 ... 0.7 $\times U_s$ | 0.7 ... 1.1 $\times U_s$ |
| • Pickup                    | V    | 0.85 ... 1.1 $\times U_s$ | --                       |
| <b>Maximum opening time</b> | ms   | 20                        |                          |

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## Accessories

### Mountable accessories

#### Short-circuit protection for auxiliary and control circuits

|                                                     |   |                 |
|-----------------------------------------------------|---|-----------------|
| <b>Melting fuses</b> gL/gG                          | A | 10              |
| <b>Miniature circuit breaker</b> , C characteristic | A | 6 <sup>1)</sup> |

1) Prospective short-circuit current < 0.4 kA.

#### Conductor cross-sections for auxiliary and control circuits

##### Connection type

##### Terminal screw

##### Prescribed tightening torque

##### Conductor cross-sections (1 or 2 conductors)

- Solid
- Finely stranded with end sleeve
- Stranded
- AWG cables

##### Connection type

##### Conductor cross-sections (1 or 2 conductors connectable)

- Solid
- Finely stranded with end sleeve
- Finely stranded without end sleeve
- AWG cables, solid or stranded

Max. external diameter of the conductor insulation

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.

##### Screw terminals

Pozidriv size 2

Nm 0.8 ... 1.2

mm<sup>2</sup> 2 x (0.5 ... 1.5)<sup>1)</sup>/2 x (0.75 ... 2.5)<sup>1)</sup>

mm<sup>2</sup> 2 x (0.5 ... 1.5)<sup>1)</sup>/2 x (0.75 ... 2.5)<sup>1)</sup>

mm<sup>2</sup> 2 x (0.5 ... 1.5)<sup>1)</sup>/2 x (0.75 ... 2.5)<sup>1)</sup>

AWG 2 x (18 ... 14)

##### Cage Clamp terminals<sup>2)3)</sup>

mm<sup>2</sup> 2 x (0.25 ... 2.5)

mm<sup>2</sup> 2 x (0.25 ... 1.5)

mm<sup>2</sup> 2 x (0.25 ... 2.5)

AWG 2 x (24 ... 14)

mm 3.6

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

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

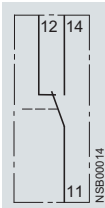
## Schematics

### Internal circuit diagrams

#### Transverse auxiliary switches

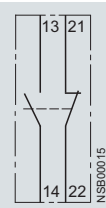
1 CO

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



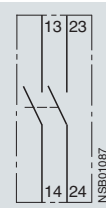
1 NO + 1 NC

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



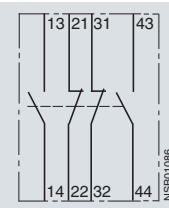
2 NC

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



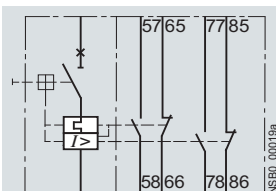
2 NO + 2 NC

3RV19 01-1J



#### Signal switches

3RV19 21-1M

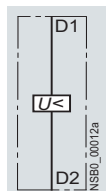


#### Auxiliary trip units

Undervoltage trip

units

3RV19 02-1A..



Undervoltage trip

units

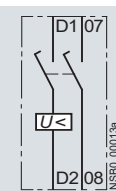
with leading

auxiliary contacts

2 NO

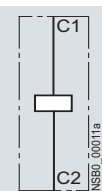
3RV19 12-1C..

3RV19 22-1C..



Shunt trip units

3RV19 02-1D.0



# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

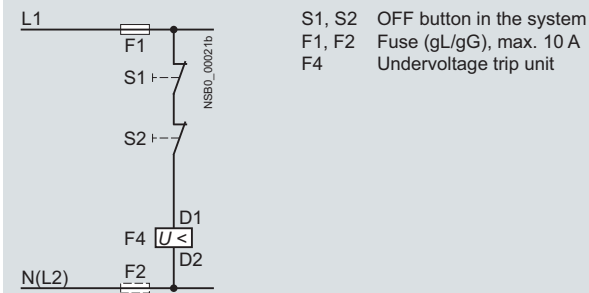
## Accessories

### Mountable accessories

#### Circuit diagrams

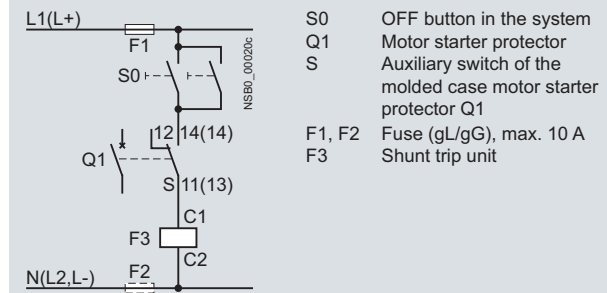
##### Undervoltage trip unit

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



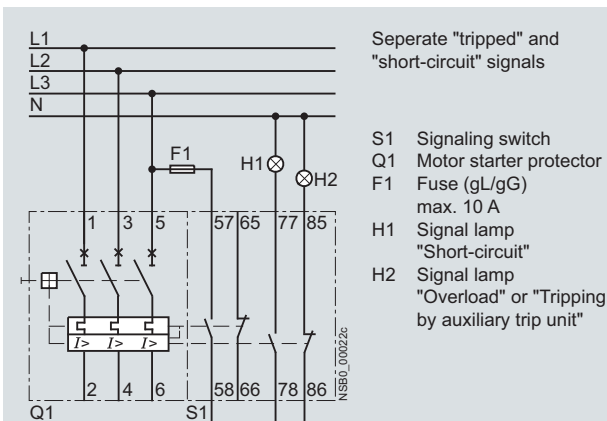
##### Shunt trip unit

3RV19 02-1D.0

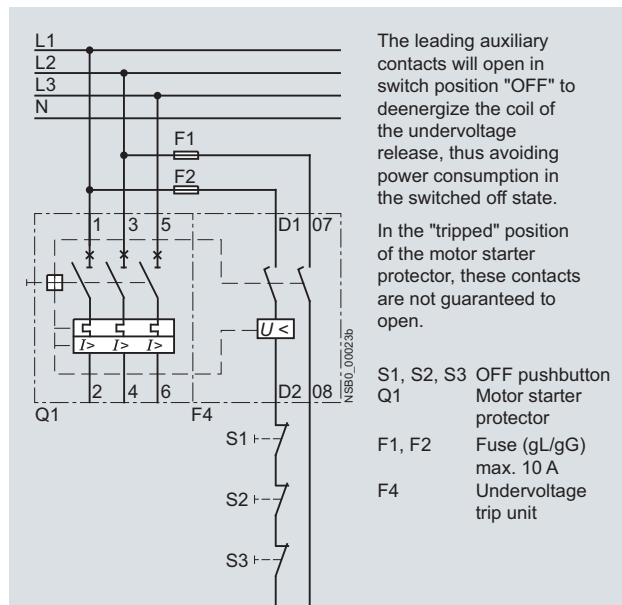


#### Switching examples

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



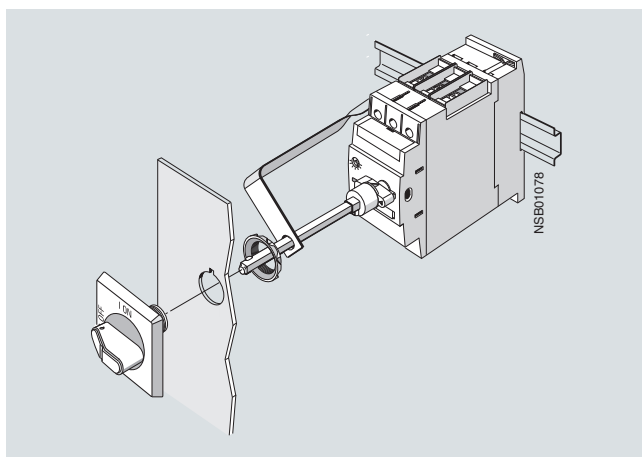
##### Motor starter protectors tripped by means of pushbutton or EMERGENCY-STOP pushbutton in the system



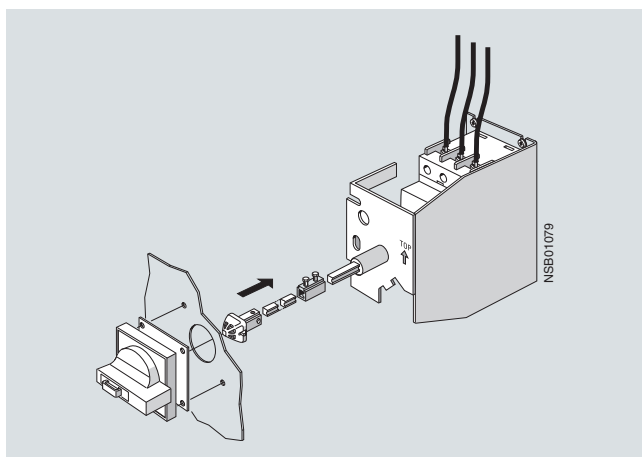
#### Overview

##### 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.

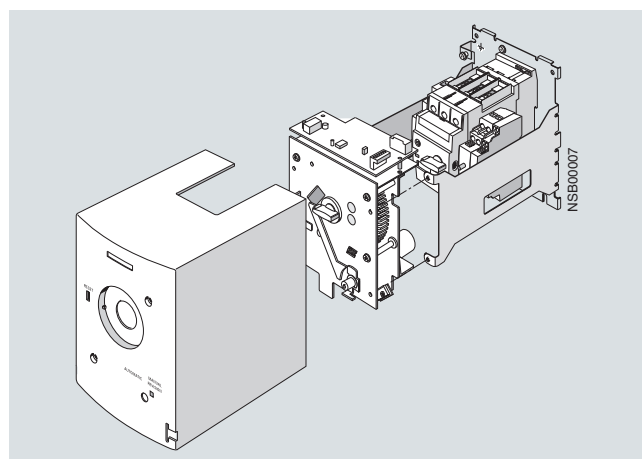
If the motor starter protector is tripped as a result of overload or short-circuit, it will be in tripped position. For reclosing, the remote motorized operating mechanism must first be set manually or electrically to the 0 position (electrically by means of the Open command). Then it can be reclosed.

