GREEN PROTECT

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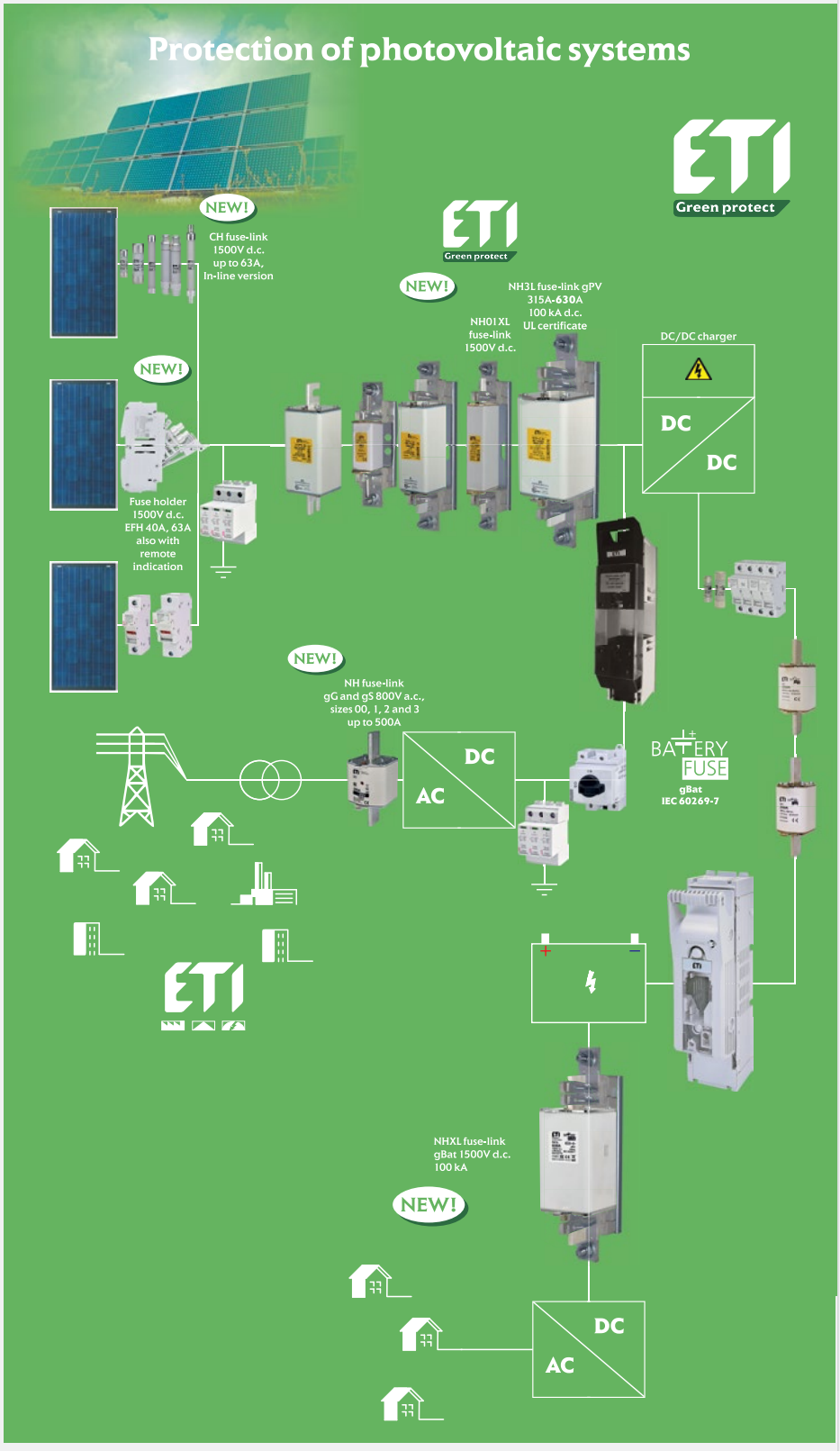
PROTECTION OF RENEWABLE RESOURCES

ETI POWER NEEDS CONTROL

PROTECTION OF PHOTOVOLTAIC SYSTEMS

ETI provides high-quality solutions for the complete overcurrent and overvoltage protection of applications in the field of photovoltaic and other renewable energy sources.
Our products are designed for complete protection of:
- DC circuits (overvoltage protection and reverse current protection)
- circuits inside DC/AC inverters (semiconductor protection)
- AC circuits between the inverter and the power grid (overvoltage, overcurrent and anti-islanding protection).

The products are internationally certified and carry several quality marks.



DC - distribution and protection components

Introduction

Photovoltaic systems are composed by photovoltaic panels, cables, fuses, switches, overvoltage arresters and power inverter. Photovoltaic panels utilise the power of sun light to converters photons to DC current.
Electricity generated by solar panels is then fed into a power inverter that converts DC current to AC current. gPV fuse has been developed to protect cable and panel against "reverse" overcurrent.
ETITEC B, C-PV series of over voltage surge protective devices has been developed to protect against direct and indirect lightning discharges and is intended to protect photovoltaic systems.
The circuit topology consists of two varistors stages each protected by a thermal disconnection device.

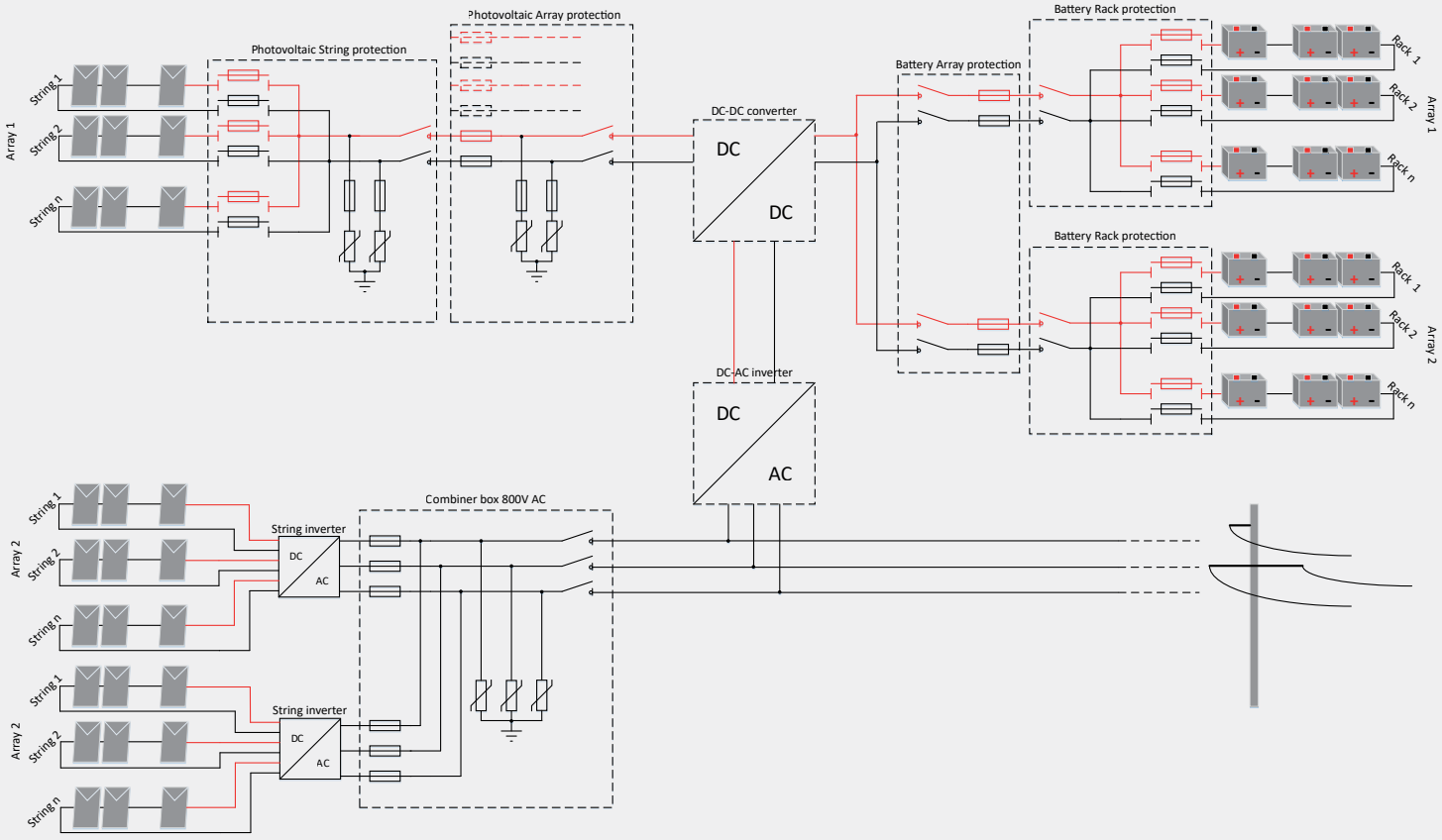
Overcurrent protection

■ PV module protection from »DC REVERSE« current on DC side

Array with three or more strings of panels:
PV systems that have three or more strings connected in parallel need to have each string protected by fuses.
Systems that have less than three strings will not generate enought fault current to damage the conductors/solar panels.
Normaly there are two gPV fuses connected on each string (+ and - pole), that protect conductors/solar panels from damage and eliminate any safety hazards.
Fuses isolate the faulted string. The rest of PV system can continue to generate electricity.

■ PV module protection from »AC REVERSE« current caused by defective inverter

If an inverter becomes defective (transformerless...), AC reverse current can feed into DC strings and destroy PV modules.

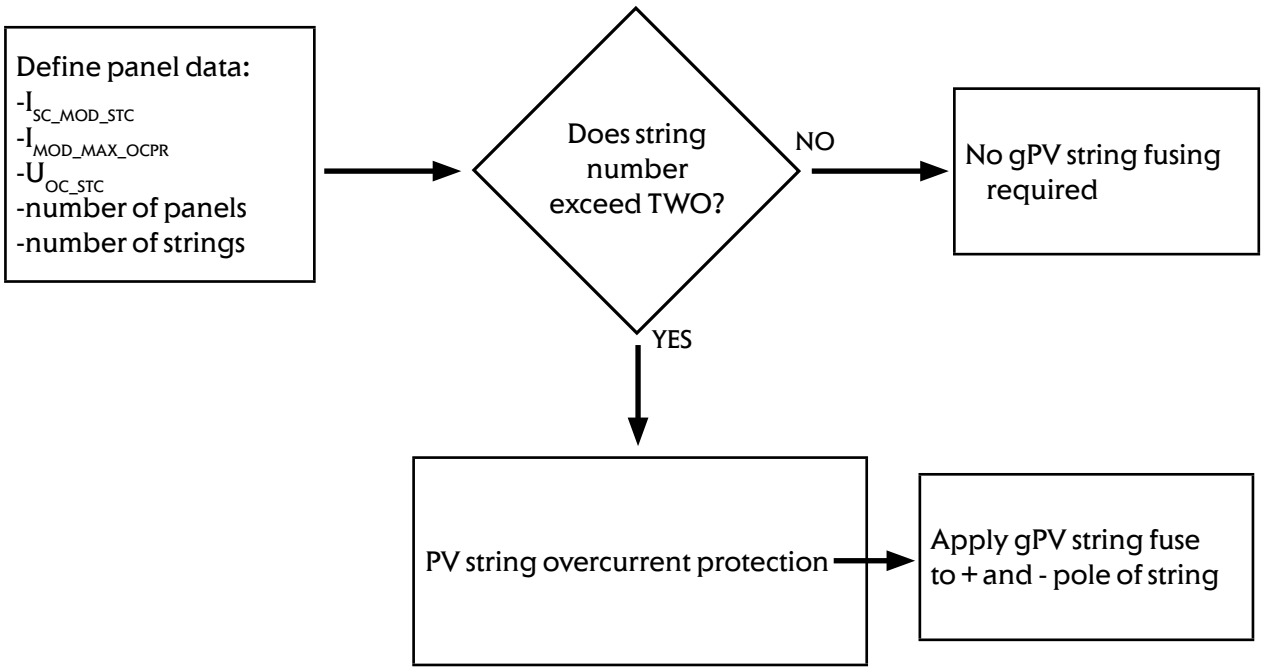


Applications

PROTECTION OF PV SYSTEMS

Photovoltaic String Protection

CH 10 gPV fuse selection



PV string overcurrent protection:
$I_n > 1,5 \times I_{SC\_MOD\_STC}$ – the short circuit current of a PV module or PV string st STC
$I_n < 2,4 \times I_{SC\_MOD\_STC}$
$I_n \leq I_{MOD\_MAX\_OCPR}$ – the PV module max. overcurrent protection rating

$U_n \geq 1,2 \times U_{OC\_STC \times No.\ of\ PV\ modules}$

I_n – nominal overcurrent protection rating
U_n – nominal overcurrent protection voltage

Use temperature derating factor.

ETI as one of the most important European producer of overcurrent protection equipment and devices participating in many working groups for standards developement at International Electrotechnical Commission (IEC). ETI is member of maintenance team MT9 belonging to the 32B group, working on the part 6 of the IEC 60269 dealing with supplementary requirements for fuse-links for the overcurrent protection of solar photovoltaic energy systems.

gPV fuse-link must be selected acc. standard IEC 62548

CH10 gPV 1000V - Fuse-links

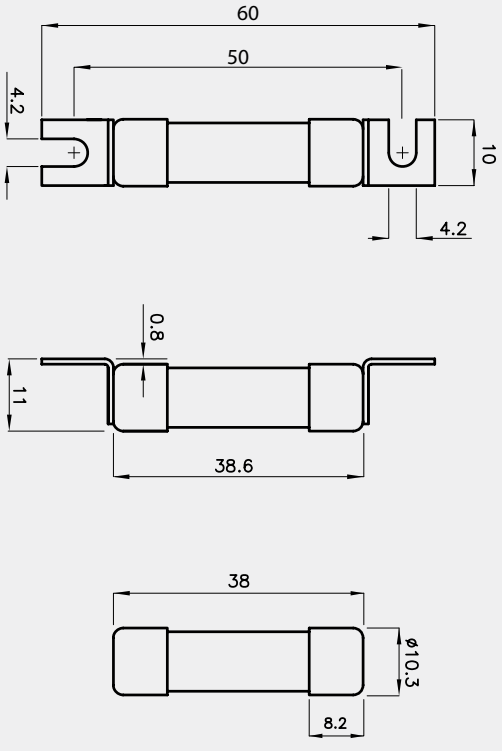
General characteristics	UL file: E347771
Rated voltage	1000V d.c. L/R=2ms
Rated current	0,5 - 25A
Breaking capacity	10kA d.c. UL / 30kA d.c. IEC
Standards	IEC 60269-6, UL 248-19
Application	For protection of photovoltaic modules.

lead-free

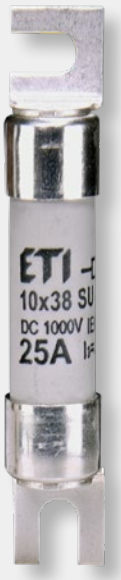
RoHS 2011/65/EU

CH10x38 gPV 1000V d.c.

Size	Breaking capacity [kA]	I_n [A]	Code No. "standard contacts" 10kA UL	Code No. "standard contacts" 30kA IEC	Code No. "type SU contacts" 30kA IEC	Pre-arcing Joule integral [A^2s] L/R=2ms	Operating Joule integral [A^2s] L/R=2ms	Power dissipation [0,7 x I_n] P_d [W]	Power dissipation [I_n] P_d [W]	Weight [g]	Packaging [pcs]
10 x 38	UL 10kA IEC 30kA	0,5	/	002625134	002625131	0,02	0,07	0,2	0,5	10 SU: 12	10/500 SU:10/380
		1	/	002625138	002625129	1,5	3	0,4	1,0		
		2	002625101	002625065	002625115	1,7	2,3	0,5	1,1		
		3	002625100	002625067	002625113	2,8	5,4	0,7	1,6		
		3,5	002625135	002625068	002625127	2,5	7	0,6	1,4		
		4	002625102	002625069	002625116	3,9	11,7	0,5	1,3		
		5	002625111	002625070	002625124	8	21	0,6	1,5		
		6	002625103	002625071	002625117	10,6	34,6	0,7	1,8		
		7	002625110	002625072	002625114	16	60	0,7	1,7		
		8	002625104	002625073	002625118	17	65	0,8	1,9		
		10	002625105	002625075	002625119	8,3	33	1,0	2,4		
		12	002625106	002625077	002625120	22	73	0,8	1,9		
		13	002625137	002625078	002625128	21	70	1,0	2,3		
		14	002625136	002625079	002625126	28	92	1,3	3,0		
		15	002625112	002625080	002625125	49	145	1,0	2,2		
		16	002625107	002625081	002625121	48	147	1,1	2,6		
		20	002625108	002625085	002625122	86	245	1,3	3,2		
		25	/	002625139	002625140	110	470	1,7	4,1		

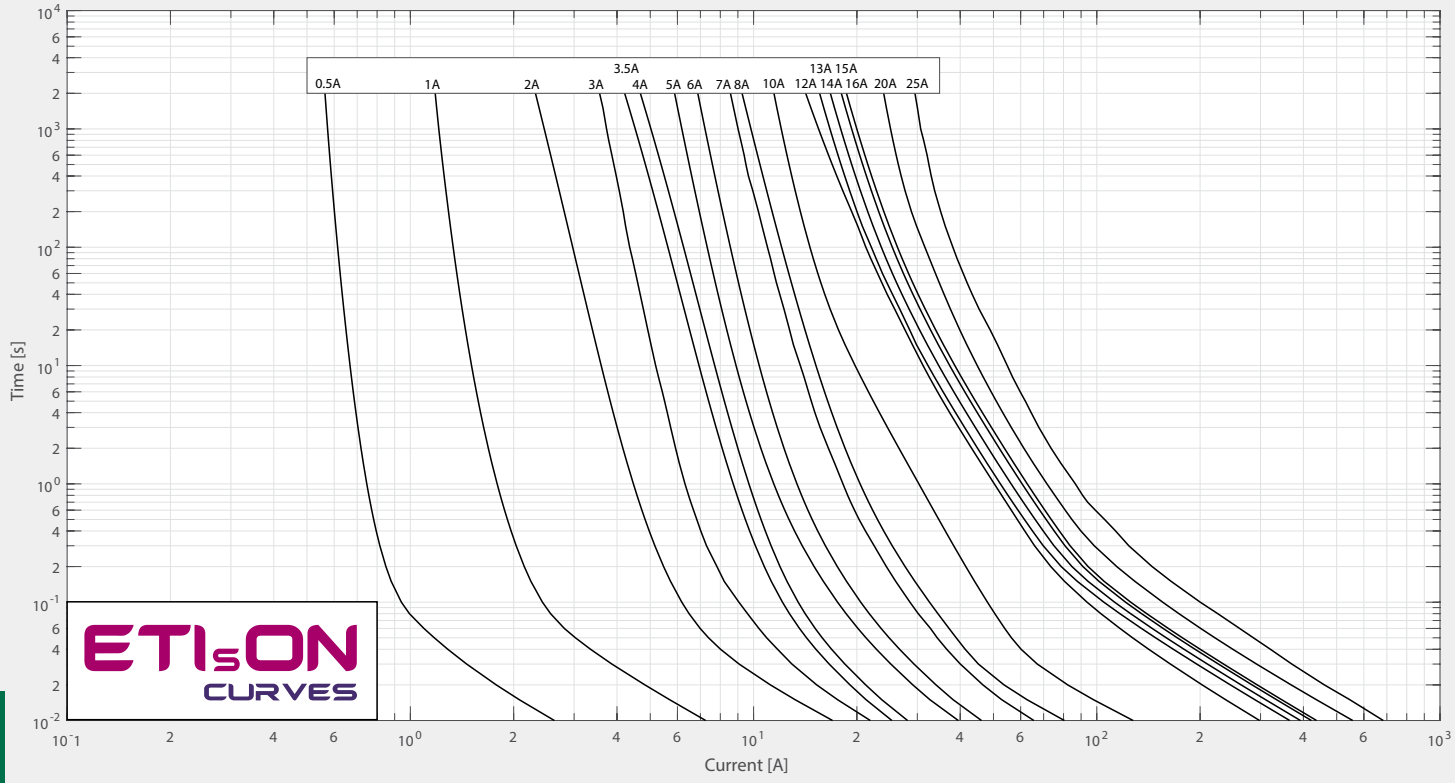


Standard Contacts

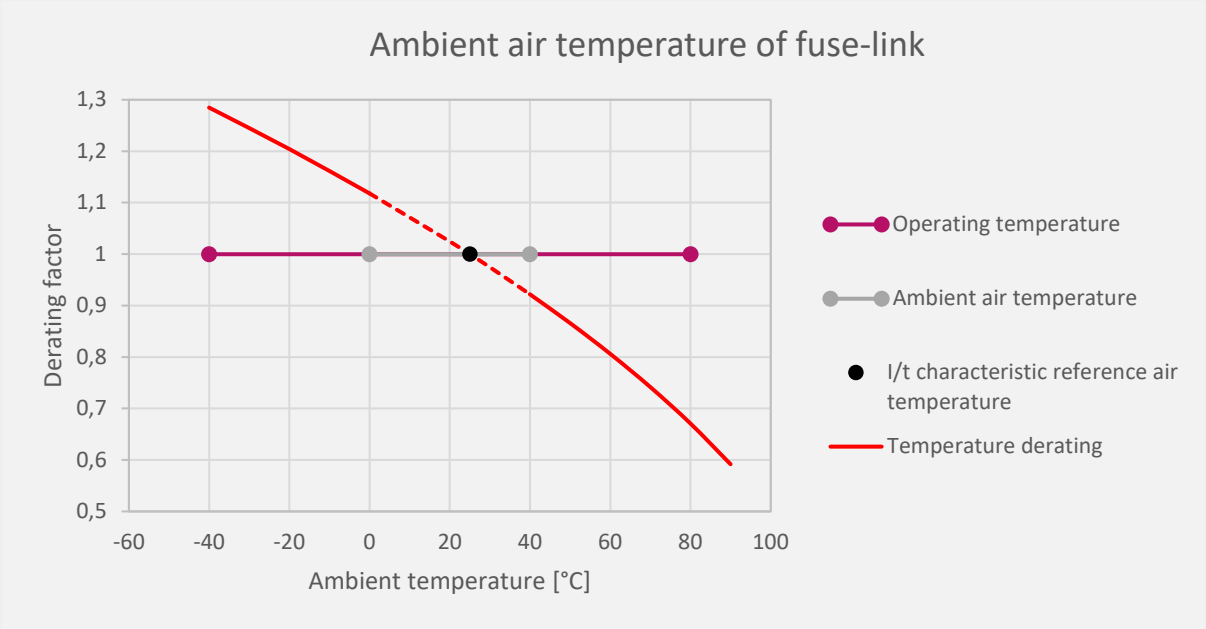


Type SU Contacts

Green protect - gPV



CH10x38 gPV I/t characteristics



Legend:

T_{amb} – Ambient Temperature

TDF – Temperature Derating Factor

I_N – Nominal Current of Fuse-link

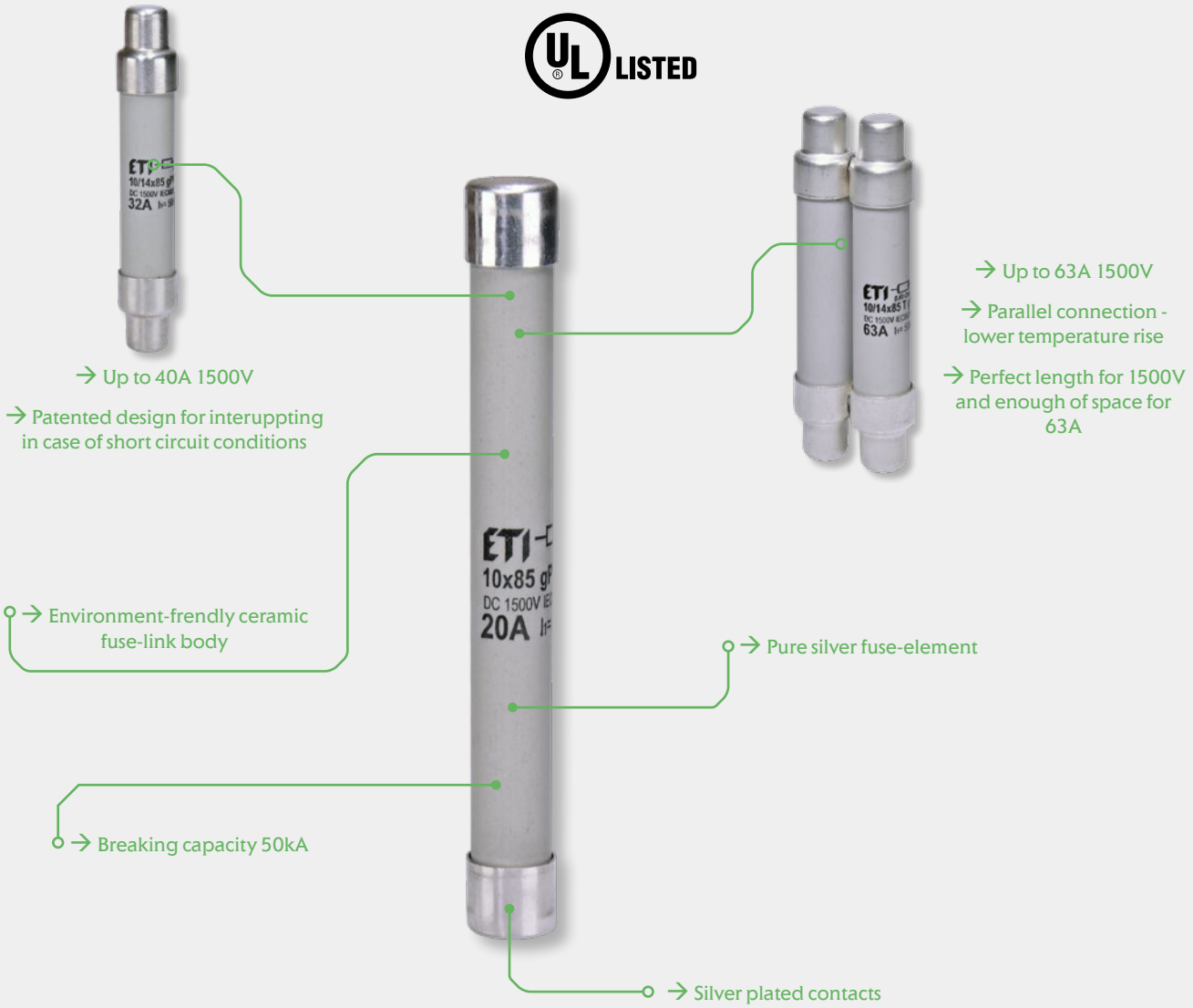
I_{TDF} – Nominal Current Including Temperature Derating Factor

Current calculation: $I_{TDF} = I_N \times TDF$

NEW generation
cylindrical gPV 1500V fuse-links

Features of cylindrical gPV 1500V fuse-links

ETI developed a new generation of PV cylindrical fuse-links with nominal currents up to 63A and rated voltage up to 1500V, with gPV characteristic for protecting solar panels against the reverse current. New fuse-links have a lower power dissipation and higher breaking capacity up to 50 kA. Size 10/14x85 has a patented design for interrupting in case of short circuit conditions. All current range of fuse-links can be mounted in EFH 10/14x85 fuse-holder.



CH10 gPV 1500V - Fuse-links

General characteristics	UL file: E347771
Rated voltage	1500V d.c. L/R=2ms
Rated current	2 - 63A
Breaking capacity	50kA d.c.
Standards	IEC 60269-6, UL 248-19
Application	For protection of photovoltaic modules.

lead-free

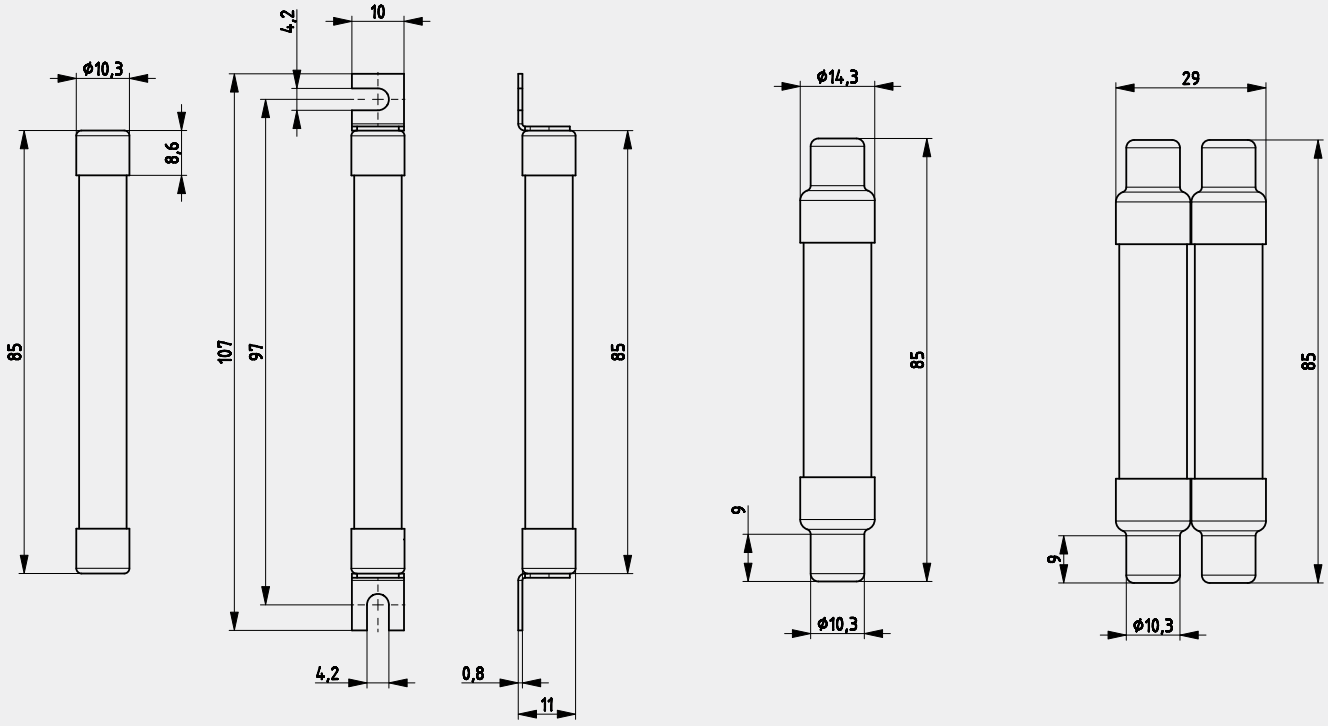
RoHS 2011/65/EU

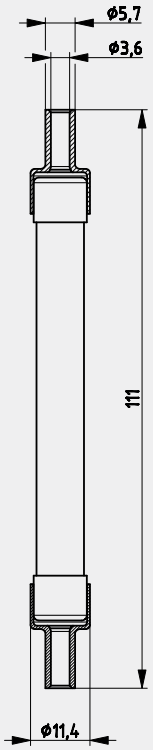
CH10x85 & CH10/14x85 gPV 1500V d.c.

Size	Breaking capacity [kA]	I_n [A]	Code No. "standard contacts" UL	Code No. "type SU contacts"	Code No. 'In-Line'	Pre-arcing Joule integral [A^2s] L/R=2ms	Operating Joule integral [A^2s] L/R=2ms	Power dissipation [0,7 x I_n] P_d [W]	Power dissipation [I_n] P_d [W]	Weight [g]	Packaging [pcs]
10 x 85	50kA	2	002625200	002625210	002626300	0,8	2,3	1,0	2,4	15 SU:17 IN: 22	10/210 SU:10/160 IN: 9/144
		3	002625241	002625245	002626301	2,9	5,2	1,1	2,7		
		4	002625274	002625211	002626302	11,4	16,9	1,1	2,7		
		5	002625276	002625209	002626303	7,0	25,9	1,2	3,0		
		6	002625277	002625212	002626304	14,5	50,6	1,2	3,0		
		8	002625279	002625213	002626306	36,1	106,9	1,5	3,6		
		10	002625280	002625214	002626307	7,0	116,6	1,2	2,8		
		12	002625282	002625215	002626308	10,3	152,0	1,4	3,3		
		15	002625285	002625219	002626309	28,2	307,4	1,5	3,6		
		16	002625286	002625216	002626310	34,2	352,1	1,5	3,6		
		20	002626234	002625217	002626311	48,4	462,2	2	4,8		
10/14 x 85		25	002626235	/	/	72,3	633,1	2,3	5,6	28	10/230
		30	002626236	/	/	143,8	959,2	2,6	6,4		
		32	002626237	/	/	158,5	938,7	3,0	7,4		
		35*	002626238	/	/	260	1.500	2,9	7		
		40*	002626239	/	/	400	2.500	3,2	7,7		
10/14 x85T		50	002626240	/	/	350	2.000	5,3	13	56	5/115
		63	002626241	/	/	770	4.300	5,6	13,7		

* Self certified

10x85 | SU contacts | In-Line | 10/14x85 | 10/14x85 T



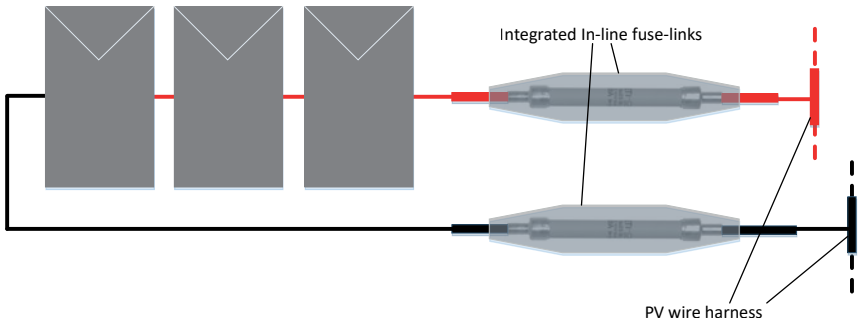


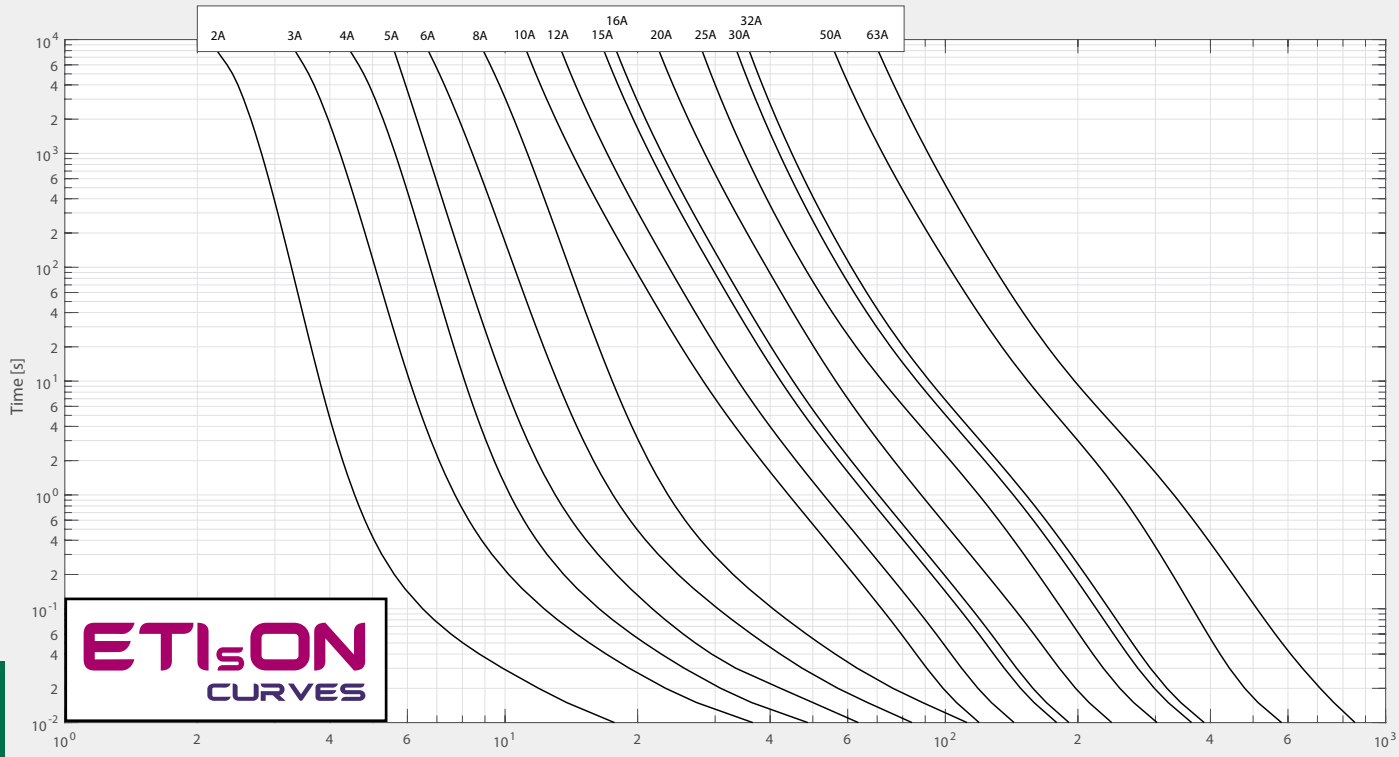
CH In-Line

Fuse-links in accordance with TUV 2 PfG 2380:2014-02

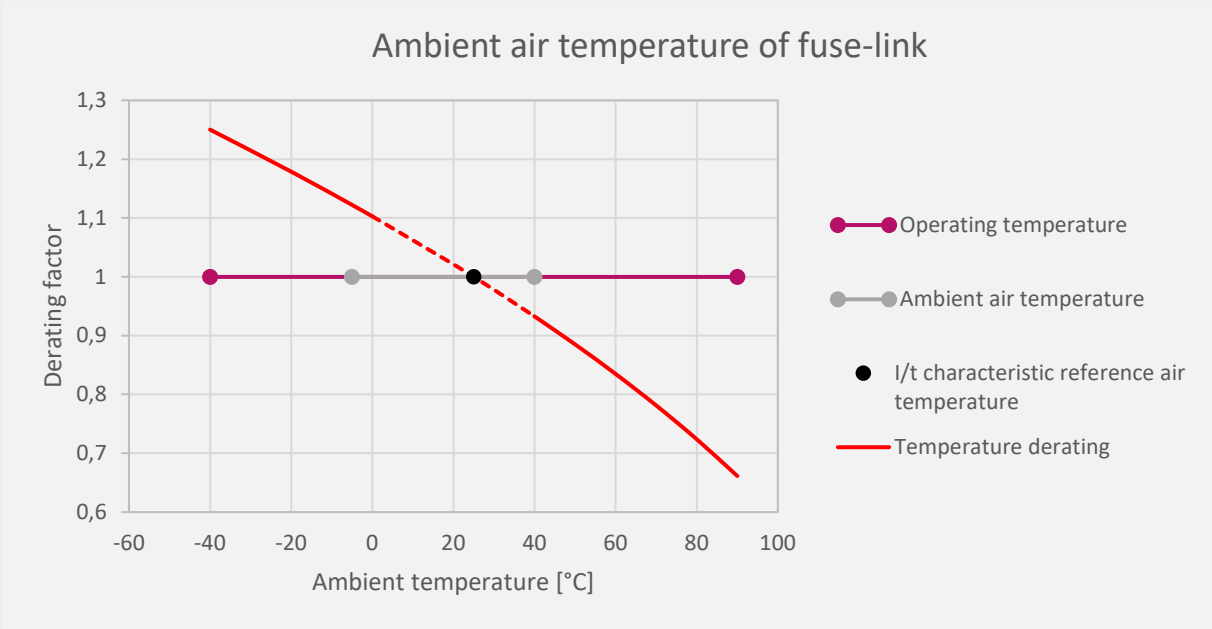
Crimp connection: 4-6mm^2

Recommended crimping tool: Amphenol Helios H4





CH10x85 and CH10/14x85 gPV I/t characteristics



Legend:

T_{amb} – Ambient Temperature

TDF – Temperature Derating Factor

I_N – Nominal Current of Fuse-link

I_{TDF} – Nominal Current Including Temperature Derating Factor

Current calculation: $I_{TDF} = I_N \times TDF$

CH14 gPV 1000V, 1100V - Fuse-links

General characteristics	
Rated voltage	1000V d.c. L/R=2ms (1100V d.c. for 002637185)
Rated current	15-36A
Breaking capacity	30kA d.c.
Standards	IEC 60269-6
Application	For protection of photovoltaic modules

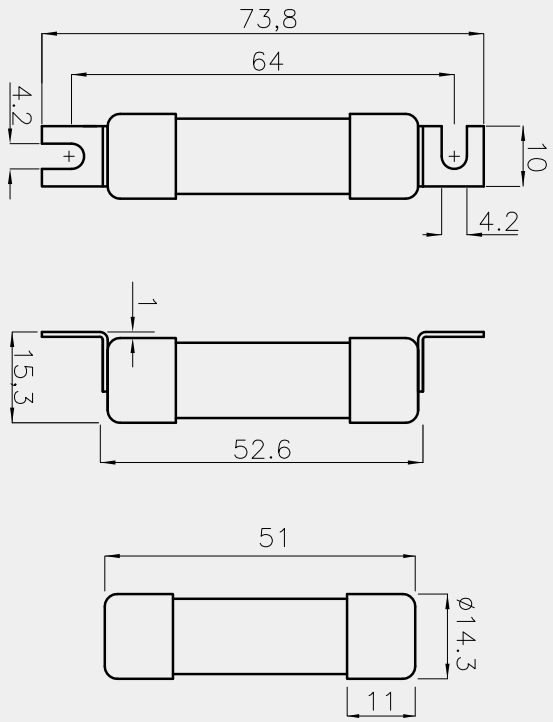
lead-free

RoHS 2011/65/EU

CH14x51 gPV 1000V d.c.

Size	Breaking capacity [kA]	I_n [A]	Code No. "standard contacts" 30kA IEC	Code No. "type SU contacts" 30kA IEC	Pre-arcing Joule integral [A^2s] L/R=2ms	Operating Joule integral [A^2s] L/R=2ms	Power dissipation [0,7 x I_n] P_d [W]	Power dissipation [I_n] P_d [W]	Weight [g]	Packaging [pcs]
14x51	30kA	15	002637140	002637340	22	237	1,4	3,1	19 SU: 21	10/200 SU:10/260
		16	002637105	002637305	55	155	1,4	3,1		
		16*	002637185	/	55	220	1,4	3,1		
		20	002637107	002637307	130	330	1,5	3,2		
		25	002637109	002637309	180	360	2	4		
		32	002637111	002637311	297	1.290	2,1	5,1		
		36	002637115	002637315	450	1.190	2,3	5,6		

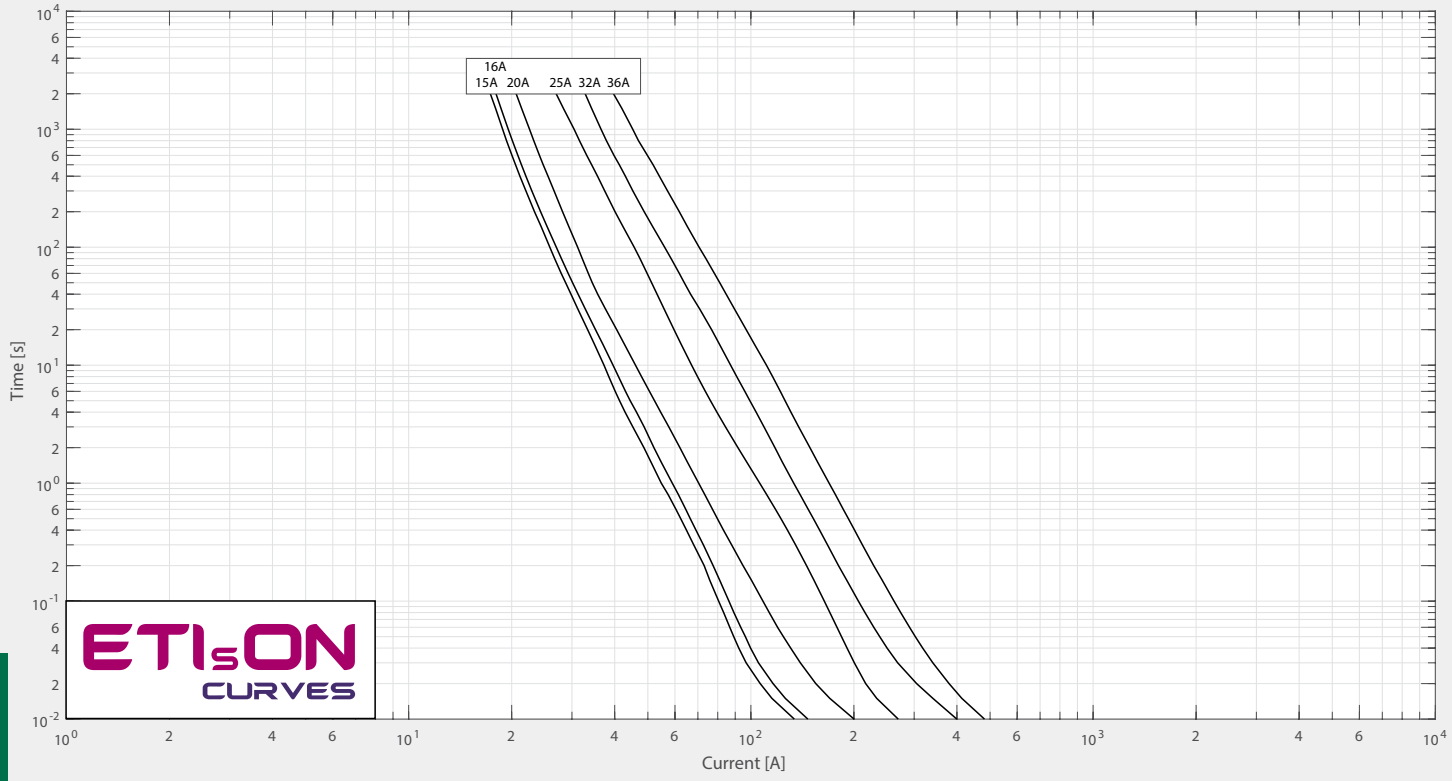
*Rated voltage 1100V d.c.



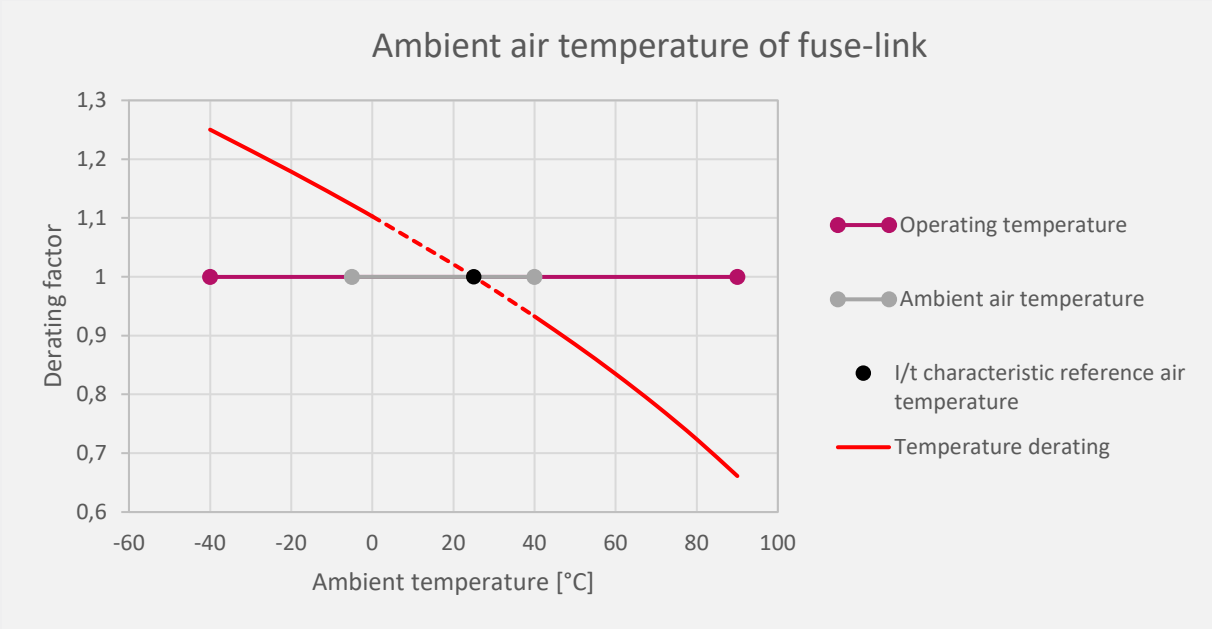
Standard Contacts

Type SU Contacts

Green protect - gPV



CH 14 PV I/t characteristics



Legend:

T_{amb} – Ambient Temperature

TDF – Temperature Derating Factor

I_N – Nominal Current of Fuse-link

I_{TDF} – Nominal Current Including Temperature Derating Factor

Current calculation: $I_{TDF} = I_N \times TDF$

BATTERY FUSE

BATTERY FUSE

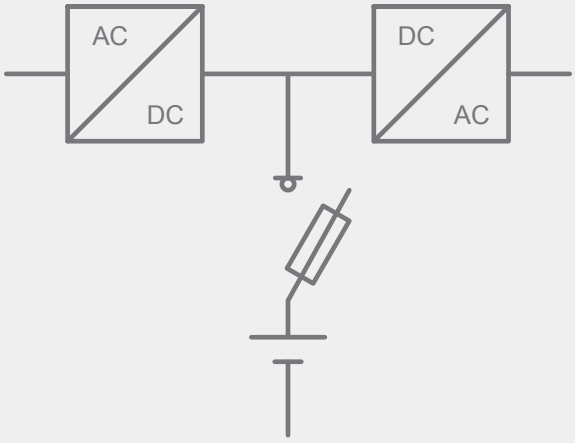
BECAUSE EVERY SECOND COUNTS

Application

- in battery storage systems
- in UPS systems
- in e-mobility

Battery Protection Fuses

Battery storage fuse selection



Short circuit current

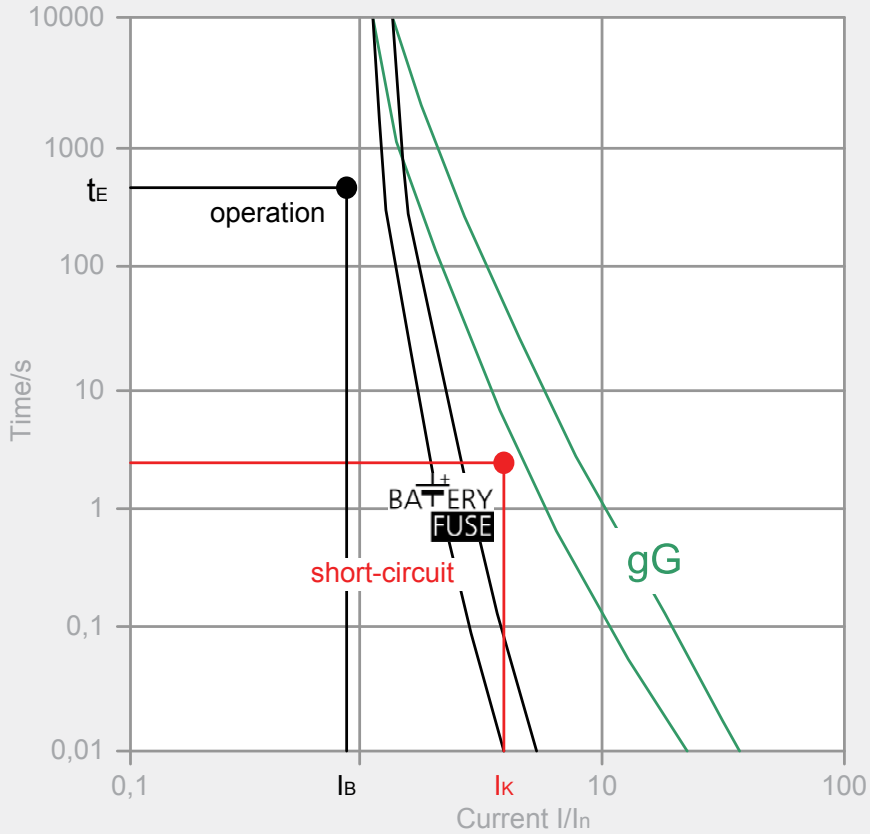
- Short circuit current depending on battery model, type and capacity, low compared to operating current
- Short circuit current has to be interrupted in <5 seconds

Required steep characteristics: protection with Battery fuse-link required!

Operating current

- Operating current depends on battery storage specification
- Battery operation: voltage of DC link circuit decreases to the final discharge voltage

Consider maximum current at final discharge voltage for fuse-link selection



In accordance with IEC 60269-7

Short circuit point (I_K)

- Short circuit current depending on battery model and type
- Manufacturer datasheets to include short circuit current according to IEC896
- Operating point has to be in adequate distance below the curve
- Short-circuit point has to be above the range of tolerance of the curve

Operating point (t_E/I_B)

- maximum operating curent I_B has to be calculated from battery storage true power and final discharge voltage U_E: $I_B = P_W/U_E$
- t_E is the back-up time of battery storage system

When choosing fuse switch disconnector consider fuse-link power dissipation!

$$P_d(I_B) < P_y$$

Power dissipation of fuse-link at maximal operating current (I_B):

$$P_d(I_B)=(I_B/I_n)^2 \times P_d(I_n)$$

I_B- maximal operating current
$P_d(I_B)$-power dissipation of fuse-link at maximal operating current
$P_d(I_n)$-power dissipation of fuse-link at nominal current
P_y- maximal permissible fuse-link power dissipation mounted in fuse switch disconnector

CH 10x38 gBat Fuse-link 550V d.c.

General characteristics	
Rated voltage	550V d.c. (L/R=10ms)
Breaking capacity	30kA d.c.
Standard	IEC 60269-7
Application	Battery protection
Fuse base	EFH 10 DC

CH gBat fuse-link

Size	I_n [A]	Code No. "standard contacts" 550V DC 30kA	Code No. "type SU contacts" 550V DC 30kA	Pre-arcing Joule integral L/R=10ms [A^2s]	Operating Joule integral L/R=10ms [A^2s]	Power dissipation [0,7 x I_n] P_d [W]	Power dissipation [1x I_n] P_d [W]	Weight [g]	Pack. [pcs]
10x38	2	002626002	002626102	1,1	1,8	0,47	1,12	10/12	10/500 SU: 10/380
	4	002626004	002626104	3,0	7,8	0,52	1,25		
	6	002626006	002626106	14,1	27,3	0,73	1,75		
	8	002626008	002626108	25,1	53,4	0,8	1,9		
	10	002626010	002626110	8,0	18,8	0,97	2,4		
	12	002626012	002626112	18,5	41,5	0,8	1,9		
	16	002626016	002626116	42	88	1,1	2,6		
	20	002626020	002626120	86	166	1,3	3,2		
	25	002626025	002626125	140	270	1,65	4,1		

Note:
CH Battery fuse-links are used in combination with fuse disconnector EFH 10 DC

CH 10x38 gBat Fuse-link 800V d.c.

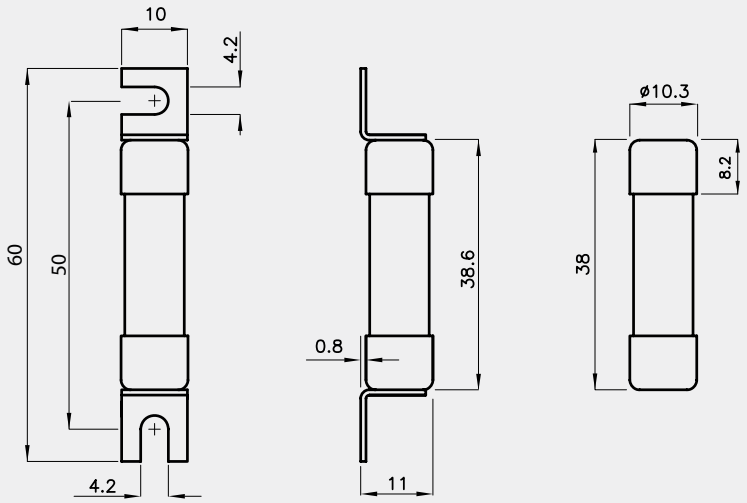
General characteristics	
Rated voltage	800V d.c. (L/R=10ms)
Breaking capacity	30kA d.c.
Standard	IEC 60269-7
Application	Battery protection
Fuse base	EFH 10 DC

CH gBat fuse-link

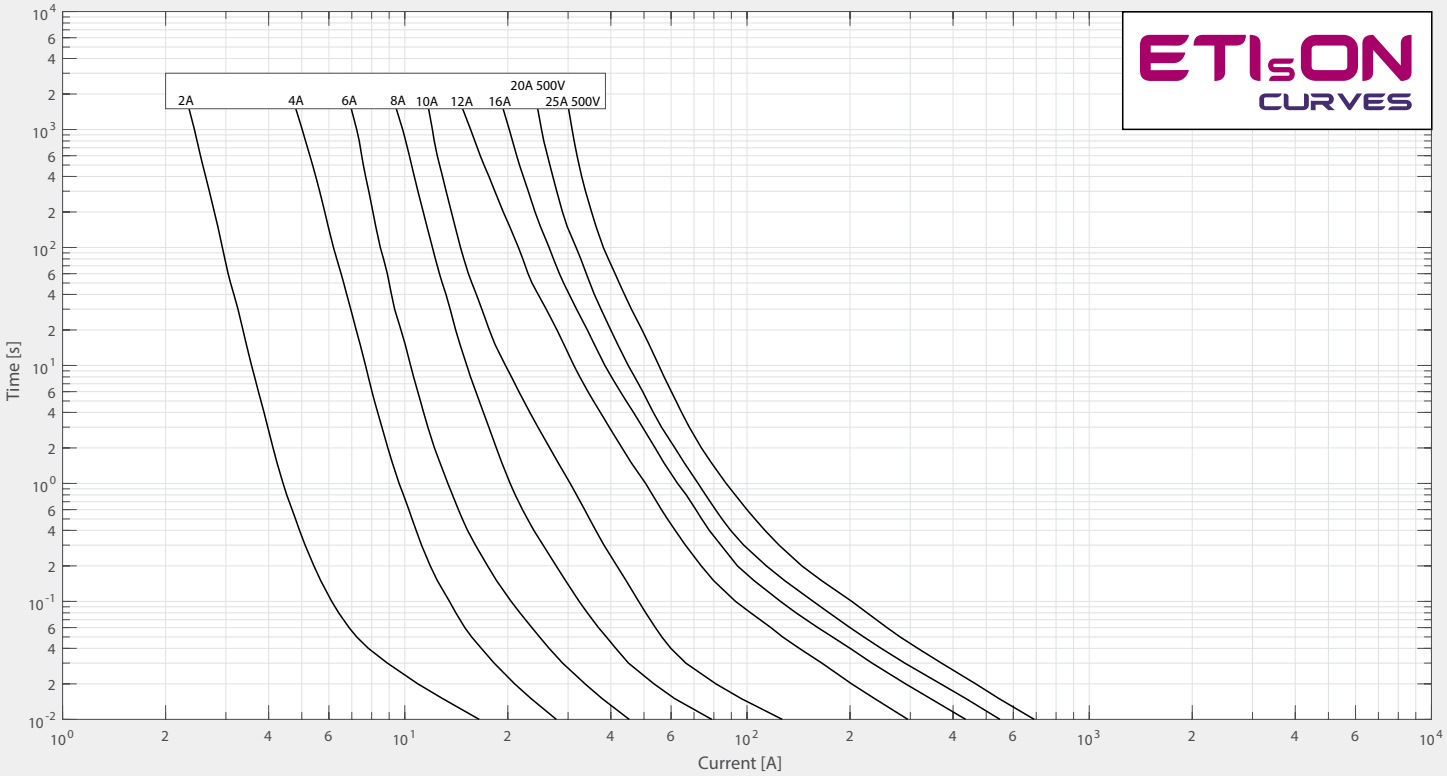
Size	I_n [A]	Code No. "standard contacts" 800V DC 30kA	Code No. "type SU contacts" 800V DC 30kA	Pre-arcing Joule integral L/R=10ms [A^2s]	Operating Joule integral L/R=10ms [A^2s]	Power dissipation [0,7 x I_n] P_d [W]	Power dissipation [1x I_n] P_d [W]	Weight [g]	Pack. [pcs]
10x38	2	002626030	002626130	1,2	1,6	0,47	1,12	10/12	10/500 SU: 10/380
	4	002626032	002626132	3,6	8,9	0,52	1,25		
	6	002626034	002626134	9,5	27,2	0,73	1,75		
	8	002626036	002626136	27,3	65,8	0,8	1,9		
	10	002626038	002626138	8,2	26,6	0,97	2,4		
	12	002626040	002626140	20,6	54,6	0,8	1,9		
	16	002626042	002626142	44,4	109,3	1,1	2,6		

Note:
CH Battery fuse-links are used in combination with fuse disconnector EFH 10 DC

Dimensions for CH 10x38 Battery fuses



I/t characteristics for CH 10x38 Battery fuses



CH 14x51 gBat Fuse-link 800V d.c.

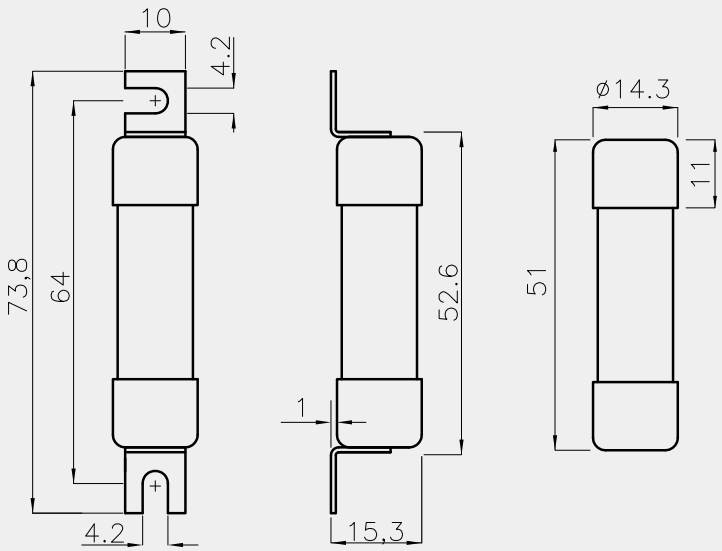
General characteristics	
Rated voltage	800V d.c. (L/R=10ms)
Breaking capacity	30kA d.c.
Standard	IEC 60269-7
Application	Battery protection
Fuse base	EFH 14 DC

CH gBat fuse-link

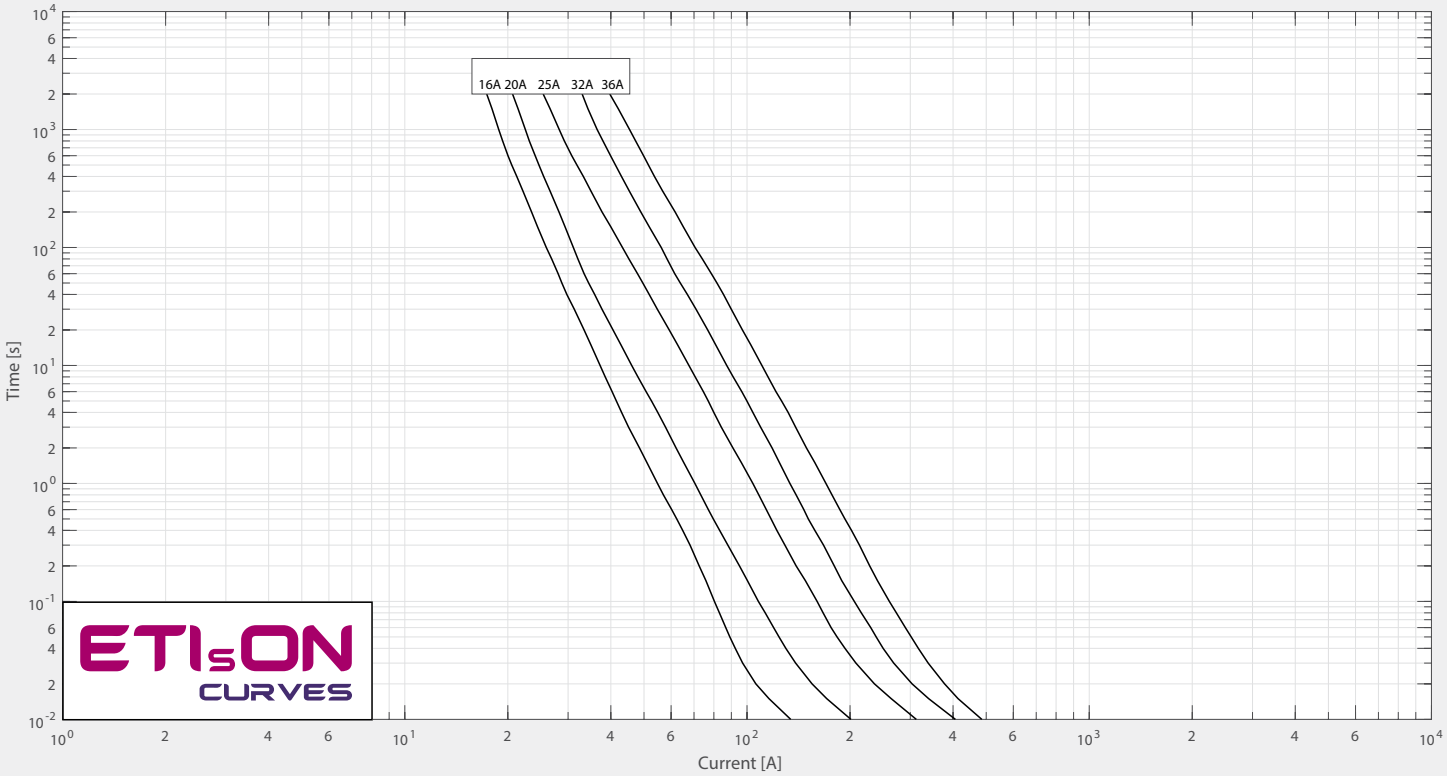
Size	I_n [A]	Code No. "standard contacts" 800V DC 30kA	Code No. "type SU contacts" 800V DC 30kA	Pre-arcing Joule integral L/R=10ms [A^2s]	Operating Joule integral L/R=10ms [A^2s]	Power dissipation [0,7 x I_n] P_d [W]	Power dissipation [1x I_n] P_d [W]	Weight [g]	Pack. [pcs]
14x51	16	002637405	002637505	37	136	1,4	3,1	19/21	10/200 SU: 10/260
	20	002637407	002637507	80	284	1,5	3,2		
	25	002637409	002637509	128	438	2	4		
	32	002637411	002637511	296	1050	2,1	5,1		
	36	002637412	002637512	370	1160	2,3	5,6		

Note:
CH Battery fuse-links are used in combination with fuse disconnector EFH 14 DC

Dimensions for CH 14x51 Battery fuses



I/t characteristics for CH 14x51 Battery fuses




ENERGY
STORAGE

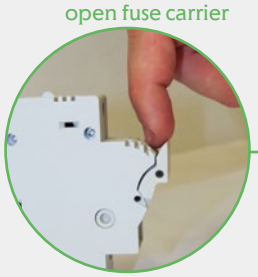
FUSEHOLDERS FOR CYLINDRICAL DC FUSE-LINKS

Advantages of DC fuseholder EFH

→ Compliance with IEC 60947-1, IEC 60947-3, UL 4248-1, UL 4248-19

UL LISTED

→ More space for finger to open fuse carrier



→ Complete protection against touch according to IP20

→ Mounting on standard DIN 35 mm rail (DIN EN60715)

→ All contact surfaces are silver plated

→ Possibility of sealing in ON or OFF positions

→ All plastic parts are made of material resistant to extremely high temperatures. Fuse carrier assures that a fuse-link is not in touch with a housing

→ Modular design – it is possible to assemble multi-pole versions at the building site

→ For both sizes a **version with electronic indicator** is available. Marked with **L (LED)**, the EFH has a built-in LED diode which blinks after the fuse-link operates. Operating voltage ranges from 50V to 1000V d.c.

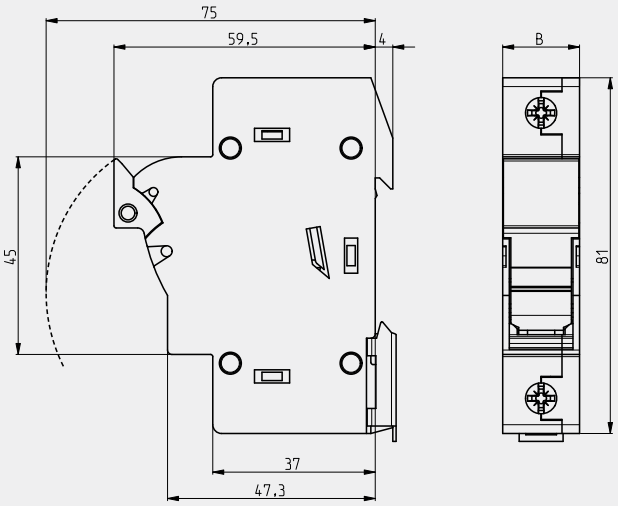
Fuse holder EFH 10, 14, 22 1000V d.c.

General characteristics	UL file: E356295
Rated voltage	1000V d.c.
Rated current	25A, 50A, 100A
Utilization category	DC-20B (Do not operate under load)
Degree of protection	IP20
Standards	IEC 60947-1, IEC 60947-3, UL 4248-1, UL 4248-19

EFH 10 d.c.

