

Dimensioning Rules for Combined Soft Start and Braking Devices 2.05

Note! All data sheets and commissioning instructions are available on our homepage at:
www.peter-electronic.com

Dimensioning VC II Safe

Dimensioning of pre-fuses:

The pre-fuses can be dimensioned according to the following instructions:

Fusing according to allocation type „1“, DIN EN 60947-4-2. After a short circuit, the device is allowed to be inoperative. After an overload or a short-circuit on the output-side, repair work is possible.

The following dimensioning information refers to the operating conditions below:

- Use of asynchronous motors IE1, IE2 and IE3 (IE4 in preparation)
- Start-up and/or braking times in accordance with the datasheet
- Switching frequency is not higher than stated in the datasheet

Fusing according to allocation type „1“:

As pre-fuses, we recommend using fuses in the operating class gG.

If these fuses are also used as cable protection, the cable cross-section must be coordinated accordingly!

Short-circuit protection according to EN 60947-4-2

Device rated current (technical data)	Device type	Fuse rating with allocation type 1	Fuse type (recommendation)
12A	VC II S ...-12	35A	690V NH00 gG
22A	VC II S ...-22	63A	690V NH00 gG
37A	VC II S ...-37	80A	690V NH00 gG
50A	VC II S ...-50	100A	690V NH00 gG
60A	VC II S ...-60	125A	690V NH00 gG

Short-circuit protection according to UL 508 (Class RK5 Fuse)

Device rated current (technical. data)	Device type	Fuse rating	Fuse
12A	VC II S 480/575-12	20A	600V AC
22A	VC II S 480/575-22	40A	600V AC
37A	VC II S 480/575-37	50A	600V AC
50A	VC II S 480/575-50	60A	600V AC
60A	VC II S 480/575-60	80A	600V AC

Fusing according to allocation type „2“:

For the protection of the power semiconductors, semi-conductor fuses of the operating class aR or gR are necessary. However, since these fuses do not guarantee any line protection, circuit breakers (operating class gG), must be used in addition.

As fuses for the semi-conductor protection, fuses must be selected whose switch-off is suitable for I²t-value approx. 10-15% below the I²t value boundary of the power semiconductor (see technical data). The current value of the selected fuse in this case should not be less than the inrush current to be expected.

Notes

- *The employment of semi-conductor fuses is not prescribed by PETER electronic. There are exceptions in case of some UL or CSA authorised devices. In this case, this is referred to in the start-up instruction.*
- *With the specifications on the Pt value of the power semiconductors, the start-up time and possibly the max. inrush current, the fuse supplier is able to select a suitable type. Because of the large number of manufacturers, construction sizes and types, a fuse recommendation by PETER electronic is not appropriate.*
- *If the fuse rating or the switch-off Pt value is selected too small, the semiconductor protection fuse can release during the start phase or the soft rundown.*

Motor protection switch

IEC / Europe 400V

Motor power	Siemens	EATON
5,5kW	3RV2021_17-22A	PKE 16-65A
11kW	3RV1031_28-40A	PKE 16-65A
22kW	3RV1041_45-63A	PKE 16-65A
25kW	3RV1041_45-63A	PKE 16-65A
30kW	3RV1041_57-75A	PKE 16-65A

Dimensioning VBMS

Dimensioning of pre-fuses:

Basically, two types of fuse protection are available for the user:

1. Fusing according to allocation type „1“, DIN EN 60947-4-2.
After a short circuit, the braking device is allowed to be inoperative.
2. Fusing according to allocation type „2“, DIN EN 60947-4-2.
After a short circuit, the braking device must be suitable for further use. However, there is the danger that the contacts of the braking relay (braking conductor) weld. Therefore, if possible, these contacts are to be checked prior to applying again mains voltage to the device. If this check cannot be carried out by the user, the device has to be returned to the producer in order to have it checked.

The following dimensioning information refers to the below operating conditions:

- Use of standard asynchronous motors
- Braking current not exceeding $2.5 \times I_{\text{NOM}}$ of the motor
- Cyclic duration factor (c.d.f.) not exceeding the value indicated in the datasheet

Fusing according to allocation type „1“:

As pre-fuses, we recommend to use line protection fuses (utilization category gL) or automatic circuit breakers with tripping characteristics B, C, D or K.

Taking into account the maximum braking currents that occur (normally the rated device current), we recommend fuses according to table 2, column 3.

Note:

- Wiring cross-sectional area according to DIN VDE 0100-430, DIN EN 57100-430.

Fusing according to allocation type „2“:

The power semiconductors are to be protected by fuses of the utilization category gR (semiconductor fuses, high-speed fuses). However, since these fuses do not ensure line protection, it is necessary to use additionally line protection fuses (utilization category gL).

As for the dimensioning of the line protection fuse (gL), please refer to table 2, column 3.

To protect the semiconductors it is necessary to select gR-fuses featuring cutoff- I^2t -values of the ranges indicated in table 2, column 4. In this connection, the fuse rating of the selected fuse should not be smaller than the braking current to be expected (rated device current).

Notes

- On the basis of the recommended I^2t -value, braking current, and possibly the c.d.f., the fuse supplier is able to select a suitable type. Due to the great variety of producers, sizes, and types, PETER electronic does not recommend any particular fuses.
- If the fuse or cutoff I^2t -value is selected too small, it may happen that the semiconductor fuse reacts during braking.

Table 2

Column 1	Column 2	Column 3	Column 4
max. Braking current	Device Typ	Fuse value in the case of allocation type 1	Recommended range for cutoff- I^2t -value of semiconductor protection fuses in the case of allocation type „2“
20A	VBMS	16A	300 ... 650 A ² s