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HIGH SPEED FUSES

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High Speed Fuses

HIGH SPEED FUSES

Summary

High Speed Fuses

WEG aR fuses are available from 20 to 1000 A and were designed according to IEC 60269 and dimensional requirements of DIN 43620.

High Speed Fuses

- For short circuit protection of semiconductors / electronic equipment up to 690 Vac

Available sizes

- NH range - sizes 00, 1, 2 and 3

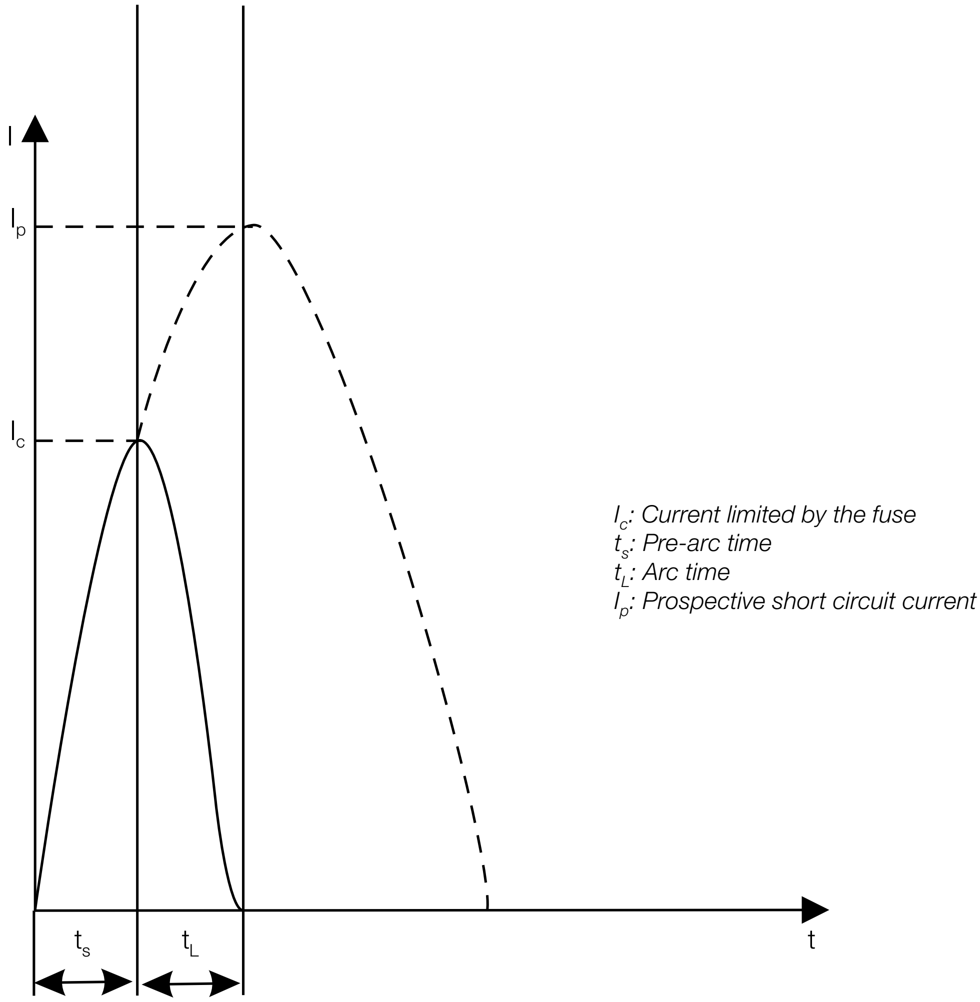
General Data

- Fuse type: High Speed (aR), Square Body (NH)
- Max. Application Voltage: 690 Vca 50/60 Hz
- Short Circuit Breaking Capacity: 100 kA @ 690 Vca
- Standard: IEC 60269
- Certification:

Note: WEG's aR and gL/gG NH range fuses may be mounted in the same fuse base.

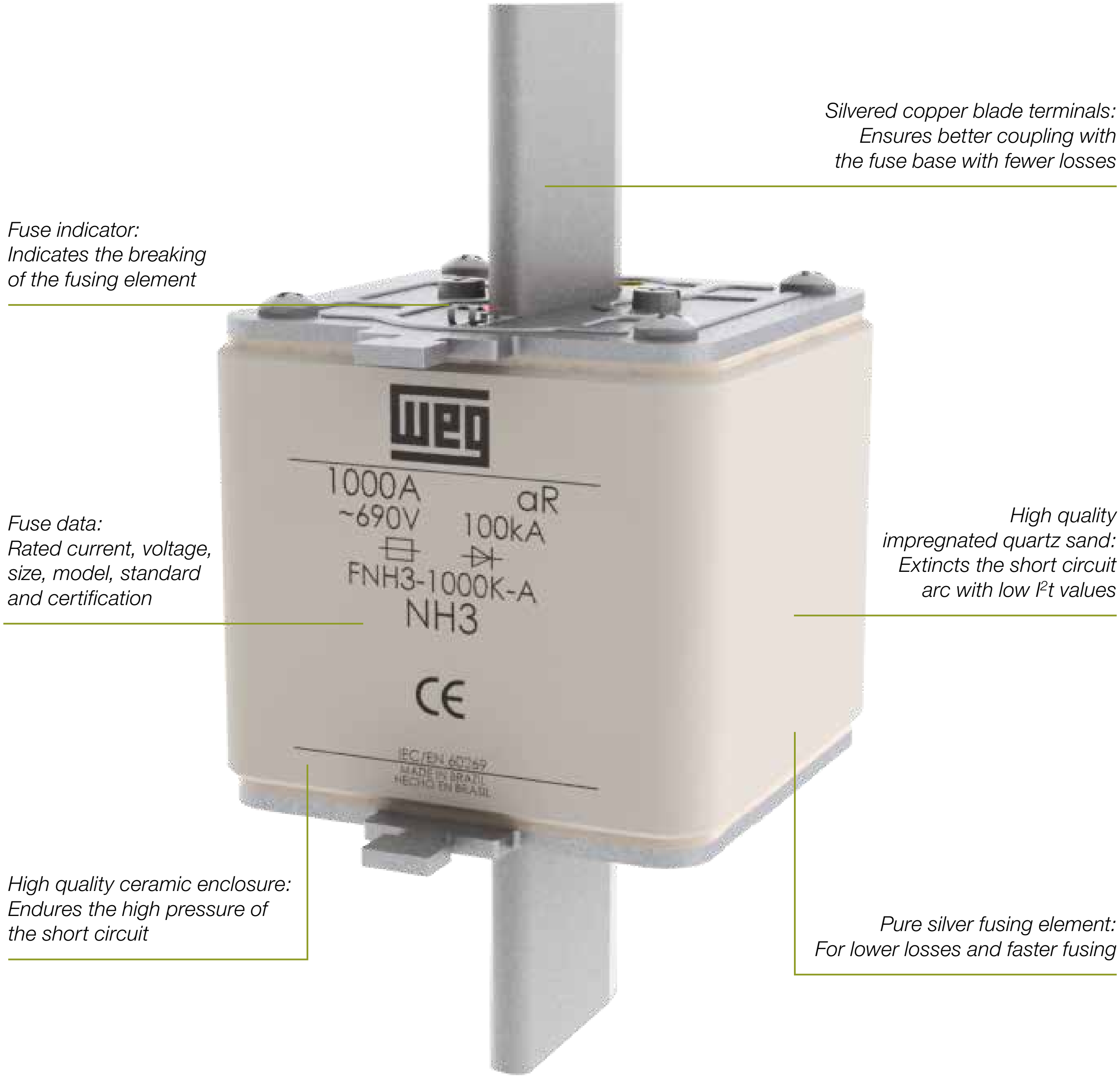
Fuse Functioning

In short circuits, the fuse element fuses, opening the electric circuit and interrupting the current flow. The aR fuses are not designed to be used in short overloads, because they may act inappropriately. During the short circuit, the fuse will limit the prospective short circuit current, according to the picture below:

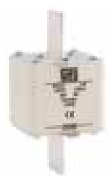


WEG high speed fuses are assembled in a high quality ceramic body, filled with impregnated quartz sand, with silver fusing element and silvered copper blade terminals.

This assembly provides reduced I2t values and great electrical insulation, mechanical strength and thermal shock resistance during the short circuit protection.



100kA / 690Vca

	Technical characteristics					
	Reference	Size	Current [A]	I^2t - Ic	I^2t total - Ip	Power loss [W] @ 0.8 x In
				690Vca [A^2s]		
	FNH00-20K-A	00	20	16	240	3.2
	FNH00-25K-A		25	19	255	3.5
	FNH00-35K-A		35	23	430	5
	FNH00-40K-A		40	56	580	7
	FNH00-50K-A		50	130	1430	9
	FNH00-63K-A		63	180	2170	10.5
	FNH00-80K-A		80	270	2710	13.5
	FNH00-100K-A		100	400	4530	14
	FNH00-125K-A		125	810	6350	16.5
	FNH00-160K-A		160	2100	15270	22.5
	FNH00-200K-A		200	2900	25870	26.5
	FNH00-250K-A		250	6200	43980	30.5
	FNH1-63K-A	1	63	63	770	15
	FNH1-80K-A		80	175	1610	19
	FNH1-100K-A		100	320	3050	21
	FNH1-125K-A		125	695	6360	25
	FNH1-160K-A		160	1460	13090	29.5
	FNH1-200K-A		200	2420	16380	34.5
	FNH1-250K-A		250	4920	29810	40.5
	FNH1-315K-A		315	7310	39590	48
	FNH1-350K-A		350	11430	64870	52
	FNH1-400K-A		400	16950	98860	59
	FNH2-250K-A	2	250	3390	24370	45.5
	FNH2-315K-A		315	4760	32780	57.5
	FNH2-350K-A		350	7990	60150	66.5
	FNH2-400K-A		400	14850	92060	77
	FNH2-450K-A		450	18420	132990	91
	FNH2-500K-A		500	23040	146250	103
	FNH2-630K-A		630	49130	298820	127
	FNH2-710K-A		710	57910	378450	137.5
	FNH3-400K-A	3	400	6520	66830	70
	FNH3-450K-A		450	15090	105220	74.5
	FNH3-500K-A		500	18770	107200	79.5
	FNH3-630K-A		630	32500	222540	94
	FNH3-710K-A		710	56620	308900	105
	FNH3-800K-A		800	87390	612850	117
	FNH3-900K-A		900	129380	636150	130
	FNH3-1000K-A		1000	197890	893350	150

