df Electric

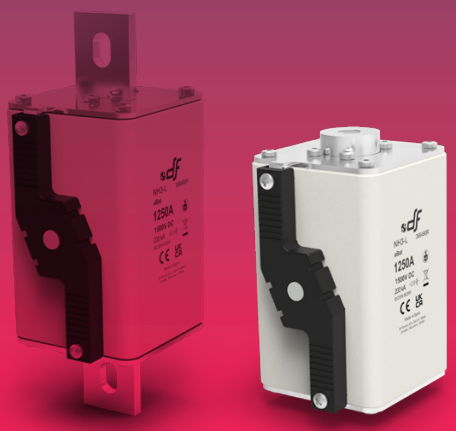
BESS
BATTERY STORAGE

aBat

NH XL 1500V DC

fuse links

NH aBat NH3 L FLUSH END CONTACT



BOLTED BLADE

FLUSH END CONTACT

PROTECTING THE WORLD

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BESS BATTERY STORAGE

NH3 L · FLUSH END CONTACT

RATED VOLTAGE
1500V DC

RATED CURRENT
450A...1250A

BREAKING CAPACITY
200kA

STANDARDS
IEC/EN 60269-1
IEC/EN 60269-7
UL248-1
UL248-21

NH3 L 1500V DC fuse links to protect battery energy storage systems (BESS)

NH3 L aBat fuse links are specially designed to protect battery energy storage systems (BESS).

Provide excellent protection against short-circuits for the batteries as well as other devices of the installation such as contactors, switches, etc.

Thanks to the design of their melting elements, the materials employed and their construction with solidified sand, these fuse links provide excellent characteristics:

- Ultra-fast acting.
- Very good current limiting.
- Very low I^2t values.
- High breaking capacity.
- Excellent cycling capability.

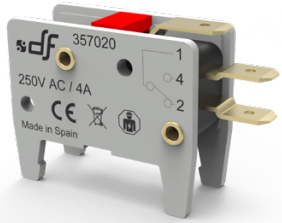
The range comprises the following fuse links:

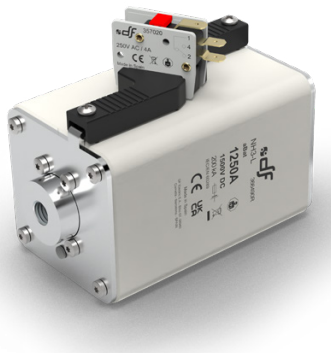
→ **Size NH3 L aBat 1500V DC 450A to 1250A**

These fuse links have a striker that can be used as a visual indication or can be equipped with a microswitch mounted on the fuse link.

RoHS COMPLIANT

Accessories





REFERENCE	DESCRIPTION	PACKING Uni /BOX
357020	MICROSWITCH FOR NH3 L BOLTED BLADE & FLUSH END CONTACT FUSE LINK **250V | 4A**	5/50

Range

In (A)	REFERENCE	PACKING Uni /BOX
450	**366463R**	1/5
500	**366465R**	1/5
550	**366467R**	1/5
630	**366470R**	1/5
700	**366472R**	1/5
800	**366475R**	1/5
900	**366480R**	1/5
1000	**366485R**	1/5
1100	**366487R**	1/5
1250	**366490R**	1/5

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Technical data

Rated voltage	1500V DC L/R ≤ 3ms
Rated current	450A...1250A
Rated breaking capacity	200kA
Operating class	aBat
Minimum breaking current	10·In
Maximum altitude *	2000m
Storage temperature	-40°C ... 90°C
Operating temperature **	-40°C ... 80°C

* For altitudes higher than 2000m it is necessary to apply a derating in maximum current (consult us).
** For ambient temperatures higher than 25ºC it is necessary to apply a derating in maximum current.

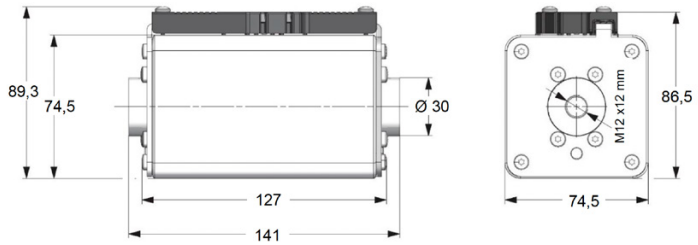
Standards

IEC/EN 60269-1
IEC/EN 60269-7
UL248-1
UL248-21
RoHS Compliant

Materials

Body	High grade ceramics (alumina)
Contact blades | Flush end contacts	Copper (tin plated)
Plates	Brass (tin plated)
Screws	Zinc plated steel

