SIEMENS

LV HRC Fuses: DIN Type

Geared up for any situation

Answers for Infrastructure.

Fuses are the fastest & simplest current limiting devices. With a wide current range, multiple voltage ratings and high short circuit strength, Siemens 3NA fuses are perfectly equipped for overcurrent protection in buildings & industries. The unique combi- indication enables the user to view the fuse status, easily, even from a distance. With Siemens fuses, protection is easy, safe and reliable.

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Introduction

Short data description : 3NA7 LV HRC Fuses	
Standards	IS 13703 Part 2 Section 1(1993); IEC 60269-2
Dimensions	IS 13703; IEC 60269-2
Operating class	gG
Rated Voltage	AC 500V* / DC 440V upto 630A (DC 250V for size 00)
	AC 690V/DC 440V (DC 250V for size 00)
Rated Current Range	2A-800A, AC 500V
	40A-500A, AC 690V
Rated Breaking Capacity	AC 120kA / DC 25kA
Mounting position	as desired but preferably vertical
Resistance to climate	-30°C to +50°C at 95% relative humidity

LV HRC Fuses

During installations, when the HRC Fuses are mounted on the fuse bases or Switch Disconnector Fuse Units in panels above certain height, it is very difficult to identify the status of the fuse link; whether healthy or blown. This necessitates requirement of additional front indication.

The combination indicator Fuse has two indicators as against one used in conventional fuses. One indicator is on top cover plate similar to conventional fuses and other indicator is at the centre of the ceramic body of the fuse link. **This helps in clear identification of status of fuse also from the front.**

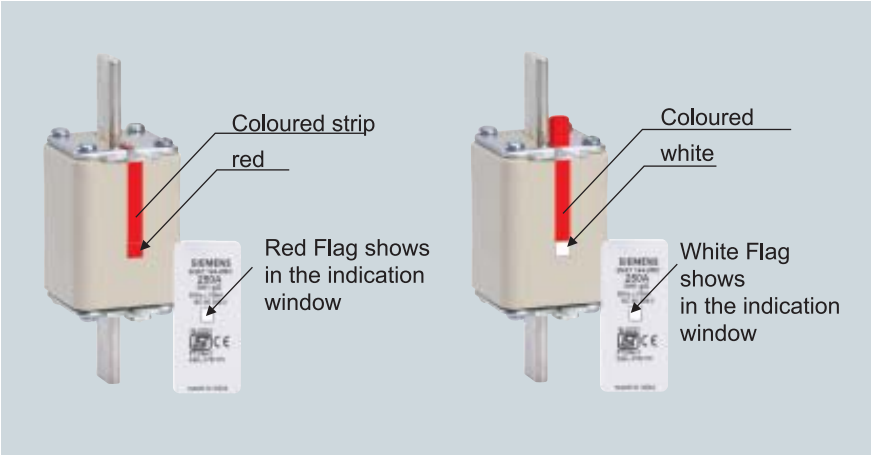
3NA7 LV HRC Fuses are available in 4 different sizes from 2 to 400A. The Size 3 fuses (315A -800A) continue to be with single indicator on top. The main part of the LV HRC fuse is the fuse element of high-grade copper. The important factors for conductivity are the resistance value per meter, the material thickness and the dimensional accuracy. Three important criteria in the production of the fuse elements are:

- Accurate cutting and punching
- Precise application of the solder deposit
- Accurate and concentric insertion of the fuse-element in the fuse body.

Where several fuse elements are involved, these are fitted exactly parallel to each other in the fuse body. This ensures adequate cooling of the individual arcs. The precision of the parallel arrangement can be verified by observing the beads of molten metal after the fuse has responded to short circuit. The fuse-element must not be too close to the wall of the fuse body or otherwise there will be no protective layer of sand. If the arc were to touch the wall of the fuse body, the fuse might burst or blow.

The fuse elements of 3NA7 & 3NA3 fuses are of operating class gG. The use of silver-plated or pure silver fuse-elements is not required for physical reasons.

Oxidation, also called scaling of copper, reduces the cross-section of the fuse-element. This occurs only at a temperature of approx. 350°C. In the time/current range within which a fuse operates, however, only temperatures of 180°C to 240°C are attained. Hence safe tripping is ensured with this fuse element.



Advantages

- High quality of fuse
- Less stresses to downstream equipments during short circuit due to lower let through current
- Low power losses resulting in high economy and minimal heating.
- Safe and reliable breaking capacity from the smallest overload upto the largest short-circuit current.
- Finely graded selectivity level for the optimum use of cable cross sections
- High resistance to ageing
- Constant characteristics even under different temperature conditions

* 400A (Size II) and 800A, are rated at 415V AC

Applications

Fuses are primarily used for the protection of cables and conductors against overload and short-circuit currents, and are also suitable for the protection of equipment. Some of the important applications are:

- Use in radial and ring networks with high selectivity
- For back-up protection of MCBs
- For protection of motor circuits in which operational short-term overloads and short-circuits occur
- Short circuit protection for switching devices such as contactors and circuit-breakers

The field of application for fuses include industrial installations, power supply utilities, equipment manufacturers, switchboards and control panels.

Selectivity

In an installation, as a rule, several fuses are connected in series. Selectivity ensures that in an emergency, only the faulty circuit is disconnected, and not the entire operation. Siemens fuses with operating class gG for a rated voltage up to ~230V are mutually selective in the ratio 1:1.25. This is due to the much lower tolerance range, ±5% of the time/current characteristics curve. The standard requires a ratio limit of 1:1.6, which our fuses clearly exceed. The cable sizes due to the smaller rated currents can also be reduced.

Breaking capacity

The fuses distinguish themselves with their high rated breaking capacity of alteast 120kA which is achieved through:

- Fuse element design and the manufacturing process
- Precise positioning of fuse element inside the fuse body
- Chemical purity, grain size and density of the quartz sand
- Resistance to pressure and temperature change on the ceramic fuse body

The basic requirements and circuit data for the testing, i.e. voltage, load factor, switching angle etc. are detailed in the international (IEC 60269) standards and Indian standard IS 13703.

Current limitation

Along with a reliable rated breaking capacity, the let through current of fuse links can also have a significant influence on the economy of an installation.

During the interruption of a short-ciruit by a fuse, the short-circuit current also flows through the upstream fuses. The short-circuit current is limited by the network impedance.

By the simultaneous melting of all narrow parts of the fuse element, partial electrical arcs assure quick breaking with greater current limitation. The current limitation is therefore, influenced substantially by the quality of manufacturing.

This strong current limiting property of 3NA7 protects the system for excessive loads.

Co-ordination for cable and line protection

To ensure co-ordination of fuses with respect to cable and line protection during overload, according to DIN 0100 part 430, the following conditions apply:

(1) $I_B \leq I_N \leq I_z$ (Nominal current range)

(2) $I_2 \leq 1.45 \times I_N$ (Tripping range)

I_B : Operating current of the circuit

I_N : Nominal current of selected protective device

I_z : Permissible current loading capacity at given operating conditions for the cable or line

I_2 : Tripping current of the protective device under determined conditions (large test current)

The factor 1.45 is an internationally accepted agreement between utilisation and level of protection for a conductor, when considering the disconnection limits and the possible protective device (e.g. fuses).

Co-ordination for cable and line protection

Siemens fuse links of the operating class gG completely conform to the supplementary part of the standard IEC 60269, the condition being:

"Disconnection with $I_2 = 1.45 \times I_N$ for the conventional continuous test under the particular test requirements according to the named supplementary part of standard IEC 60269".

A direct co-ordination is therefore possible.