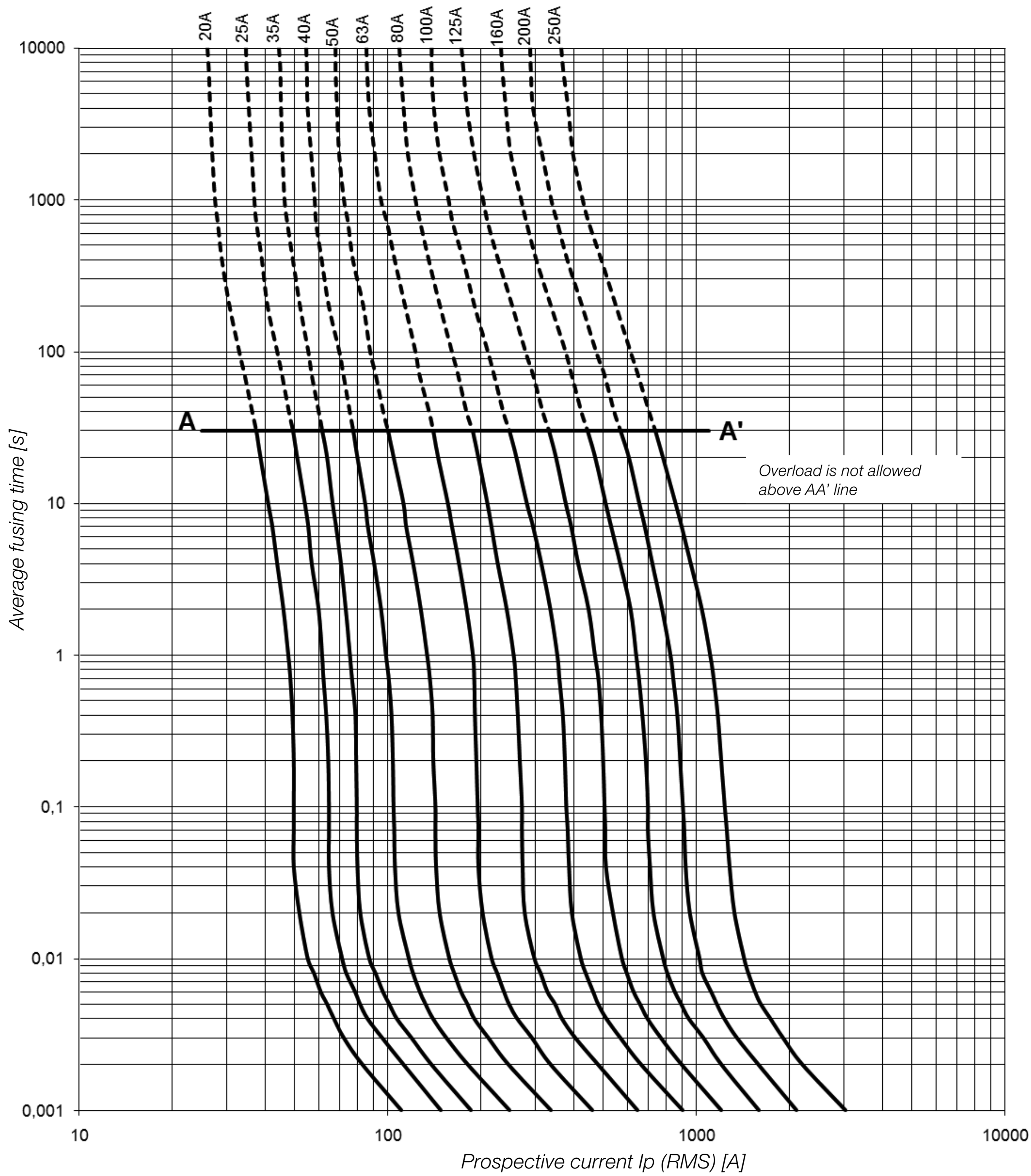
Note: For I2t sizing in other voltages, use “Total I2t variation vs. Applied voltage” chart on page 13.

I^2t reduction factors for voltages under 690 Vac	
Voltage Vac	Applied factor
127	0.43
220	0.43
254	0.45
266	0.46
277	0.48
300	0.50
345	0.53
400	0.58
440	0.62
460	0.64
480	0.68

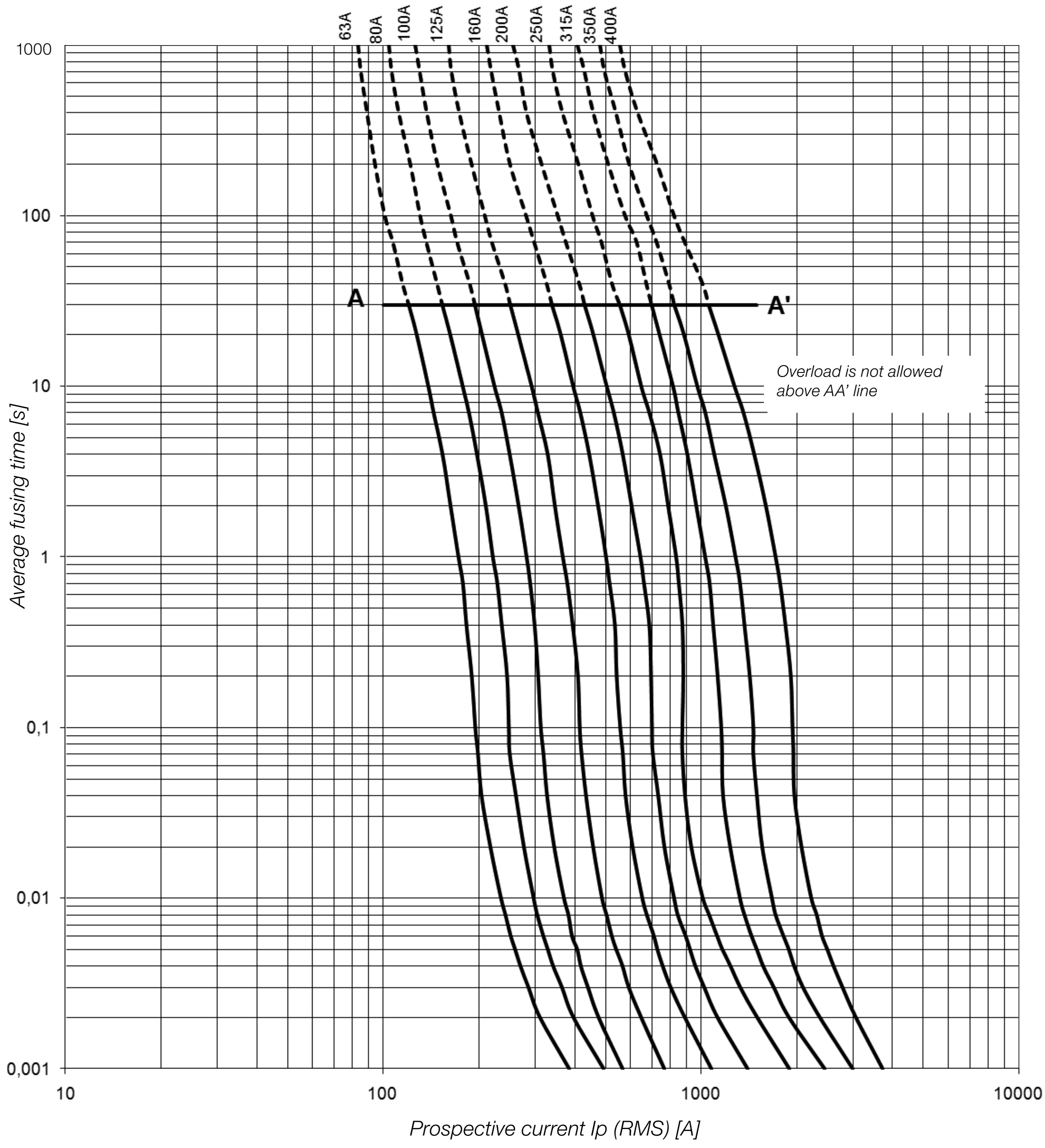
Note: For other voltages use the chart on page 13.