Dimensions

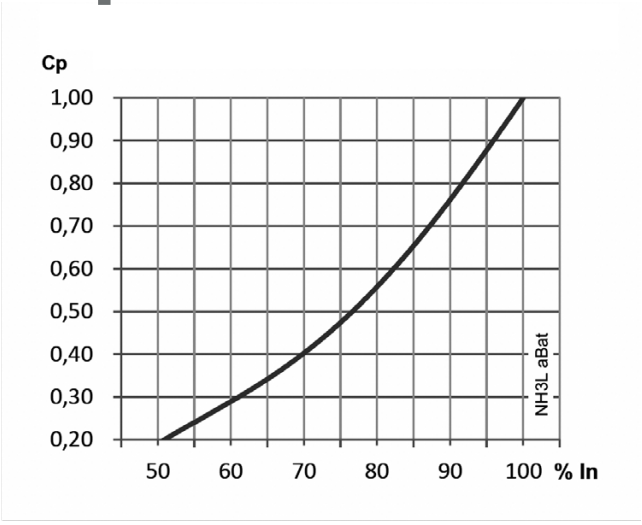


Weight 2,18kg

Power dissipation

I_n	PREARCING I^2t	OPERATING I^2t	POWER DISSIPATION I_n
(A)	(A^2S)	(A^2S)	(W)
450	79200	216380	120
500	107800	294520	142
550	140800	384680	153
630	163300	446140	198
700	220000	601070	230
800	316800	865540	240
900	431220	1178000	256
1000	563220	1538700	270
1100	712830	1947400	285
1250	1079790	2950000	295

Correction factor for power loss



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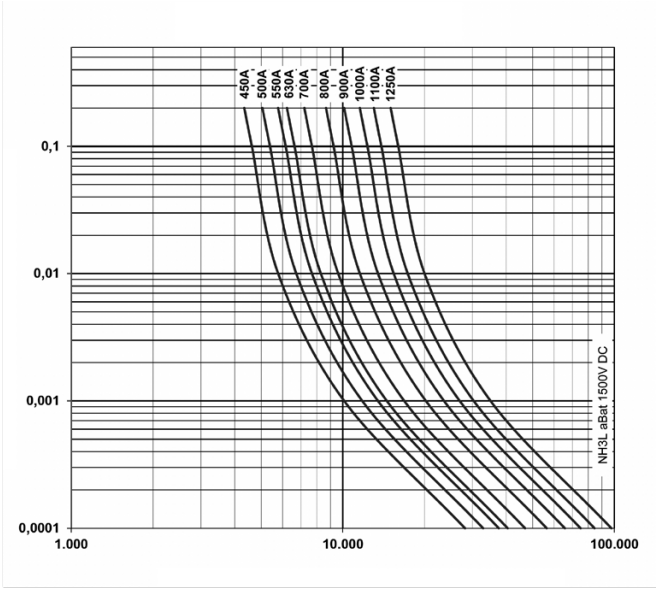
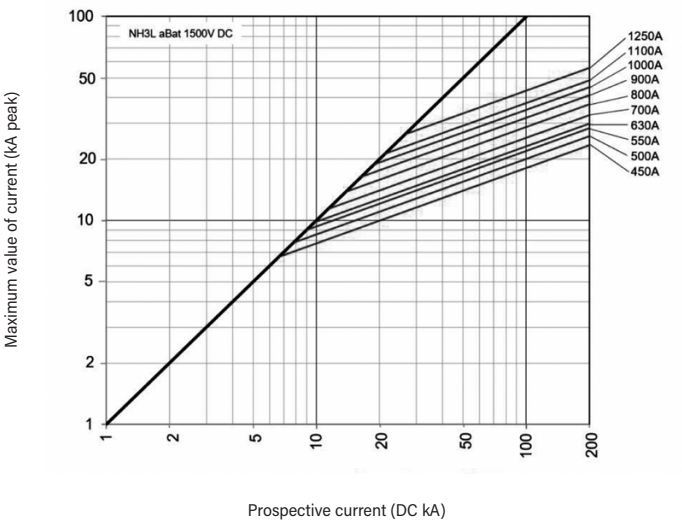
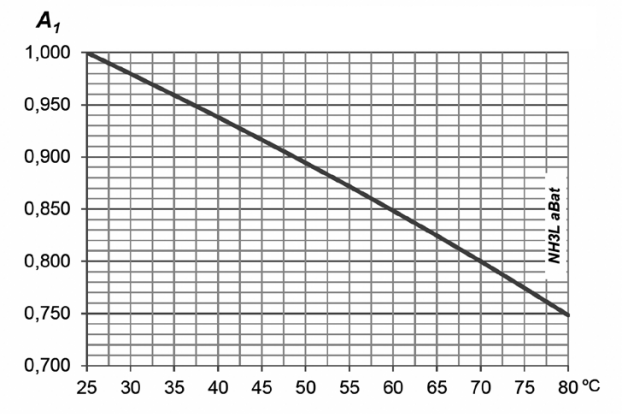
t-I characteristics