Rated watt loss

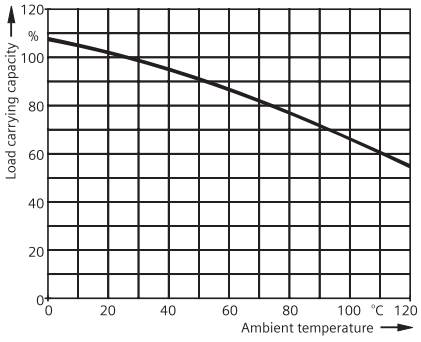
The economy of a fuse depends considerably on the rated watt loss. This should be kept as low as possible by minimal self-heating. Siemens fuses, considering their high breaking capacity, have rated power losses kept as low as possible.

These values lie far below the limits specified in the standards. That means minimal heating, reliable breaking capacity and high economy.

Load carrying capacity at higher ambient temperatures

Testing according to IEC 60269

According to IEC 60269, the shape of the time / current characteristic of LV HRC fuse links is referred to an ambient temperature of 20°C ± 5%°C. When being used at a higher ambient temperature (see diagram), a lower load carrying capacity should be anticipated. For example, at an ambient temperature of 50°C, a LV HRC fuse link should be loaded with only 90% of the rated current. The short-circuit behaviour is not affected by a high ambient temperature.



Selection & Ordering Data

LV HRC fuses : 500V AC

LV HRC fuse links

- According to IEC 60269/IS 13703
- Rated voltage (AC): 500V *
- Rated voltage (DC): 440V, upto 630A (250V for size 000/00)
- Utilization Category gG
- Rated breaking capacity: 120kA (AC), 25kA (DC)

	Size	Rating A	Order No.	Weight per unit kg
	000	2 4 6 10	3NA7 802-0RC 3NA7 804-0RC 3NA7 801-0RC 3NA7 803-0RC	0.125
	000	16 20 25 32	3NA7 805-0RC 3NA7 807-0RC 3NA7 810-0RC 3NA7 812-0RC	0.125
	000	40 50 63	3NA7 817-0RC 3NA7 820-0RC 3NA7 822-0RC	0.125
	000	80 100	3NA7 824-0RC 3NA7 830-0RC	0.125
	00	125 160	3NA7 832-0RC 3NA7 836-0RC	0.190
	1	50 63 80 100 125 160	3NA7 120-0RC 3NA7 122-0RC 3NA7 124-0RC 3NA7 130-0RC 3NA7 132-0RC 3NA7 136-0RC	0.270
	1	200 224 250	3NA7 140-0RC 3NA7 142-0RC 3NA7 144-0RC	0.450
	2	200 250	3NA7 240-0RC 3NA7 244-0RC	0.475
	2	315 *400	3NA7 252-0RC 3NA7 260-0RC	0.670
	3	315 400 500 630 *800	3NA3 352-0RC 3NA3 360-0RC 3NA3 365-0RC 3NA3 372-0RC 3NA3 375-4RC	1.040

* 400A (Size II) and 800A, are rated at 415V AC

Selection & Ordering Data

LV HRC fuses : 690V AC

LV HRC fuse links

- According to IEC 60269/IS 13703
- Rated voltage (AC): 690V
- Rated voltage (DC): 440V, (250V for size 00)
- Utilization Category gG
- Rated short circuit breaking capacity: 120kA (AC), 25kA (DC)

	Size	Rating A	Order No.	Weight per unit kg
	000	2	3NA7 802-6	0.122
		4	3NA7 804-6	0.130
		6	3NA7 801-6	0.122
		10	3NA7 803-6	0.124
		16	3NA7 805-6	0.123
		20	3NA7 807-6	0.128
		25	3NA7 810-6	0.120
		32	3NA7 812-6	0.128
		35	3NA7 814-6	0.129
	00	40	3NA7 817-6RC	0.190
		50	3NA7 820-6RC	
		63	3NA7 822-6RC	
		80	3NA7 824-6RC	
		100	3NA7 830-6RC	
	1	125	3NA7 132-6RC	0.270
		160	3NA7 136-6RC	0.270
		200	3NA7 140-6RC	0.450
	2	250	3NA7 244-6RC	0.670
		315	3NA7 252-6RC	
	3	400	3NA3 360-6RC	1.040
		425	3NA3 362-6RC	
		500	3NA3 365-6RC	

Selection & Ordering Data

LV HRC Fuse Bases

Fuse bases are available in four different ratings corresponding to different sizes of fuse links. They consist of an insulated base on which lyra contacts are fixed. Fuse links can be removed under live conditions. The fuse bases can be supplied either with screw terminals or plug in terminal connection.

The fuse bases are manufactured in accordance with IEC 269 & IS 13703

Rated voltage : AC 690V/DC 440V

Special Characteristics :

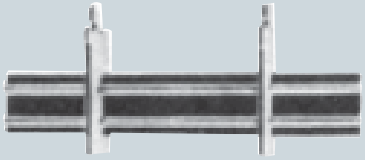
- Low contact resistance due to silver plated lyra contacts
- Easy handling due to special shape of lyra contacts
- Constant contact pressure ensures reliable current conduction

		Conductor - cross section upto mm^2	Order No.	Weight per unit kg
	• Size 00 Rated current 160A (Suitable for fuselink of size 000/00) Single pole			
	With screw in connection	95	3NH3 030	0.145
	With plug-in connection	6 to 70	3NH3 032	0.145
	• Size 1 Rated current 250A Single pole With screw in connection	150	3NH3 230	0.390
	• Size 2 Rated current 400A Single pole With screw in connection	300	3NH3 330	0.420
	• Size 3 Rated current 630A Single pole With screw in connection	2x40x5	3NH3 430	0.680
	• Size 3 Rated current 800A Single pole With screw in connection	2x40x5	3NH3 430-4RC	0.720

Selection & Ordering Data

Isolating Links

Together with fuse bases, these isolating links can effectively be used to serve as removable links in feeders instead of isolators. These are made of silver plated copper alloy in one piece and are similar in construction to the ribbed contact knife of the fuse link.

	Rating	Order No. (Nos.)	Weight per unit (Kg)
	160	3NG1 000	0.075
	250	3NG1 250	0.175
	400	3NG1 300	0.260
	630	3NG1 400	0.280

Fuse Pullers

Fuse puller with special insulated handle makes it possible to change fuses even under live conditions (on load). A mechanical lock provided on the fuse puller prevents the fuse link from drapping out the puller. The fuse link can be released by merely pressing the push button provided on a fuse puller.

Fuse Puller	Order No. Unit	Weight per unit (Kg)
3NX1 010  3NX1 011 	3NX1 010	0.205
	3NX1 011	0.560
	3NX1 014	0.480
3NX1 014 	**Fuse Puller** Type 3NX1 010, 3NX1 011, 3NX1 014 suitable for all sizes of fuse links and isolating links.	

3NX1 Signal Detector Link NEW

3NX1 signal detector links are used for the remote indication of the fuse status (whether fuse has blown or not). These links are to be used with fuses having non-insulated grip lugs.