The remote motorized operating mechanism is available for motor starter protectors of size S2 ( $I_{n\max} = 50\text{ A}$ ) and S3 ( $I_{n\max} = 100\text{ A}$ ) 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

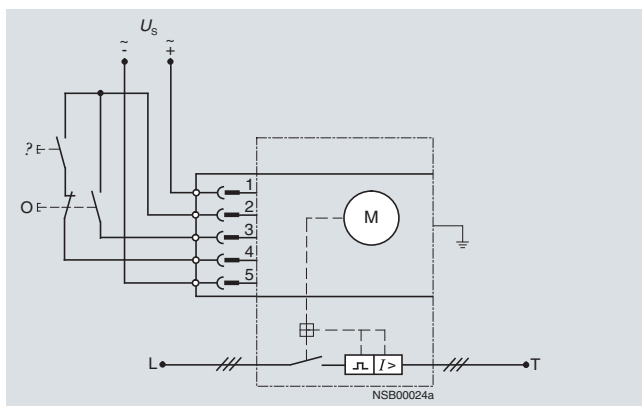
##### Remote motorized operating mechanisms

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

#### Schematics

##### Switching examples

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



# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## Accessories

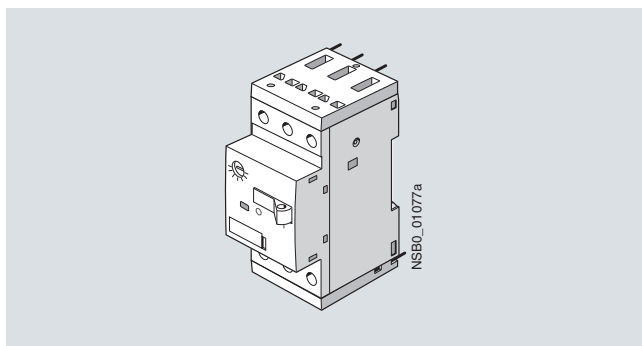
### Mounting accessories

#### 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.



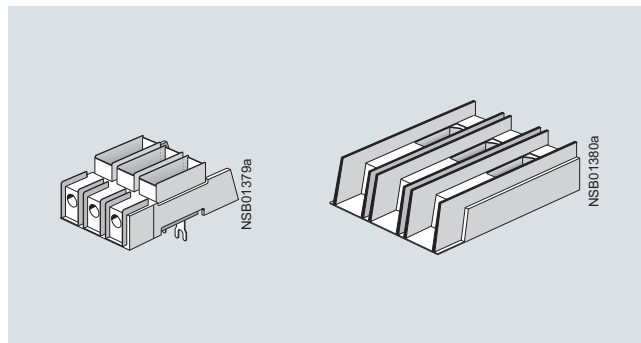
3RV19 18-5A

##### 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                                                                |                                   |                |                                               |
| <br>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                                                                 |                                   |                |                                               |
| <br>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                                                                |                                   |                |                                               |
| <br>NSB00481 | - Front clamping point:           |                | See data for 3RV1. 4 motor starter protectors |
|                                                                                                 | Solid                             |                |                                               |
|                                                                                                 | Finely stranded with end sleeve   |                |                                               |
|                                                                                                 | Stranded                          |                |                                               |
|                                                                                                 | AWG cables, solid or stranded     |                |                                               |
|                                                                                                 | Terminal screw                    |                |                                               |
|                                                                                                 | - Rear clamping point:            |                |                                               |
|                                                                                                 | Solid                             |                |                                               |
|                                                                                                 | Finely stranded with end sleeve   |                |                                               |
|                                                                                                 | Stranded                          |                |                                               |
|                                                                                                 | AWG cables, solid or stranded     |                |                                               |
|                                                                                                 | Terminal screw                    |                |                                               |

# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## Accessories

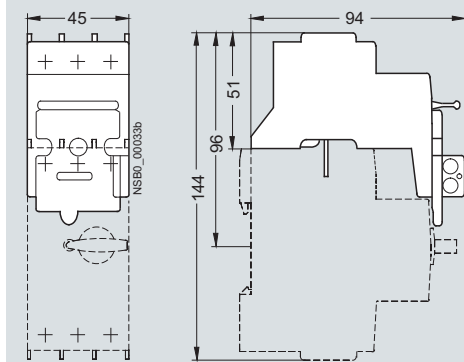
### Project planning aids

#### Dimensional drawings

##### Isolator modules

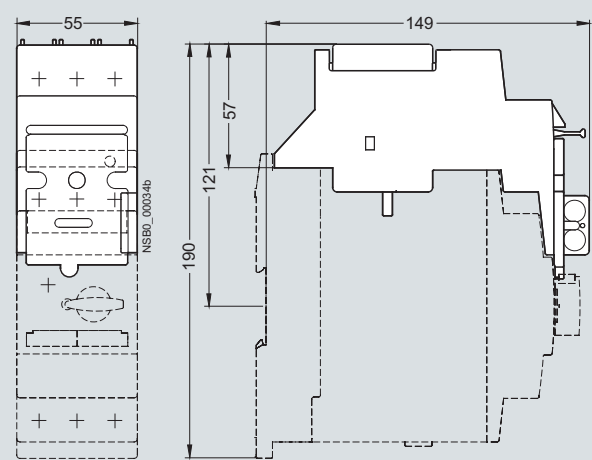
###### 3RV19 28-1A

For motor starter protector size S0



###### 3RV19 38-1A

For motor starter protector size S2



##### Busbars

###### 3RV19 15-1.. 3-phase busbar

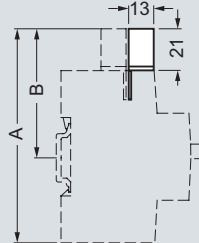
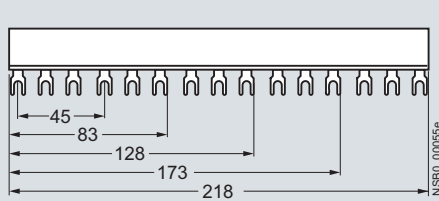
For motor starter protector sizes S00 and S0, modular spacing 45 mm

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

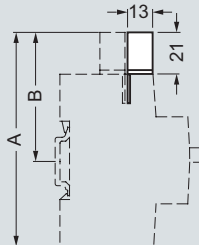
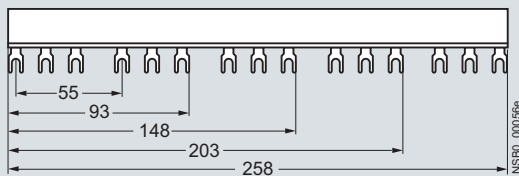
For motor starter protector sizes S00 and S0, modular spacing 55 mm

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 |

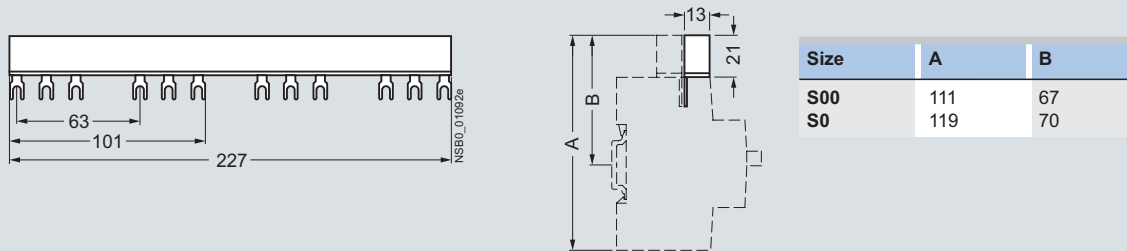
# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## Accessories

### Project planning aids

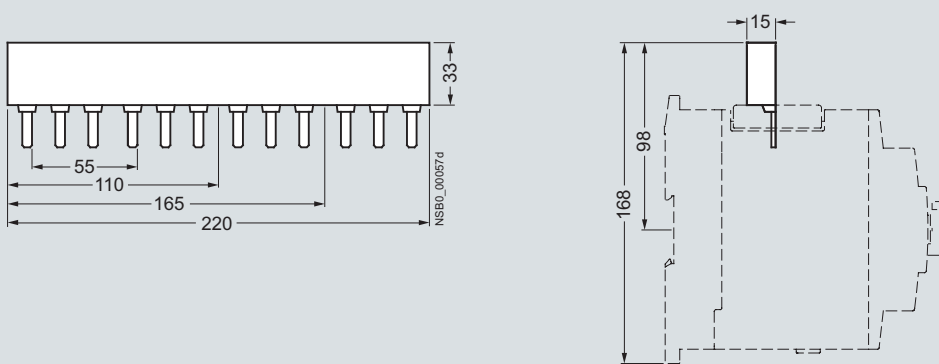
#### 3RV19 15-3.. 3-phase busbar

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



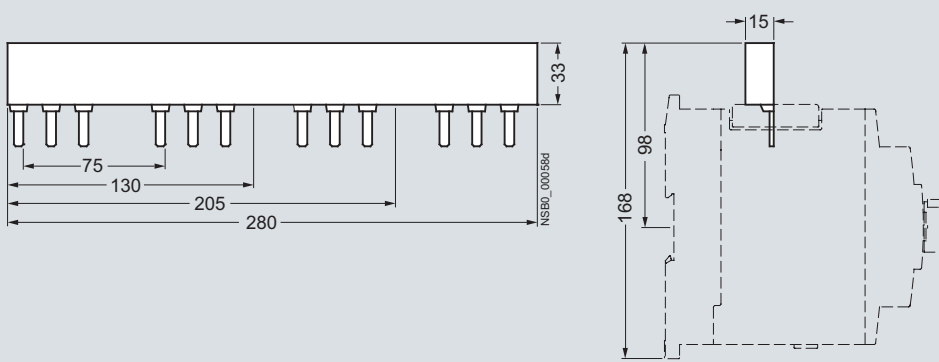
#### 3RV19 35-1. 3-phase busbar

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



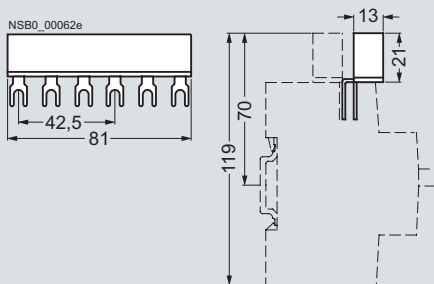
#### 3RV19 35-3. 3-phase busbar

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)



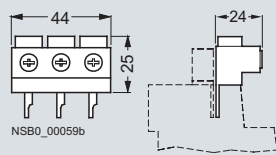
# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

## Accessories

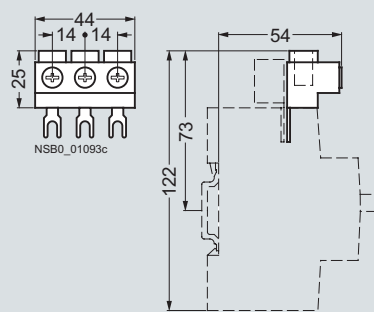
### Project planning aids

#### 3RV19 .5 three-phase feeder terminals

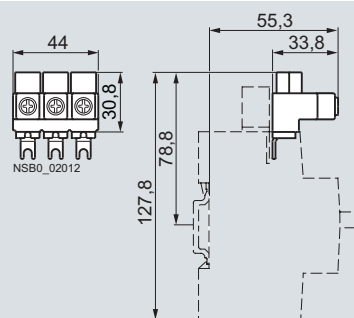
3RV19 15-5A  
Connected from top,  
for motor starter protector size S00