Cut-off characteristics

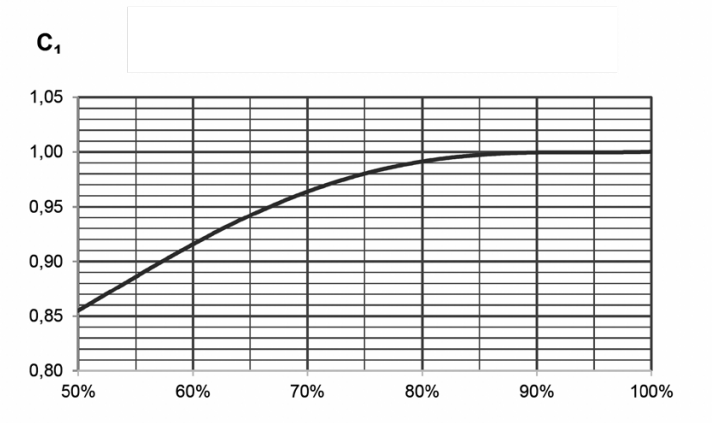


Ambient temperature derating factor



t_a (°C)	A_1
25	1,000
30	0,980
35	0,959
40	0,938
45	0,917
50	0,894
55	0,872
60	0,849
65	0,825
70	0,800
75	0,775
80	0,748

Conductor size correction factor



Percentage of the recommended conductor size (100% = 1,3 A/mm²)

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TECHNICAL CHARACTERISTICS
(Introduction)

Power dissipation correction factor C_P

Power dissipation values are given at rated current (I_n). It is possible to calculate values of power dissipation for other currents multiplying these values by correction factor C_P for power loss as a function of % of rated current.

Ambient temperature correction coefficient A_1

Fuse link current ratings are established by type tests conducted in laboratory with an ambient temperature of 25°C.

When the utilization ambient temperature is higher than this reference value, the fuse link must be "de-rated".

The rated current of fuselink must be multiplied by a derating factor A_1 to find the maximum operating current.

Conductor size correction factor C_1

These fuses generate a lot of heat that is partly evacuated by thermal conduction through the conductors (cables or busbars). In some applications, the fuse will work with conductor sections lower than those used in standard type tests carried out in the laboratory according to Standards IEC/EN 60269, which means that the heat generated by the fuse does not be evacuated optimally.

To compensate for this lack of conduction cooling, a correction coefficient is applied. To obtain the value of the C_1 coefficient from the curve, we have to calculate the current density value at which the conductors will work and determine what % of the reference value it represents.

A current density of 1.3A/mm^2 is considered as the reference value (100%).
In the event that the two conductors are not the same, we can use the average value of the two current density values.

Current variation correction factor A_2

In battery energy storage systems (BESS) current variations occur continuously due to the power output demand. This, combined with the batteries charge and discharge cycles causes continuous current variation through the fuse links generating heating and cooling which can lead to mechanical fatigue in the melting element.

To prevent premature aging that leads to undesirable operation of the fuse links, we must apply a safety factor, which we select based on the number of battery charge-discharge cycles:

frequency	A_2 factor
Several cycles per day	0,65
One cycle per day	0,75
One cycle per week	0,80
One cycle per month (or less)	0,95

The typical value to use would be that of a daily cycle (A_2 = 0,75).

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Selection and application's guide

The rated voltage of these fuses (1500V DC) is the maximum working voltage, so they can be used in systems with a working voltage up to 1500V DC.

To select the rated current of the fuse link to be used, the following points must be considered:

· Working current (I_L).
· Ambient temperature correction factor (A_1).
· Conductor size correction factor (C_1).
· Current fluctuation correction factor (A_2).