	MLFB	Description	Fuse Size	Weight per unit (Kg)
	3NX1021	• Rated voltage upto 690V AC/600V DC • Contact: Microswitch 250V AC, 6A	000-4	0.036
	3NX1022* 3NA1023*	• Response voltage > 9V AC, 2.5A • Response voltage >2V; 7A	000-4	0.015 0.015
	3NX1024	• Rated voltage upto 690V AC/600V DC • Contact: Microswitch 230V AC, 6A	000-2	0.010

* To be used with 3NX1021

Characteristic Curves

LV HRC Fuse Links

Time-current characteristic chart

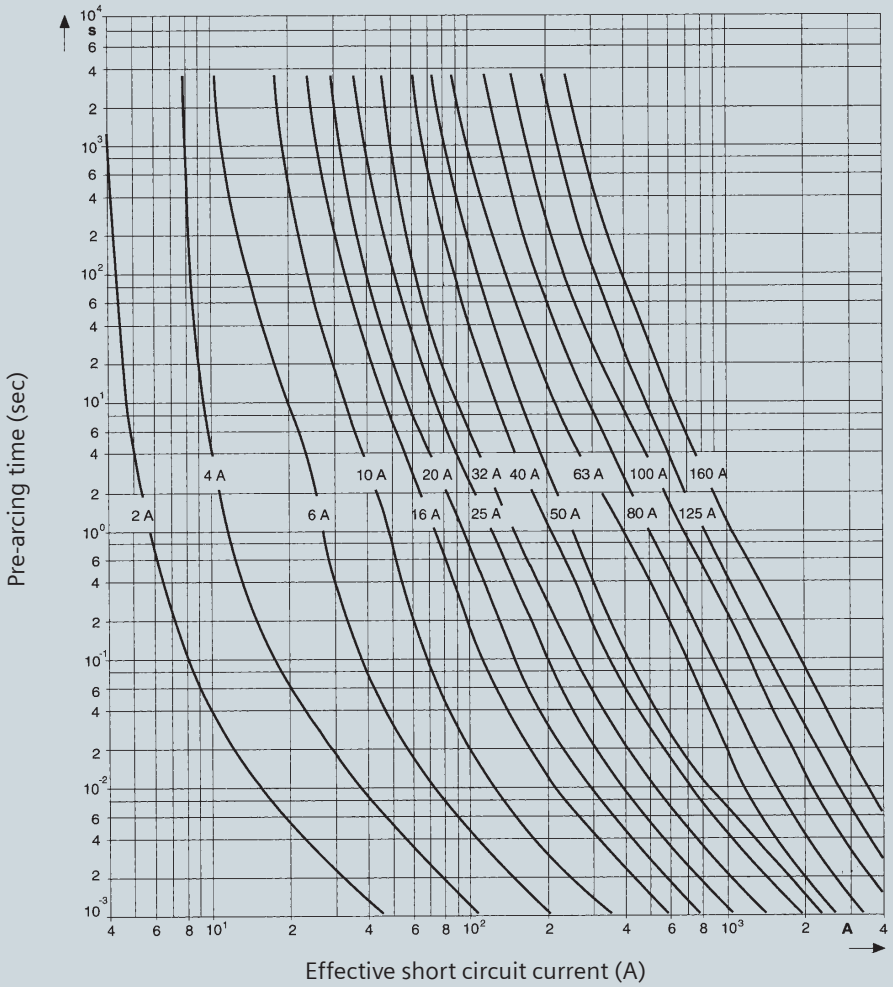
Range
3NA7 8

Size
000/00

Operating class
gG

Rated voltage
AC 500V / DC 250V

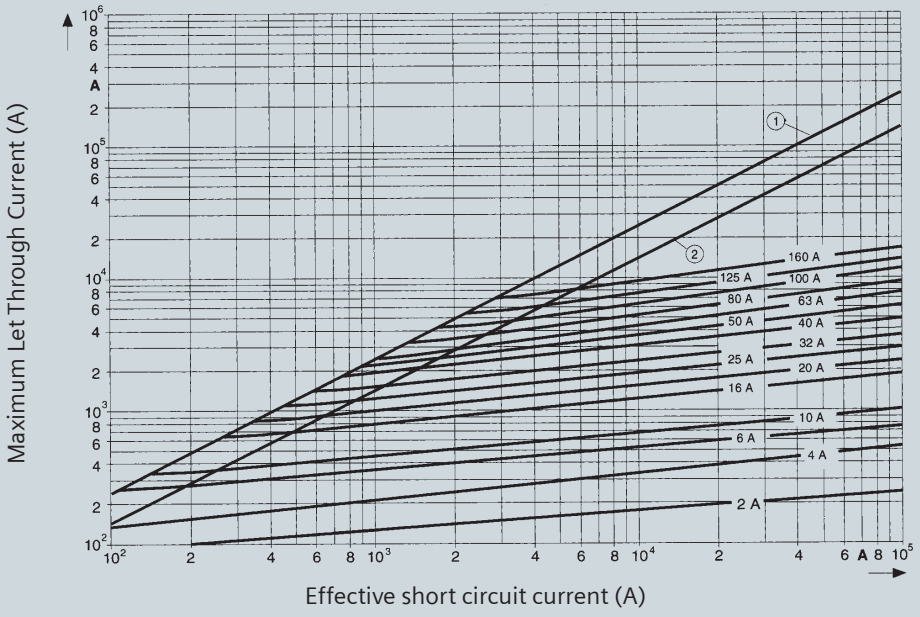
Rated current
2 - 160A



Peak let-through current chart

① Peak short circuit current with maximum DC component