Number of poles	U_e/U_i [V]	$I_{max.}$ [A]	Code No.	Max. power dissipation of the fuse-link per pole [W]	Indicator	Weight [g]	Pack. [pcs]
1p	1000	25	002540201	3	-	63	12/108
			002540211		LED	64	
2p			002540203		-	124	6/54
			002540213		LED	125	
2p+N+S*			002540204		-	257	3/27

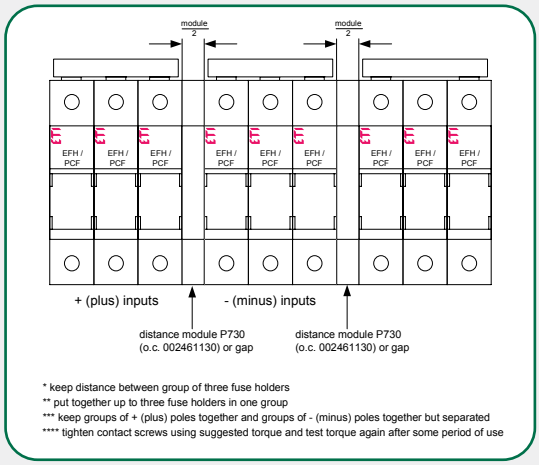
*Only IEC certified

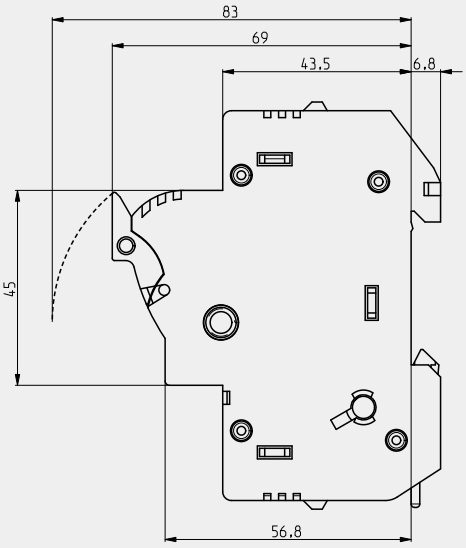


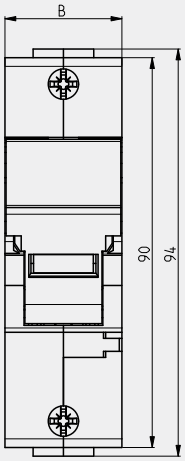
	B
1p	17,5
2p	35
2p+N+S	70

EFH 14 d.c.							
Number of poles	U_e/U_i [V]	$I_{max.}$ [A]	Code No.	Max. power dissipation of the fuse-link per pole [W]	Indicator	Weight [g]	Pack. [pcs]
1p	1000	50	002560201	5	-	102	12/96
			002560211		LED	103	
2p			002560203		-	206	6/48
			002560213		LED	208	
2p+N+S*			002560205		-	452	3/24

*Only IEC certified

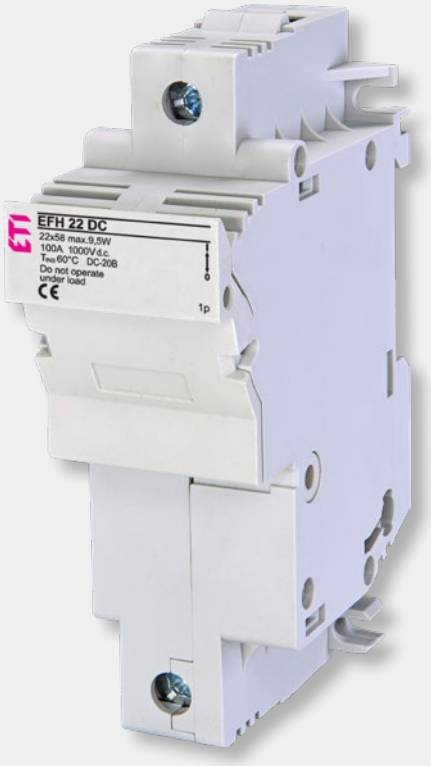


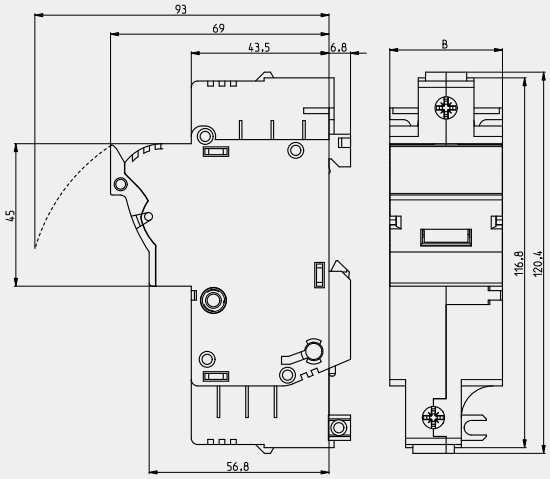




	B
1p	27
2p	54
2p+N+S	108

EFH 22 d.c.							
Number of poles	U_e/U_i [V]	$I_{max.}$ [A]	Code No.	Max. power dissipation of the fuse-link per pole [W]	Indicator	Weight [g]	Pack. [pcs]
1p	1000	100	002570201	9,5	-	156	3/105
			002570211		LED	158	
2p			002570203		-	317	2/34
			002570213		LED	321	





Type	Dimensions [mm]
	B
1 pole	35,6
2 pole	71,2

Technical data

		EFH 10 DC	EFH 14 DC	EFH 22 DC
Fuse type		CH 10x38	CH 14x51	CH 22x58
Versions		Without indicator, LED indicator		
Number of poles		1p, 2p, 2p+N+S		
Rated operational voltage Ue		1000V d.c.		
Rated operational current Ie		25A	50A	100A
Rated conditional short-circuit current		IEC 30kA, UL 10kA		30kA
Rated insulation voltage Ui		1000V		
Rated imp. withstand voltage Uimp		8kV		
Max power dissipation of the fuse-link		3W	5W	9,5W
Derating factor of current In for different ambient temperatures	20^0	1		
	30^0	0,95		
	40^0	0,9		
	50^0	0,8		
	60^0	0,7		
	70^0	0,5		
Derating factor of current In for side by side mounting fuse holders (nr. of poles)	1-4	1		
	5-6	0,8		
	7-9	0,7		
	≥10	0,6		
LED indicator operating range		80V-1000V d.c.		
Utilization category		DC-20B (Do not operate under load)		
Operational performance (cycles with current)		0		
Operational performance (cycles without current)		2000		
Inclined Plane Tracking (IPT)		60min at 1kV		
Humidity		90% at 20°C		
Ambient air temperature		-5°C ... +40°C		
Operating ambient air temperature		-40°C ... +90°C		
Storage ambient air temperature		-25°C ... +55°C		
Degree of protection (IEC 60529)		IP 20		
Terminal capacity		1-25mm² AWG 18-8 solid&stranded Cu only	1,5-35mm² AWG 16-6 solid&stranded Cu only	4-50mm²
Screw		PZ M5		
Torque		2Nm 17,7 lb-in	2Nm 17,7 lb-in	2,5-3Nm
Mounting on EN 60715 rail		35mm rail		
Sealing posibility		ON and OFF		
Standards - fuse-links		IEC 60269-2, IEC 606269-6, IEC 60269-7 UL, 248-1, UL 248-19		IEC 60269-2, IEC 606269-6, IEC 60269-7
Standards - fuse holders		IEC 60947-1, IEC 60947-3 UL 4248-1, UL 4248-19		IEC 60947-1, IEC 60947-3
Test reports		UL		Internal
Certificates		UL Listed		

NEW Fuse holder EFH 1500V d.c. PV

Advantages of photovoltaic fuseholder Fuse holder EFH 1500V d.c.

UL LISTED

→ The same size of fuse-holders 10/14 up to 40A and 10/14 T up to 63A

→ Versatility - the same type of combiner boxes for different systems

Regular version:

→ For 10x85 and 10/14x85 fuse-links

→ Up to 40A 1500V

→ Max. permissible power dissipation of fuse-link 8,5W

T version:

→ 1¼ standard module width

→ The most compact design on the market (35% less needed space in combiner box)

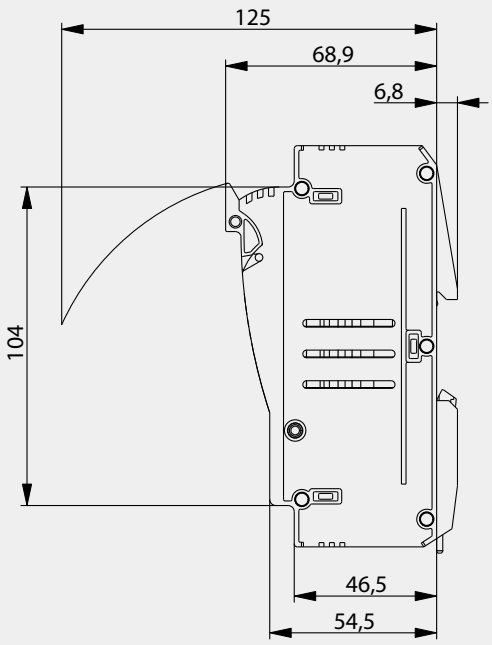
EFH 10/14x85 DC - Photovoltaic fuseholder

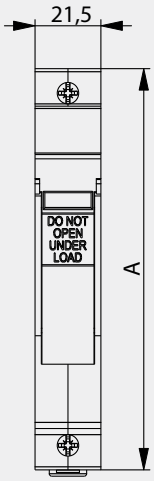
NEW!

General characteristics	UL file: E356295
Rated voltage	1500V d.c.
Rated current	40, 63A
Utilization category	PV-0
Degree of protection	IP20
Standards	IEC 60947-1, IEC 60947-3, UL 4248-1, UL 4248-19

CH EFH 1500V d.c.

Type	$I_{max.}$ [A]	Nr. Poles	Code No.	Max. power dissipation of the fuse-link per pole [W]	Indicator	Weight [g]	Pack. [pcs]
EFH 10/14x85	40	1p	002580001	8,5	-	94	10/160
			002580011		LED	97	
EFH 10/14x85 T	63		002580006	14,5	-	125	
			002580016		LED	128	





	A
EFH 10/14	131
EFH 10/14 T	135,6

C fuse - holders

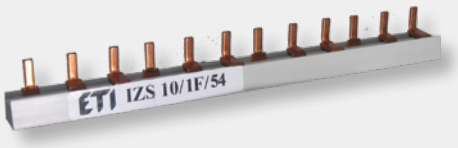
Technical data		
	EFH 10/14x85	EFH 10/14x85 T
Fuse type	CH 10x85, CH 10/14x85	CH 10/14x85 T
Versions	Without indicator, LED indicator	
Rated operational voltage U_e	1500V d.c.	
Rated operational current I_e	40A	63A
Rated conditional short-circuit current	50kA	
Max. power dissipation of the fuse-link	8,5W	14,5W
LED indication operating range	80V - 1500V d.c.	
Utilization category	PV-0	
Operational performance (cycles with current)	Do not operate under load	
Operational performance (cycles without current)	2000	
Humidity	90% at 20°C	
Ambient air temperature	-5°C … +40°C	
Operating ambient temperature	-40°C … +90°C	
Store ambient temperature	-25°C … +55°C	
Degree of protection (IEC 60529)	IP 20	
Terminal capacity	0,75-16mm² AWG 18-6 solid&stranded Cu only	0,75-50mm² AWG 18-2 solid&stranded Cu only
Screw	PZ M5	PZ M6
Torque	2 Nm 17,7 lb-in	2,5 Nm 22,2 lb-in
Mounting on EN 60715 rail	35mm rail	
Sealing posibility	ON and OFF	
Standards - fuse-links	IEC 60269-2, IEC 60269-6, IEC 60269-7 UL 248-1, UL 248-19	
Standards - fuse holders	IEC 60947-1, IEC 60947-3, UL 4248-1, UL 4248-19	
Test reports	UL	UL
Certificates	UL Listed	UL Listed

Section rail

EFH 10 DC

Type	Description	Code No.	Cross section (mm^2)	Length (m)	Weight [g]	Packaging [pcs]
IZS10/1F/54	10 mm^2, 1 pole, 54 mod	002921101	10	1	150	40
IZS16/1F/54	16mm^2, 1 pole, 54 mod	002921111	16	1	220	40

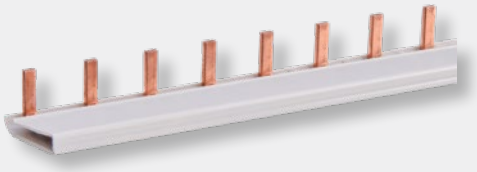
For use with EFH10 DC, more info in B&I catalogue



EFH 14 DC

Type	Description	Code No.	Cross section (mm^2)	Length (m)	Weight [g]	Packaging [pcs]
IZS16/1F/36	16mm^2, 1 pole, 36 mod	002921121	16	1	280	40

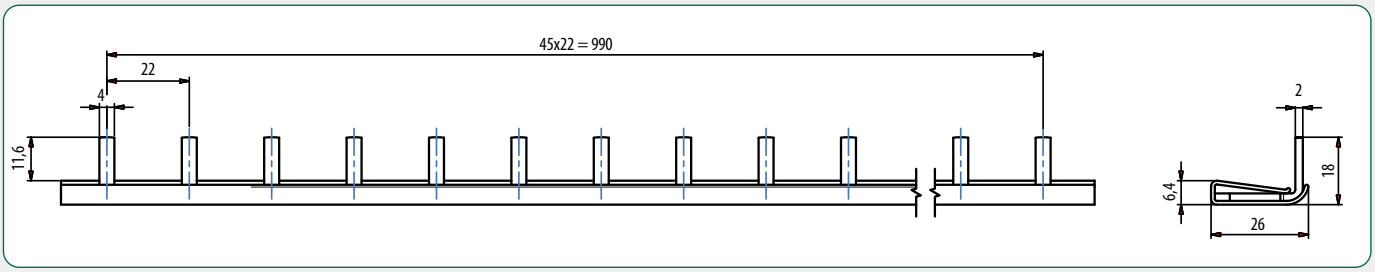
For use with EFH14 DC, more info in B&I catalogue



EFH 10/14x85 DC

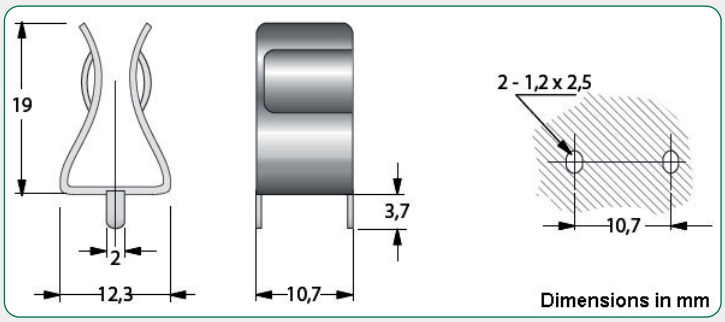
Type	Description	Code No.	Cross section (mm^2)	Length (m)	Weight [g]	Packaging [pcs]
IZS35/1F/46	35mm^2, 1 pole, 46 mod, T=22mm, 1500 VDC, 125A	002921292	35	1,016	400	10

Use end cover Z-50/1F/28 (002921263), under 1 reference code = 1 pair
Feeding at begining/ending rail = 125A, feeding in middle of rail = 200A



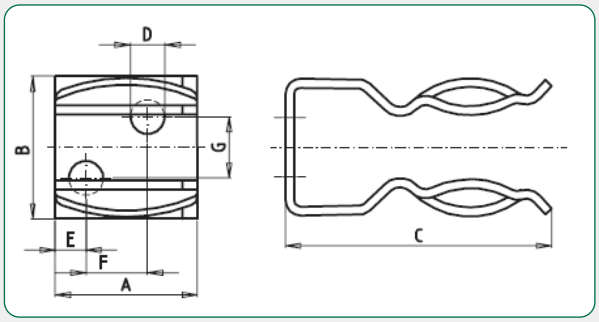
Fuseholder for CH fuse-links

Fuseholders for CH10 fuse-links			
Code	Type	Weight(g)	Packaging [pcs]
006710335	CH10-PCB	1	250

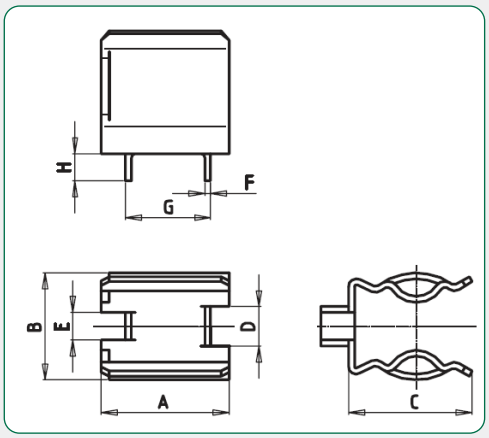


Type	Dimensions [mm]							
	A	B	C	D	E	F	G	H
CH10-PCB	12,3	9,8	19,0	2,0	2,0	0,75	11,0	4,0

Fuseholders for CH14 fuse-links			
Code	Type	Weight(g)	Packaging [pcs]
006710340	CH14-PCB	5	100
006710341	CH14-SCR	5	100



Type	Dimensions [mm]						
	A	B	C	D	E	F	G
CH14-SCR	16	16	23	4,2	6,5	0	0



Type	Dimensions [mm]							
	A	B	C	D	E	F	G	H
CH14-PCB	16	14	15,5	5	3,5	0,75	10,7	3,5

PROTECTION OF PV SYSTEMS

Photovoltaic Array Overcurrent Protection

NH gPV fuse selection

Define panel data:

- $I_{SC\_MOD\_STC}$
- $I_{MOD\_MAX\_OCPR}$
- U_{OC_STC}
- number of panels
- number of strings

→ PV Array overcurrent protection → Apply NH PV fuse to + and - pole of string

PV array overcurrent protection:

$I_n > 1{,}25 \times I_{SC\_ARRAY}$ – the short circuit current of the PV array at STC

$I_n \leq 2{,}4 \times I_{SC\_ARRAY}$

$I_{SC\_ARRAY} = I_{SC\_MOD\_STC} \times$ No. of PV strings

ETI as one of the most important European producer of overcurrent protection equipment and devices participating in many working groups for standards developement at International Electrotechnical Commission (IEC). ETI is member of maintenance team MT9 belonging to the 32B group, working on the part 6 of the IEC 60269-7dealing with supplementary requirements for fuse-links for the overcurrent protection of solar photovoltaic energy systems.

gPV fuse-link must be selected acc. standard IEC 62548

NH gPV 1000V - Fuse-links

General characteristics	
Rated voltage	1000V d.c. (NH1, 2, 3: L/R=1ms; NH0, 1C: L/R=2ms)
Breaking capacity	30kA d.c. (NH1, 2, 3), 20kA d.c. (NH0, 1C)
Standards	IEC 60269-6
Application	Fuse-link for DC application. Applied in fuse base PK1, 2, 3 1000V d.c..

lead-free

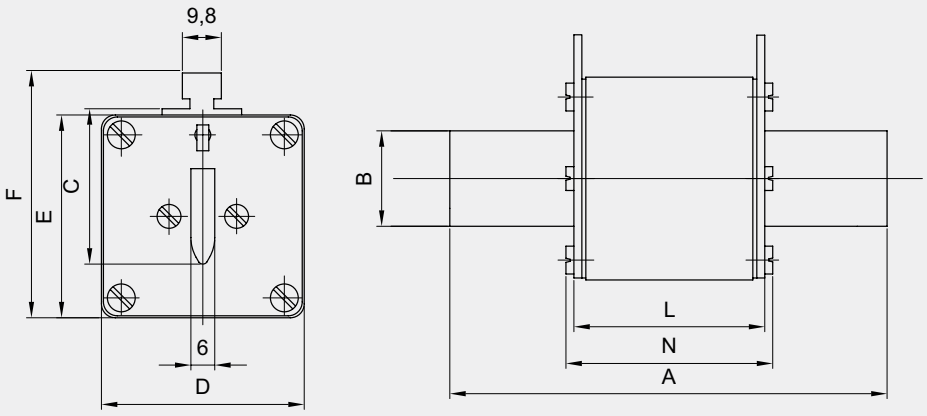
RoHS 2011/65/EU

Patented technology by European Patent Office

NH gPV 1000V d.c.

Size	I_n [A]	gPV Standard indicator Code No. Pic.1	gPV S_{110} screw contact Code No. Pic.2	gPV U_{110} screw contact Code No. Pic.3	gPV G screw contact with centre trip indicator for microswitch MK Code No. Pic.4	Power dissipation (0,7 x I_n) [W]	Power dissipation [W]	Pre-arcing Joule integral [I^2t] (L/R = 1ms)	Operating Joule integral [I^2t] (L/R = 1ms)	Weight [g]	Packaging [pcs]
0	32	004110381	-	-	-		7,6	52	430	280	3/45
	40	004110383	-	-	-		8,8	96	730		
	50	004110384	-	-	-		11,0	155	920		
	63	004110385	-	-	-		13,5	290	1.760		
	80	004110386	-	-	-		17,0	520	3.160		
	100	004110387	-	-	-		21,0	1.110	5.280		
	125	004110388	-	-	-		22	2.800	11.340		
	160	004110389	-	-	-		32	5.950	20.750		
1C	32	004110371	-	-	-		7,6	52	430	300	3/45
	40	004110373	-	-	-		8,8	96	730		
	50	004110374	-	-	-		11,0	155	920		
	63	004110375	-	-	-		13,5	290	1.760		
	80	004110376	-	-	-		17,0	520	3.160		
	100	004110377	-	-	-		21,0	1.110	5.280		
	125	004110378	-	-	-		22	2.800	11.340		
	160	004110379	-	-	-		32	5.950	20.750		
1	200	004110342	-	-	-	11	27	4.400	29.000	500	3/24
2	200	004110343	004110292	004110296	004110346	11	26	4.400	29.000	650	1/16 (G screw contact: 2/16)
	250	004110344	004110293	004110297	004110347	15	36	6.000	38.000		
3	160	004110456	-	-	-	15	38	5.000	10.000	1200	3/15 (G screw contact: 2/8)
	200	004110455	-	-	-	18	45	10.000	20.000		
	250	004110458	-	-	-	18	44	20.000	40.000		
	315	004110460	004110294	004110298	004110232	24	54	40.000	80.000		
	350	004110459	004110348	004110349	004110233	25	55	45.000	90.000		
	400	004110457	004110295	004110299	004110234	24	58	46.000	138.000		

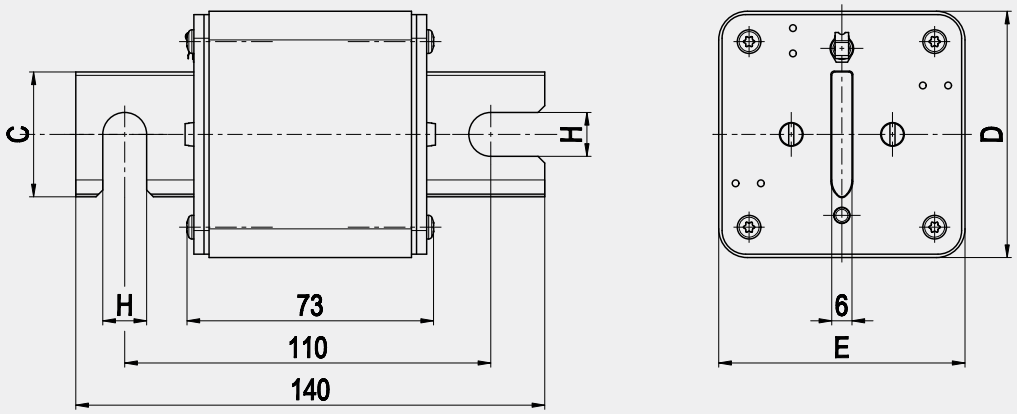
Pic.1



Standard indicator

Size	A	B	C	D	E	F	L	N
1	135	24	42	51	51	67	70	74
2	150	30	48	61	61	71	70	74
3	150	37	60	73	73	87	70	74

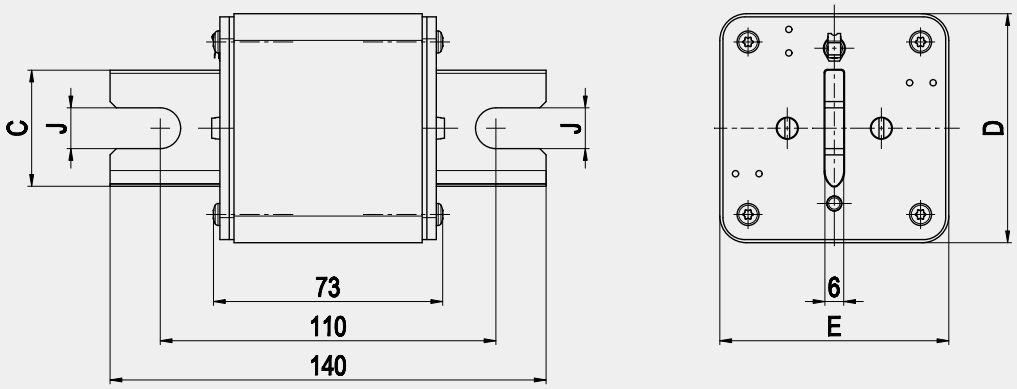
Pic.2



S_{110} screw contact

Size	C	E	D	H
2	30	60	60	11
3	37	73	73	11

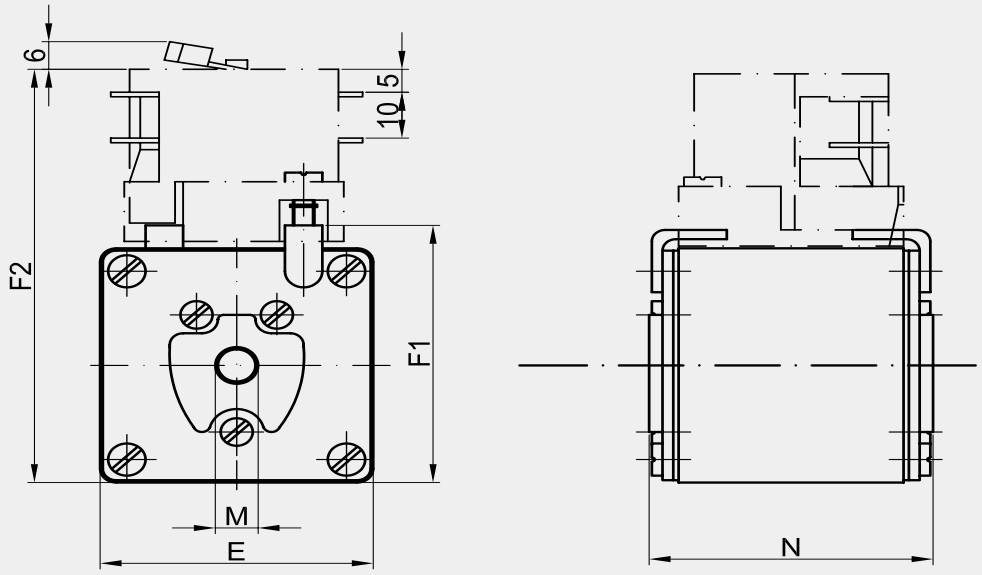
Pic.3



U_{110} screw contact

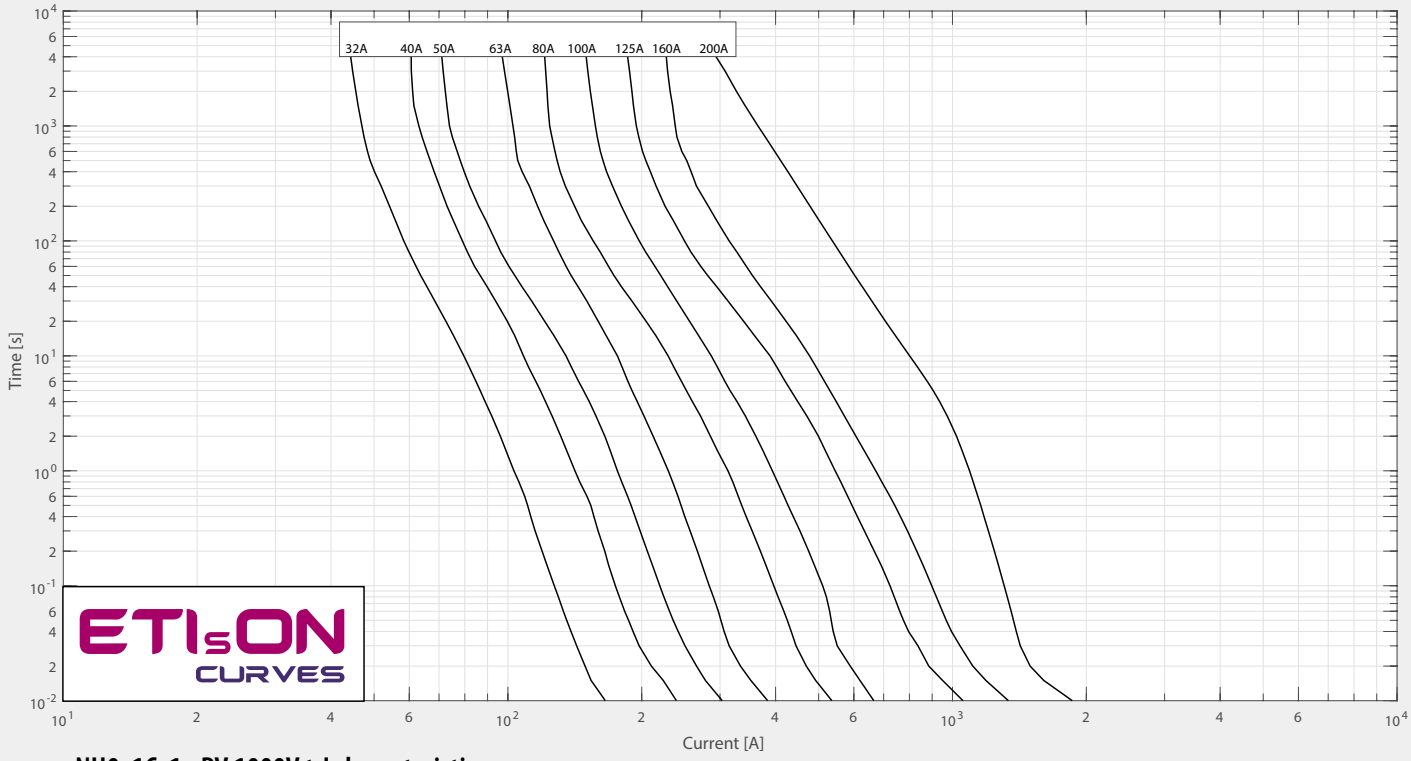
Size	C	J	E	D
2	30	13	60	60
3	37	13	73	73

Pic.4

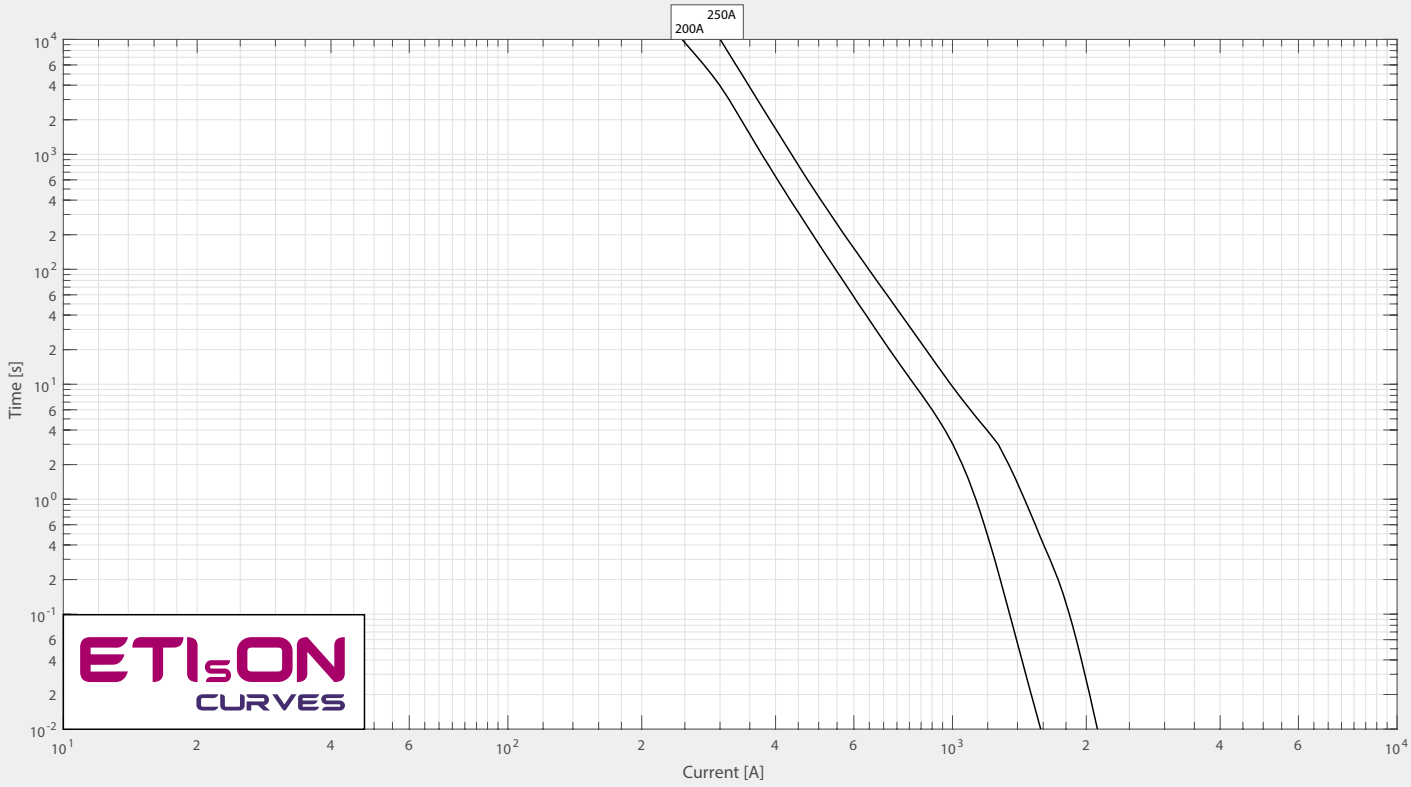


G screw contact

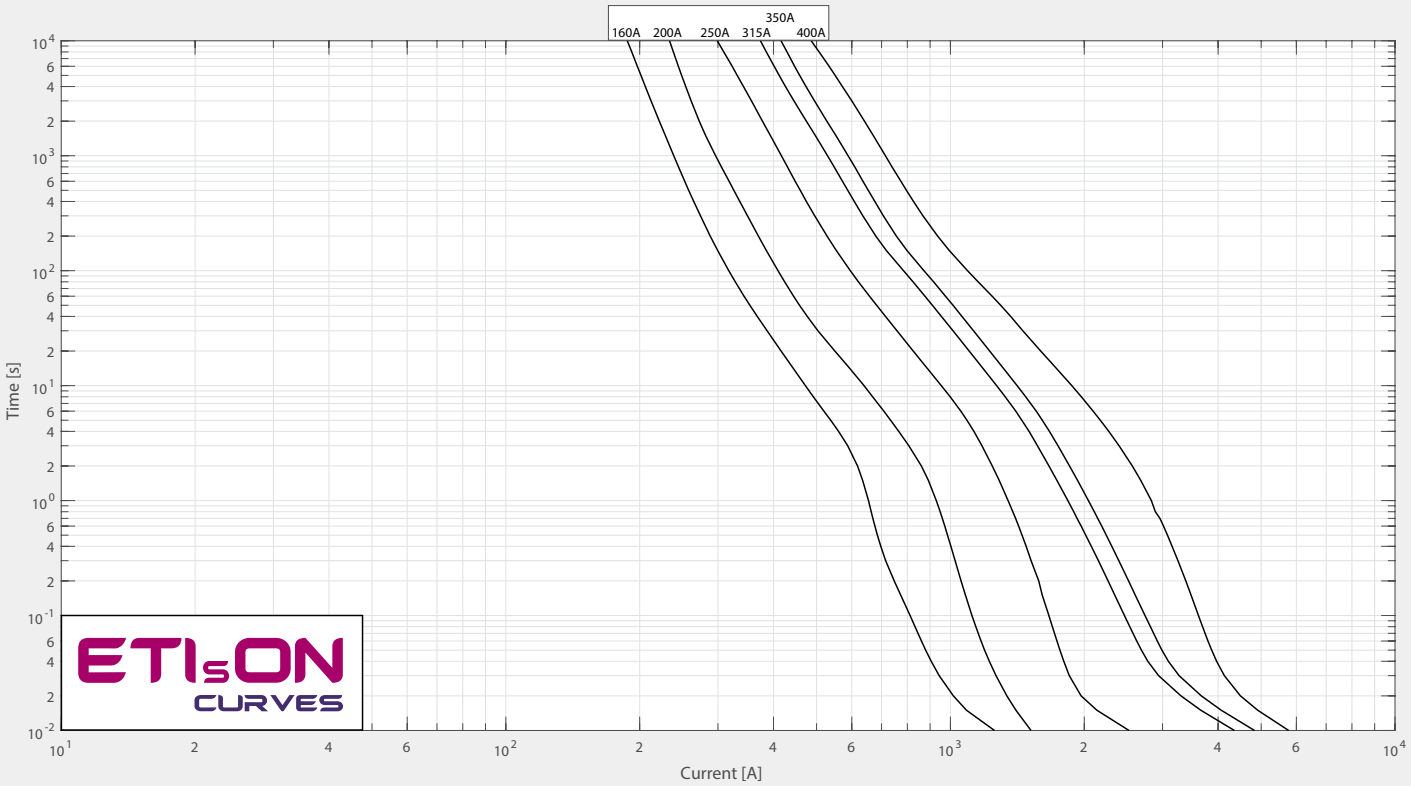
Size	D	E	F1	F2	M	N
2	60	60	65	99	M10	75
3	75	75	80	114	M12	75



NH0, 1C, 1 gPV 1000V t-I characteristics



NH2 gPV 1000V t-I characteristics



NH3 gPV 1000V t-I characteristics

NH gPV 1100V - Fuse-links

General characteristics	UL file: E347771
Rated voltage	1100V d.c. (L/R = 2ms)
Breaking capacity	10 kA d.c. (NH 3L 630A: 30kA d.c.)
Standards	IEC 60269-6, UL 248-19
Application	Fuse-link for DC application. Applied in fuse base PK XL 1500V.

lead-free

RoHS 2011/65/EU

c UL us

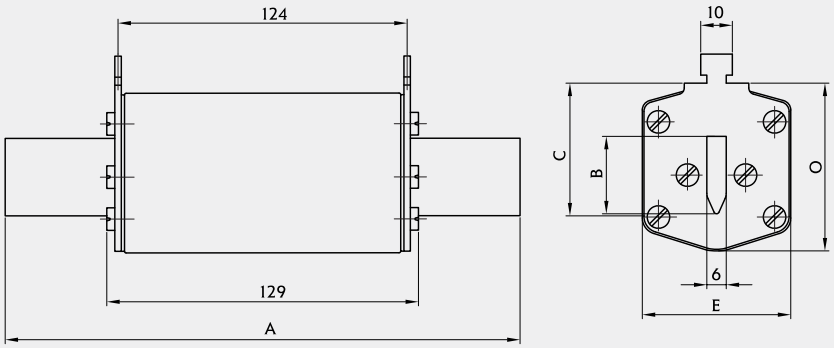
Approved by SMA SOLAR TECHNOLOGY

NH gPV 1100V d.c.

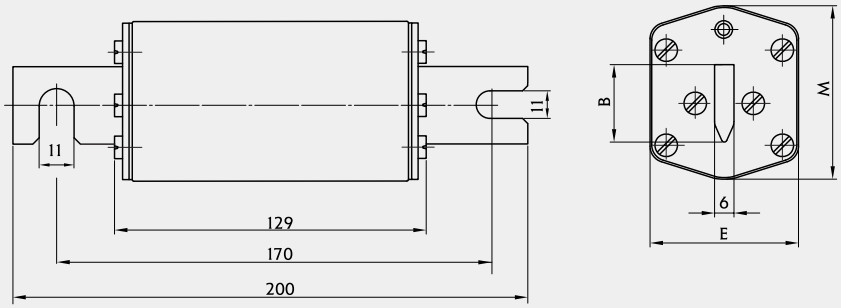
Size	I_n [A]	gPV			Power dissipation (0,7xI_n) P_d [W]	Power dissipation [W]	Pre-arcing Joule integral [I^2t] (L/R = 2ms)	Operating Joule integral [I^2t] (L/R = 2ms)	Weight [g]	Packaging [pcs]
		Standard indicator (pic.1)	S_{170} screw contact (pic.2)	U_{170} screw contact (pic.3)						
1XL	63	004110391	004110472	004110487	7	15,7	2.800	3.500	750	1/17
	80	004110392	004110473	004110488	7	16	4.500	5.500		
	100	004110393	004110474	004110489	8,3	19	7.500	9.000		
	125	004110394	004110475	004110490	9,7	22	13.000	15.000		
	160	004110395	004110476	004110491	13,2	30	25.000	30.000		
	200	004110396	004110477	004110492	15	34,8	39.000	80.000		
2XL	200	004110397	004110478	004110493	15,9	36	55.000	75.000	1050	1/15
	250	004110398	004110479	004110494	19,3	44	90.000	120.000		
3L	315	004110399	004110480	004110495	23	53,6	170.000	230.000	1360	1/10
	350	004110400	004110481	004110496	26	58	195.000	260.000		
	400	004110401	004110482	004110497	28	64,8	250.000	350.000		
	450	004110485	004110486	004110498	34	85	130.000	250.000		
	500*	004110629	004110628	004110627	37	98	150.000	370.000	1970	1/10
	630**	004110449	/	004110484	46	119	180.000	450.000		

*size 73x73; dimensions on page 52 (3L).
** 30kA, not UL certified

Picture 1

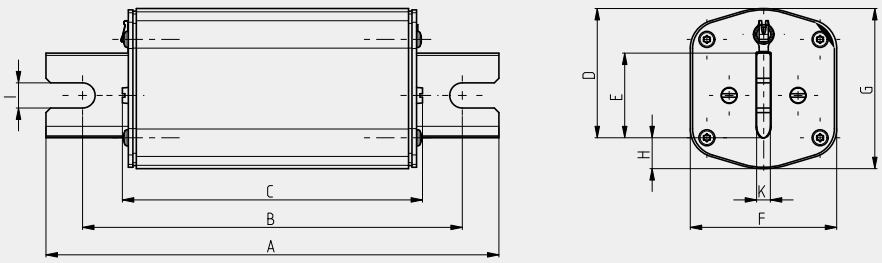


Picture 2



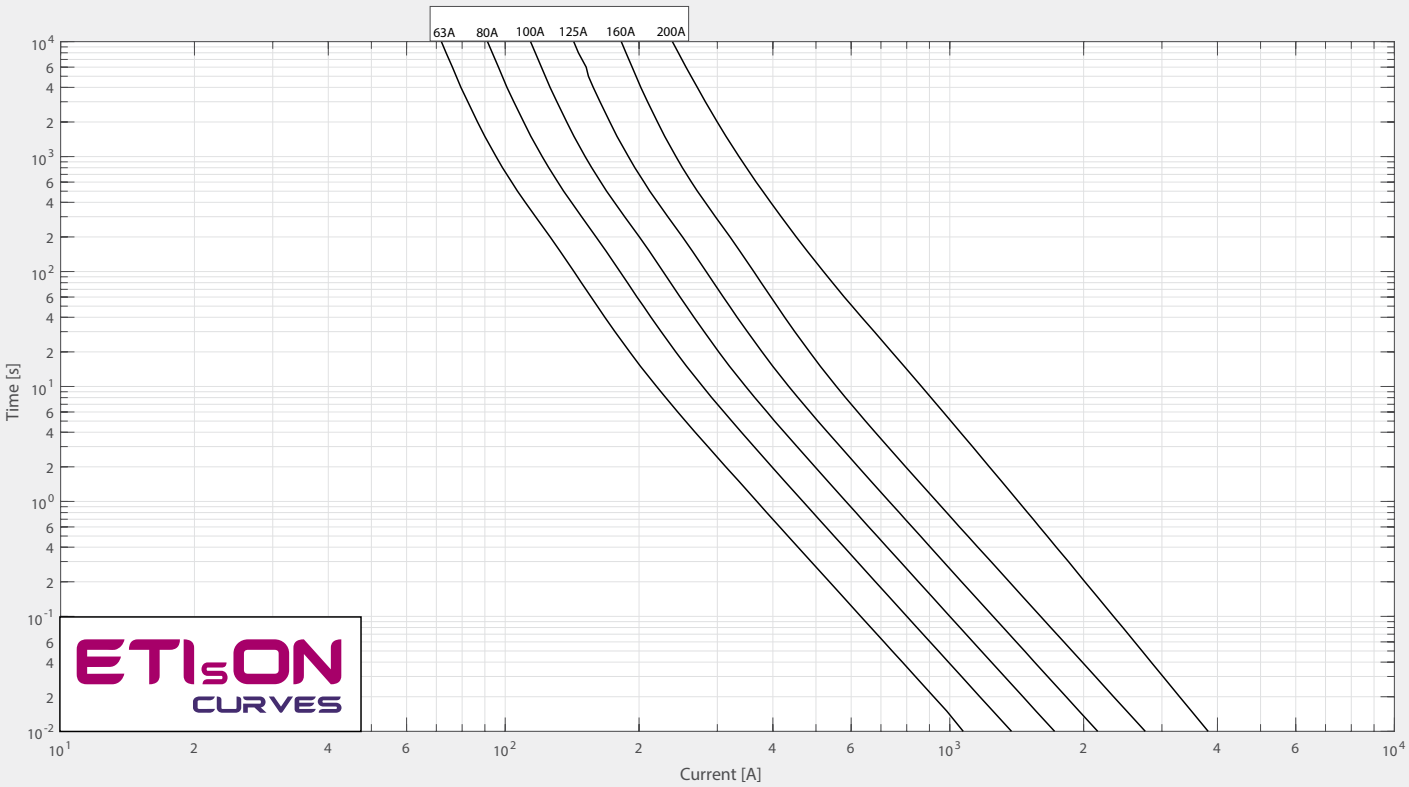
Size	Dimensions [mm]								
	A	B	C	E	G	P	R	M	O
1XL	194	24	40	46	61,5	20,5	13,7	50	52
2XL	209	30	48	54	71	27,3	16,2	59	61
3L	209	37	60	64	82	35,6	17,0	70	74

Picture 3

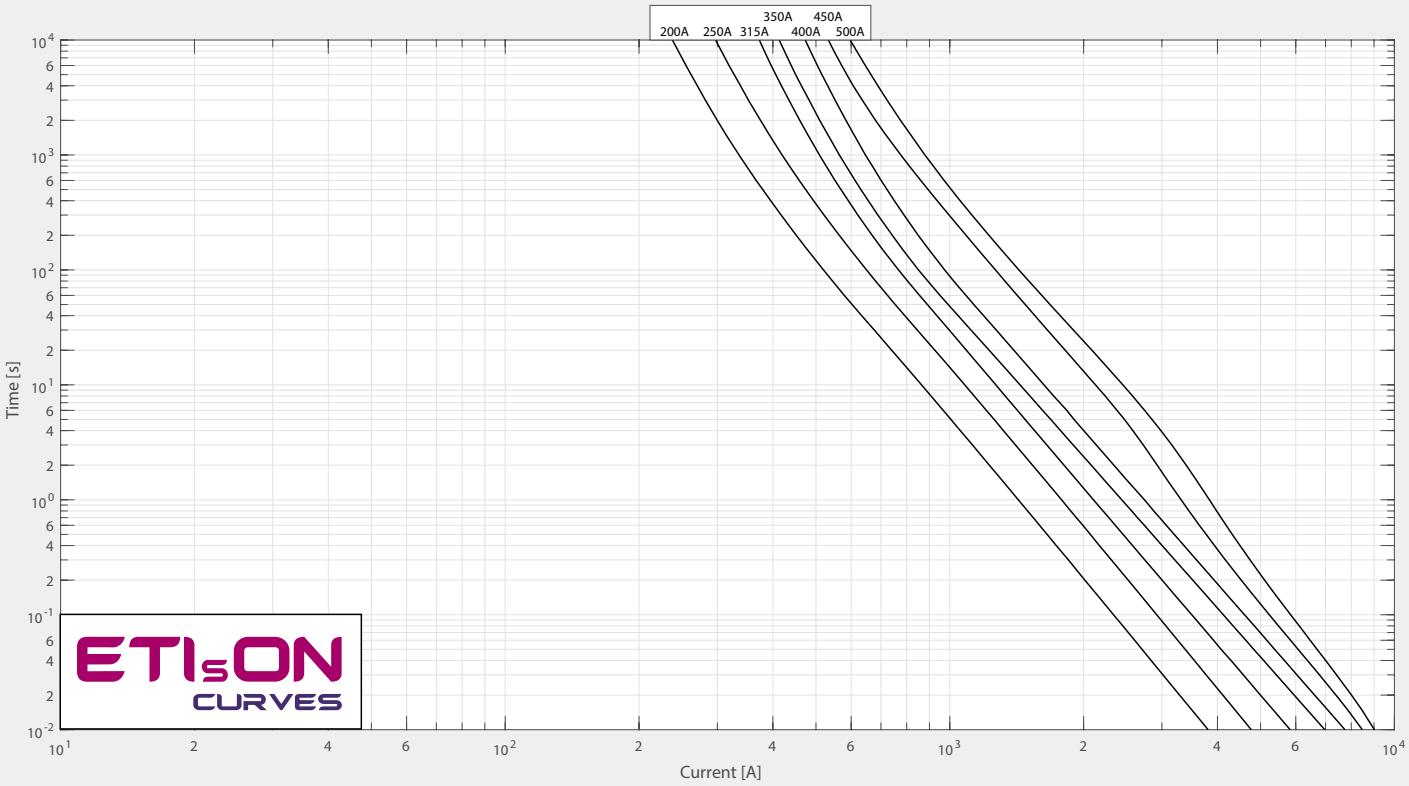


Size	Dimensions [mm]									
	A	B	C	D	E	F	G	H	K	I
1XL	197	170	133	40	24	46	50	16	6	11
2XL	200	170	130	48	30	54	59	18	6	13
3L	200	170	130	60	37	64	70	23	6	13

gPV 1100V t-I characteristics



NH1XL



NH2XL, NH3L

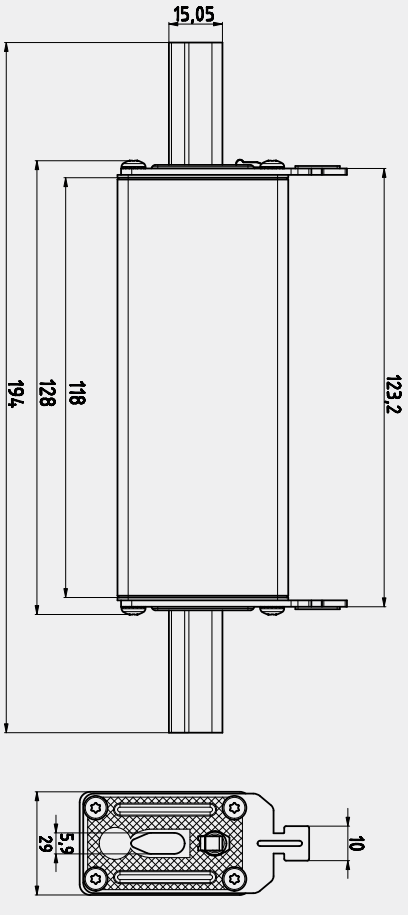
NH 01XL gPV 1500V - Fuse-links

General characteristics	
Rated voltage	1500V d.c. (L/R=3ms)
Breaking capacity	30kA d.c.
Standards	IEC 60269-6, UL248-19
Application	Fuse-link for DC application. Applied in fuse base PK1XL.

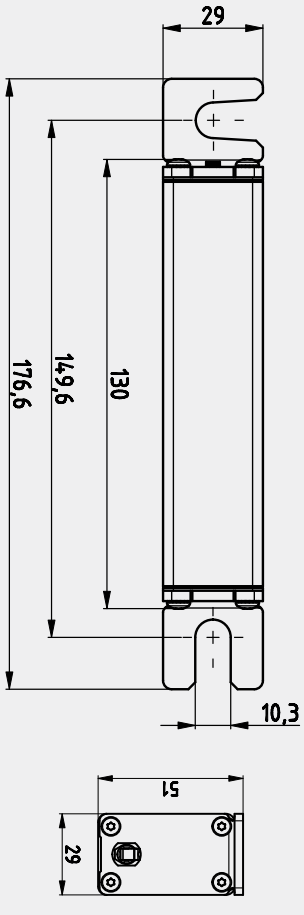
Patented technology by European Patent Office

NH gPV 1500V d.c.

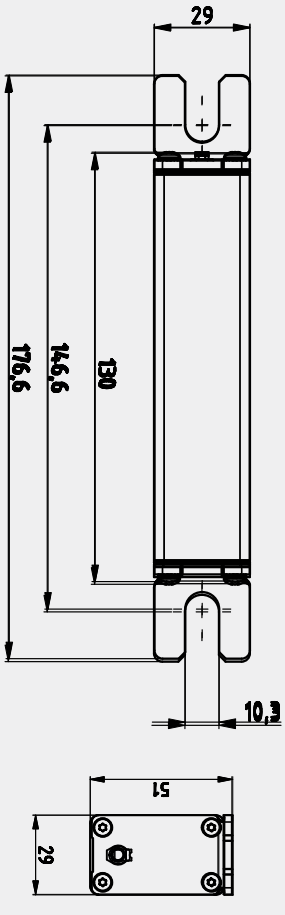
Size	I_n [A]	gPV Standard indicator (pic.1)	gPV S_{150} screw contact (pic.2)	gPV U_{150} screw contact (pic.3)	Power dissipation ($0{,}7xI_n$) P_d [W]	Power dissipation [W]	Pre-arcing Joule integral [I^2t] (L/R = 3ms)	Operating Joule integral [I^2t] (L/R = 3ms)	Weight [g]	Packaging [pcs]
01XL	50	004110692	004110743	004110749	7	18	500	3.000	450	3/30
	63	004110693	004110744	004110750	8,5	22	1.000	6.000		
	80	004110694	004110745	004110751	9	21	2.000	15.000		
	100	004110695	004110746	004110752	11	29	3.500	25.000		
	125	004110696	004110747	004110753	13	36	4.000	30.000		
	160	004110697	004110748	004110754	17	46	6.000	48.000		



Picture 1

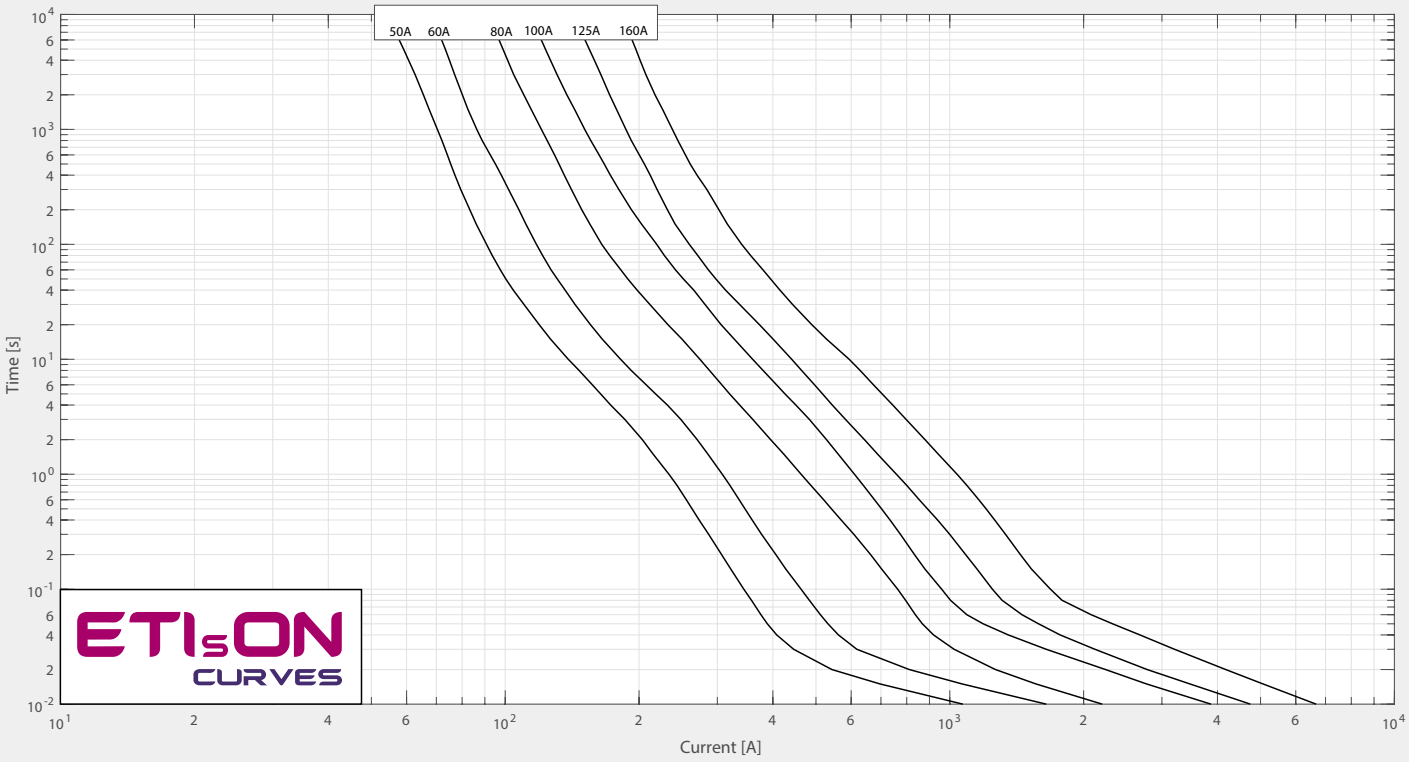


Picture 2



Picture 3

Green protect - gPV



NH 01XL gPV 1500V t-I characteristics

NH gPV 1500V - Fuse-links

General characteristics	UL file E347771
Rated voltage	1500V d.c. (L/R=3ms)
Breaking capacity	30kA d.c. NH1,2XL; 50kA d.c. NH3L
Standards	IEC 60269-6, UL 248-19
Application	Fuse-link for PV applications. Applied in fuse base PK XL 1500V.

lead-free

RoHS 2011/65/EU

Approved by SMA SOLAR TECHNOLOGY

NEW!

Patented technology by European Patent Office

NH gPV 1500V d.c.

Size	I_n [A]	gPV Standard indicator (pic.1)	gPV S_{170} screw contact (pic.2)	gPV U_{170} screw contact (pic.3)	Power dissipation (0,7xI_n) P_d [W]	Power dissipation [W]	Pre-arcing Joule integral [I^2t] (L/R = 3ms)	Operating Joule integral [I^2t] (L/R = 3ms)	Weight [g]	Packaging [pcs]
1XL	50	004110621*	004110622	004110623	6	14	800	3500	950	1/15
	63	004110560*	004110591	004110606	6,2	14	1.500	6.000		
	80	004110561*	004110592	004110607	7	16	5.000	15.000		
	100	004110562*	004110593	004110608	8,3	19	10.000	26.000		
	125	004110563*	004110594	004110609	9,7	22	15.000	37.000		
	160	004110564*	004110595	004110610	13,2	30	19.000	48.000		
	200	004110565*	004110596	004110611	13,7	32,5	22.000	75.000		
2XL	200	004110566*	004110597	004110612	15,9	36	42.000	75.000	1350	1/9
	250	004110567*	004110598	004110613	19,3	44	73.000	132.000		
3L	315	004110630*	004110635	004110640	22,2	57	65.000	300.000	1970	1/9
	350	004110631*	004110636	004110641	23,7	61	75.000	350.000		
	400	004110632*	004110637	004110642	26,8	67	85.000	450.000		
	450	004110633*	004110638	004110643	29	75	130.000	600.000		
	500	004110634*	004110639	004110644	44,3	79	160.000	700.000		
	630	004110647*	004110648	004110649	40	102	280.000	1.600.000		

* possible to mount microswitch NVS5

General characteristics	UL file E347771
Rated voltage	1500V d.c. (L/R=3ms)
Breaking capacity	50kA d.c.
Standards	IEC 60269-6, UL 248-19
Application	Fuse-link for PV applications. Applied in fuse base PK XL 1500V.

lead-free

RoHS 2011/65/EU

Approved by SMA SOLAR TECHNOLOGY

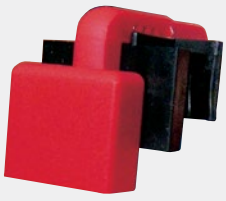
Patented technology by European Patent Office

NEW!

NH gPV 1500V d.c.

Size	I_n [A]	gPV S_{170} screw contact (pic.4)	gPV U_{170} screw contact (pic.5)	Power dissipation ($0,7xI_n$) P_d [W]	Power dissipation [W]	Pre-arcing Joule integral [I^2t] (L/R = 3ms)	Operating Joule integral [I^2t] (L/R = 3ms)	Weight [g]	Packaging [pcs]
3L MS	315	004110729	004110734	22,2	57	65.000	300.000	1970	1/9
	350	004110730	004110735	23,7	61	75.000	350.000		
	400	004110731	004110736	26,8	67	85.000	450.000		
	450	004110732	004110737	29	75	130.000	600.000		
	500	004110733	004110738	44,3	79	160.000	700.000		

It is possible to mount microswitch NVS5 to all fuse-links in the above table.



General characteristics	UL file E347771
Rated voltage	1500V d.c. (L/R=3ms)
Breaking capacity	70kA d.c. (IEC 60947-3: test sequence IV) / 50kA d.c. (IEC 60269-6), UL 248-19
Standards	IEC 60269-6, IEC 60947-3:test sequence IV, UL 248-19
Application	Fuse-link for battery protection applications. Applied in fuse base PK 3L 1500V.

lead-free

RoHS 2011/65/EU

Patented technology by European Patent Office

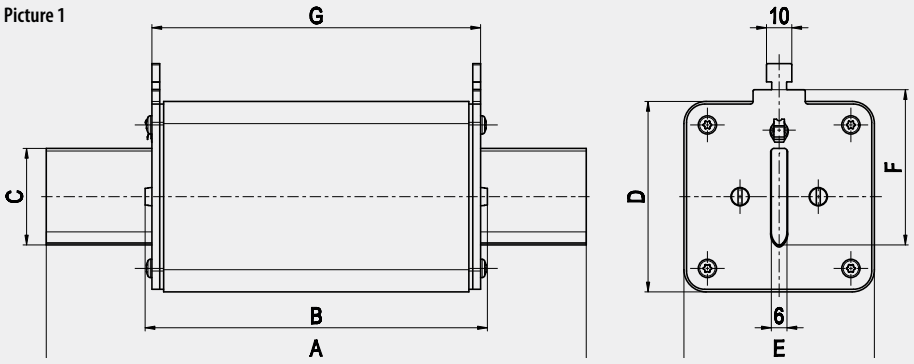
NEW!

NH gPV 1500V d.c.

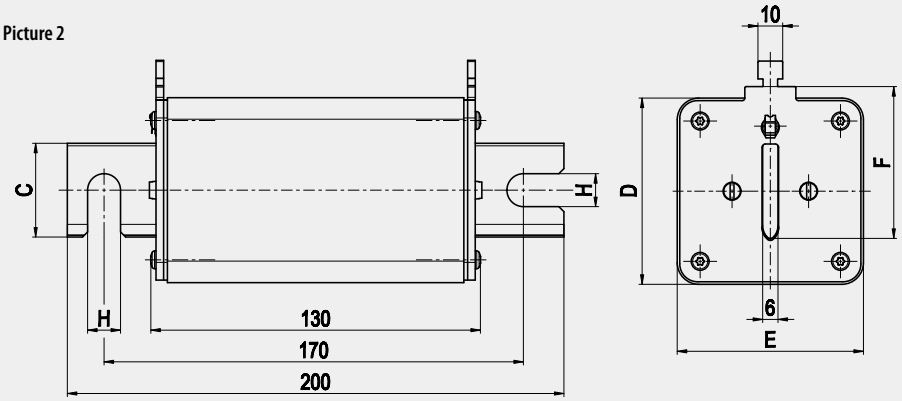
Size	I_n [A]	gPV			Power dissipation ($0,7xI_n$) P_d [W]	Power dissipation [W]	Pre-arcing Joule integral [I^2t] (L/R = 3ms)	Operating Joule integral [I^2t] (L/R = 3ms)	Weight [g]	Packaging [pcs]
		Standard indicator (pic.1)	S_{170} screw contact (pic.2)	U_{170} screw contact (pic.3)						
3L	315	004110714*	004110719	004110724	22,2	57	65.000	300.000	1970	1/9
	350	004110715*	004110720	004110725	23,7	61	75.000	350.000		
	400	004110716*	004110721	004110726	26,8	67	85.000	450.000		
	450	004110717*	004110722	004110727	29	75	130.000	600.000		
	500	004110718*	004110723	004110728	44,3	79	160.000	700.000		

* possible to mount microswitch NVS5

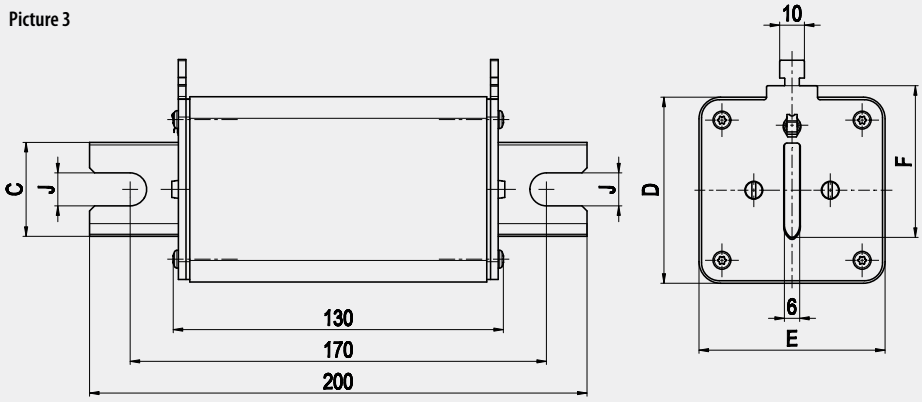
Picture 1



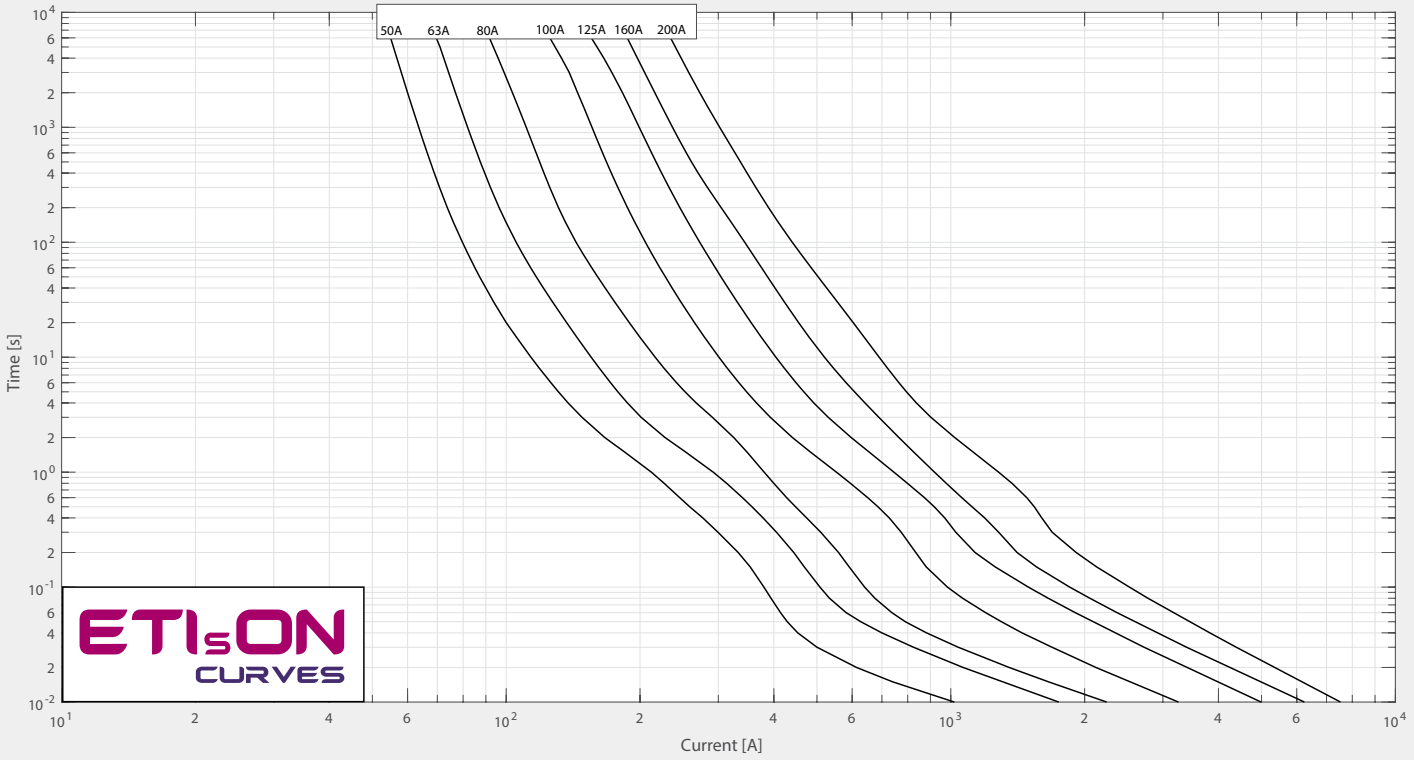
Picture 2



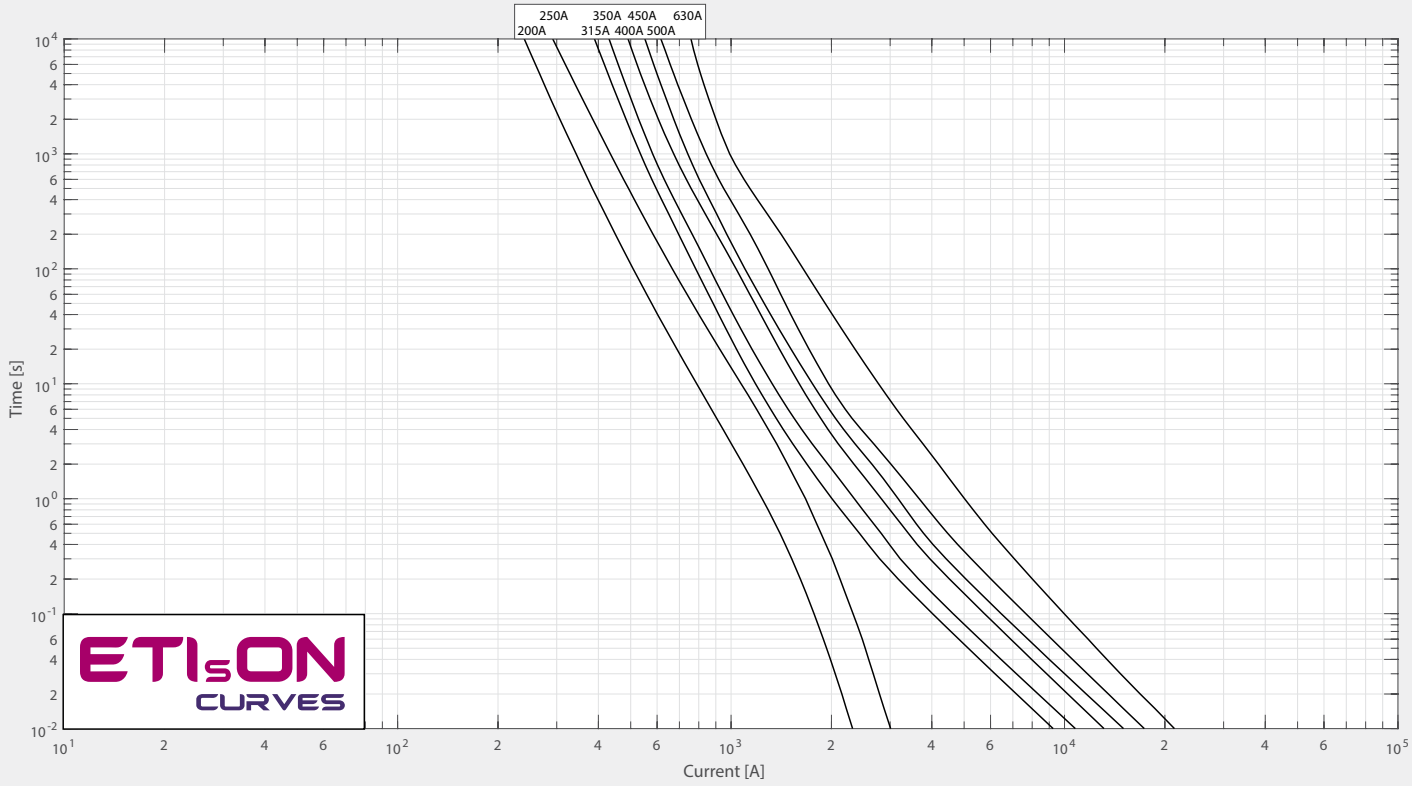
Picture 3



Size	Dimensions [mm]								
	A	B	C	D	E	F	G	H	J
1XL	192	131	24	51	51	43,5	125	11	11
2XL	208	130	30	60	60	48	126	11	13
3L	208	130	37	73	73	60	126	11	13



t-I characteristics NH 1XL



t-I characteristics NH 2XL & NH 3L

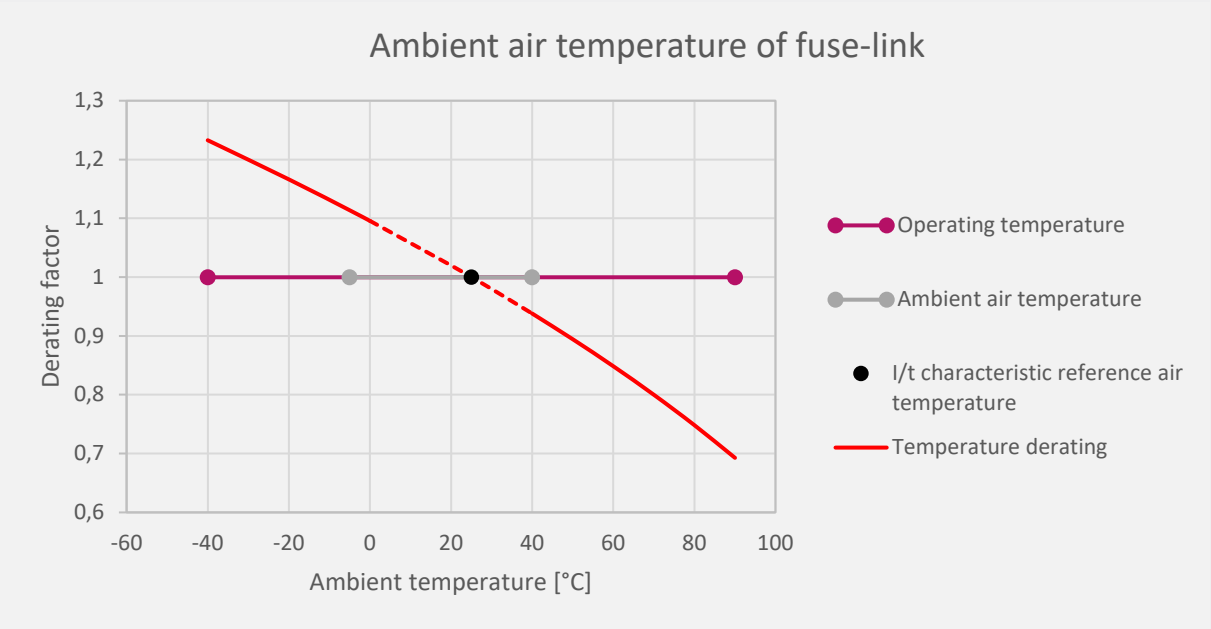
315 A							
cut-off	L/R						
Ip/kA	0,1 ms	0,5 ms	1 ms	1,5 ms	2 ms	2,5 ms	3 ms
10	10 kA	9 kA	9 kA	8 kA	8 kA	8 kA	8 kA
20	17 kA	13 kA	12 kA	11 kA	11 kA	10 kA	10 kA
30	22 kA	16 kA	14 kA	13 kA	12 kA	12 kA	12 kA
40	25 kA	19 kA	16 kA	14 kA	14 kA	13 kA	13 kA
50	28 kA	20 kA	17 kA	16 kA	15 kA	14 kA	14 kA
60	30 kA	21 kA	18 kA	17 kA	16 kA	16 kA	15 kA
70	33 kA	22 kA	19 kA	18 kA	17 kA	17 kA	16 kA
80	36 kA	26 kA	23 kA	20 kA	19 kA	19 kA	18 kA
90	38 kA	28 kA	24 kA	22 kA	20 kA	20 kA	19 kA
100	41 kA	30 kA	25 kA	23 kA	21 kA	21 kA	20 kA

350 A							
cut-off	L/R						
Ip/kA	0,1 ms	0,5 ms	1 ms	1,5 ms	2 ms	2,5 ms	3 ms
10	10 kA	10 kA	9 kA	9 kA	9 kA	8 kA	8 kA
20	18 kA	14 kA	13 kA	12 kA	12 kA	11 kA	11 kA
30	23 kA	17 kA	15 kA	14 kA	13 kA	13 kA	12 kA
40	27 kA	19 kA	17 kA	16 kA	15 kA	14 kA	14 kA
50	31 kA	21 kA	18 kA	17 kA	16 kA	16 kA	15 kA
60	32 kA	24 kA	19 kA	18 kA	17 kA	17 kA	16 kA
70	34 kA	25 kA	21 kA	20 kA	19 kA	18 kA	17 kA
80	38 kA	27 kA	24 kA	23 kA	21 kA	20 kA	20 kA
90	40 kA	30 kA	26 kA	24 kA	22 kA	21 kA	21 kA
100	43 kA	32 kA	27 kA	25 kA	23 kA	22 kA	22 kA

400 A							
cut-off	L/R						
Ip/kA	0,1 ms	0,5 ms	1 ms	1,5 ms	2 ms	2,5 ms	3 ms
10	10 kA	10 kA	10 kA	10 kA	9 kA	9 kA	9 kA
20	19 kA	16 kA	14 kA	13 kA	13 kA	12 kA	12 kA
30	24 kA	19 kA	17 kA	16 kA	15 kA	14 kA	14 kA
40	29 kA	21 kA	19 kA	18 kA	16 kA	16 kA	15 kA
50	33 kA	23 kA	21 kA	19 kA	18 kA	17 kA	16 kA
60	36 kA	25 kA	22 kA	20 kA	19 kA	19 kA	18 kA
70	38 kA	28 kA	23 kA	21 kA	20 kA	20 kA	19 kA
80	41 kA	30 kA	26 kA	25 kA	24 kA	23 kA	22 kA
90	45 kA	33 kA	29 kA	27 kA	25 kA	24 kA	23 kA
100	48 kA	35 kA	30 kA	28 kA	26 kA	25 kA	24 kA

450 A							
cut-off	L/R						
Ip/kA	0,1 ms	0,5 ms	1 ms	1,5 ms	2 ms	2,5 ms	3 ms
10	10 kA	10 kA	10 kA	10 kA	9 kA	9 kA	9 kA
20	20 kA	17 kA	16 kA	15 kA	14 kA	13 kA	13 kA
30	26 kA	21 kA	19 kA	18 kA	17 kA	16 kA	15 kA
40	32 kA	24 kA	21 kA	20 kA	18 kA	18 kA	17 kA
50	36 kA	27 kA	24 kA	22 kA	20 kA	19 kA	18 kA
60	41 kA	29 kA	25 kA	23 kA	22 kA	21 kA	19 kA
70	44 kA	32 kA	27 kA	25 kA	23 kA	22 kA	22 kA
80	48 kA	35 kA	30 kA	29 kA	27 kA	26 kA	25 kA
90	52 kA	37 kA	33 kA	30 kA	28 kA	27 kA	26 kA
100	55 kA	40 kA	35 kA	31 kA	29 kA	28 kA	27 kA

500 A							
cut-off	L/R						
Ip/kA	0,1 ms	0,5 ms	1 ms	1,5 ms	2 ms	2,5 ms	3 ms
10	10 kA	10 kA	10 kA	10 kA	9 kA	9 kA	9 kA
20	20 kA	17 kA	16 kA	15 kA	14 kA	14 kA	13 kA
30	28 kA	23 kA	20 kA	18 kA	17 kA	17 kA	16 kA
40	35 kA	27 kA	23 kA	21 kA	20 kA	19 kA	18 kA
50	40 kA	30 kA	26 kA	24 kA	22 kA	21 kA	20 kA
60	47 kA	33 kA	28 kA	26 kA	24 kA	23 kA	21 kA
70	50 kA	35 kA	30 kA	28 kA	26 kA	24 kA	23 kA
80	55 kA	39 kA	34 kA	31 kA	30 kA	28 kA	27 kA
90	59 kA	41 kA	36 kA	33 kA	32 kA	31 kA	29 kA
100	61 kA	44 kA	39 kA	35 kA	33 kA	32 kA	30 kA



Legend:

T_{amb} – Ambient Temperature

TDF – Temperature Derating Factor

I_N – Nominal Current of Fuse-link

I_{TDF} – Nominal Current Including Temperature Derating Factor

Current calculation: $I_{TDF} = I_N \times TDF$

PROTECTION OF PV INVERTERS

New generation of NH gG and gS fuse-links for cable protection in 800V a.c. system in standard NH sizes

New directions in PV inverters development

New directions in PV inverters development...