Time vs. Current Curves

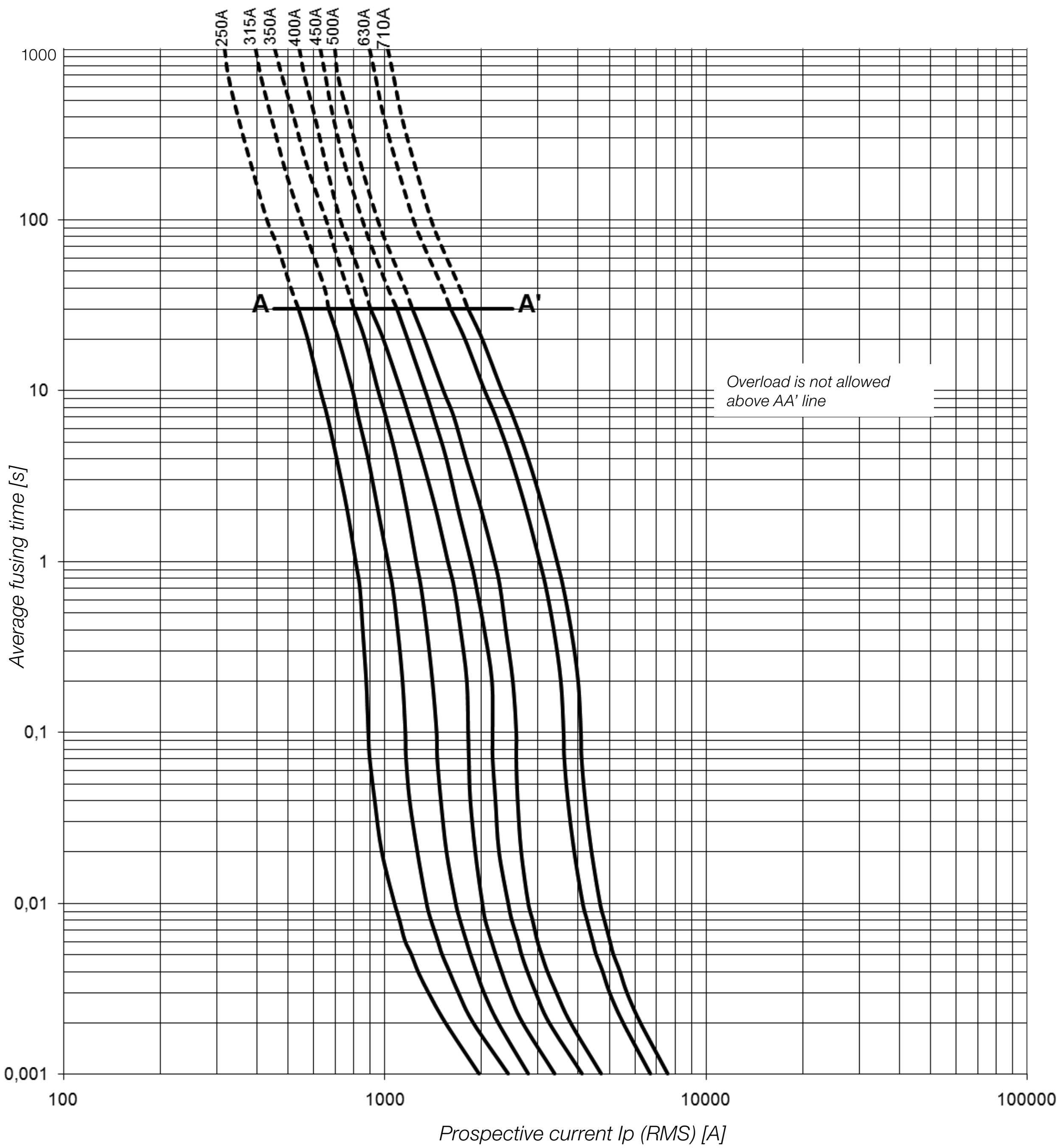
FNH00 aR fuses



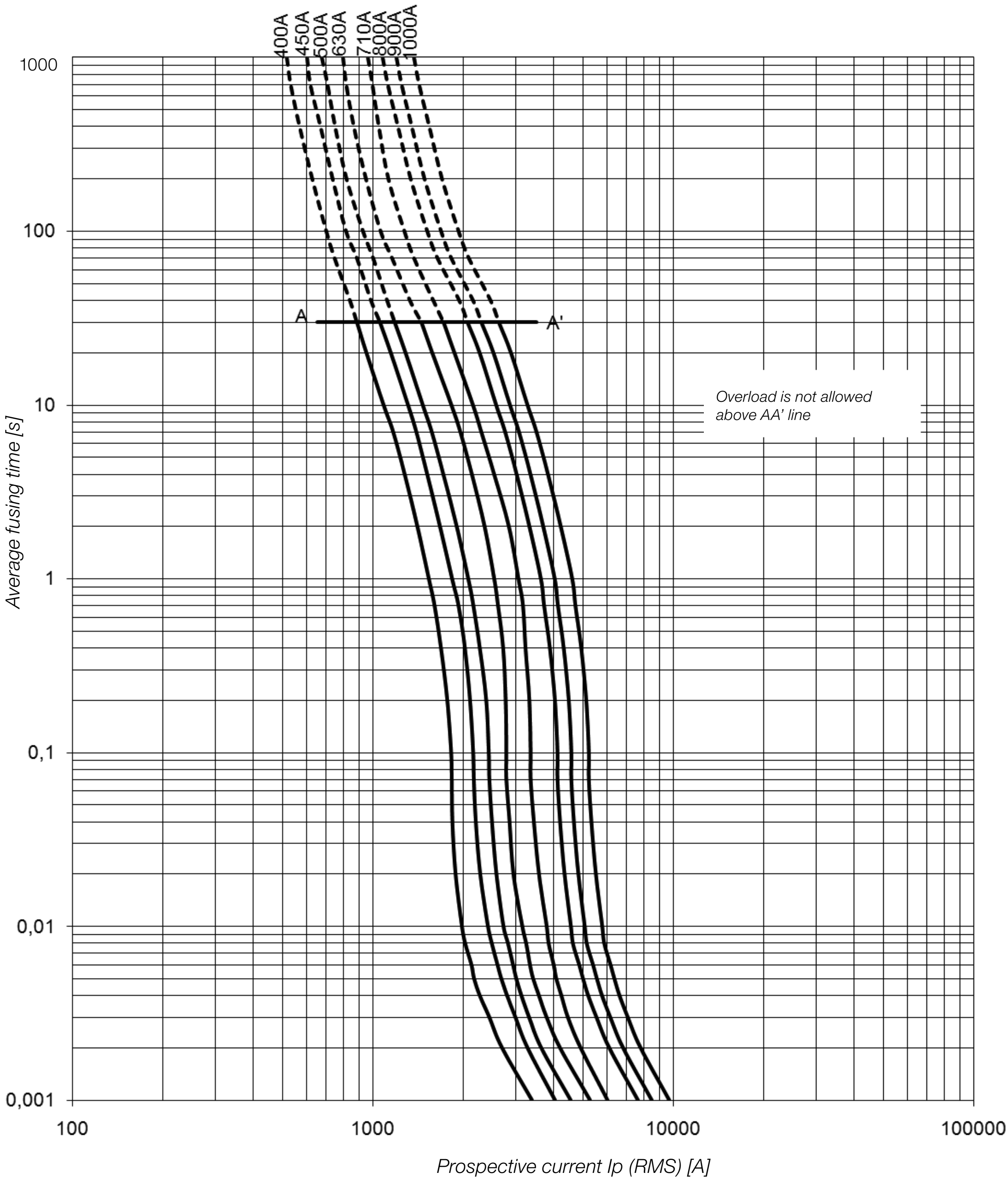
FNH1 aR fuses



FNH2 aR fuses



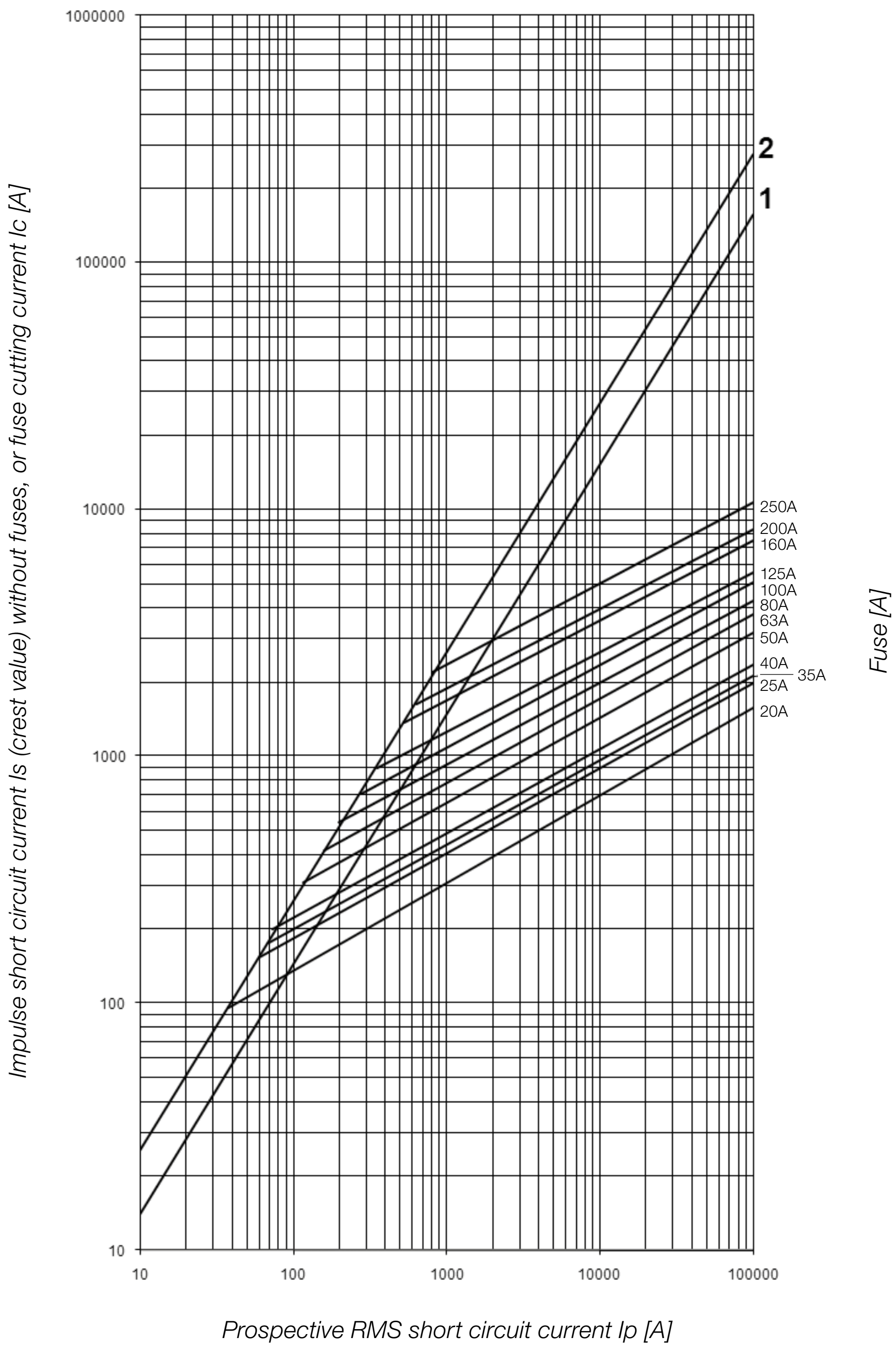
FNH3 aR fuses



Current limitation curves

FNH00 aR fuses

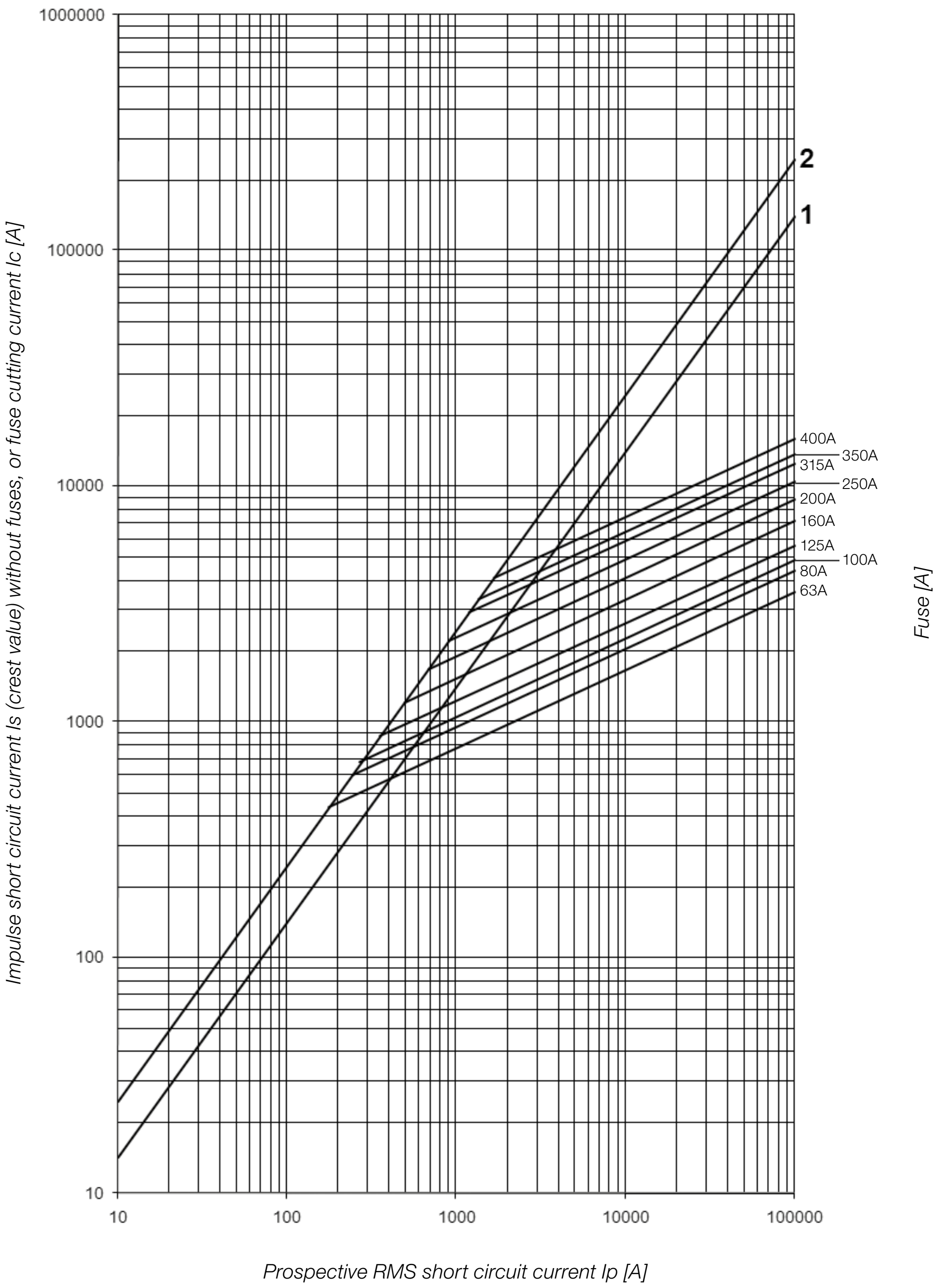
1 - Symmetric short circuit current
2 - Asymmetric short circuit current



FNH1 aR fuses

1 - Symmetric short circuit current

2 - Asymmetric short circuit current



FNH2 aR fuses

1 - Symmetric short circuit current