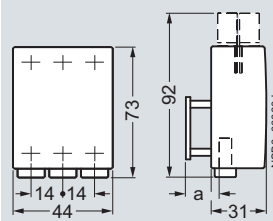
3RV19 25-5AB  
Connected from top,  
for motor starter protector size S0



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

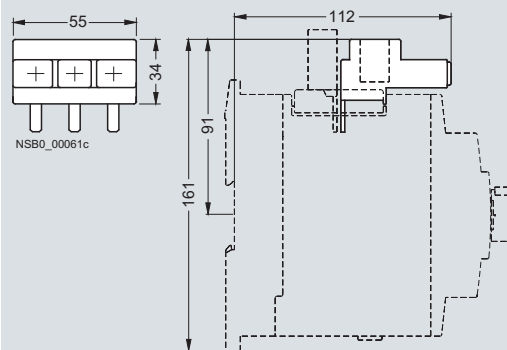


3RV19 35-5B  
Connected from bottom,  
for motor starter protector size S00 and S0

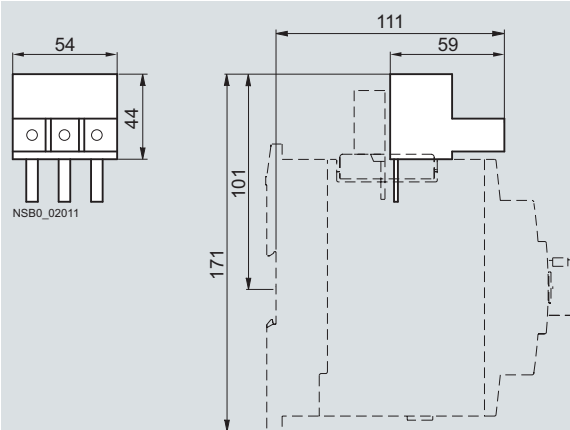


| Typ     | a  |
|---------|----|
| 3RV1. 1 | 19 |
| 3RV1. 2 | 23 |

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



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



# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

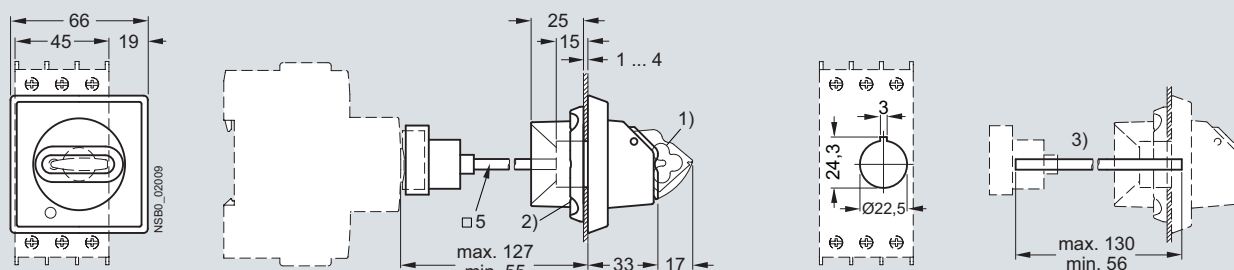
## Accessories

### Project planning aids

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

##### 3RV19 26-0B, 3RV19 26-0C

Short shaft<sup>3)</sup>, for motor starter protector sizes S0, S2, S3

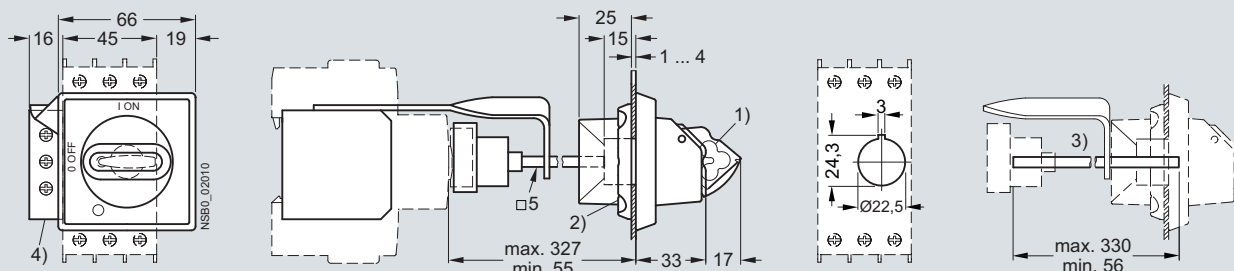


- 1) Lockable in neutral position with max. 8 mm shackle diameter.
- 2) Mounting with screw cap.

- 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)<sup>3)</sup>, for motor starter protector sizes S0, S2, S3



- 1) Lockable in neutral position with max. 8 mm shackle diameter.
- 2) Mounting with screw cap.

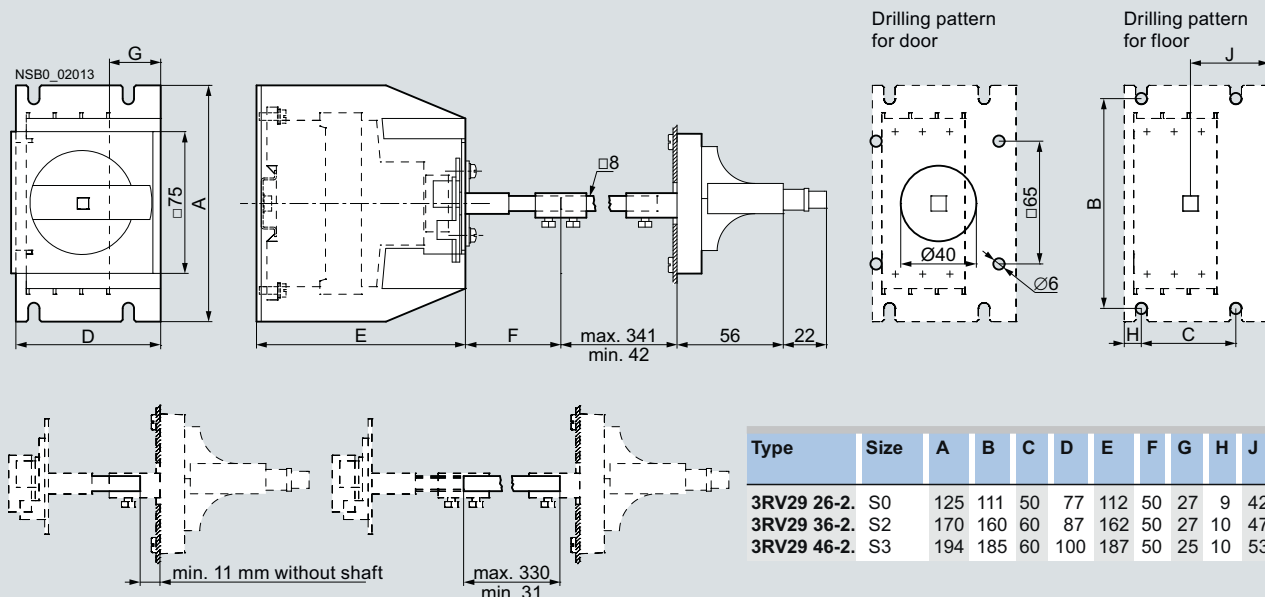
- 3) Supplied with a shaft length of 330 mm; can be adjusted by shortening the shaft.

- 4) Grounding terminal 35 mm<sup>2</sup> 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

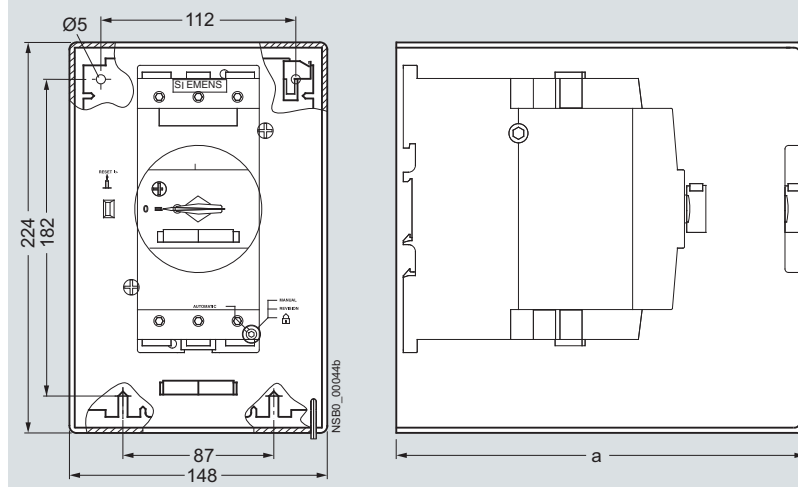


| Type        | Size | A   | B   | C  | D   | E   | F  | G  | H  | J  |
|-------------|------|-----|-----|----|-----|-----|----|----|----|----|
| 3RV29 26-2. | S0   | 125 | 111 | 50 | 77  | 112 | 50 | 27 | 9  | 42 |
| 3RV29 36-2. | S2   | 170 | 160 | 60 | 87  | 162 | 50 | 27 | 10 | 47 |
| 3RV29 46-2.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

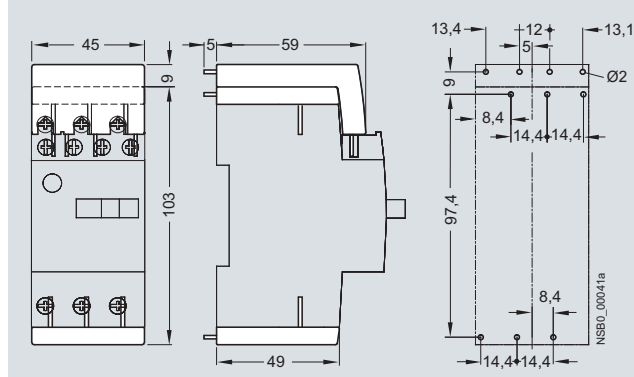


| Type                            | a   |
|---------------------------------|-----|
| 3RV19 36-3AP0,<br>3RV19 36-3AB4 | 211 |
| 3RV19 46-3AP0,<br>3RV19 49-3AB4 | 236 |