PV inverters are getting larger and smarter, their characteristics better and better, they have become smart, safe, reliable and efficient.

Higher yields are reached by utilizing dynamic system efficiency optimization with intelligent technology. Achieved efficiency currently ranges above 98,5%. One of most important technical features of the new generation of PV inverters is 800V a.c. output voltage instead of 400V a.c. With this output voltage increase, we achieve a 75% decrease in a.c. connection wires losses. Yet, because of the increased output voltage modern PV central inverters demand a specially designed fuse-link for reliable short-circuit and over-current protection.

... and new fuse-links to answer the increased demands of their output protection

As one of the first among the producers of NH fuse-links, ETI has developed a new generation of NH gG fuse-links, specially designed for cable protection on 800V a.c. system voltage. With an innovative design of melting elements, adoption of high temperature and internal pressure resistant ceramic material, the final NH fuse-link construction can now be incorporated in a standard NH size dimensions.

At the moment ETI is offering sizes NH00, NH1 and NH3 gG fuse-links, from rated current 6A up to 315A, designed and tested on 800V a.c. with very low power dissipation and high breaking capacity. On a customer request, we are also ready to develop even higher rated currents.

Features and benefits

- Load switching capacity up to 800V a.c.
- Meets IEC photovoltaic standards
- In standard NH size dimensions
- Extremely low power dissipation
- High breaking capacity
- Designed to protect against a full range of overcurrents
- High temperature and internal pressure resistant ceramic material
- Innovative design of melting elements

Applications

- For cable protection on a.c. side of 1500V PV inverter

NH gG 800V a.c. Fuse-links

General characteristics	
Rated voltage	800V a.c.
Rated current	6A - 315A
Breaking capacity	120kA
Characteristic	gG
Standards	IEC 60269-2
Application	For cable protection on a.c. side of PV inverter

NV/NH gG 800V a.c.

Size	Breaking capacity [kA]	I_n [A]	Code No.	Pre-arcing Joule integral [A^2s]	Operating Joule integral [A^2s]	Power dissipation [0,7 x In] Pd [W]	Power dissipation [W]	Weight [g]	Pack. [pcs]
NH00	120	6	004184512	63	650	0,8	1,9	173	3/90
		10	004184513	35	850	0,6	1,3		
		16	004184514	120	1.800	1,1	2,4		
		20	004184515	225	4.000	1,1	2,6		
		25	004184516	300	6.500	1,2	2,7		
		35	004184518	1.800	10.000	1,5	3,3		
		40	004184519	2.100	13.500	1,8	4,0		
		50	004184520	4.300	27.000	2,1	4,8		
		63	004184521	7.000	43.000	2,6	6,0		
NH1		25	004184482	600	14.000	1,4	3,2	420	3/24
		35	004184483	2.400	35.000	1,5	3,4		
		40	004184484	3.200	50.000	1,8	4,0		
		50	004184485	3.500	70.000	1,9	4,4		
		63	004184486	5.500	120.000	2,4	5,5		
		80	004184487	11.000	145.000	3,0	6,9		
		100	004184488	18.000	185.000	3,8	8,6		
		125	004184489	27.000	260.000	4,3	9,7		
		160	004184490	45.000	475.000	5,5	12,4		
		200	004184463*	55.000	500.000	8,1	18,5		
NH3		160	004184524	28.000	400.000	6,3	14,4	785	3/12
		200	004184525	70.000	690.000	6,4	14,5		
		250	004184526	110.000	1.100.000	9,7	22,0		
		315	004184498**	140.000	1.340.000	12,8	29,0	1200	3/15

* Breaking capacity: 30kA

** Top visual indicator

Recommended Accessories

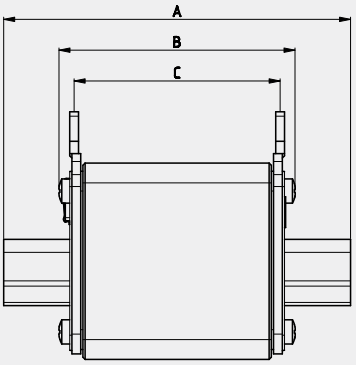
- Ceramic fuse bases
- Plastic fuse bases
- Fuse disconnectors

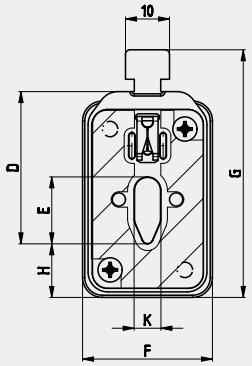
Dimensions

Size	Dimensions [mm]								
	A	B	C	D	E	F	G	H	K
00	79	53	47	35	15	28	56	12	6
1	135	72	65	40	20	46	65	14	6
3	150	74	70	60	37	73	87	13	6
3*	150	74	70	60	37	73	87	13	6

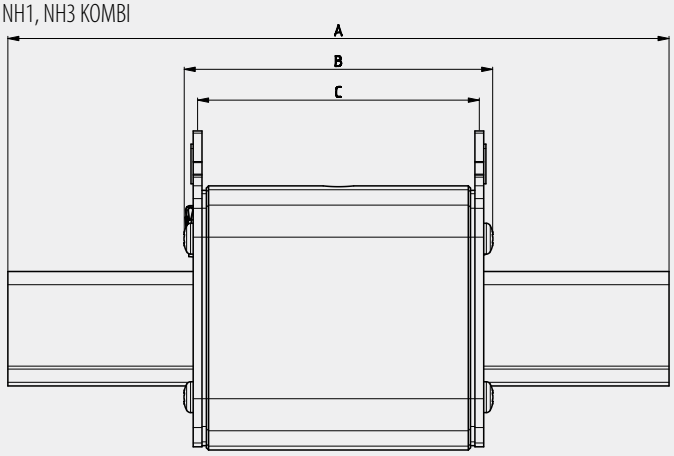
*Top visual indicator

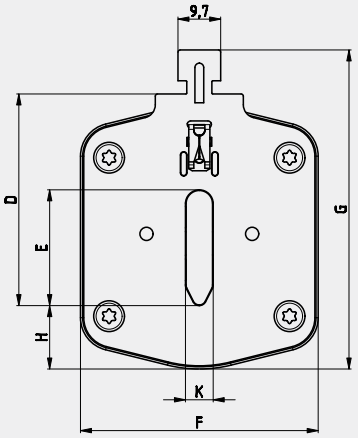
NH00 KOMBI



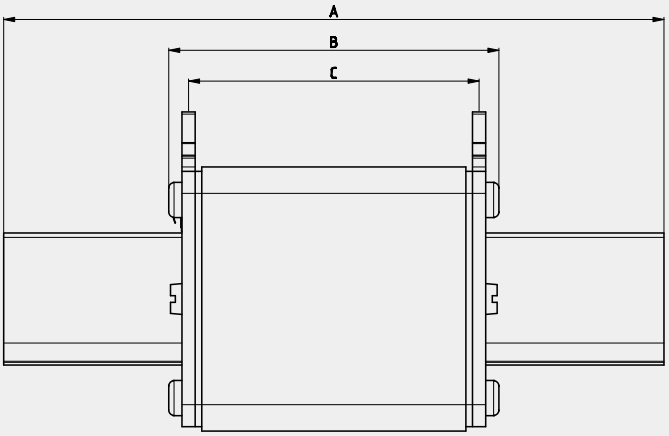


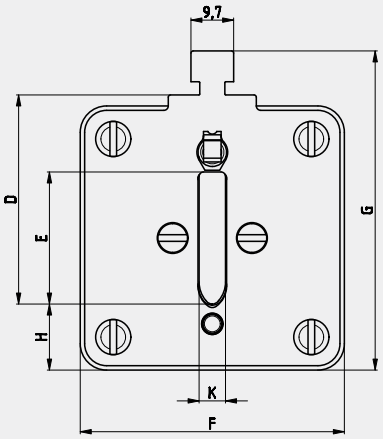
NH1, NH3 KOMBI





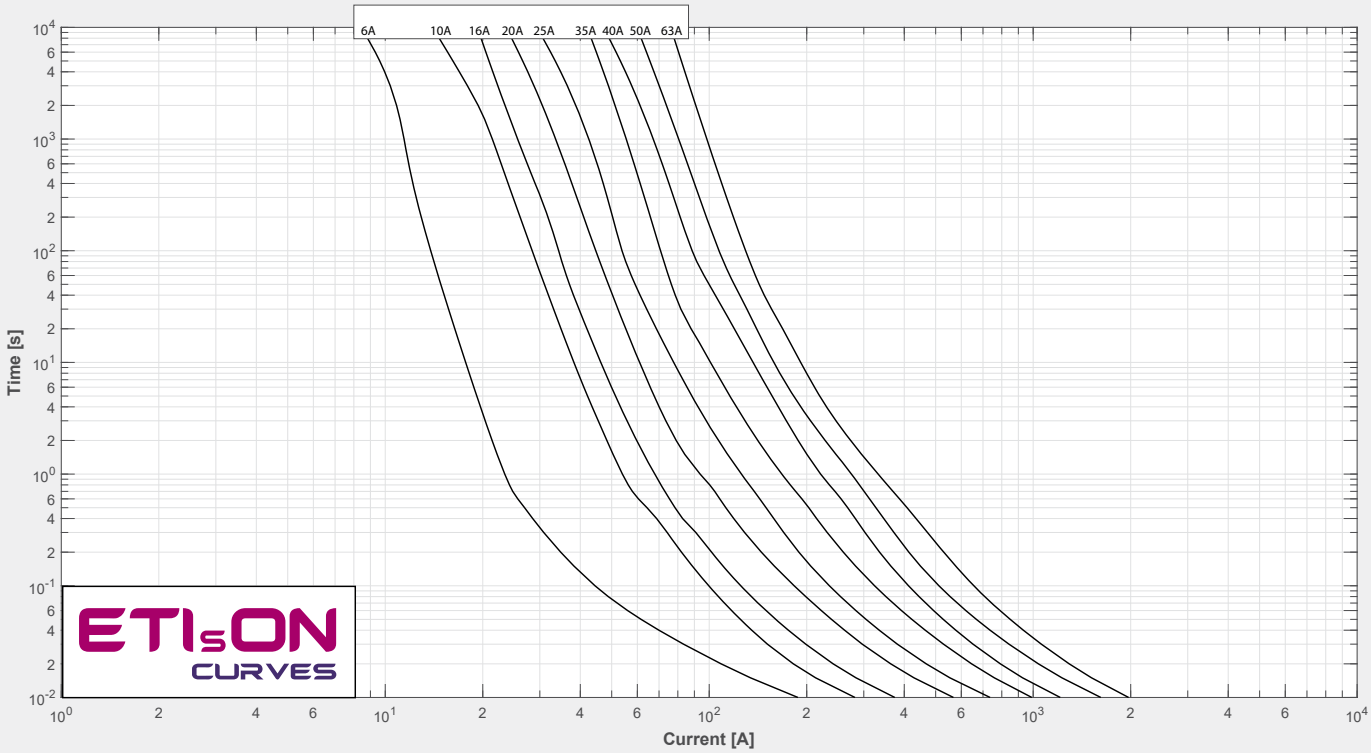
NH3



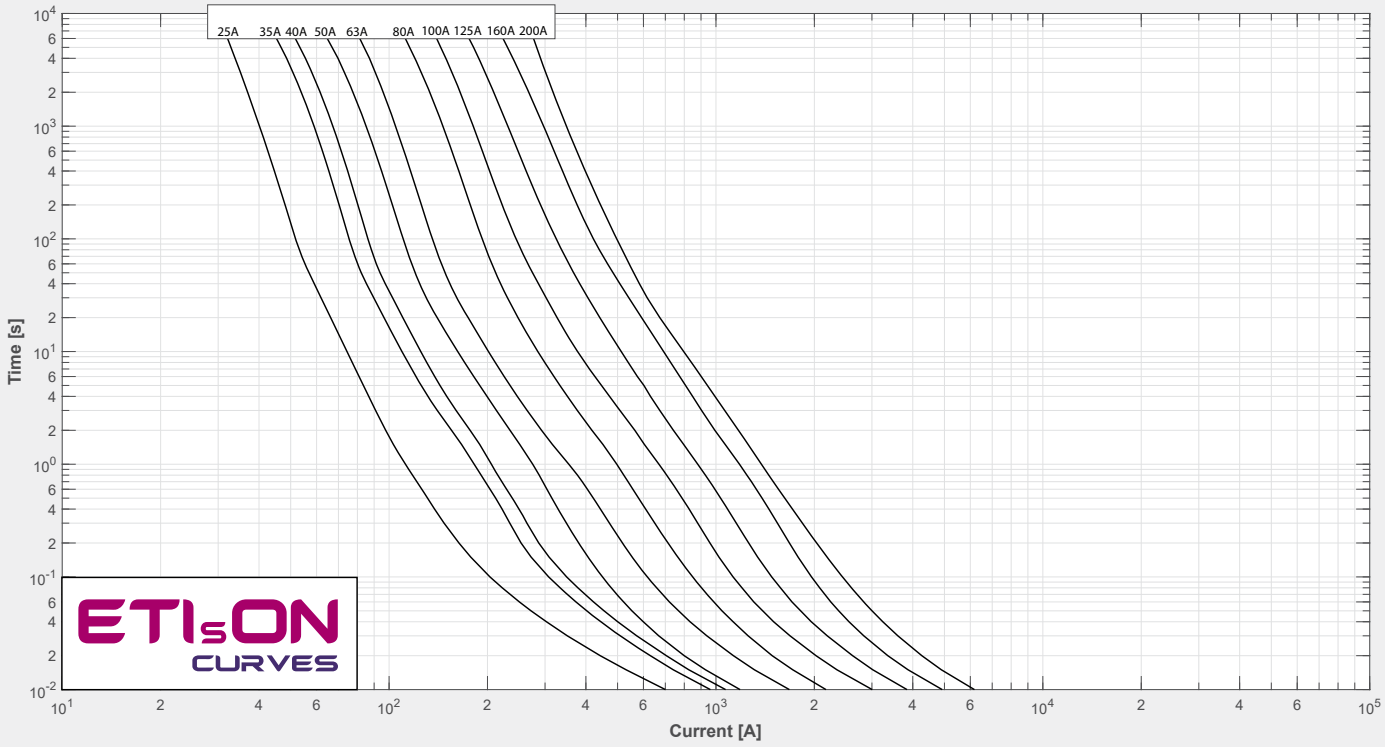


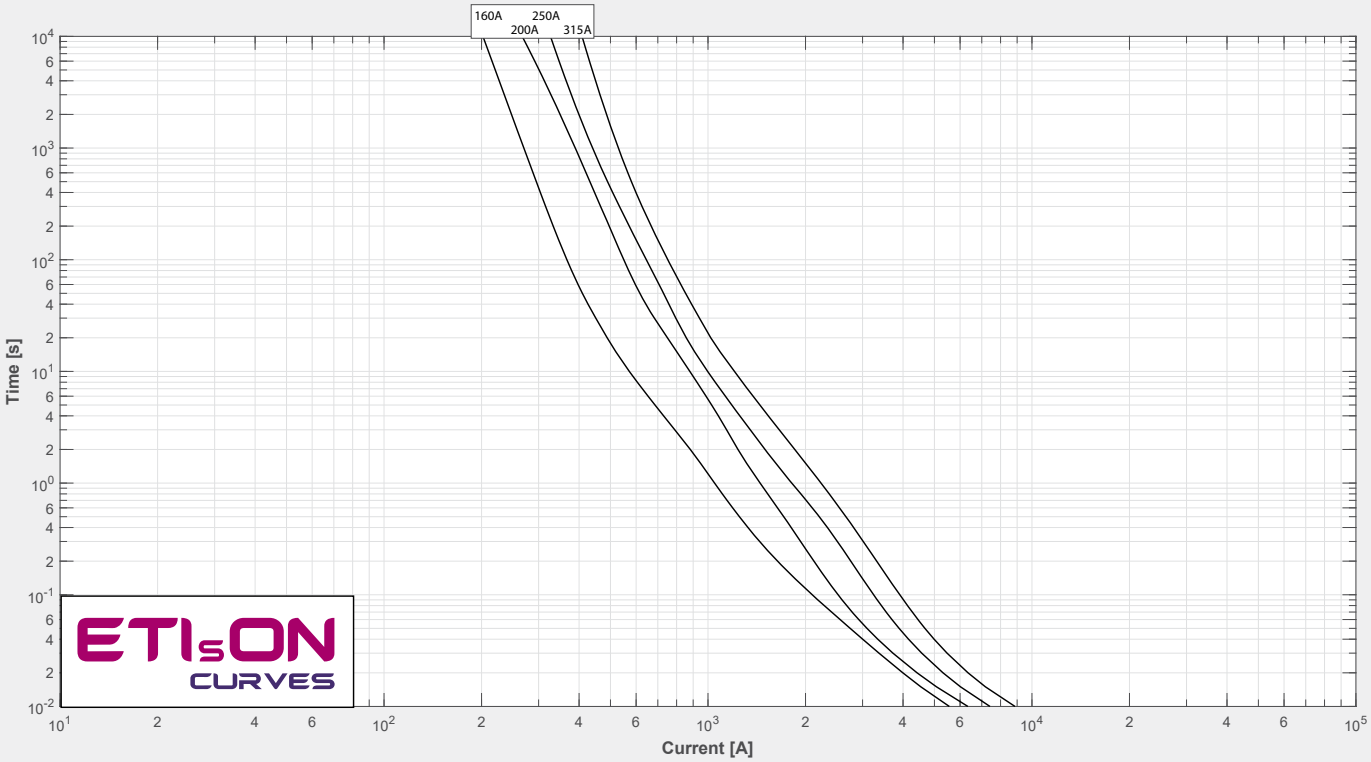
I/t characteristics

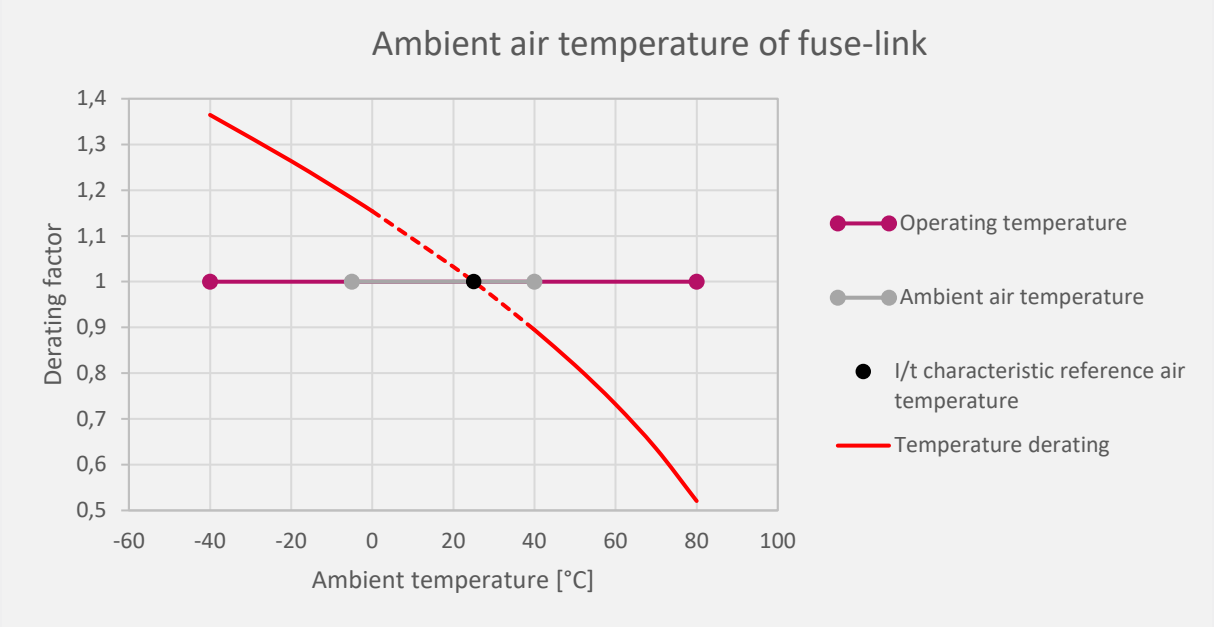
NH00 KOMBI



NH1 KOMBI







Legend:

T_{amb} – Ambient Temperature

TDF – Temperature Derating Factor

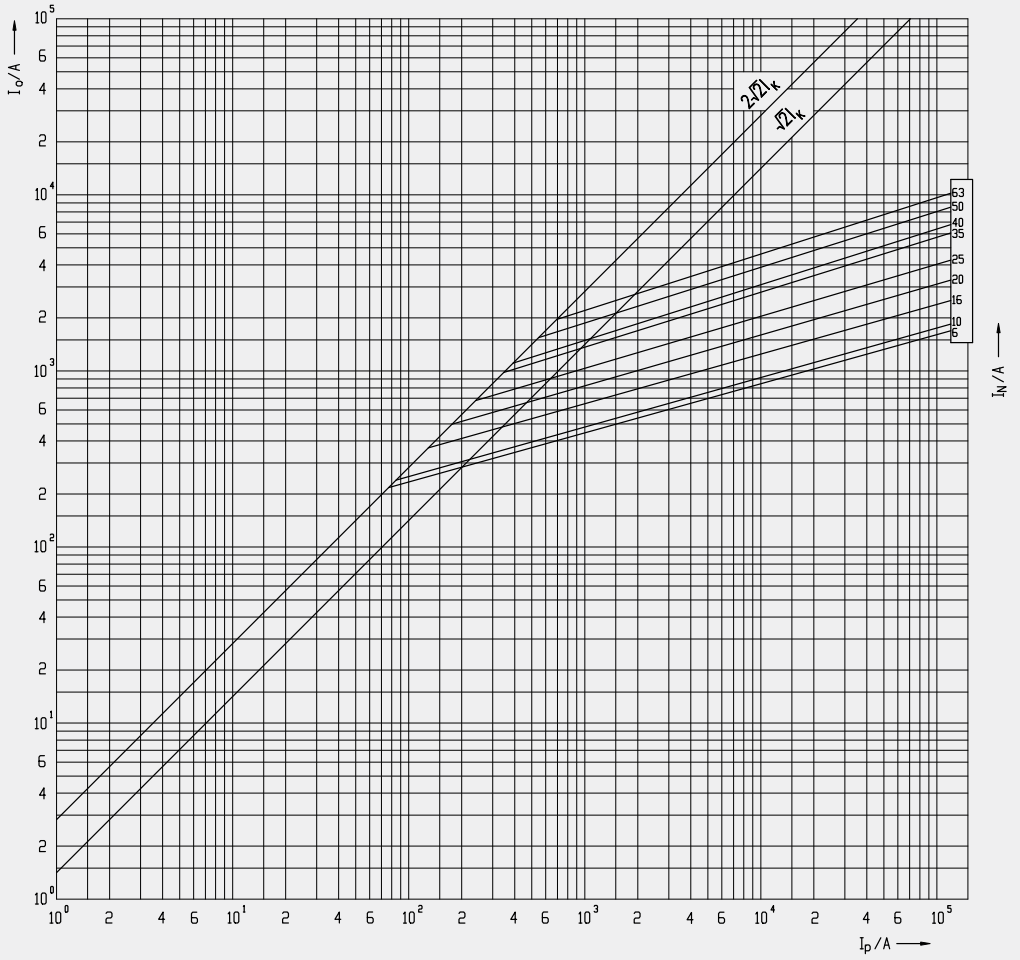
I_N – Nominal Current of Fuse-link

I_{TDF} – Nominal Current Including Temperature Derating Factor

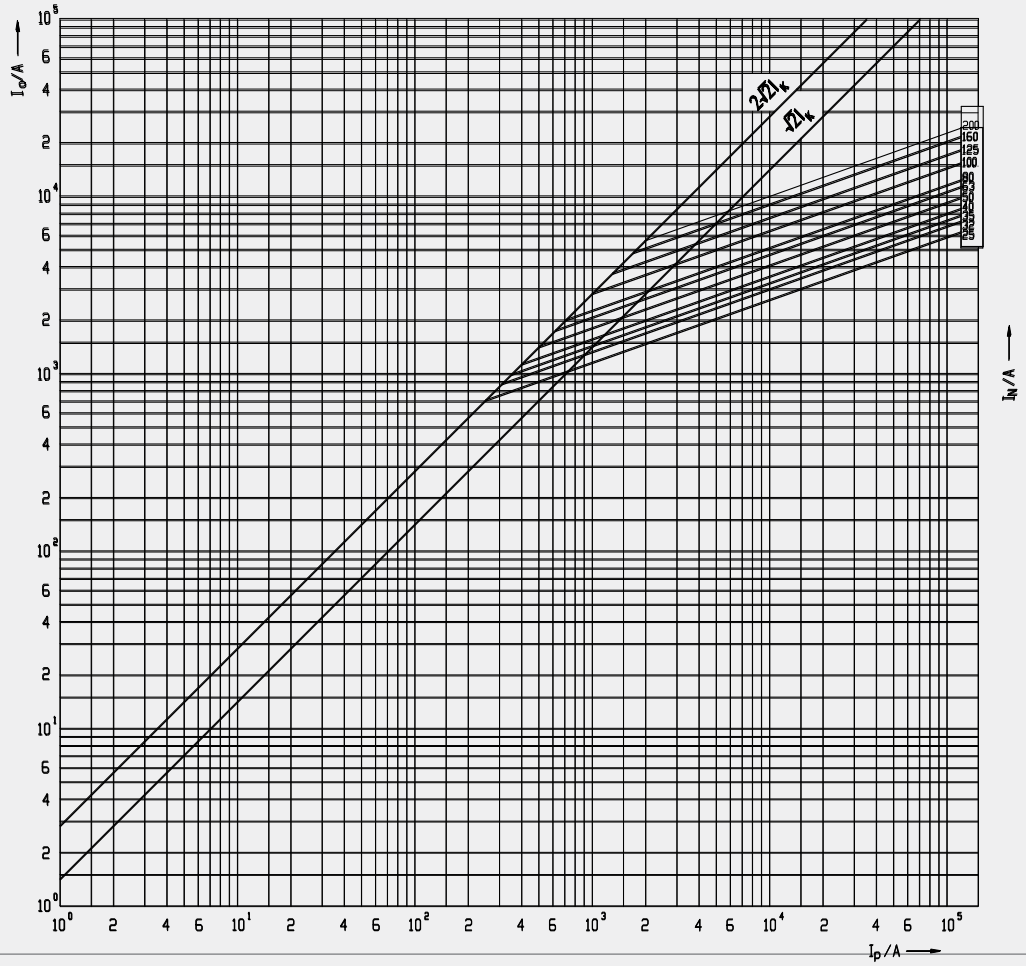
Current calculation: $I_{TDF} = I_N \times TDF$

Cut-off current **characteristics**

NH00



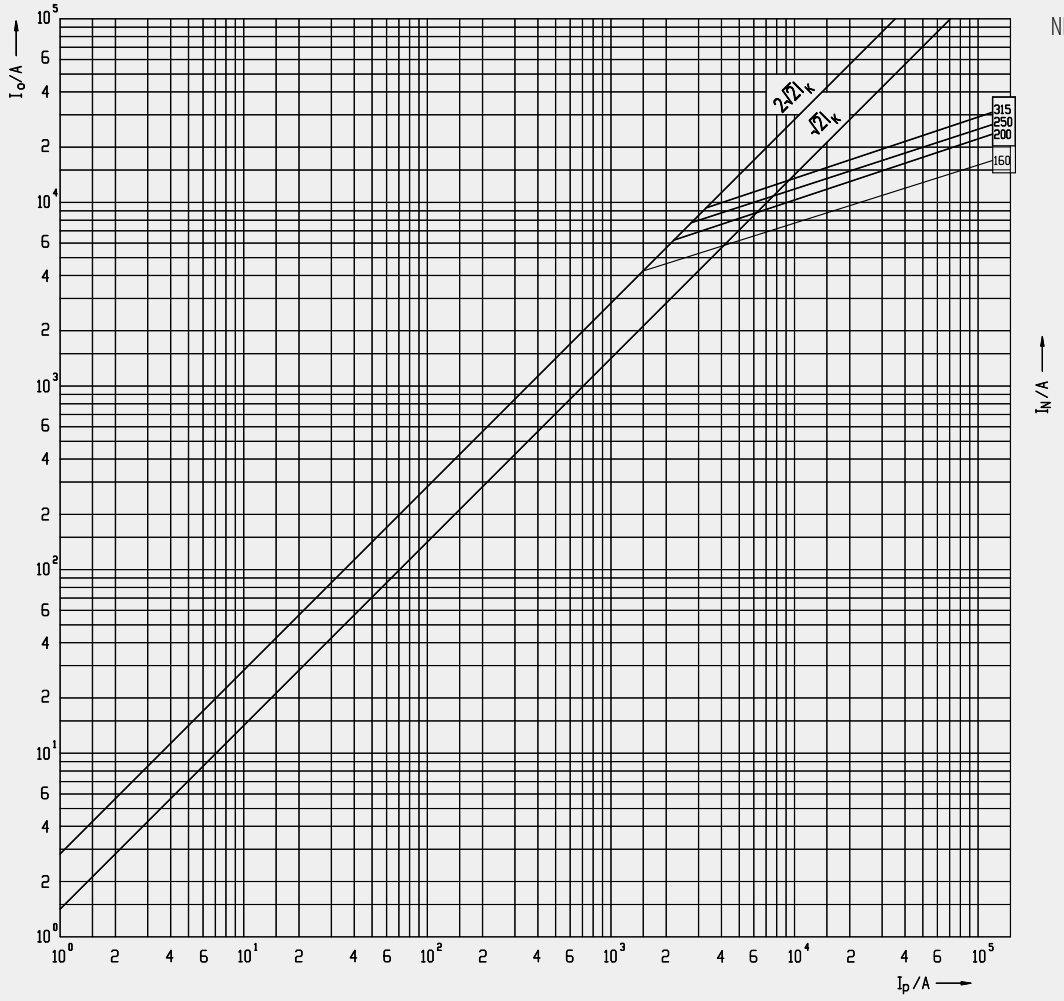
NH1



Green protect - 800V a.c.

Cut-off current **characteristics**

NH3



Green protect - 800V a.c.

NH gS 800V a.c. Fuse-links

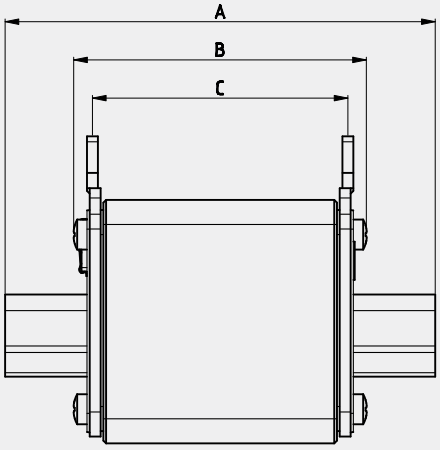
General characteristics	
Rated voltage	800V a.c.
Rated current	16 - 500A
Breaking capacity	30kA (NH00), 120kA (NH1-3)
Characteristic	gS
Standards	IEC 60269-4
Application	For cable protection on a.c. side of PV inverter

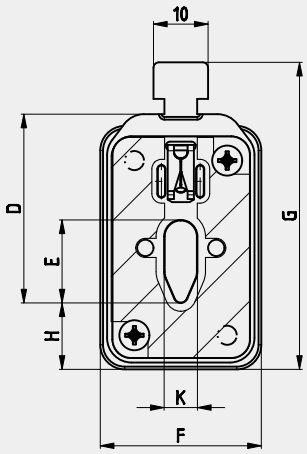
NV/NH gS 800V a.c.

Size	Breaking capacity [kA]	I_n [A]	Standard indicator	Pre-arcing Joule integral [A^2s]	Operating Joule integral [A^2s]	Power dissipation [0,7 x In] Pd [W]	Power dissipation [W]	Weight [g]	Packaging [pcs]
NH00	30	16	004184504	15	1000	1,3	3,1	173	3/90
		20	004184505	32	1200	1,3	3,2		
		25	004184506	54	1600	1,8	4,3		
		35	004184507	250	5500	1,8	4,3		
		40	004184508	390	6300	1,9	4,5		
		50	004184509	460	9500	2,4	5,7		
		63	004184502	510	18.400	2,6	6,2		
		80	004184501	1.360	32.000	2,8	6,7		
		100	004184500	3.000	60.000	3,8	9		
		125	004184503	4.000	72.000	5,4	12,9		
NH1	120	160	004723234	3.500	110.000	7,1	17	500	3/24
		200	004723235	9.000	145.000	8,0	19		
		250	004723236	18.000	275.000	9,2	22		
		315	004723237	35.000	490.000	11,7	28		
NH2		350	004724234	70.000	825.000	10,5	25	660	1/16
		400	004724235	95.000	1.020.000	12,6	30		
NH3		350	004725232	85.000	980.000	10,5	25	1200	3/15
		400	004725233	105.000	1.200.000	12,6	30		
		450	004725234	170.000	1.750.000	13,3	31,7		
		500	004725235	220.000	2.100.000	14,0	33,5		

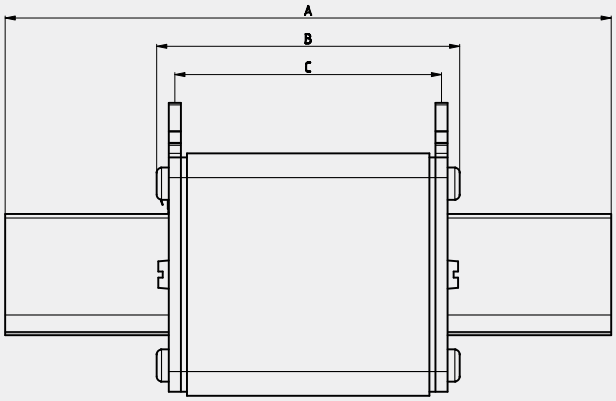
Dimensions

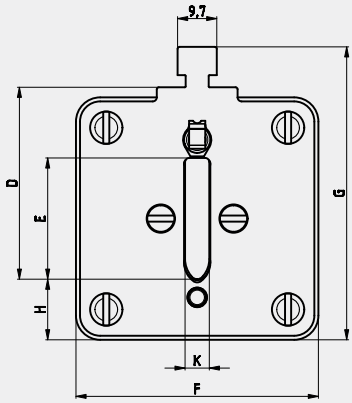
NH00





NH1, NH2, NH3

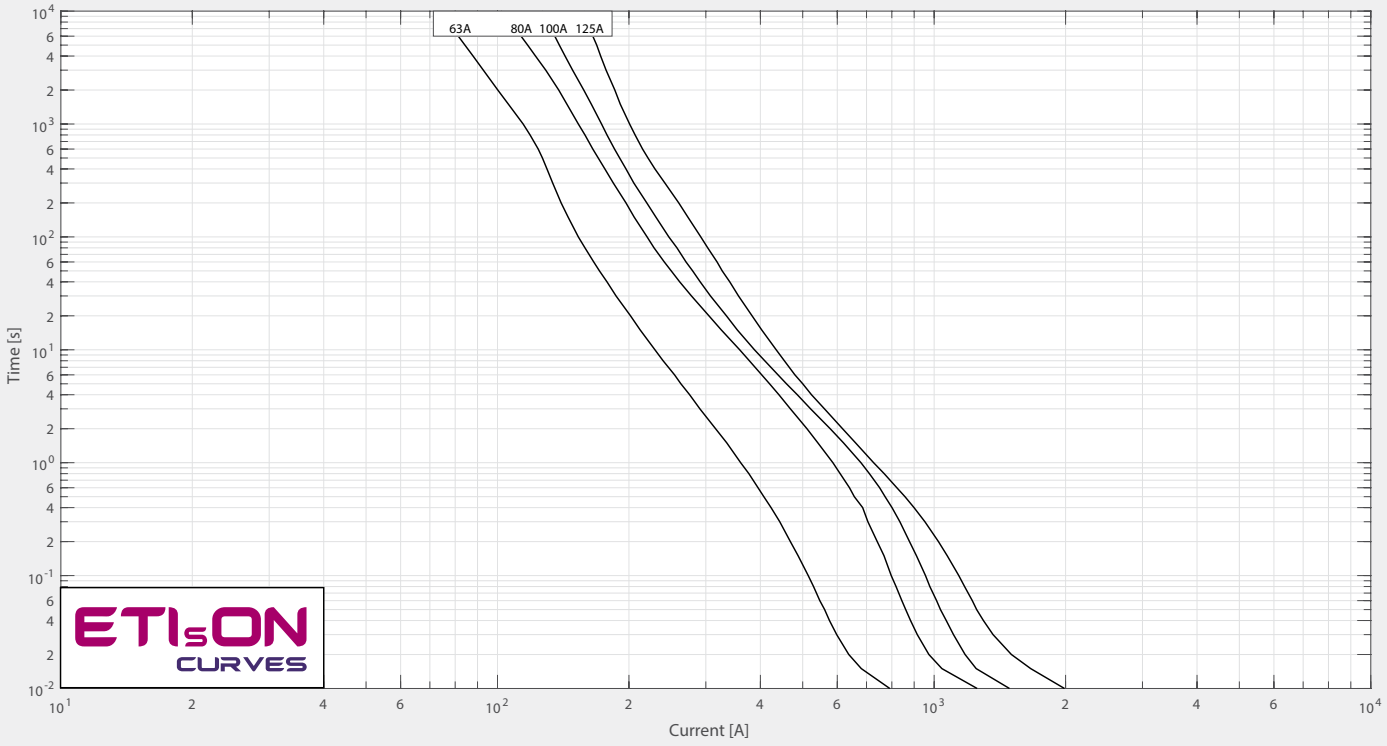




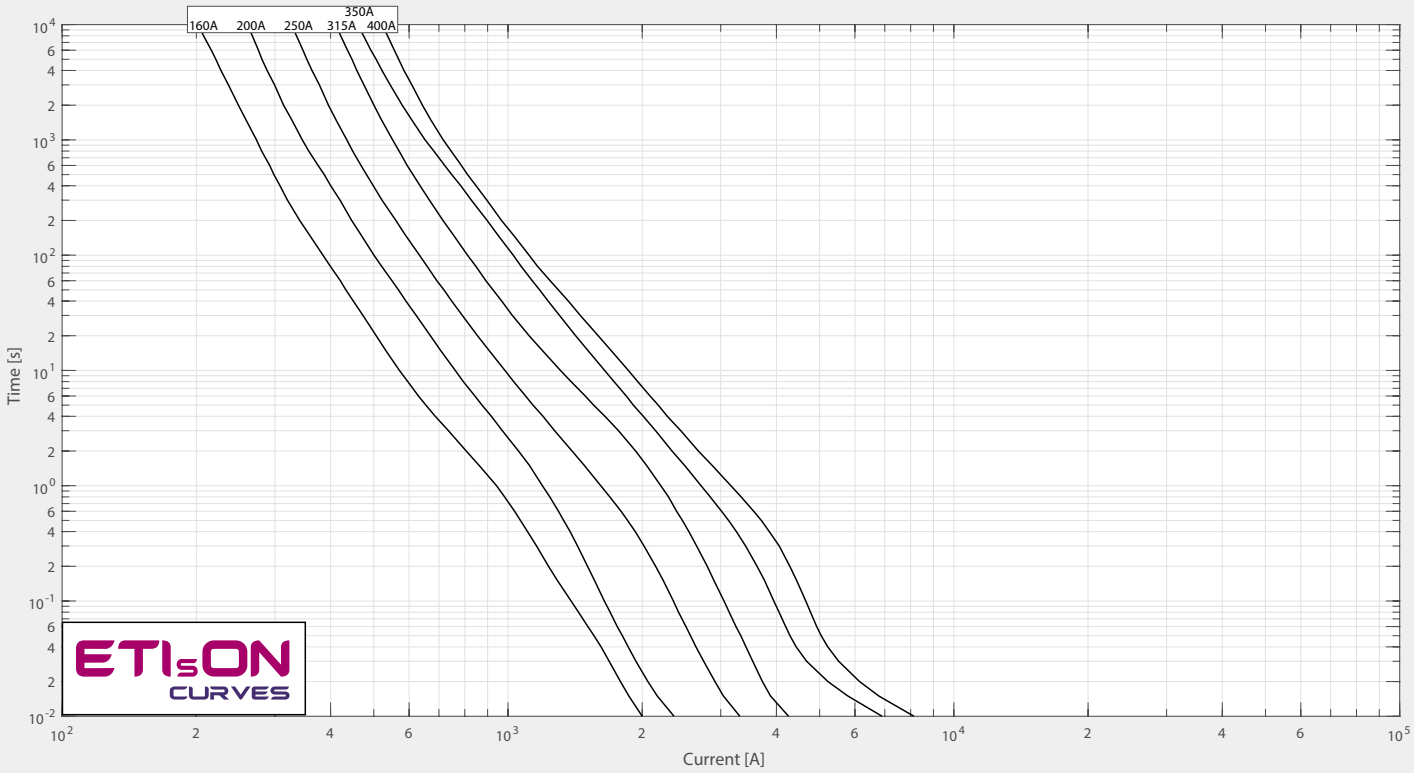
Size	Dimensions [mm]								
	A	B	C	D	E	F	G	H	K
00	79	53	47	35	15	28	56	12	6
1	135	72	65	40	24	46	62	12	6
2	150	72	65	48	30	54	71	12	6
3	150	72	65	60	37	64	84	12	6

I/t characteristics

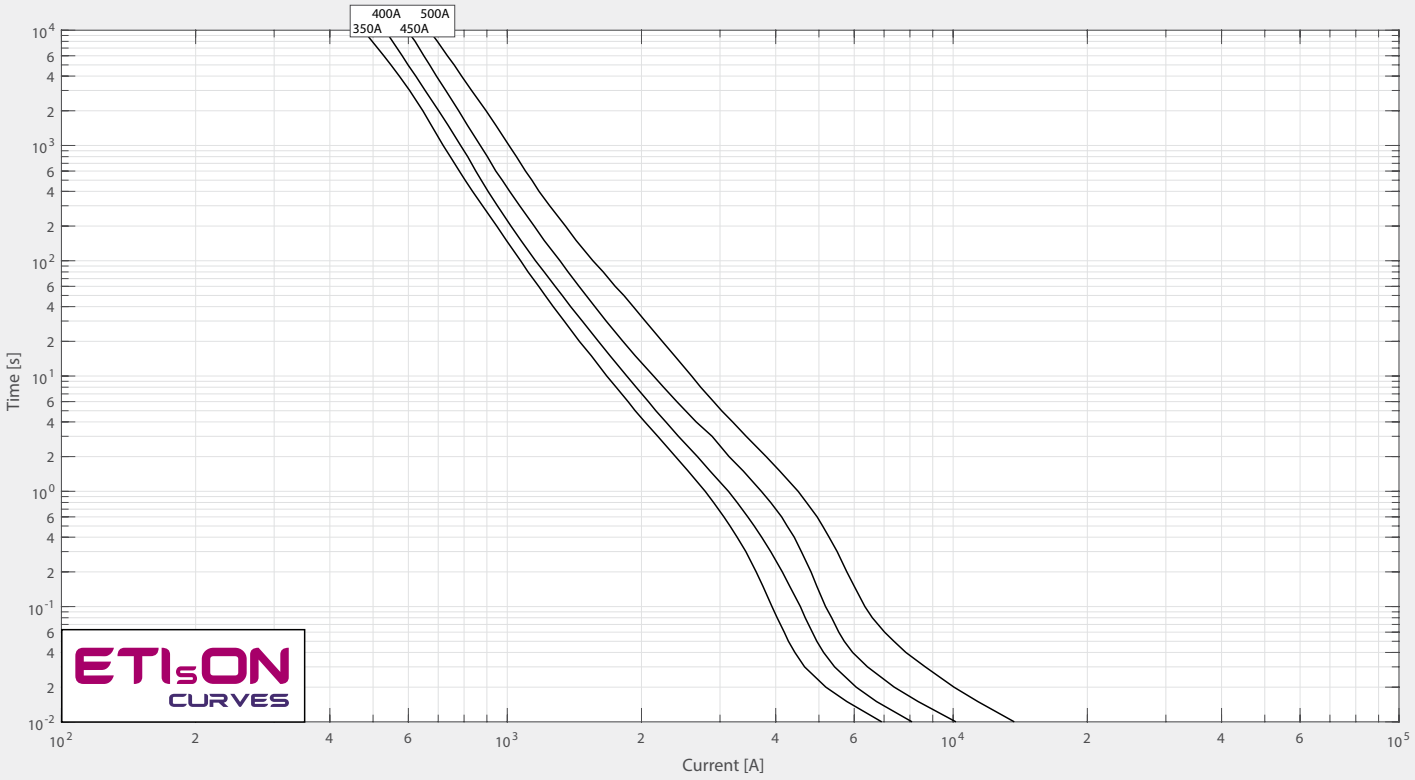
t-I characteristics NH00

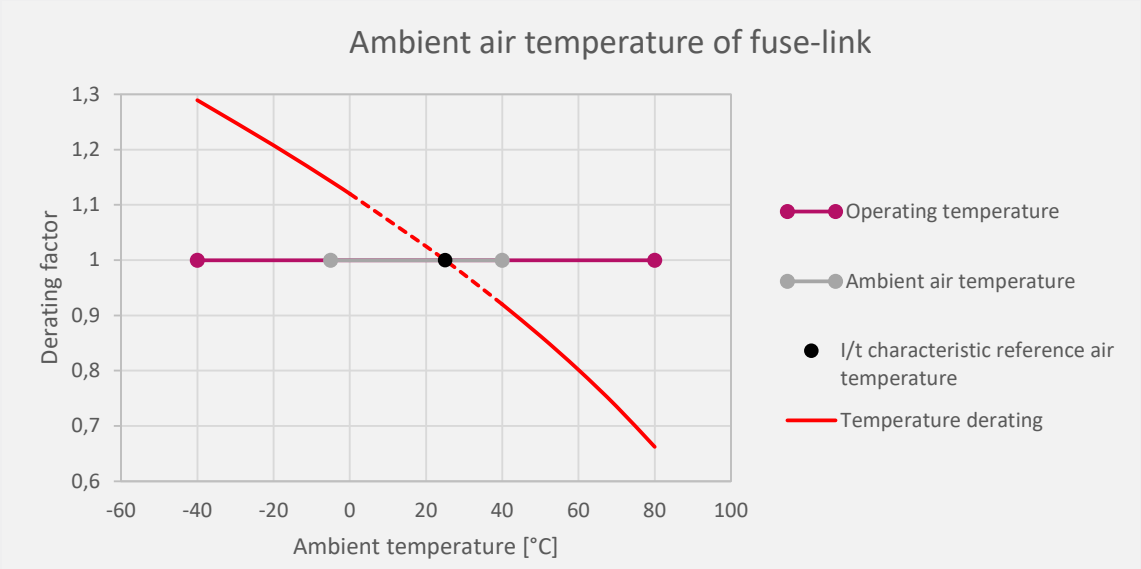


t-I characteristics NH1, NH2



t-I characteristics NH3





Legend:

T_{amb} – Ambient Temperature

TDF – Temperature Derating Factor

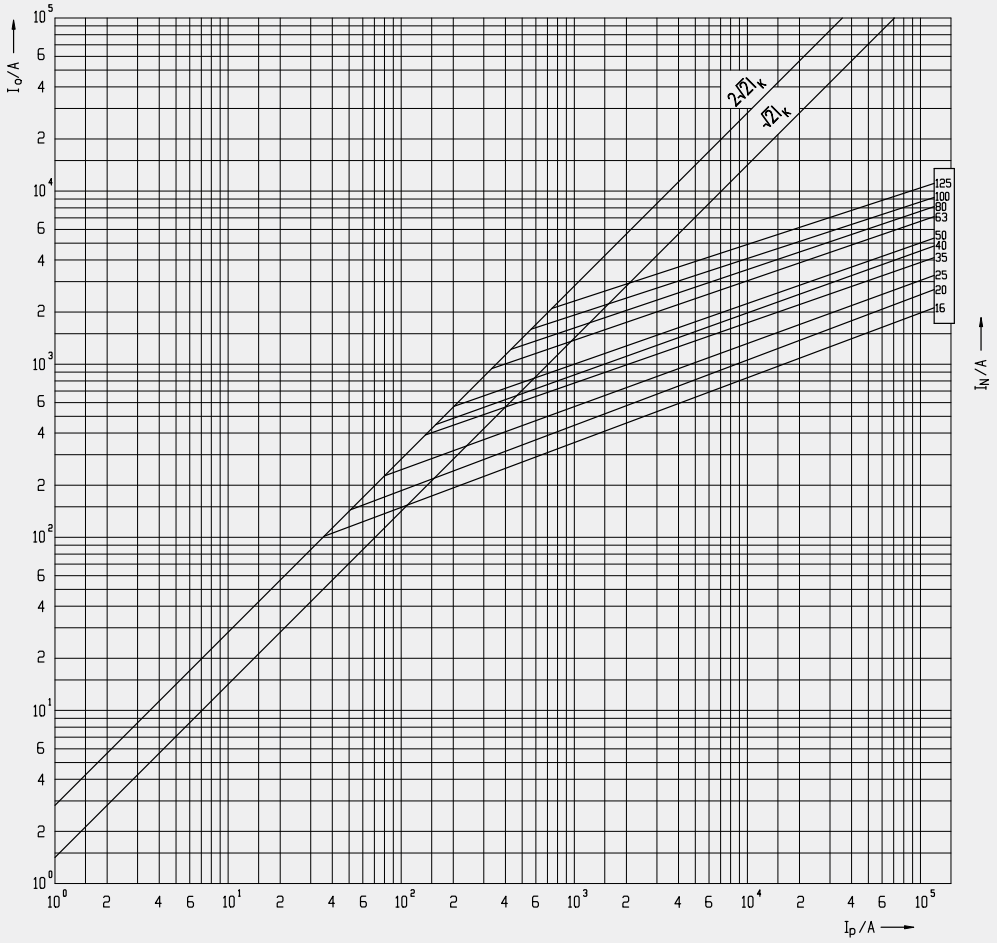
I_N – Nominal Current of Fuse-link

I_{TDF} – Nominal Current Including Temperature Derating Factor

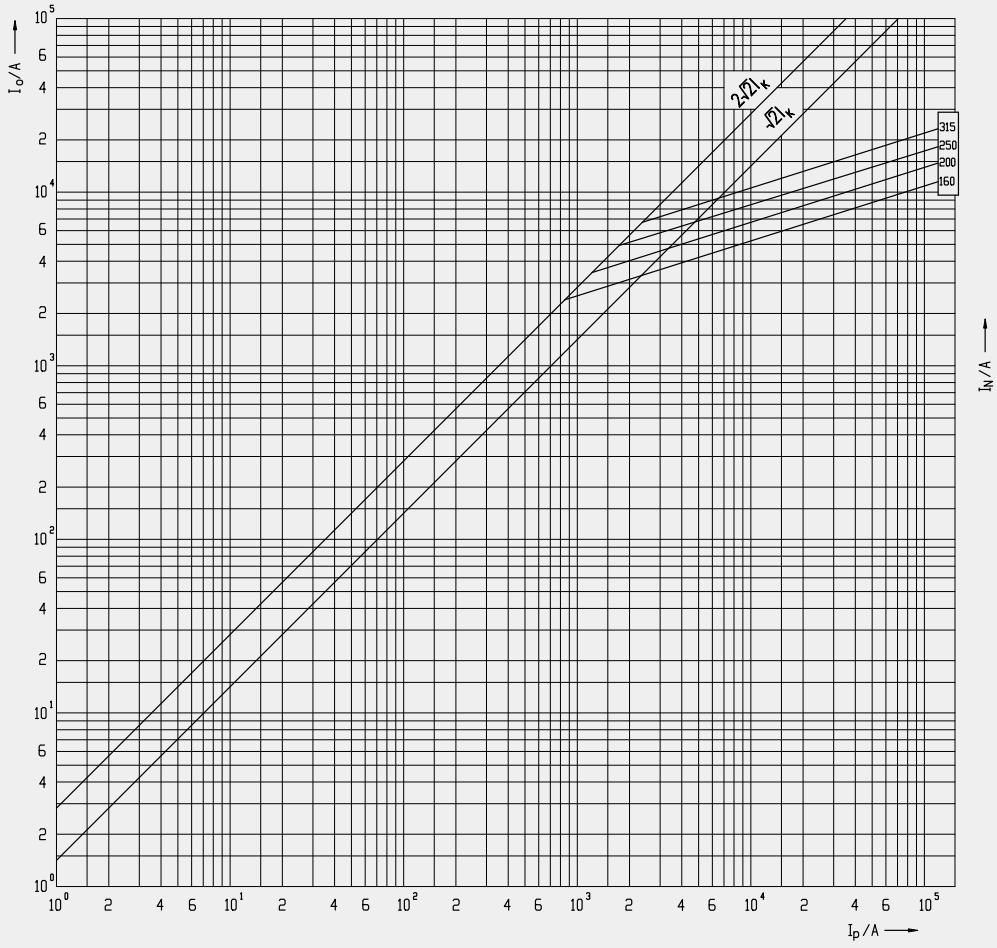
Current calculation: $I_{TDF} = I_N \times TDF$

Cut-off current characteristics

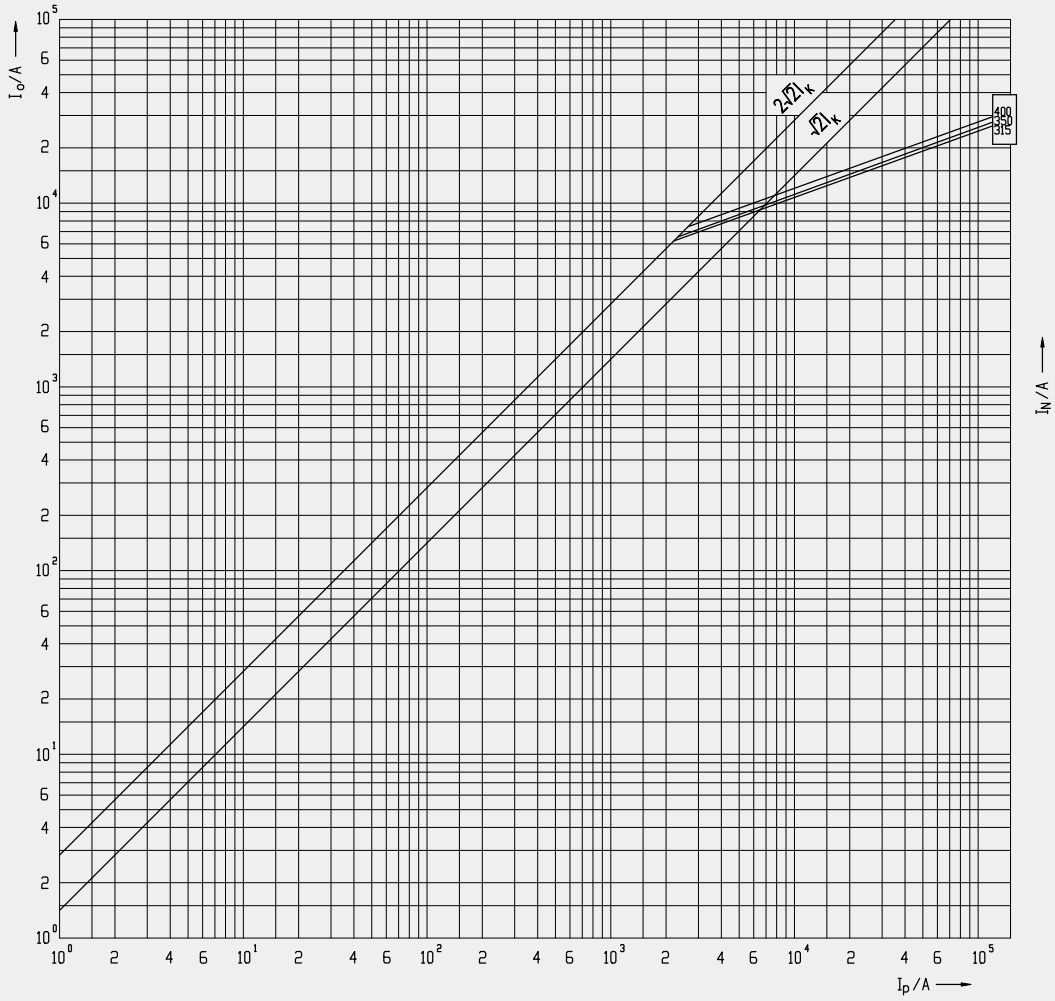
NH00



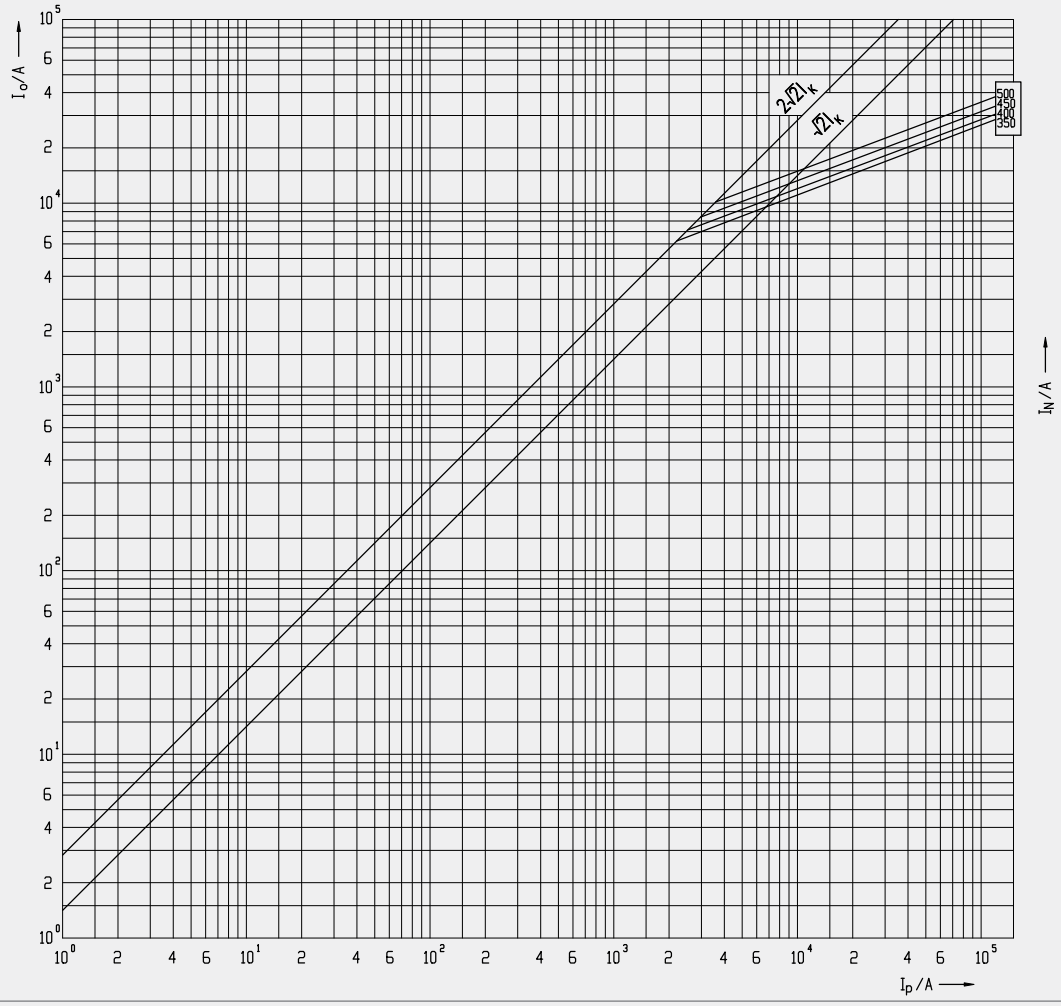
NH1



NH2


I_o/A
I_p/A
I_N/A
$2\sqrt{2}I_k$
$\sqrt{2}I_k$
400
355
315

NH3


I_o/A
I_p/A
I_N/A
$2\sqrt{2}I_k$
$\sqrt{2}I_k$
500
450
400
350

BATTERY FUSE

BATTERY FUSE

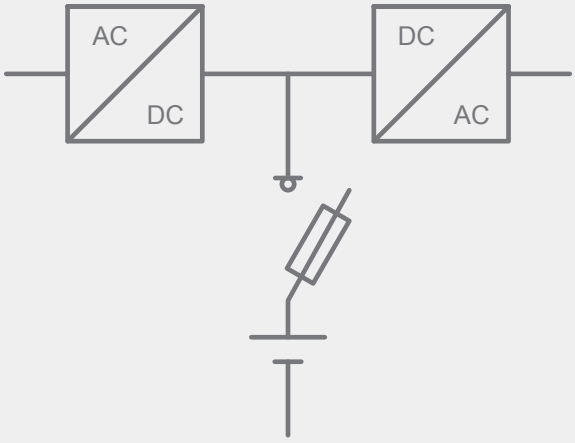
BECAUSE EVERY SECOND COUNTS

Application

- in battery storage systems
- in UPS systems
- in e-mobility

Battery Protection Fuses

Battery storage fuse selection



Short circuit current

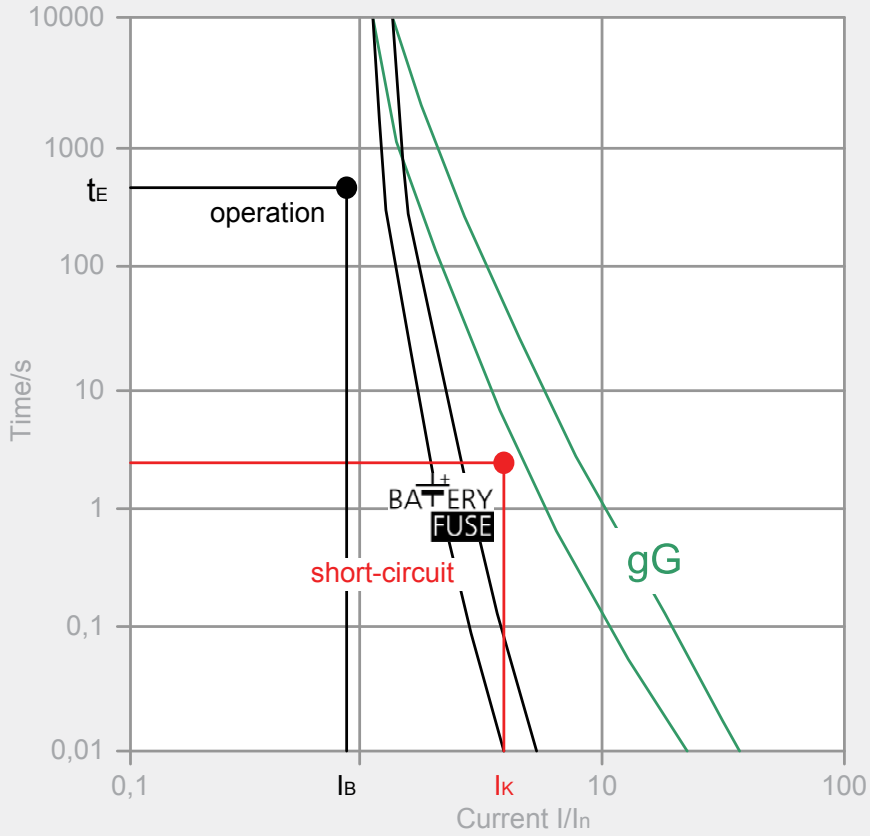
- Short circuit current depending on battery model, type and capacity, low compared to operating current
- Short circuit current has to be interrupted in <5 seconds

Required steep characteristics: protection with Battery fuse-link required!

Operating current

- Operating current depends on battery storage specification
- Battery operation: voltage of DC link circuit decreases to the final discharge voltage

Consider maximum current at final discharge voltage for fuse-link selection



In accordance with IEC 60269-7

Short circuit point (I_K)

- Short circuit current depending on battery model and type
- Manufacturer datasheets to include short circuit current according to IEC896
- Operating point has to be in adequate distance below the curve
- Short-circuit point has to be above the range of tolerance of the curve

Operating point (t_E/I_B)

- maximum operating curent I_B has to be calculated from battery storage true power and final discharge voltage U_E: $I_B = P_W/U_E$
- t_E is the back-up time of battery storage system

When choosing fuse switch disconnector consider fuse-link power dissipation!

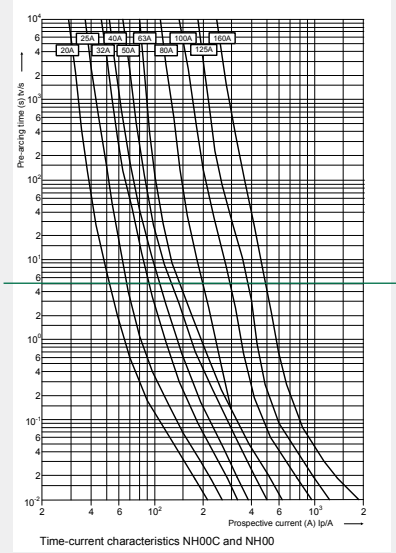
$$P_d(I_B) < P_y$$

Power dissipation of fuse-link at maximal operating current (I_B):

$$P_d(I_B)=(I_B/I_n)^2 \times P_d(I_n)$$

I_B- maximal operating current
$P_d(I_B)$-power dissipation of fuse-link at maximal operating current
$P_d(I_n)$-power dissipation of fuse-link at nominal current
P_y- maximal permissible fuse-link power dissipation mounted in fuse switch disconnector

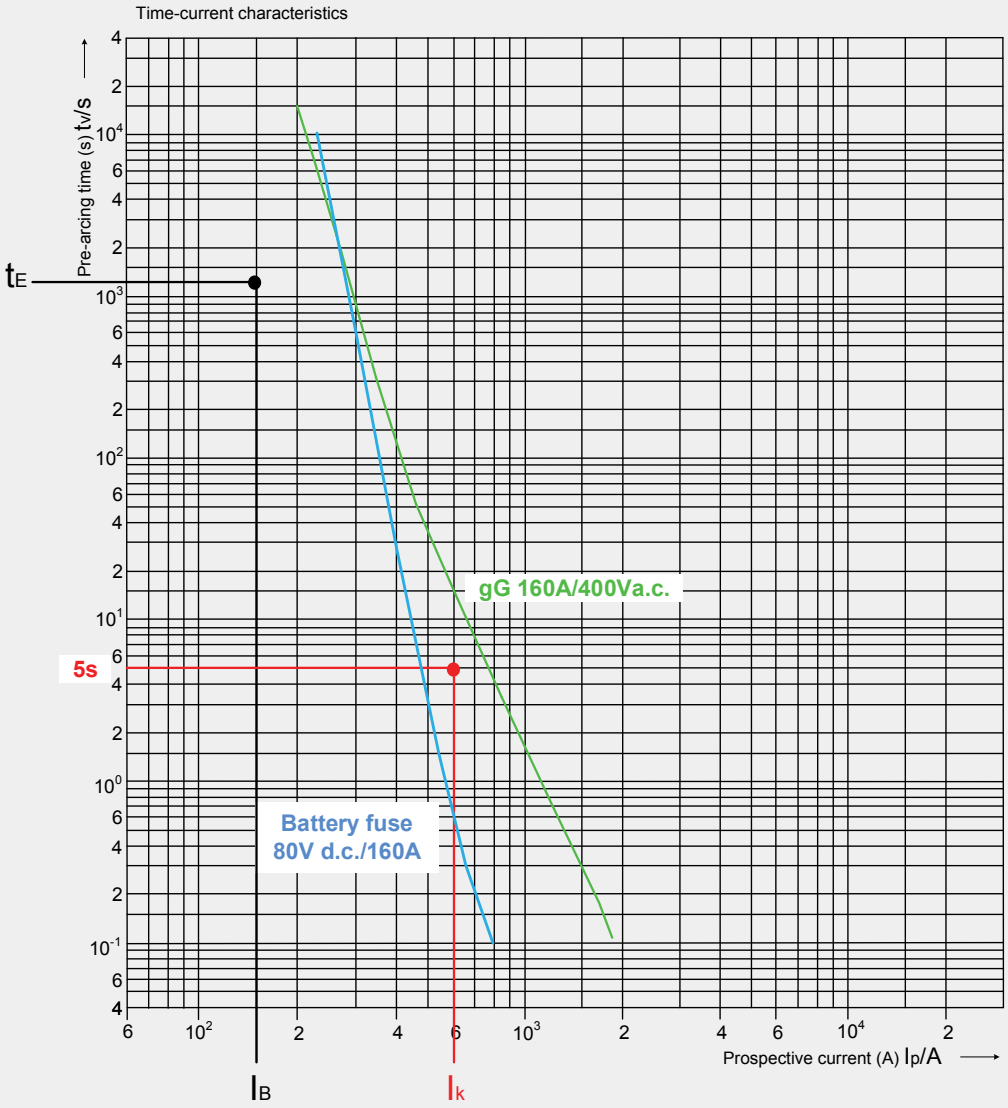
Low power dissipation and fast characteristic in time range of 5s!