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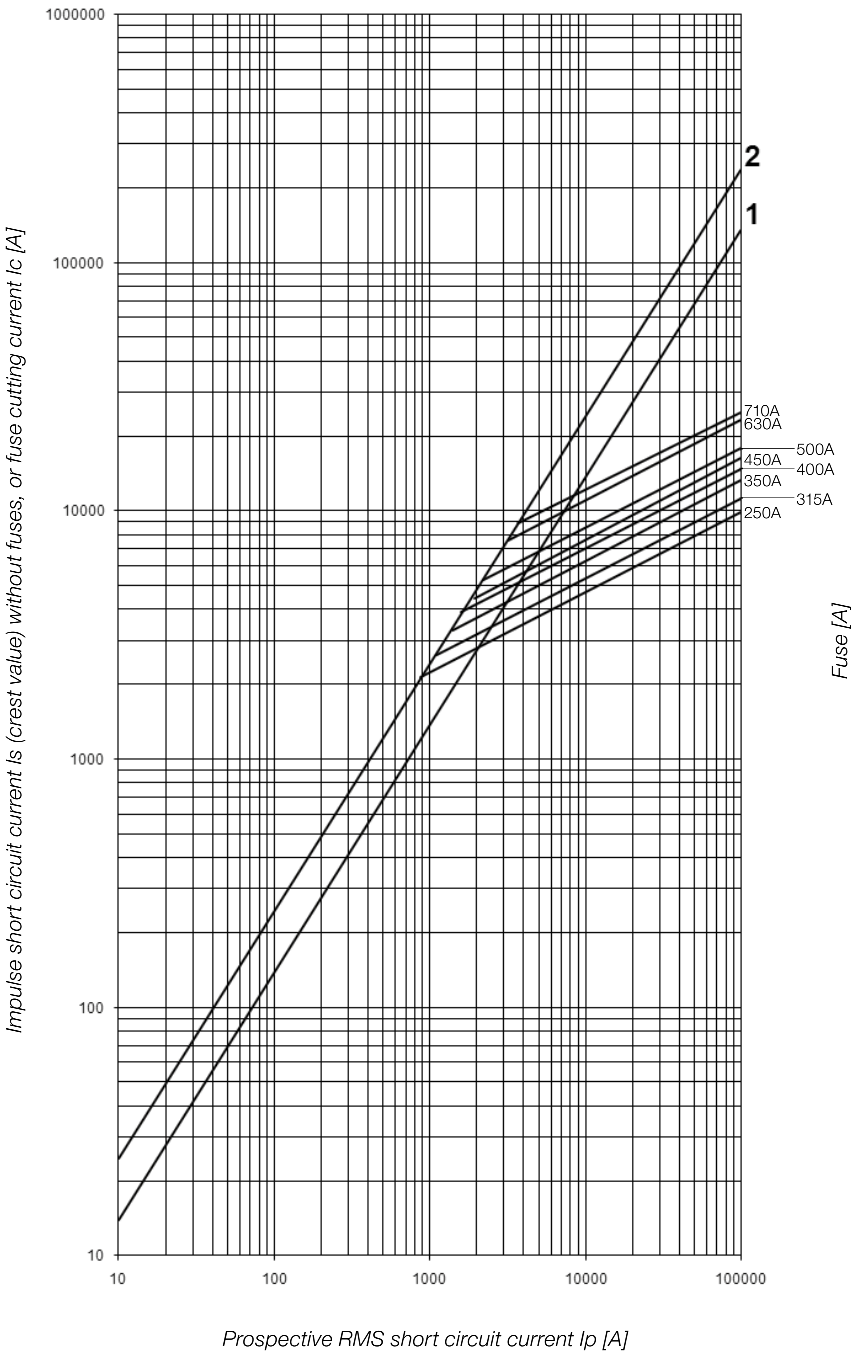
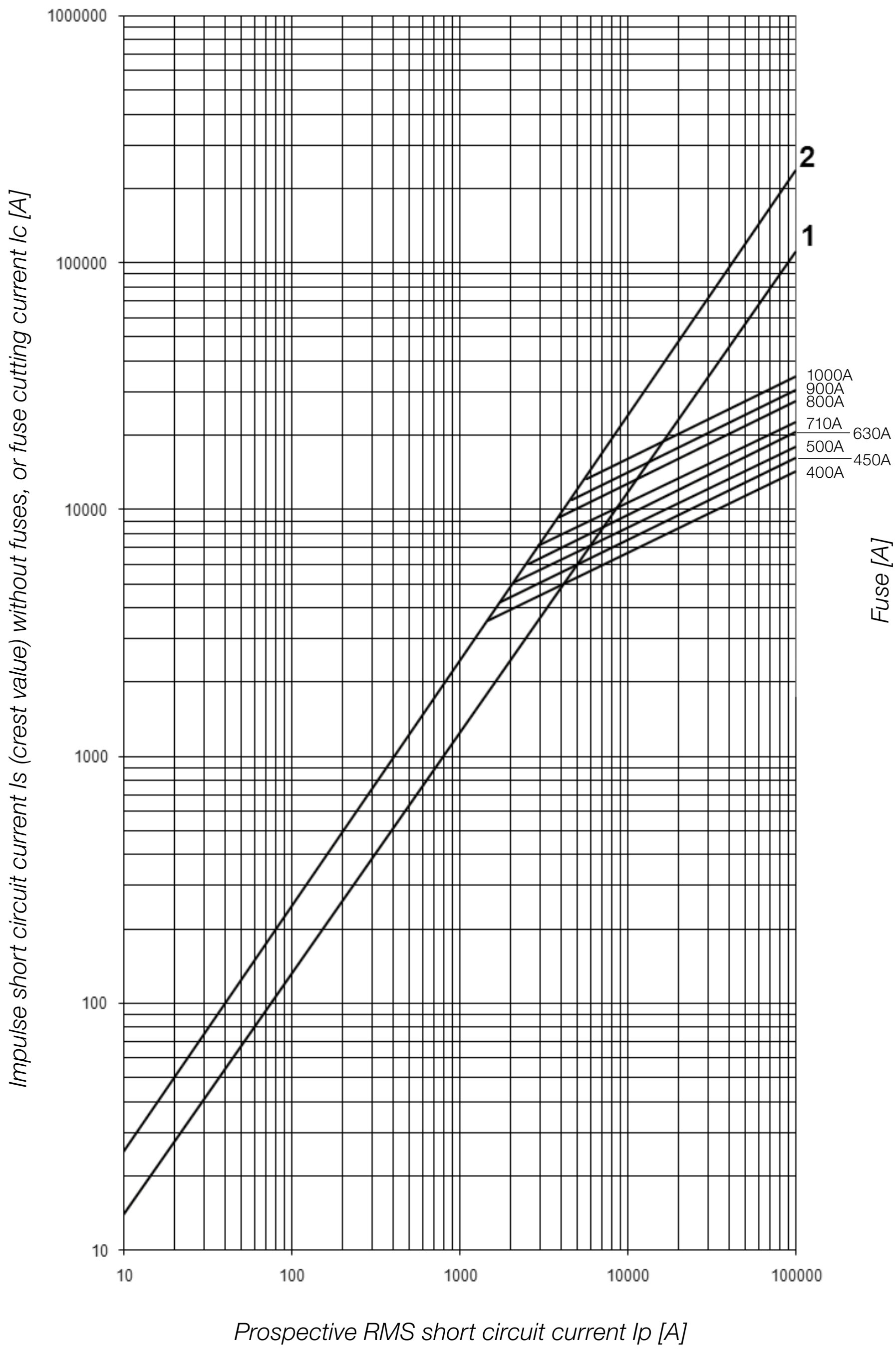


FNH3 aR fuses

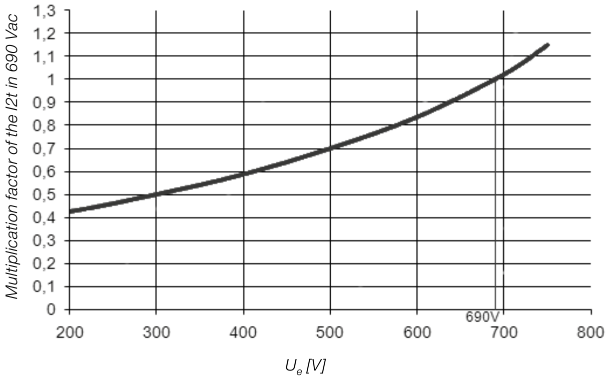
1 - Symmetric short circuit current
2 - Asymmetric short circuit current



High Speed Fuses

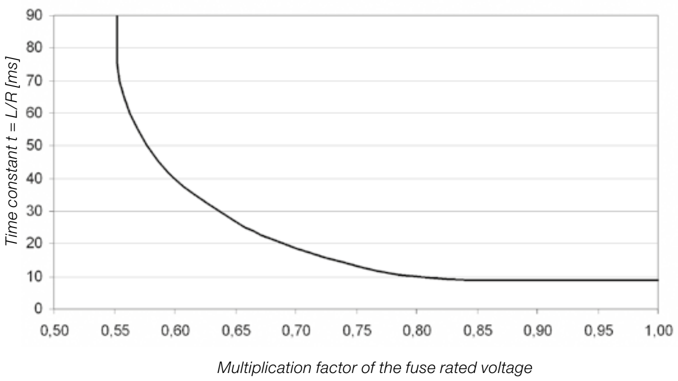
Total I²t variation vs. applied voltage

The presented I²t values are referenced to 690 Vac. For other voltages the I²t varies according to the chart below.