② Peak short circuit current without DC component



Characteristic Curves

LV HRC Fuse Links

Time-current characteristic chart

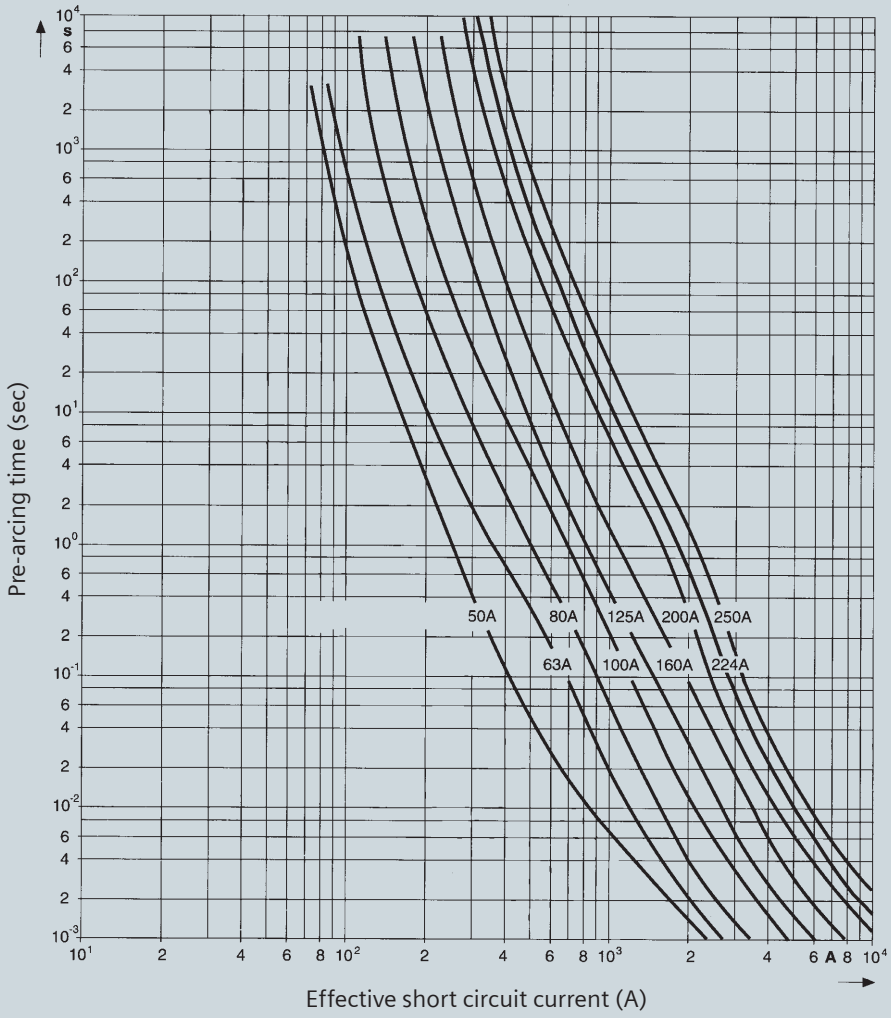
Range
3NA7 1

Size
1

Operating class
gG

Rated voltage
AC 500V / DC 440V

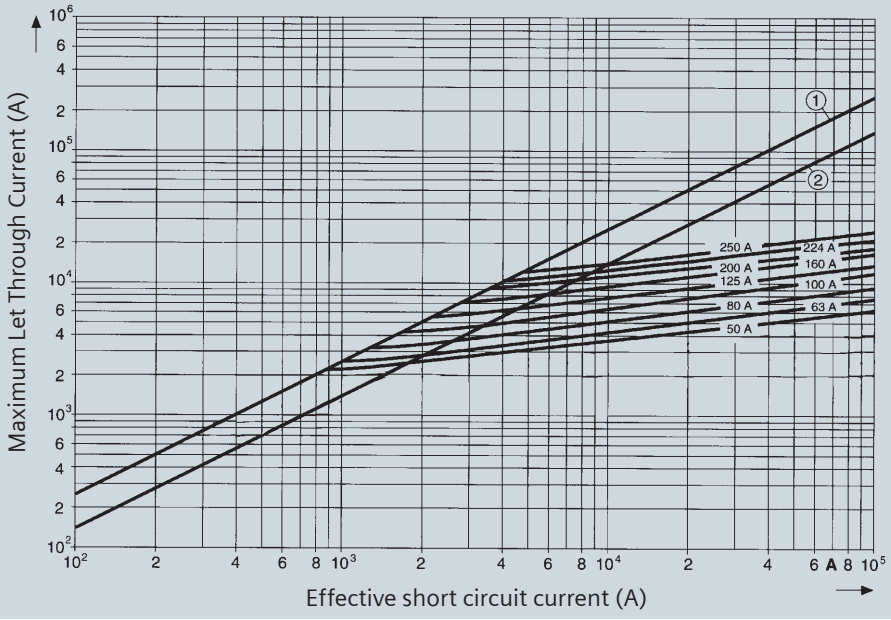
Rated current
50 - 250A



Peak let-through current chart

① Peak short circuit current with maximum DC component

② Peak short circuit current without DC component



Characteristic Curves

LV HRC Fuse Links

Time-current characteristic chart

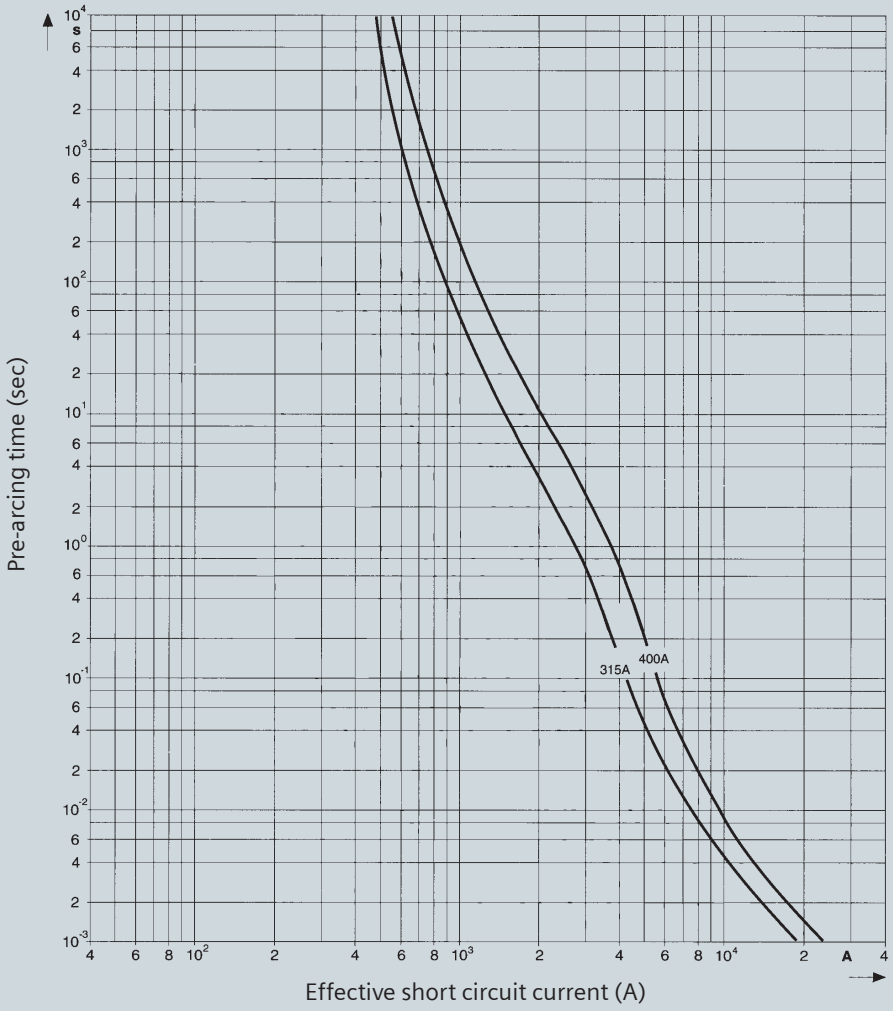
Range
3NA7 2

Size
2

Operating class
gG

Rated voltage
AC 500V* / DC 440V

Rated current