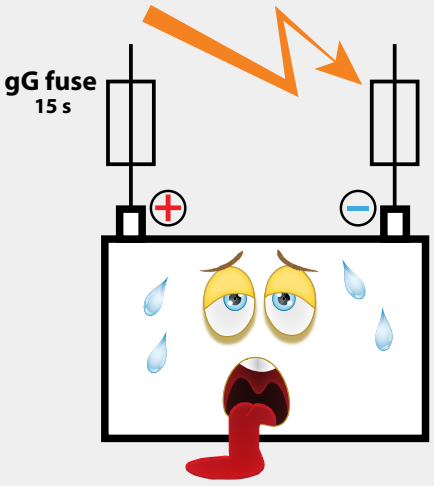


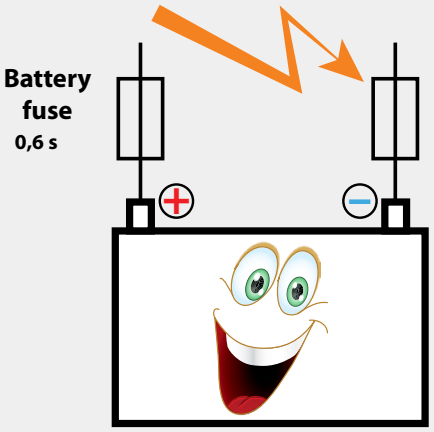
Time-current characteristics NH00C and NH00

Discharge	-20~60°C
Charge	-10~60°C
Storage	-20~60°C
Max. Discharge Current 77°F(25°C)	1000A(5s)
Short Circuit Current	3300A
Charge Methods: Constant Voltage Charge 77°F(25°C)	
Cycle use	14.4-14.7V
Maximum charging current	60A
Temperature compensation	-30mV/°C

Better protection of battery cells on overheating in case of short circuit comparable to standard gG characteristic







Green protect - gBat

NH gBat fuse-link 80V d.c.

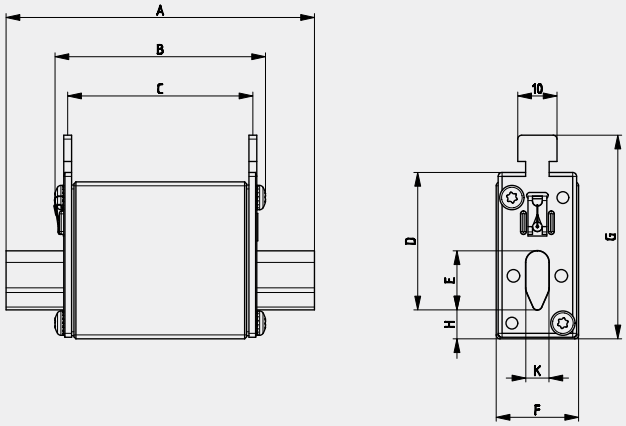
General characteristics	
Rated voltage	80V d.c., L/R=10ms
Breaking capacity	50kA d.c..
Standard	IEC 60269-7
Application	Battery protection
Fuse base	NH00C, NH00: 004123001 PK00 NH1C, NH1: 004123100 PK1

NH gBat fuse-link 80V d.c.

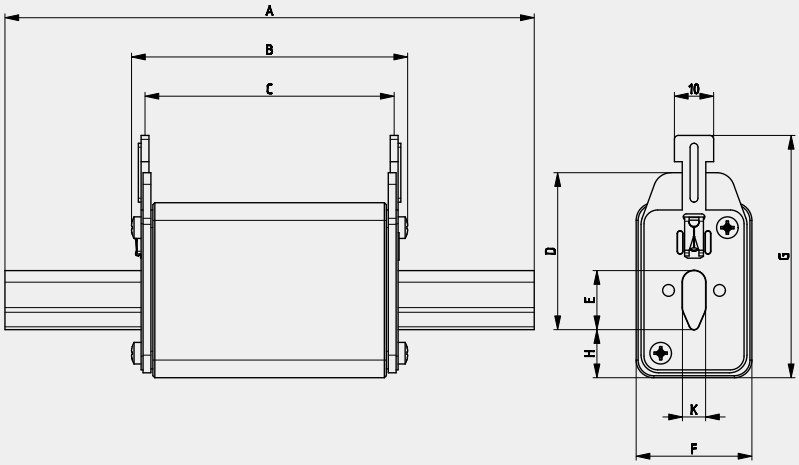
Size	I_n [A]	Standard indicator	Power dissipation [W]	Power dissipation $0,7xI_n$ [W]	Pre-arcing Joule integral [A^2s]	Operating Joule integral [A^2s]	Weight [g]	Pack. [pcs]
00C pic. 1	20	004110075	4,6	2	360	414	125	3/120
	25	004110076	5,8	2,6	710	817		
	32	004110077	6,6	3	920	1.058		
	40	004110078	9,4	4,2	1.440	1.656		
	50	004110079	11,1	5	2.820	3.243		
00 pic. 1	63	004110080	11,7	5,2	4.160	4.784	173	3/90
	80	004110081	10,4	4,7	4.670	5.371		
	100	004110082	11,1	5	9.360	10.764		
	125	004110083	13,4	6	14.750	16.963		
	160	004110084	15,5	7	27.880	32.062		
1C pic. 2	20	004110085	6,3	2,8	360	414	233	3/45
	25	004110086	7,3	3,3	710	817		
	32	004110087	9	4	920	1.058		
	40	004110088	11,2	5	1.440	1.656		
	50	004110089	14,5	6,5	2.820	3.243		
	63	004110090	16,8	7,5	4.160	4.784		
	80	004110091	11,4	5,1	4.670	5.371		
	100	004110092	12	5,4	9.360	10.764		
	125	004110093	14,8	6,6	14.750	16.963		
	160	004110094	17,6	7,9	27.880	32.062		
1 pic. 3	200	004110095	26,6	11,9	41.990	48.289	430	3/24
	250	004110096	31	13,9	81.000	93.150		

Dimensions

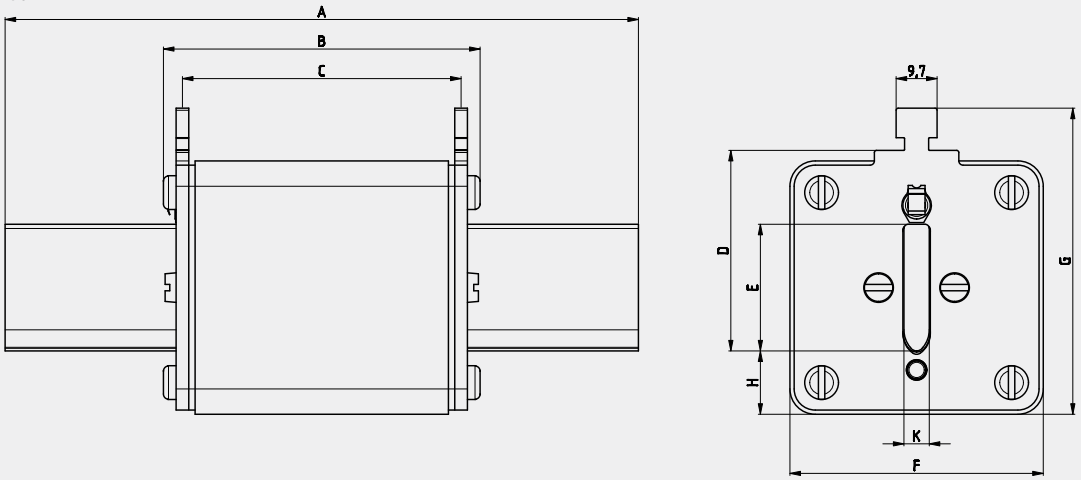
Picture 1



Picture 2



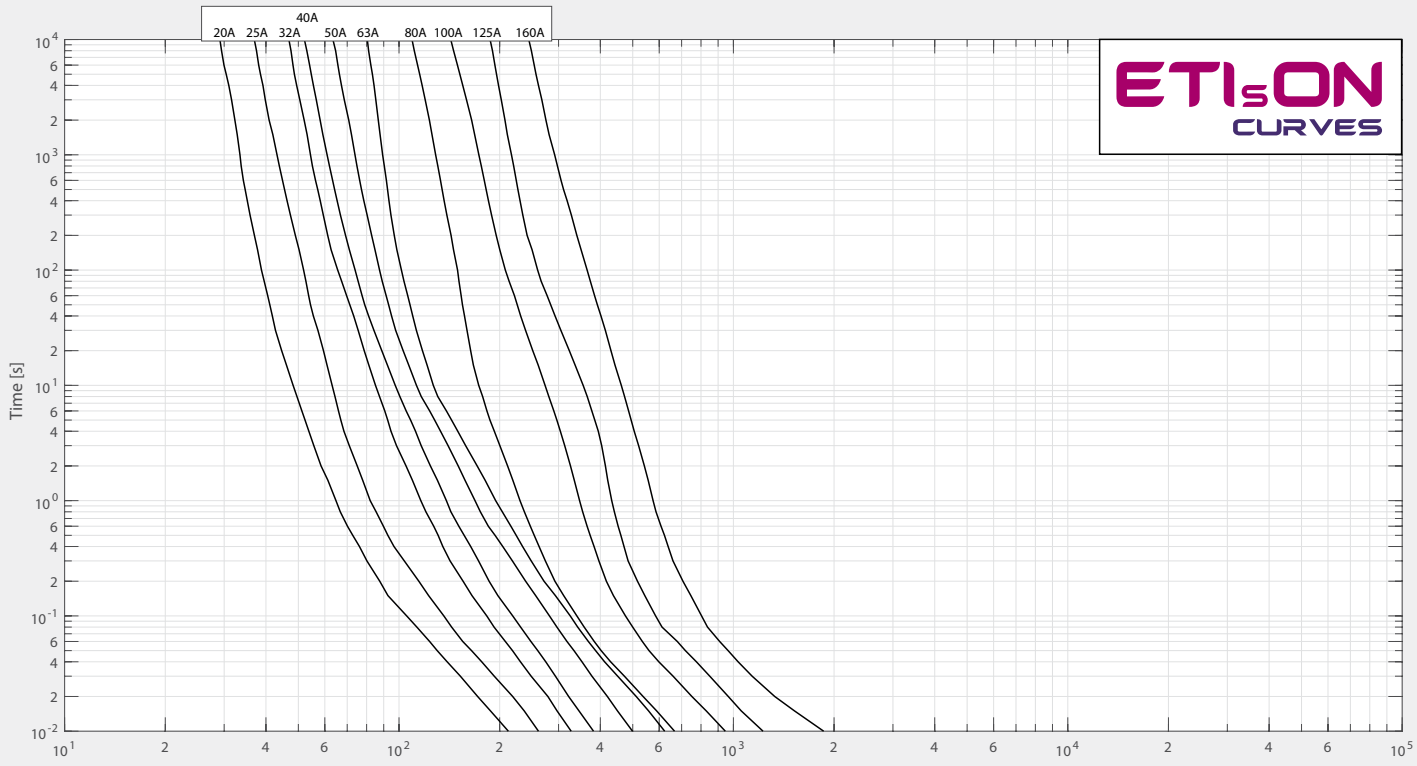
Picture 3



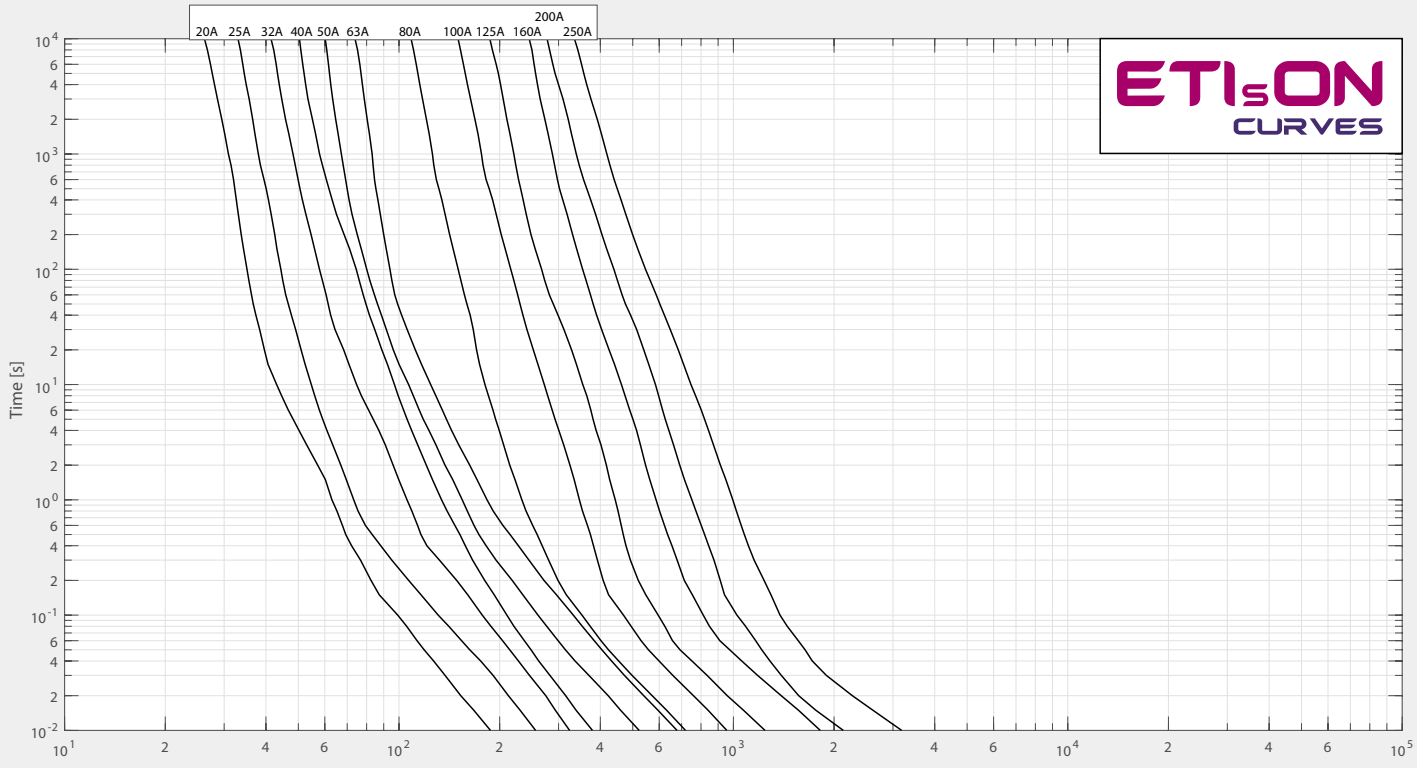
	A	B	C	D	E	F	G	H	K
00 C	79	53	47	35	15	21	52	7,5	6
00	79	53	47	35	15	28	56	12	6
1 C	135	68	65	40	15	28	61	12	6
1	135	72	65	40	20	46	65	14	6

I/t characteristics for NH Battery fuses

NH00C & NH00



NH1C & NH1



NH gBat fuse-link 440V d.c.

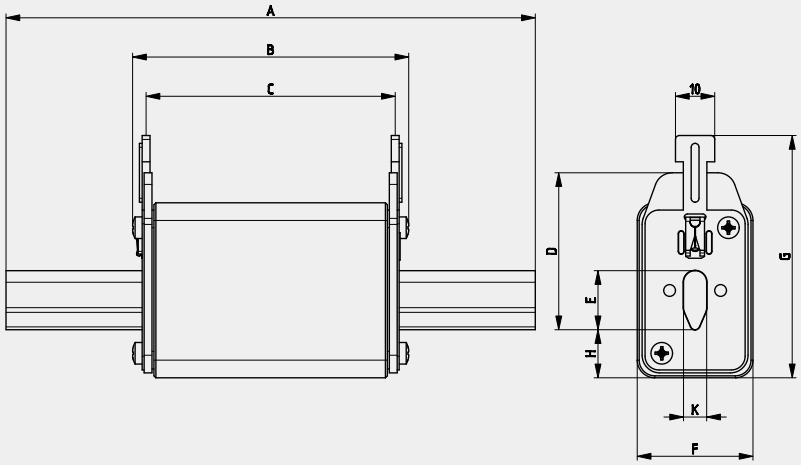
General characteristics	
Rated voltage	440V d.c., L/R=10ms
Breaking capacity	30kA d.c.
Standard	IEC 60269-7
Application	Battery protection

Patented technology by European Patent Office

NH gBat fuse-link 440 V d.c.

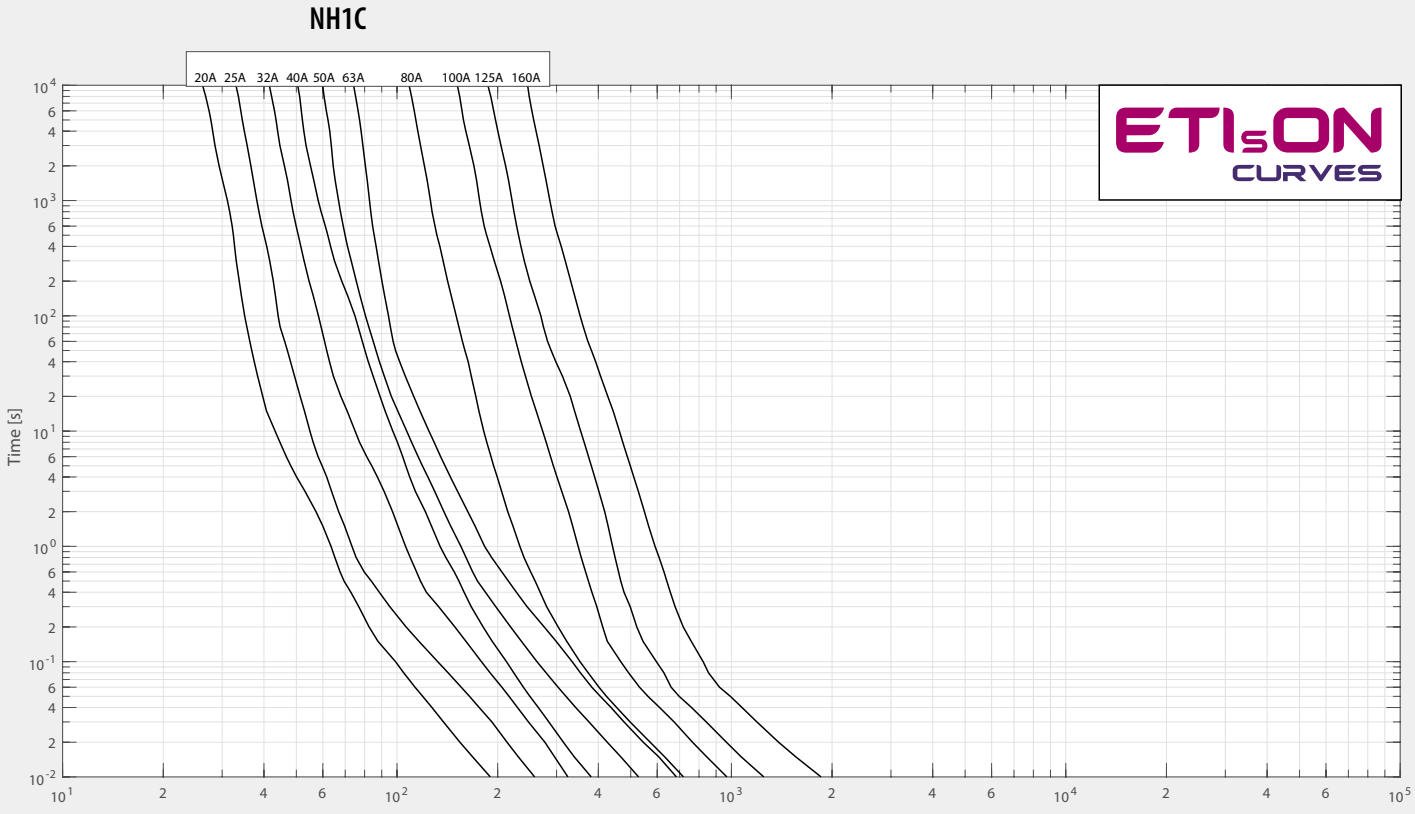
Size	I_n [A]	Standard indicator	Power dissipation [W]	Power dissipation $0,7xI_n$ [W]	Pre-arcing Joule integral L/R=10ms [A^2s]	Operating Joule integral L/R=10ms [A^2s]	For use with	Weight [g]	Pack. [pcs]
1C pic. 2	20	004723103	6,3	2,8	360	648	PK1 004123100	233	3/45
	25	004723104	7,3	3,3	710	1.278			
	32	004723105	9	4	920	1.656			
	40	004723106	11,2	5	1.440	2.592			
	50	004723107	14,5	6,5	2.820	5.076			
	63	004723108	16,8	7,5	4.160	7.488			
	80	004723109	11,4	5,1	4.670	8.406			
	100	004723110	12	5,4	9.360	16.848			
	125	004723111	14,8	6,6	14.750	26.550			
	160	004723112	17,6	7,9	27.880	50.184			

Dimensions

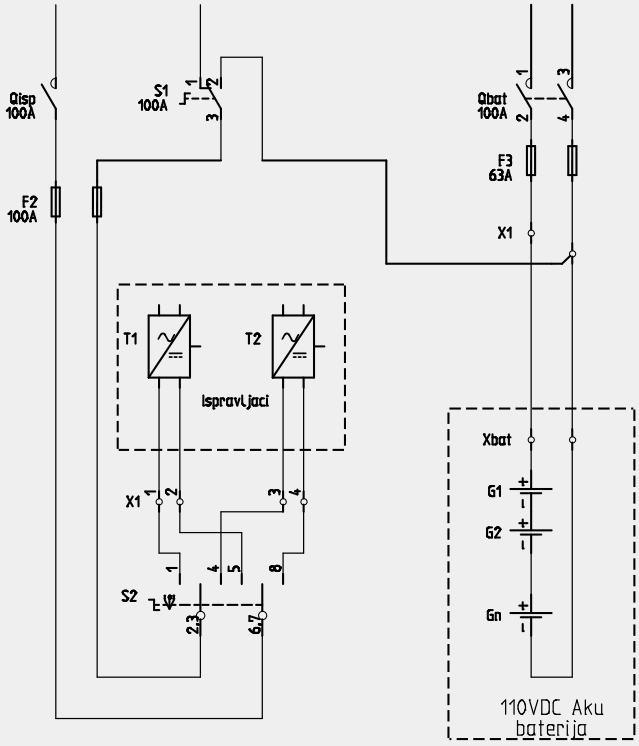


	A	B	C	D	E	F	G	H	K
1C	135	68	65	40	15	28	61	12	6

I/t characteristics for NH Battery fuses size 1C



Application



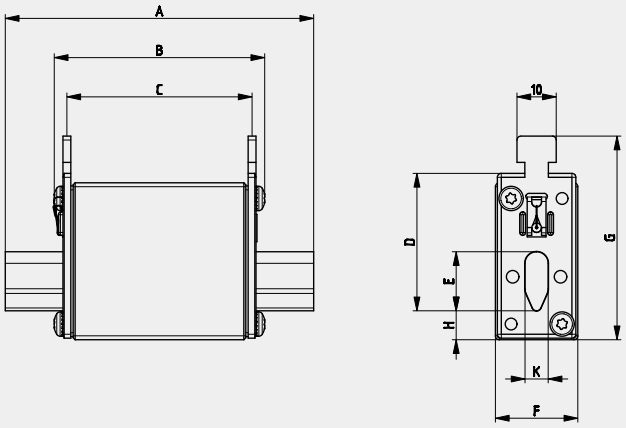
NH gBat fuse-link 550V d.c.

General characteristics	
Rated voltage	550V d.c. (L/R=3ms)
Breaking capacity	30kA d.c.
Standard	IEC 60269-7
Application	Battery protection

Patented technology by European Patent Office

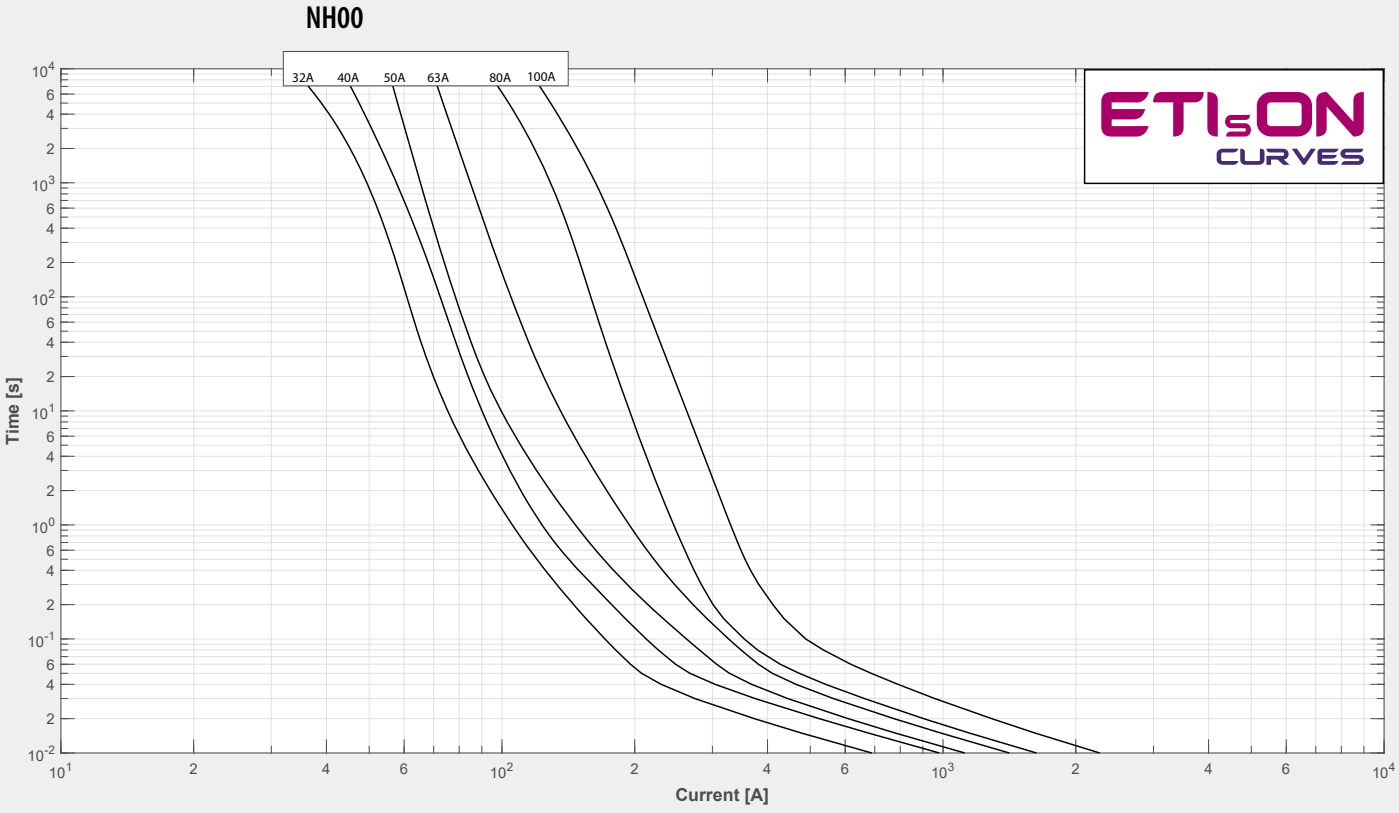
NH gBat fuse-link 550 V d.c.

Size	I_n [A]	Standard indicator	Power dissipation [W]	Power dissipation $0,7xI_n$ [W]	Pre-arcing Joule integral L/R=10ms [A^2s]	Operating Joule integral L/R=10ms [A^2s]	For use with	Weight [g]	Pack. [pcs]
00	32	004110209	7,0	2,9	500	2.000	PK00 004123001	190	3/90
	40	004110219	7,3	3,1	1.000	3.000			
	50	004110218	11,5	4,8	1.700	5.300			
	63	004110217	11,8	4,9	3.000	9.200			
	80	004110216	9,8	4,1	3.100	12.000			
	100	004110215	11,8	4,9	4.500	20.000			



	A	B	C	D	E	F	G	H	K
00	79	53	47	35	15	28	56	12	6

I/t characteristics for NH Battery fuses size 00



NH gBat fuse-link 550 V d.c.

Size	I_n [A]	Standard indicator pic. 1	Striker indicator pic. 2	Standard indicator S110mm pic. 3	Power dissipation [W]	Power dissipation $0,7xI_n$ [W]	Prearcing Joule integral L/R=10ms [A^2s]	Operating Joule integral L/R=10ms [A^2s]	For use with	Weight [g]	Pack. [pcs]
1	40	004723259	004723279	004723269	6	2,7	250	833	PK1DC 004122025	420	3/24
	50	004723260	004723280	004723270	7	3,1	449	1.495			
	63	004723261	004723281	004723271	9	4	700	2.331			
	80	004723262	004723282	004723272	12	5,4	1.200	3.996			
	100	004723263	004723283	004723273	15	6,7	1.650	5.495			
	125	004723264	004723284	004723274	20	9	2.200	7.326			
	160	004723265	004723285	004723275	26	11,7	4.300	14.319			
	200	004723266	004723286	004723276	32	14,4	8.500	28.305			
	224	004723267	004723287	004723277	37	16,6	10.000	33.300			
	250	004723268	004723288	004723278	43	19,3	15.000	50.000			
2	125	004724260	004724280	004724270	20	9	2.200	10.296	PK2DC 004122024	660	3/24
	160	004724261	004724281	004724271	26	11,7	4.300	20.124			
	200	004724262	004724282	004724272	32	14,4	8.500	39.780			
	224	004724263	004724283	004724273	37	16,6	10.000	46.800			
	250	004724264	004724284	004724274	43	19,3	15.000	70.200			
	315	004724265	004724285	004724275	57	26,6	20.000	93.600			
	350	004724266	004724286	004724276	67	30	28.000	131.040			
	400	004724267	004724287	004724277	76	34,2	32.000	150.000			
3	250	004725260	004725280	004725270	43	19,3	15.000	65.550	PK3DC 004122023	870	3/24
	315	004725261	004725281	004725271	57	26,6	20.000	87.400			
	350	004725262	004725282	004725272	67	30	28.000	122.360			
	400	004725263	004725283	004725273	76	34,2	32.000	139.840			
	425	004725264	004725284	004725274	84	37,8	40.000	174.800			
	500	004725265	004725285	004725275	110	49,5	44.000	192.280			
	630	004725266	004725286	004725276	160	72	80.000	350.000			

NH gBat fuse-link 700V d.c.

General characteristics	
Rated voltage	700V d.c. (L/R=3ms)
Breaking capacity	30kA d.c.
Standard	IEC 60269-7
Application	Battery protection

Patented technology by European Patent Office

NH gBat fuse-link 700 V d.c.

Size	I_n [A]	Standard indicator pic. 1	Striker indicator pic. 2	Standard indicator S110mm pic. 3	Power dissipation [W]	Power dissipation 0,7xI_n [W]	Pre-arcing Joule integral L/R=10ms [A^2s]	Operating Joule integral L/R=10ms [A^2s]	For use with	Weight [g]	Pack. [pcs]
1	40	004723289	004723309	004723299	6	2,7	250	1.000	PK1DC 004122025	420	3/24
	50	004723290	004723310	004723300	7	3,1	449	1.796			
	63	004723291	004723311	004723301	9	4	700	2.800			
	80	004723292	004723312	004723302	12	5,4	1.200	4.800			
	100	004723293	004723313	004723303	15	6,7	1.650	6.600			
	125	004723294	004723314	004723304	20	9	2.200	8.800			
	160	004723295	004723315	004723305	26	11,7	4.300	17.200			
	200	004723296	004723316	004723306	32	14,4	8.500	34.000			
	224	004723297	004723317	004723307	37	16,6	10.000	40.000			
	250	004723298	004723318	004723308	43	19,3	15.000	60.000			
2	125	004724290	004724310	004724300	20	9	2.200	11.682	PK2DC 004122024	660	3/24
	160	004724291	004724311	004724301	26	11,7	4.300	22.833			
	200	004724292	004724312	004724302	32	14,4	8.500	45.135			
	224	004724293	004724313	004724303	37	16,6	10.000	53.100			
	250	004724294	004724314	004724304	43	19,3	15.000	79.650			
	315	004724295	004724315	004724305	57	26,6	20.000	106.200			
	350	004724296	004724316	004724306	67	30	28.000	148.680			
	400	004724297	004724317	004724307	76	34,2	32.000	170.000			
3	250	004725290	004725304	004725297	43	19,3	15.000	75.000	PK3DC 004122023	870	3/24
	315	004725291	004725305	004725298	57	26,6	20.000	100.000			
	350	004725292	004725306	004725299	67	30	28.000	140.000			
	400	004725293	004725307	004725300	76	34,2	32.000	160.000			
	425	004725294	004725308	004725301	84	37,8	40.000	200.000			
	500	004725295	004725309	004725302	110	49,5	44.000	220.000			
	630	004725296	004725310	004725303	160	72	80.000	400.000			

NH gBat fuse-link 800V d.c.

General characteristics	
Rated voltage	800V d.c. (L/R=3ms)
Breaking capacity	30kA d.c.
Standard	IEC 60269-7
Application	Battery protection
Fuse base	NH1: 004122025 PK1DC NH2: 004122024 PK2DC NH3L: 004132023 PK3L 1500V

Patented technology by European Patent Office

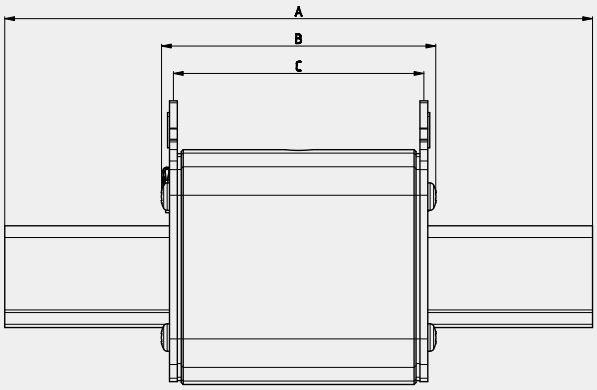
NH gBat fuse-link 800 V d.c.

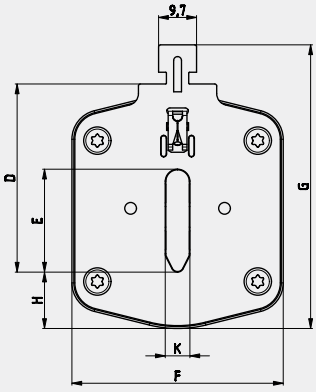
Size	I_n [A]	Standard indicator pic. 1	Striker indicator pic. 2	Standard indicator S110mm pic. 3	Power dissipation [W]	Power dissipation $0,7xI_n$ [W]	Pre-arcing Joule integral L/R=10ms [A^2s]	Operating Joule integral L/R=10ms [A^2s]	Weight [g]	Pack. [pcs]
1	40	004723320	004723330	004723340	6	2,7	250	1.750	420	3/24
	50	004723321	004723331	004723341	7	3,1	449	3.143		
	63	004723322	004723332	004723342	9	4	700	4.900		
	80	004723323	004723333	004723343	12	5,4	1.200	8.400		
	100	004723324	004723334	004723344	15	6,7	1.650	11.550		
	125	004723325	004723335	004723345	20	9	2.200	15.400		
	160	004723326	004723336	004723346	26	11,7	4.300	30.100		
	200	004723327	004723337	004723347	32	14,4	8.500	60.000		
2	125	004724320	004724330	004724340	20	9	2.200	13.046	660	3/24
	160	004724321	004724331	004724341	26	11,7	4.300	25.499		
	200	004724322	004724332	004724342	32	14,4	8.500	50.405		
	224	004724323	004724333	004724343	37	16,6	10.000	59.300		
	250	004724324	004724334	004724344	43	19,3	15.000	88.950		
	315	004724325	004724335	004724345	57	26,6	20.000	118.600		
	350	004724326	004724336	004724346	67	30	28.000	166.040		
	400	004724327	004724337	004724347	76	34,2	32.000	190.000		
3L*	500	004110350	-	-	112	50	150.000	300.000	1970	1/10

*Pic 4

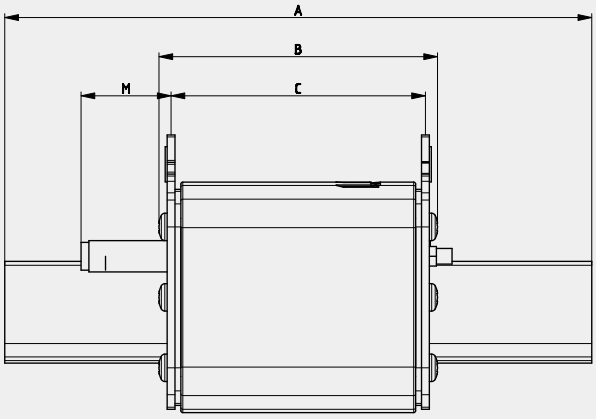
Dimensions

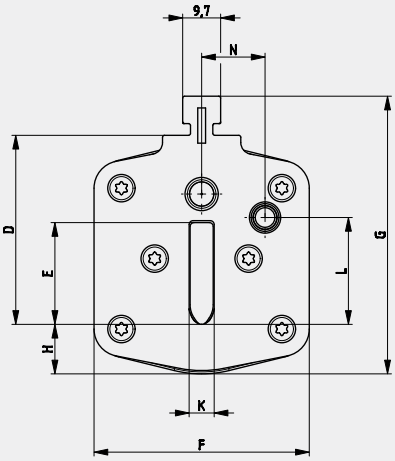
pic. 1





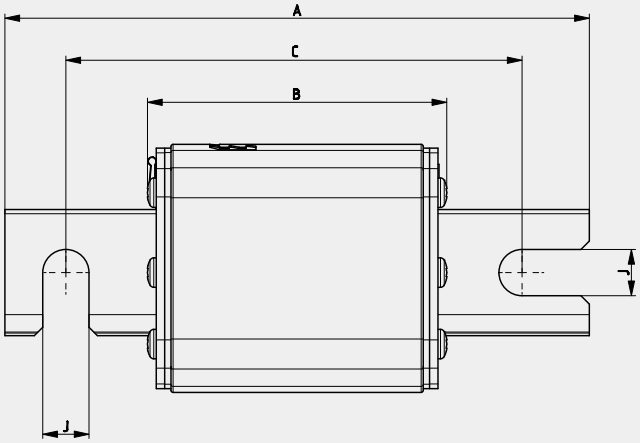
pic. 2

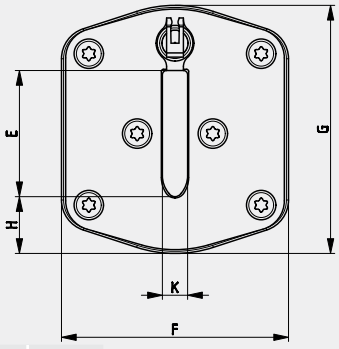




Size	A	B	C	D	E	F	G	H	K	L	M	N
1	135	73	65	40	24	46	62	12	6	20,5	27,5	13,7
2	150	73	65	48	30	54	71	13	6	27,3	27,5	16,2
3	150	73	65	60	37	64	84	14	6	35,6	27,5	17

pic. 3

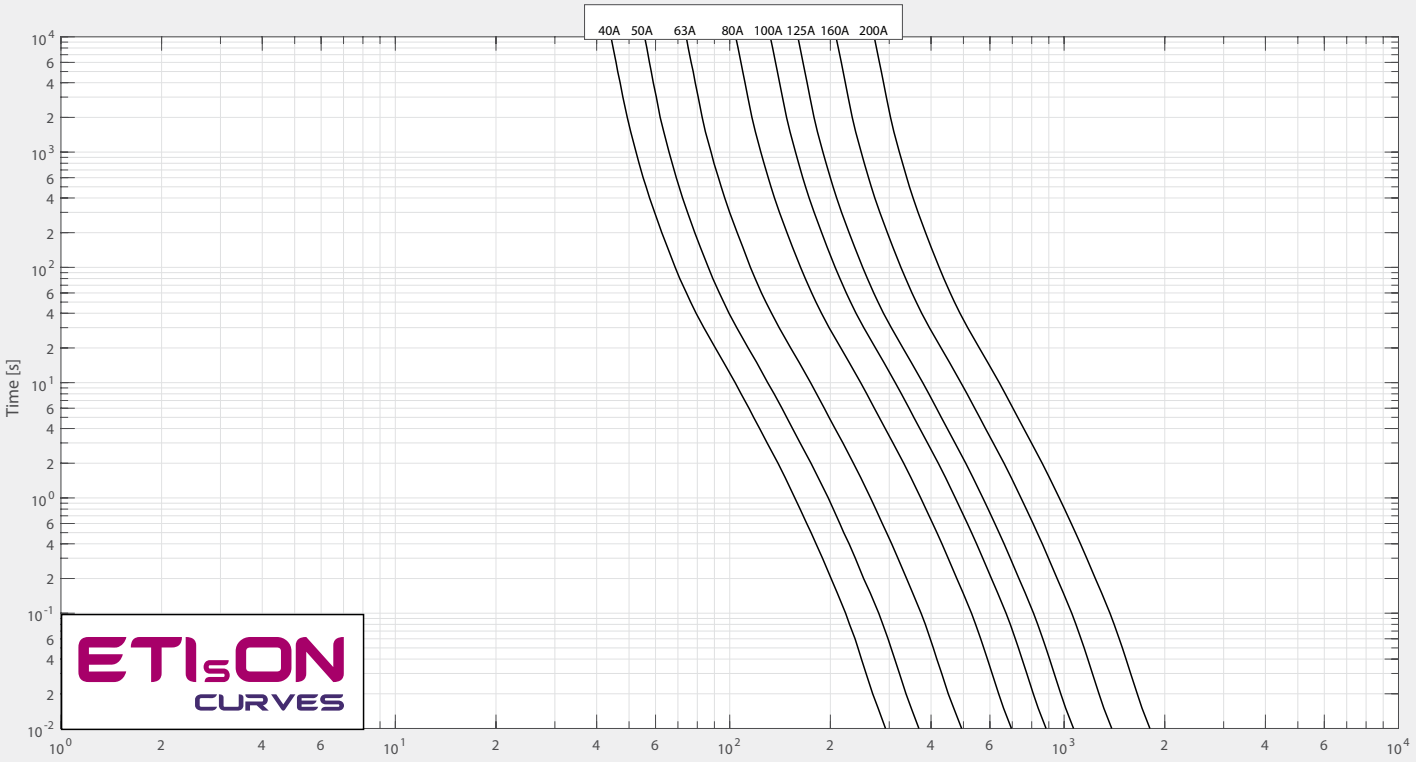




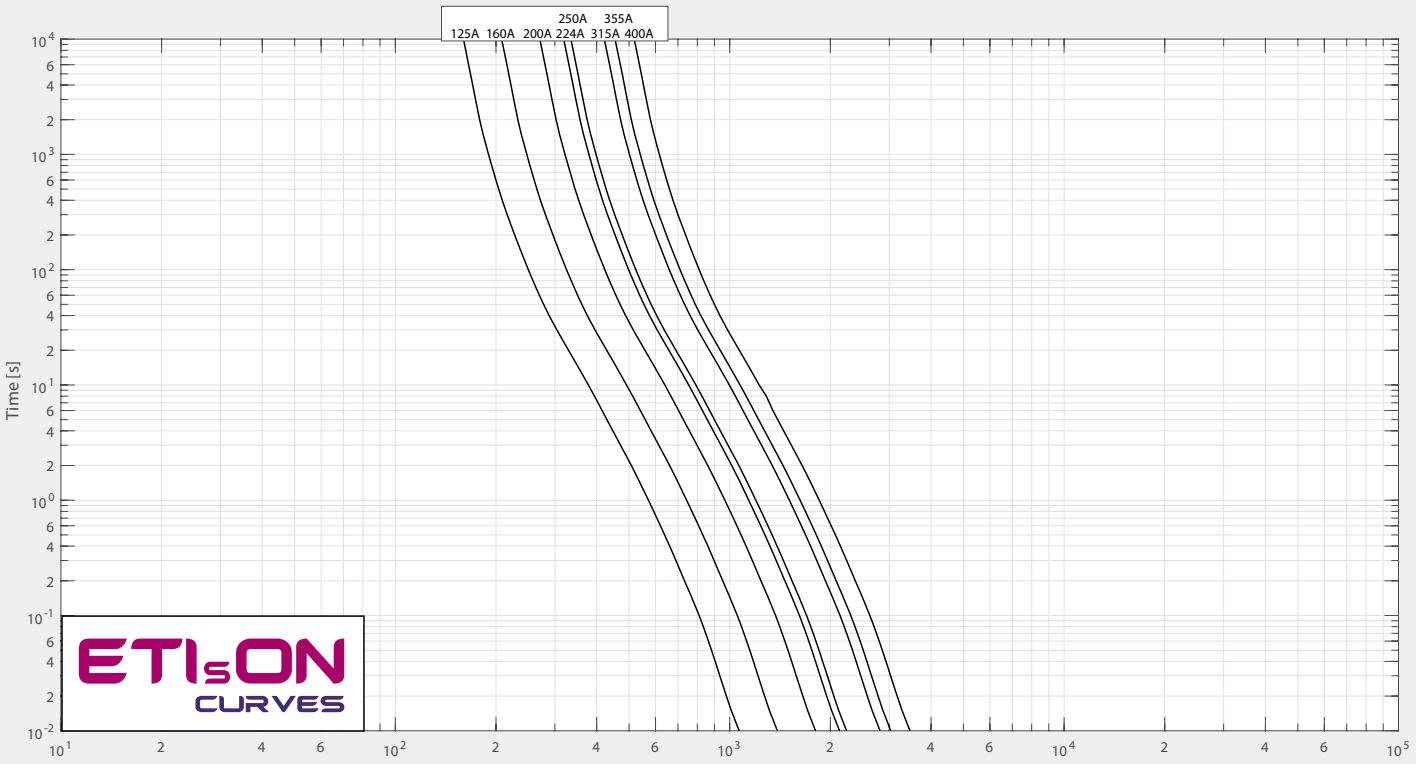
Size	A	B	C	E	F	G	H	J	K
1	140	72	110	24	46	51	12	11	6
2	140	72	110	30	54	59	13	11	6
3	140	72	110	37	64	70	14	11	6

I/t characteristics for NH Battery fuses sizes 1, 2, 3

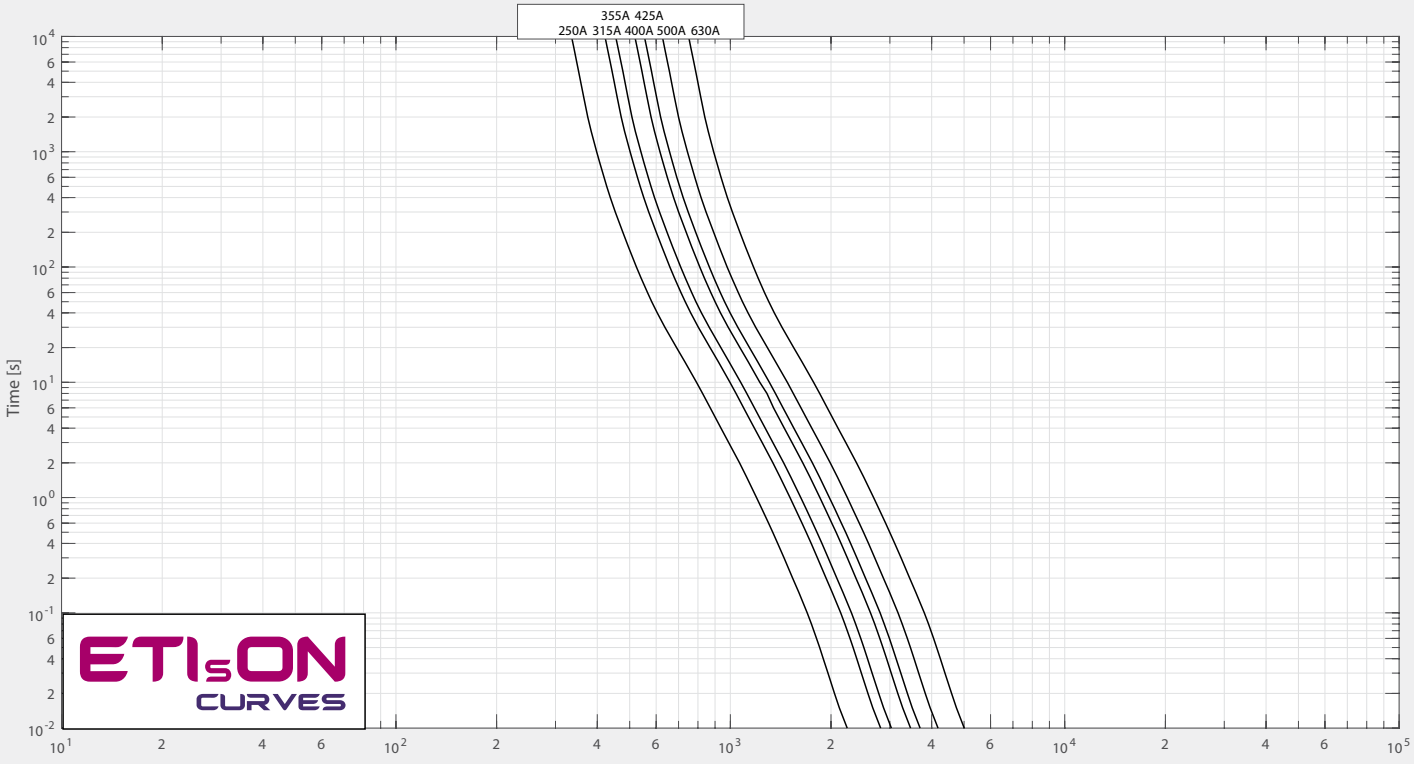
NH1 550V, 700V, 800V



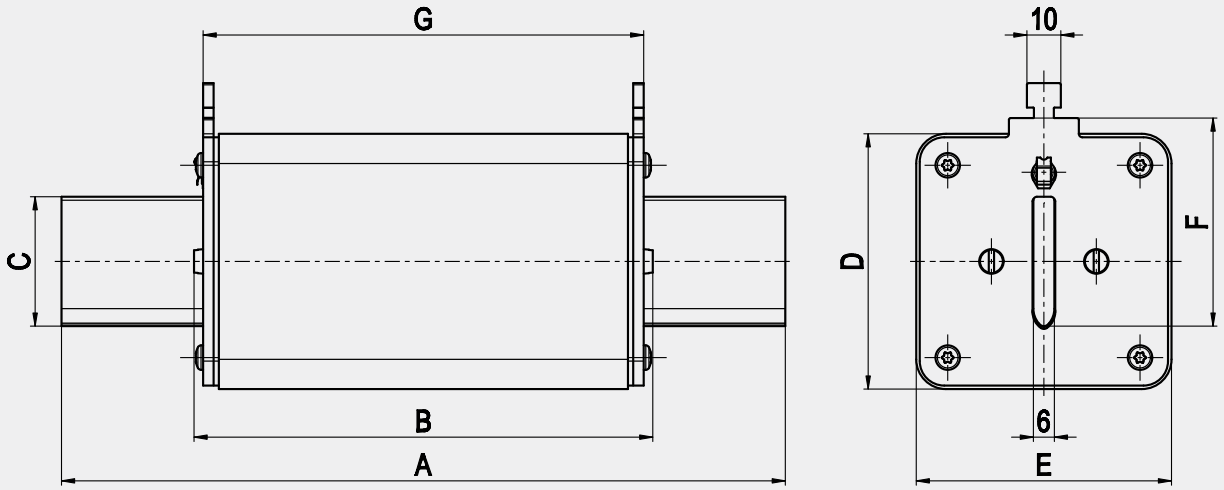
NH2 550V, 700V, 800V



NH3 550V, 700V

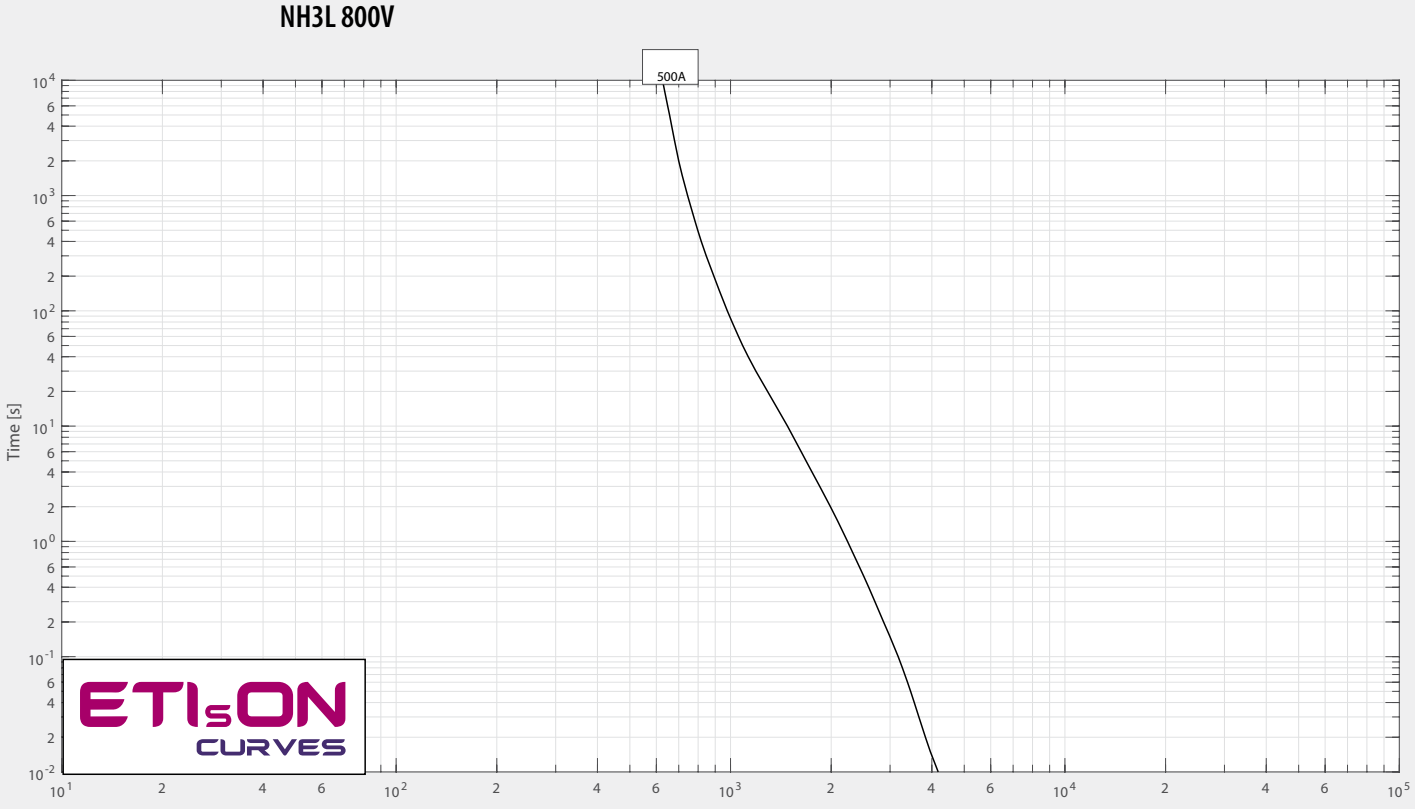


pic. 4

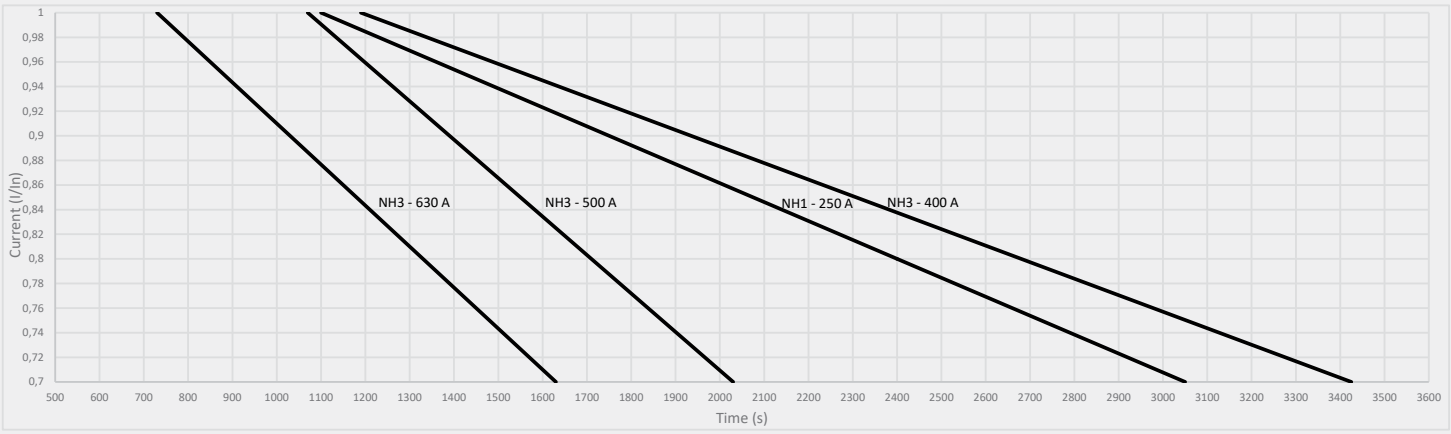


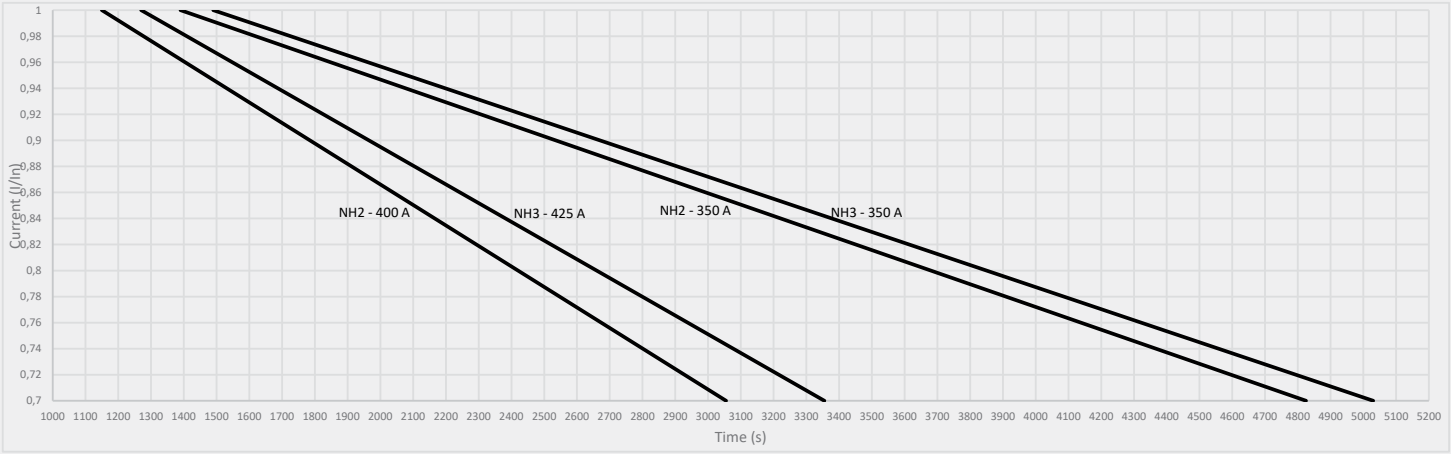
	A	B	C	D	E	F	G	H	J
3L	208	130	37	73	73	60	126	11	13

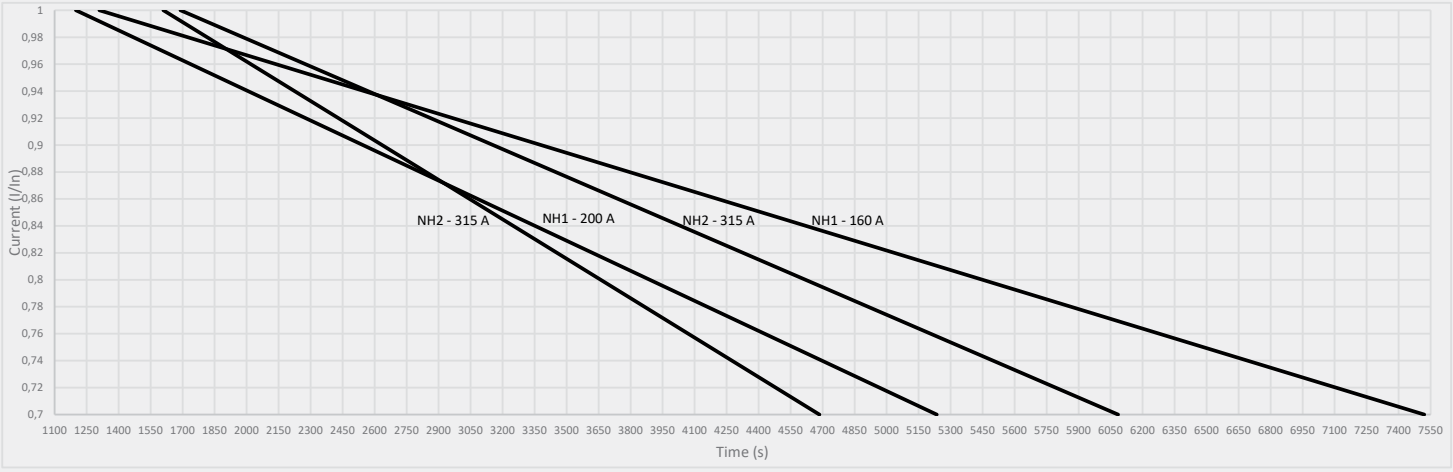
I/t characteristics for NH Battery fuses size 3L



Battery fuse NH1,2,3 550V, 700V, 800V d.c.-current loading derating factor in disconnector







NH gBat fuse-link 1000V d.c.

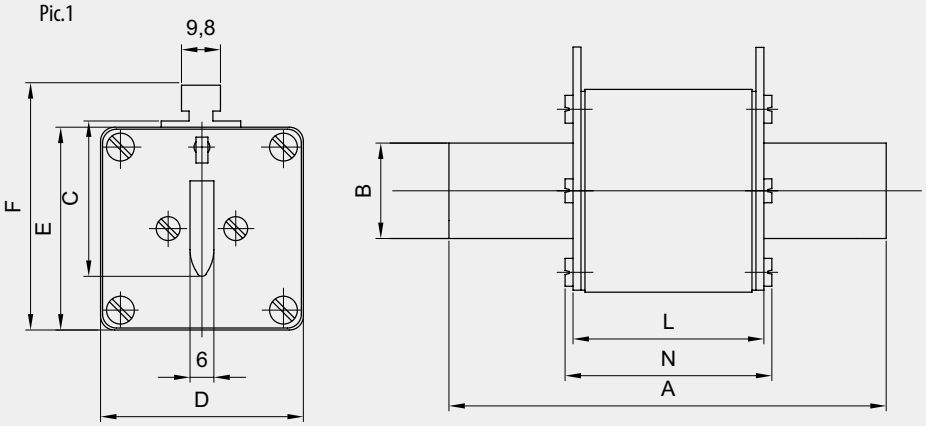
General characteristics	
Rated voltage	1000V d.c. (L/R=1ms)
Breaking capacity	30kA d.c.
Standard	IEC 60269-7
Application	Fuse-link for battery protection.

Patented technology by European Patent Office

NH gBat fuse-link 1000V d.c.

Size	I_n [A]	Standard indicator pic. 1	S_{110} screw contact pic. 2	U_{110} screw contact pic. 3	G screw contact with centre trip indicator for microswitch MK pic. 4	Power dissipation [W]	Power dissipation $0,7xI_n$ [W]	Pre-arcing Joule integral [A^2s]	Operating Joule integral [A^2s]	Weight [g]	Pack. [pcs]
1	200	004110760	/	/	/	27	11	4.400	29.000	500	3/24
2	200	004110761	004110769	004110774	004110755	26	11	4.400	29.000	650	1/16 (G type 2/32)
	250	004110762	004110770	004110775	004110756	36	15	6.000	38.000		
3	160	004110763	/	/	/	38	15	5.000	10.000	1200	3/15 (G type 2/9)
	200	004110764	/	/	/	45	18	10.000	20.000		
	250	004110765	/	/	/	44	18	20.000	40.000		
	315	004110766	004110771	004110776	004110757	54	24	40.000	80.000		
	350	004110767	004110772	004110777	004110758	55	25	45.000	90.000		
	400	004110768	004110773	004110778	004110759	58	24	46.000	138.000		

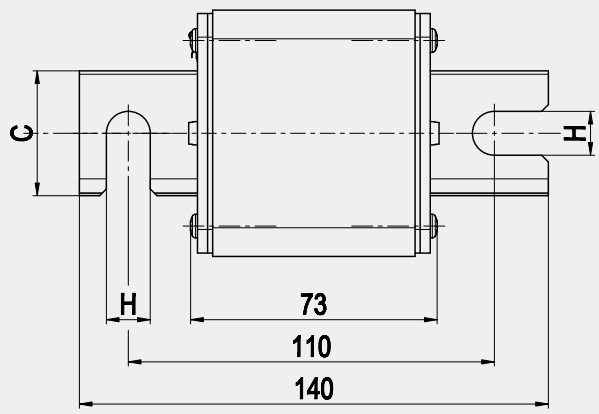
Pic.1

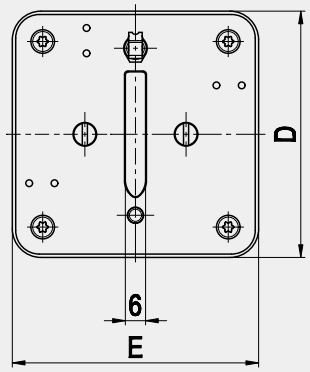


Standard indicator

Size	A	B	C	D	E	F	L	N
1	135	24	42	51	51	67	70	74
2	150	30	48	61	61	71	70	74
3	150	37	60	73	73	87	70	74

Pic.2

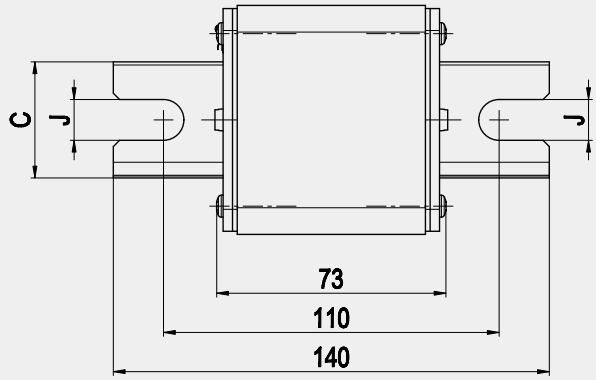


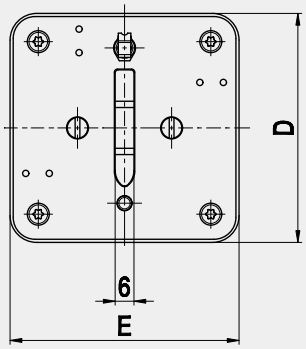


S_{110} screw contact

Size	C	E	D	H
2	30	60	60	11
3	37	73	73	11

Pic.3

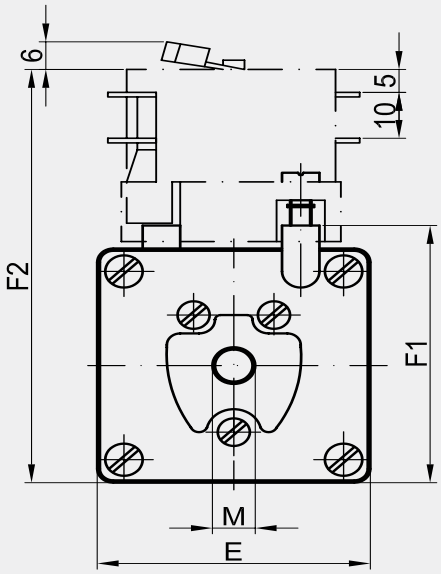


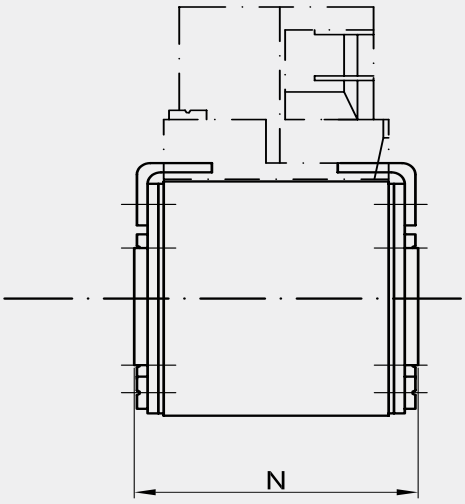


U_{110} screw contact

Size	C	J	E	D
2	30	13	60	60
3	37	13	73	73

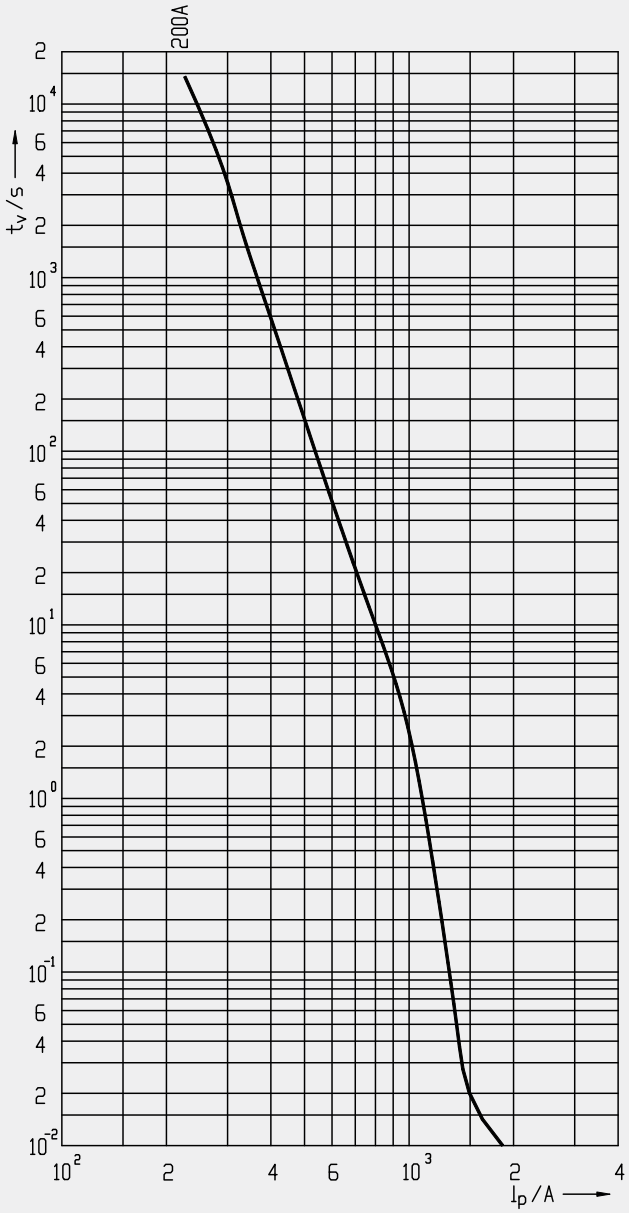
Pic.4



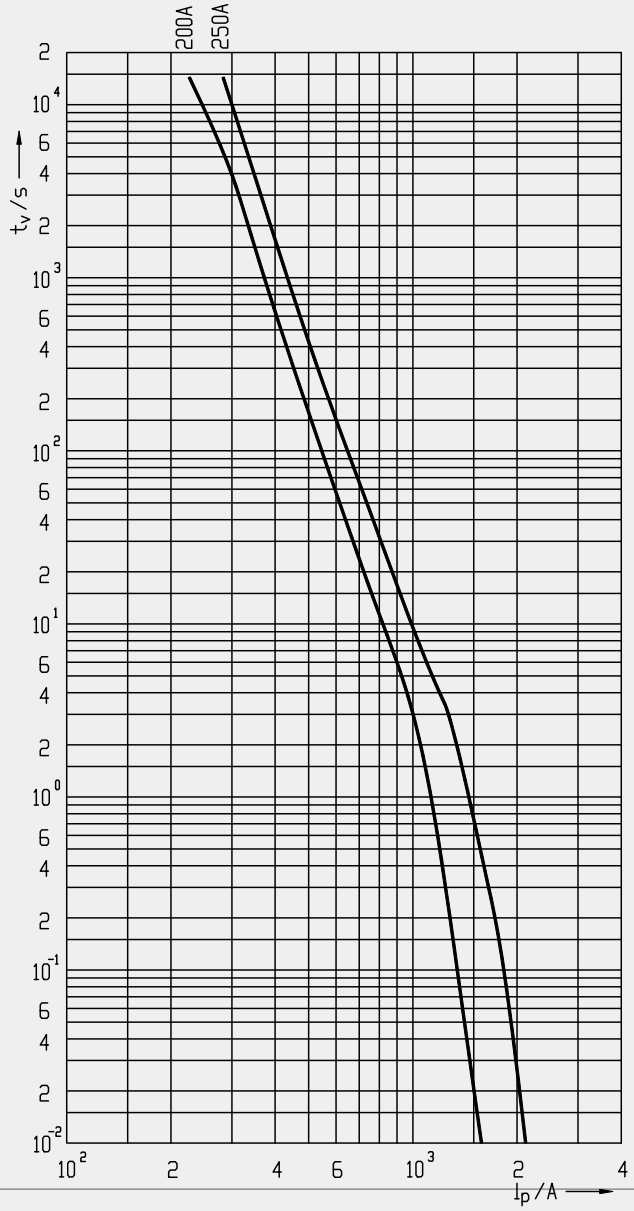


G screw contact

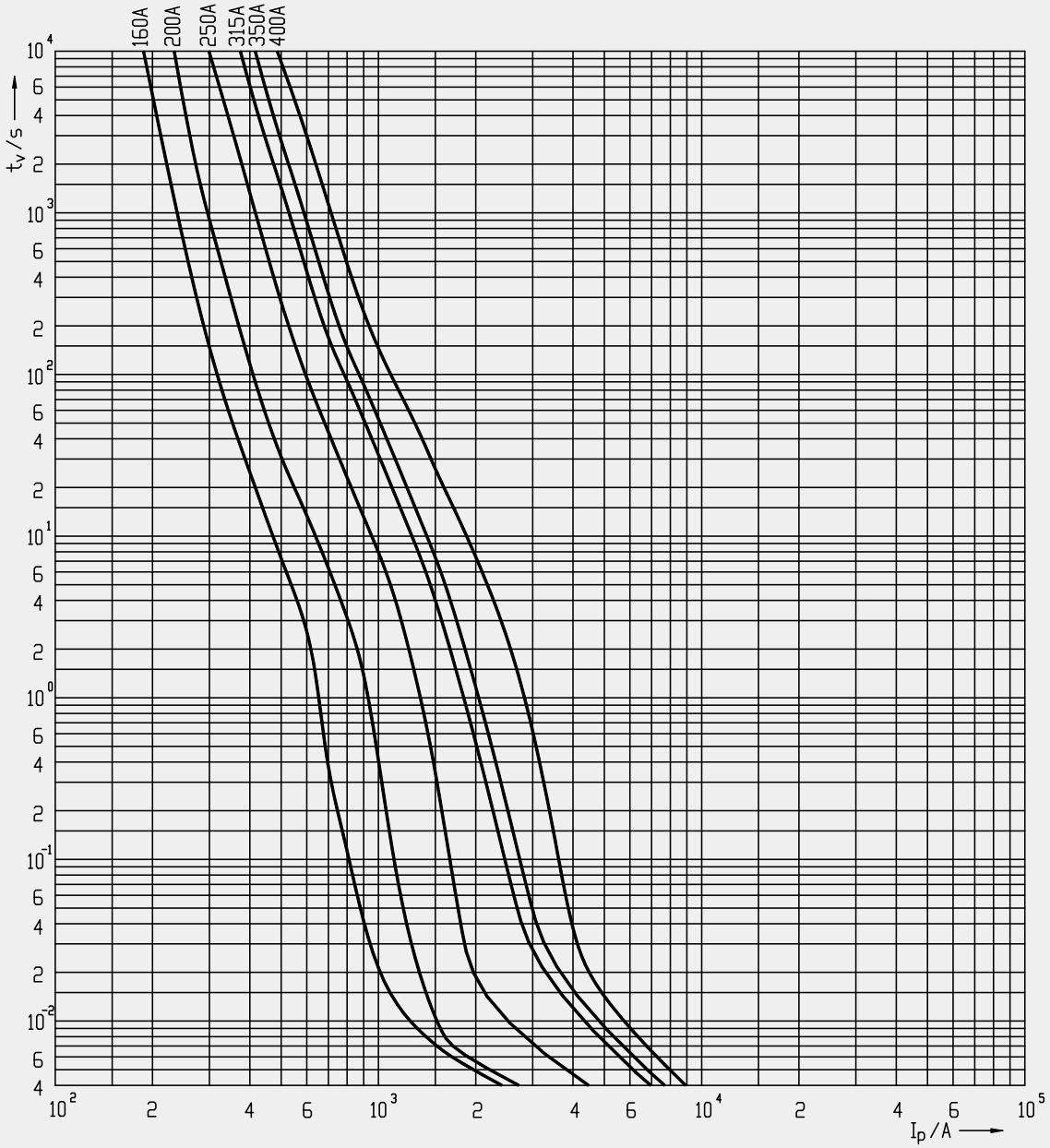
Size	D	E	F1	F2	M	N
2	60	60	65	99	M10	75
3	75	75	80	114	M12	75



NH1
1000V t-I
characteristics



NH2
1000V t-I
characteristics



NH3 1000V t-I characteristics

NH XL gBat fuse-link 1500V d.c.