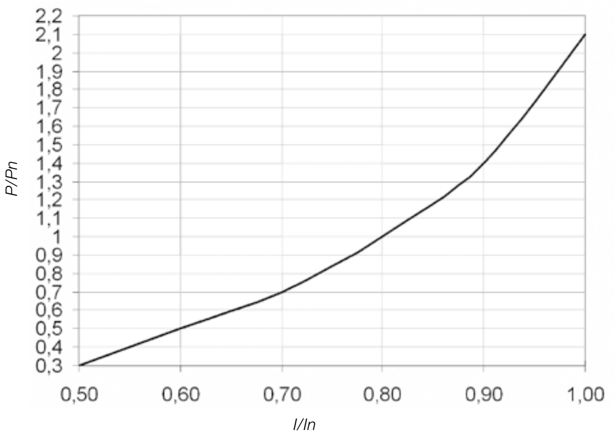
New I²t according to the applied voltage = Multiplication Factor (MF) x I²t of the fuse

Aplication in DC voltage
- Definition of the DC fuse voltage



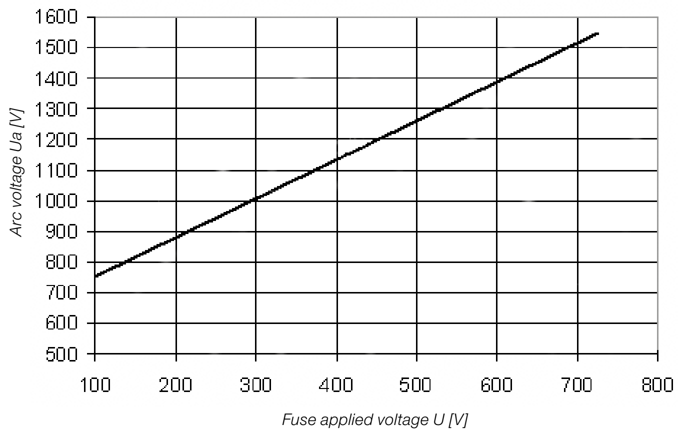
Vdc = "Multiplication factor" x 690 Vca

Multiplication coeficient for the calculation of the lost power for currents lower than the rated fuse current



Voltage arc curve

During the fault current breaking, on each strangulation of the fusing element an electric arc is formed, generating consenquently an arc voltage. The arc value of the fuses varies with the applied voltage on the fuse.



Current reduction factor (CRF) for the instalation of the fuses on the BNH individual fuse base - BNH

Fuse size	Rated fuse current	Current reduction factor (CRF) to be used in the rated current (In) of the fuse when using the fuse base	
		BNH fuse base	
		$CRF_{Fuse\ Base}$	Fuse base reference
00	20	1	BNH00-160
	25	1	BNH00-160
	35	1	BNH00-160
	40	1	BNH00-160
	50	1	BNH00-160
	63	1	BNH00-160
	80	1	BNH00-160
	100	1	BNH00-160
	125	1	BNH00-160
	160	0.9	BNH00-160
	200	0.85	BNH00-160
	250	0.8	BNH00-160
1	63	1	BNH1-250
	80	0.95	BNH1-250
	100	0.95	BNH1-250
	125	0.9	BNH1-250
	160	0.85	BNH1-250
	200	0.8	BNH1-250
	250	0.75	BNH1-250
	315	0.75	BNH1-250
	350	0.7	BNH1-250
	400	0.7	BNH1-250
2	250	0.9	BNH2-400
	315	0.9	BNH2-400
	350	0.85	BNH2-400
	400	0.8	BNH2-400
	450	0.8	BNH2-400
	500	0.75	BNH2-400
	630	0.7	BNH2-400
	710	0.7	BNH2-400
3	400	0.8	BNH3-630
	450	0.8	BNH3-630
	500	0.75	BNH3-630
	630	0.75	BNH3-630
	710	0.75	BNH3-630
	800	0.75	BNH3-630
	900	0.7	BNH3-630
	1000	0.7	BNH3-630

Accessories

Fuse base for NH fuses

Reference	Fuse size
BNH00-160	00
BNH1-250	1
BNH2-400	2
BNH3-630	3

PDNH Partition Wall

Reference	Size
PDNH00	00
PDNH1	1
PDNH2	2
PDNH3	3

Fuse Handle

Reference
PSFNH

Codification

Breaking Capacity	Code
100kA	K

F	N	H	0	0	-	1	0	0	K	-	A

Range	Code
NH	FNH

Size	Code
00	00
1	1
2	2
3	3

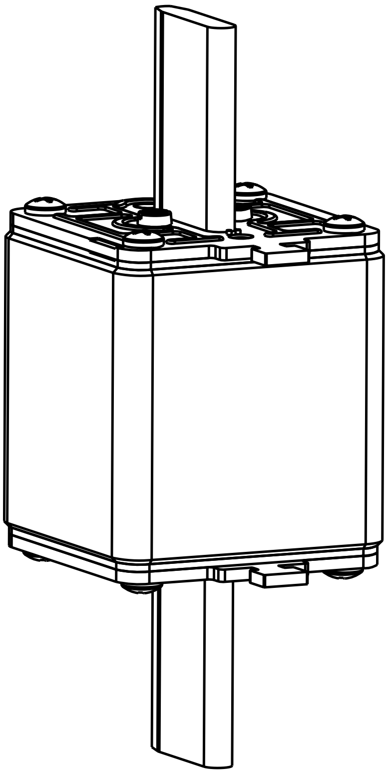
Current (A)	Code
20	20
25	25
35	35
40	40
50	50
63	63
80	80
100	100
125	125
160	160
200	200
250	250
315	315
350	350
400	400
450	450
500	500
630	630
710	710
800	800
900	900
1000	1000

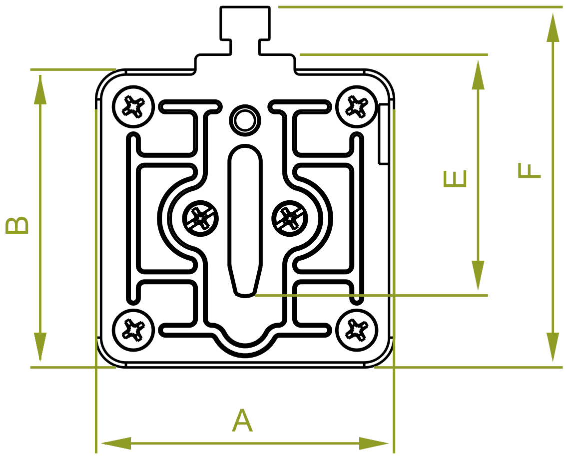
Class of Operation	Code
aR	A

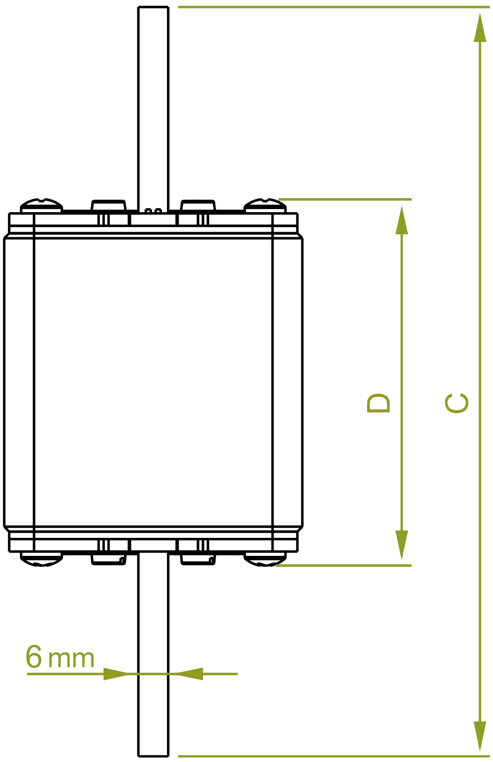
Dimensions

FNH aR fuses

Class of Operation	Size	Current Range [A]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
a R	00	20 a 250	29.5	47.5	78.5	54	35	59.5
	1	63 a 400	51.5	51.5	135	73	40	63.5
	2	250 a 710	60	60	150	73	48	72.5
	3	400 a 1000	73.6	73.6	150	73	60	87.5