By applying the following formula, we can determine the minimum rated current of the fuse link to be used:

$$I_N \text{ (fuse link)} \geq \frac{I_L}{A_1 \cdot C_1 \cdot A_2}$$

EXAMPLE

We have an installation with the following characteristics:

· Working current: 500A
· Ambient temperature surrounding the fuses: 45°C
· Cross-sectional busbars of the fuses: 250 mm²
· One cycle per day

With this information we will determine the different coefficients:

From the graph "AMBIENT TEMPERATURE DERATING FACTOR" we obtain a factor of 0,917 for an ambient temperature of 45°C.

A_1 = 0,917

With a 250 mm² busbars, the current density will be 500A/250 mm² = 2A/mm²; And with respect to the density reference (1,3A/mm²):

(1,3/2) · 100 = 65%

From the graph "CONDUCTOR SIZE CORRECTION FACTOR" we obtain a factor of 0,94 for 65%

C_1 = 0,94

Since we consider a daily charge/discharge cycle, the current fluctuation coefficient is ➔ **A_2 = 0,75**

With these values, we can now apply the formula:

$$I_N \text{ (fuse link)} \geq \frac{I_L}{A_1 \cdot C_1 \cdot A_2}$$

$$I_N \text{ (fuse link)} \geq \frac{500A}{0,917 \cdot 0,940 \cdot 0,75}$$

$$I_N \text{ (fuse link)} \geq 773 \text{ A}$$

We should select the next available rated current, in this case **800A**.

For special working conditions such as altitudes above 2000m above sea level or forced air cooling, please consult us.

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Installation guidelines

NH3 L aBat fuses require correct installation to ensure proper operation.

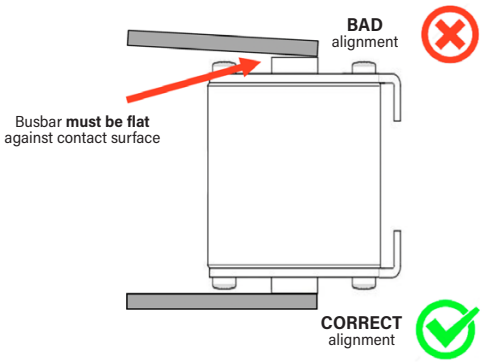
When installing several fuses together, a minimum distance of 15 mm between them is recommended, to ensure electrical clearances and proper heat evacuation.

It is very important that the contact between the fuse link and the fuse-base or the connecting busbars/cables is optimal, because in addition to the electrical contact itself, it must be taken into account that these fuses generate a lot of heat that is partially evacuated by thermal conduction through these connections.

Bad connection due to inadequate assembly or lack of maintenance may cause overheating of the fuse and could reduce the expected life of the fuse.

The use of copper conductors and busbars is recommended.

Excessive tension, compression or torsion that could be caused by a misalignment between the fuse and the connection busbars must be avoided.



It is important to apply the correct tightening torques when mounting the fuses.

The contacts should be retightened at least once a year.

FLUSH END CONTACT

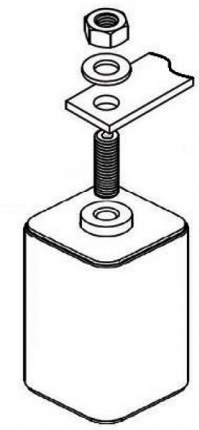
To prevent any damage inside these fuses, the use of screws to make the connection is not recommended.

It is recommended to make the connection using threaded studs according to DIN 913 (ISO 4026) or DIN 916 (ISO 4029) with the corresponding nut.

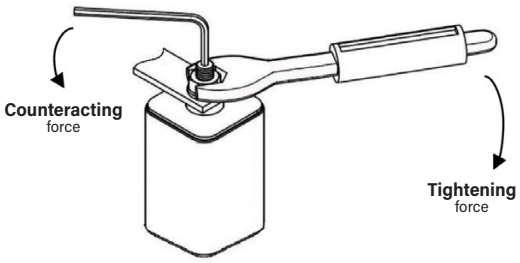
It is recommended to include a conical contact washer (NF E 25-511) or a flat washer (DIN 125) plus some elastic fixing element like a spring curved washer (DIN 137), a grower washer (DIN 127 - DIN 7980), a serrated lock washer (DIN 6798A) or similar.

The stud must be screwed onto the fuse with a tightening torque of approximately 5Nm. The recommended tightening torque for the nut is as follows:

Size	Thread	Recommended torque
NH3 L	M12	45…55Nm



When tightening the nuts using the torque wrench, it is recommended to use an Allen key to prevent the stud from turning.