General characteristics	
Rated voltage	1500V d.c. (L/R=3ms)
Rated current	50 - 630A
Breaking capacity	100kA d.c.
Standard	IEC60269-7
Application	For battery protection. Applied in fuse base PK XL 1500V.

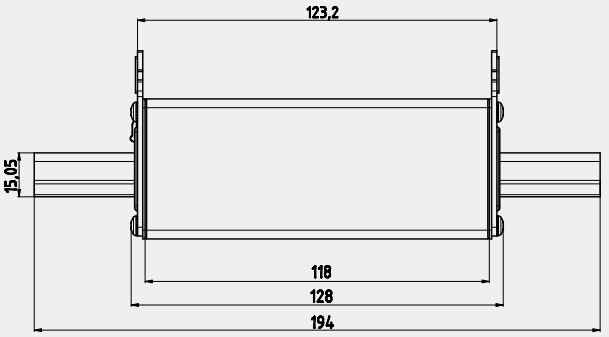
Patented technology by European Patent Office

NH gBat 1500V d.c.

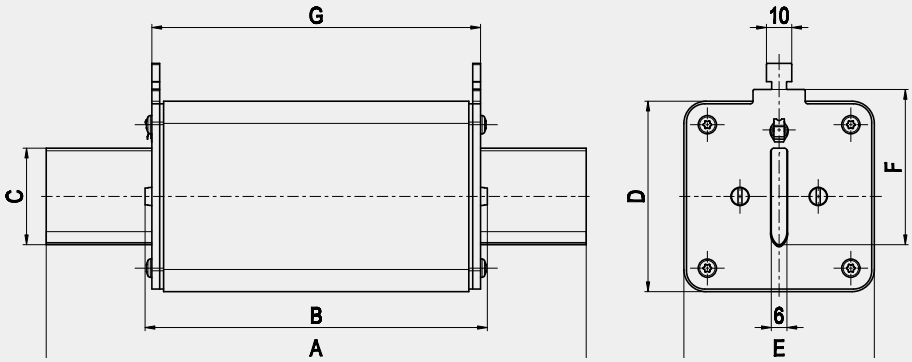
Size	I_n [A]	Standard indicator pic. 1	S_{170} screw contact pic. 2	U_{170} screw contact pic. 3	Power dissipation [W]	Power dissipation $0,7xI_n$ [W]	Pre-arcing Joule integral L/R=3ms [A^2s]	Operating Joule integral L/R=3ms [A^2s]	For use with	Weight [g]	Pack. [pcs]
01XL	50	004110698	004110782	004110788	18	7	1.100	6.500	PK1XL 1500V	450	3/30
	63	004110699	004110783	004110789	22	8,5	2.500	13.000			
	80	004110700	004110784	004110790	21	9	4.500	32.500			
	100	004110701	004110785	004110791	29	11	7.500	54.000			
	125	004110702	004110786	004110792	36	13	9.000	65.000			
	160	004110703	004110787	004110793	46	17	13.000	104.000			
1XL	50	004110650	004110657	004110664	14	6	1.000	8.000		950	1/15
	63	004110651	004110658	004110665	14	6,2	2.000	13.000			
	80	004110652	004110659	004110666	16	7	6.000	32.000			
	100	004110653	004110660	004110667	19	8,3	12.500	56.000			
	125	004110654	004110661	004110668	22	9,7	19.000	80.000			
	160	004110655	004110662	004110669	30	13,2	24.000	104.000			
	200	004110656	004110663	004110670	32,5	13,7	27.500	160.000			
2XL	200	004110671	004110673	004110675	36	15,9	50.000	165.000	PK2XL 1500V	1350	1/9
	250	004110672	004110674	004110676	44	19,3	90.000	286.000			
3L	315	004110677	004110682	004110687	57	22,2	60.000	350.000	PK3L 1500V	1970	1/9
	350	004110678	004110683	004110688	61	23,7	70.000	400.000			
	400	004110679	004110684	004110689	67	26,8	80.000	550.000			
	450	004110680	004110685	004110690	75	29	120.000	700.000			
	500	004110681	004110686	004110691	79	44,3	150.000	850.000			
	630	004110779	004110780	004110781	102	40	280.000	1.600.000			

Dimensions

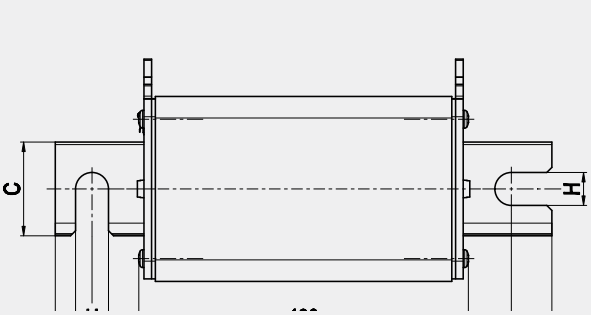
01XL



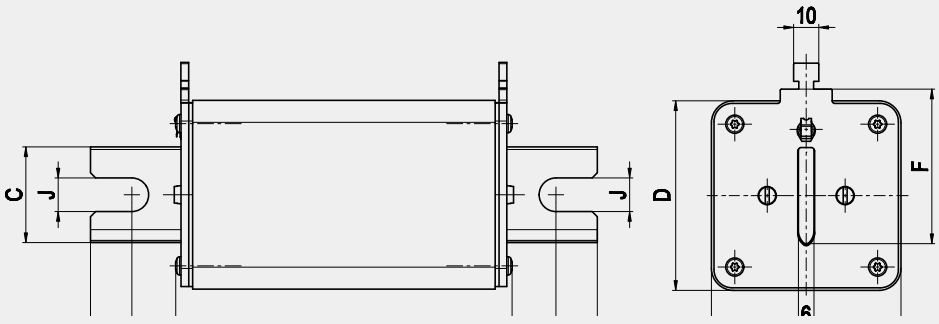
pic. 1



pic. 2



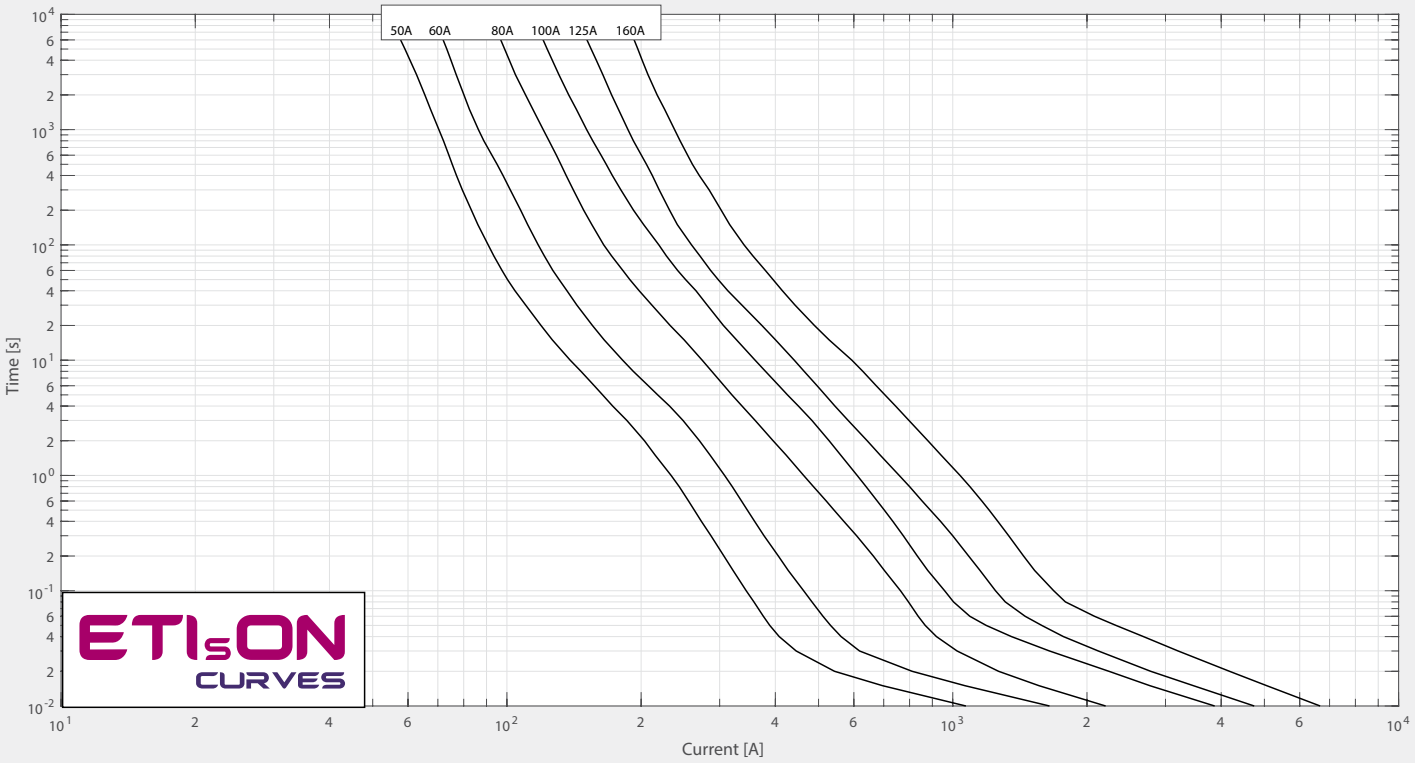
pic. 3



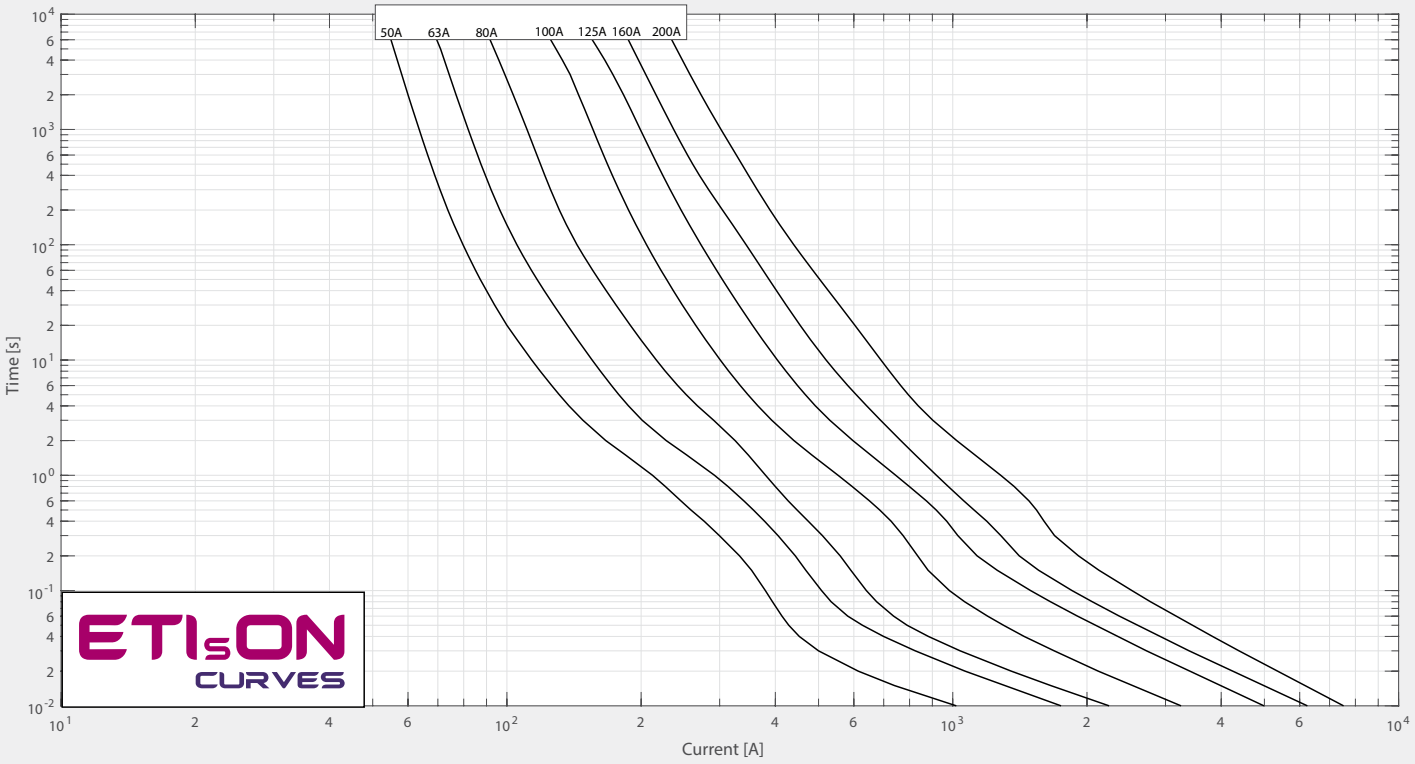
Size	A	B	C	D	E	F	G	H	J
1XL	192	131	24	51	51	43,5	125	11	11
2XL	208	130	30	60	60	48	126	11	13
3L	208	130	37	73	73	60	126	11	13

I/t characteristics for NH XL Battery fuses

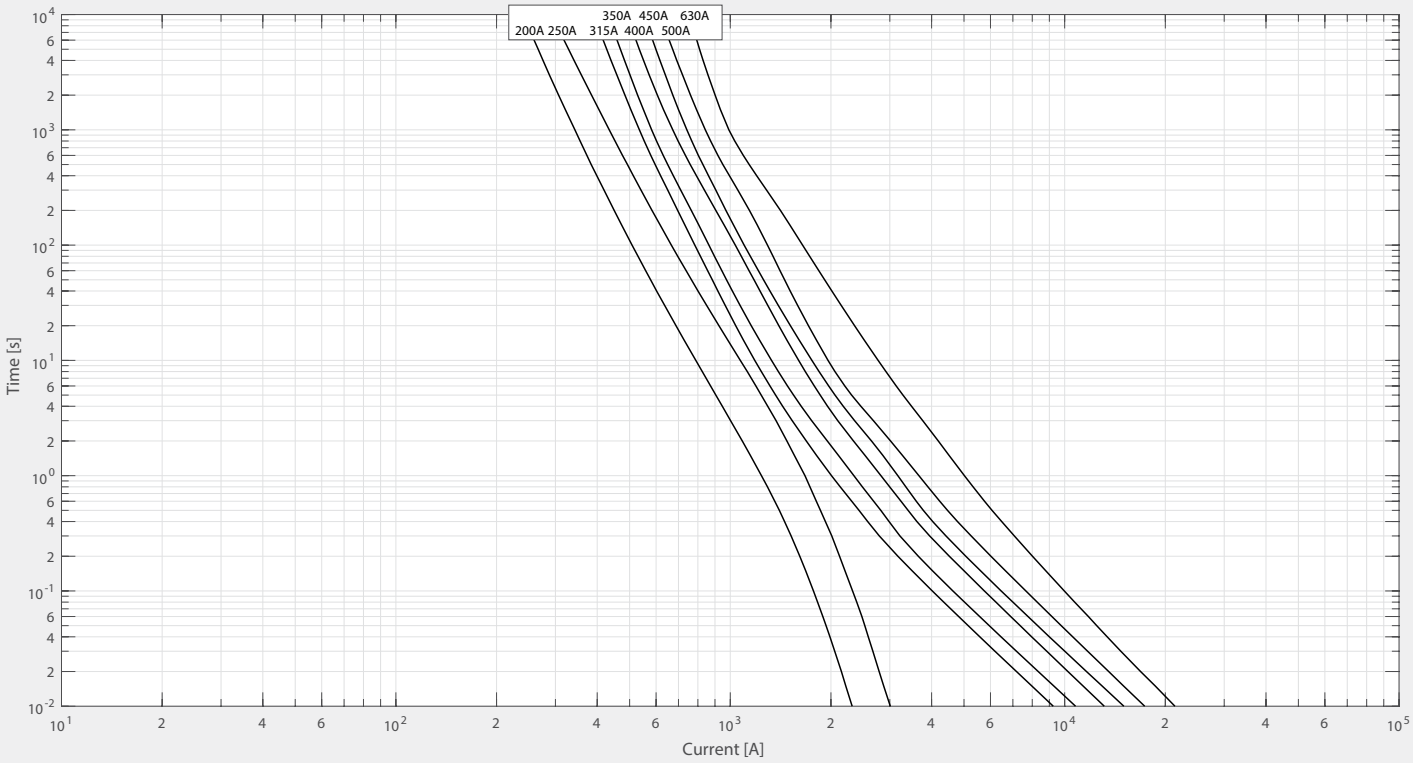
NH01XL

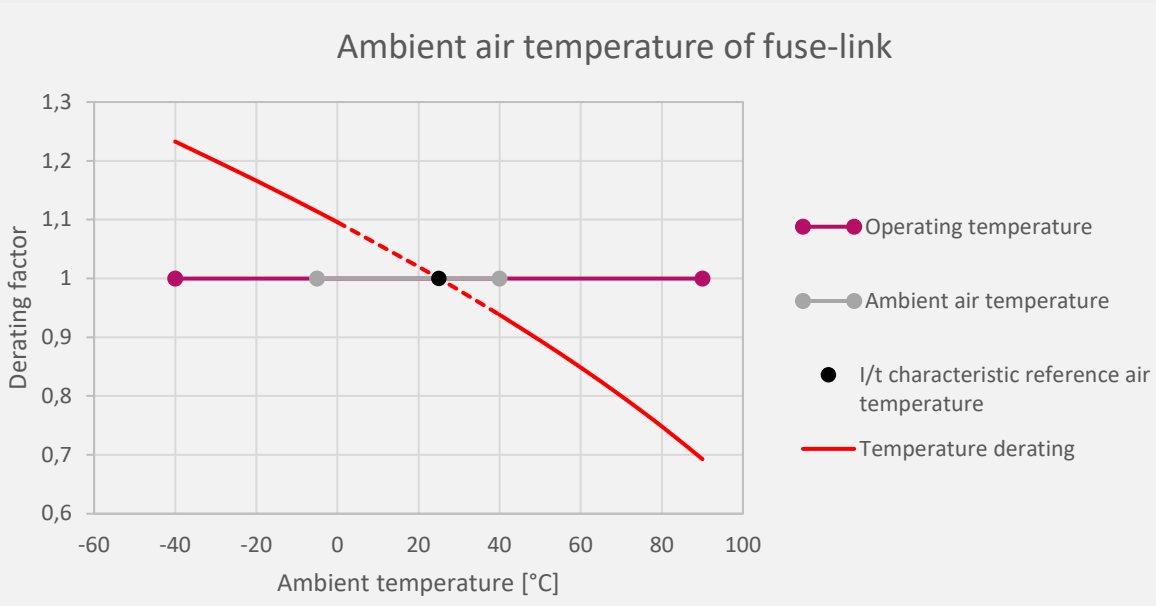


NH1XL



NH2XL, NH3L





Legend:

T_{amb} – Ambient Temperature

TDF – Temperature Derating Factor

I_N – Nominal Current of Fuse-link

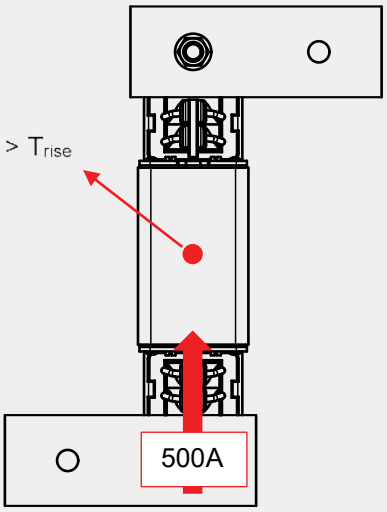
I_{TDF} – Nominal Current Including Temperature Derating Factor

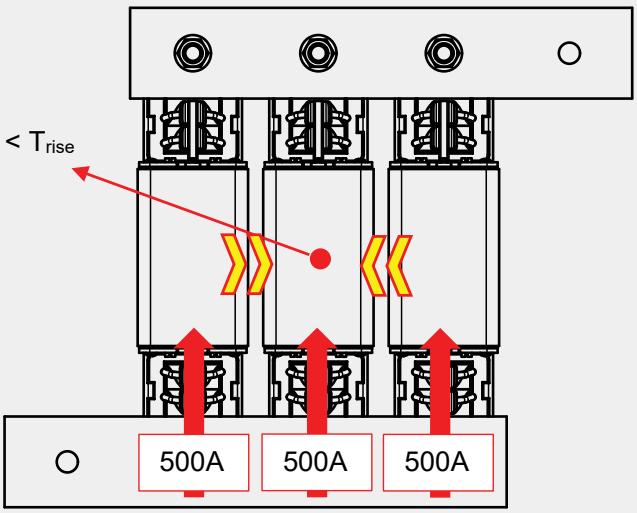
Current calculation: $I_{TDF} = I_N \times TDF$

Parallel connection of fuse-links to increase the rated current

Rules for parallel connection of fuse-links:

- The fuse-links have to be the same type, size, and rating.
- The combination of parallel fuses must be selected by the manufacturer.
- The current rating of parallel-connected fuse-links is lower than the sum of the single fuse-links ($n \times I_n > I_{n\ parallel}$).
- The current distribution on all parallel fuse-links must be the same.
- Parallel fuse-links must be connected as prescribed by the manufacturer.
- The incoming and outgoing connection must have prescribed cross-section.
- The values of power dissipation are equal to the sum of values of power dissipation of a single fuse-link.
- The pre-arcing Joule integral is approximately equal to $n^2 \times I^2t_{[single\ fuse\text{-}link]}$.
- Breaking capacity is not larger than I1 of a single fuse-link.
- The cut-off current is approximately equal $n \times I_{cut\text{-}off\ [single\ fuse\text{-}link]}$.
- The temperature rise of each parallel fuse-links is higher than the temperature rise of single fuse-link.





Parallel solutions	
Type	Code No.
NH 550V	On request
NH 700V	
NH 800V	
NH 1000V	
NH 1100V	
NH 1500V	

CHARGER FUSE

For protection of high power DC eV chargers

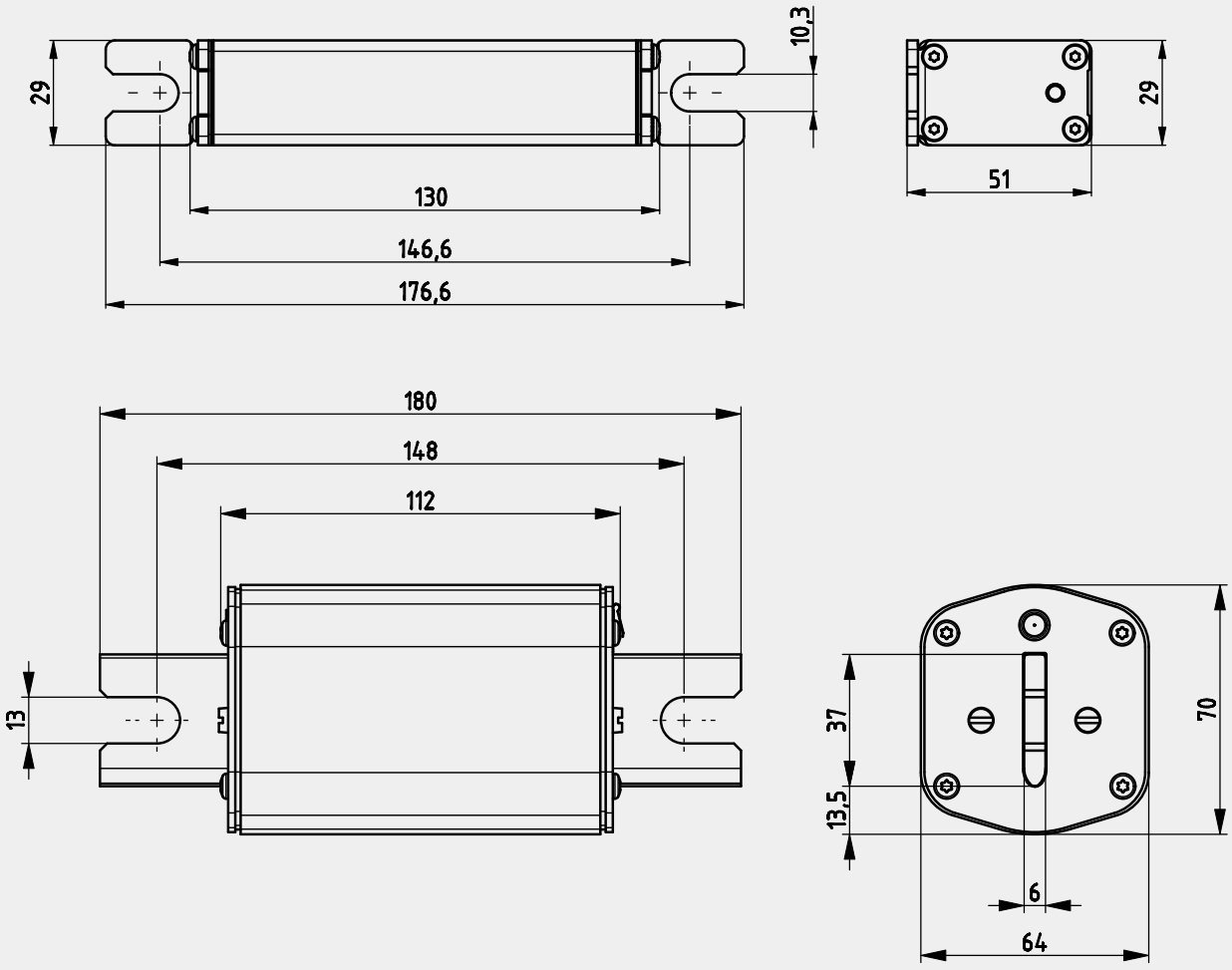
NH Charger fuse-link 1000V d.c.

General characteristics	
Rated voltage	1000V d.c. L/R=3ms
Rated current	300 - 600A
Breaking capacity	30kA d.c.
Standard	IEC 60269-4, IEC 60269-6, UL 248-13, UL 248-19
Application	For protection on DC side of EV chargers

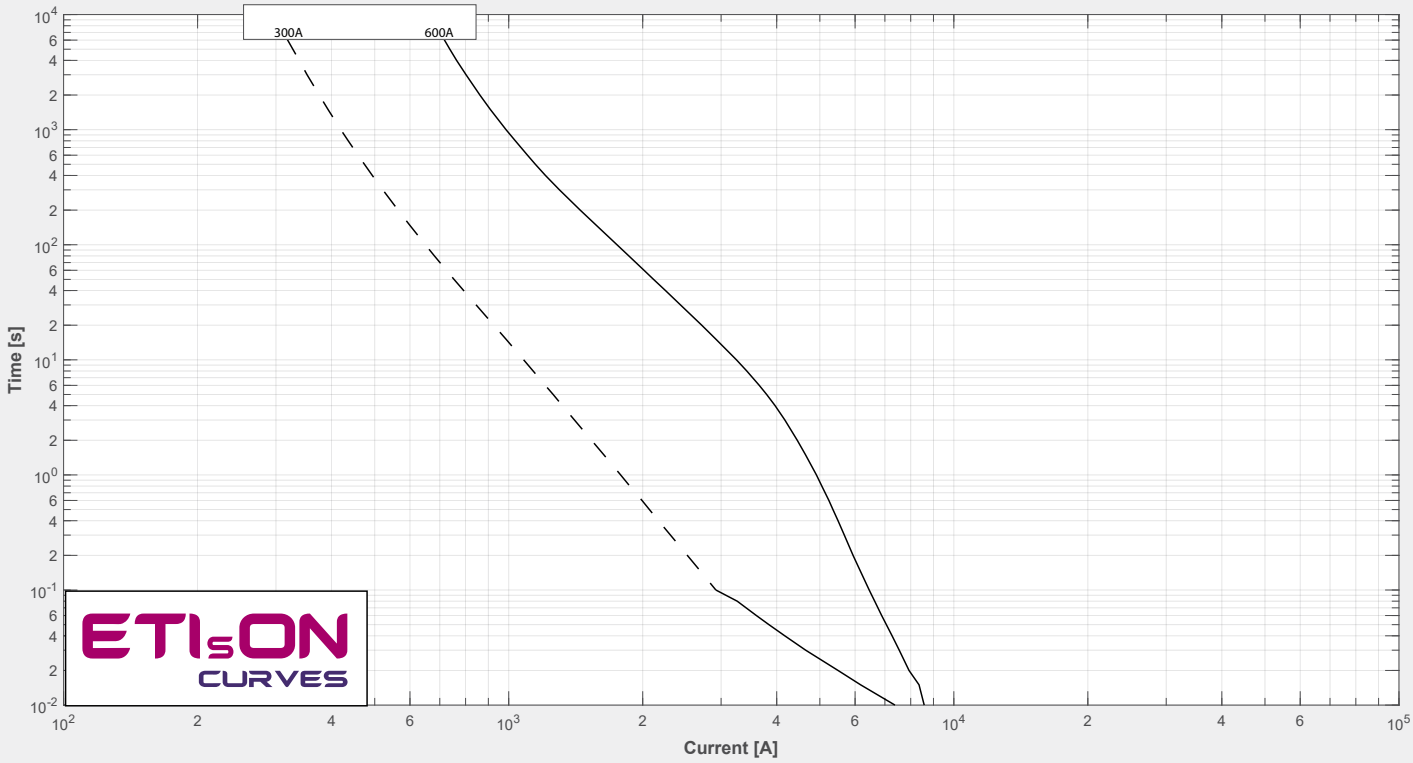
NH Charger Fuse 1000V d.c.

Size	I_n [A]	Standard indicator	Power dissipation [W]	Power dissipation 0,7xI_n [W]	Pre-arcing Joule integral [A^2s]	Operating Joule integral [A^2s]	Weight [g]	Pack. [pcs]
NH 01XL	300	004110800	81	30	33.000	107.000	450	3/30
NH 3/150	600	004110805	67	27	450.000	180.000	1300	1/9

Dimensions



I/t characteristics for NH Charger Fuse



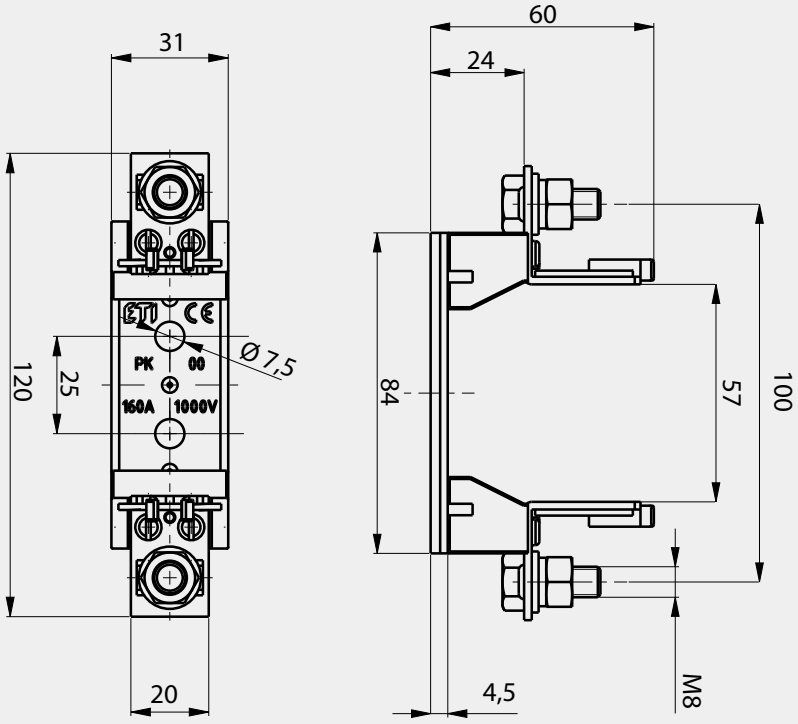
FUSE BASES FOR NH DC FUSE-LINKS

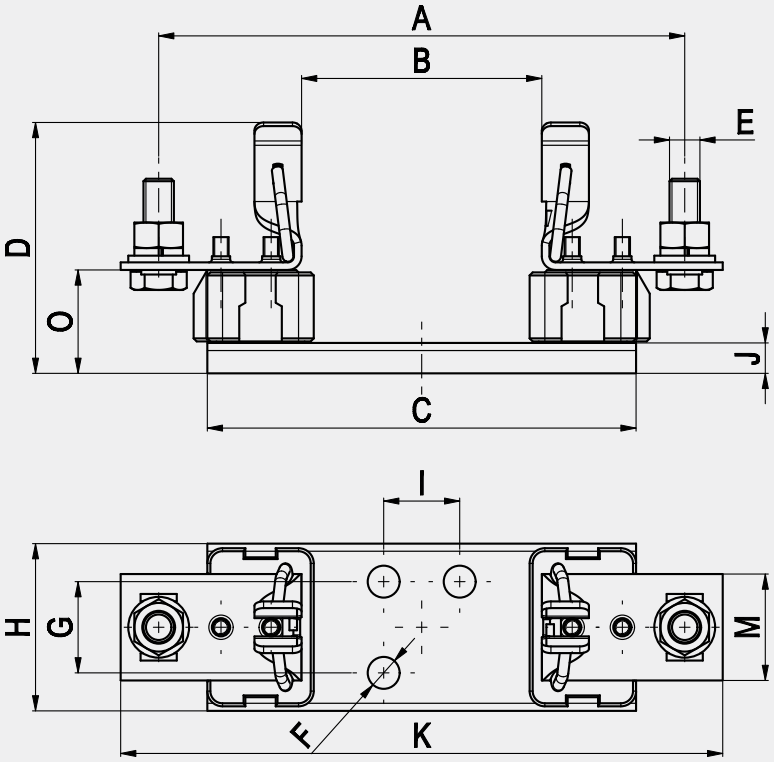
Fuse base PK 00, 0, 1, 2, 3 1000V a.c./d.c.

General characteristics	
Rated voltage	1000V a.c./d.c.
Rated current	160A, 250A, 400A, 630A
Insulation class	C-VDE 0110
Degree of protection	IP00
Standards	IEC 60269, DIN VDE 0636, DIN 43620, DIN 43623

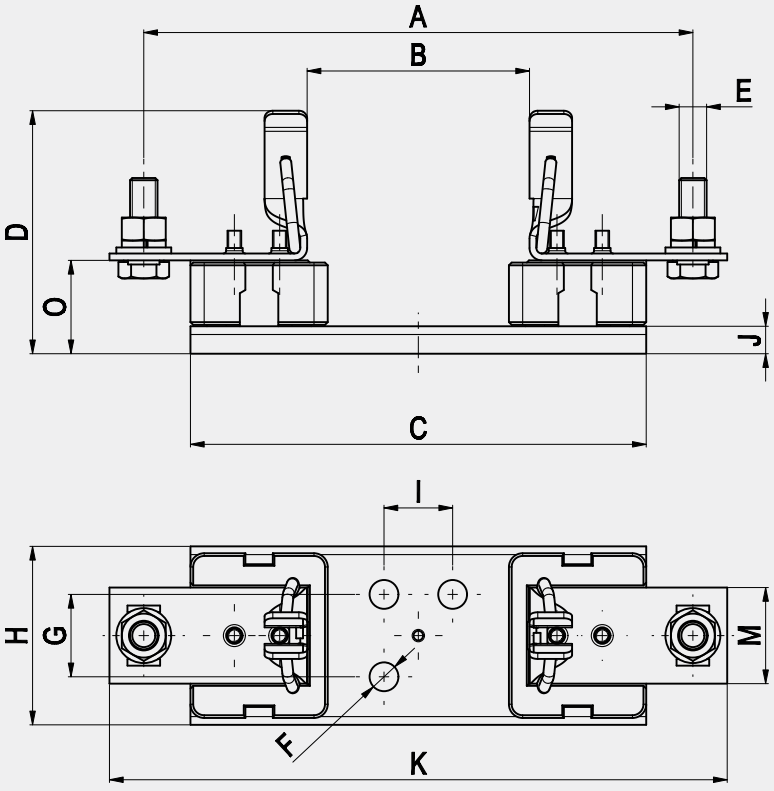
Fuse base PK 1000V a.c./d.c.

Size	I_n [A]	No. of poles	Code No.	Cable lugs according to DIN 46235 [mm²]	Tightening torque [Nm]	Max. power dissipation of the fuse-link per pole [W]	Weight [g]	Packaging [pcs]
PK 00 M8-M8 DC 1000V 1p	160A	1p	004122044	6 - 95	10	12	173	3/75
PK 0 M8-M8 DC 1000V 1p	160A		004122033	6 - 95	10	12	258	3/90
PK 1 M10-M10 DC 1000V 1p	250A		004122025	25 - 150	32	32	605	3/18
PK 2 M10-M10 DC 1000V 1p	400A		004122024	25 - 240	32	45	845	3/15
PK 3 M12-M12 DC 1000V 1p	630A		004122023	25 - 300	32	60	1110	3/12

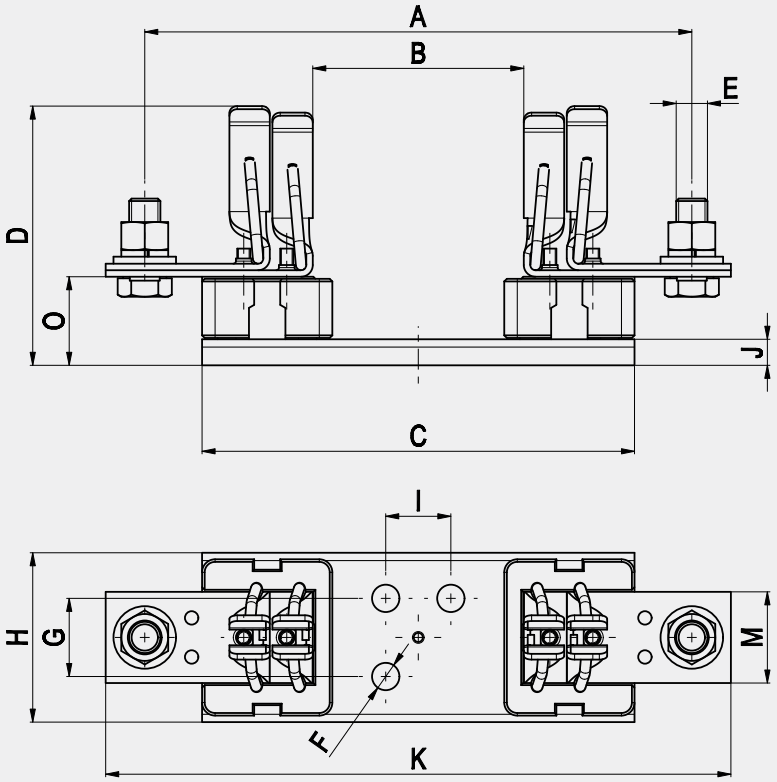




PK0, 1 DC



PK2 DC



PK3 DC

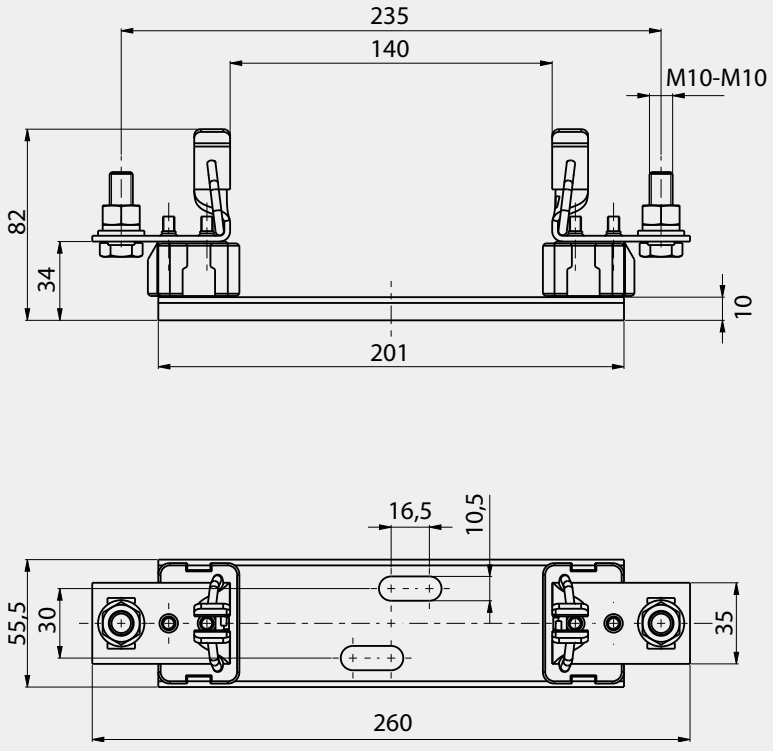
Type	Dimensions [mm]												
	A	B	C	D	E	F	G	H	I	J	K	M	O
PK 00	100	57	84	60	M8-M8	Ø7,5	-	31	25	4,5	120	20	24
PK 0	150	74	130	60	M8-M8	Ø7,5	-	33	25	4,5	170	20	25
PK 1	175	80	141	82	M10-M10	Ø10,5	30	55,5	25	10	200	35	35
PK 2	200	80	166	87	M10-M10	Ø10,5	30	65	25	10	225	35	35
PK 3	210	80	166	99	M12-M12	Ø10,5	30	65	25	10	240	35	35

Fuse base PK XL 1500V d.c.

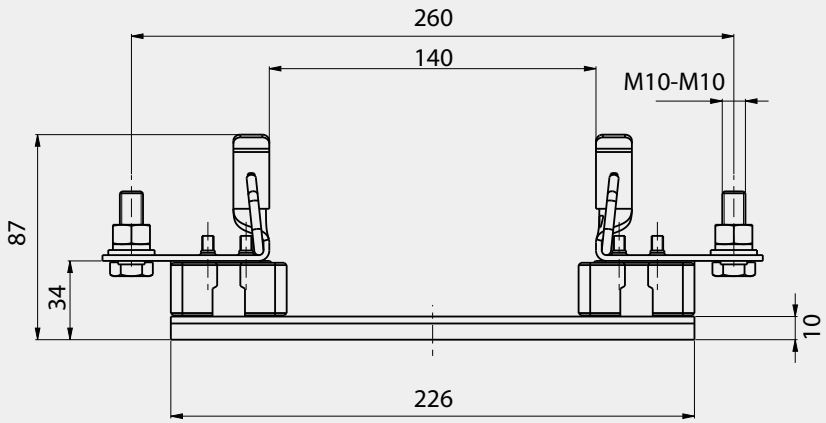
General characteristics	UL file: E356295
Rated voltage	1500V d.c.
Rated current	160A, 250A, 400A, 630A
Insulation class	C-VDE 0110
Degree of protection	IP00
Standards	IEC 60269, DIN VDE 0636, DIN 43620, DIN 43623

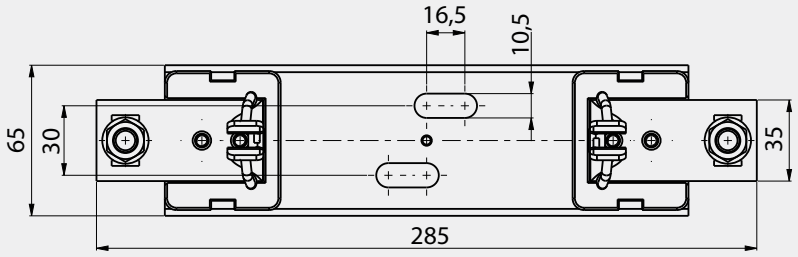
Fuse base PK XL 1500V d.c.

Size	I_n [A]	No. of poles	Code No.	Cable lugs according to DIN 46235 [mm²]	Tightening torque [Nm]	Max. power dissipation of the fuse-link per pole [W]	Weight [g]	Packaging [pcs]
PK 01XL M8-M8 1500V 1p	160A	1p	004132029	6 - 95	10	12		3/75
PK 1XL M10-M10 1500V 1p	250A		004132017	25 - 150	32	32	675	3/90
PK 2XL M10-M10 1500V 1p	400A		004132019	25 - 240	32	45	921	3/18
PK 3L M12-M12 1500V 1p	630A		004132023	25 - 300	32	60	1184	3/15



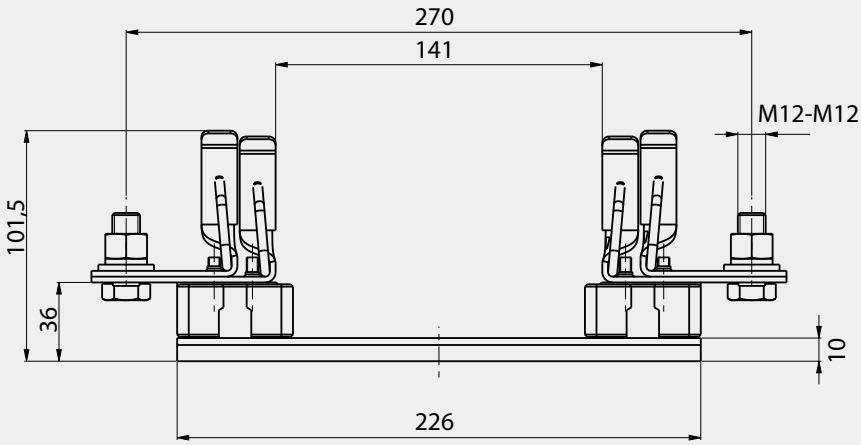
PK1XL

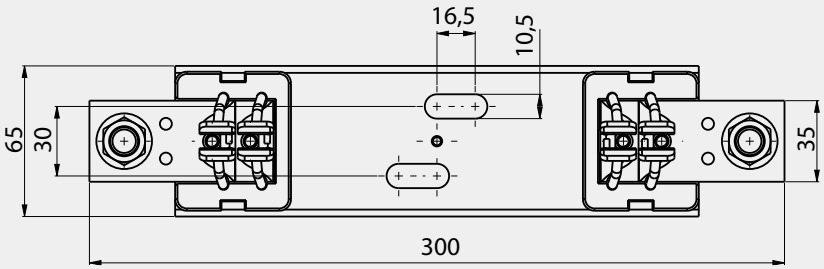

260
140
M10-M10
87
34
10
226


16,5
10,5
65
30
35
285

PK2XL


ETI
PK2XL
400A
1500V


270
141
M12-M12
101,5
36
10
226


16,5
10,5
65
30
35
300

PK3L


ETI
PK3L
630A
1500V

Fuse base U1...3/GZ/1500/H

General characteristics					
Type			**U1XL-1IGZ/1500/H**	**U2XL-1IGZ/1500/H**	**U3L-1IGZ/1500/H**
Size			**NH1XL**	**NH2XL**	**NH3L**
Rated voltage		V	**1500**	**1500**	**1500**
Rated current		A	**250**	**400**	**630**
Conv. free air thermal current with fuse-links		A	**200**	**315**	**630**
Conv. free air thermal current with solid links		A	**325**	**400**	**1000**
Rated frequency		Hz	**40-60**	**40-60**	**40-60**
Max. permis. power dissipation per fuse-link		W	**35**	**35***	**70**
Cable terminal - Flat terminal	**Screw**	–	**M10**	**M10**	**M12**
	Cable lug (DIN 46235)	mm^2	**25-240**	**25-240**	**25-300**
	Flat termination	mmxmm	**30x10**	**30x10**	**40x10**
	Rated torque	Nm	**30-35**	**30-35**	**30-35**
Cable terminal - Terminal	**Cross-section**	mm^2	**KM2G**	**KM2G**	**P32**
	Rated torque	Nm			
Degree of protection - Front side, device fitted	Operating conditions	–	IP00	IP00	IP00
	Gripping lug cover A-U... (available separately) applied	–	IP2X	IP2X	IP2X
Operating conditions	**Ambient temperature****	°C	-25 ... +55		
	Rated operating mode	–	Uninterrupted duty		
	Actuation	–	–		
	Mounting position	–	Vertical, horizontal		
	Altitude	m	< 2000		
	Pollution degree	–	3		
	Overvoltage category	–	III		

*** with application of gPV fuse-links max. 250A: 46W**
**** 35°C normal temperature, at 55°C with reduced operating current**

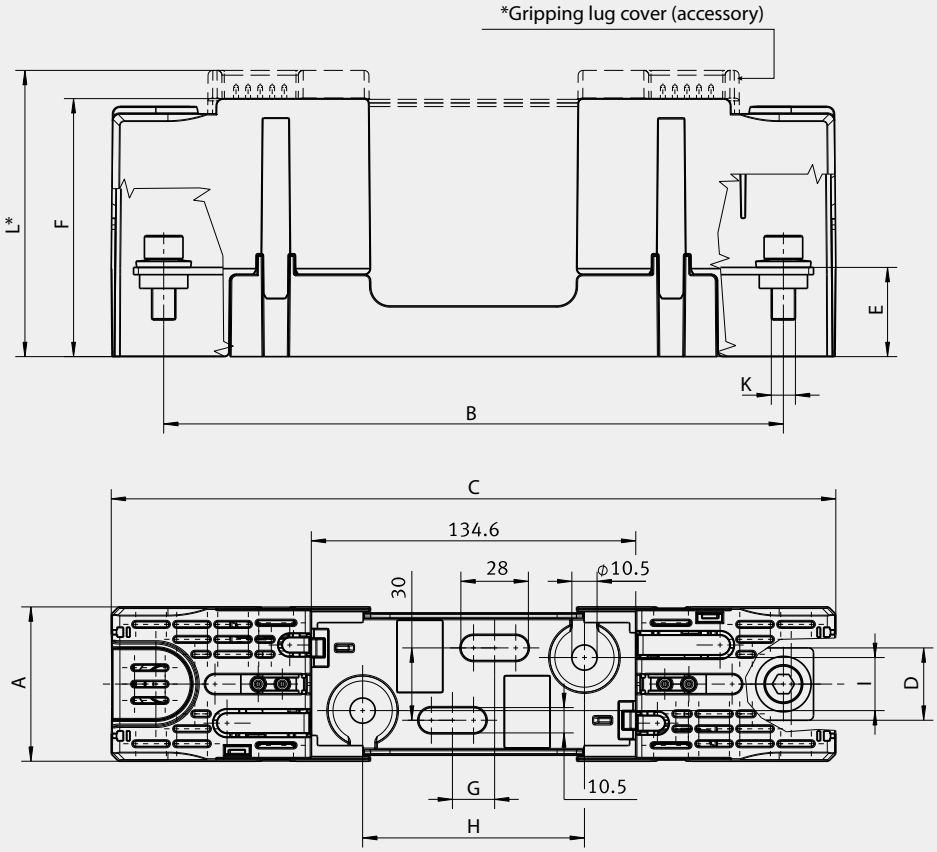
Fuse base U1...3/GZ/1500/H

Type	I_n [A]	Code No.	Max. Connection (mm^2)	Weight [g]	Packaging [pcs]
U1XL-1IGZ/1500/H	250	004122060	240	600	1
U2XL-1IGZ/1500/H	400	004122061	240	600	1
U3L-1IGZ/1500/H	630	004122062	300	1000	1

Accessories

Type	Code No.	Description	Weight [g]	Packaging [pcs]
K-U1XL-3L	004122063	Mechanical fuse monitoring	9	1
A-U1XL-2XL	004122064	Gripping lug cover	13	1
A-U3L	004122065	Gripping lug cover	32	1

Size	Dimensions [mm]										
	A	B	C	D	E	F	G	H	I	K	L*
U1XL-1IGZ/1500/H	59	257	300,5	30	37	102,5	175	92	22	M10	111
U2XL-1IGZ/1500/H	64	257	300,5	30	37	107	175	92	22	M10	119
U3L-1IGZ/1500/H	80	270	328	40	38	122,5	25	96	26	M12	1.345

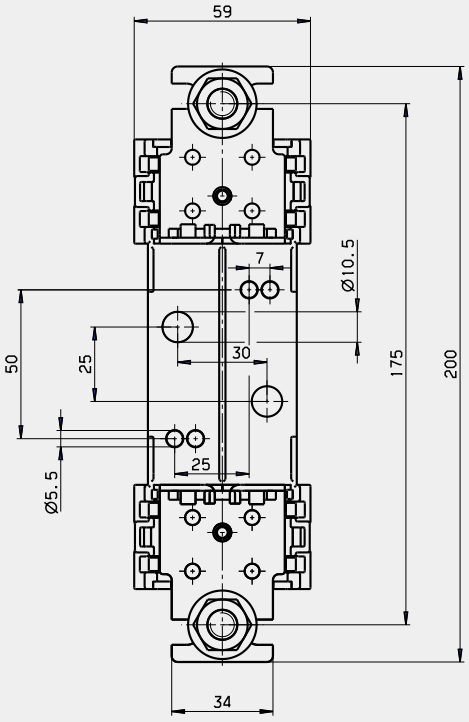


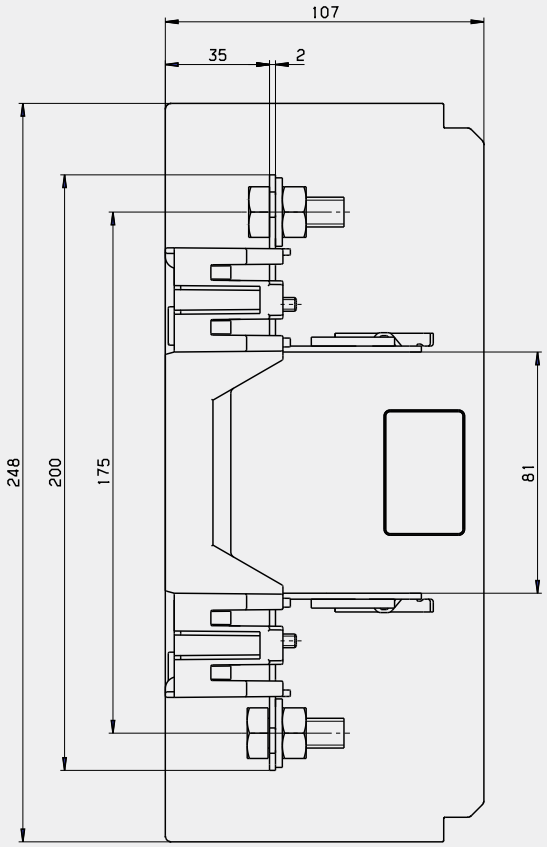
Fuse base U1-1/GZ/PV

General characteristics		
Rated voltage		1000V d.c.
Rated current		160A
Fuse-link size		1C, 1
Conv. free air thermal current with fuse-links		160A
Conv. free air thermal current with solid links		325A
Max. permis. power dissipation per fuse-link		31W
Cable terminal - Flat terminal	Screw	M10
	Cable lug (DIN 46235)	25-150 mm²
	Flat termination	30x10 mmx-mm
	Rated torque	30-35 Nm

Fuse base U1-1/GZ/PV

Type	I_n [A]	Code No.	Max. Connection (mm²)	Weight [g]	Packaging [pcs]
U1-1/GZ/PV	160	004122035	150	387	1





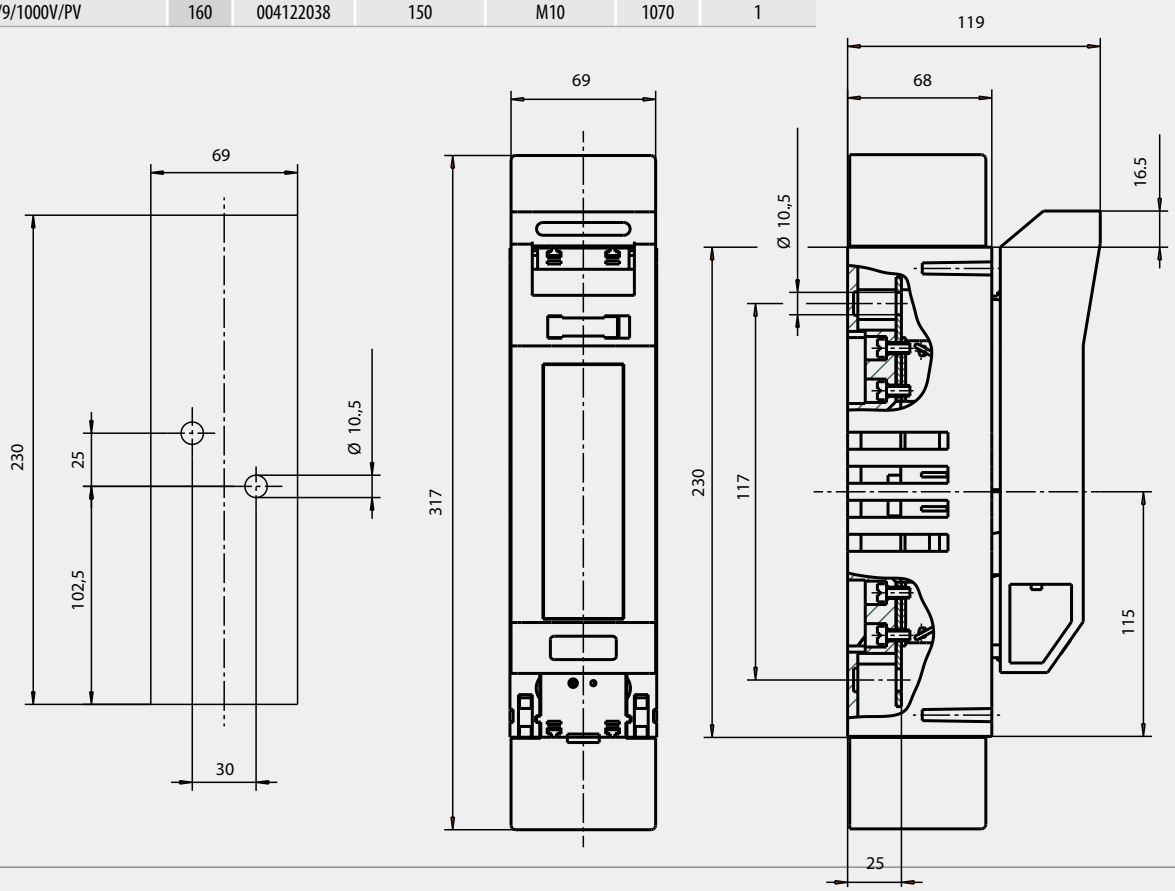
FUSEHOLDERS & DISCONNECTORS FOR NH DC FUSE-LINKS

Photovoltaic fuseholder TL1-1/9/1000V/PV

General characteristics		
Number of poles		1
Rated voltage		1000V d.c.
Rated current		160A
Conv. free air thermal current with fuse-links		160A
Utilization category		DC-20B
Fuse-links	Size to DIN 43620	1C, 1
	Max. rated current (gL/gG)	160A
	Max. permis. power loss per fuse-link	25W
Cable terminal - Flat terminal	Screw	M10
	Cable lug (DIN 46235)	25-240 mm^2
	Flat termination	30x10 mm
	Rated torque	30-35 Nm
Type of protection - front side, device fitted		IP20, IP10
Operating conditions	Ambient temperature*	-25 ... +55
	Rated operating mode	Cont. operation
	Actuation	Dependent manual actuation
	Mounting position	Vertical, horizontal
	Altitude	≤ 2000 m
	Pollution degree	3
	Overvoltage category	III

*35°C normal temperature, 55°C with reduced operating current

Photovoltaic fuseholder TL1-1/9/1000V/PV						
Type	I_n [A]	Code No.	Max. Connection (mm^2)	Terminal	Weight [g]	Packaging [pcs]
TL1-1/9/1000V/PV	160	004122038	150	M10	1070	1



Photovoltaic fuseholder TL1,3-1/9/1200V

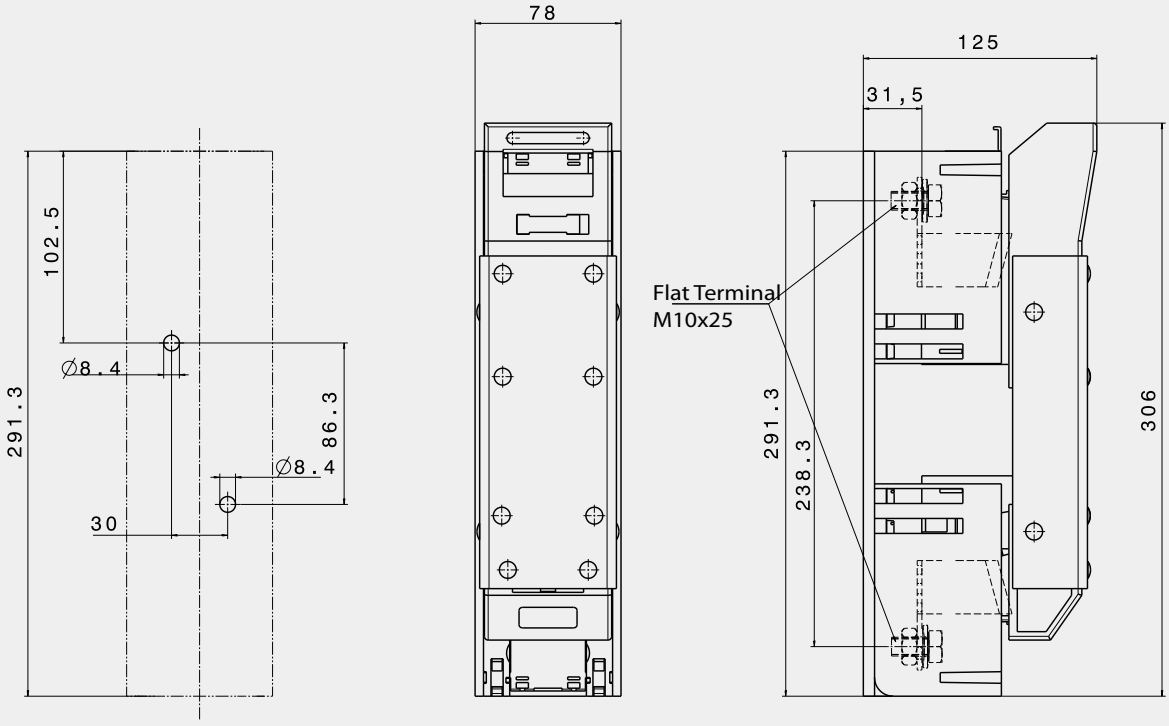
General characteristics			
Type		TL1/1200V	TL3/1200V
For NH fuse-links/extended length/acc. to DIN VDE 0636-2	Size	a1=194mm, a4=124mm	a1=209mm, a4=124mm
Rated voltage		1200V a.c. / 1000V d.c.	1200V a.c. / 1000V d.c.
Rated current		250A	630A
fuse-link size		1XL	2XL, 3L
Conv. free air thermal current with fuse-links		250A	630A
Conv. free air thermal current with solid links		325A	1000A
Rated frequency		40-60 Hz	40-60Hz
Utilization category		AC-20B, DC-20B	AC-20B, DC-20B
Max. permis. power loss per fuse-link		25W	48W
Cable terminal - Flat terminal	Bolt diameter	M10	M12
	Cable lug (DIN 46235)	25-150 mm^2	25-300 mm^2
	Flat bar	30x10 mm	40x10 mm
	Rated torque	30-35 Nm	30-35 Nm
Type of protection - front side, device fitted	Switching cover close	IP20	IP20
	Switching cover open	IP10	IP10
Operating conditions	Ambient temperature*	-25 ... +55	
	Rated operating mode	Cont. operation	
	Actuation	Dependent manual operation	
	Mounting position	Vertical, horizontal	
	Altitude	≤ 2000 m	
	Pollution degree	3	
	Overvoltage category	III	

*35°C normal temperature, 55°C with reduced operating current

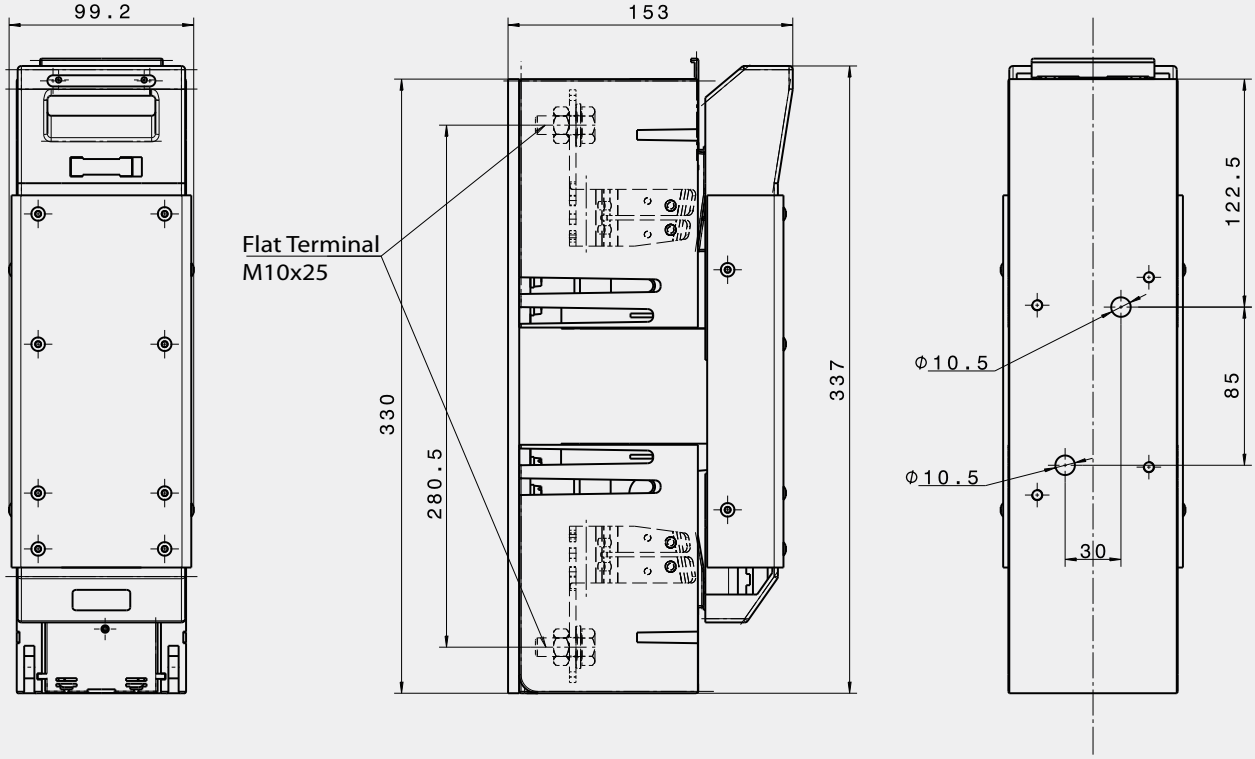
Photovoltaic fuseholder TL1,3-1/9/1200V

Type	I_n [A]	Code No.	Max. Connection (mm^2)	Terminal	Weight [g]	Packaging [pcs]
TL1-1/9/1200V	250	004122036	150	M10	1485	1
TL3-1/9/1200V	630	004122037	300	M12	2535	1