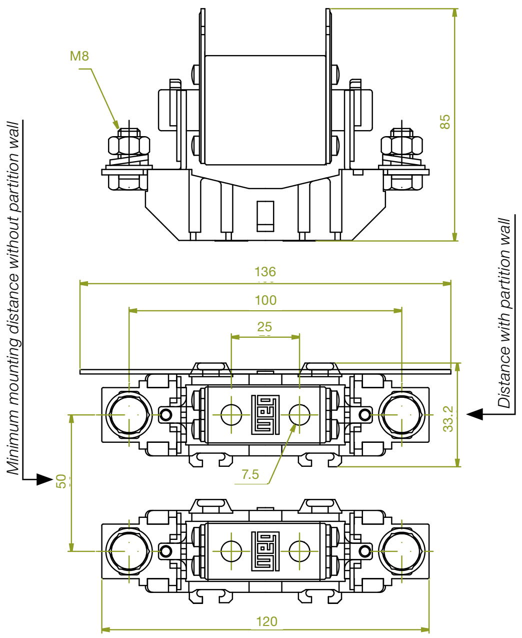




Fuse base

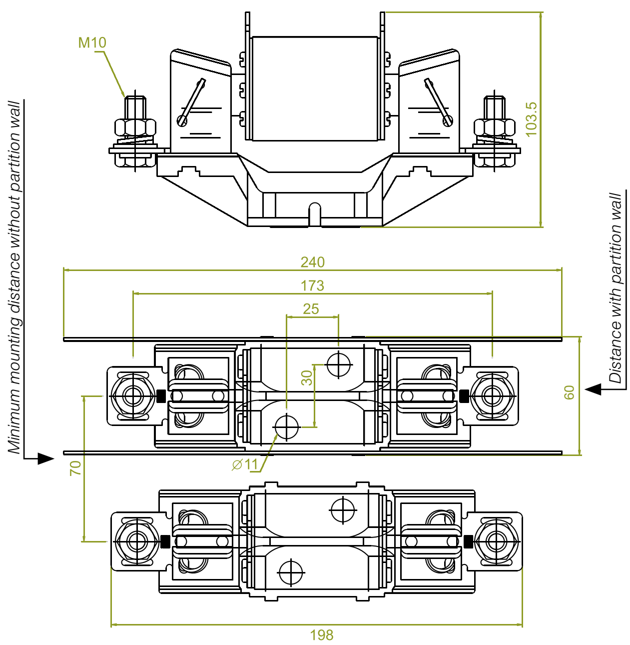
Size 00

Dimensions (mm)



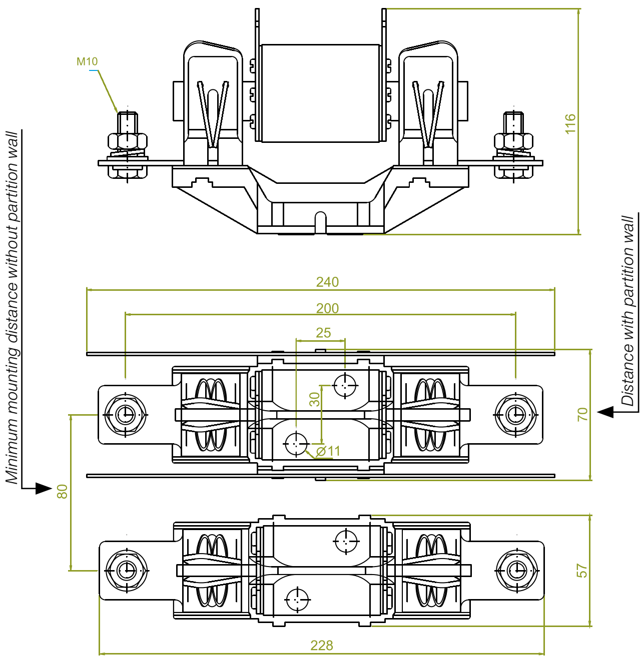
Size 1

Dimensions (mm)



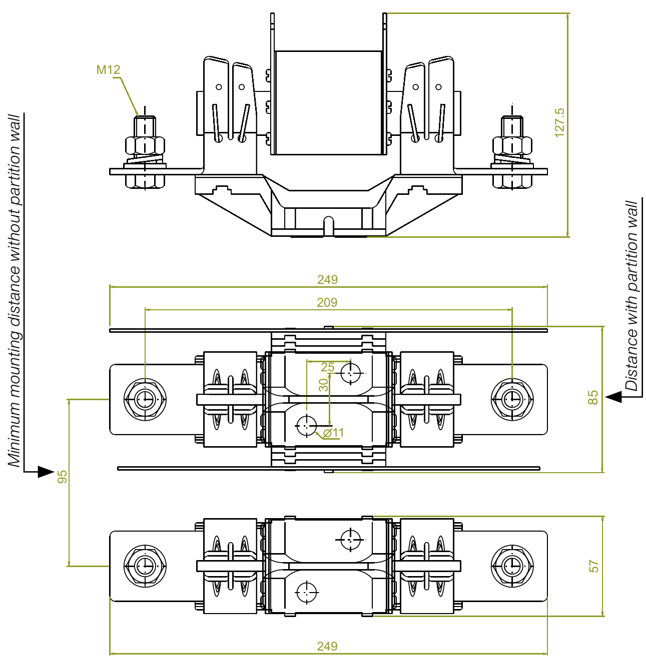
Size 2

Dimensions (mm)



Size 3

Dimensions (mm)



Appendix 1: WEG aR high speed fuses sizing criteria

Fuse Sizing

The sizing of High Speed Fuses is subject to many variables, but two of them are the most significant: I^2t and rated current. On the next paragraphs you will find three different suggestions on how to size WEG aR fuses depending on the load type.

Without Overloads

For applications without overloads, the rated current of the load should be at least 20% lower than the rated current of the fuse. The current reduction factor of the fuse base must also be taken into consideration and if it is lower than 0.8 (see page 14), the current reduction factor must be fuse base reduction factor.

Also, the I^2t of the fuse must be equal or lower than the maximum allowed I^2t for the protection of the semiconductor.

Example:

A diode bridge with rated current IN of 250 A, I^2t of 120 kA^2s, rated phase voltage 690 Vac and without overloads.

The fuse current should be:

$$I_F \geq I_N / 0.8 = 312.5$$

A size NH1 fuse of 315 A should be enough, but when mounted on the fuse base BNH1, the reduction factor is 0.75, and the maximum allowed current is only 236 A.

Therefore, in this case the right fuse is the 400 A NH1. When mounted on the fuse base it has a rated current of 280 A, which is higher than the rated current of the diode bridge.

The I^2t of the FNH1-400K-A fuse is 98860 A^2s @ 690 Vac, and is lower than the I^2t of the semiconductor, so the short circuit protection is guaranteed.

Parallel Association

If the current of the load is too high, or if the $I^2$of the selected fuse is larger than allowed, parallel fuse association can be used, taking into consideration these restrictions:

- In addition to meeting the above specifications, the fuses connected in parallel must have the same characteristics, *meaning that they must have the same size and rated current* in order to avoid load unbalance, and *the cable bars must have the same length to match the circuit impedance.*
- The I^2t value of the fuse association must be lower than the maximum $I^2$of the semiconductor and is calculated by:

$$I^2t_{//} = I^2t \times n^2$$

where:

$I^2t_{//}$ is the I^2t value of the parallel fuse association;

I^2t is the I^2t value of the individual fuse, adjusted for the applied voltage (see page 13);

n is the number of fuses connected in parallel.

Long Duration Overloads

High speed fuses must not be submitted to long duration overloads above the AA' line, presented on the Time vs. Current curves on pages 5 to 8.

When long duration overloads are unavoidable, the sizing of WEG aR fuses must be done considering the overload current as the rated current of the system.

Then the fuse rated current must be calculated the same way as on the Without Overloads paragraph.

Cyclical Overloads

Cyclical overloads are regular or irregular variations where the load current becomes higher than the system rated current for a few seconds, but, being enough to raise the temperature of the fuse elements, causing thermal fatigue on its constrictions.

Equipments that contain semiconductors and, consequently, high speed fuses for short circuit protection, are frequently submitted to repetitive (or cyclic) overloads, especially when starting electric motors. Under this condition, the temperature of the elements of the fuse rises and, depending on the number of overloads per time interval, this temperature may stress these elements or even reach the fusing temperature. This may cause the fuse to act inappropriately.

To avoid the consequences of cyclic overloads, WEG aR fuses should, preferentially, be sized so that its current on the Time vs. Current charts of pages 5 to 8 is higher than the overload current multiplied by the factors shown on the table below, and for the same duration.

aR fuse size	How many times the fusing current must be higher than the overload current, for the same overload period
00	2
1	2.5
2	
3	

Example:

A semiconductor with 150 A of rated current where there are frequent overloads of 450 A with 5 s duration.

For a NH00 fuse, the NH00 Time vs. Current curves on page 5 should be used to search for a fuse that won't act at 2 x 450 A (900 A) in 5 s. In this case, the lower rated current found is 250 A.

For fuses sizes of 1, 2 and 3 the same steps are made, but with a current 2.5 times higher than 450 A, in this case 1125 A. For this current, all three fuse sizes have rated current of 400 A.

The I^2t of the selected fuses adjusted for the applied voltage, must be lower than the maximum allowed I^2t for the protection of the semiconductor.

In cases where it isn't possible to find a fuse that satisfies both the overload current and the I^2t of the semiconductor criteria, there are two choices:

- Fuse parallel association: divide the multiplied overload current (2 or 2.5 times the overload) by the number of fuses in parallel and repeat the method showed on the example above, with the I^2t of the parallel association recalculated using the equation shown on the Parallel Association paragraph.
- Specify the largest fuse current that satisfies the I^2t criteria, but perhaps not the overload. In this case the fuse may be subjected to some overload, which in time can cause the fuse to act inappropriately. This time period depends on the application, overload current, number of overloads per hour, duration of the overload, ambient temperature, ventilation, cable sizes and many other factors. The objective here is to protect the semiconductor in prejudice of the fuse. Several times this is a less expensive solution, as showed on the example 3 below.

Summary

Without Overloads

1. $I_F \geq I_N / 0.8$
2. If the current reduction factor of the fuse base is lower than 0.8, use the reduction factor of the fuse base, so

$$I_F \times CRF_{Fuse\ Base} \geq I_N$$

And:

3. $I^2t_{F@Applied\ Voltage} = I^2t_{F@690} \times MF$
4. $I^2t_{F@Applied\ Voltage} < I^2t_{Max\ Allowed}$

Where:

$CRF_{Fuse\ Base}$: Current Reduction Factor of the Fuse Base,

on page 14

MF: Multiplication Factor of the Total I2t Variation vs. Applied Voltage chart on page 13

Long Overloads

1. $I_N = I_{OL}$
2. Use the steps of the sizing without overloads

Cyclic Overloads

1. $I_{F@OL\ Time} \geq I_{OL} \times 2$ (size NH00) or 2.5 (sizes NH1, 2 and 3) on the Time vs. Current charts

And:

2. $I^2t_{F@Applied\ Voltage} = I^2t_{F@690} \times MF$
3. $I^2t_{F@Applied\ Voltage} < I^2t_{Max\ Allowed}$

Parallel Association

1. Parallel fuses must be of the same size, rated current, and the system cables and bars must be of the same size and length to match the impedances.
2. $I^2t_{//} = I^2t \times n^2$

Sizing Examples

Example 1:

Sizing WEG aR fuses to protect a rectifying bridge with the following characteristics:

- Maximum supported I^2t: 80 kA^2s
- Line voltage: 500 Vac
- Constant load
- Rated load current: 100 A
- Overload current: 200 A
- Overload duration: 5 min, a few times a day.