PROTECTING THE WORLD

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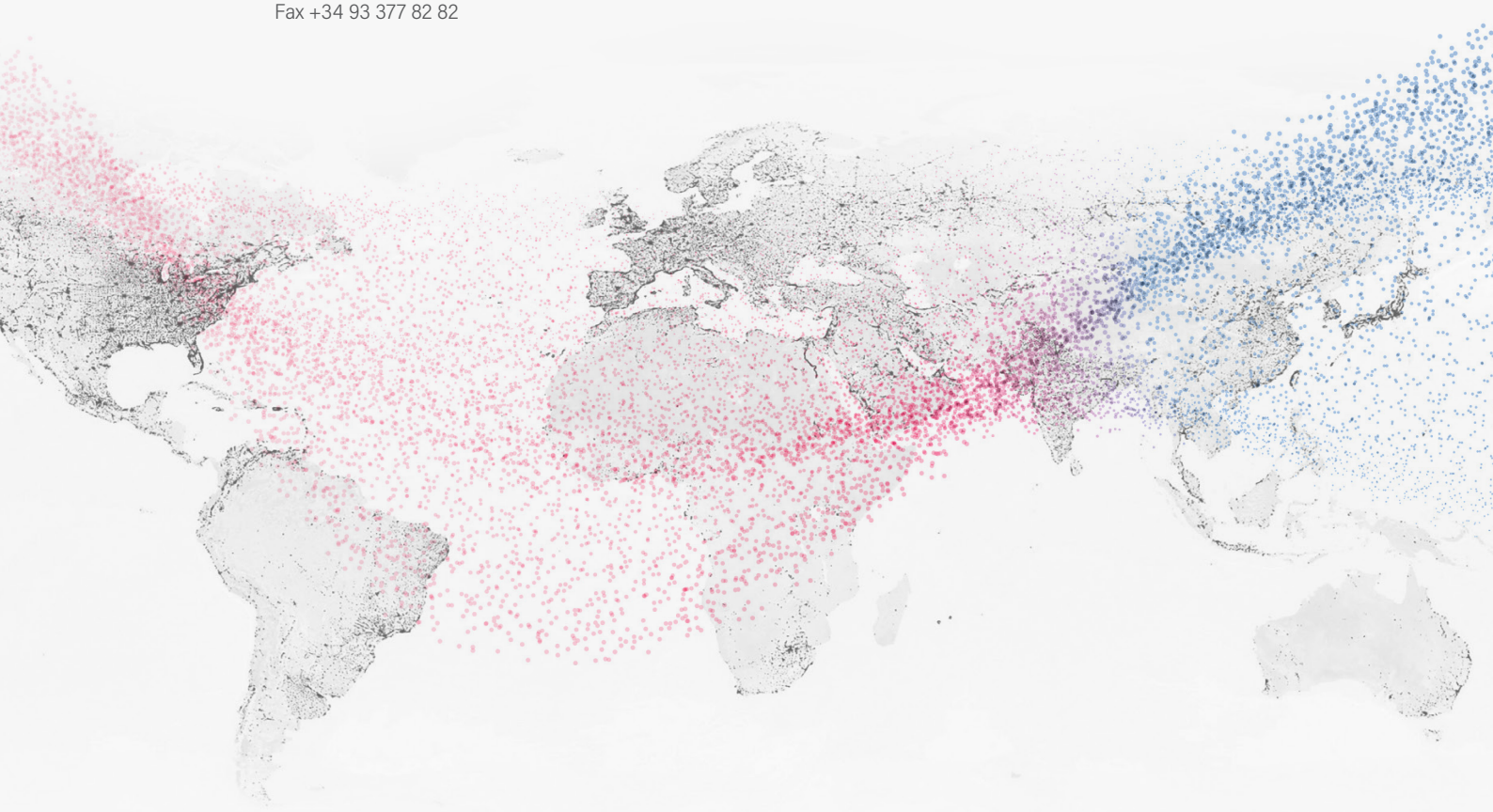

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MADE IN SPAIN

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The "electro technical expert" logo marked on the products included in this data sheet indicates that the installation of these products must be carried out by expert personnel with specialized knowledge.

To prevent electrical hazards, carry out the installation without voltage.

Safety notice
Please capture the following QR code and read our safety notice carefully before installing our products.

The data reflected in this technical record are subject to the correct installation of the product in accordance with manufacturer's instructions, relevant installation standards and professional practices, maintained and used in applications for which they were made.

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