TL1-1/9/1200V



TL3-1/9/1200V



NH strip-fuseways L2,3-2/1500V

General characteristics				
Type			L2	L3
For NH fuse-links acc. to IEC 60269-6		Size	2 (extended body)	3 (extended body)
Rated voltage			1500V d.c.	1500V d.c.
Rated current			250A	500A
fuse-link size			1XL, 2XL	3L
Conv. free air thermal current with fuse-links			250A	500A
Rated insulation voltage			1500V d.c.	1500V d.c.
Max. permis. power loss per fuse-link			46W	75W
Cable terminal	Flat terminal	Bolt diameter	M12	M12
		Cable lug (DIN 46235)	1 x 25-240 mm^2	1 x 25-240 mm^2
		Flat bar	30x10 mm	30x10 mm
		Tightening torque	35-40 Nm	35-40 Nm
	Clamp KM2G	Clamping cross-section	25-150mm^2/185-300mm^2	25-150mm^2/185-300mm^2
		Tightening torque	32 Nm	32 Nm
	Clamp KM2G-F	Clamping cross-section	25-240 mm^2	25-240 mm^2
		Tightening torque	32 Nm	32 Nm
Type of protection - front side, device fitted - with front side strip cover			IP10	IP10
Operating conditions		Ambient temperature*	-25 ... +55	
		Rated operating mode	Cont. operation	
		Actuation	Dependent manual operation	
		Mounting position	Vertical	
		Altitude	≤ 2000 m	
		Pollution degree	3	
		Overvoltage category	III	

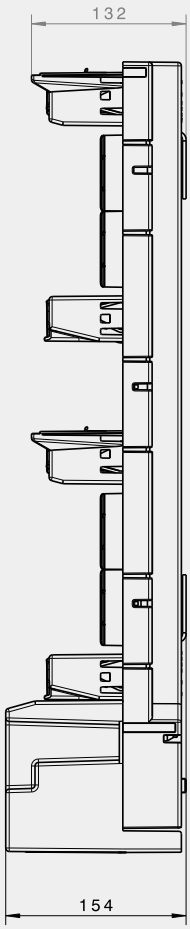
*35^{0}C normal temperature, 55^{0}C with reduced operating current

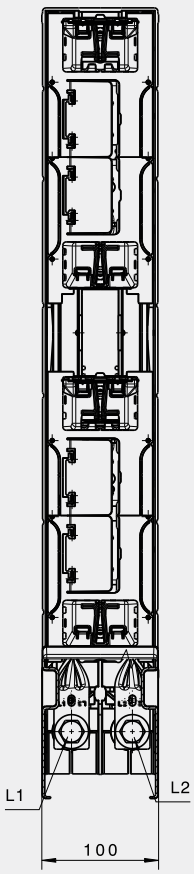
NH fuse - disconnectors

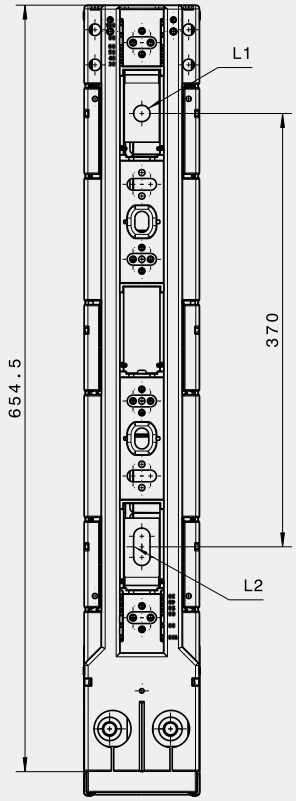
NH strip-fuseways L2,3-2/1500V

Type	I_n [A]	Code No.	Max. Connection (mm^2)	Terminal	Weight [g]	Packaging [pcs]
L2-2/1500/3A/HA/PV	250	004122039	25-240	Flat terminal M12	3500	1
L2-2/1500/9/KM2G-F/HA/PV	250	004122040	25-240	Steel-frame clamp KM2G-F	3650	1
L3-2/1500/3A/HA/PV	500	004122041	25-240	Flat terminal M12	4110	1
L3-2/1500/9/KM2G-F/HA/PV	500	004122042	25-240	Steel-frame clamp KM2G-F	4260	1

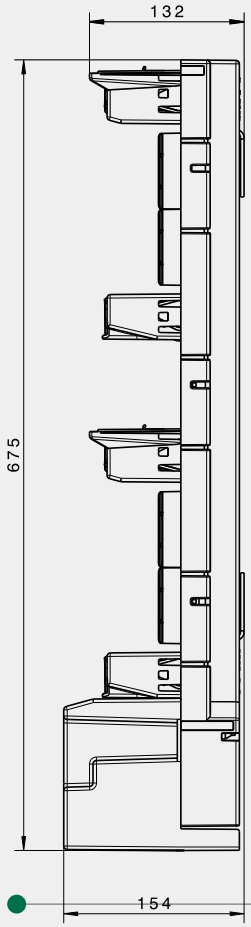
Flat terminal M12

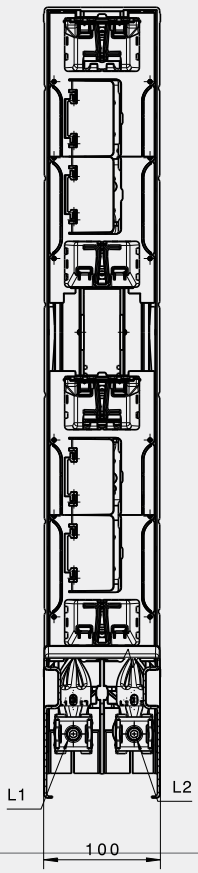


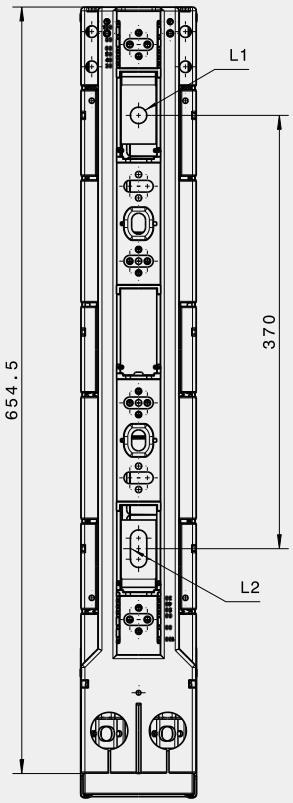




Steel-frame clamp KM2G-F







Horizontal fuse-switch disconnector type KVL

General characteristics									
Size			00						
Technical Characteristics									
Rated operational voltage	U_e	V	400 a.c.	500 a.c.	690 a.c.	800 a.c.	1000 a.c.	250 d.c.	1000 d.c.
Rated operational current*	I_e	A	160	160	160	63	160	160	160
Conv. free air thermal current with fuse-links*	I_{th}	A	160						
Conv. free air thermal current with solid-links*	I_{th}	A	210						
Rated frequency	f	Hz	40-60						
Rated insulation voltage	U_i	V	Baseplate mounting 1000 a.c. , Busbar mounting 800 a.c.						
Total power loss (without fuse)	P_v	W	1Pole - 3W, 3Pole - 9W						
Power loss at 80% I_{th} (without fuse-links), **	P_v	W	1Pole - 1,9 W, 3Pole - 5,8 W						
Rated impulse withstand voltage	U_{imp}	kV	8						
Utilization category***			AC-23B	AC-22B	AC-21B	AC-21B	AC-20B	DC-22B	DC-20B
Rated conditional short-circuit current****		kA	120 (500 a.c.), 100 (690 a.c.), 10 (800 a.c.), 35 (250 d.c.)						
Rated short-time withstand current	I_{cw}	kA	5/1s						
Fuse-links									
Size - DIN VDE 0636-2	-	-	000/00						
Max. permissible power loss per fuse-link	P_a	W	12						
Cable terminal									
Flat terminal-Screw			M8						
Tightening torque	Ma	Nm	12-15						
Clip terminal, Clamping cross-section		mm^2	(SP KVL00) Round conductor: 1,5-70 Cu , Strip conductor: 6 x 9 x 0,8 Cu						
Tightening torque	Ma	Nm	2,6						
Prism Clamp, Clamping cross-section		mm^2	(SP KVL00 P1) 10-70 Al/Cu , 35-95 Al/Cu						
Tightening torque	Ma	Nm	2,6						
Prism Clamp, Clamping cross-section		mm^2							
Tightening torque	Ma	Nm							
Frame clamp, Clamping cross-section		mm^2	1,5-95 Al/Cu , (Al 95: max. 125A),******						
Torque	Ma	Nm	4,5						
Degree of Protection, front side device									
Front cover closed	-	-	IP20						
Front cover open	-	-	IP10						
With clamp- and lateral cover	-	-	IP2XC						
Operating condition									
Ambient temperature *****	T_{amb}	°C	-25 ... +55						
Operating condition	-	-	Continuous operation						
Mounting	-	-	vertical, horizontal						
Altitude	-	m	≤ 2000						
Pollution degree	-	-	3						
Overvoltage category	-	-	IV						
Endurance									
Mechanical cycles			1600						
Electrical cycles			200						

* Mounting of several units in low voltage switchgear-combinations, please think about rated diversity factors acc. to DIN EN 61439.
** Reference value for replacement of devices acc. to DIN EN 61439-1 clause 10.10.4.2.
*** minimum distance to earthed, conductive parts: Lateral: 20mm/Above: 50mm
**** Type tested with NH fuse-links characteristic gG
***** 35°C Normal temperature, at 55°C with reduced operating current

General characteristics										
Size			1							
Technical Characteristics										
Rated operational voltage	U_e	V	400 a.c.	500 a.c.	690 a.c.	800 a.c.	1000 a.c.	250 d.c.	440 d.c.#	1000 d.c.
Rated operational current*	I_e	A	250	250	250	250	250	250	250	250
Conv. free air thermal current with fuse-links*	I_{th}	A	250							
Conv. free air thermal current with solid-links*	I_{th}	A	350							
Rated frequency	f	Hz	40-60							
Rated insulation voltage	U_i	V	Baseplate mounting 1000 a.c. , Busbar mounting 800 a.c.							
Total power loss (without fuse)	P_v	W	1Pole - 5W, 3Pole - 15W							
Power loss at 80% I_{th} (without fuse-links), **	P_v	W	1Pole - 3,2 W, 3Pole - 9,6 W							
Rated impulse withstand voltage	U_{imp}	kV	8							
Utilization category***			AC-23B	AC-22B	AC-21B	AC-21B	AC-20B	DC-22B	DC-21B	DC-20B
Rated conditional short-circuit current****		kA	120 (500 a.c.), 100 (690 a.c.), 10 (800 a.c.), 35 (440 d.c.)							
Rated short-time withstand current	I_{cw}	kA	8,6/1s							
Fuse-links										
Size - DIN VDE 0636-2	-	-	1							
Max. permissible power loss per fuse-link	P_a	W	23							
Cable terminal										
Flat terminal-Screw			M10							
Tightening torque	Ma	Nm	30-35							
Clip terminal, Clamping cross-section		mm^2	0(SP KVL1) Round conductor: 25-150 Cu , Strip conductor: 6 x 16 x 0,8 Cu0							
Tightening torque	Ma	Nm	9,5							
Prism Clamp, Clamping cross-section		mm^2	0(SP KVL1 P1) 10-150 Al/Cu0							
Tightening torque	Ma	Nm	4,5							
Prism Clamp, Clamping cross-section		mm^2	(SP KVL1 P2); 2 x (10-150) Al/Cu							
Tightening torque	Ma	Nm	4,5							
Frame clamp, Clamping cross-section		mm^2	35-150 Al/Cu							
Torque	Ma	Nm	12							
Degree of Protection, front side device										
Front cover closed	-	-	IP20							
Front cover open	-	-	IP10							
With clamp- and lateral cover	-	-	IP2XC							
Operating condition										
Ambient temperature *****	T_{amb}	°C	-25 ... +55							
Operating condition	-	-	Continuous operation							
Mounting	-	-	vertical, horizontal							
Altitude	-	m	≤ 2000							
Pollution degree	-	-	3							
Overvoltage category	-	-	IV							
Endurance										
Mechanical cycles			1600							
Electrical cycles			200							

* Mounting of several units in low voltage switchgear-combinations, please think about rated diversity factors acc. to DIN EN 61439.
** Reference value for replacement of devices acc. to DIN EN 61439-1 clause 10.10.4.2.
*** minimum distance to earthed, conductive parts: Lateral: 20mm/Above: 50mm
**** Type tested with NH fuse-links characteristic gG
***** 35°C Normal temperature, at 55°C with reduced operating current
# 3-pole only

General characteristics

Size			2						
Technical Characteristics									
Rated operational voltage	U_e	V	400 a.c.	500 a.c.	690 a.c.	1000 a.c.	250 d.c.	440 d.c.#	1000 d.c.
Rated operational current*	I_e	A	400	400	400	400	400	400	400
Conv. free air thermal current with fuse-links*	I_{th}	A	400						
Conv. free air thermal current with solid-links*	I_{th}	A	500						
Rated frequency	f	Hz	40-60						
Rated insulation voltage	U_i	V	Baseplate mounting 1000 a.c. , Busbar mounting 1000 a.c.						
Total power loss (without fuse)	P_v	W	1Pole - 9W, 3Pole - 28W						
Power loss at 80% I_{th} (without fuse-links), **	P_v	W	1Pole - 6 W, 3Pole - 17,9 W						
Rated impulse withstand voltage	U_{imp}	kV	8						
Utilization category***			AC-23B	AC-22B	AC-21B	AC-20B	DC-22B	DC-22B	DC-20B
Rated conditional short-circuit current****		kA	120 (500 a.c.), 100 (690 a.c.), 35 (440 d.c.)						
Rated short-time withstand current	I_{cw}	kA	15/1s						
Fuse-links									
Size - DIN VDE 0636-2	-	-	2						
Max. permissible power loss per fuse-link	P_a	W	34						
Cable terminal									
Flat terminal-Screw			M10						
Tightening torque	Ma	Nm	30-35						
Clip terminal, Clamping cross-section		mm^2	0(SP KVL2) Round conductor: 25-185 Cu , Strip conductor: 10 x 16 x 0,8 Cu0						
Tightening torque	Ma	Nm	23,0						
Prism Clamp, Clamping cross-section		mm^2	0(SP KVL2 P1) 120-240 Al/Cu0						
Tightening torque	Ma	Nm	11						
Prism Clamp, Clamping cross-section		mm^2	(SP KVL2 P2); 2 x (120-150) Al/Cu						
Tightening torque	Ma	Nm	11						
Frame clamp, Clamping cross-section		mm^2	95-300 Al/Cu						
Torque	Ma	Nm	20						
Degree of Protection, front side device									
Front cover closed	-	-	IP20						
Front cover open	-	-	IP10						
With clamp- and lateral cover	-	-	IP2XC						
Operating condition									
Ambient temperature *****	T_{amb}	°C	-25 ... +55						
Operating condition	-	-	Continuous operation						
Mounting	-	-	vertical, horizontal						
Altitude	-	m	≤ 2000						
Pollution degree	-	-	3						
Overvoltage category	-	-	IV						
Endurance									
Mechanical cycles			1000						
Electrical cycles			200						

* Mounting of several units in low voltage switchgear-combinations, please think about rated diversity factors acc. to DIN EN 61439.
** Reference value for replacement of devices acc. to DIN EN 61439-1 clause 10.10.4.2.
*** minimum distance to earthed, conductive parts: Lateral: 20mm/Above: 50mm
**** Type tested with NH fuse-links characteristic gG
***** 35°C Normal temperature, at 55°C with reduced operating current
# 3-pole only

General characteristics

Size			3							
Technical Characteristics										
Rated operational voltage	U_e	V	400 a.c.	500 a.c.	690 a.c.	800 a.c.	1000 a.c.	250 d.c.	440 d.c.#	1000 d.c.
Rated operational current*	I_e	A	630	630	630	315	630	630	630	630
Conv. free air thermal current with fuse-links*	I_{th}	A	630							
Conv. free air thermal current with solid-links*	I_{th}	A	785							
Rated frequency	f	Hz	40-60							
Rated insulation voltage	U_i	V	Baseplate mounting 1000 a.c. , Busbar mounting 1000 a.c.							
Total power loss (without fuse)	P_v	W	1Pole - 17W, 3Pole - 51W							
Power loss at 80% I_{th} (without fuse-links), **	P_v	W	1Pole - 10,9 W, 3Pole - 32,6 W							
Rated impulse withstand voltage	U_{imp}	kV	8							
Utilization category***			AC-23B	AC-22B	AC-21B	AC-21B	AC-20B	DC-22B	DC-22B	DC-20B
Rated conditional short-circuit current****		kA	120 (500 a.c.), 100 (690 a.c.), 10 (800 a.c.), 35 (440 d.c.)							
Rated short-time withstand current	I_{cw}	kA	15/1s							
Fuse-links										
Size - DIN VDE 0636-2	-	-	3							
Max. permissible power loss per fuse-link	P_a	W	48							
Cable terminal										
Flat terminal-Screw			M10 / M12							
Tightening torque	Ma	Nm	30-35							
Clip terminal, Clamping cross-section		mm^2	(SP KVL3) Strip conductor: 11 x 21 x 1 Cu							
Tightening torque	Ma	Nm	23							
Prism Clamp, Clamping cross-section		mm^2	(SP KVL3 P1); 120-300 Al/Cu							
Tightening torque	Ma	Nm	11							
Prism Clamp, Clamping cross-section		mm^2	(SP KVL3 P2); 2 x (120-240) Al/Cu							
Tightening torque	Ma	Nm	11							
Frame clamp, Clamping cross-section		mm^2	95-300 Al/Cu							
Torque	Ma	Nm	20							
Degree of Protection, front side device										
Front cover closed	-	-	IP20							
Front cover open	-	-	IP10							
With clamp- and lateral cover	-	-	IP2XC							
Operating condition										
Ambient temperature *****	T_{amb}	°C	-25 ... +55							
Operating condition	-	-	Continuous operation							
Mounting	-	-	vertical, horizontal							
Altitude	-	m	≤ 2000							
Pollution degree	-	-	3							
Overvoltage category	-	-	IV							
Endurance										
Mechanical cycles			1000							
Electrical cycles			200							

* Mounting of several units in low voltage switchgear-combinations, please think about rated diversity factors acc. to DIN EN 61439.
** Reference value for replacement of devices acc. to DIN EN 61439-1 clause 10.10.4.2.
*** minimum distance to earthed, conductive parts: Lateral: 20mm/Above: 50mm
**** Type tested with NH fuse-links characteristic gG
***** 35°C Normal temperature, at 55°C with reduced operating current
# 3-pole only

3-pole, Baseplate mounting

Size	Code No.	Type	Weight [kg]	Packaging [pcs]
00	001690870	KVL-00 3p M8-M8	0,63	1
	001690871	KVL-00 3p BC95-BC95	0,67	1
1	001690872	KVL-1 3p M10-M10	2,03	1
3	001690874	KVL-3 3p M10-M10	3,95	1

BC95-BC95

3-pole, Baseplate mounting, LED indication

Size	Code No.	Type	Weight [kg]	Packaging [pcs]
00	001690880	KVL-00 3p M8-M8 LED	0,66	1
	001690881	KVL-00 3p BC95-BC95 LED	0,8	1
1	001690882	KVL-1 3p M10-M10 LED	2,06	1
3	001690884	KVL-3 3p M10-M10 LED	3,92	1

1-pole, Baseplate mounting

Size	Code No.	Type	Weight [kg]	Packaging [pcs]
00	001690890	KVL-00 1p M8-M8	0,31	2
1	001690891	KVL-1 1p M10-M10	0,93	1
3	001690892	KVL-3 1p M10-M10	1,57	1

2-pole, Baseplate mounting

Size	Code No.	Type	Weight [kg]	Packaging [pcs]
00	001690895	KVL-00 2p M8-M8	0,72	1
1	001690896	KVL-1 2p M10-M10	1,88	1
3	001690897	KVL-3 2p M10-M10	3,19	1

4-pole, Baseplate mounting

Size	Code No.	Type	Weight [kg]	Packaging [pcs]
00	001690900	KVL-00 4p M8-M8	1,19	1
1	001690901	KVL-1 4p M10-M10	2,91	1
3	001690902	KVL-3 4p M10-M10	5,76	1

Accessories

Type	Code No.	Description	Packaging [pcs]
SP KVL00	001692701	Clip terminal, 1,5 – 70 mm2 Cu	set=3
SP KVL1	001692702	Clip terminal, 25– 150 mm2 Cu	set=3
SP KVL2	001692703	Clip terminal, 25– 240 mm2 Cu	set=3
SP KVL3	001692704	Clip terminal, 11x21 mm2 Cu	set=3
SP KVL00 P1	001692760	Prism clamp, 10 – 70 mm2 Al/Cu	set=3
SP KVL1 P1	001692761	Prism clamp, 70 – 150 mm2 Al/Cu	set=3
SP KVL2 P1	001692762	Prism clamp, 120 – 240 mm2 Al/Cu	set=3
SP KVL3 P1	001692763	Prism clamp, 120 – 300 mm2 Al/Cu	set=3
SP KVL1 P2	001692764	Prism clamp for 2-conductors connection, 2x70 – 95 mm2 Al/Cu	set=3
SP KVL2 P2	001692765	Prism clamp for 2-conductors connection, 2x120 – 150 mm2 Al/Cu	set=3
SP KVL3 P2	001692766	Prism clamp for 2-conductors connection, 2x120 – 240 mm2 Al/Cu	set=3
SP KVL-1 V	001690940	Frame clamp, 35-150mm^2 Al/Cu	set=3
SP KVL-23 V	001690941	Frame clamp, 95-300mm^2 Al/Cu	set=3
SP KVL-00 FC95	001690942	Feeding clamp, 25-95mm^2 Cu/Al, isolated, terminal M8,*	set=3
IZ2 KVL-00 3p	001690943	Phase busbars, 2 x 3pole KVL-00 50mm^2	5
IZ3 KVL-00 3p	001690944	Phase busbars, 3 x 3pole KVL-00 50mm^2	5
IZ4 KVL-00 3p	001690945	Phase busbars, 4 x 3pole KVL-00 50mm^2	3
IZ5 KVL-00 3p	001690946	Phase busbars, 5 x 3pole KVL-00 50mm^2	3
MST KVL-00 1p	001690947	Switch position indicator, 1-pole, size 00, **	1
MST KVL-00 3p	001690948	Switch position indicator, 3-pole, size 00, **	1
MST KVL-123 1p/2p/3p	001690949	Switch position indicator, 1/2/3 -pole, size 1, 2, 3, **	1
MFM KVL-00 1p/2p/3p	001690950	Mechanical fuse monitor, size 00, **	3
MFM KVL-123 1p/2p/3p	001690951	Mechanical fuse monitor, size 1, 2, 3, **, ***	3
PRS KVL-00 3p L	001690952	Terminal cover, 3-pole, variable to open, Length 66mm, size 00	2
PRS KVL-00 3p S	001690953	Terminal cover, 3-pole, variable to open, Length 36mm, size 00	2
PRS KVL-1 3p	001690954	Terminal cover, 3-pole, variable to open, Length 42mm, size 1	2
PRS KVL-2 3p	001690955	Terminal cover, 3-pole, variable to open, Length 42mm, size 2	2
PRS KVL-3 3p	001690956	Terminal cover, 3-pole, variable to open, Length 42mm, size 3	2
PRS KVL-00 1p L	001690957	Terminal cover, 1-pole, variable to open, Length 66mm, size 00	2
PRS KVL-00 1p S	001690958	Terminal cover, 1-pole, variable to open, Length 36mm, size 00	2
PRS KVL-1 1p	001690959	Terminal cover, 1-pole, variable to open, Length 42mm, size 1	2
PRS KVL-3 1p	001690960	Terminal cover, 1-pole, variable to open, Length 42mm, size 3	2
DIN KVL-00 100-150	001690964	DIN rail fixing parts, For mounting on DIN rails, size 00	1
DIN KVL-1 100-150	001690965	DIN rail fixing parts, For mounting on DIN rails, size 1	1
EFMU KVL-00 3p	001690966	Electronic fuse monitoring unit, 3-pole, size 00, ****	1
EFMU KVL-1 3p	001690967	Electronic fuse monitoring unit, 3-pole, size 1, ****	1
EFMU KVL-2 3p	001690968	Electronic fuse monitoring unit, 3-pole, size 2, ****	1
EFMU KVL-3 3p	001690969	Electronic fuse monitoring unit, 3-pole, size 3, ****	1
MPFMU KVL-00 3p	001690974	Elektromechanical fuse monitoring unit (AM), 3-pole, size 00, ****	1
MPFMU KVL-1 3p	001690975	Elektromechanical fuse monitoring unit (AM), 3-pole, size 1, ****	1
MPFMU KVL-2 3p	001690976	Elektromechanical fuse monitoring unit (AM), 3-pole, size 2, ****	1
MPFMU KVL-3 3p	001690977	Elektromechanical fuse monitoring unit (AM), 3-pole, size 3, ****	1
CK KVL-00 2p/4p	001690970	Connecting kit 2- and 4-pole, For making of 2- and 4-pole disconnectors, size 00	1
CK KVL-123 2p/4p	001690971	Connecting kit 2- and 4-pole, For making of 2- and 4-pole disconnectors, size 1, 2, 3	1
LP KVL-00123	001690972	Interlock device, locking with padlock, diameter 6mm max., size 00, 1, 2, 3	10
IC KVL-00123	001690973	Contact cover interlock, only be operated by tool, size 00-3	10

* Feeding clamp, AC690V/DC1000V-250A
** 1 Changeover, AC250V, 10/3A (ohmic/ind.)
*** Only in combination with ETI fuse-links with striker-pin; not in combination with frame-clamp or 2-wire-prism clamp.
**** For monitoring of fuse-links with live gripping lugs


SP KVL

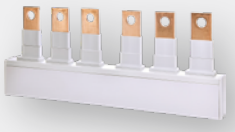

SP KVL...P1

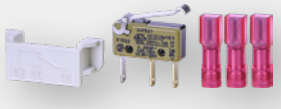

DIN KVL-00 100-150


SP KVL-1 V


SP KVL-23 V

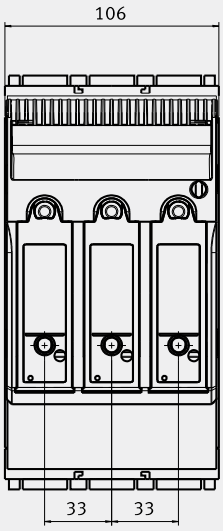

SP KVL-00 FC95

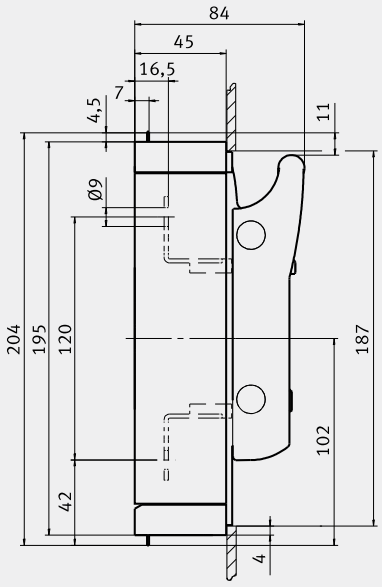

IZ2 KVL-00 3p


MST KVL- ...

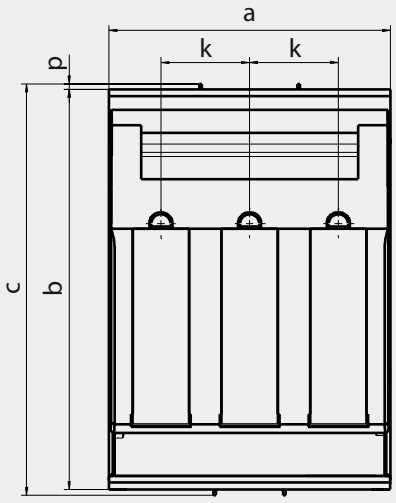

MFM KVL-123 1p 2p 3p

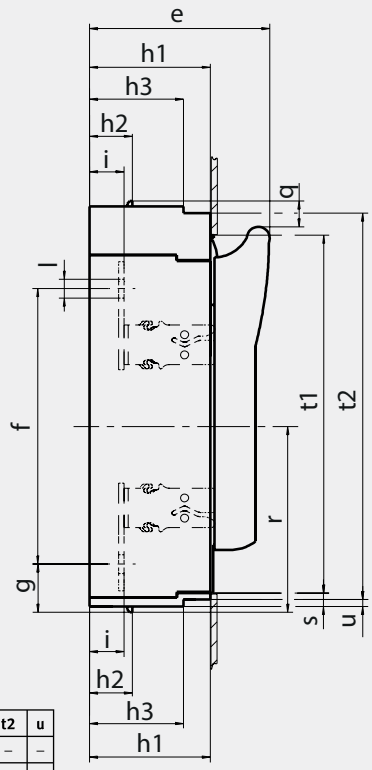

PRS KVL-... 3p





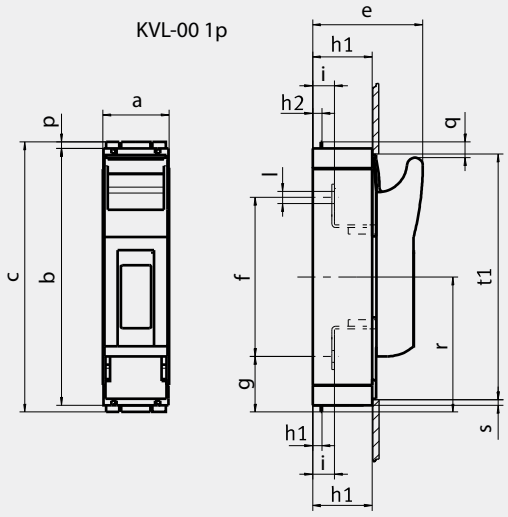
KVL-00 3p M8-M8
KVL-00 3p BC95-BC95
KVL-00 3p M8-M8 LED
KVL-00 3p BC95-BC95 LED



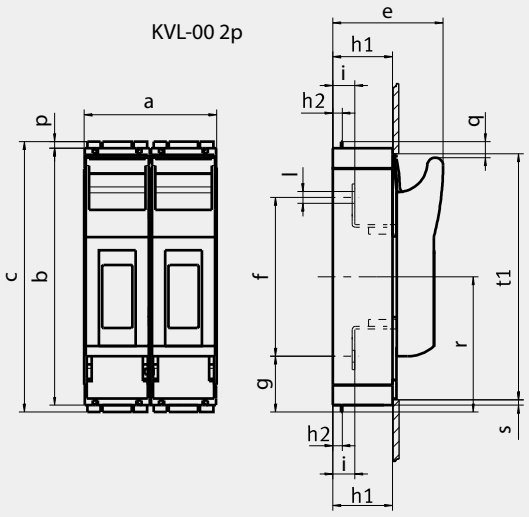


	a	b	c	e	f	g	h1	h2	h3	i	k	l	p	q	r	s	t1	t2	u
KVL-1 3p M10-M10 (LED)	184	298	306	117	185	46	70	32	–	25	58	Ø10,5	4	19	138	5	272	–	–
KVL-2 3p M10-M10 (LED)	210	298	306	134	205	36	90	32	70	26	66	Ø14	4	19	138	10	268	288	5
KVL-3 3p M10-M10 (LED)	250	298	306	143	205	36	90	32	70	26	82	Ø14	4	19	138	10	268	288	5

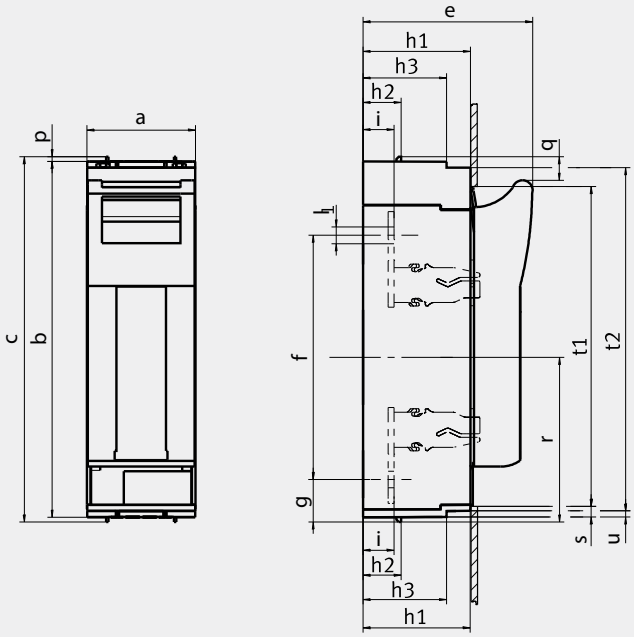
KVL-00 1p



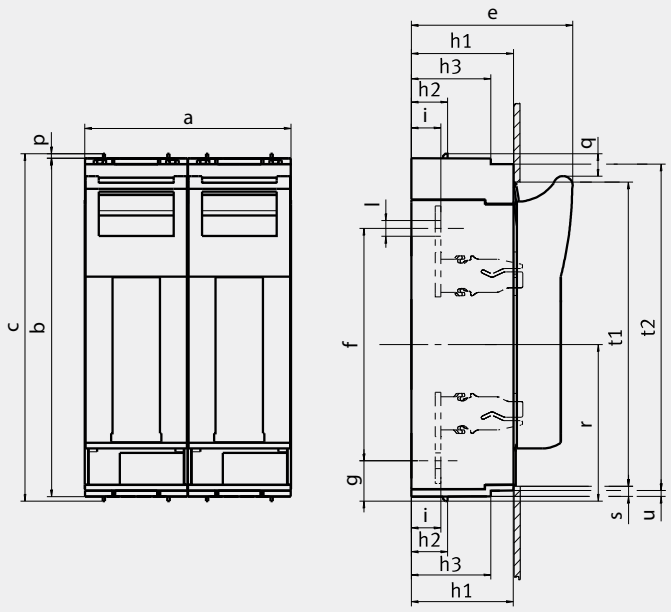
KVL-00 2p



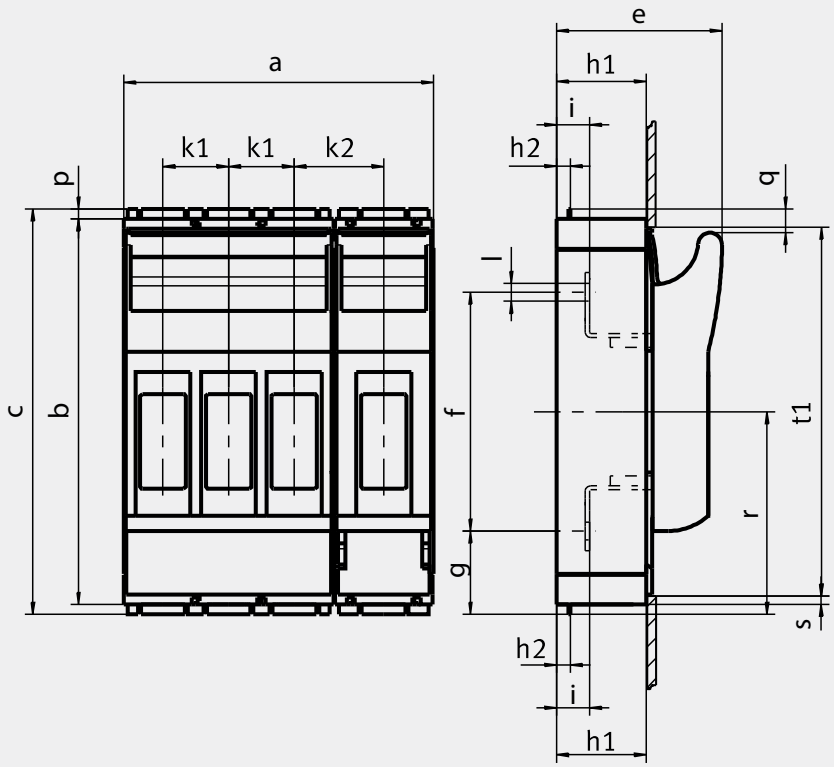
	a	b	c	e	f	g	h1	h2	h3	i	l	p	q	r	s	t1
KVL-00 1p M8-M8	50	195	204	84	120	42	45	7	–	16,5	Ø9	4,5	12	102	5	187
KVL-00 2p M8-M8	100	195	204	84	120	42	45	7	–	16,5	Ø9	4,5	12	102	5	187

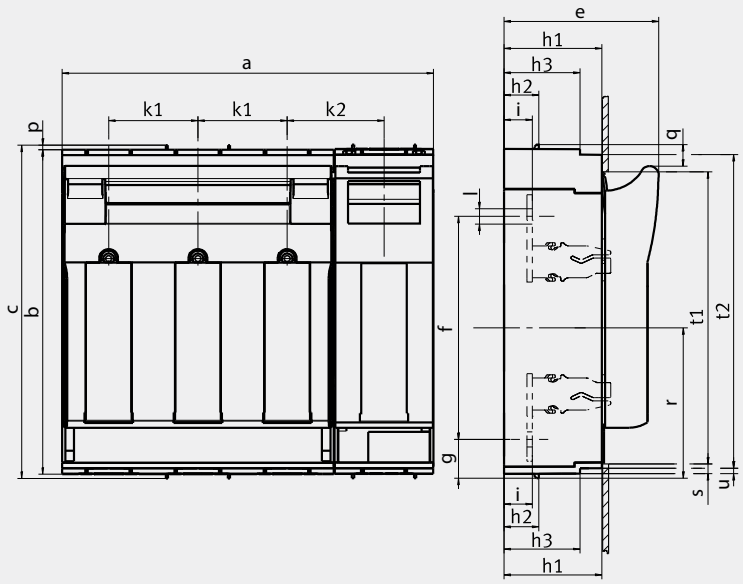


	a	b	c	e	f	g	h1	h2	h3	i	l	p	q	r	s	t1	t2	u
KVL-1 1p M10-M10	69	298	306	117	185	46	70	32	–	25	Ø10,5	4	19	138	5	272	–	–
KVL-3 1p M10-M10	91	298	306	143	205	36	90	32	70	26	Ø14	4	19	138	10	268	288	5



	a	b	c	e	f	g	h1	h2	h3	i	l	p	q	r	s	t1	t2	u
KVL-1 2p M10-M10	138	298	306	117	185	46	70	32	–	25	Ø10,5	4	19	138	5	272	–	–
KVL-3 2p M10-M10	182	298	306	143	205	36	90	32	70	26	Ø14	4	19	138	10	268	288	5



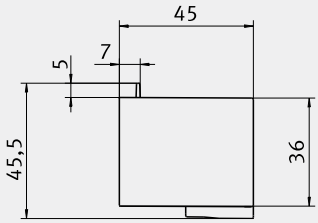


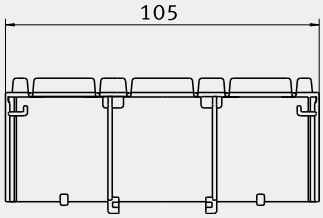
	a	b	c	e	f	g	h1	h2	h3	k1	k2	i	l	p	q	r	s	t1	t2	u
KVL-1 4p	254	298	306	117	185	46	70	32	–	58	69	25	Ø10,5	4	19	138	5	272	–	–
KVL-3 4p	341,5	298	306	143	205	36	90	32	70	82	89	26	Ø14	4	19	138	10	268	288	5

Technical data - Feeding clamps			
Technical Characteristics			
Max. electrical load			690V a.c. / 1000V d.c. -250A
Heat deflection temp.			125°C UL94: V0
Comparative tracking index			600
Cross sections			
Conductor - Max. Diameter Ø14 mm			
single wire		mm^2	25 - 95
multi wire		mm^2	25 - 95
fine wire (with end sleeve)		mm^2	25 - 70
Torque	Ma	Nm	13
Degree of protection			IP20
Regulations			EN 60998-1:2004; EN 60998-2:2004; EN 60999-1:2000; EN 60999-2:2003

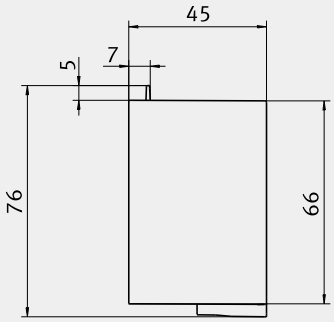
Important
This Terminal is suitable for Al and Cu conductors. Please pay attention to the common handling guidelines when connecting the Aluminium conductors. Clean and brush the contact surfaces and lubricate them with an appropriate grease.

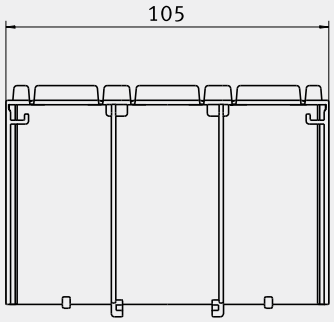
Technical data - Phase busbars			
Technical Characteristics			
		mm^2	50
Impulse voltage strenght		kV	≥8,5
Min. air distance		mm	>8
Min. creeping distance		mm	>9
Max. operating voltage		V	AC690
Protection class			IP20
Short circuit rating			I_{PK}=25kA/0,1s, Surge energy capacity I_{PK}, I_{CC} 100kA - NH3 355A gG 500V
Dielectric strenght	kV/mm		≥32
Capacity at 35°C ambient temperature depending of feeding point cross section		mm^2	50
Busbar lenght		mm	Max. 300
Feeding at beginning/ending			
Max. current Is /Phase		A	250
Connection cross current		mm^2	95
Other feedings			
Max. feeding current Ie /Phase		A	250
Connection cross current		mm^2	95
Insulation coordination			III / 2
Regulations			IEC 60947-1:2007

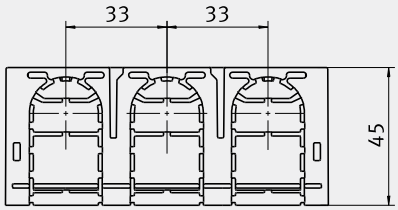


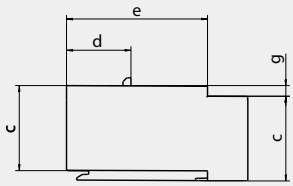


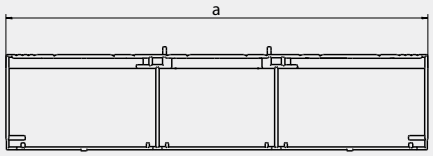
PRS KVL-00 3p S
PRS KVL-00 3p L



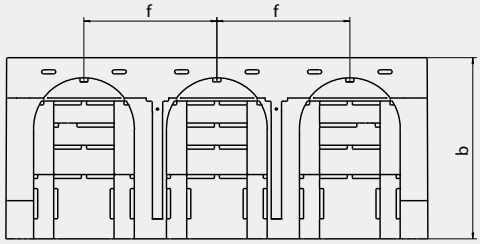




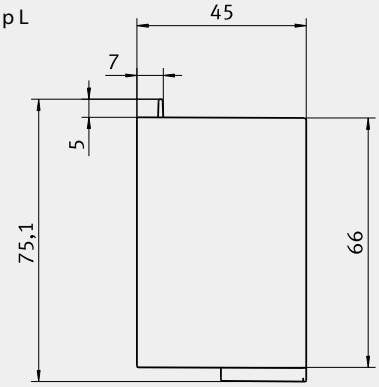


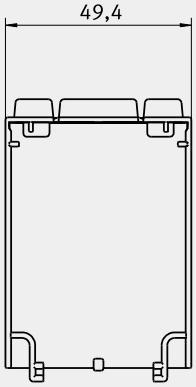


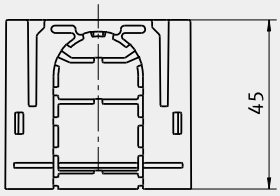
	a	b	c	d	e	f	g
PRS KVL-1 3p	184	70	42	32	–	58	–
PRS KVL-2 3p	210	90	42	32	70	66	5
PRS KVL-3 3p	250	90	42	32	70	82	5



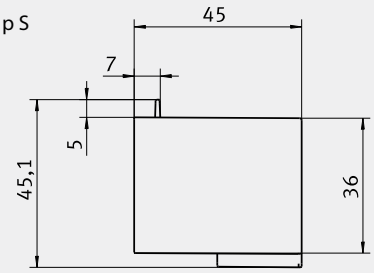
PRS KVL-00 1p L

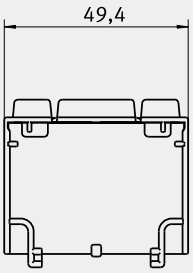


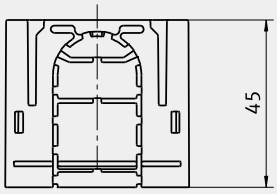




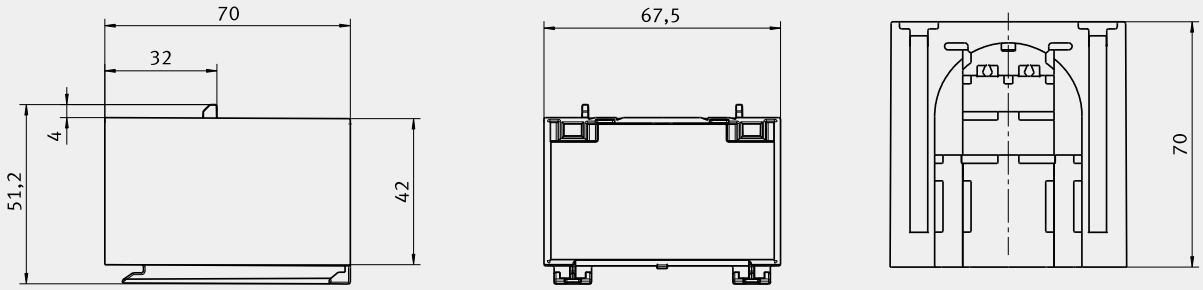
PRS KVL-00 1p S



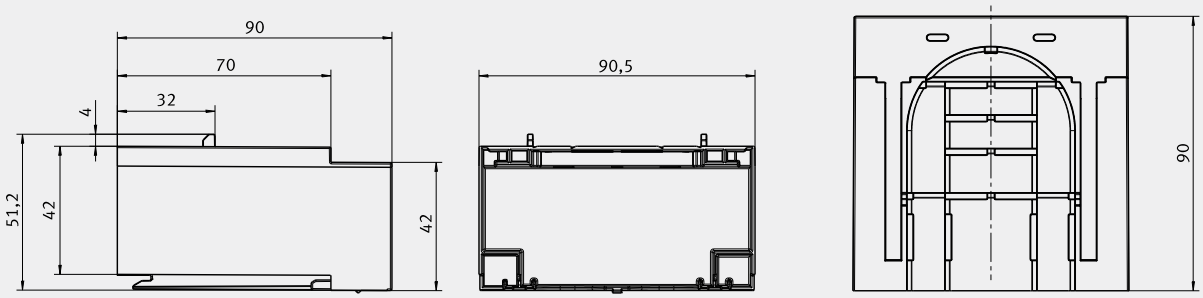




PRS KVL-1 1p



PRS KVL-3 1p

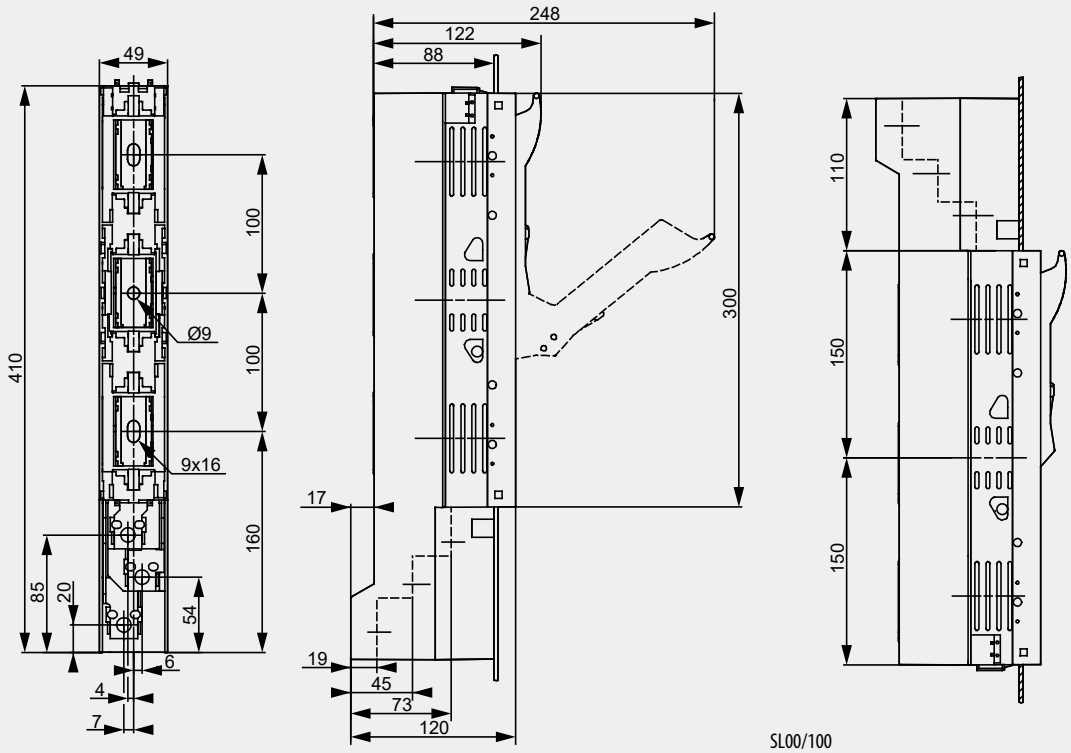


Fuse-switch disconnector type SL 800V

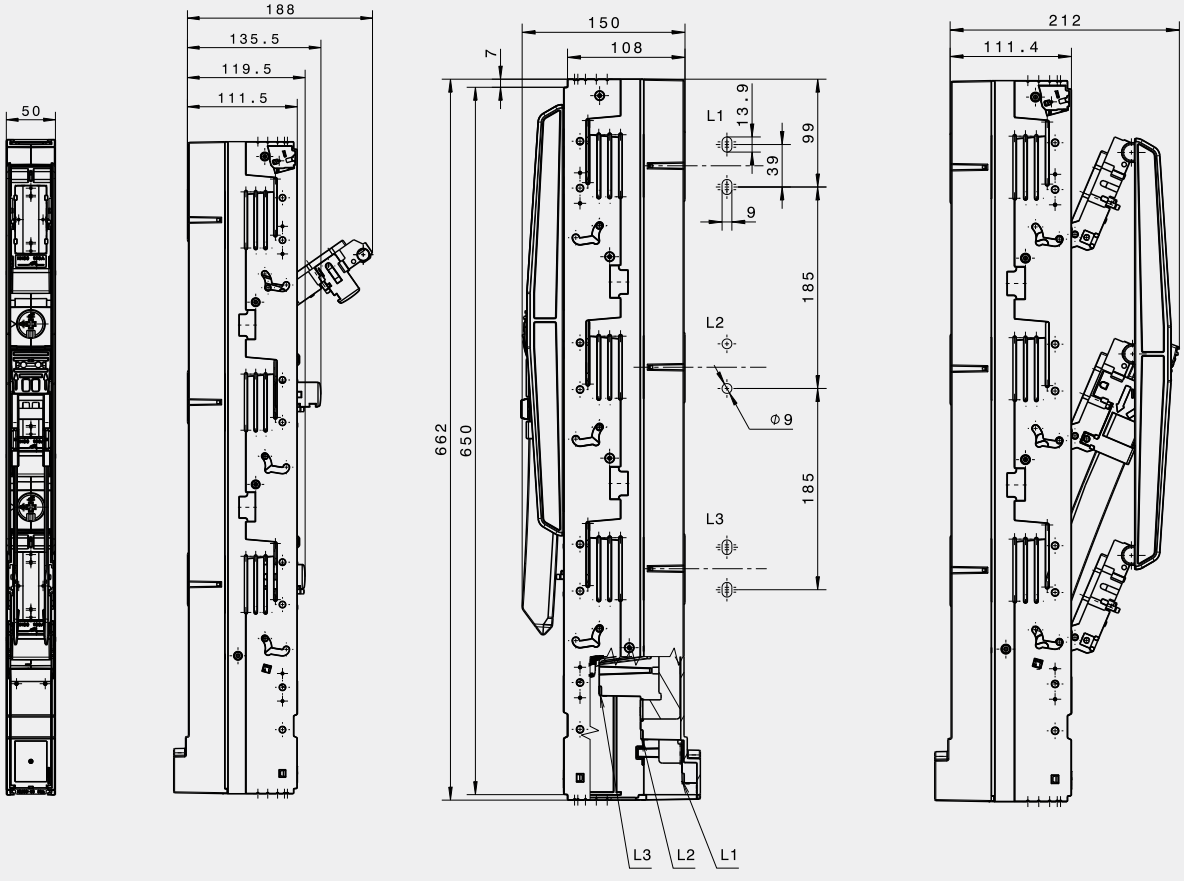
General characteristics						
Size			SL00/100	SL00/185	SL1	SL3
Technical Characteristics						
Rated operational voltage	U_e	V	800 a.c.	800 a.c.	800 a.c.	800 a.c.
Rated operational current	I_e	A	160	160	250	630
Rated frequency	f	Hz	40-60	40-60	40-60	40-60
Rated insulation voltage	U_i	V	800 a.c.	800 a.c.	1000 a.c.	1000 a.c.
Total power loss at I_{th} (without fuse)	P_v	W	18	23	23	115
Utilisation category			AC-21B (160A/800V)	AC-21B (160A/800V)	AC-21B (250A/800V)	AC-21B (315A/800V)
Fuse-links						
Size - DIN 43620, IEC 60269-2	-	-	000/00		1	3
Max. permissible power loss per fuse-link	P_a	W	12		32	48
Dimensions						
Mass	-	kg	100mm=0,85	185mm=1,79	4,66	5,48
Bubars (distance)	-	mm	100	185	185	185
Cable connection						
Screw			M8		M10	M12
Protection						
Operational state	-	-	IP30		IP30	IP30
Cover open	-	-	IP10		IP10	IP10
Operating condition						
Ambient temperature	T_{amb}	°C	-25 ... +55		-25 ... +55	-25 ... +55
Operating condition	-	-	Continuous operation			
Mounting	-	-	vertical, horizontal			
Altitude	-	m	≤ 2000			
Pollution degree	-	-	3			
Overvoltage category	-	-	III	III	III	III

SL 800V

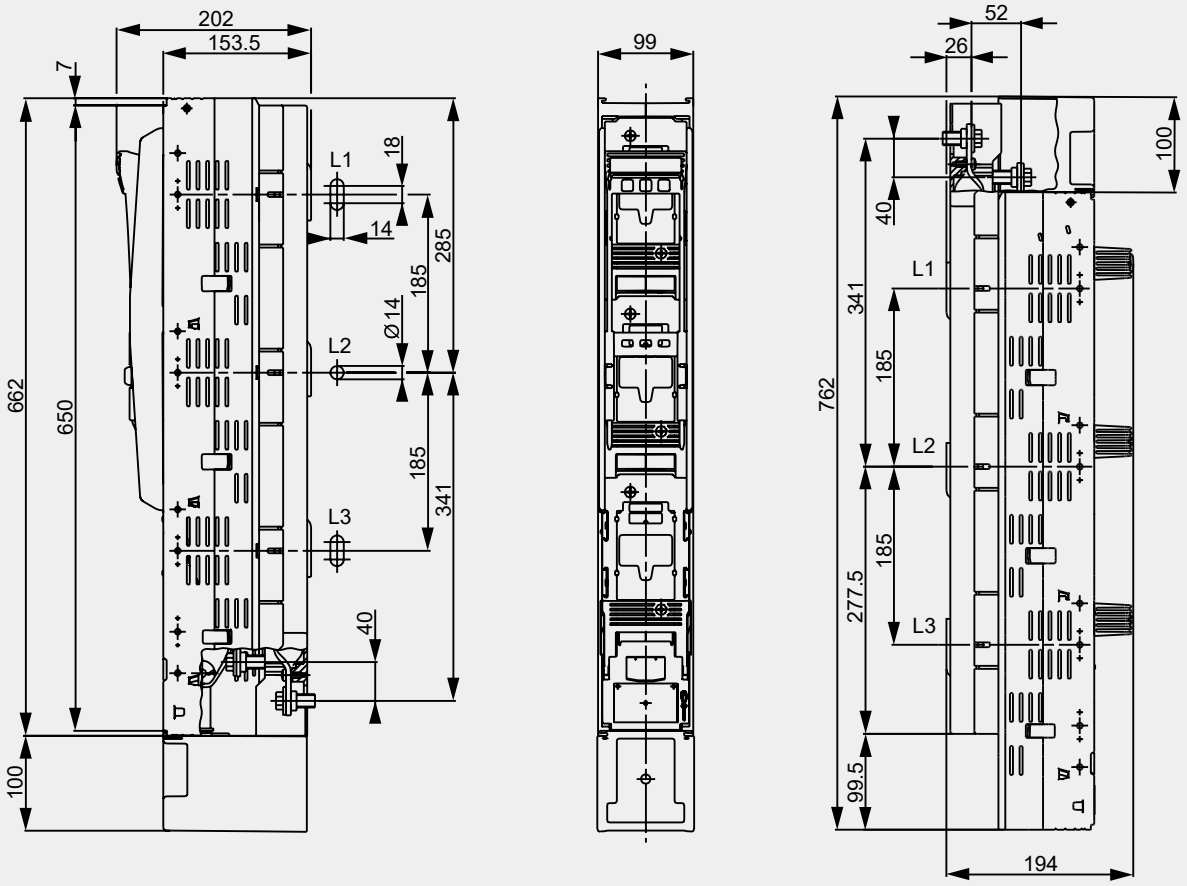
Size	Code No.	Busbar system	Type	Connection description	Weight [kg]	Packaging [pcs]
00	001690860	100	SL00/100 3P M8 800AC	flat connection – screw M8	0,85	1
	001690861	185	SL00 3P M8 800AC	flat connection – screw M8	1,79	1
1	001690862	185	SL1 3P M10 800AC	flat connection – screw M10	4,66	1
3	001690863	185	SL3 3P M12 800AC	flat connection – screw M12	5,48	1



SL00/100



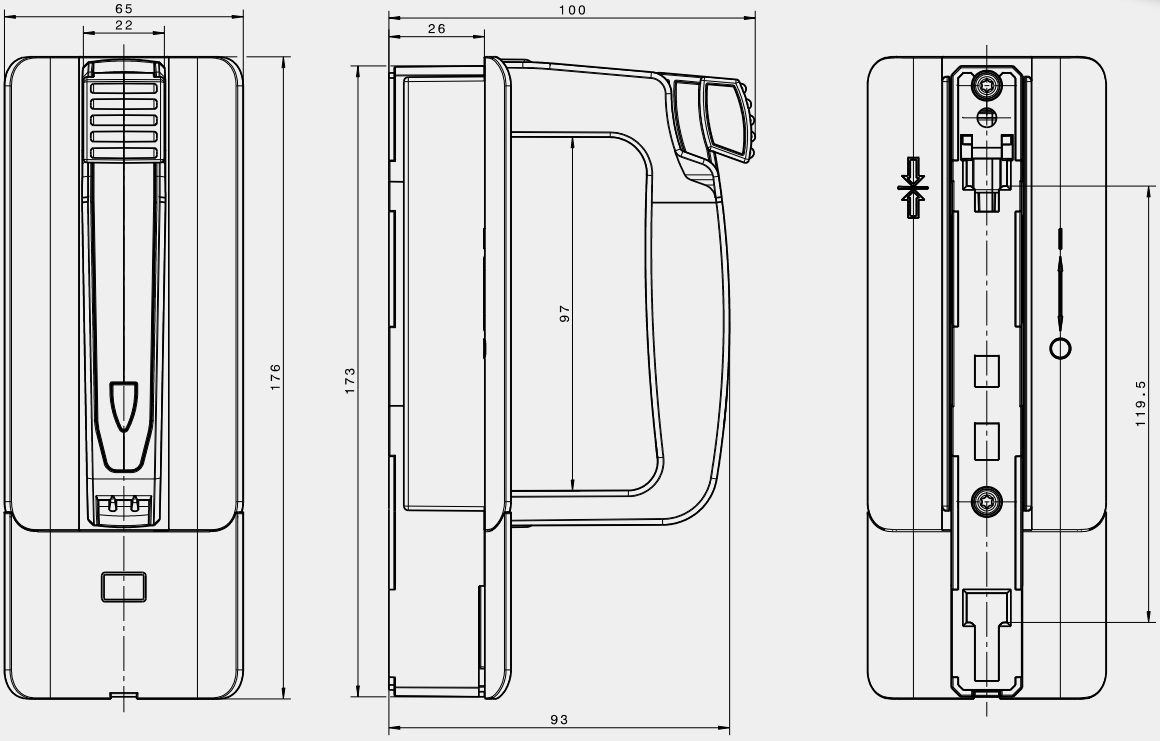
SL00/185


202
153.5
7
L1
18
14
285
185
Ø14
L2
185
341
L3
40
662
650
100
99
52
26
100
40
341
185
L1
762
185
L2
277.5
185
L3
99.5
194

SL1, SL3

NH handle

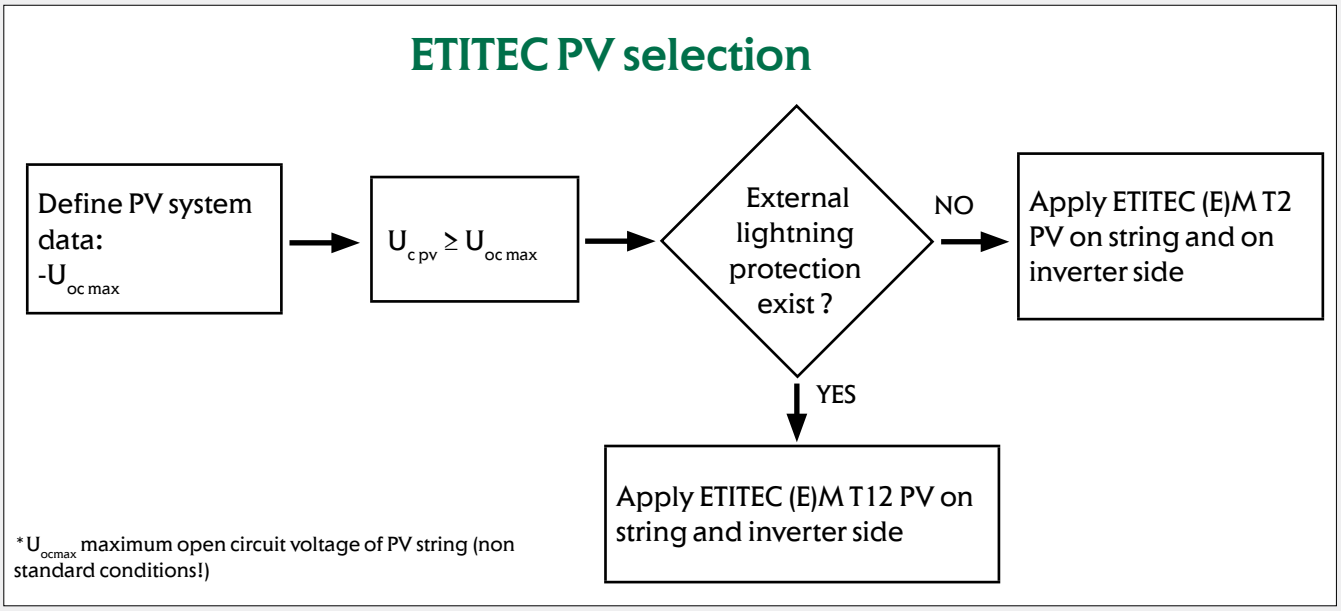
NH handle for fuse-link DC 1100V and DC 1500V			
Code	Type	Weight [g]	Packaging [pcs]
001691062	GPN 1500	590	1



OVERVOLTAGE PROTECTION FOR PV SYSTEMS

ETITEC - Lightning and Surge Arresters

Overvoltage protection selection



ETITEC (E)M T12 PV ..... Y series of overvoltage surge protective devices has been developed to protect against direct and indirect discharges and is intended to protect photovoltaic systems.
The circuit topology consist of three varistors stages each protected by a thermal disconnection device.

Advantages:

- optical indication of faulty device (green ok, red false)
- remote signalisation (RC version only)
- DIN rail mounting (EN 60715)
- high discharge currents and high degree of protection
- MOV varistor is the protective element
- metal snapper, new way of mounting on DIN rail (easier, quicker)
- modular design
- RoHS compliant
- connection up to 35mm^2

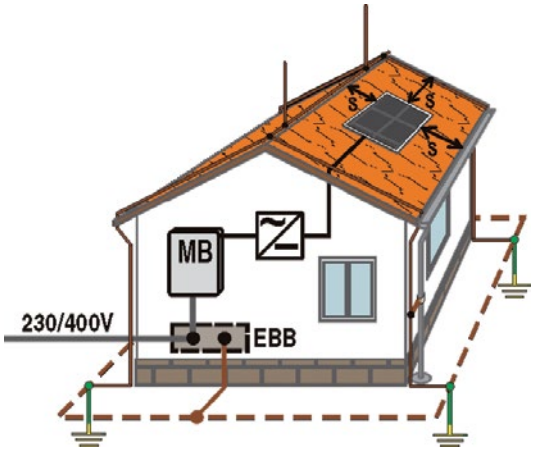
Suitable for green field installations (IEC/EN 61643-32)

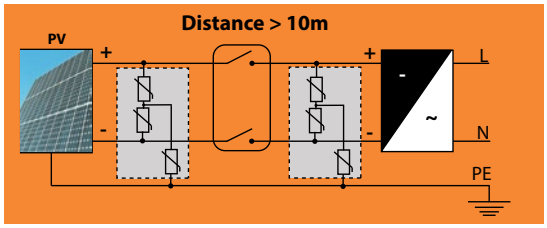
ETITEC M T12 PV
Location of Use: String box, Inverter
Mode of Protection:(+) - PE, (-) - PE, (+) - (-)
Surge Ratings: I_{Total} =up to 12.5 kA (10/350 µs) I_{Total} =up to 60 kA (8/20 µs)
EN Category: Type 1+2
Protective Elements: High Energy MOV
Housing: Pluggable Design
Compliance: IEC 61643-31:2018+A1:2014

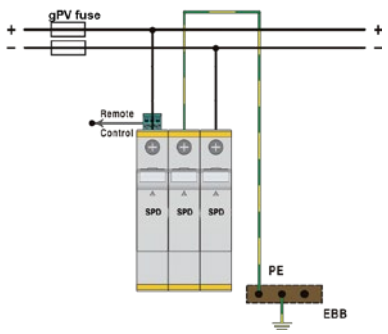
Suitable for roof installations (IEC/EN 61643-32)

ETITEC EM T12 PV
Location of Use: String box, Inverter
Mode of Protection:(+) - PE, (-) - PE, (+) - (-)
Surge Ratings: I_{Total} =up to 6.25 kA (10/350 µs) I_{Total} =up to 65 kA (8/20 µs)
EN Category: Type 1, Type 2
Protective Elements: High Energy MOV
Housing: Pluggable Design
Compliance: IEC 61643-31:2018+A1:2014

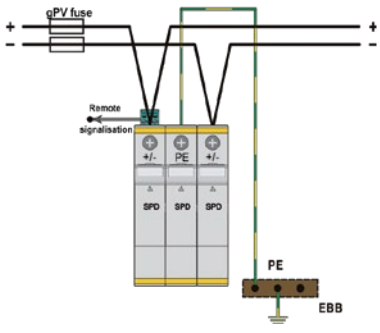
ETITEC (E)M T12 PV ..... Y for photovoltaic system on a building with External Lightning Protection







T connection



V connection

Note: If distance between string and inverter is less than 10 m, then you need only one ETITEC.