#### 3RV19 18-5. solder pin connections

##### 3RV19 18-5A, 3RV19 18-5B

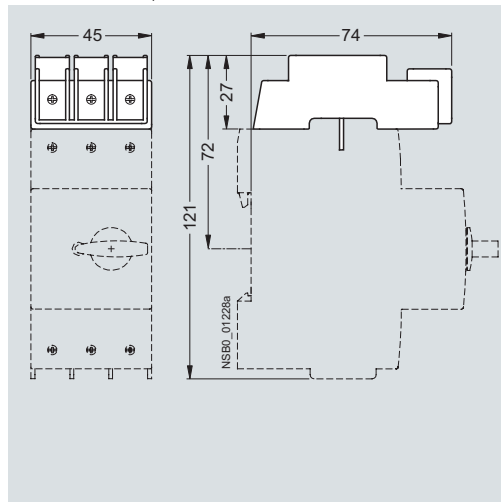
For motor starter protector size S00



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

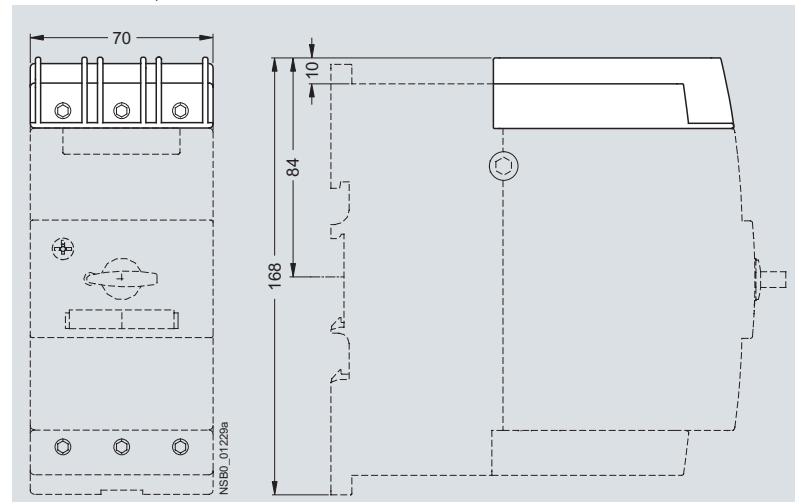
##### 3RV19 28-1H

For motor starter protector size S0



##### 3RT19 46-4GA07

For motor starter protector size S3



# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

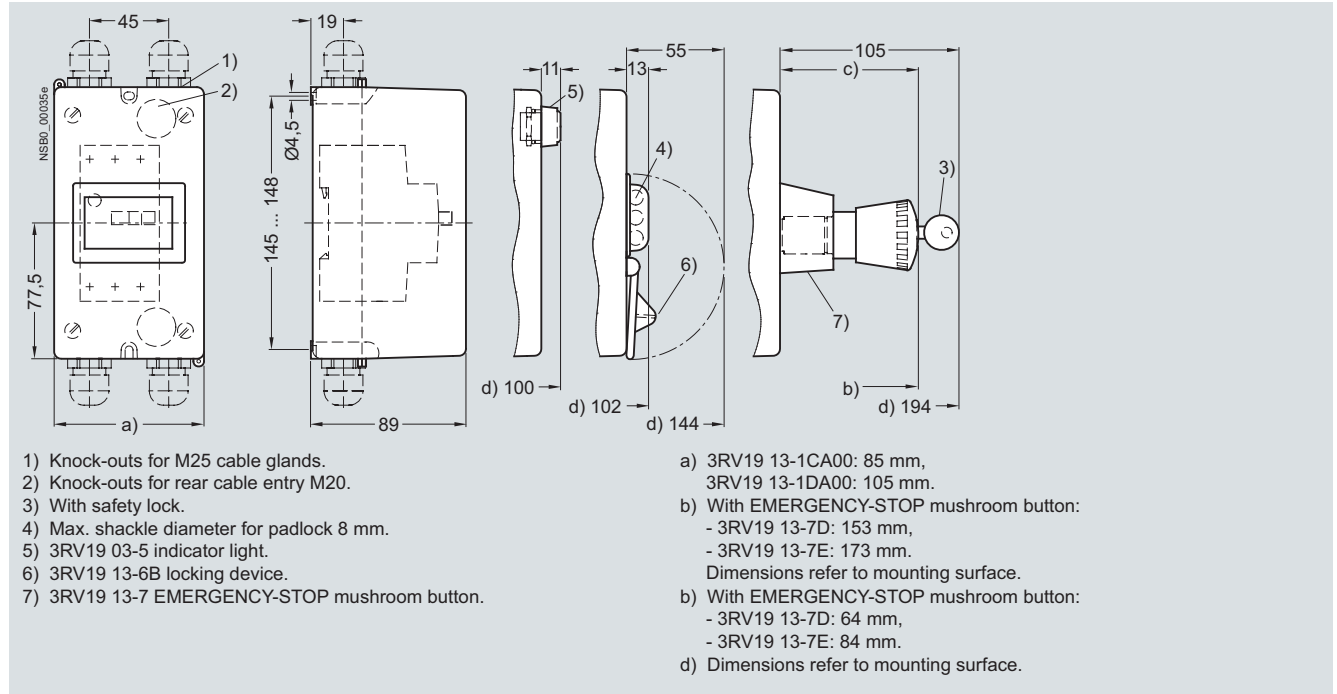
## Accessories

### Project planning aids

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

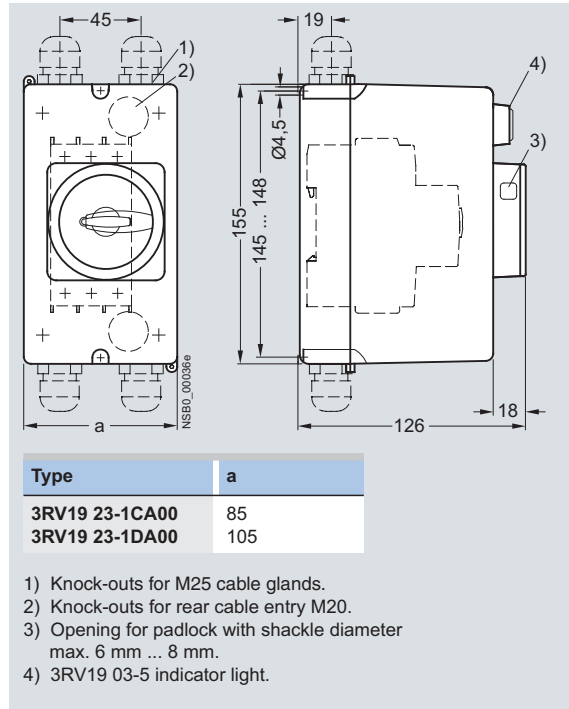
##### 3RV19 13-1.A00

For motor starter protector size S00



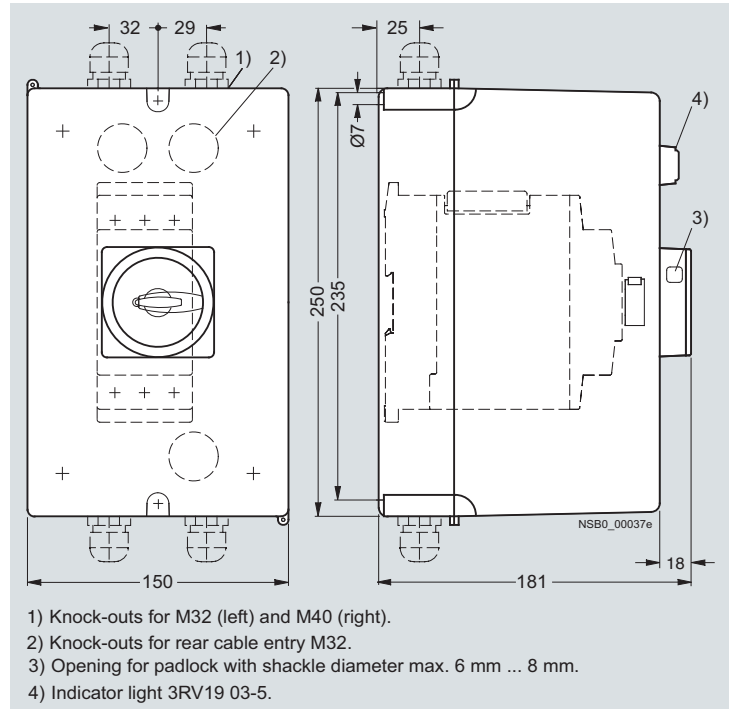
##### 3RV19 23-1.A00

For motor starter protector size S0



##### 3RV19 33-1.A00

For motor starter protector size S2





# 3RV Motor Starter Protectors/Circuit Breakers up to 100 A

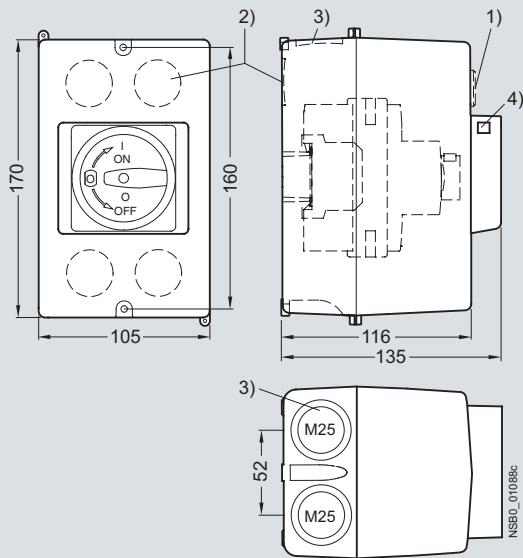
## Accessories

### Project planning aids

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

##### 3RV19 23-1DA01, 3RV19 23-1GA01

For motor starter protector size S0

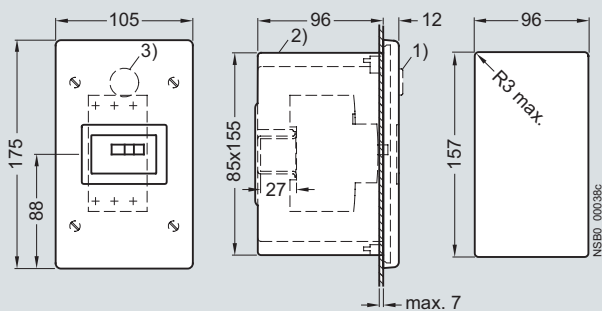


- 1) 3RV19 03-5 indicator light.
- 2) Knock-outs for rear cable entry M20.
- 3) Knock-outs for M25 cable glands.
- 4) Opening for padlock with shackle diameter from 6 mm ... 8 mm.

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

##### 3RV19 13-2DA00

For motor starter protector size S00

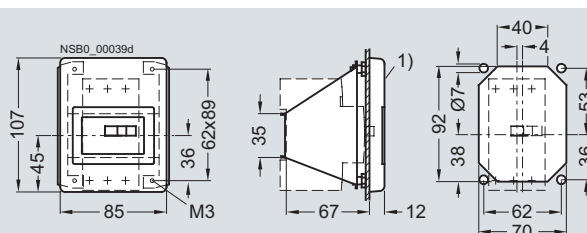


- 1) 3RV19 03-5 indicator light.
- 2) Knock-outs for M25 cable glands.
- 3) Knock-outs for rear cable entry M20.