315 - 400A

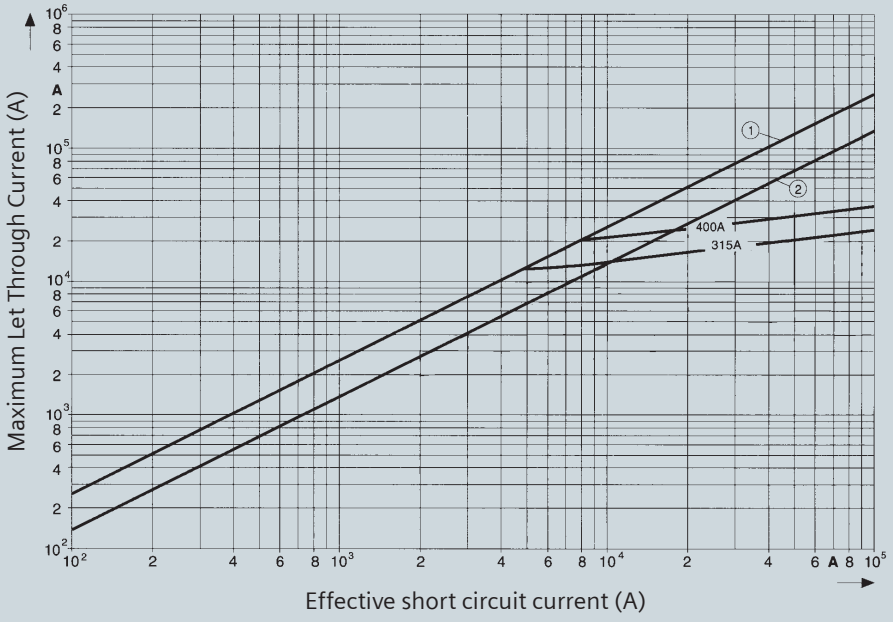


* 400A rated at 415V AC

Peak let-through current chart

① Peak short circuit current with maximum DC component

② Peak short circuit current without DC component



Characteristic Curves

LV HRC Fuse Links

Time-current characteristic chart

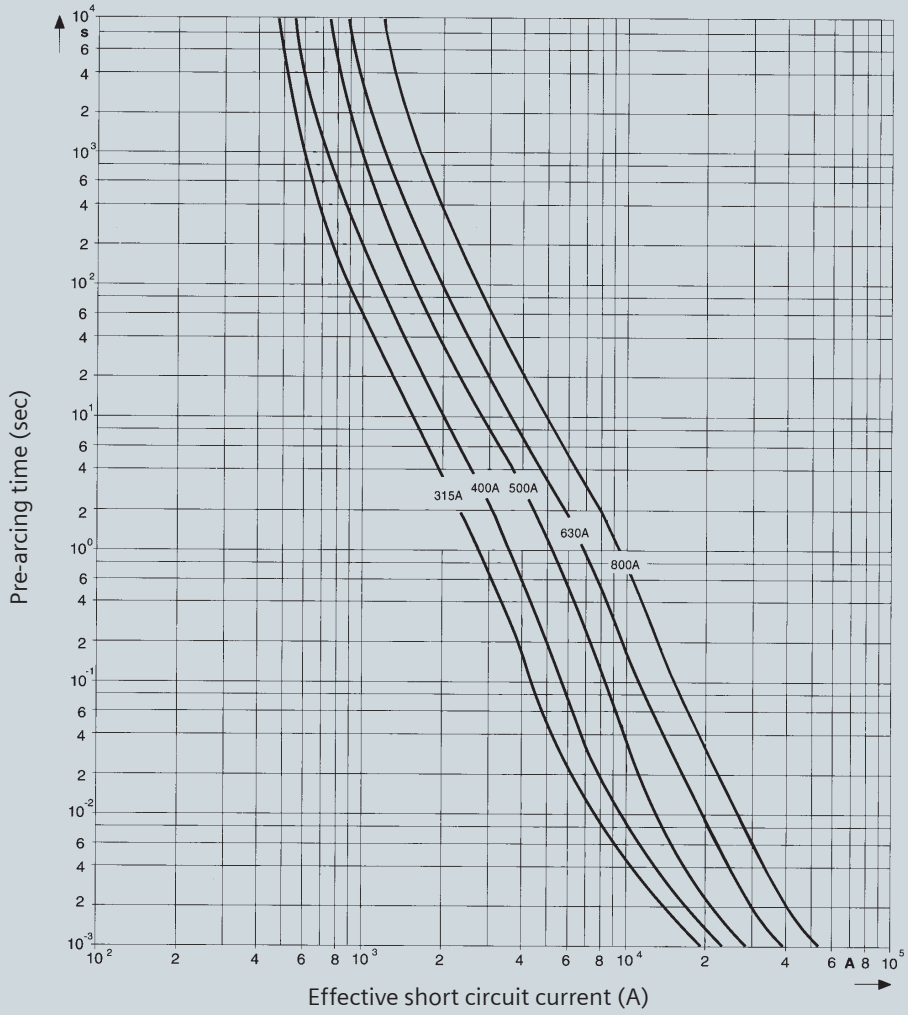
Range
3NA3 3

Size
3

Operating class
gG

Rated voltage
AC 500V* / DC440V

Rated current
315 - 800A

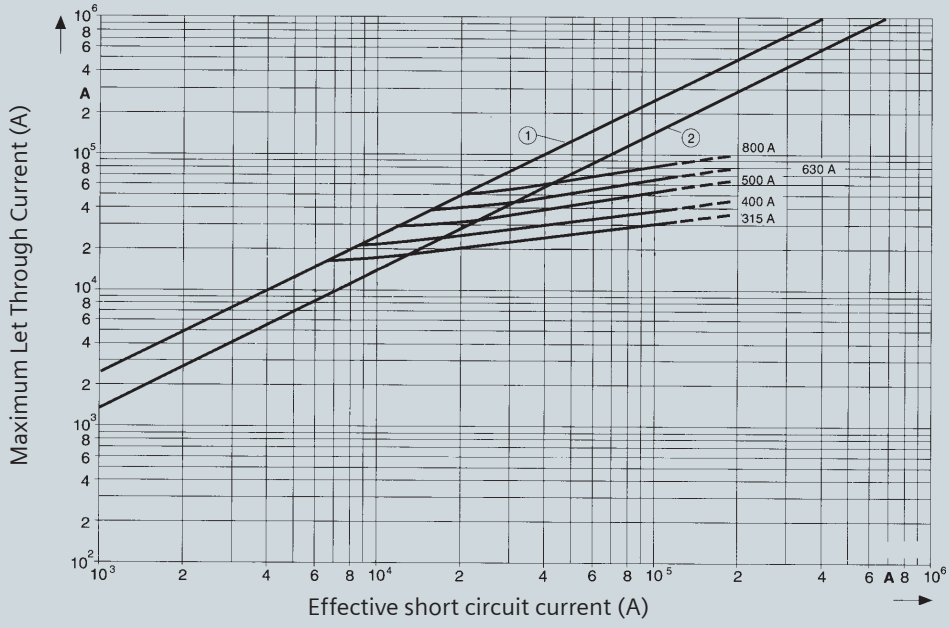


* 800A rated at 415V AC

Peak let-through current chart

① Peak short circuit current with maximum DC component

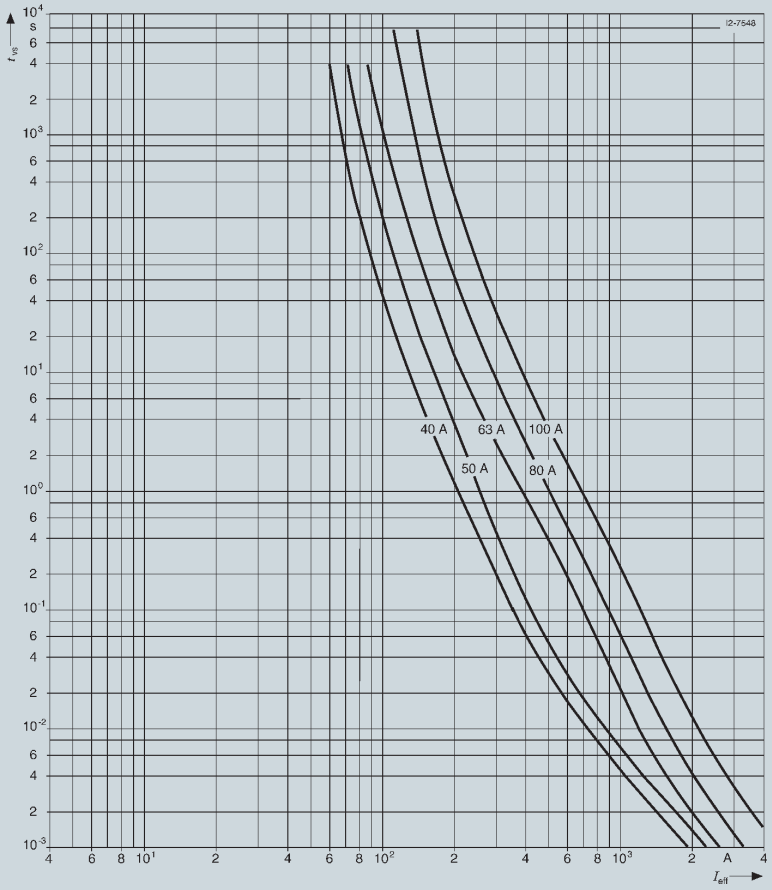
② Peak short circuit current without DC component