ETITEC M T12 PV

Type	Code No.	Max PV voltage U_{cpv} [V DC]	I_{scpv} [kA]	I_{total} (10/350) [kA]	I_{imp} [kA]	I_n [kA]	Weight [g]	Packaging [pcs]
ETITEC M T12 PV 1100/12,5 Y	002440511	1100	11	12,5	6,25	20	453	1/5
ETITEC M T12 PV 1100/12,5 Y RC	002440512	1100	11	12,5	6,25	20	462	1/5
ETITEC M T12 PV 1500/12,5 Y	002440513	1500	30	12,5	6,25	20	488	1/5
ETITEC M T12 PV 1500/12,5 Y RC	002440514	1500	30	12,5	6,25	20	497	1/5

*RC - remote contact for remote signalisation of bad module (to be replaced)

Spare (replacement) modules

Type	Code No.	Compatible with	Weight [g]	Packaging [pcs]
MOD. M T12 PV 550/12,5	002440519	ETITEC M T12 PV 1100/12,5 Y (RC)	71	1/28
MOD. M T12 PV 550/6,25*	002440520	ETITEC M T12 PV 1100/12,5 Y (RC)	127	1/28
MOD. M T12 PV 750/10	002440521	ETITEC M T12 PV 1500/10 Y (RC)	87	1/28
MOD. M T12 PV 750/5*	002440522	ETITEC M T12 PV 1500/10 Y (RC)	130	1/28

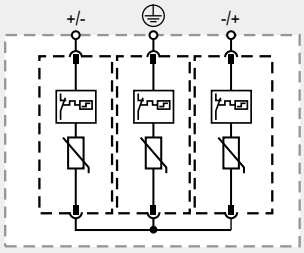
*left or right module (Y connection)

Due to serial connection of modules (Y topology), U_{cpv} voltage of single module is 1/2 of total U_{cpv} between each pole

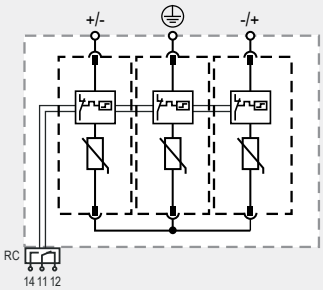
Technical data

Type	ETITEC M T12 PV 1100/12,5 Y	ETITEC M T12 PV 1500/12,5 Y
	T1,T2 / I,II / B,C	
Maximum Continuous Operating DC Voltage UCPV	1100 V	1500V
Nominal Discharge Current (8/20 µs) In	20 kA	20 kA
Total Discharge Current (8/20 µs) ITotal	50 kA	60 kA
Impulse Discharge Current (10/350)	6,25 kA	5 kA
Total Discharge Current (10/350 µs) ITotal	12,5 kA	10 kA
Specific Energy W/R	9,77 kJ/Ω	9,77 kJ/Ω
Charge	3,125 As	2,5 As
Voltage Protection Level Up	< 3,8 kV	< 5 kV
Response Time tA	< 25 ns	
Number of Ports	1	
Thermal Protection	✓	
Short-Circuit Current Rating SCCR ISCPV	11 kA	
Operating Temperature Range Ta	- 40°C ... +85°C	
Permissible Operating Humidity RH	5% - 95%	
Altitude (max)	4000 m	
Operating State / Fault Indication	Green Flag / Not Green Flag	
Conductor Cross Section (max)	35 mm2 (Solid, Stranded) / 25 mm2 (Flexible)	
Terminal Screw Torque Mmax	max. 4,5 Nm	
Mounting	35 mm DIN Rail, EN 60715	
Degree Of Protection	IP20	
Housing Material	Thermoplastic: Extinguishing Degree UL 94 V-0	
Size	3 modułes	
Remote contacts - type ...RC		
Contacts ratings	AC: 250V/1A; 125V/1A; DC: 48V/0,5A, 24V/0,5A, 12V/0,5A	
Terminal cross section	Max. 1,5 mm²	
Terminal Screw Torque Mmax	0,25 Nm	
Standards	IEC 61643-31:2018+A1:2014	

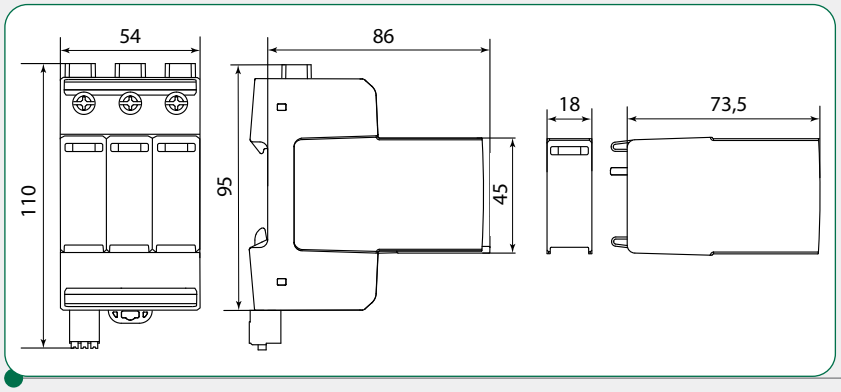
ETITEC M T12 PV 1500/12,5 Y



ETITEC M T12 PV .... Y



ETITEC M T12 PV .... Y RC



Overvoltage protection

ETITEC EM T12 PV

Type	Code No.	Max PV voltage U_{cpv} [V DC]	I_{scpv} [kA]	I_{total} (10/350) [kA]	I_{imp} [kA]	I_n [kA]	Weight [g]	Packaging [pcs]
ETITEC EM T12 PV 1100/6,25 Y	002440580	1100	11	6,25	6,25	20	397	1/5
ETITEC EM T12 PV 1100/6,25 Y RC	002440581	1100	11	6,25	6,25	20	406	1/5
ETITEC EM T12 PV 1500/5 Y	002440582	1500	11	5	5	20	488	1/5
ETITEC EM T12 PV 1500/5 Y RC	002440583	1500	11	5	5	20	497	1/5

*RC - remote contact for remote signalisation of bad module (to be replaced)

Spare (replacement) modules

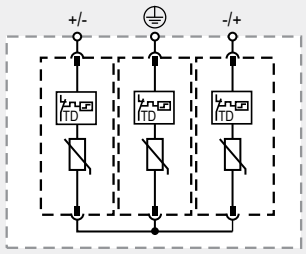
Type	Code No.	Compatible with	Weight [g]	Packaging [pcs]
MOD. EM T12 PV 550/6,25	002440584	ETITEC EM T12 PV 1100/6,25 Y (RC)	79	1/28
MOD. EM T12 PV 750/5	002440585	ETITEC EM T12 PV 1500/5 Y (RC)	87	1/28

Due to serial connection of modules (Y topology), U_{cpv} voltage of single module is 1/2 of total U_{cpv} between each pole

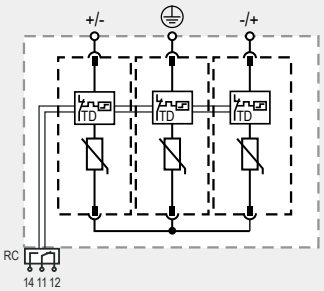
Technical data

Type	ETITEC EM T12 PV 1100/6,25 Y (RC)	ETITEC EM T12 PV 1500/5 Y (RC)
	T1,T2 / I,II / B,C/1CA	
Maximum Continuous Operating DC Voltage UCPV	1100 V	1500V
Nominal Discharge Current (8/20 µs) In	20 kA	20 kA
Total Discharge Current (8/20 µs) ITotal	65 kA	50 kA
Impulse Discharge Current (10/350)	6,25 kA	5 kA
Total Discharge Current (10/350 µs) ITotal	6,25 kA	5 kA
Specific Energy W/R	9,77 kJ/Ω	6,25 kJ/Ω
Charge	3,125 As	2,5 As
Maximum Discharge Current (8/20 µs) Imax	40 kA	30 kA
Voltage Protection Level Up	3,8 kV	5 kV
Response Time tA	< 25 ns	
Number of Ports	1	
Thermal Protection	✓	
Short-Circuit Current Rating SCCR ISCPV	11 kA	
Maximum Permitted DC Voltage Vpvdc	1100 V	1500 V
Voltage Protection Rating VPR	2500 V	4000 V
Nominal Discharge Current (8/20 µs) In In	20 kA	20 kA
Short-Circuit Current Rating SCCR ISCPV	50 kA	65 kA
Operating Temperature Range Ta	- 40°C ... +85°C	
Permissible Operating Humidity RH	5% - 95%	
Altitude (max)	4000 m	
Operating State / Fault Indication	Green Flag / Not Green Flag	
Conductor Cross Section (max)	35 mm² (Solid, Stranded) / 25 mm² (Flexible)	
Terminal Screw Torque Mmax	max. 4,5 Nm	
Mounting	35 mm DIN Rail, EN 60715	
Degree Of Protection	IP20	
Housing Material	Thermoplastic: Extinguishing Degree UL 94 V-0	
Size	3 modułes	
Remote contacts - type ...RC		
Contacts ratings	AC: 250V/1A; 125V/1A; DC: 48V/0,5A, 24V/0,5A, 12V/0,5A	
Terminal cross section	Max. 1,5 mm²	
Terminal Screw Torque Mmax	0,25 Nm	
Standards	IEC 61643-31:2018+A1:2014	

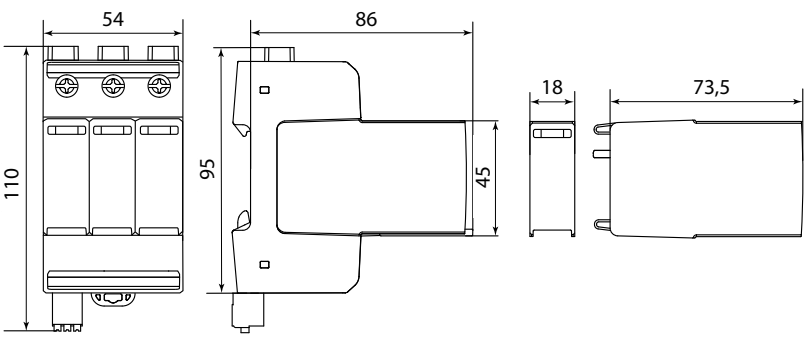
ETITEC EM T12 PV 1100/6,25 Y RC



ETITEC EM T12 PV .... Y



ETITEC EM T12 PV .... Y RC



NEW! acc. to IEC 61643-31:2018

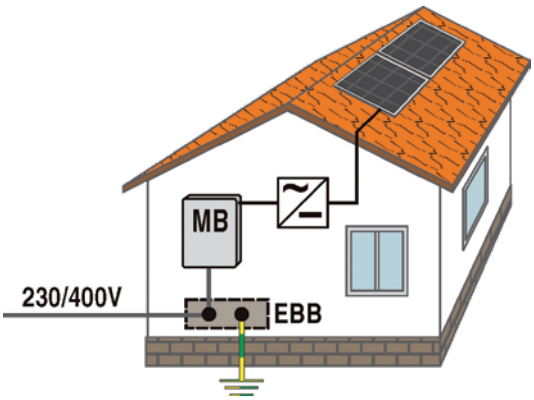
ETITEC (E)M T2 PV ..... Y series of overvoltage surge protective devices has been developed to protect against indirect discharges and is intended to protect photovoltaic systems.
The circuit topology consist of two (three) varistors stages each protected by a thermal disconnection device.

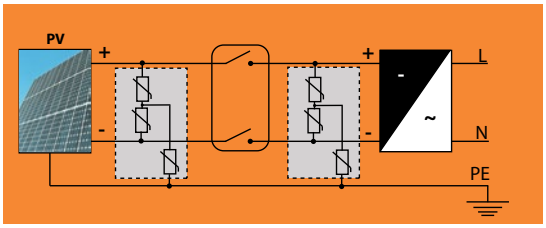
Location of Use: String box, Inverter
Mode of Protection:(+) - PE, (-) - PE, (+) - (-)
Surge Ratings: I_{Total} =up to 20 kA (8/20 µs)
I_{Total} =up to 50 kA (8/20 µs)
EN Category: Type 2
Protective Elements: High Energy MOV
Housing: Pluggable Design
Compliance: IEC 61643-31:2018+A1:2014

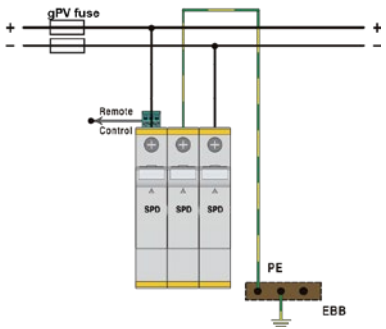
Advantages:

- optical indication of faulty device (green ok, red false)
- remote signalisation (RC version only)
- DIN rail mounting (EN 60715)
- high discharge currents and high degree of protection
- MOV varistor is the protective element
- metal snapper, new way of mounting on DINrail (easier, quicker)
- modular design
- IEC 61643-31:2018
- RoHS compliant
- connection up to 35mm2

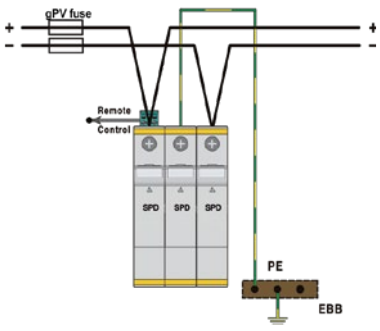
ETITEC (E)M T2 PV ..... Y for photovoltaic system on a building without External Lightning Protection







T connection



V connection

Note: If distance between string and inverter is less than 10 m, then you need only one ETITEC.

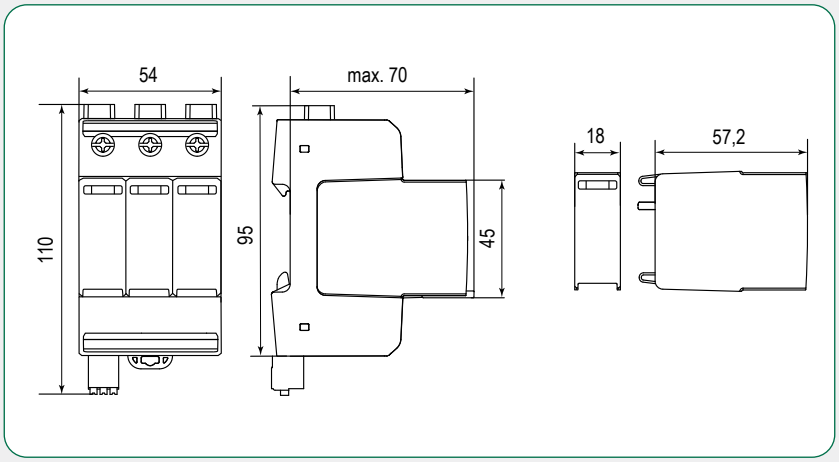
ETITEC M T2 PV						
Type	Code No.	Max PV voltage U_{cpv} [V DC]	I_{scpv} [kA]	I_n/I_{max} [kA]	Weight [g]	Packaging [pcs]
ETITEC M T2 PV 250/20 Y	002440732	250	11	20/50	294	1/5
ETITEC M T2 PV 250/20 Y RC	002440733	250	11	20/50	300	1/5
ETITEC M T2 PV 600/20 Y	002440735	600	11	20/50	347	1/5
ETITEC M T2 PV 600/20 Y RC	002440736	600	11	20/50	353	1/5
ETITEC M T2 PV 1100/20 Y	002440515	1100	11	20/40	396	1/5
ETITEC M T2 PV 1100/20 Y RC	002440516	1100	11	20/40	406	1/5
ETITEC M T2 PV 1500/20 Y	002440517	1500	11	20/30	444	1/5
ETITEC M T2 PV 1500/20 Y RC	002440518	1500	11	20/30	454	1/5

*RC - remote contact for remote signalisation of bad module (to be replaced)

ETITEC M T2 PV 1100/20 Y

Spare (replacement) modules				
Type	Code No.	Compatible with	Weight [g]	Packaging [pcs]
MOD. M T2 PV 125/20	002440734	ETITEC M T2 PV 250/20 Y (RC)	50	1/24
MOD. M T2 PV 300/20	002440737	ETITEC M T2 PV 600/20 Y (RC)	61	1/24
MOD. M T2 PV 550/20	002440523	ETITEC M T2 PV 1100/20 Y (RC)	0,071	1/28
MOD. M T2 PV 750/20	002440524	ETITEC M T2 PV 1500/20 Y (RC)	0,087	1/28

*Due to serial connection of modules (Y topology), Ucpv voltage of single module is 1/2 of total Ucpv between each pole

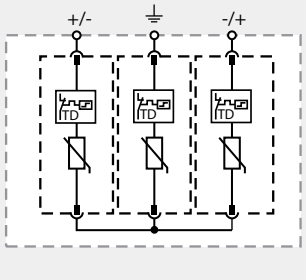


Difference between ETITEC M T2 PV and ETITEC EM T2 PV
ETITEC EM T2 PV is the economic version without module latching mechanism, easily distinguishable from ETITEC M T2 PV by the grey color of ETI logo on the device.

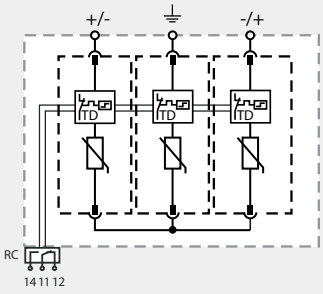
Technical data				
Type	ETITEC M T2 PV 250/20 Y	ETITEC M T2 PV 600/20 Y	ETITEC M T2 PV 1100/20 Y	ETITEC M T2 PV 1500/20 Y
	T2 / II / C			
Maximum Continuous Operating DC Voltage U_{CPV}	250 V	600 V	1100 V	1500V
Nominal Discharge Current (8/20 µs) I_n	20 kA			
Maximum Discharge Current (8/20 µs) I_{max}	50 kA		40 kA	30 kA
Total Discharge Current I_{total}	50 kA			40 kA
Voltage Protection Level U_p	1 kV	2 kV	< 3,8 kV	< 5 kV
Response Time t_A	< 25 ns			
Number of Ports	1			
Thermal Protection	✓			
Short-Circuit Current Rating SCCR I_{SCPV}	11 kA			
Operating Temperature Range T_a	- 40°C ... +85°C			
Permissible Operating Humidity RH	5% - 95%			
Altitude (max)	4000 m			
Operating State / Fault Indication	Green Flag / Not Green Flag			
Conductor Cross Section (max)	35 mm² (Solid, Stranded) / 25 mm² (Flexible)			
Terminal Screw Torque M_{max}	max. 4,5 Nm			
Mounting	35 mm DIN Rail, EN 60715			
Degree Of Protection	IP20			
Housing Material	Thermoplastic: Extinguishing Degree UL 94 V-0			
Size	3 modułes			
Remote contacts - type ...RC				
Contacts ratings	AC: 250V/1A; 125V/1A; DC: 48V/0,5A, 24V/0,5A, 12V/0,5A			
Terminal cross section	Max. 1,5 mm²			
Terminal Screw Torque M_{max}	0,25 Nm			
Standards	IEC 61643-31:2018+A1:2014			

Legend

+/-, -/+	Terminal for +/-, -/+ Conductor
⏚	Terminal for PE /G Conductor
RC	Remote Contacts Optional
TD	Thermal Disconnector

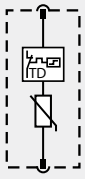


ETITEC M T2 PV .... Y

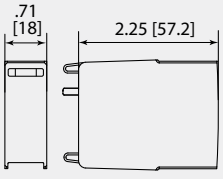


ETITEC M T2 PV .... Y RC

Plug Internal Configuration



Spare Plug



ETITEC EM T2 PV

Type	Code No.	Max PV voltage U_{cpv} [V DC]	I_{scpv} [kA]	I_n/I_{max} [kA]	Weight [g]	Packaging [pcs]
ETITEC EM T2 PV 1100/20 Y	002440623	1100	9	20/40	329	1/5
ETITEC EM T2 PV 1100/20 Y RC	002440624	1100	9	20/40	333	1/5
ETITEC EM T2 PV 1500/15 Y	002440625	1500	9	15/40	358	1/5
ETITEC EM T2 PV 1500/15 Y RC	002440626	1500	9	15/40	363	1/5

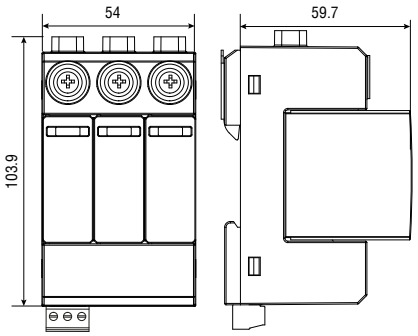
*RC - remote contact for remote signalisation of bad module (to be replaced)

Spare (replacement) modules

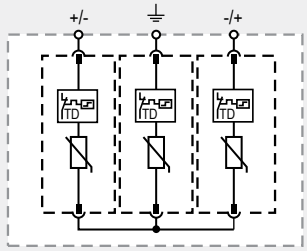
Type	Code No.	Compatible with	Weight [g]	Packaging [pcs]
MOD. EM T2 PV 550/20	002440627	ETITEC EM T2 PV 1100/20 Y (RC)	60	1/12
MOD. EM T2 PV 750/20	002440628	ETITEC EM T2 PV 1500/20 Y (RC)	71	1/12

Technical data

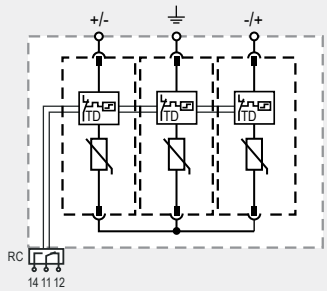
Type		ETITEC EM T2 PV 1100/20 Y	ETITEC EM T2 PV 1500/15 Y
		T2 / II / C	
Maximum Continuous Operating DC Voltage U_{CPV}		1100 V	1500V
Nominal Discharge Current (8/20 µs) I_n		20 kA	15 kA
Maximum Discharge Current (8/20 µs) I_{max}		40 kA	40 kA
Total Discharge Current I_{total}		40 kA	40 kA
Voltage Protection Level U_p	(+)-(-)	< 4,2 kV	< 4,8 kV
	(+)/(-)-PE	< 4,2 kV	< 4,8 kV
Response Time t_A		< 25 ns	
Thermal Protection		✓	
Number of Ports		1	
Short-Circuit Current Rating I_{SCPV}		9 kA	
Maximum Permitted DC Voltage V_{pvdc}		1000V	1500V
Voltage Protection Rating VPR		2500V	3000V
Short-Circuit Current Rating SCCR		50kA	65kA
Operating Temperature Range T_a		- 40°C ... +85°C	
Permissible Operating Humidity RH		5% - 95%	
Altitude (max)		2000 m	
Operating State / Fault Indication		Green Flag / Not Green Flag	
Conductor Cross Section (max)		35 mm² (Solid) / 25 mm² (Stranded)	
Terminal Screw Torque M_{max}		max. 4,5 Nm	
Mounting		35 mm DIN Rail, EN 60715	
Degree Of Protection		IP20	
Housing Material		Thermoplastic: Extinguishing Degree UL 94 V-0	
Size		3 modułes	
Remote contacts - type ...RC			
Contacts ratings		AC: 250V/1A; 120V/1A; DC: 48V/0,5A, 24V/0,5A, 12V/0,5A	
Terminal cross section		Max. 1,5 mm²	
Terminal Screw Torque M_{max}		0,25 Nm	
Standards		IEC 61643-31:2018+A1:2014	



ETITEC EM T2 PV 1500/15 Y



ETITEC EM T2 PV .... Y



ETITEC EM T2 PV .... Y RC

ETITEC M T12 950/12,5 4Y series of overvoltage surge protective devices has been developed to protect against direct and indirect discharges the new generation of PV inverters with an output voltage of 800V AC (line voltage).
Class I • Class II • Type 1 • Type 2

ETITEC M T12 950/12,5 4Y

Type	Code No.	Iimp (10/350) [kA]	In/Imax (8/20) [kA]	Uc [V AC]	Network	Weight [g]	Packaging [pcs]
ETITEC M T12 950/12,5 4Y	002440810	12,5	20 / 50	950	TNC / IT	775	1 / 4
ETITEC M T12 950/12,5 4Y RC	002440811	12,5	20 / 50	950	TNC / IT	78	1 / 4

Spare (replacement) modules

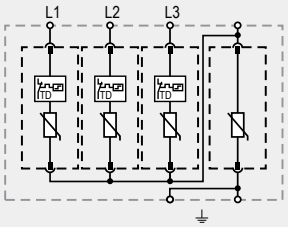
Type	Code No.	Compatible with	Weight [g]	Packaging [pcs]
MOD.ETITEC M T12 400/12,5	002440812	ETITEC M T12 950/12,5 4Y (RC)	13	1 / 28
MOD.ETITEC M T12 550/12,5 PE/N*	002440813	ETITEC M T12 950/12,5 4Y (RC)	128	1 / 28

*4th pole without indication window, needs to be replaced each time as any of other modules is being replaced

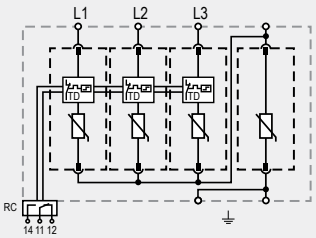
Technical data

Type	ETITEC M T12 950/12,5 4Y
	T1,T2 / I,II / B,C
Nominal AC voltage (50/60Hz)	800 V
Maximum Continuous Operating Voltage (AC)	950 V
Nominal Discharge Current (8/20 µs)	20 kA
Maximum Discharge Current (8/20 µs)	50 kA
Impulse Discharge Current (10/350)	12,5 kA
Specific Energy W/R	39 kJ/Ω
Charge	6,25 As
Voltage Protection Level	4000 V
Residual voltage at 5kA (8/20 µs)	3100 V
Response Time	< 25 ns
Number of Ports	1
Overcurrent protection (max)	160 A gG
Short-Circuit Current Rating	25 kA
Operating Temperature Range	- 40°C ... +85°C
Permissible Operating Humidity	5% - 95%
Altitude (max)	2000 m
Terminal screw torque	4,5Nm
Conductor Cross Section (max)	35 mm² (Solid, Stranded) / 25 mm² (Flexible)
Mounting	35 mm DIN Rail, EN 60715
Degree Of Protection	IP20
Housing Material	Thermoplastic: Extinguishing Degree UL 94 V-0
Thermal protection	✓
Operating state / fault indication	Green Flag / Not Green Flag
Remote contacts - type ...RC	
RC switching capacity	AC: 250V/1A; 125V/1A; DC: 48V/0,5A, 24V/0,5A, 12V/0,5A
Terminal cross section	Max. 1,5 mm²

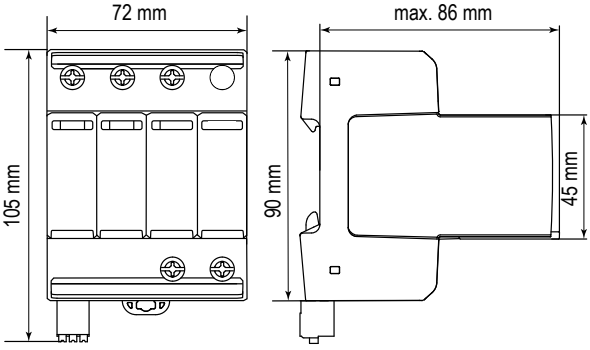
Type 1 and Type 2 SPD
U_c up to 950V
Discharge capacity – I_{imp} 12,5 kA
Discharge capacity - I_{max} up to 50 kA
Housing: Pluggable Design
Compliance: IEC 61643-11:2011
EN 61643-11:2012+A11:2018



ETITEC M T12 950/12,5 4Y



ETITEC M T12 950/12,5 4Y RC



Legend

L	Line Conductor Terminal
N	Neutral Conductor Terminal
⏚	PE /G Conductor Terminal
RC	Remote Contacts (Optional)Terminal
TD	Thermal Disconnector

ETITEC M T2 950/20 4Y series of overvoltage surge protective devices has been developed to protect against indirect discharges the new generation of PV inverters with an output voltage of 800V AC (line voltage).
Class II • Type 2

ETITEC M T2 950/20 4Y

Type	Code No.	In/Imax (8/20) [kA]	Uc [V AC]	Network	Weight [g]	Packaging [pcs]
ETITEC M T2 950/20 4Y	002440820	20 / 40	950	TNC / IT	759	1 / 4
ETITEC M T2 950/20 4Y RC	002440821	20 / 40	950	TNC / IT	764	1 / 4

Spare (replacement) modules

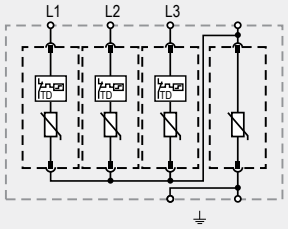
Type	Code No.	Compatible with	Weight [g]	Packaging [pcs]
MOD.ETITEC M T2 400/20	002440822	ETITEC M T2 950/20 4Y (RC)	93	1 / 28
MOD.ETITEC M T2 550/20 PE/N*	002440823	ETITEC M T2 950/20 4Y (RC)	75	1 / 28

*4th pole without indication window, needs to be replaced each time as any of other modules is being replaced

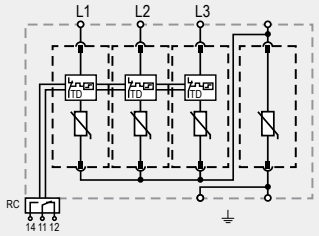
Technical data

Type	ETITEC M T2 950/20 4Y
	T2 / II / C
Nominal AC voltage (50/60Hz)	800 V
Maximum Continuous Operating Voltage (AC)	950 V
Nominal Discharge Current (8/20 µs)	20 kA
Maximum Discharge Current (8/20 µs)	40 kA
Total Discharge Current (10/350)	5 kA
Voltage Protection Level	4500 V
Residual voltage at 5kA (8/20 µs)	3400 V
Response Time	< 25 ns
Number of Ports	1
Overcurrent protection (max)	160 A gG
Short-Circuit Current Rating	25 kA
Operating Temperature Range	- 40°C ... +85°C
Permissible Operating Humidity	5% - 95%
Altitude (max)	2000 m
Terminal screw torque	4,5Nm
Conductor Cross Section (max)	35 mm² (Solid, Stranded) / 25 mm² (Flexible)
Mounting	35 mm DIN Rail, EN 60715
Degree Of Protection	IP20
Housing Material	Thermoplastic: Extinguishing Degree UL 94 V-0
Thermal protection	✓
Operating state / fault indication	Green Flag / Not Green Flag
Remote contacts - type ...RC	
RC switching capacity	AC: 250V/1A; 125V/1A; DC: 48V/0,5A, 24V/0,5A, 12V/0,5A
Terminal cross section	Max. 1,5 mm²

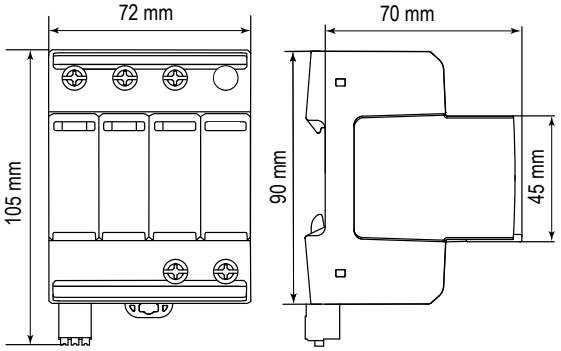
Type 2 SPD
U_c up to 950V
Discharge capacity - I_{max} up to 40 kA
Housing: Pluggable Design
Compliance: IEC 61643-11:2011
EN 61643-11:2012+A11:2018



ETITEC M T12 950/12,5 4Y



ETITEC M T12 950/12,5 4Y RC



Legend

L	Line Conductor Terminal
N	Neutral Conductor Terminal
⏚	PE /G Conductor Terminal
RC	Remote Contacts (Optional)Terminal
TD	Thermal Disconnector

ETITEC V T2 690V (EN/IEC/VDE: T2/II/C)

ETITEC V series of overvoltage surge protective devices has been developed to protect the new generation PV network inverters with an output voltage of 800V (line voltage). The circuit topology consist of three (four) parallel-connected varistor modules. Each pole is equipped with a visual indication.

Advantages:

Type 2 AC Surge Protector

- I_n : 20 kA
- I_{max} : 40 kA
- Pluggable module for each phase
- Remote signaling option
- IEC 61643-11 and EN 61643-11 compliance
- UL1449 ed.4

ETITEC V T2 690/20 3+0 RC

ETITEC V T2						
Type	Code No.	I_n/I_{max} [kA]	U_c [V AC]	Network	Weight [g]	Packaging [pcs]
ETITEC V T2 690/20 3+0 RC	002442988	20/40	750	TNC	319	1/24
ETITEC V T2 690/20 4+0 RC	002442989	20/40	750	TNC-S	420	1/18

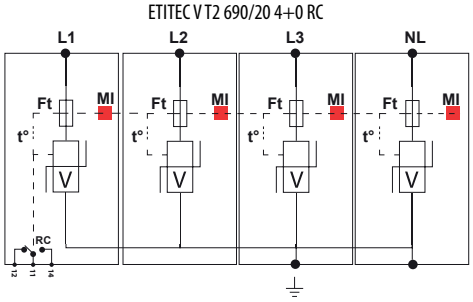
Technical data	
Type	**ETITEC V T2 690/20**
Class (IEC/EN/VDE)	II/T2/C
Network (TN)	690 V/1f
Max. AC operating voltage (AC) Uc	760 V
Temporary Over Voltage Characteristics (TOV) U_T (AC)	1000 V/5s withstand
	1300V/120 min safe turn off
Residual current Ipe	< 1 mA
Follow current If	**none**
Nominal discharge current In (15 imp. x 8/20)	20 kA
Max. discharge current Imax (8/20)	40 kA
Protection level Up	3,5 kV
Admissible short-circuit current I_{SCCR}	25 000A
Thermal disconnector	**internal**
Fuses	125 A gG
Installation ground fault breaker	Type «S» or delayed
Connection to Network	By screw terminals: 2,5-25 mm² / by bus
Disconnection indicator	1 mechanical indicator
Remote signaling of disconnection (RC)	✓
Mounting	Symmetrical rail 35 mm (EN60715)
Operating temperature	- 40°C ...+85°C
Protection rating	IP 20
Housing material	Thermoplastic UL94-V0
Standards	IEC 61643-11 / EN 61643-11

Designation:

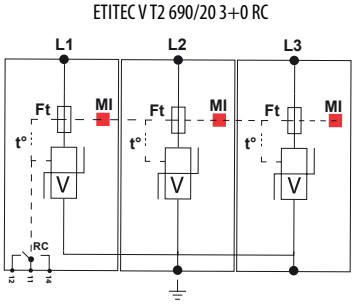
ETITEC V T2 xxx/20 p+c RC

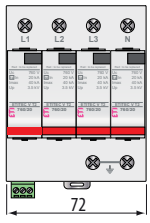
xxx - voltage Uc (max. operating voltage AC), must be above the mains voltage
20 - 20kA (8/20us)
p - number of poles with varistors MOV
c - 0 varistors MOV at the NPE pole, 1 gas-discharge GDT (TT systems)
RC - Remote signaling contact

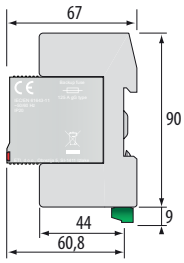
ETITEC V T2 690/20 4+0 RC



ETITEC V T2 690/20 3+0 RC







SWITCH DISCONNECTORS

PV switch disconnector LS DC

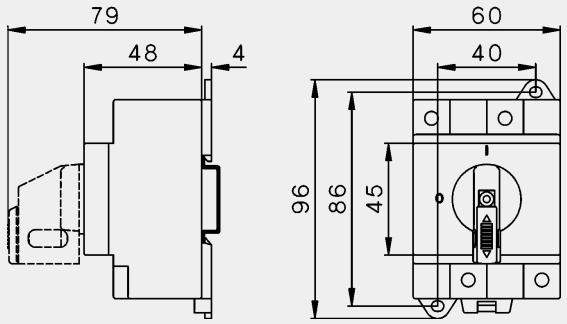
The construction of the switch ensures reliable switching up to 1500V.
The construction of the contacts and the material selection guarantee that no oxidation (small switching frequency developes, and is thus prevented inadmissible heating-up.
The switch disconnector has 2, 4 or 4+2 contacts, by serial / paralel wirring of the contacts the contact rating will be increased.
The switching speed at the manually operated handle does not have an effect on the switching attitude of the contacts.

General characteristics	
Rated voltage	≤ 1500V d.c.
Rated current	≤ 58A
Standards	IEC 60364-7-712
Application	For interupting the DC/AC inverter from the solar panels

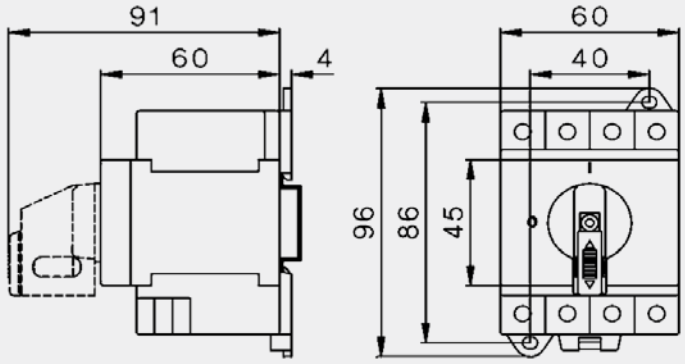
PV switch disconnector for photovoltaic systems				
Code	Type		Weight [g]	Packaging [pcs]
004660060	LS16 SMA A2	2-pole	150	1
004660061	LS25 SMA A2			
004660062	LS32 SMA A2			
004660063	LS16 SMA A4	4-pole		
004660064	LS25 SMA A4			
004660065	LS32 SMA A4			
004660066	LS32 SMA A4+2	4+2 pole	430	
004660067*	LSV-B1	-	6,6	100

Switch disconnectors "LS.." are switch gears for interupting DC/AC-inverter from the solar-panels.
Photovoltaic-installations have to be equipped with DC-isolators according to IEC 60364-7-712.
*Insulated Jumper

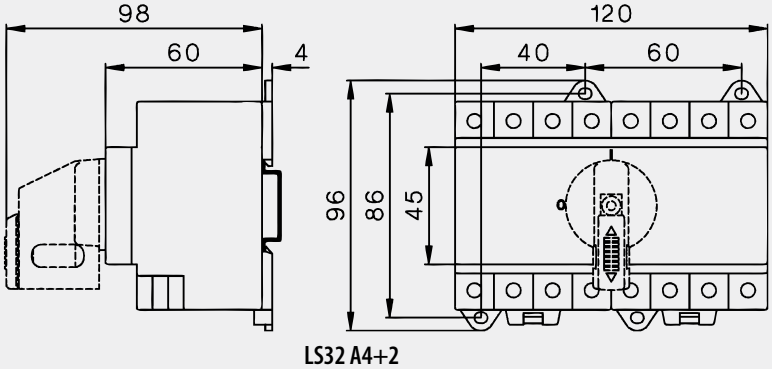
LS32 SMA A4+2 has already installed jumpers for series and parallel connection.



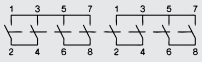
LS16, 25, 32 2p



LS16, 25, 32 4p



LS32 A4+2

				LS16 [A]		LS25 [A]		LS32 [A]	
				DC21B	DC22B	DC21B	DC22B	DC21B	DC22B
	2 pole in series A2		500V DC	16	7	25	8	32	9
			600V DC	16	5,5	25	6	32	6,5
			800V DC	16	2	20	2,5	21	3
			1000V DC	9	1	11	1,5	13	2
			1200V DC	6	-	8	-	10	-
			1500V DC	3	-	4	-	5	-
	4 poles in series A4		500V DC	16	16	25	25	32	32
			600V DC	16	16	25	25	32	27,5
			800V DC	16	11,5	25	12	32	12,5
			1000V DC	16	8	25	9	32	10
			1200V DC	16	-	25	-	32	-
			1500V DC	16	-	20	-	23	-
	4 poles in series +2 poles parallel A4+2		500V DC		-		-	58	-
			600V DC		-		-	58	-
			800V DC		-		-	58	-
			1000V DC		-		-	58	-
			1200V DC		-		-	50	-
			1500V DC		-		-	23	-
Rated conditional short-circuit current			kAeff	5					
Max. fuse size gL (gG)			A	40		63		80	
Mechanical life			x10³	10					
Rated short-time withstand current (1s) I_{cw}	A2, A4, A6, A8		A	800		900		1000	
	A2+2, A3+2, A4+2		A	1300		1500		1700	
Short circuit making capacity I_{cm}	A2, A4, A6, A8		A	800		900		1000	
	A2+2, A3+2, A4+2		A	1300		1500		1700	
Maximum cable cross sections including jumper LSV-B1	solid or stranded		mm²	4 - 16					
	flexible		mm²	4 - 10					
	flexible (+ multicore cable end)		mm²	4 - 10					
	Size of terminal screw			M4 Pz2					
	Tightening torque		Nm	1,7 - 1,8					
Maximum cable cross sections 2 cables per clamp without jumper LSV-B1 / LSV-B2	solid or stranded		mm²	16+(1,5-2,5) / 10+(1,5-6) / 6+(1,5-10) / 4+(1,5-10)					
	flexible & flexible + multicore cable end		mm²	16+(1,5-2,5) / 10+(1,5-4) / 6+(1,5-6)					
	stranded		AWG	8+(16-12) / 10+(16-10) / 12+(16-8) 14+(16-8)					
	solid		AWG	10+(16-12) / 12+(16-10) 14+(16-10)					
Maximum ambient temperature	Operation	open	°C	-40 ... +65					
		closed	°C	-40 ... +45					
	Storage		°C	-50 ... +90					
Power loss per switch at $I_{e\,max}$	A2		(A)/W	(16) / 1		(25) / 2,3		(32) / 3,7	
	A4		(A)/W	(16) / 2		(25) / 4,6		(32) / 7,4	
	A6		(A)/W	(16) / 3		(25) / 6,9		(32) / 11,1	
	A8		(A)/W	(16) / 4		(25) / 9,2		(32) / 14,8	
	A2+2		(A)/W	(29) / 1,5		(45) / 3,7		(58) / 6	
	A3+2		(A)/W	(29) / 2,3		(45) / 5,6		(58) / 9	
	A4+2		(A)/W	(29) / 3		(45) / 7,4		(58) / 12	
Contact resistance per pole			mΩ	1,75					

Because of very high breaking point capacity, switch disconnectors "LS..." are suitable for many different operating conditions.

PV switch disconnector LBS DC

→ Mounting system provides beter cooling

→ Handle position indicate true position of switch.

→ Due to perforated protection covers it is possible to measure contacts temperature without removing covers.

→ Indicator provides contacts position.

→ Possible to lock handle with 3 locks.

→ Package includes connection screws.

LBS DC are manually operated multipolar load break switches.
Making and breaking capacity under load conditions up to 1500 VDC.
These extremely durable switches have been tested and approved for use in the most demanding applications. They have been designed and tested for all types of applications: earthing, floating or bipolar.

- Thanks to a reduced number of bridging bars, you can limit your costs and save mounting time
- A 2 pole switch has reduced warming and can be placed in a smaller enclosure
- can be directly connected to up to four independent PV panel strings (4 pole switch)
- tested to critical currents and at 10kA short circuit during 50 ms without specific protection

High quality materials glass fibre reinforced polyester frame provide:
- high mechanical strength,
- stability to temperature variations (RTI of 130 °C)
- high dielectric strength (high CTI / tested as per standard ASTM D 2303)

General characteristics	
Rated voltage	1500 VDC (500 VDC/pole) IEC 60947-3
Rated current	≤ 400A
Standards	IEC 60947-3, IEC 60364-7-712
Application	For interupting DC circuits (PV, battery storage systems, etc.)

1 PV circuit 1000 V DC

Type	Code No.	Nr. Of poles	Description	Current [A] / pole	Weight [g]	Packaging [pcs]
LBS 100 2P DC1000	004661853	2	500 V DC / pole	100	1850	1
LBS 160 2P DC1000	004661854	2		160	1870	1
LBS 250 2P DC1000	004661855	2		250	1850	1
LBS 400 4P DC1000	004661856	4	250 V DC / pole	400	2360	1
LBS 500 4P DC1000	004661857	4		500	2404	1

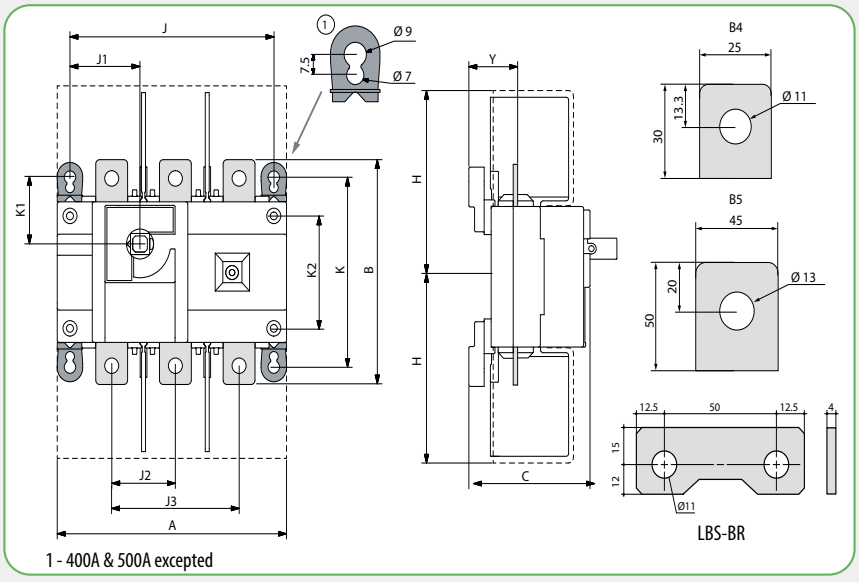
Connect poles in series for 1000 VDC, or in parallel for higher nominal current (2x at 2 pole and 4x at 4 pole)

1 PV circuit 1500 V DC

Type	Code No.	Nr. Of poles	Description	Current [A] / pole	Weight [g]	Packaging [pcs]
LBS 275 3P DC1500	004661858	3	500 V DC / pole	275	6270	1
LBS 400 3P DC1500	004661859	3		400	6270	1

Technical data (according to IEC 60947-3):										
Type			LBS 100 DC				LBS 160 DC			
Rated current, I_n			100 A				160 A			
Thermal current at 40 °C			100 A				160 A			
Thermal current at 50 °C			100 A				160 A			
Thermal current at 60 °C			100 A				160 A			
Rated insulation voltage, U_n			1000 V DC				1000 V DC			
Rated impulse withstand voltage, U_{imp}			12kV				12kV			
Number of circuits	Rated insulation voltage	Utilisation category	I_e, (A)	Number of poles in series per circuit	Number of poles of the device	Frame size	I_e, (A)	Number of poles in series per circuit	Number of poles of the device	Frame size
1	1000V DC	DC-21B	100	1P+ ; 1P-	2	B4	160	1P+ ; 1P-	2	B4
Rated short-term withstand current 0,3s (rms)			10 kA				10 kA			
Rated short-term withstand current 1s (rms)			5 kA				5 kA			
Rated short-circuit making capacity I_{cm} (50ms)			10 kA				10 kA			
Connection										
Nominal Cu cable section			35 mm^2				70 mm^2			
Nominal Cu busbar width			32 mm				32 mm			
Max Cu rigid cable cross-section			35 mm^2				70 mm^2			
Max Cu busbar width			32 mm				32 mm			
Tightening torque min			20 Nm				20 Nm			
Tightening torque max			26 Nm				26 Nm			
Durability (number of operating cycles)			10000							
Operating effort			10 Nm							
Weight of a 2 pole device			1,8 kg							
Power dissipation per poles of the PV switch (W/P) @ 40°C			0,8				2			

Technical data (according to IEC 60947-3):										
Type			LBS 250 DC				LBS 275 DC			
Rated current, I_n			250 A				275 A			
Thermal current at 40 °C			250 A				275 A			
Thermal current at 50 °C			250 A				275 A			
Thermal current at 60 °C			250 A				275 A			
Rated insulation voltage, U_n			1000 V DC				1500 V DC			
Rated impulse withstand voltage, U_{imp}			12kV				12kV			
Number of circuits	Rated insulation voltage	Utilisation category	I_e, (A)	Number of poles in series per circuit	Number of poles of the device	Frame size	I_e, (A)	Number of poles in series per circuit	Number of poles of the device	Frame size
1	1000V DC	DC-21B	250	1P+ ; 1P-	2	B4	275	1P+ ; 1P-	3	B5
1	1500V DC		-	-	-	-		2P+ ; 1P-	3	
Rated short-term withstand current 0,3s (rms)			10 kA				10 kA			
Rated short-term withstand current 1s (rms)			5 kA				5 kA			
Rated short-circuit making capacity I_{cm} (50ms)			10 kA				10 kA			
Connection										
Nominal Cu cable section			120 mm²				185 mm²			
Nominal Cu busbar width			32 mm				32 mm			
Max Cu rigid cable cross-section			120 mm²				185 mm²			
Max Cu busbar width			32 mm				32 mm			
Tightening torque min			20 Nm				20 Nm			
Tightening torque max			26 Nm				26 Nm			
Durability (number of operating cycles)			10000							
Operating effort			10 Nm							
Weight of a 2 pole device			1,8 kg				-			
Weight of a 3 pole device			-				6 kg			
Power dissipation per poles of the PV switch (W/P) @ 40°C			4,7				5,5			

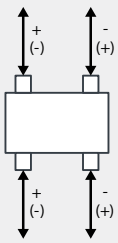
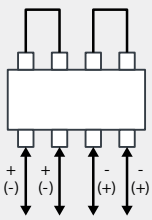
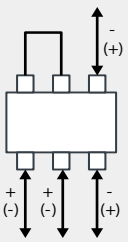


1 - 400A & 500A excepted

Frame size	Nr. Of poles	Dimensions (mm)											
		A	B	C	H	J	J1	J2	J3	K	K1	K2	Y
B4	2	180	160	95	132,5	160	55	-	100	135	48	80	38,5
B4	4	230	170	79	132,5	210	105	50	-	-	-	80	22,5
B5	3	230	260	126,5	203	210	75	65	-	195	67,5	80	51,5

Technical data (according to IEC 60947-3):										
Type			LBS 400 DC				LBS 500 DC			
Rated current, I_n			400A				500 A			
Thermal current at 40 °C			400 A				500 A			
Thermal current at 50 °C			400 A				500 A			
Thermal current at 60 °C			400 A				475 A			
Rated insulation voltage, U_n			1000 V DC/1500 V DC*				1000 V DC			
Rated impulse withstand voltage, U_{imp}			12kV				12kV			
Number of circuits	Rated insulation voltage	Utilisation category	I_e, (A)	Number of poles in series per circuit	Number of poles of the device	Frame size	I_e, (A)	Number of poles in series per circuit	Number of poles of the device	Frame size
1	1000V DC	DC-21B	400	2P+ ; 2P-	4	B4	500	2P+ ; 2P-	4	B4
	1500V DC*			2P+ ; 1P-	3	B5	-	-	-	-
Rated short-term withstand current 0,3s (rms)			-				10 kA			
Rated short-term withstand current 1s (rms)			10 kA				5 kA			
Rated short-circuit making capacity I_{cm} (50ms)			10 kA				10 kA			
Connection										
Nominal Cu cable section			240 mm²				2x150 mm²			
Nominal Cu busbar width			32 mm				32 mm			
Max Cu rigid cable cross-section			240 mm²				2x150 mm²			
Max Cu busbar width			32 mm				32 mm			
Tightening torque min			20 Nm				20 Nm			
Tightening torque max			26 Nm				26 Nm			
Durability (number of operating cycles)			5000							
Operating effort			10 Nm							
Weight of a 3 pole device			3,8 kg				-			
Weight of a 4 pole device			2,3 kg				3,8 kg			
Power dissipation per poles of the PV switch (W/P) @ 40°C			20@DC1000/8@DC1500				30			

* 1500 V DC rated insulation voltage only for switch 004661859

Pole connections in series LBS DC		
1000 V DC (1 PV circuit)		1500 V DC (1 PV circuit)
Frame size B4, 2P	Frame size B4, 4P	Frame size B5, 3P
		

LBS AC1000 load break switches (IEC 69047-3)

Heavy duty applications up to 1000 VAC - AC 22
Advantages

- Improved performance
  - The rapid opening and closing, combined with the arcing chambers, ensure improved breaking performance.
  - Harsh service categories AC-22 under 1000 VAC.
- Robustness
  - Double breaking per pole (proven sliding system) offering durability and high short-circuit current withstand.
  - Made of glass fiber reinforced polyester for maximum thermal and mechanical resistance.
- Safe operation
  - The position indicator is directly on the bar housing the moveable contacts, ensuring it can be seen in all circumstances.
- Ease of installation
  - Connection facilitated by the design of the external terminals:
  - good centre-to-centre distance (up to 65 mm),
  - copper connection up to 240 mm^2,
  - large range of accessories to facilitate integration and operation.

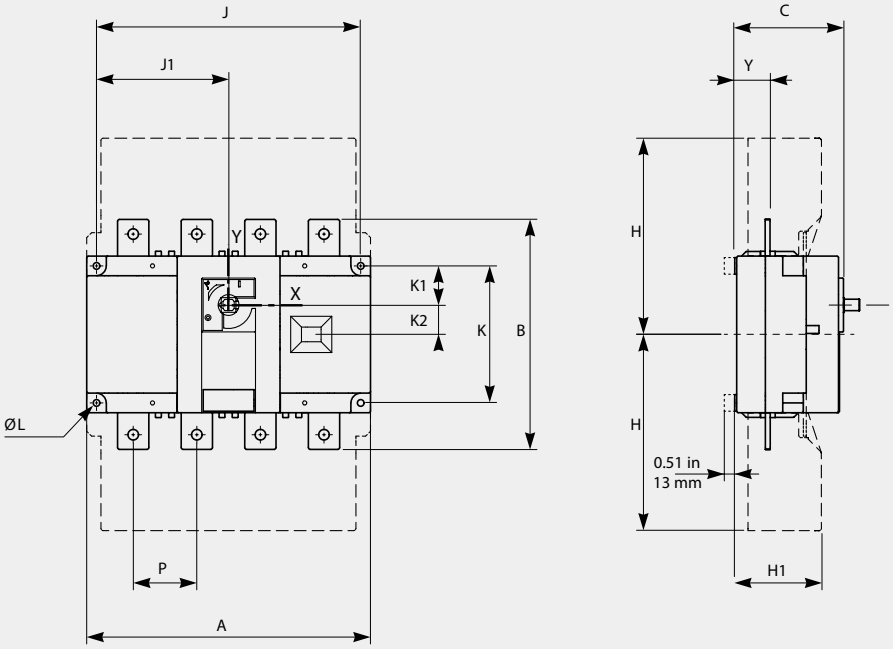
Applications
LBS AC1000 load break switches can be used in applications with non standard voltage levels. There are many PV inverters today on the market with higher output voltages (up to 800V AC).
Can be also used in applications with harsh operating conditions such as:
paper mills or the metallurgy, chemical, petrochemical or mining industries.
LBS AC is designed for all heavy duty applications up to 1000 VAC - AC 22. It offers a total adaptability to any environment thanks to a wide variety of accessories.

LBS AC1000 load break switches (IEC 69047-3)

Type	Code No.	Nr. Of poles	Ie [A]	Weight [g]	Packaging [pcs]
LBS 200 3P AC1000	004661923	3	275	1850	1/1
LBS 400 3P AC1000	004661924	3	400	4550	1/1

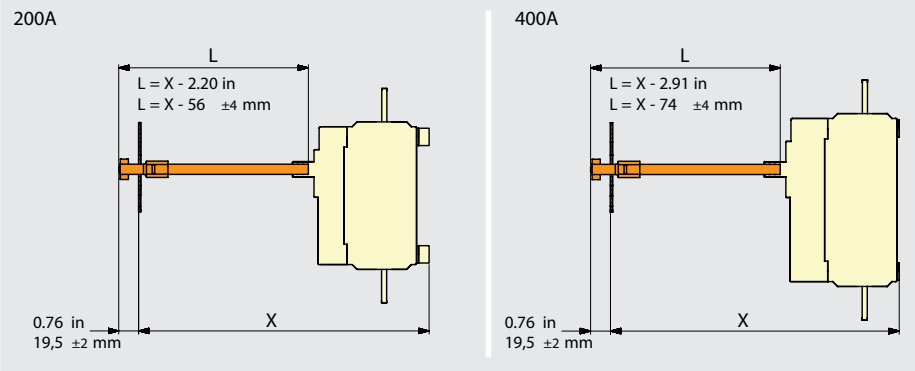
LBS 200 3P AC1000

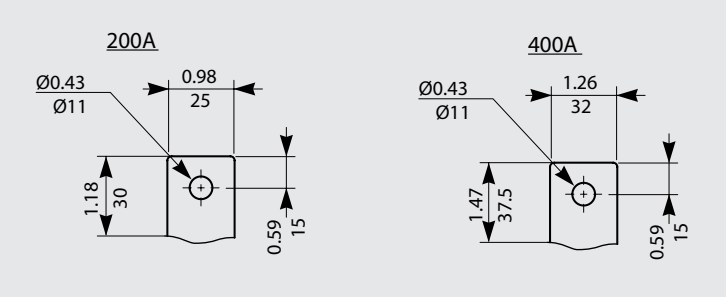
LBS 400 3P AC1000



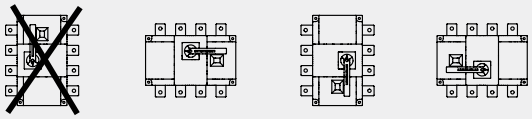
	A		B		C		H		H1		J		J1		K		K1		K2		Ø L		P		Y	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
LBS 200 3P AC1000	7.08	180	6.30	160	3.09	78.5	5.70	145	2.20	56	6.30	160	2.16	55	3.15	80	0.78	20	0.78	20	0.21	5.5	1.96	50	0.86	22
LBS 400 3P AC1000	9.05	230	9.25	235	4.37	111	7.91	201	3.36	85.5	8.26	210	2.95	75	5.51	140	1.57	40	1.18	30	0.27	7	2.56	65	1.41	36

Technical data (according to IEC 60947-3):		
Type	LBS 200 3P AC1000	LBS 400 3P AC1000
Conventional free air thermal current I_{th} at 35 °C	200 A	400 A
Rated insulation voltage, U_i	1250 V	1200 V
Rated impulse withstand voltage, U_{imp}	12 kV	
Rated operational voltage U_e	1000 V	
Utilisation category	AC-22B	
Rated operational current I_c	200 A	400 A
Rated frequency	50 / 60 Hz	
Rated short-time withstand current I_{cw} 1s	8 kA	
Rated short-circuit making capacity I_{cm}	13,6 kA peak	





Mounting orientation



Accessories for LBS DC and LBS AC1000 switches

Direct handle for direct operation LBS

Type	Code No.	Description	For use with	Weight [g]	Packaging [pcs]
LBS-DH630/B	004661481	Direct handle black	LBS100-500DC (1000V, 1500V), LBS 200 3P AC1000, LBS 400 3P AC1000	100	1/25
LBS-DH630/R	004661861	Direct handle red		100	1/80

Door interlocked handle IP65

Type	Code No.	Description	For use with	Weight [g]	Packaging [pcs]
LBS-EH630/G . . .400/G FLBS	004661483	Door handle Black	LBS100-500DC (1000V, 1500V), LBS 200 3P AC1000, LBS 400 3P AC1000	250	1/20
LBS-EH630/YR	004661486	Door handle Red		250	1/20

*shaft not included

Shaft for door interlocked handle

Type	Code No.	Description	For use with	Weight [g]	Packaging [pcs]
LBS-S200/630 (CO) . . ./400 FLBS	004661490	Shaft 200mm	LBS100-500DC (1000V, 1500V), LBS 200 3P AC1000, LBS 400 3P AC1000	160	1/25
LBS-S320/630 (CO) .../400 FLBS	004661493	Shaft 320mm		250	1/50
LBS-S500/630 (CO) . . ./400 FLBS	004661496	Shaft 500mm		390	1/10

Terminal screen

Type	Code No.	Description	For use with	Weight [g]	Packaging [pcs]
LBS-TS250 2P DC	004661862	Terminal screen, 2P	LBS ... 2P	40	1/30
LBS-TS500 4P DC	004661863	Terminal screen, 4P	LBS ... 4P	50	1/20
LBS-TS500 3P DC	004661865	Terminal screen, 3P	LBS ... 3P	60	1/100

1 reference includes 1pc for top or bottom contacts, to protect all, 2 references shall be ordered

Terminal shrouds

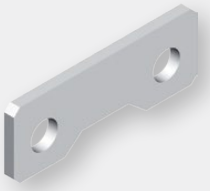
Type	Code No.	Description	For use with	Weight [g]	Packaging [pcs]
LBS-TS250 3P (CO)	004661501	Terminal shrouds, 3P	LBS 200 3P AC1000	121	1/10
LBS-TS630 3P (CO)	004661502		LBS 400 3P AC1000	242	1/5

One reference includes 3 pcs (3pole) for top or bottom contacts , to protect all 2 references shall be ordered

Bridging bars

Type	Code No.	Description	For use with	Weight [g]	Packaging [pcs]
LBS-BR500 1P DC	004661864	Bridging bars, 1pole	LBS ... DC 1000	60	1/100
LBS-BR400 1P DC	004661866		LBS ... DC 1500	210	1/50

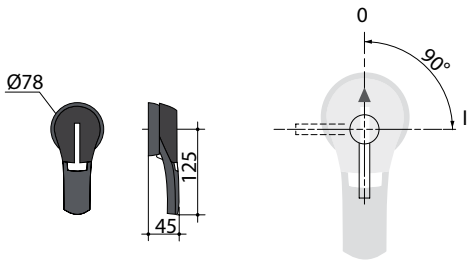
1 reference includes connection for 1 pole



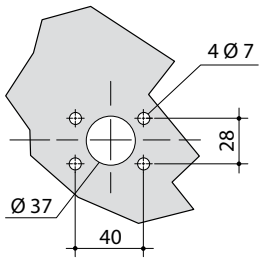
Auxiliary contact

Type	Code No.	Description	For use with	Weight [g]	Packaging [pcs]
LBS-PS11	004661499	Auxiliary contact (CO)	LBS. . .DC1000, DC1500, LBS 200 3P AC1000, LBS 400 3P AC1000	26	1/30

Handle type LBS-EH630

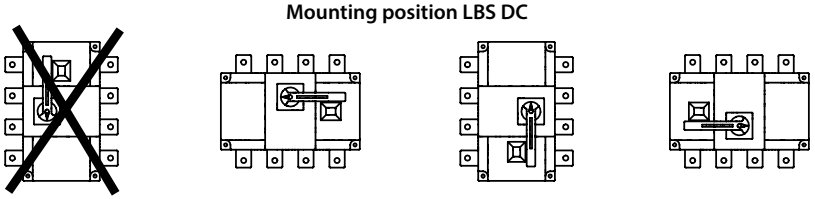


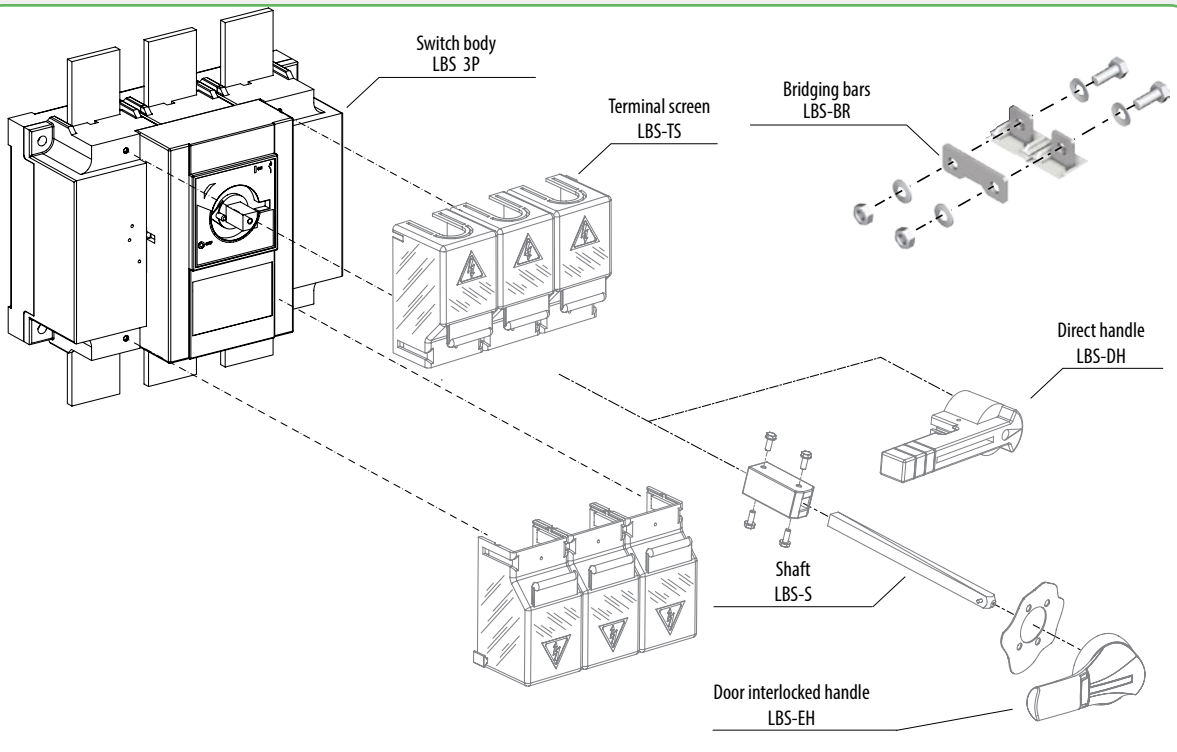
Door drilling



Direct front operation

Mounting position LBS DC





IP65 Wall mounted distribution boards ECH

Available in 4, 6, 8, 12, 18, 24, 36,48 modules

Applications:
Watertight wall-mounted distribution boards apply in domestic and industry architecture for mounting modular equipment for protection (IP65) against wet, dust and another dirtiness

Structure:
Enclosure is made of high thermal stability material - ASA (Acrylonitrile-Acrylic-Styrene), plastic with good dielectrical and mechanical attributes, UV resistant (colour stability)

Advantages: Aesthetic and attractive look, easy and quick montage

Main elements:
- Bottom cover with DIN rail, PE and N bars and holes for PG cable inlets properly marked
- Top cover with seal of the door
- Transparent door made of polycarbonate (PC) with plastic lock (in standard) or metal lock with key (in option)

Technical data:

Protection class	IP65
Isolation class	II ⧈
Impact kit	IK08
Nominal voltage	400V AC / 1500 V DC
Rated current	63A
Temperature range	-25 °C do +60 °C
IEC compatibility	IEC 62208, IEC 60670-24 CE

Type	Code number	Description	Number of terminals at PE /N	Dimensions [H x W x D] (mm)	Power dissipation (W)	Weight (kg)	Packaging (pcs.)
ECH-4G	001101060	Wall mounted enclosure, IP-65 transparent door	4/4	201x128x120	10	0,46	1/5
ECH-6G	001101176		6/6	201x165x120	10	0,46	1/5
ECH-8G	001101061		8/8	201x202x120	13	0,68	1/5
ECH-12PT	001101062		10/10	259x319x144	16	1,24	1/5
ECH-18PT	001100350		18/18	259x428x144	20	1,7	1/5
ECH-24PT	001101063		15/15	384x319x144	24	1,7	1/5
ECH-36PT	001101064		15/15	535x319x144	26	2,31	1/5
ECH-48PT	001100304		20/20	664x319x144	28	3,22	1/5
Accessories							
ECH-L2K	001100204	Lock with key for ECH	-	-		0,017	1

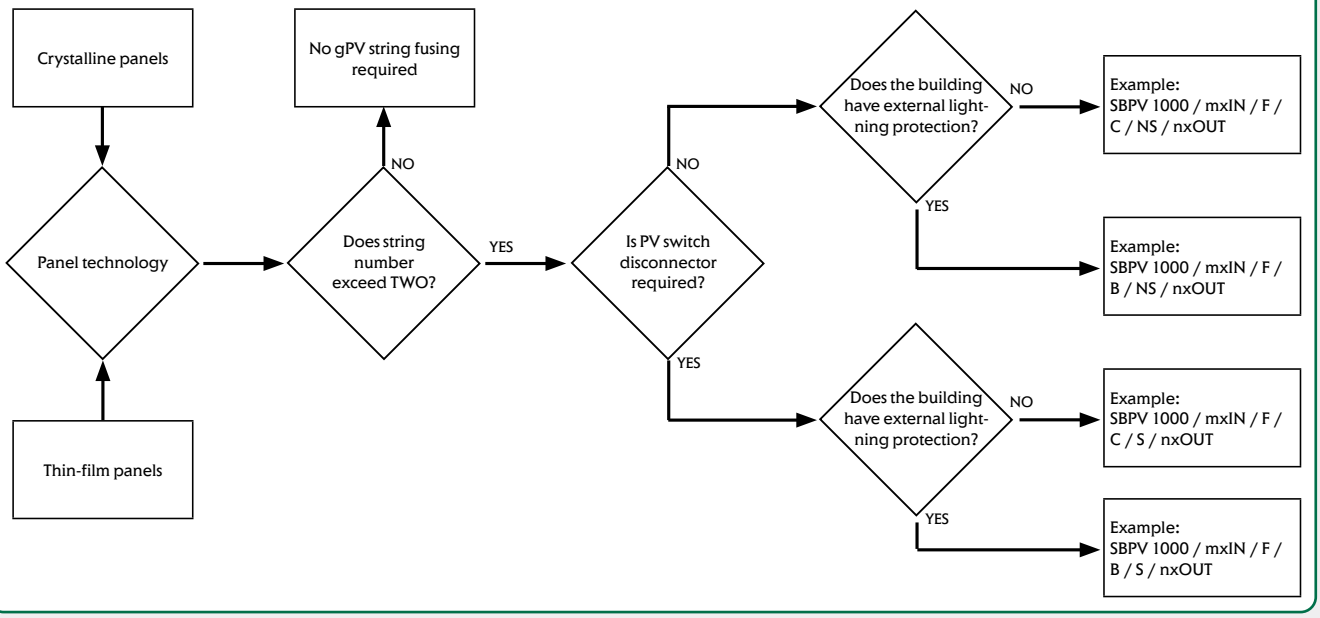
Enclosure designation

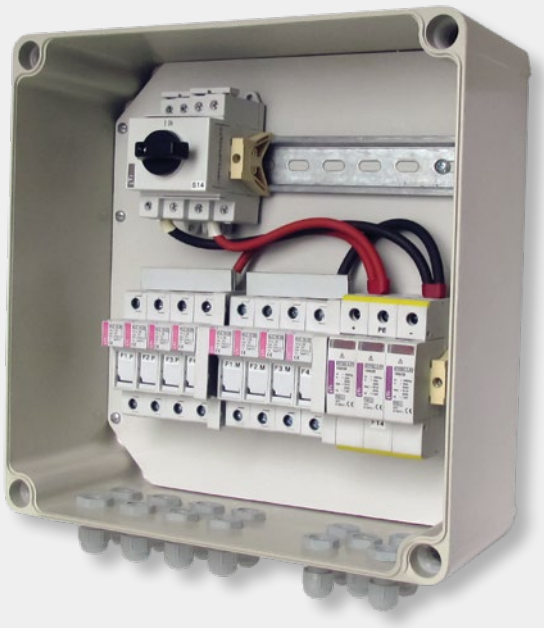
Type → ECH...G ← Vertical door opening (4, 6 or 8 modules)
...PT ← Horizontal door opening (12, 18, 24, 36 or 48 modules)
Modules (4, 8, 12, 24, 36, 48)

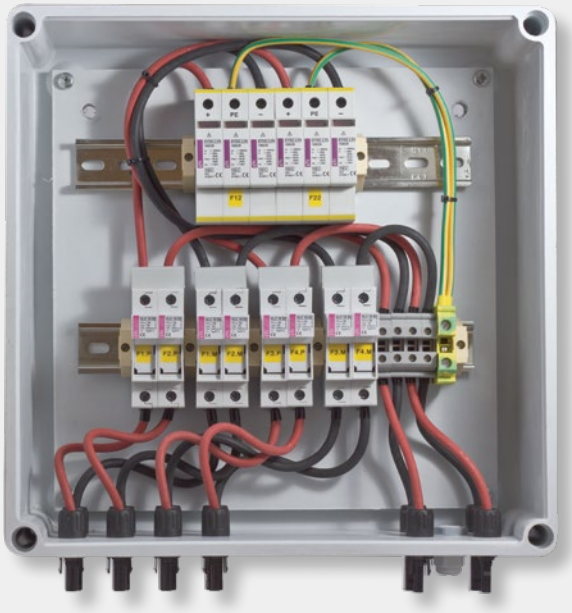
Ready made DC-junction boxes

For more technical, ordering and other information, please see our catalogue **Solutions**

How to choose correct protection for PV junction boxes



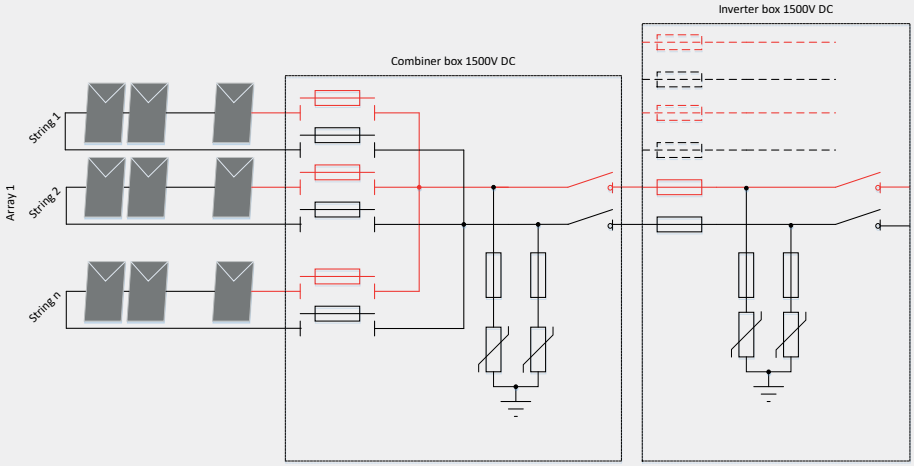




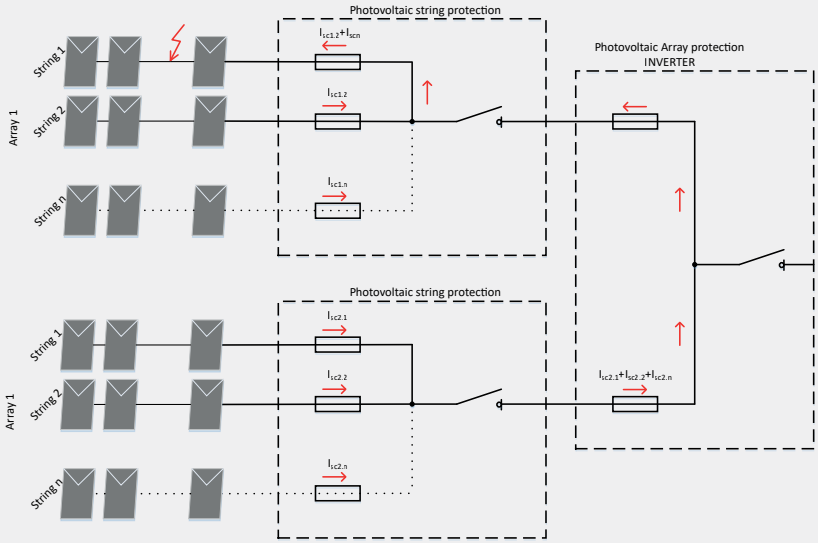
Design recommendations

Central inverter - PV system

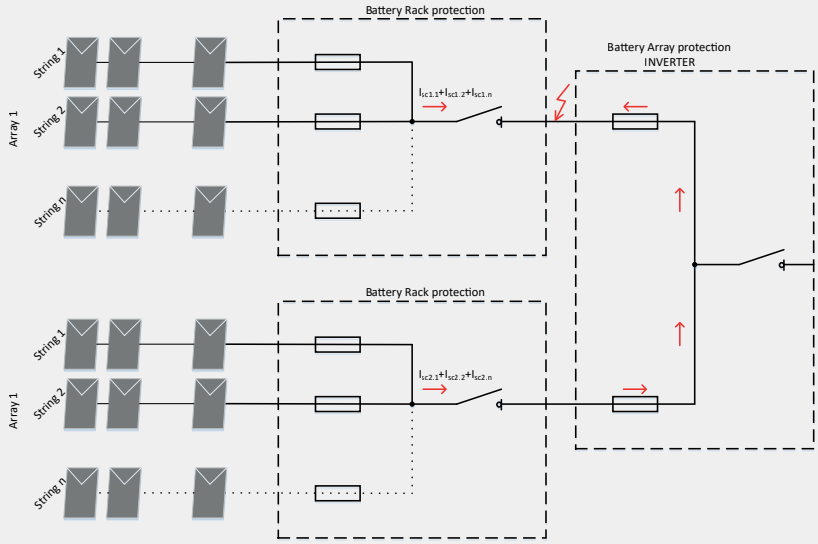
Photovoltaic modules are protected against reverse currents with **cylindrical gPV fuse-links** inserted in **cylindrical fuse holders**. Photovoltaic arrays are then connected to the central inverters protected with **NH gPV fuse-links** inserted in **NH fuse bases** or direct mounted on the busbar system. On the combiner and the inverter level, **SPDs** and **switch disconnectors** are used.