#### 3RV19 13-4C molded-plastic front plates

##### 3RV19 13-4C

For motor starter protector size S00

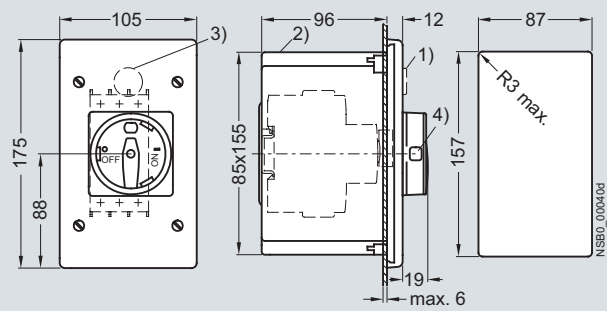


- 1) 3RV19 03-5 indicator light.

#### 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.

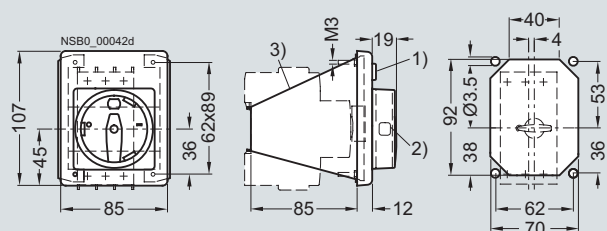
#### 3RV19 23-4. molded-plastic front plates

##### 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.

# 3RV Molded Case Motor Starter Protectors up to 800 A

## 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.

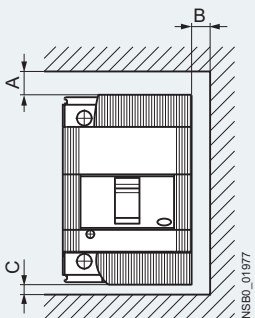
### Design

#### 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 $U_e$<br>V | A<br>mm             | B<br>mm | C<br>mm |
| 3RV13 53                             | Up to 690                            | 25                  | 20      | 20      |
| 3RV1. 6.                             | Up to 400<br>440 ... 690             | 30<br>100           | 25      | 25      |
| 3RV1. 7.                             | Up to 400<br>440 ... 690             | 30<br>100           | 25      | 25      |
| 3RV1. 83                             | Up to 690                            | 100                 | 25      | 20      |

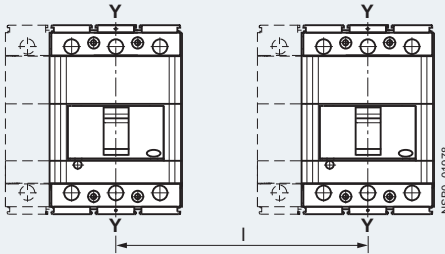


##### Minimum distance between two molded case motor starter protectors installed alongside or on top of each other

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.

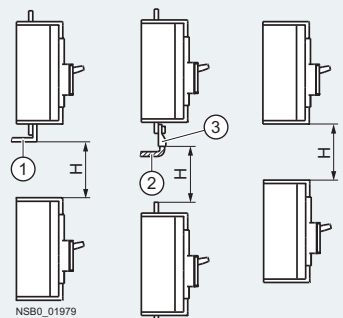
##### Minimum distance between two molded case motor starter protectors installed alongside each other

| Molded case motor starter protectors |                                      |             | Mandatory distances                   |
|--------------------------------------|--------------------------------------|-------------|---------------------------------------|
| Type                                 | Rated operational voltage $U_e$<br>V | Width<br>mm | Minimum distance between axes I<br>mm |
| 3RV13 53                             | Up to 690                            | 90          | 90                                    |
| 3RV1. 6.                             | Up to 690                            | 105         | 105                                   |
| 3RV1. 7.                             | Up to 440<br>500 ... 690             | 140         | 140<br>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 $U_e$<br>V | Minimum distance between axes H<br>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                                   |



① Non-insulated connection  
② Insulated cable  
③ Cable lug

##### 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.

# 3RV Molded Case Motor Starter Protectors up to 800 A

## General data

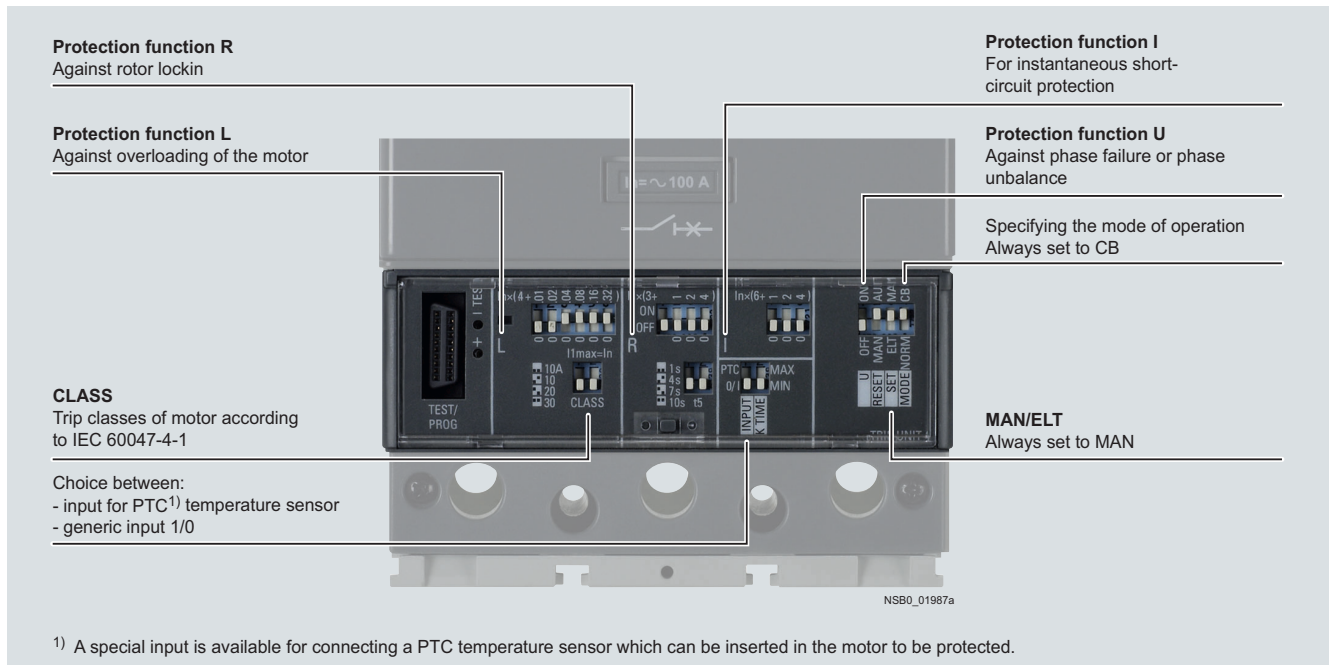
### Function

#### Trip units

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

| Type <sup>1)</sup> | 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: $13 \times I_N$                                                                         | Yes                                                      |
| TU 2               | Purely magnetic                       | 20 A, 32 A                               | Short-circuit protection                                                                     | Adjustable: $6 \dots 13 \times I_N$                                                                     | Yes                                                      |
| TU 3               | Electronic (for starter combinations) | 100 ... 800 A                            | Short-circuit protection                                                                     | Adjustable: $1 \dots 10 \times I_N$                                                                     | Yes                                                      |
| TU 4               | Electronic (for motor protection)     | 100 ... 630 A                            | Overload protection<br>Short-circuit protection<br>Protection in the event of rotor blockage | Adjustable:<br><br>$I_1 = 0.4 \dots 1 \times I_N$<br>$6 \dots 13 \times I_N$<br>$3 \dots 10 \times I_1$ | No                                                       |

1) TU = Trip unit



<sup>1)</sup> 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:  $2 \text{ s} < t_A < 10 \text{ s}$
- CLASS 10:  $4 \text{ s} < t_A < 10 \text{ s}$
- CLASS 20:  $6 \text{ s} < t_A < 20 \text{ s}$
- CLASS 30:  $9 \text{ s} < t_A < 30 \text{ s}$

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 brochure "SIRIUS Configuration".

### 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<br>m | Max. rated operational<br>voltage $U_e$<br>V AC | Max. rated operational<br>current $I_e$<br>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 $I_e$<br>A | Max. rated operational current $I_e$ at |       |       |       |       |       |
|--------------------------------------|-------------------------------|-----------------------------------------|-------|-------|-------|-------|-------|
|                                      |                               | 45 °C                                   | 50 °C | 55 °C | 60 °C | 65 °C | 70 °C |
| 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](mailto:technical-assistance@siemens.com)
- Or on the Internet:  
<http://www.siemens.com/automation/service&support>

# 3RV Molded Case Motor Starter Protectors up to 800 A

## 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 $U_e$<br>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<br>for 1 min                  | V  | 3 500                     |                         |          | 3 000            | 3 500    |          |                                        |          |          |    |
| Rated ultimate short-circuit<br>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 $I_{cs}$<br>(% 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 <sup>1)/</sup><br>75 <sup>2)</sup> | 100      | 75       |    |
| • At 690 V AC, 50 ... 60 Hz                                        | %  | 100                       |                         | 75       |                  | 100      |          | 100 <sup>1)/</sup><br>50 <sup>2)</sup> | 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),<br>A (630 A) |          | A                |          |          | B (400 A),<br>A (630 A)                |          | B        |    |
| Isolating features                                                 |    | ✓                         |                         |          |                  |          |          |                                        |          |          |    |
| Trip classes CLASS                                                 |    | 10A, 10, 20, 30           |                         |          | --               |          |          |                                        |          |          |    |
| Trip units                                                         |    |                           |                         |          |                  |          |          |                                        |          |          |    |
| • Magnetic-type                                                    |    | --                        |                         |          | ✓                | --       |          |                                        |          |          |    |
| • Electronic (motor protection)                                    |    | 3                         |                         |          | -- <sup>3)</sup> |          |          |                                        |          |          |    |
| • Electronic (starter combinations)                                |    | --                        |                         |          | ✓                |          |          |                                        |          |          |    |
| Permissible ambient temperature                                    |    |                           |                         |          |                  |          |          |                                        |          |          |    |
| • Operation                                                        | °C | -25 ... +70 <sup>4)</sup> |                         |          |                  |          |          |                                        |          |          |    |
| • 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 45](#).