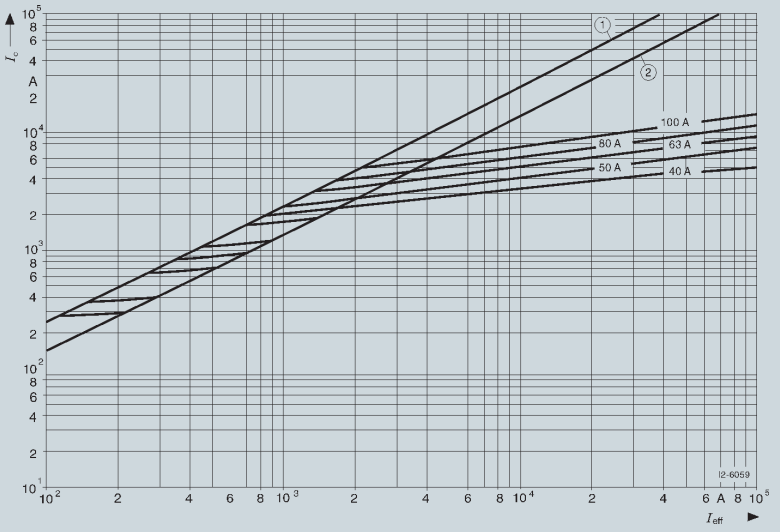
Characteristic Curves

Series	:	**3NA7 8..-6**
Size	:	00
Operational class	:	gG
Rated Voltage	:	690V AC/250V DC
Rated current	:	40... 100A

Time / current characteristics curves diagram



Current limitation diagram



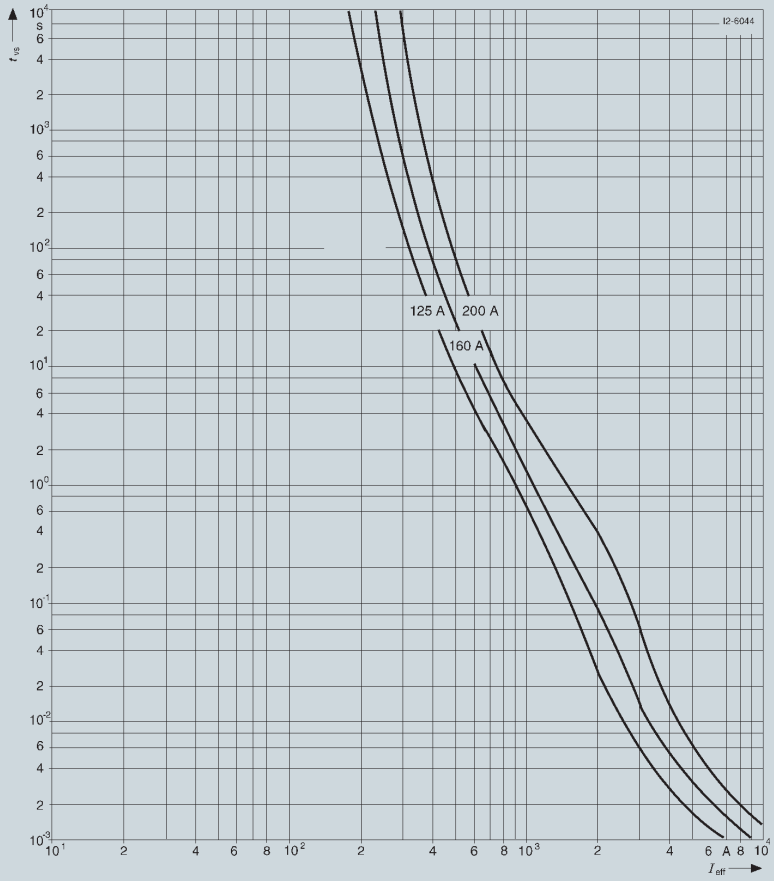
① Peak short circuit current with maximum DC component

② Peak short circuit current without DC component

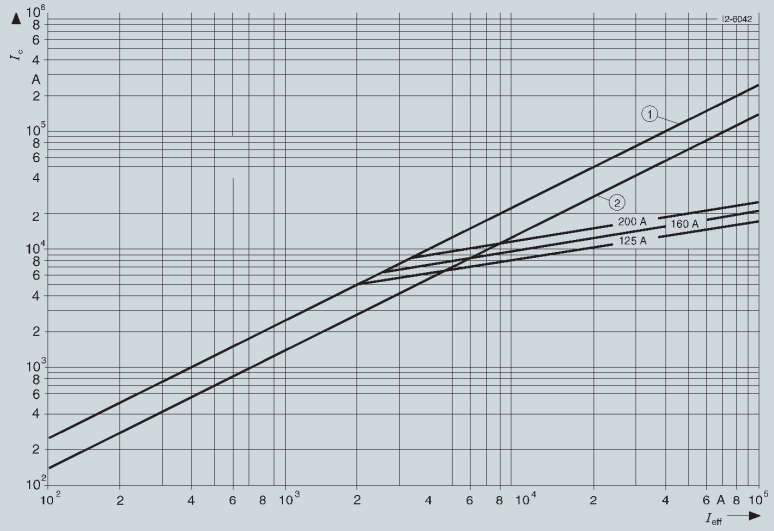
Characteristic Curves

Series	:	**3NA7 1..-6**
Size	:	1
Operational class	:	gG
Rated Voltage	:	690V AC/440V DC
Rated current	:	125... 200A

Time / current characteristics curves diagram



Current limitation diagram



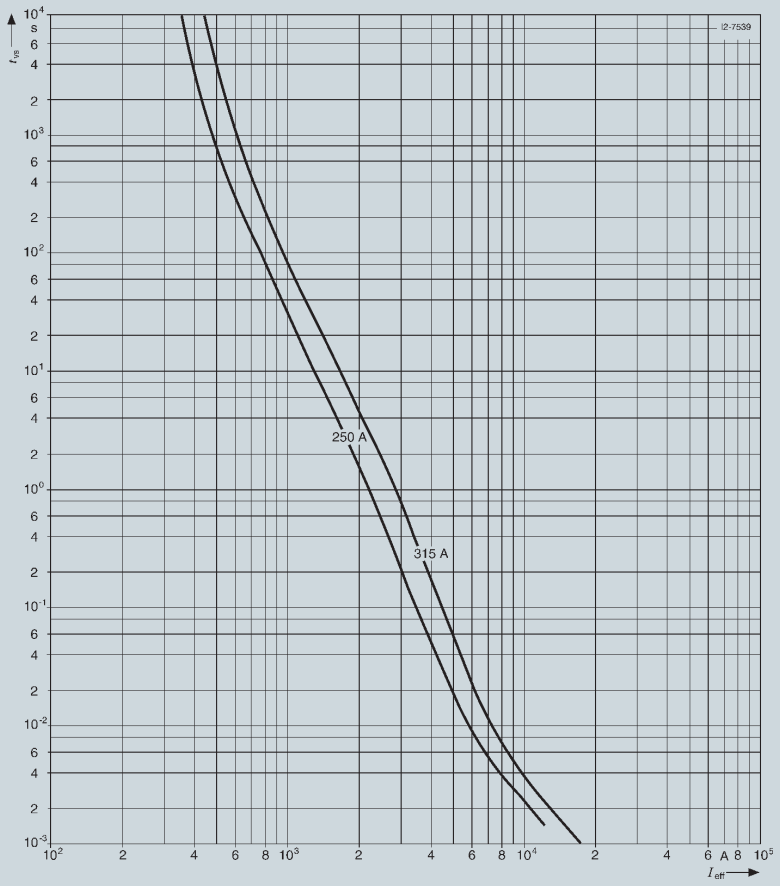
① Peak short circuit current with maximum DC component