Since overload duration is very long, the overload current will be considered as the rated current of the system.

The fuse current should then be:

$$I_F \geq I_N / 0.8 = 200 / 0.8 = 250 \text{ A}$$

In this case we select a size NH00 fuse of 250 A. This fuse when applied on a BNH00 fuse base has a reduction factor of 0.8, meaning that the rated current of the fuse mounted on this fuse base is 250 x 0.8 = 200 A, which matches the rated current of the rectifying bridge (it should be larger or equal to the rated current of the system).

Next, the I^2t must be analyzed in order to guarantee short circuit protection.

The I^2t of the 250 A NH00 fuse is 98860 A^2s @ 690 Vac and the voltage applied on the fuse is the phase voltage:

$$V_F = 500 / \sqrt{3} = 289 \text{ Vac}$$

Using the Total I^2t Variation vs. Applied Voltage chart on page 13, we find a multiplication factor of approximately 0.49 for 289 Vac. Therefore, the adjusted I^2t of this fuse is:

$$I^2t_{@289V} = I^2t_{@690V} \times MF = 98860 \times 0.49 = 48.4 \text{ kA}^2\text{s},$$

which is lower than the maximum allowed I^2t of the semiconductor, 80 kA^2s.

Conclusion: The chosen fuse *FNH00-250K-A* mounted on the fuse base *BNH00* will protect the rectifying bridge against short circuits.

Example 2:

Sizing WEG aR fuses to protect a CFW11 VSD with the following characteristics:

- Rated current: I_N = 370 A
- Maximum supported I^2t: 414 kA^2s
- Maximum I^2t of the fuse: 0.75 x 414 = 310.5 kA^2s
- Line voltage: 480 Vac
- Overload of 1.1 x I_N on the start for 60 s, up to 6 times per hour

Because there is a cyclic overload, the criterion used is the one showed on the "Cyclical Overloads" paragraph.

For a size NH00, the overload current is multiplied by 2, resulting in 814 A. With this current, on the FNH00 Time vs.Current chart on page 5, at 60 s, there is no fuse available.

For fuse size NH1, the overload current is multiplied by 2.5, resulting in 1017.5 A. On the FNH1 Time vs. Current chart on page 6 with this current and 60 s, there is also no fuse available.

Finally, for fuse size NH2, with the overload current multiplied by 2.5 (1017.5 A) at 60 s on the FNH2 Time vs. Current chart on page 7, we find that the 630 A fuse is above this point, guarantying that the fuse won't act inappropriately during the start.

This fuse, mounted on the fuse base BNH2, has a rated current of 441 A, which is larger than the rated current of the VSD (370 A) and the overload current (407 A). Therefore, with this method, because of the fuse being oversized to withstand the starting current, there is no need to use the de-rating of the fuse base.

Next, the I^2t of the fuse must be compared with the maximum allowed I^2t of the semiconductor. The I^2t of the NH2 630 A fuse at 690 Vac is 298820 A^2s, but there is the need of adjusting it with the applied voltage.

For a line voltage of 480 Vac, the phase voltage on the fuse is:

$$V_F = 480 / \sqrt{3} = 277 \text{ Vac}$$

Using the Total I^2t Variation vs. Applied Voltage chart on page 13, we find a multiplication factor of approximately 0.48 for 277 Vac. Therefore, the adjusted I^2t of this fuse is:

$$I^2t_{@277Vac} = I^2t_{@690Vac} \times MF = 298820 \times 0.48 = 143.4 \text{ kA}^2\text{s},$$

which is lower than the maximum allowed I^2t of the fuse, 310.5 kA^2s.

Conclusion: The chosen fuse *FNH2-650K-A* will protect the rectifying bridge against short circuits and may be mounted on the fuse base *BNH2.*

Example 3:

Sizing WEG aR fuses to protect a SSW06 Soft-Starter with the following characteristics:

- Rated current: I_N = 312 A
- Maximum supported I^2t: 178.5 kA^2s
- Line voltage: 575 Vac
- Overload of 3 x I_N on the start for 30 s

Because there is a cyclic overload, the criterion used is the one showed on the "Cyclical Overloads" paragraph.

When searching for a single fuse using this method, the conclusion is that there isn't a fuse that satisfies both Current and I^2t conditions. Then, the first alternative is parallel fuse association.

With fuses in parallel, the current used on the Time vs.Current charts is 2 times the overload current for size NH00, or 2.5 times the overload current for sizes NH1, 2 and 3, divided by the number of fuses in parallel.

So, for two NH2 fuses the current used on the corresponding chart is 312 x 3 x 2.5 / 2 = 1170 A. The fuse found is the NH2, 500 A.

The adjusted I^2t of a single fuse, in phase voltage of 332 V (575 V / √3) is 77512.5 A^2s.

Then, the total I^2t of the parallel association is:

$$I^2t//_{@332Vac} = I^2t_{@332Vac} \times n^2 = 310\ kA^2s,$$

which is larger than the maximum allowed I^2t (178.5 kA^2s), so it won't protect the Soft-Starter.

If we continue to search for a fuse association, like different sizes with 2 fuses, or other combinations with different number of fuses, the final result is: 6 fuses in parallel per phase, size NH00, 125 A, with a result of 750 A.

In most applications, a total of 18 fuses and 18 fuse bases (6 fuses and 6 fuse base per phase) demand too much space in the electric panel and cost too much assembly time and money.

Since the main objective is to protect the *semiconductor* (Soft-Starter), not the fuse, the recommended WEG aR fuse for this case is the *FNH3-710K-A,* as its current is closest to the total current of the association (750 A) that also satisfies the I^2t criterion (I^2t of the fuse in 332 Vac is 163.7 kA^2s). Depending on the application, the number of starts per hour, overload current, rated voltage, ambient temperature and many other factors, the fuse may act inappropriately, but this is a less expensive solution than 6 fuses per phase in many ways and will guarantee short circuit protection for the Soft-Starter.

Appendix 2: Sizing tables of aR fuses when protecting SSW and CFW

Criteria used for the sizing of the aR fuses on the tables below:

- Voltage for I2t sizing:
  - Higher line voltage of the drive - SSW or CFW
    For example: SSW06 from 220 to 575 Vac - 575/Ö3 = 332 Vac (phase voltage applied on the fuse).
- Fuse current:
  - Considering the Overload vs. Time curves of the Soft Starters and VSDs and using the Cyclical Overload criteria
- Max. I2t of the fuse = 0.75 x I2t indicated on the manual of the CFW or SSW.

SSW06 - 220-575 Vac

SSW06 Plus [A]	aR WEG fuse recommended for standard connection				aR WEG fuse recommended in the delta connection of the motor			
	Reference	Size	In [A]	Qty in parallel	Reference	Size	In [A]	Qty in parallel
10	FNH00-40-K-A	00	40	1	FNH1-63-K-A	Connection not applicable		
16	FNH00-40-K-A	00	40	1	FNH1-63-K-A	Connection not applicable		
23	FNH00-80-K-A	00	80	1	FNH00-125-K-A	Connection not applicable		
30	FNH00-125-K-A	00	125	1	FNH00-125-K-A	Connection not applicable		
45	FNH00-125-K-A	00	125	1	FNH1-200-K-A	1	200	1
60	FNH00-160-K-A	00	160	1	FNH1-200-K-A	1	200	1
85	FNH00-250-K-A	00	250	1	FNH2-400-K-A	2	400	1
130	FNH1-400-K-A	1	400	1	FNH3-500-K-A	3	500	1
170	FNH2-630-K-A	2	630	1	FNH3-710-K-A	3	710	1
205	FNH2-630-K-A	2	630	1	FNH3-710-K-A	3	710	1
255	FNH3-710-K-A	3	710	1	FNH3-400-K-A	3	400	2
312	FNH3-710-K-A	3	710	1	FNH2-310-K-A	2	315	3
365	FNH3-710-K-A	3	710	1	FNH3-500-K-A	3	500	2
412	FNH3-1000-K-A	3	1000	1	FNH3-710-K-A	3	710	2
480	FNH2-630-K-A	2	630	2	FNH3-1000-K-A	3	1000	2
604	FNH2-710-K-A	2	710	2	FNH3-1000-K-A	3	1000	2
670	FNH3-800-K-A	3	800	2	FNH3-800-K-A	3	800	3
820	FNH3-900-K-A	3	900	2	FNH3-800-K-A	3	800	3
950	FNH3-1000-K-A	3	1000	2	FNH3-900-K-A	3	900	3
1100	FNH2-710-K-A	2	710	3	FNH3-1000-K-A	3	1000	3 (1)
1400	FNH3-900-K-A	3	900	3	FNH3-1000-K-A	3	1000	4 (1)

1) For this application the fuse can only be mounted on BNH individual fuse base.

SSW07 - 220-575 Vac

SSW07 [A]	aR WEG fuse recommended for standard connection			
	Reference	Size	In [A]	Qty in parallel
17	FNH1-63-K-A	1	63	1
24	FNH00-80-K-A	00	80	1
30	FNH00-100-K-A	00	100	1
45	FNH00-125-K-A	00	125	1
61	FNH00-160-K-A	00	160	1
85	FNH00-250-K-A	00	250	1
130	FNH1-400-K-A	1	400	1
171	FNH2-500-K-A	2	500	1
200	FNH2-630-K-A	2	630	1
255	FNH3-500-K-A	3	500	1
312	FNH3-710-K-A	3	710	1
365	FNH3-710-K-A	3	710	1
412	FNH3-500-K-A	3	500	2

SSW08 - 220-575 Vac

SSW08 [A]	aR WEG fuse recommended for standard connection			
	Reference	Size	In [A]	Qty in parallel
17	FNH1-63-K-A	1	63	1
24	FNH00-80-K-A	00	80	1
30	FNH00-100-K-A	00	100	1
45	FNH00-160-K-A	00	160	1
61	FNH1-200-K-A	1	200	1
85	FNH00-250-K-A	00	250	1
130	FNH2-400-K-A	2	400	1
171	FNH2-500-K-A	2	500	1
200	FNH2-630-K-A	2	630	1
255	FNH3-500-K-A	3	500	1
312	FNH3-710-K-A	3	710	1
365	FNH3-710-K-A	3	710	1
412	FNH3-500-K-A	3	500	2