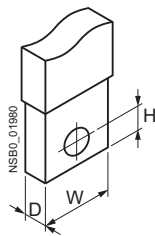
# 3RV Molded Case Motor Starter Protectors up to 800 A

## General data

### Main circuit terminals

| Type | 3RV13 53 | 3RV1. 6. | 3RV1. 7. | 3RV10 83-7JL10, 3RV13 83-7KN10<br>3RV13 83-7JN10 |
|------|----------|----------|----------|--------------------------------------------------|
|------|----------|----------|----------|--------------------------------------------------|

### 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 <sup>2</sup> | 1 ... 70 | 2.5 ... 120 | 16 ... 240 | -- |
| • For 2 units | mm <sup>2</sup> | 1 ... 50 | 2.5 ... 95  | 16 ... 150 | -- |

#### Cable lug, rigid

|                                      |                 |          |             |             |    |
|--------------------------------------|-----------------|----------|-------------|-------------|----|
| Number                               | Units           | 1        |             | 1 or 2      | -- |
| Dimensions                           |                 |          |             |             |    |
| • For 1 unit                         | mm <sup>2</sup> | 1 ... 95 | 2.5 ... 185 | 16 ... 300  | -- |
| • For 2 units (for outside mounting) | mm <sup>2</sup> | --       |             | 120 ... 240 | -- |

### Rear-mounting terminals

#### Busbars

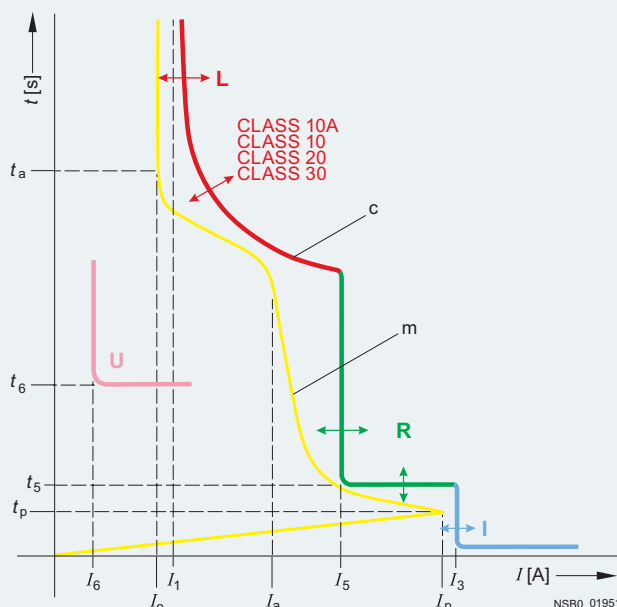
|                 |       |     |    |    |    |    |
|-----------------|-------|-----|----|----|----|----|
| Number          | Units | 1   |    | 2  |    |    |
| Dimensions      |       |     |    |    |    |    |
| • W             | mm    | 20  |    | 30 | 40 | 50 |
| • D             | mm    | 4   | 10 | 7  | 5  |    |
| • Hole diameter | mm    | 8.5 |    | 11 | 14 |    |

# 3RV Molded Case Motor Starter Protectors up to 800 A

## 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](mailto:technical-assistance@siemens.com)
- Or on the Internet: <http://www.siemens.com/automation/service&support>



## General data

# 3RV Molded Case Motor Starter Protectors up to 800 A

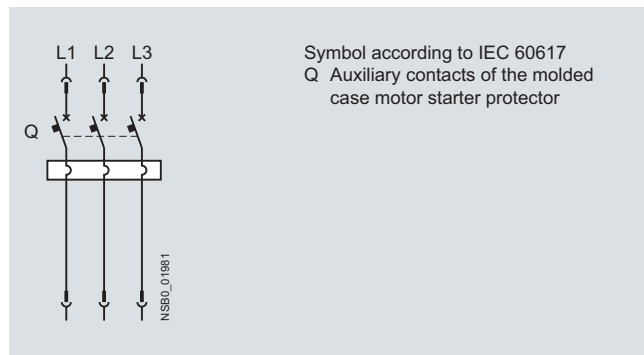
## General data

### Schematics

#### Internal circuit diagrams

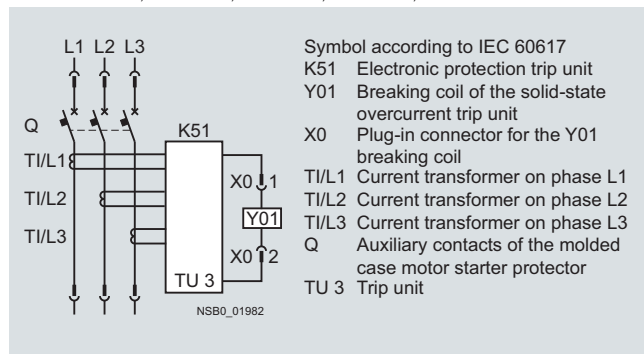
##### Molded case motor starter protectors with electronic trip unit