② Peak short circuit current without DC component

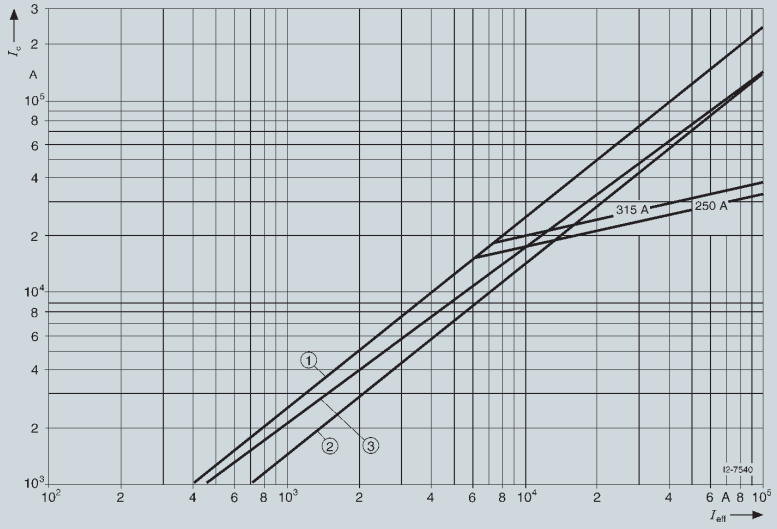
Characteristic Curves

Series	:	**3NA7 2..-6**
Size	:	2
Operational class	:	gG
Rated Voltage	:	690V AC/440V DC
Rated current	:	250... 315A

Time / current characteristics curves diagram



Current limitation diagram



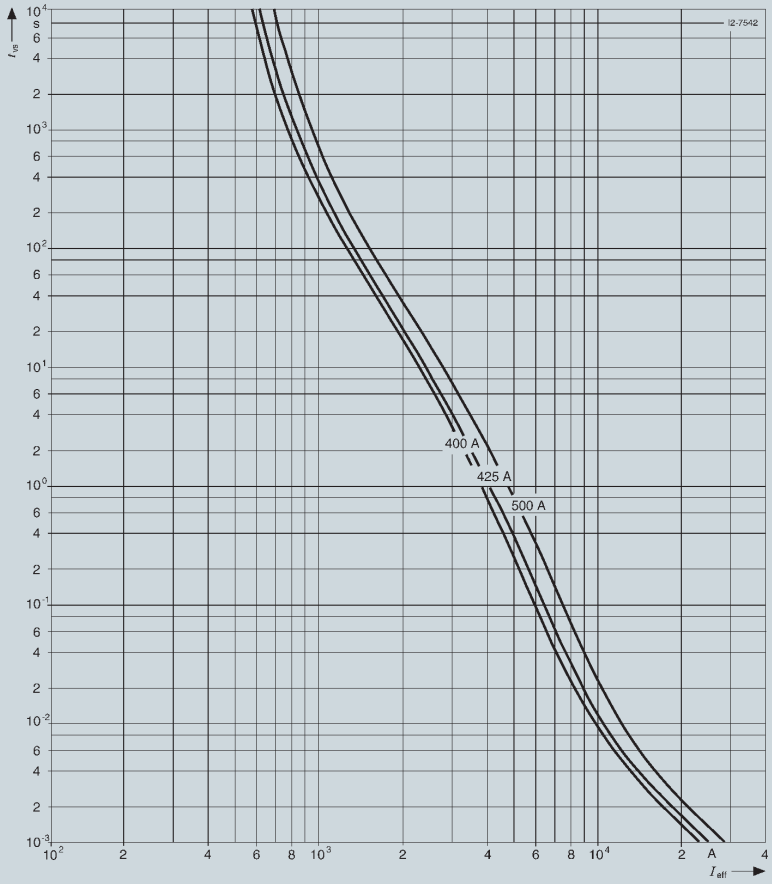
① Peak short circuit current with maximum DC component

② Peak short circuit current without DC component

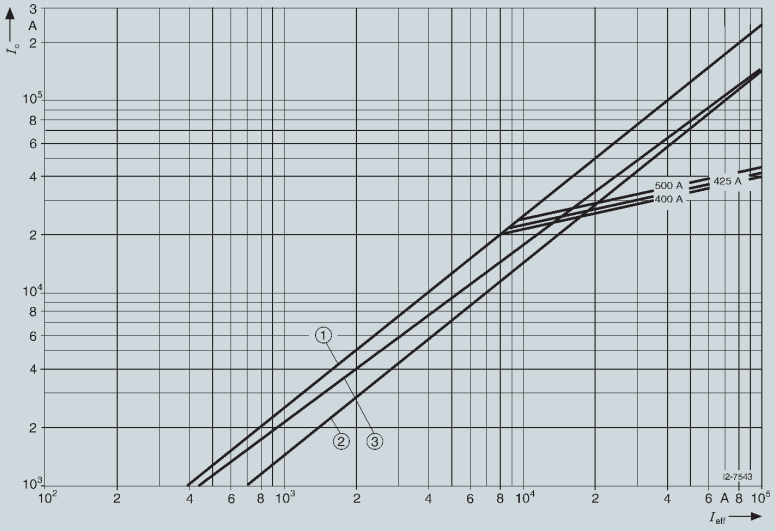
Characteristic Curves

Series	:	**3NA3 3..-6**
Size	:	3
Operational class	:	gG
Rated Voltage	:	690V AC/440V DC
Rated current	:	400... 500A

Time / current characteristics curves diagram



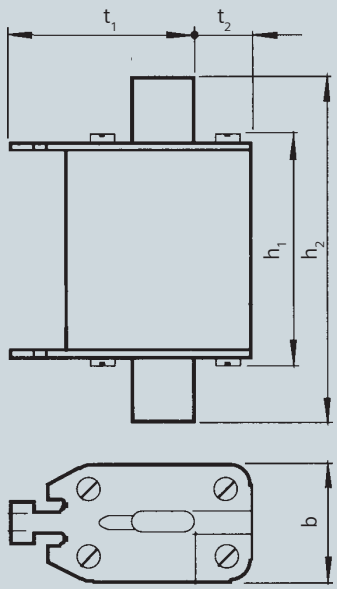
Current limitation diagram



① Peak short circuit current with maximum DC component

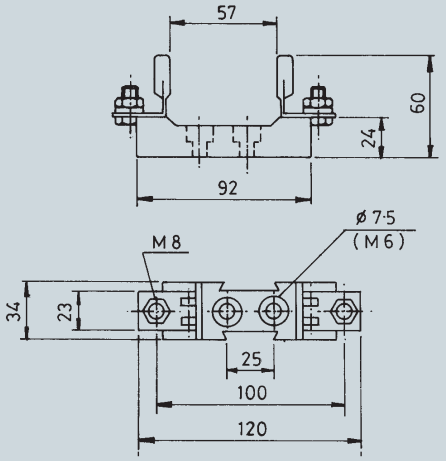
② Peak short circuit current without DC component

Dimensions

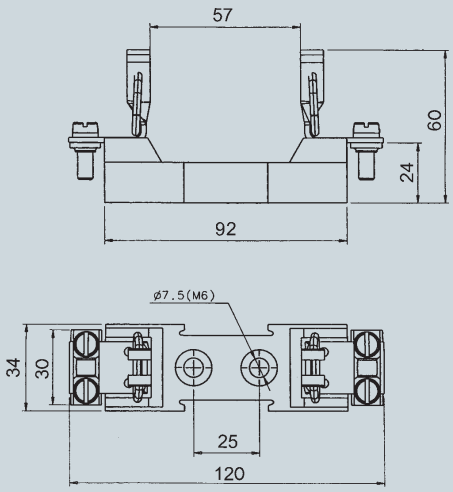


Sizes	Rating	MLFB	b	h_1	h_2	t_1	t_2
000	2A - 100A	3NA78...	21	54	80	45	8
00	125A - 160A	3NA78...	30	54	80	45	14
1	50A - 160A	3NA71...	30	75	137	50	15
1	200A - 250A	3NA71...	47	75	137	51	9
2	200A - 250A	3NA72...	47	75	151	58	10
2	315A - 400A	3NA72...	58	74	151	59	13
3	315A - 800A	3NA33...	71.2	74	151	69.5	12.8