CFW09 - 220-230 / 380-480 Vac

CFW09 Rated current and voltage of the VSD A / Volts		aR WEG fuse recommended for standard connection		
CT	VT	Reference	Size	In [A]
6.0/220-230	-	FNH00-25-K-A	00	25
7.0/220-230	-	FNH00-25-K-A	00	25
10/220-230	-	FNH00-35-K-A	00	35
13/220-230	-	FNH00-35-K-A	00	35
16/220-230	-	FNH00-35-K-A	00	35
24/220-230	-	FNH00-40-K-A	00	40
28/220-230	-	FNH00-50-K-A	00	50
45/220-230	-	FNH00-80-K-A	00	80
54/220-230	68/220-230	FNH00-100-K-A	00	100
70/220-230	86/220-230	FNH00-125-K-A	00	125
86/220-230	105/220-230	FNH00-160-K-A	00	160
105/220-230	130/220-230	FNH00-200-K-A	00	200
130/220-230	150/220-230	FNH1-250-K-A	1	250
3.6/380-480	-	FNH00-20-K-A	00	20
4.0/380-480	-	FNH00-20-K-A	00	20
5.5/380-480	-	FNH00-25-K-A	00	25
9.0/380-480	-	FNH00-25-K-A	00	25
13/380-480		FNH00-35-K-A	00	35
16/380-480		FNH00-35-K-A	00	35
24/380-480	-	FNH00-40-K-A	00	40
30/380-480	36/380-480	FNH00-63-K-A	00	63
38/380-480	45/380-480	FNH00-80-K-A	00	80
45/380-480	54/380-480	FNH00-80-K-A	00	80
60/380-480	70/380-480	FNH00-125-K-A	00	125
70/380-480	86/380-480	FNH00-125-K-A	00	125
86/380-480	105/380-480	FNH00-160-K-A	00	160
105/380-480	130/380-480	FNH00-200-K-A	00	200
142/380-480	174/380-480	FNH1-250-K-A	1	250
180/380-480	-	FNH1-350-K-A	1	350
211/380-480	-	FNH1-400-K-A	1	400
240/380-480	-	FNH2-450-K-A	2	450
312/380-480	-	FNH2-630-K-A	2	630
361/380-480	-	FNH3-710-K-A	3	710
450/380-480	-	FNH3-900-K-A	3	900
515/380-480	-	FNH3-1000-K-A	3	1000
600/380-480	-	FNH3-1000-K-A	3	1000 (1)

(1) For this application the fuse can only be mounted on BNH individual fuse base.

CFW09 - 500-690 Vac

CFW09 Rated current and voltage of the VSD A / Volts		aR WEG fuse recommended for standard connection		
CT	VT	Reference	Size	In [A]
2.9/500-600	4.2/500-600	FNH00-20-K-A	00	20
4.2/500-600	7.0/500-600	FNH00-20-K-A	00	20
7.0/500-600	10/500-600	FNH00-25-K-A	00	25
10/500-600	12/500-600	FNH00-25-K-A	00	25
12/500-600	14/500-600	FNH00-35-K-A	00	35
14/500-600	-	FNH00-35-K-A	00	35
22/500-600	27/500-600	FNH00-50-K-A	00	50
27/500-600	32/500-600	FNH00-63-K-A	00	63
32/500-600	-	FNH00-63-K-A	00	63
44/500-600	53/500-600	FNH00-80-K-A	00	80
53/500-600	63/500-600	FNH00-100-K-A	00	100
63/500-600	79/500-600	FNH00-125-K-A	00	125
79/500-600	99/500-600	FNH00-160-K-A	00	160
100/660-690	127/660-690	FNH00-200-K-A	00	200
107/500-690	147/500-690	FNH00-250-K-A	00	250
127/660-690	179/660-690	FNH1-315-K-A	1	315
147/500-690	196/500-690	FNH1-350-K-A	1	350
179/660-690	179/660-690	FNH1-350-K-A	1	350
211/500-690	-	FNH1-400-K-A	1	400
225/660-690	259/660-690	FNH2-450-K-A	2	450
247/500-690	315/500-690	FNH2-500-K-A	2	500
259/660-690	305/660-690	FNH2-630-K-A	2	630
305/660-690	340/660-690	FNH2-630-K-A	2	630
315/500-690	343/500-690	FNH2-710-K-A	2	710
340/660-690	428/660-690	FNH3-800-K-A	3	800
343/500-690	418/500-690	FNH3-710-K-A	3	710
418/500-690	472/500-690	FNH3-900-K-A	3	900
428/660-690	428/660-690	FNH3-900-K-A	3	900
472/500-690	555/500-690	FNH3-1000-K-A	3	1000

CFW700 - 220-240 / 380-480 Vac

CFW700			aR WEG fuse recommended for standard connection		
Reference	Voltage [Vac]	Rated current [A]	Reference	Size	In [A]
CFW700A06P0S2	220-240	6	FNH00-20K-A	00	20
CFW700A07P0S2	220-240	7	FNH00-20K-A	00	20
CFW700A10P0S2	220-240	10	FNH00-25K-A	00	25
CFW700A06P0B2	220-240	6	FNH00-20K-A	00	20
CFW700A07P0B2	220-240	7	FNH00-20K-A	00	20
CFW700A07P0T2	220-240	7	FNH00-20K-A	00	20
CFW700A10P0T2	220-240	10	FNH00-25K-A	00	25
CFW700A13P0T2	220-240	13	FNH00-25K-A	00	25
CFW700A16P0T2	220-240	16	FNH00-35K-A	00	35
CFW700B24P0T2	220-240	24	FNH00-40K-A	00	40
CFW700B28P0T2	220-240	28	FNH00-40K-A	00	40
CFW700B33P5T2	220-240	33.5	FNH00-50K-A	00	50
CFW700C45P0T2	220-240	45	FNH00-80K-A	00	80
CFW700C54P0T2	220-240	54	FNH00-80K-A	00	80
CFW700C70P0T2	220-240	70	FNH00-100K-A	00	100
CFW700D86P0T2	220-240	86	FNH1-125K-A	00	125
CFW700D0105T2	220-240	105	FNH00-125K-A	00	125
CFW700E0142T2	220-230	142	FNH1-250K-A	00	250
CFW700E0180T2	220-230	180	FNH1-315K-A	1	315
CFW700E0211T2	220-230	211	FNH1-350K-A	1	350
CFW700A03P6T4	380-480	3.6	FNH00-20K-A	00	20
CFW700A05P0T4	380-480	5	FNH00-20K-A	00	20
CFW700A07P0T4	380-480	7	FNH00-20K-A	00	20
CFW700A10P0T4	380-480	10	FNH00-25K-A	00	25
CFW700A13P5T4	380-480	13.5	FNH00-25K-A	00	25
CFW700B17P0T4	380-480	17	FNH00-35K-A	00	35
CFW700B24P0T4	380-480	24	FNH00-40K-A	00	40
CFW700B31P0T4	380-480	31	FNH00-40K-A	00	40
CFW700C38P0T4	380-480	38	FNH00-50K-A	00	50
CFW700C45P0T4	380-480	45	FNH00-63K-A	00	63
CFW700C58P5T4	380-480	58.5	FNH1-80K-A	00	80
CFW700D70P5T4	380-480	70.5	FNH1-80K-A	00	80
CFW700D88P0T4	380-480	88	FNH1-125K-A	00	125
CFW700E0105T4	380-480	105	FNH1-160K-A	00	160
CFW700E0142T4	380-480	142	FNH1-250K-A	00	250
CFW700E0180T4	380-480	180	FNH1-315K-A	1	315
CFW700E0211T4	380-480	211	FNH1-350K-A	1	350

CFW11 - 220-240 / 380-480 Vac

CFW11 – 220-240 / 380-480Vac			aR WEG fuse recommended for standard connection		
Reference	Voltage [Vac]	Rated current [A]	Reference	Size	In [A]
CFW110006B2	200-240	6	FNH00-20K-A	00	20
CFW110006S2OFA	200-240	6	FNH00-20K-A	00	20
CFW110007B2	200-240	7	FNH00-20K-A	00	20
CFW110007S2OFA	200-240	7	FNH00-20K-A	00	20
CFW110007T2	200-240	7	FNH00-20K-A	00	20
CFW110010S2	200-240	10	FNH00-20K-A	00	20
CFW110010T2	200-240	10	FNH00-20K-A	00	20
CFW110013T2	200-240	13	FNH00-25K-A	00	25
CFW110016T2	200-240	16	FNH00-35K-A	00	35
CFW110024T2	200-240	24	FNH00-40K-A	00	40
CFW110028T2	200-240	28	FNH00-40K-A	00	40
CFW110033T2	200-240	33	FNH00-50K-A	00	50
CFW110045T2	200-240	45	FNH00-63K-A	00	63
CFW110054T2	200-240	54	FNH00-80K-A	00	80
CFW110070T2	200-240	70	FNH00-100K-A	00	100
CFW110086T2	200-240	86	FNH1-100K-A	1	100
CFW110105T2	200-240	105	FNH00-125K-A	00	125
CFW110142T2	200-240	142	FNH1-250K-A	1	250
CFW110180T2	200-240	180	FNH1-315K-A	1	315
CFW110211T2	200-240	211	FNH1-350K-A	1	350
CFW110003T4	380-480	3	FNH00-20K-A	00	20
CFW110005T4	380-480	5	FNH00-20K-A	00	20
CFW110007T4	380-480	7	FNH00-20K-A	00	20
CFW110010T4	380-480	10	FNH00-20K-A	00	20
CFW110013T4	380-480	13	FNH00-25K-A	00	25
CFW110017T4	380-480	17	FNH00-35K-A	00	35
CFW110024T4	380-480	24	FNH00-35K-A	00	35
CFW110031T4	380-480	31	FNH00-50K-A	00	50
CFW110038T4	380-480	38	FNH00-50K-A	00	50
CFW110045T4	380-480	45	FNH00-63K-A	00	63
CFW110058T4	380-480	58	FNH1-80K-A	1	80
CFW110070T4	380-480	70	FNH1-80K-A	1	80
CFW110088T4	380-480	88	FNH1-100K-A	1	100
CFW110105T4	380-480	105	FNH1-200K-A	1	200
CFW110142T4	380-480	142	FNH1-250K-A	1	250
CFW110180T4	380-480	180	FNH1-315K-A	1	315
CFW110211T4	380-480	211	FNH1-350K-A	1	350
CFW110242T4	380-480	242	FNH2-400K-A	2	400
CFW110312T4	380-480	312	FNH2-500K-A	2	500
CFW110370T4	380-480	370	FNH2-630K-A	2	630
CFW110477T4	380-480	477	FNH3-710K-A	3	710
CFW110515T4	380-480	515	FNH3-900K-A	3	900
CFW110601T4	380-480	601	FNH3-1000K-A	3	1000 (1)
CFW110720T4	380-480	720	FNH3-1000K-A	3	1000 (1)

(1) For this application the fuse can only be mounted on BNH individual fuse base.

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