3RV13 53

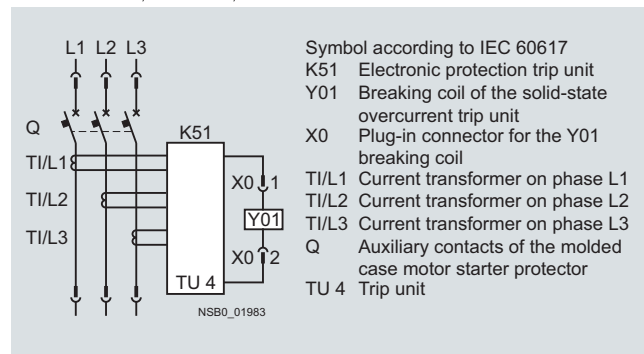


##### Molded case motor starter protectors with electronic trip unit

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



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



# 3RV Molded Case Motor Starter Protectors up to 800 A

## Accessories

### Mountable accessories

## 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

#### Molded case motor starter protectors

Version

#### Power consumption during pick-up

**3RV13 53** **3RV1. 6, 3RV1. 7, 3RV1. 83**

#### Undervoltage trip units

- 24 ... 30 V AC/DC
- 110 ... 127 V AC/110 ... 125 V DC
- 220 ... 240 V AC/220 ... 250 V DC

Opening times

ms

#### 3RV19 52-1A.0

- 1.5 VA
- 2 VA
- 2.5 VA

- 1.5 W
- 2 W
- 2.5 W

#### 3RV19 82-1A.0

- 6 VA
- 6 VA
- 6 VA

- 150 W
- 150 W
- 150 W

≤25

≤15

#### Shunt trip units

- 24 ... 30 V AC/DC
- 110 ... 127 V AC/110 ... 125 V DC
- 220 ... 240 V AC/220 ... 250 V DC

Opening times

ms

#### 3RV19 52-1E.0

- 50 VA
- 50 VA
- 50 VA

- 50 W
- 50 W
- 50 W

#### 3RV19 82-1E.0

- 150 VA
- 150 VA
- 150 VA

- 150 W
- 150 W
- 150 W

15

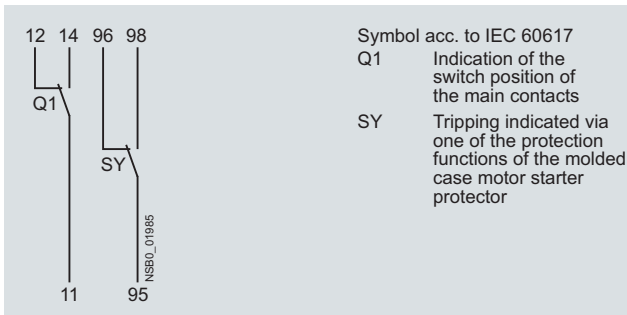
15

## Schematics

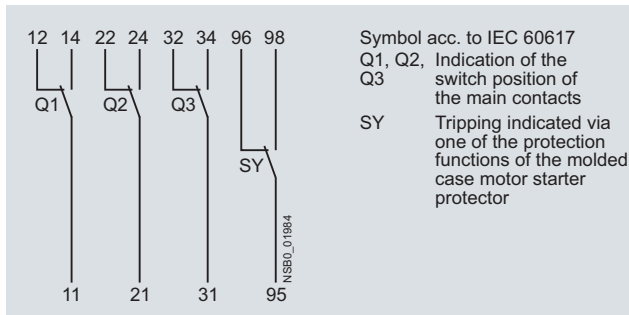
### Internal circuit diagrams

#### Auxiliary switches

3RV19 91-1AA0



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

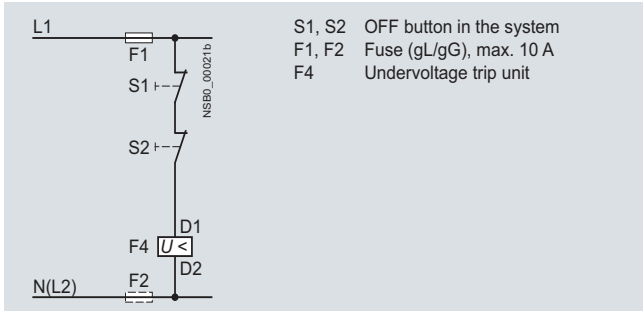


### Circuit diagrams

#### Auxiliary trip units

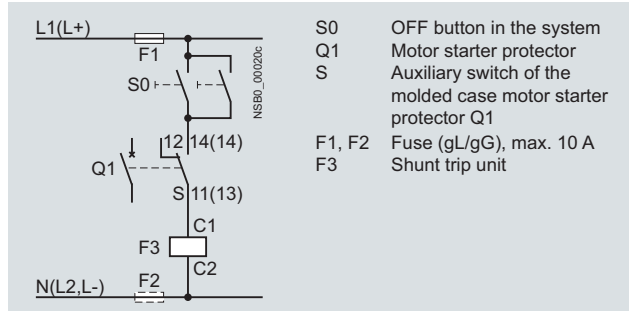
3RV19 .2-1A.0

Undervoltage trip unit



3RV19 .2-1E.0

Shunt trip unit



# 3RV Molded Case Motor Starter Protectors up to 800 A

## Accessories

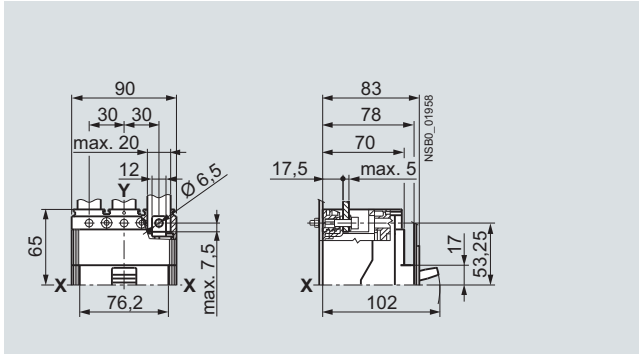
### Project planning aids

#### Dimensional drawings

##### 3RV13 53 molded case motor starter protectors

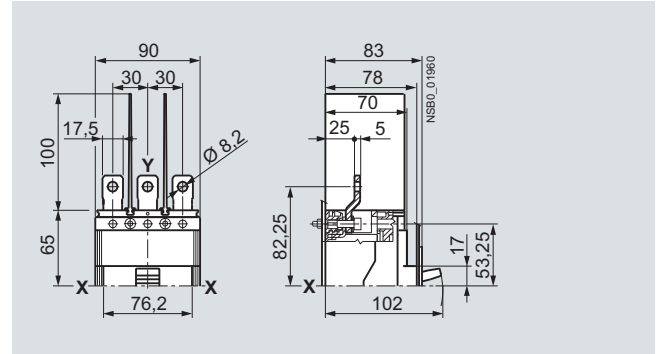
###### Mountable accessories

###### Front-accessible standard terminals



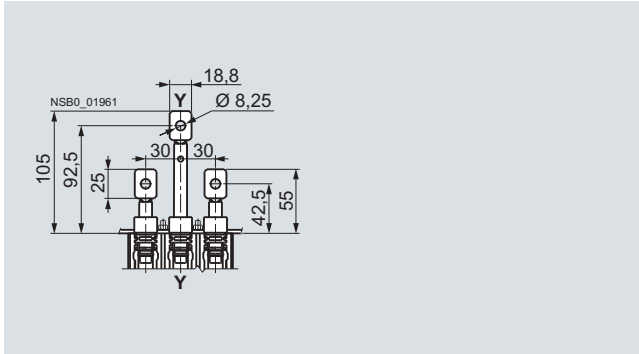
###### Front-extended terminals

3RV19 55-1AA0



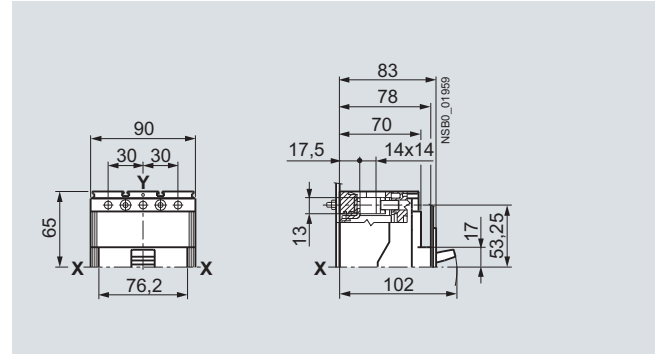
###### Rear-accessible terminals

3RV19 55-3AA0



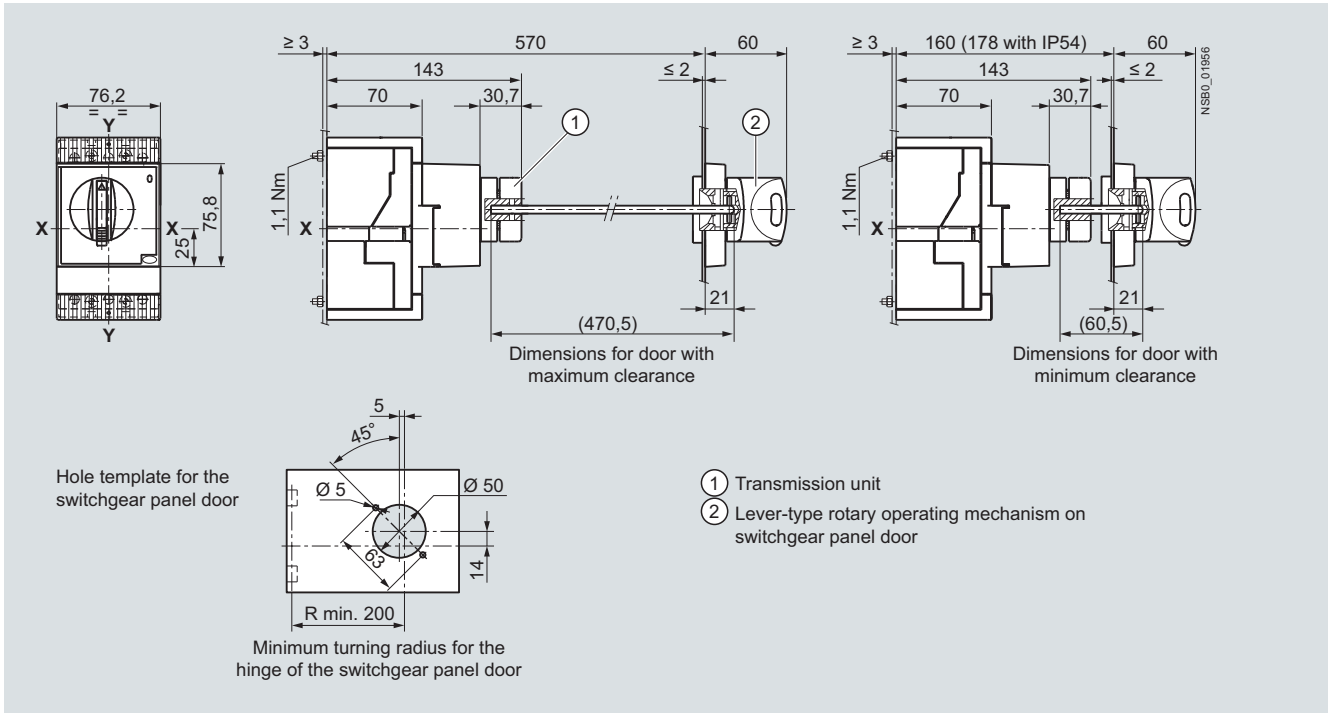
###### Front-extended cable terminals

3RV19 55-2AA0



#### Rotary operating mechanisms

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



## Accessories

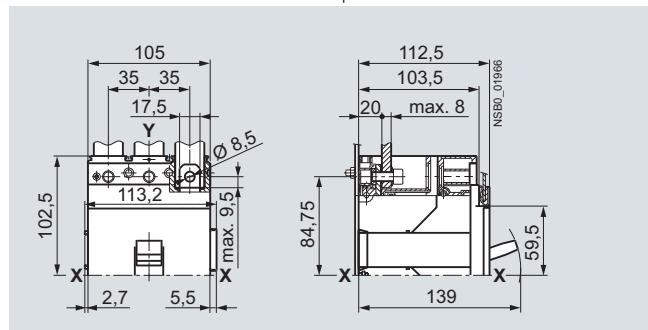
## Project planning aids

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

## Mountable accessories

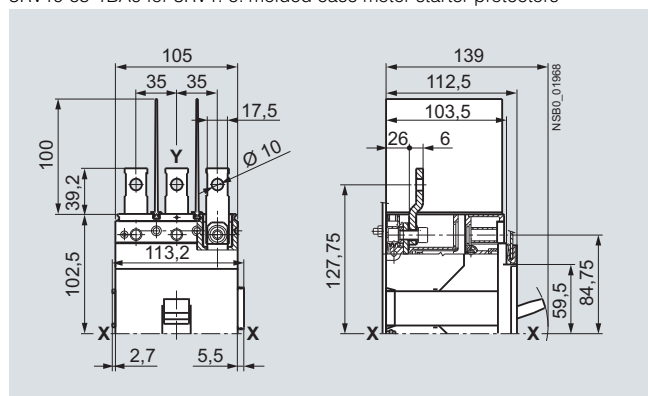
### Front-accessible standard terminals

For 3RV1. 6. molded case motor starter protectors



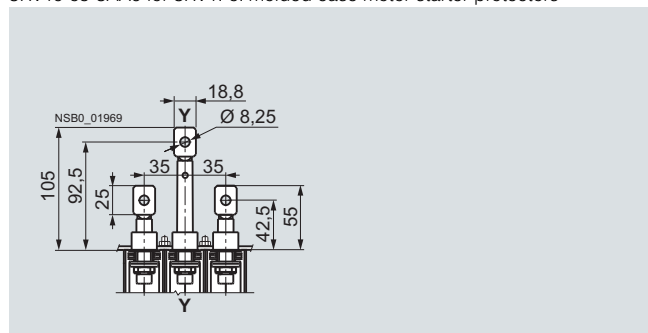
### Front-extended terminals

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



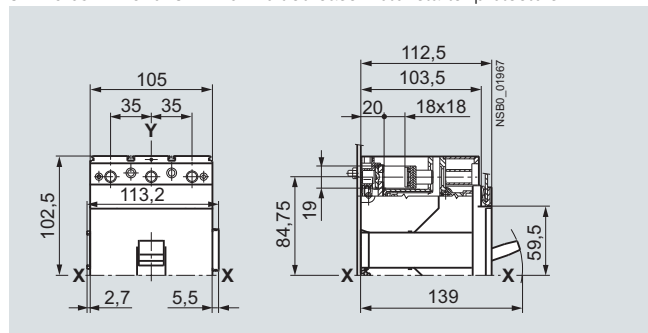
### Rear-accessible terminals

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

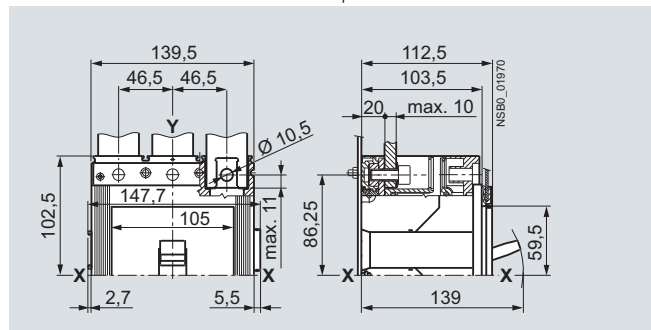


### Front-extended cable terminals

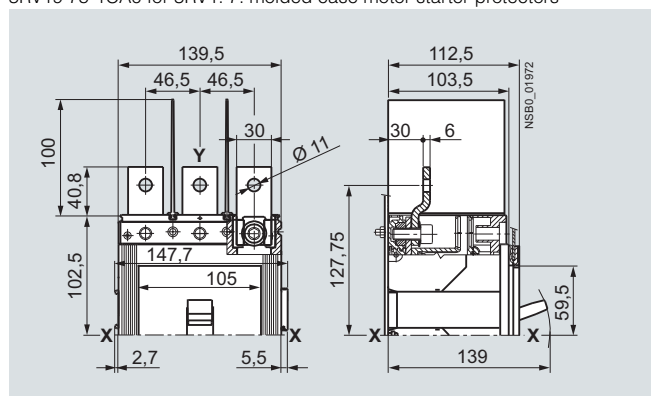
3RV19 65-2BA0 for 3RV1. 6. molded case motor starter protectors



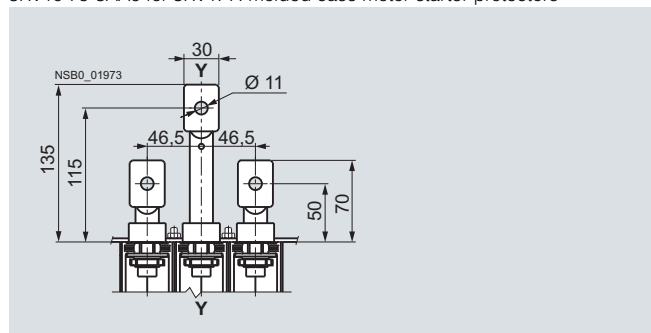
For 3RV1. 7. molded case motor starter protectors