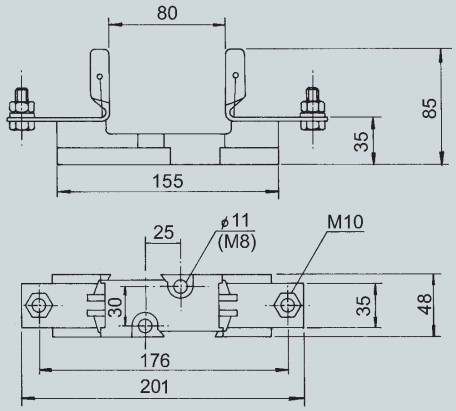
3NH3 Fuse Bases



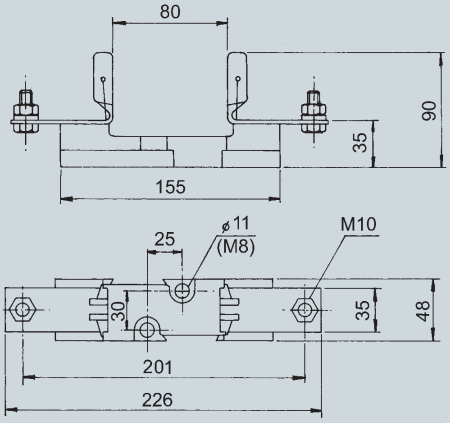
3NH3 030 (Size 00)



3NH3 032 (Size 00)



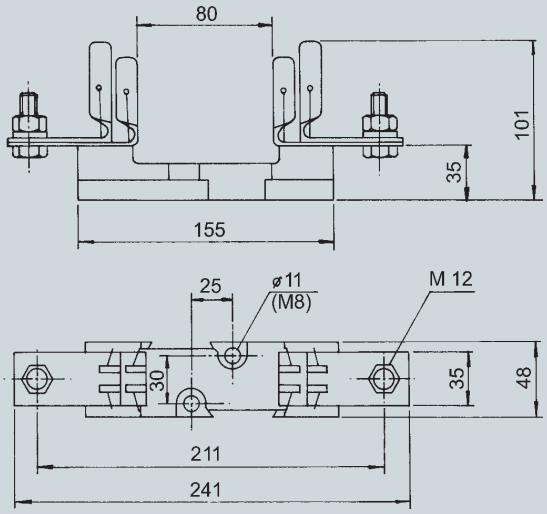
3NH3 230 (Size 1)



3NH3 330 (Size 2)

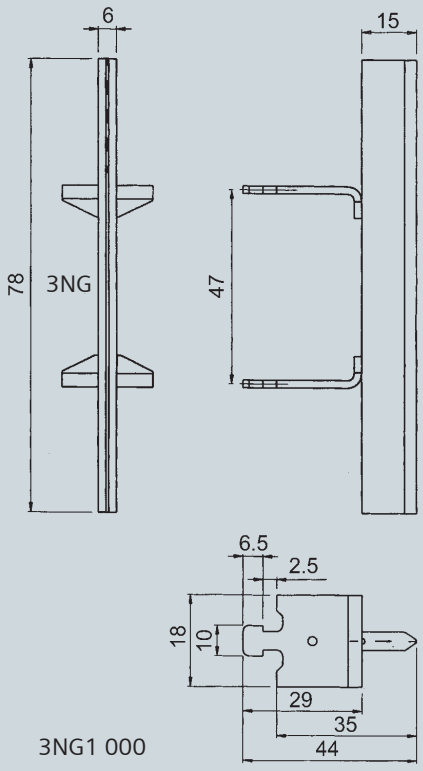
Dimensions

3NH3 Fuse Bases (Continuation)

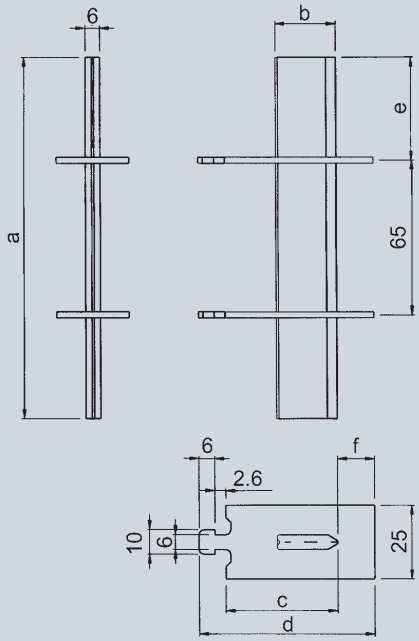


3NH3 430 (Size 3)

Isolating Links 3NG



3NG1 000

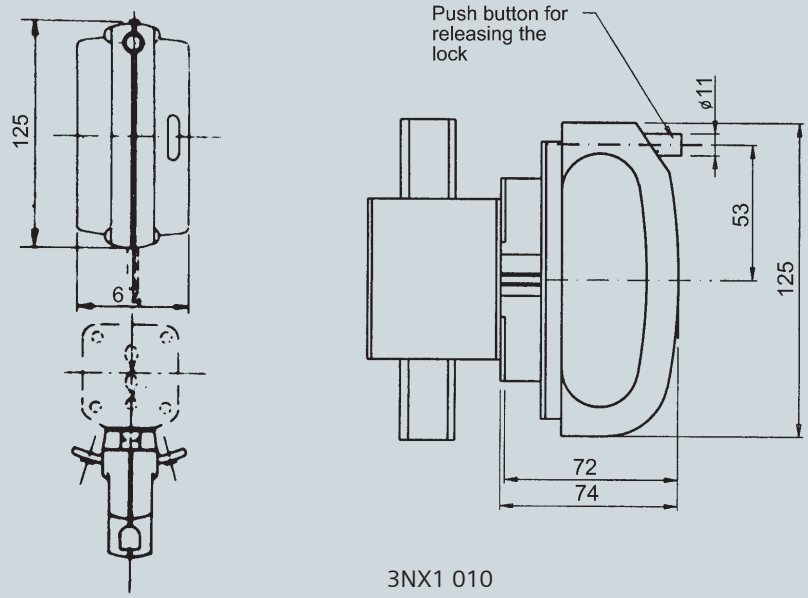


3NG1 250/300/400

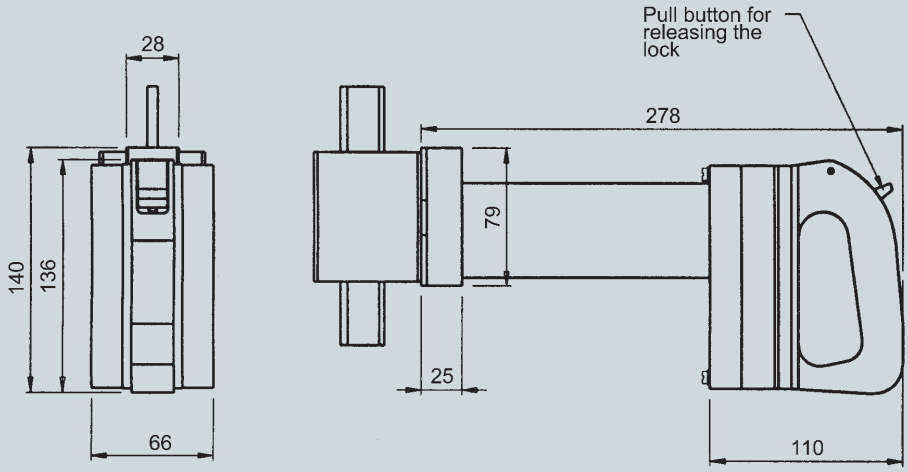
Type	a	b	c	d	e	f
3NG1 250	135	23	40	56	35	8
3NG1 300	150	30	48	66.5	42.5	9
3NG1 400	150	36	60	77.5	42.5	10

Dimensions

3NX Insulated-handle fuse pullers



3NX1 010



3NX1 011

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