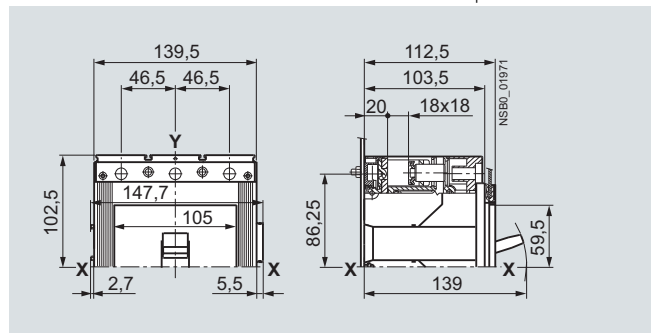
3RV19 75-1CA0 for 3RV1. 7. molded case motor starter protectors



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



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

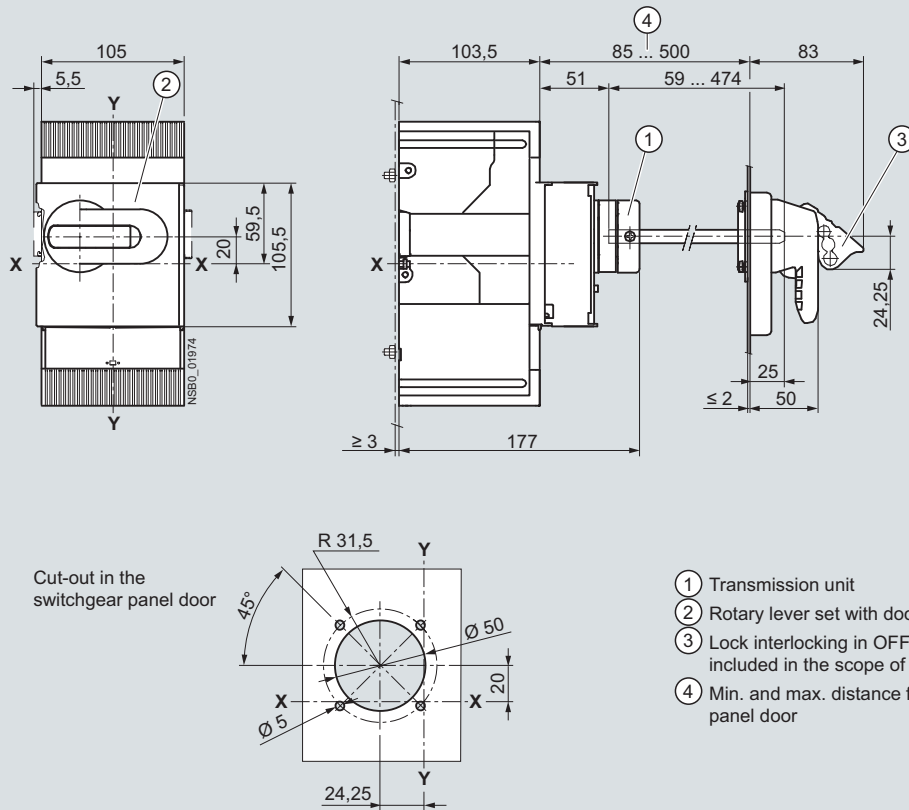


# 3RV19 76-0BA0 lever-type rotary operating mechanism Accessories

## Project planning aids

### Rotary operating mechanisms

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



# 3RV Molded Case Motor Starter Protectors up to 800 A

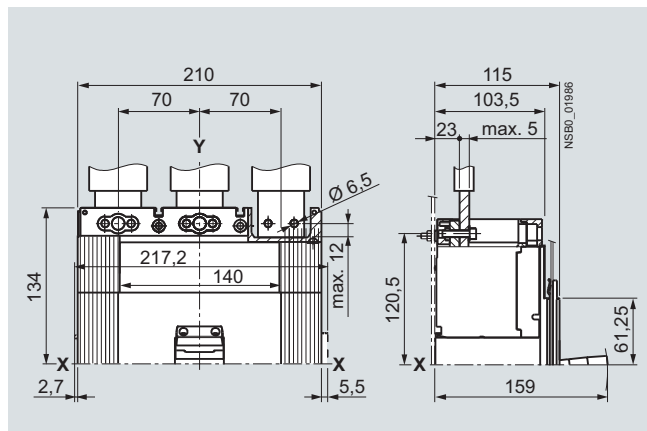
## Accessories

### Project planning aids

#### 3RV1. 83 molded case motor starter protectors

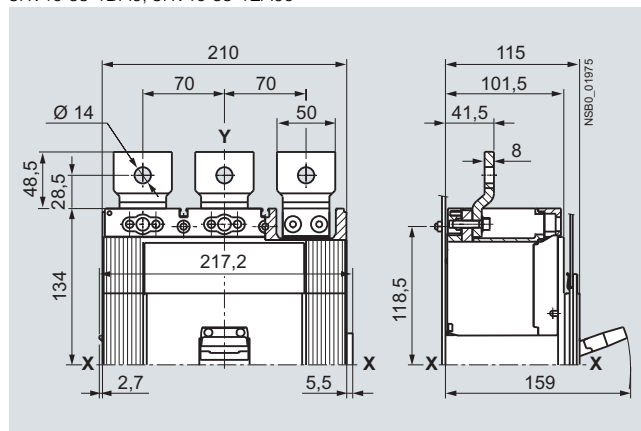
##### Mountable accessories

##### Front-accessible standard terminals



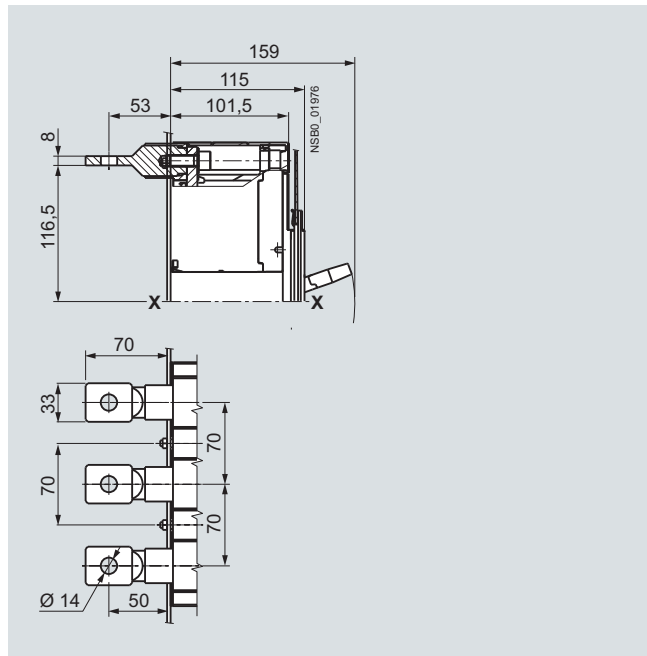
##### Front-extended terminals

3RV19 85-1DA0, 3RV19 85-1EA00



##### Rear-accessible terminals

3RV19 85-3AA0



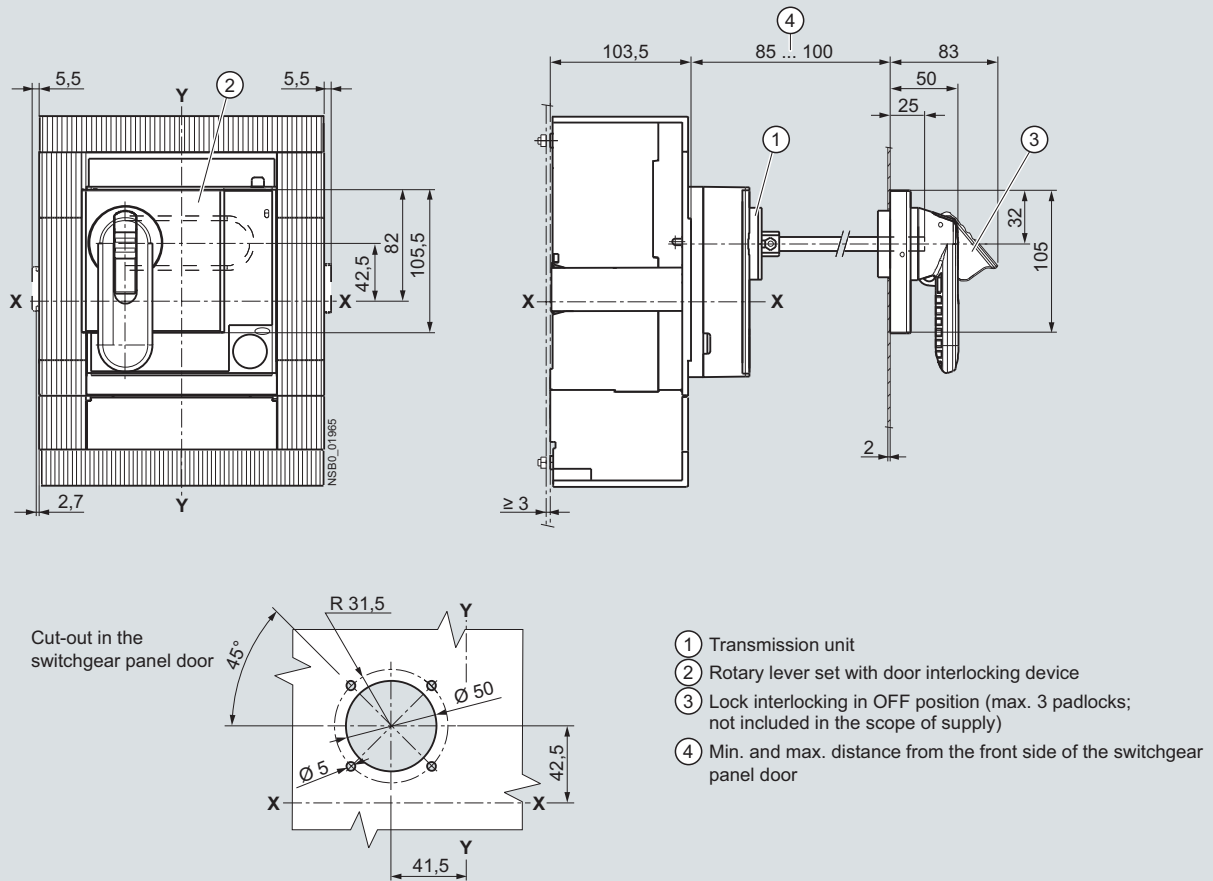
# 3RV Molded Case Motor Starter Protectors up to 800 A

## Accessories

### Project planning aids

#### Rotary operating mechanisms

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





## Get more information

Low-Voltage Controls and Distribution  
[www.siemens.com/lowvoltage](http://www.siemens.com/lowvoltage)

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