Basic scheme of central inverter PV system



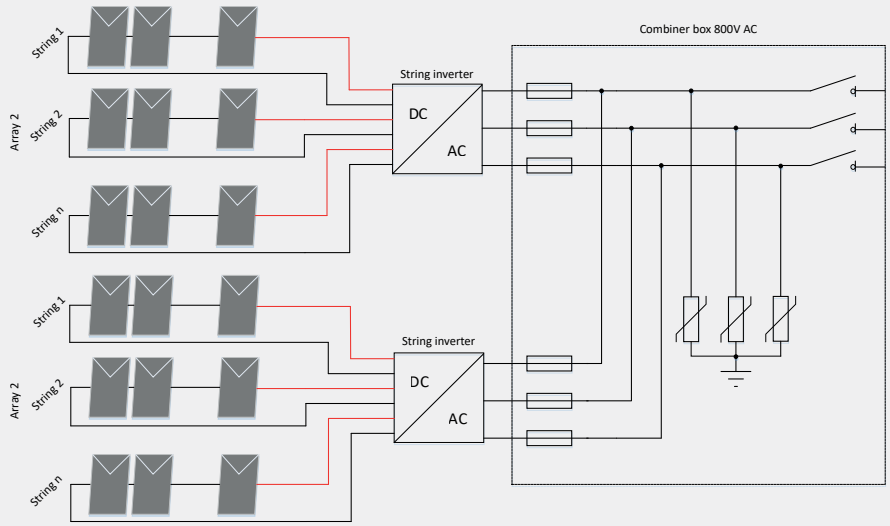
Protection of reverse current by CH gPV fuse-link



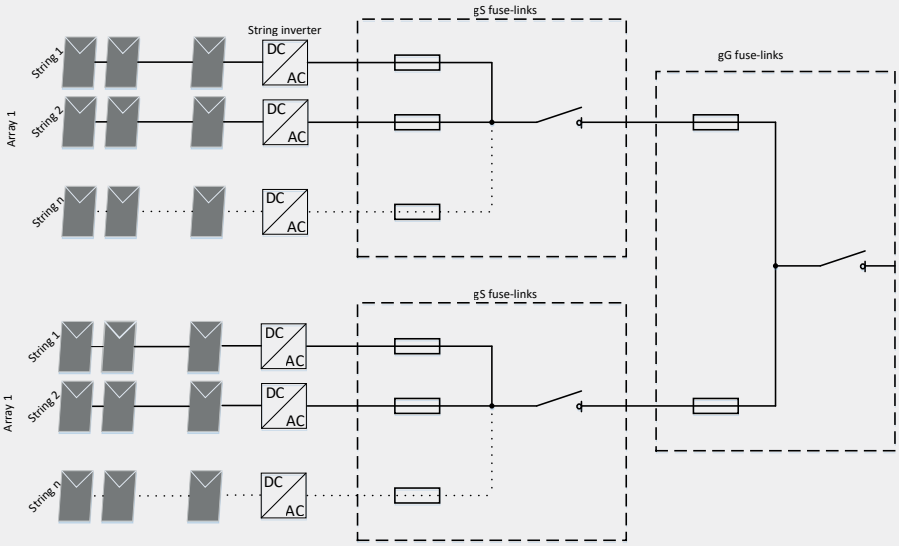
Protection of PV array by NH gPV fuse-link

String inverter - PV system

Photovoltaic modules are connected to string inverter. On a.c. side of string inverter there are **gG or gS NH fuse-links** inserted in **NH fuse bases or disconnectors**. On the combiner level, **SPDs** and **switch disconnectors** are used.



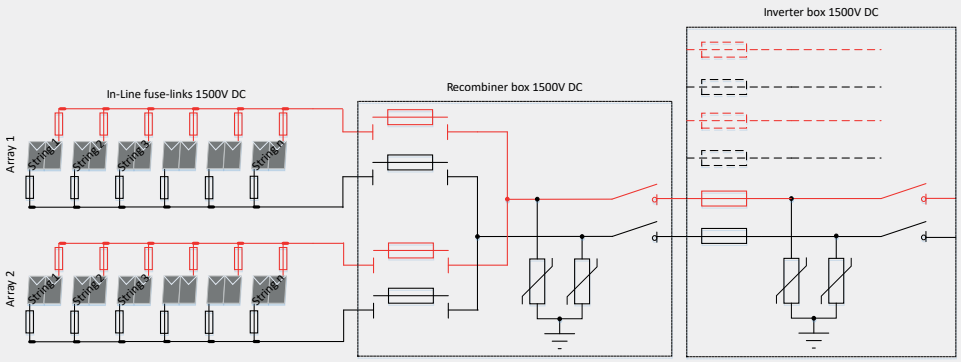
Basic scheme of string inverter PV system



Protection on combiner level with gS and recombiner level with gG characteristic fuse-links

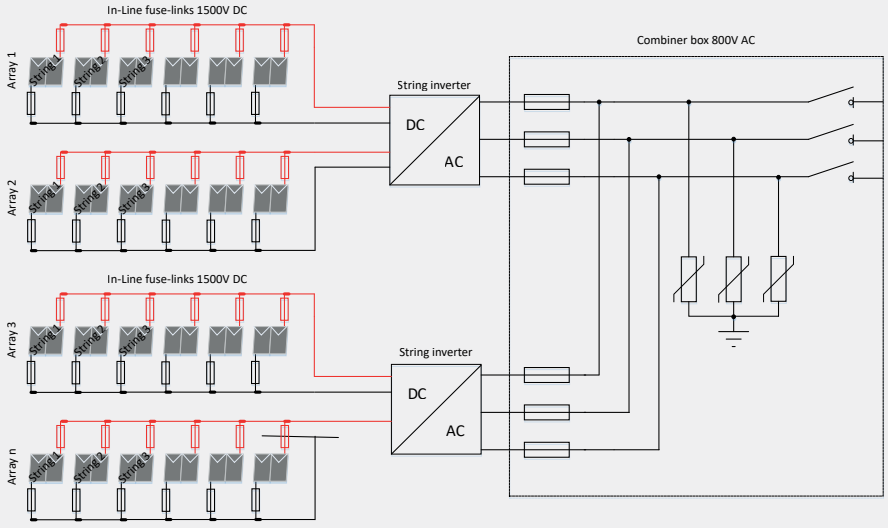
In-Line PV system

In-Line PV systems could be used in central or string inverter systems.
Photovoltaic modules are protected against reverse currents with c**ylindrical In-Line gPV fuse-links**.
Photovoltaic strings are on array level combined in recombiner boxes protected with **cylindrical gPV fuse-links** inserted in **cylindrical fuse holders**. Recombiner boxes are then connected to the central inverters protected with N**H gPV fuse-links** inserted in **NH fuse bases** or direct mounted on the busbar system. On the recombiner and the inverter level, **SPDs** and **switch disconnectors** are used.



In-Line topology – central inverter

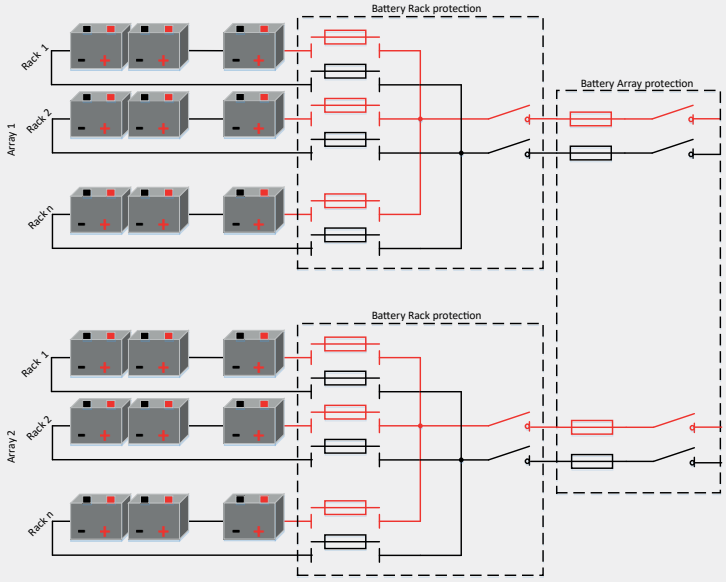
Photovoltaic strings are on array level combined in the wire harness. Wire harnesses are then connected to the string inverters. On a.c. side of string inverter there are **gG or gS NH fuse-links** inserted in **NH fuse bases or disconnectors**. On the combiner level, **SPDs** and **switch disconnectors** are used.

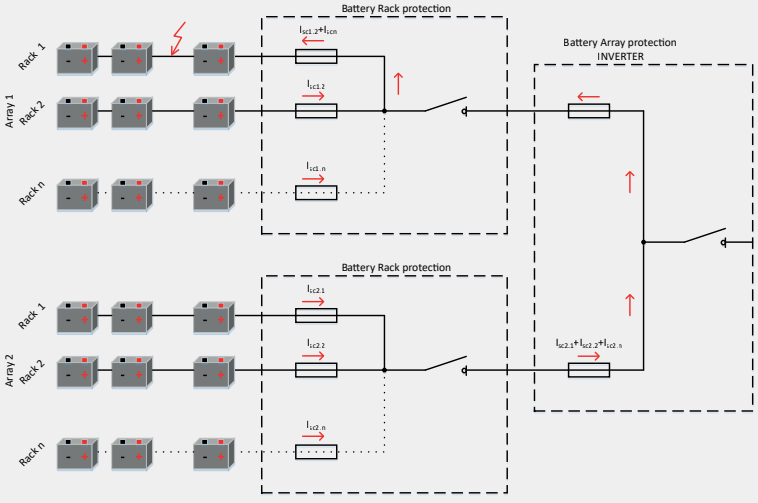


In-Line topology – string inverter

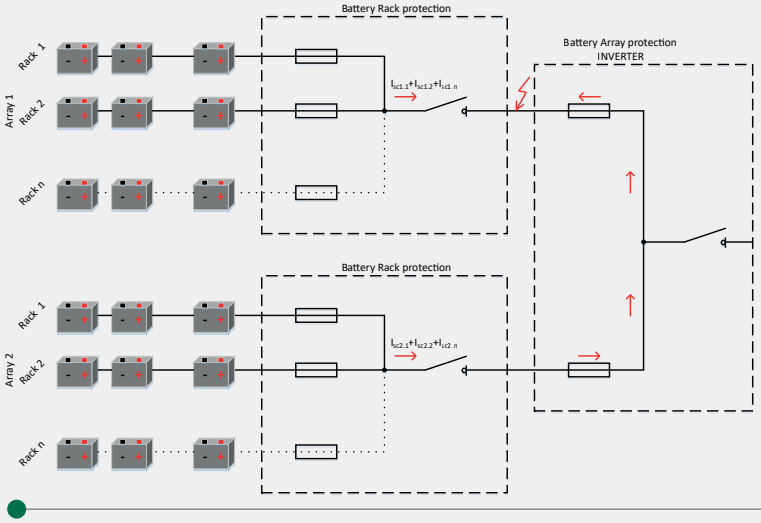
Battery system

Battery modules are in series connected in battery racks. Battery racks are protected with **battery fuse-links** in d.c. combiner boxes. D.c. combiner boxes are then connected to the battery inverter protected with **NH fuse-links** inserted in **NH fuse bases**.





Protection of battery racks

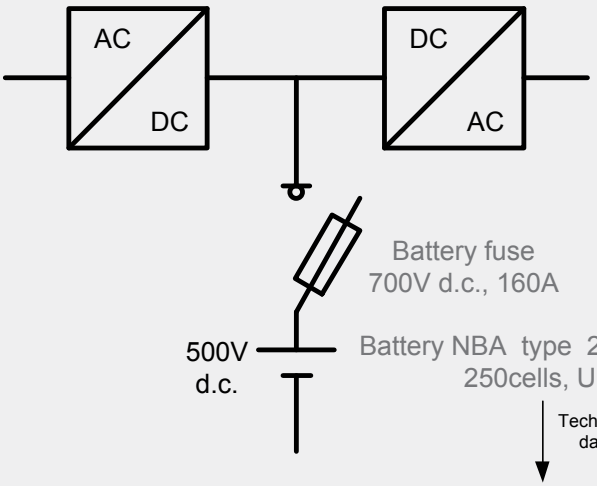


Protection of battery array

How to choose the correct Battery fuse - example

P_W=67,5kW

t_E= 20min (back-up time of storage system)



1. Short circuit point (I_k):

2. Types, capacities, dimensions, mass

Type	C10	C5	C3	C1	Ri 1)	Ik 2)	length	width	height max	mass 3)	mass 4)
	Ah	Ah	Ah	Ah	mΩ	kA	mm	mm	mm	kg	kg
Ue (V/cell)	1,80	1,77	1,75	1,67							
2V 1 OPzS 50	50	45	36	24	3,96	0,58	103	206	426	4,5	7
2V 2 OPzS 100	100	85	69	48	1,98	1,16	103	206	426	7,5	6,5
2V 3 OPzS 150	150	125	102	72	1,27	1,74	103	206	426	10	6
2V 4 OPzS 200	200	170	138	96	1,01	2,06	103	206	426	12	6
2V 5 OPzS 250	250	210	171	120	0,81	2,57	124	206	426	14	7,5
2V 6 OPzS 300	300	250	204	144	0,69	3,14	145	206	426	16	9
6V 3 OPzS 150	150	125	107	75	3,71	1,62	233	224	426	23,5	13,5

1, 2) internal resistance and short - circuit - current according to IEC 896-1 3) dry-charged 4) filled and charged

I_k=580A

2. Operating point (t_E/I_B):

t_E = 20min (1200s)

U_E= 250cells x 1,8V= 450V d.c.

I_B = P_W/U_E...67,5kW / 450V = 150A

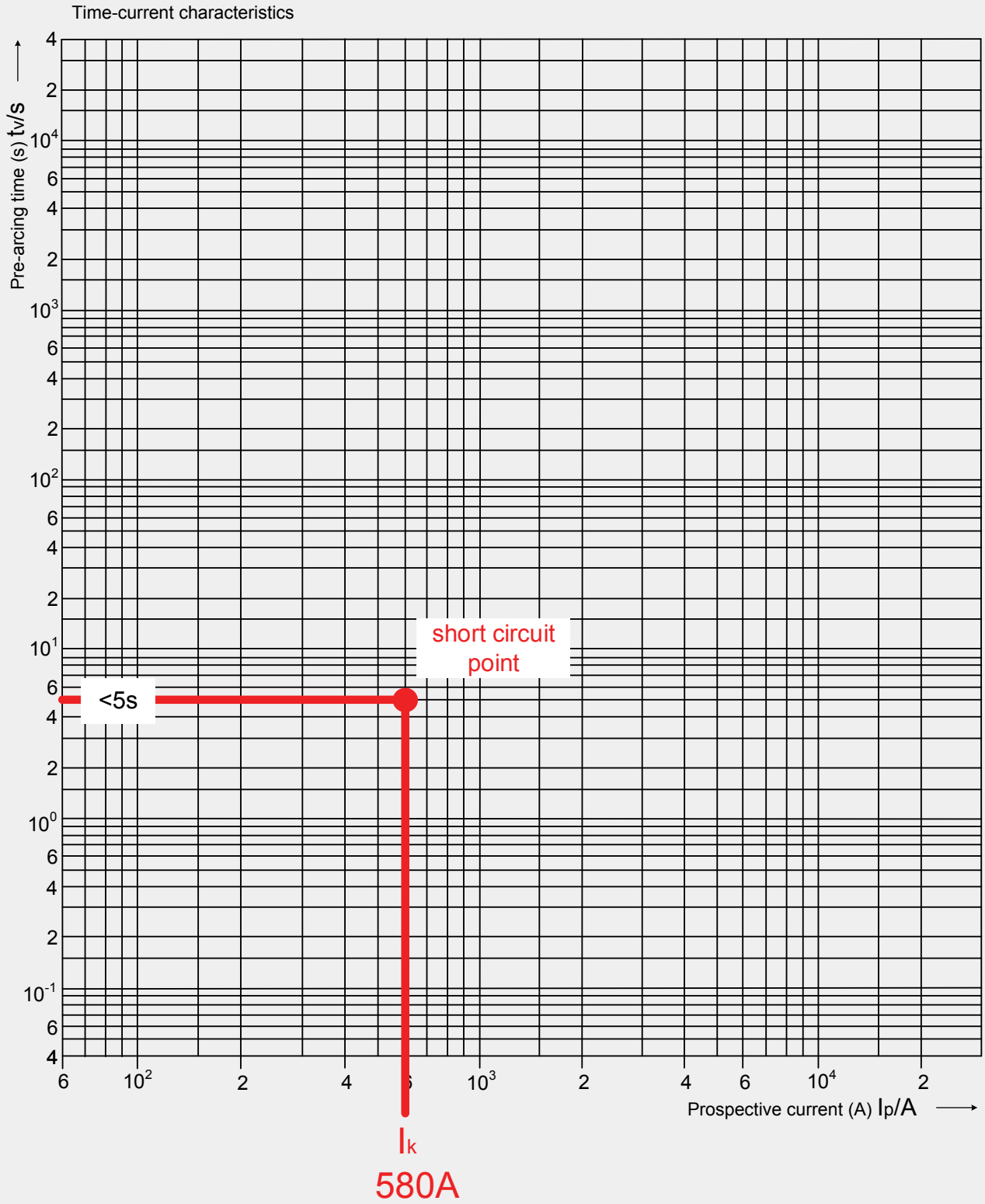
3. DC rated fuse link:

Battery fuse 700V d.c., L/R=10ms

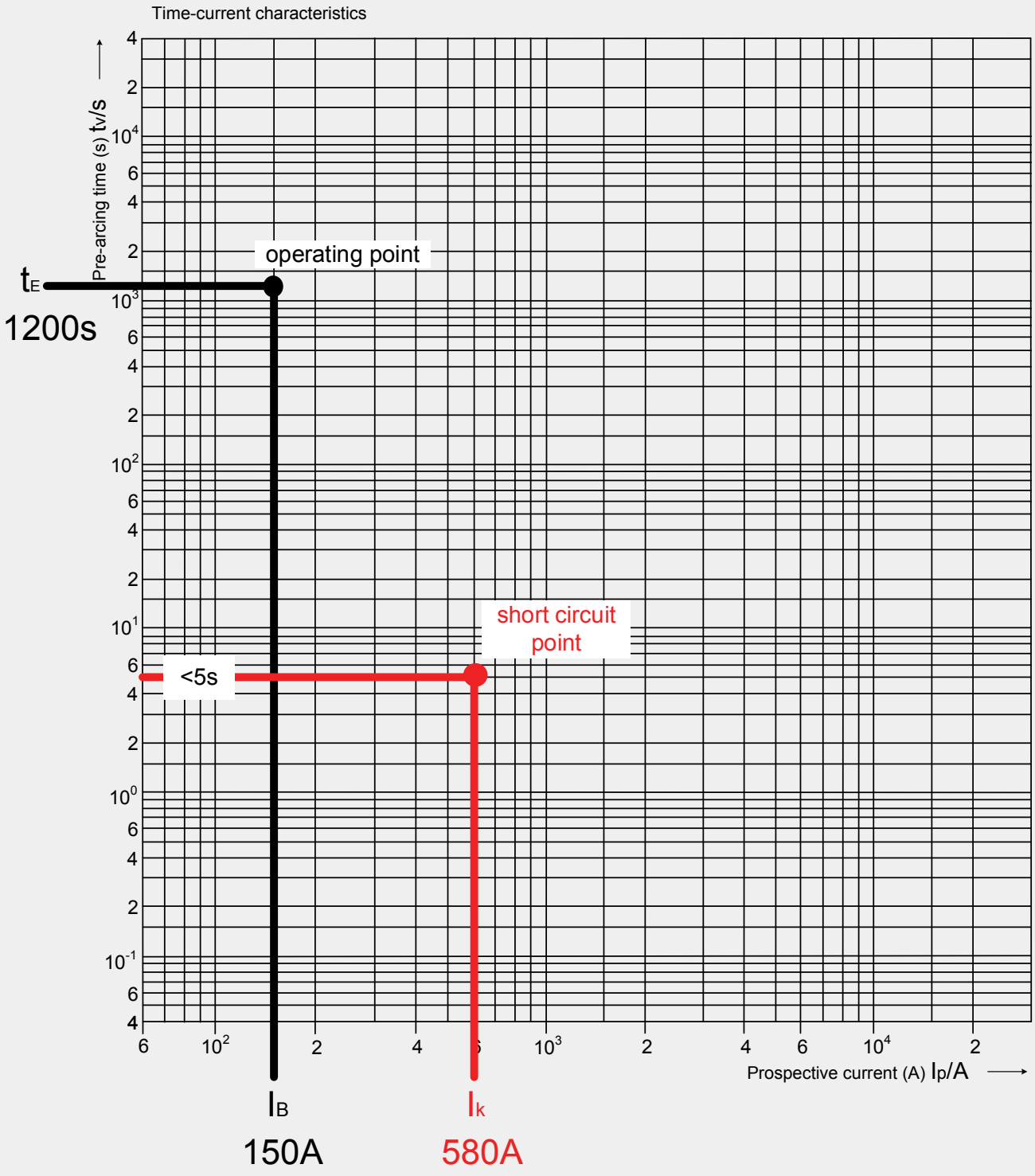
NH00 gG 160A 690V a.c.....problem DC rating at min. breaking capacity ~ 2xIn ???

Green protect - gBat

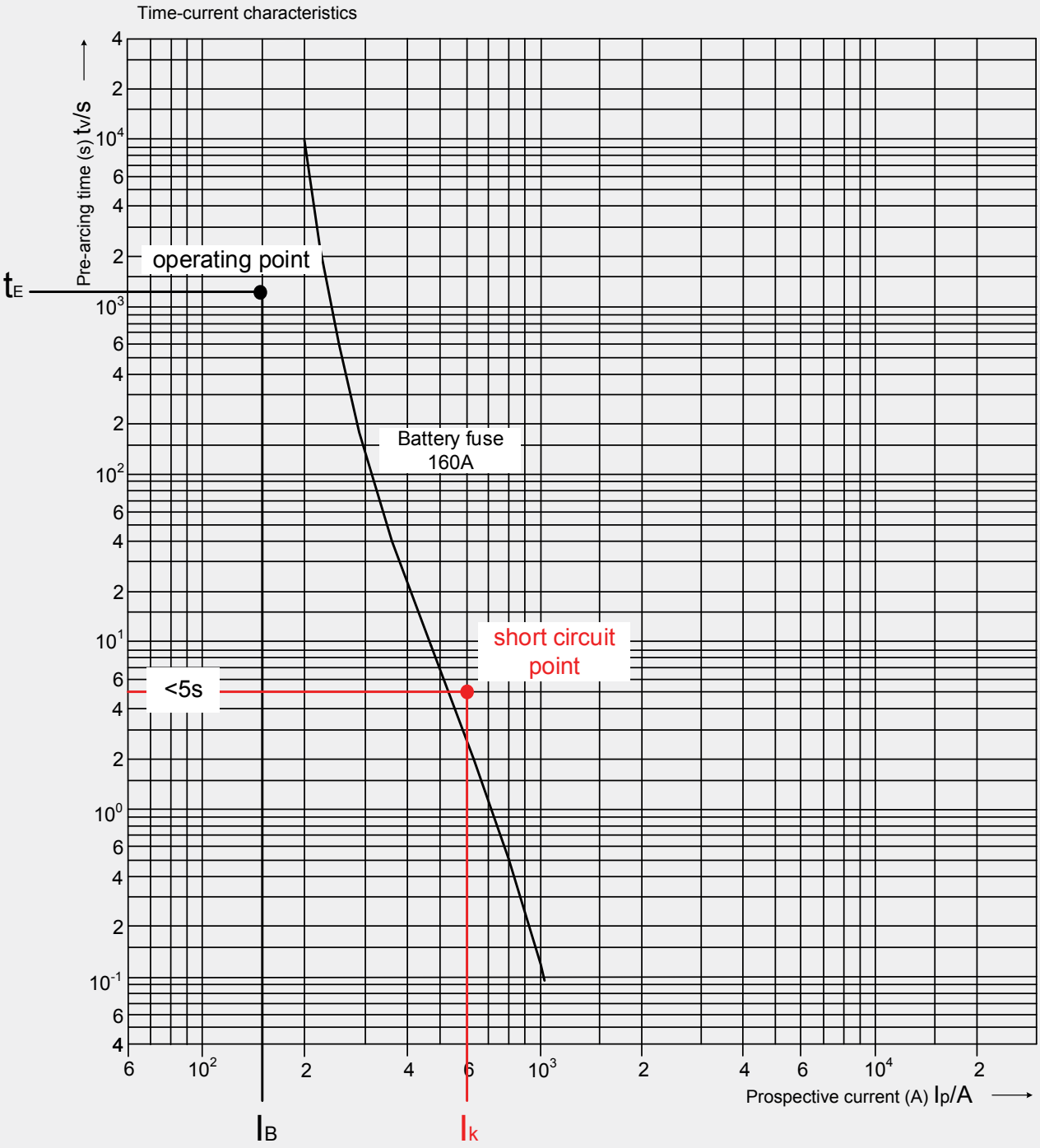
1. Short circuit point (Ik):

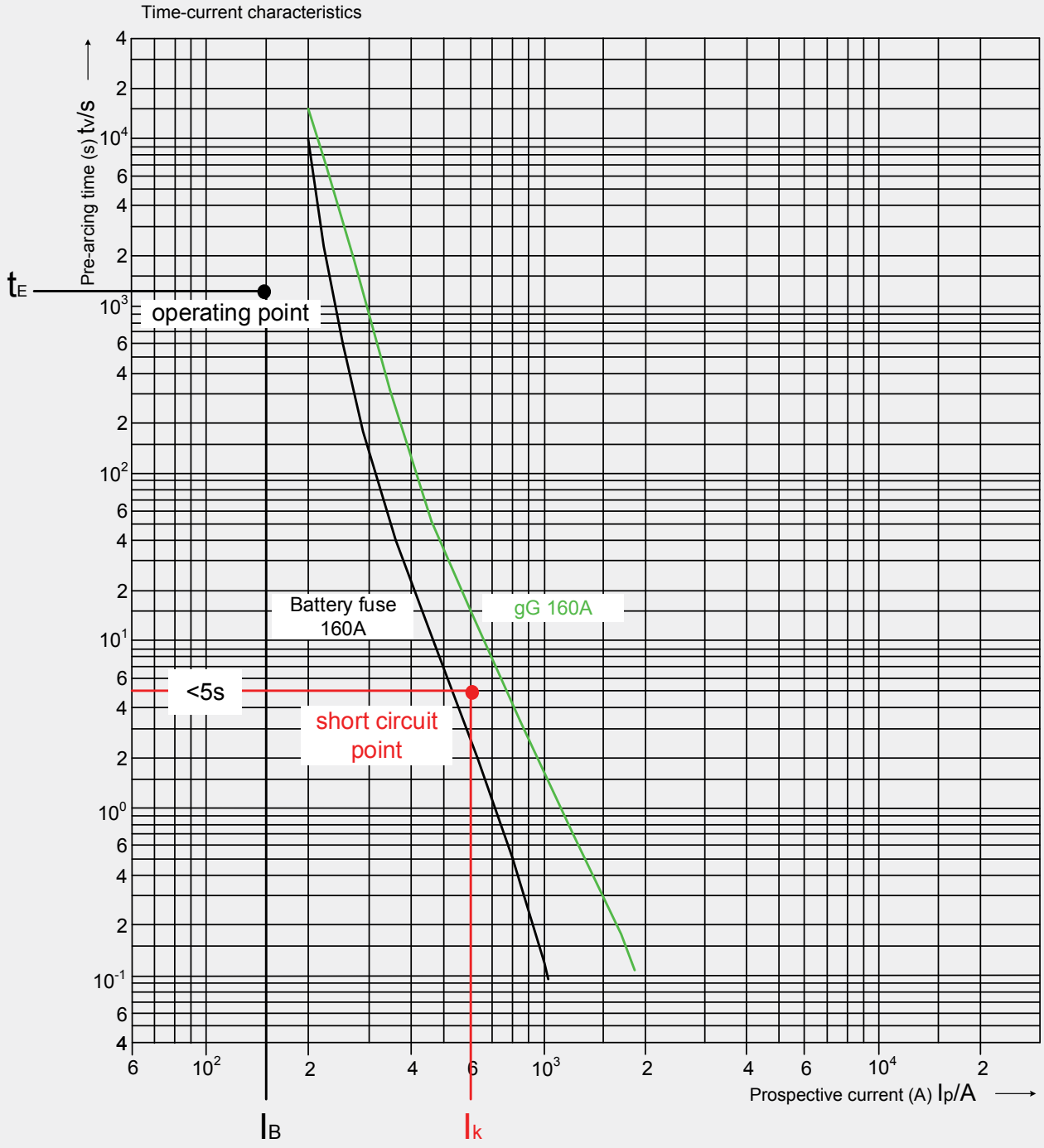


2. Operating point (t_E/I_B):



Battery fuse selection-I/t characteristic





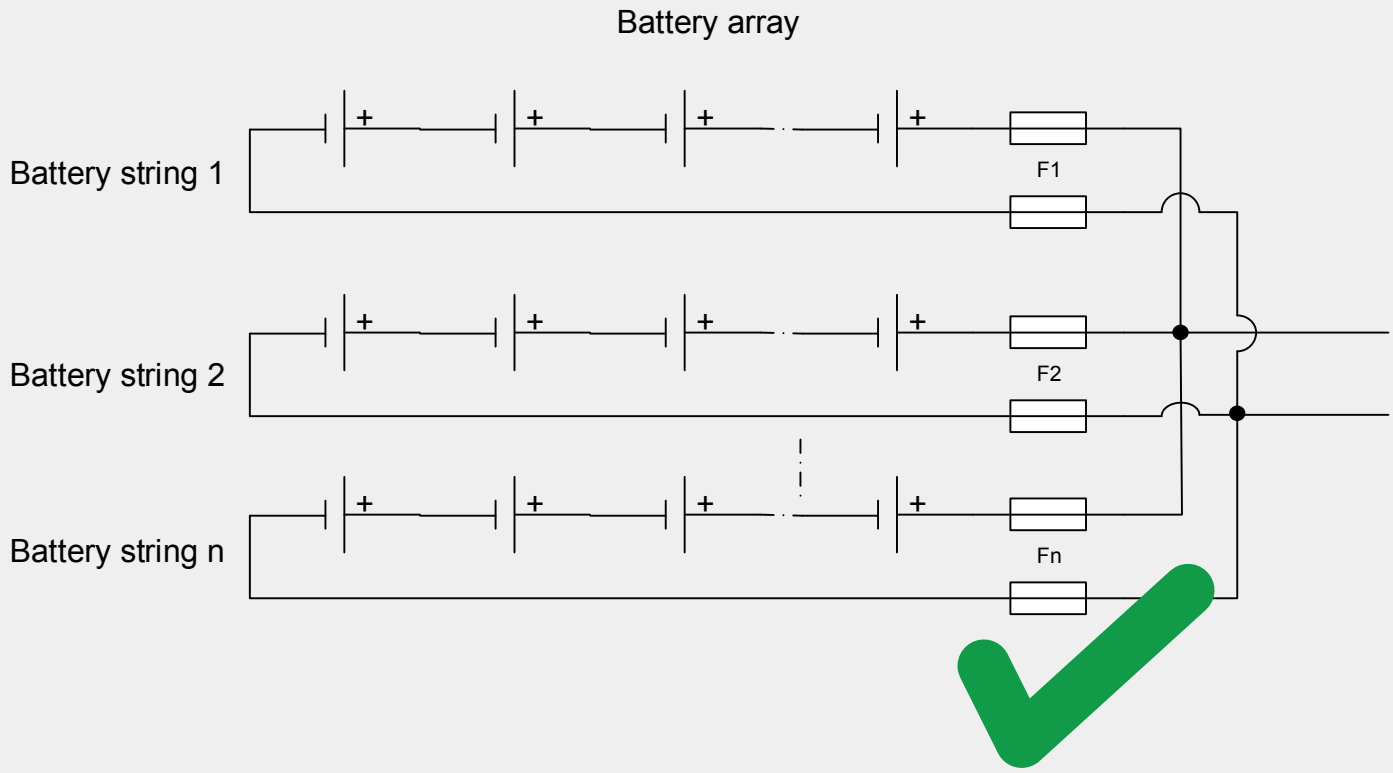
Required operating time

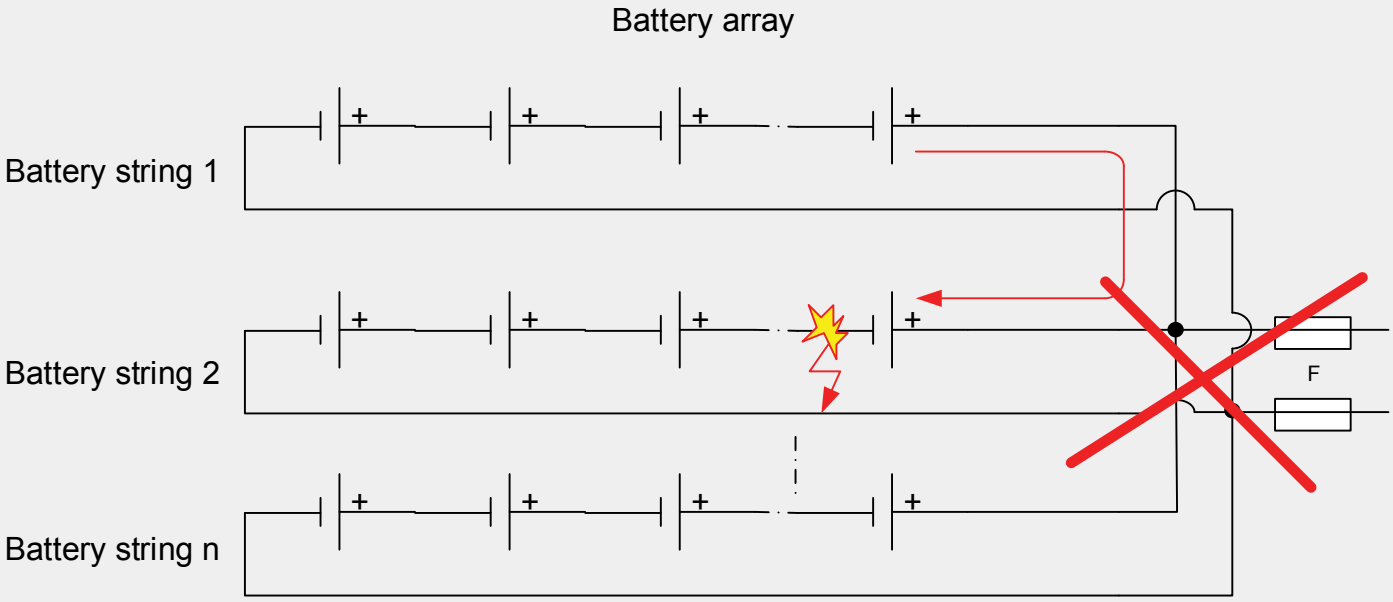
<5s

Battery fuse 700V d.c.
160A
operating time
2,5s

~~**gG** fuse 160A
operating time
15s~~

~~**MCB** 160A
operating time
~30s~~





For battery banks with parallel strings, a good practice is to include overcurrent protection for each battery string. This minimizes the potential of the bank backfeeding a single shorted battery, which can lead to fires and property damage.

Battery-string fusing is best accomplished with appropriately sized dc-rated fuses secured in bolt-in fuse holders that are housed in a single enclosure. This arrangement makes it easy to isolate one battery string for testing or maintenance while allowing the system to continue operation. Individual battery-string fuses can provide protection against catastrophic failure in the event of major fault in the main disconnect breaker panel or elsewhere in the battery bank. Series fuses on each battery string also reduce the available shortcircuit current levels, allowing for the use of lower ampere interrupting current rated circuit breakers for the inverter/ charger disconnects. Without the fuses, the amount of current that the circuit breaker has to interrupt during a fault could potentially exceed it's rating.

Ratings for Li-ion batteries

Burst discharge (pulse) ratings for Li-ion batteries:

The first set of C ratings on a Li-ion tells us how fast the battery can be discharged.

30C/60C

translates to

(maximum constant discharge rate) / (Burst discharge rate)

Burst can last for <5 seconds. To figure out how many amps this rate is, you need to know the capacity of the battery pack. If the pack says that it has 2,3Ah, take that number before the Ah and multiply with 30 to get the number of amps. In this case, it would be 69A. That is rating of 30C for that pack.

The burst rate would then be 2,3 x 60=138A amps for less than 5 seconds.

Specifications: Hypersonic 2300 6.6V

Product Summary:
2S1P cell configuration Li Ion
Deans Ultra output/charge
connector Balancing connector
(Balancing only with Sonic Charge™)

Voltage:	6.6V
Capacity:	2300 mAh
Max C-rate cont.	30C
Max C-rate pulse	60C
Max Current cont.	69A (limited by connector)
Max Current pulse	138A
Max temperature*	160F/71°C
Size (length x diam)	135mm x 28mm
Weight:	155g

Product Specifications

Type:	Lithium Ion
Capacity:	2300 mAh
Voltage:	6.6V
Connector Type:	Deans Ultra (WSD1300)
Number of Cells:	2
Weight:	155g
Configuration:	2S1P
Length:	5.31 in (135mm)
Width:	1.10 in (28.0mm)
Height:	1.10 in (28.0mm)
Maximum Continuous Discharge :	30C
Maximum Burst Discharge :	60C

Examples of maximum discharge current for Lead-acid and Li-ion batteries:

Internal Resistance (Fully Charged Battery)	<12mΩ
Maximum Discharge Current For 5 sec.(A)	180A

Storage	-20~60°C
Max. Discharge Current 77°F(25°C)	1000A(5s)
Short Circuit Current	3300A
Charge Methods: Constant Voltage Charge 77°F(25°C)	

Capacity	20.0Ah@20hr-rate
Weight	Approx. 5.9 Kg
Max. Discharge Current	200 A (5 sec)
Internal Resistance	Approx. 12 mΩ
Operating Temperature Range	Discharge: -20°C~

Continuous discharge current	100 A	100 A
Max discharge Impulse current:		
(10 min.)	200 A (temperature controlled)	200 A (temperature controlled)
(5 sec.)	>500 A	>500 A
(uSec.)	>1000 A	>1000 A
Continuous charge current	100 A	100 A

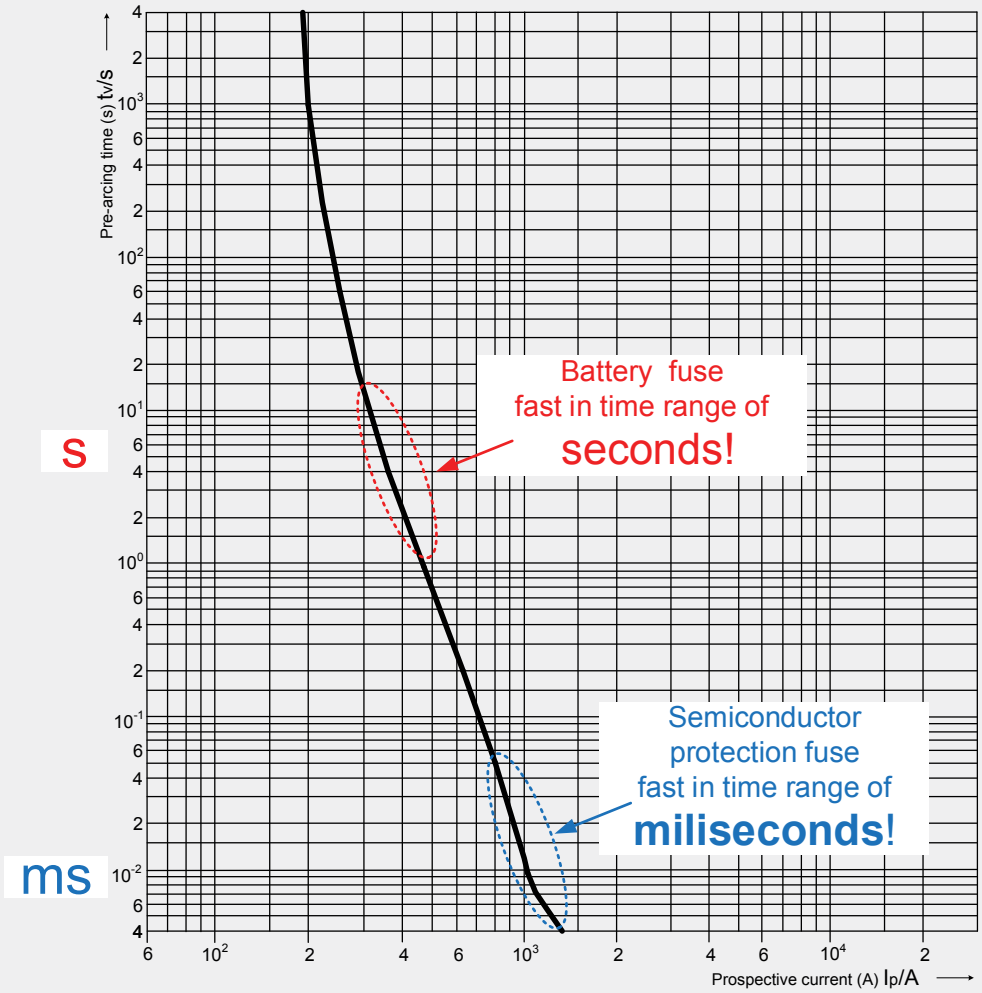
Max. Discharging Rate	• 66A (30.0C), Maximum continuous discharge, Recommended • 132A (60.0C),Maximum Burst rate < 5 seconds
Dimensions (LxWxH)	116mm(4.6") x 38mm(1.5") x 40mm(1.6")
Weight	10.8 Oz (300 g))

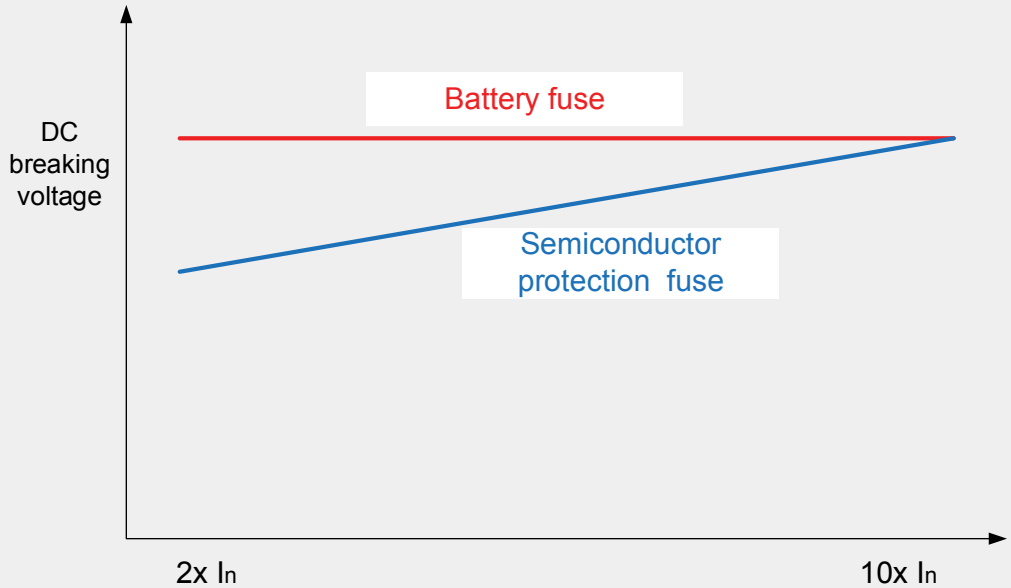
A few reasons why protection of batteries with simple fuse link is not OK:

- Flammable hydrogen gas is always present during battery recharging. Hydrogen gas is potentially explosive if allowed to accumulate in a closed area.
- Prevent open flames, sparks, or electrical arcs in the battery charging area to minimize the danger of explosion.
- Breaking capacity of »fork lift fuse link« is less than 1kA at nominal voltage!

Comparison characteristics

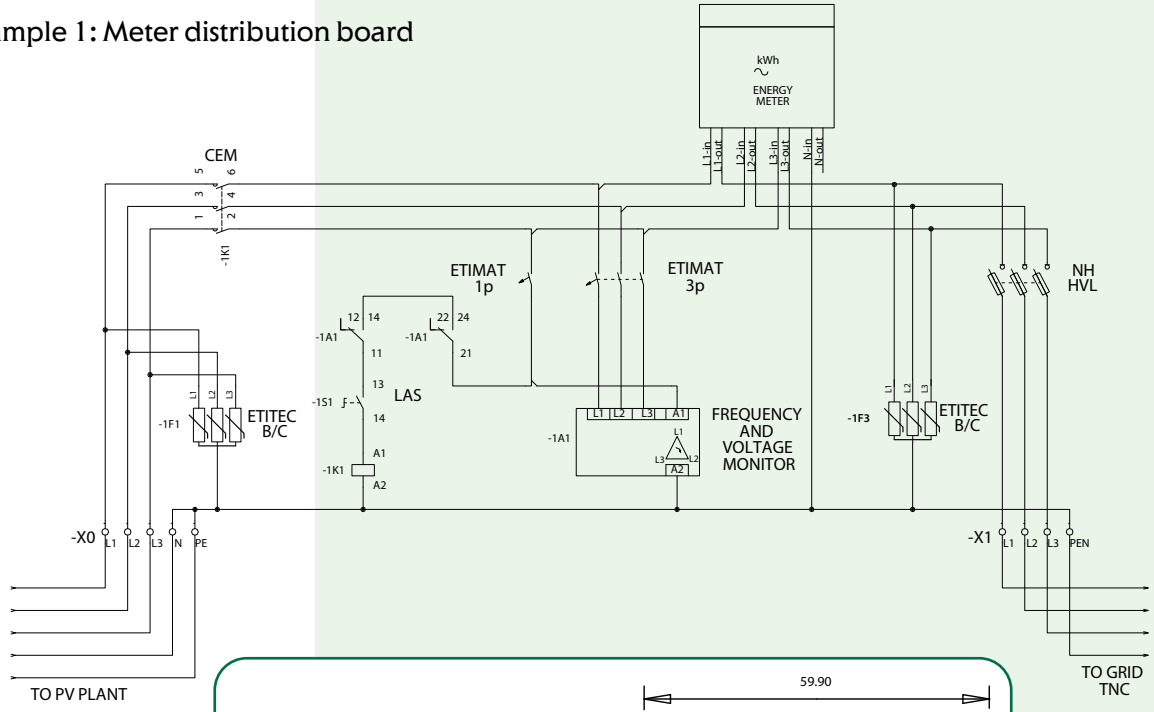
Battery fuse ⟷ Semiconductor protection fuse

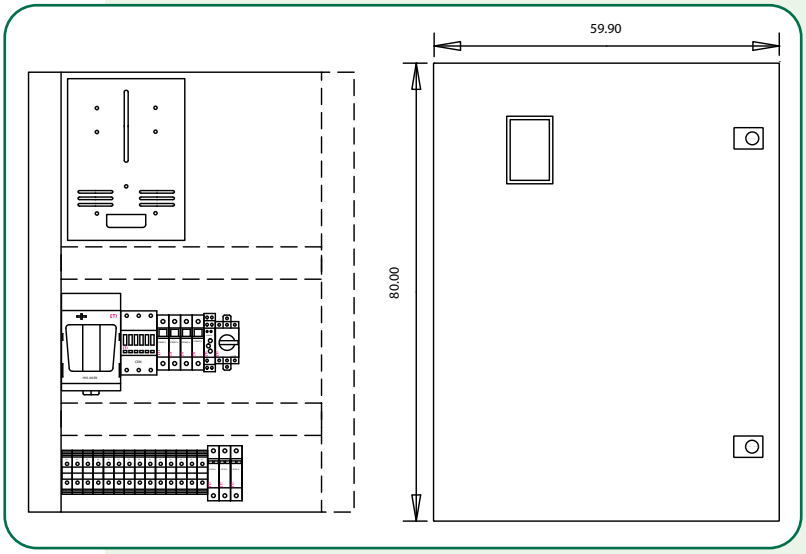




Solutions

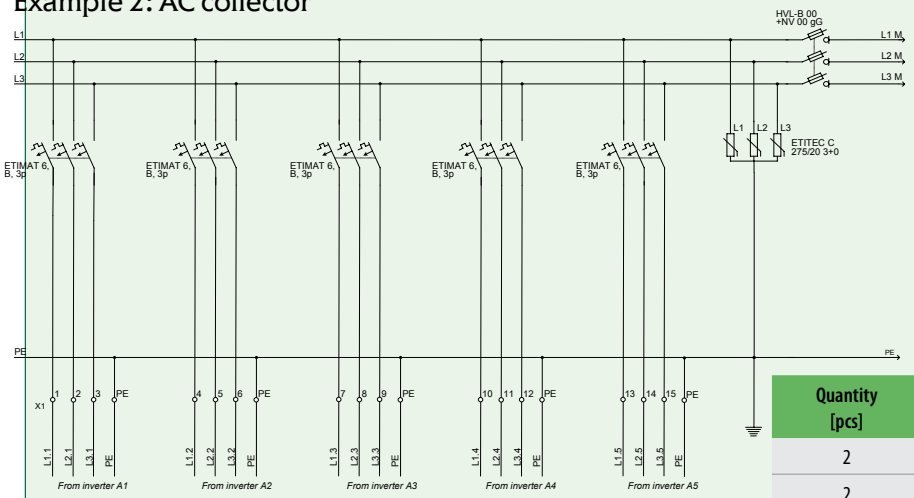
Example 1: Meter distribution board

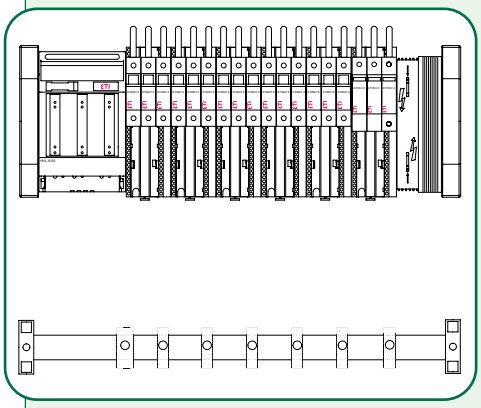




Quantity [pcs]	Code No.	Description
1	001102133	GT 80-60-25
1	002440141	ETITEC B-F 320/12,5 F 3+0
1	004648103	ETICON CEM 50.00 230V
1	002115512	ETIMAT 6, B, 6A, 3P
1	002111512	ETIMAT 6, B, 6A, 1P
1	001701250	HVL EK 00, 3p
3	004181213	NH 00 C KOMBI 80 A, gG 500 V
1	004660011	ETISWITCH LAS 1
2	002911001	35 mm TH rail NVS35/7,5 1m
1	001117002	3F, VP0
1	002471416	HRN-54
10	003901157	VS 35 PA
2	003901539	VS 35 PE
2	003901158	VS 35 PAN
6	003901000	VS 2,5 PA
3	003901911	IKP S 6060

Example 2: AC collector

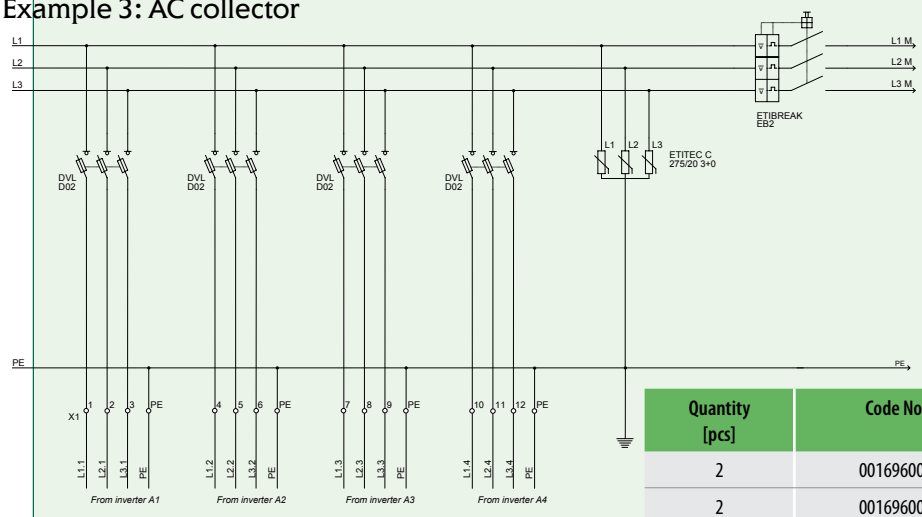


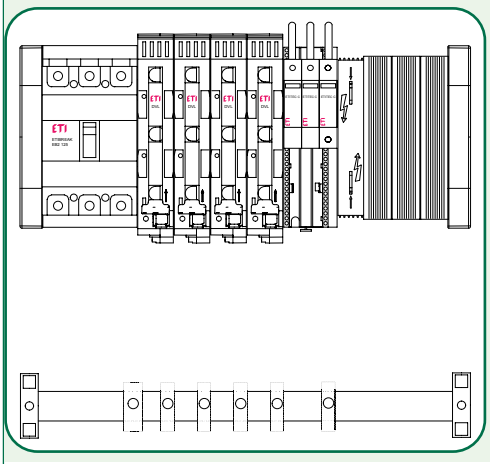


Quantity [pcs]	Code No.	Description
2	001696001	BBS-60/3
2	001696006	L-BBS-60/3
1	001696009	BBC-60/3
6	001696083	DA-60/32/72/1
1	001696042	HVL-B 00 3p M8
5	002111516	ETIMAT 6, B, 3p
1	002441522	ETITEC C 275/20 3+0
3	004183214	NH 00, 100A, gG
2	001696000	BBS-60/1
6	001696019	CT-5/16
1	001696021	CT-5/50

* see general catalogue about 60mm busbar system

Example 3: AC collector

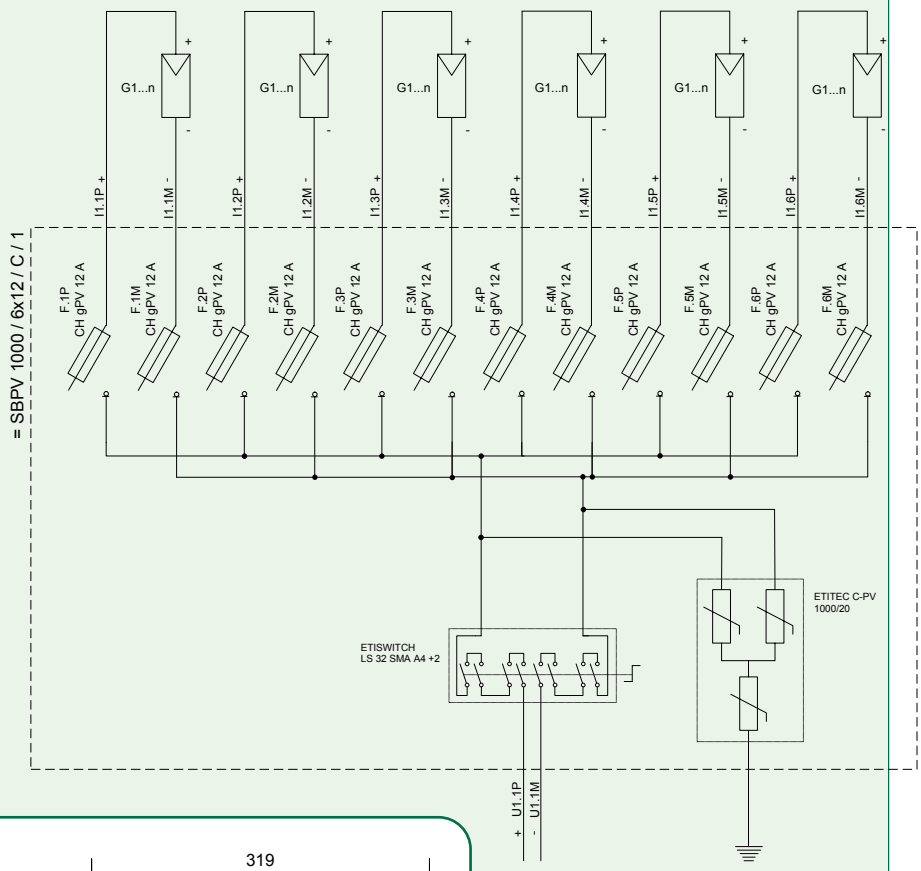


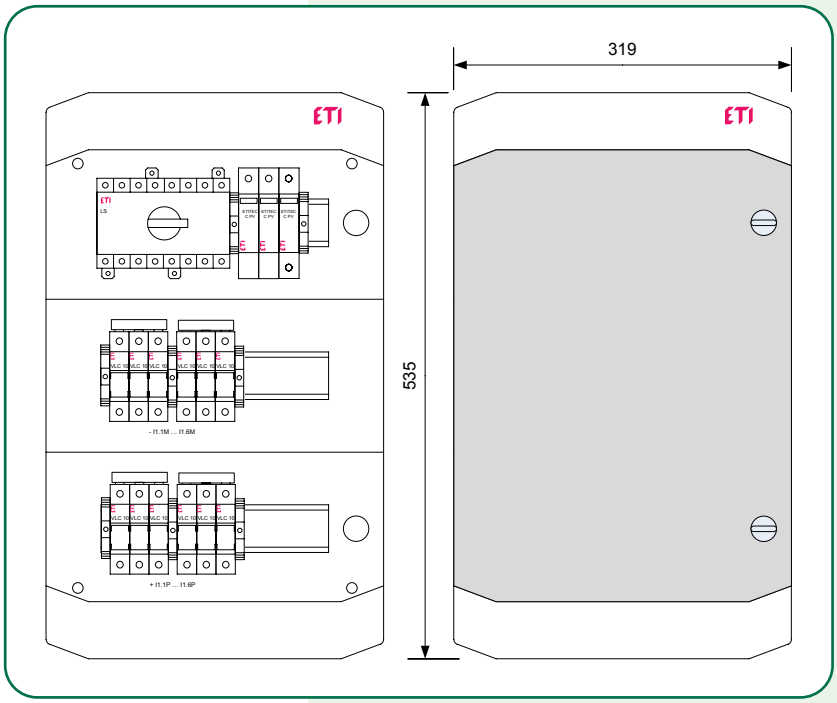


Quantity [pcs]	Code No.	Description
2	001696001	BBS-60/3
2	001696006	L-BBS-60/3
3	001696009	BBC-60/3
1	001696083	DA-60/32/72/1
4	001696050	DVL-60/183
12	002212006	D02, 32A
1	002441522	ETITEC C 275/20 3+0
1		universal MCCB adapter, frame 125
1	004671046	ETIBREAK EB2 125/3S 125A 3p
2	001696000	BBS-60/1
5	001696019	CT-5/16
1	001696021	CT-5/50

* see general catalogue about 60mm busbar system

Example 4: DC junction box

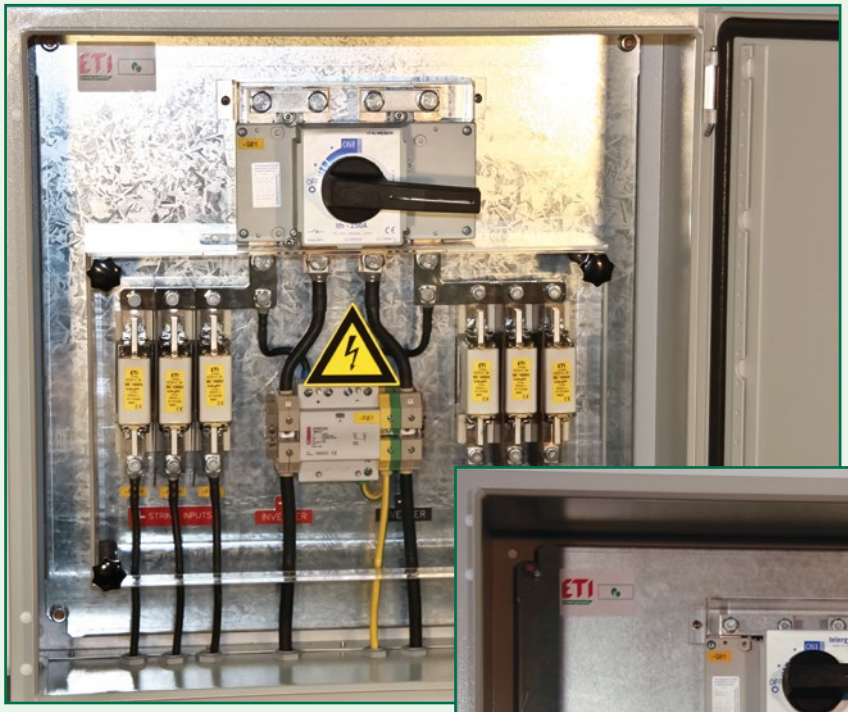




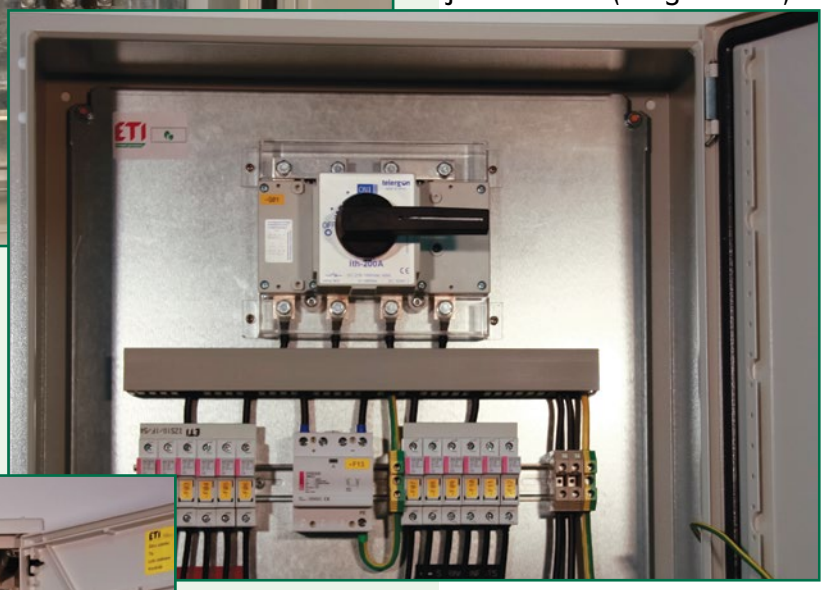
Quantity [pcs]	Code No.	Description
1	001101064	ECH-36PT
12	002540201	EFH 10 1p DC 1000V
0,25	002921101	IZS10/1F/54
12	002625106	CH10 gPV 1000V 12A
1	002445208	ETITEC C-PV 1000/20
1	004660066	LS32 SMA A4+2
8	003901016	PKPA 35 end bracket

Design on customer's request

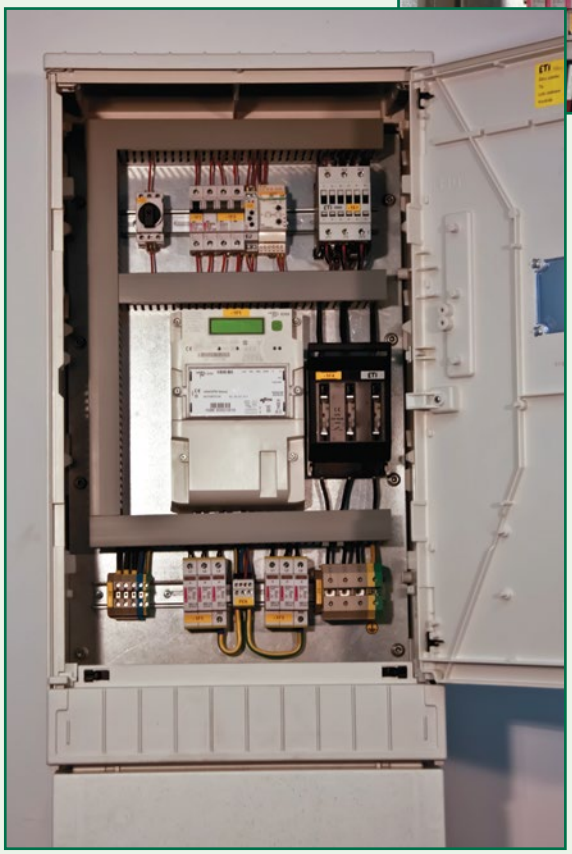
DC junction box (NH gPV fuses)



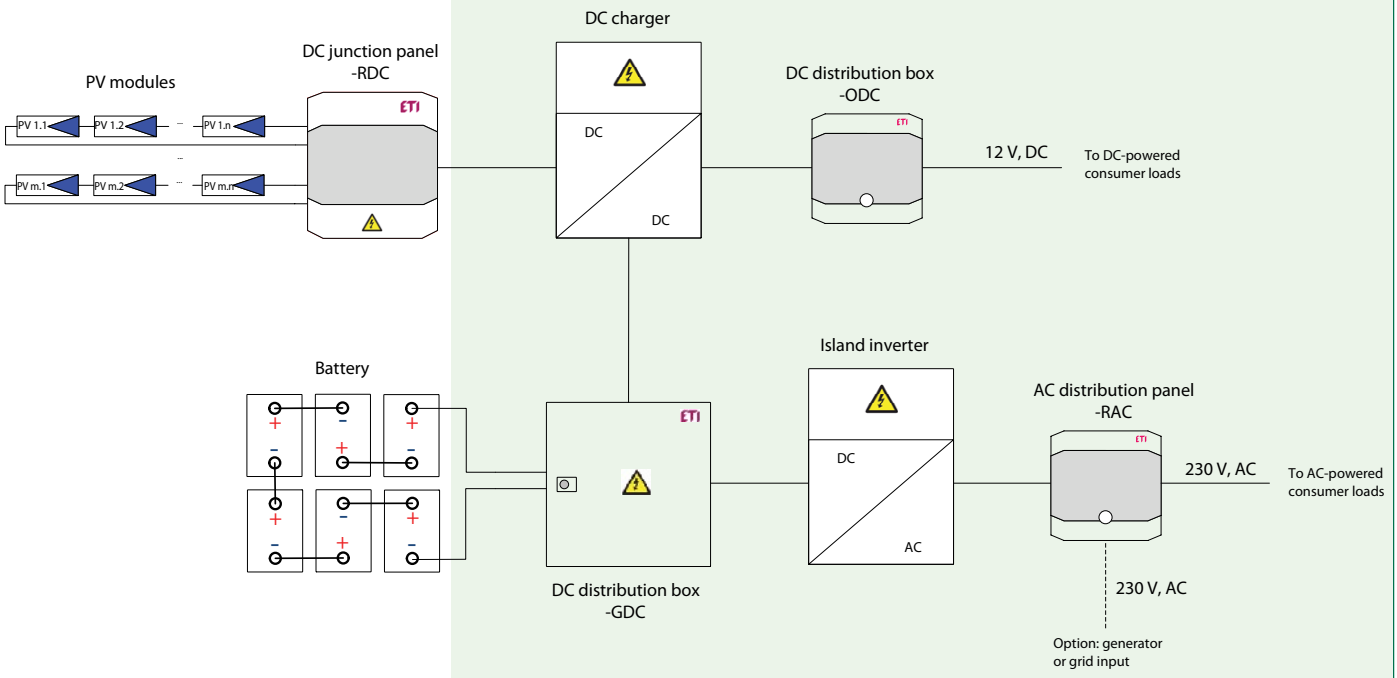
DC junction box (CH gPV fuses)



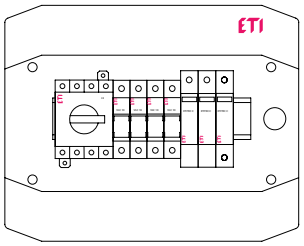
Meter distribution cabinet



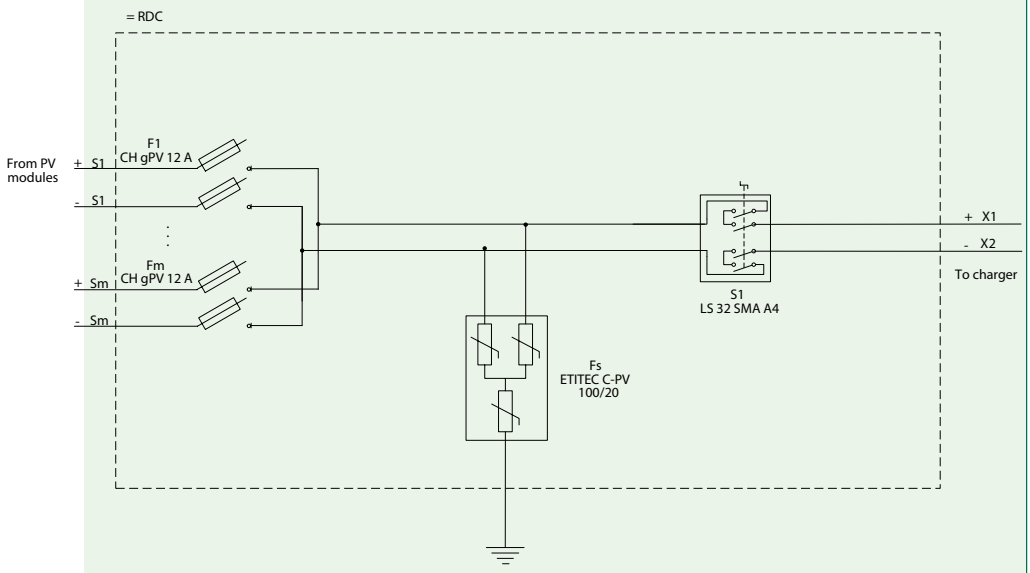
PV off-grid system protection



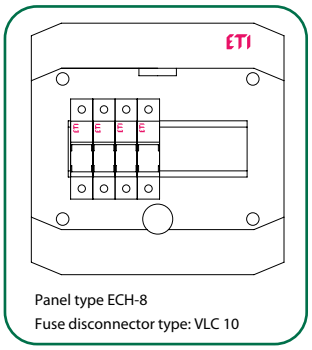
PROTECTING DC SIDE OF
ISLAND PV PLANT.



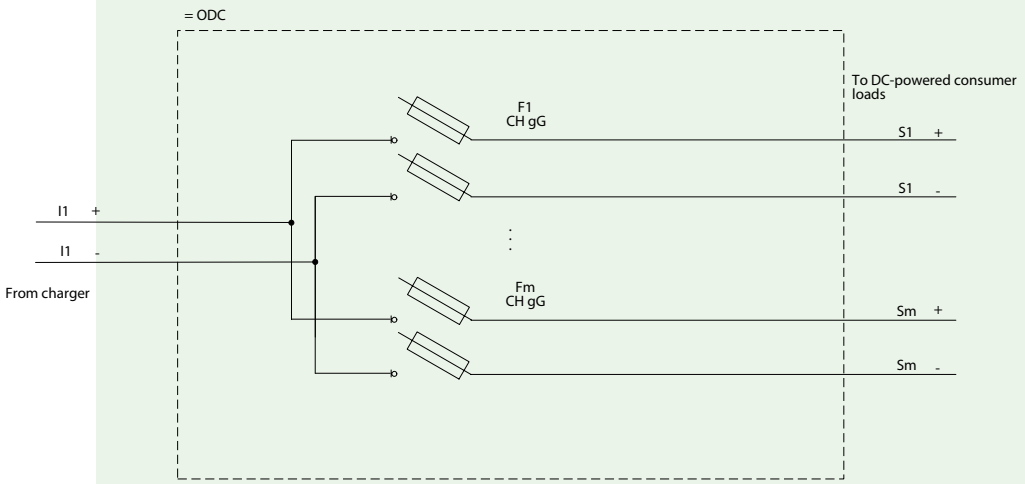
Panel type ECH-12
Fuse disconnector type: VLC 10 PV
Switch disconnector: LS
Surge arrester: ETITEC C, PV



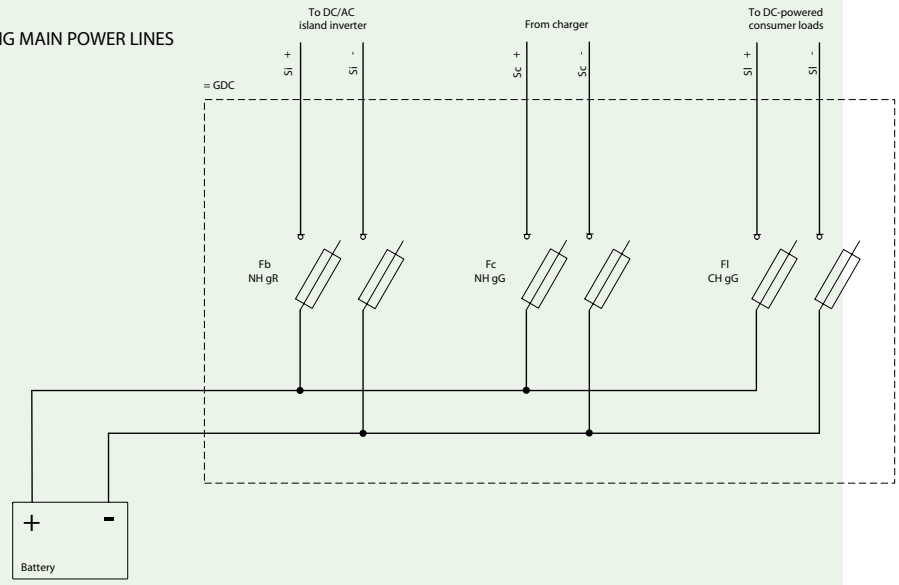
PROTECTING DC-POWERED CONSUMER LOADS
DIRECTLY FROM CHARGES.



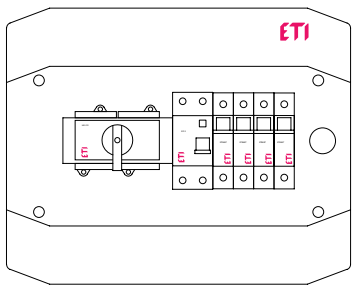
Panel type ECH-8
Fuse disconnector type: VLC 10



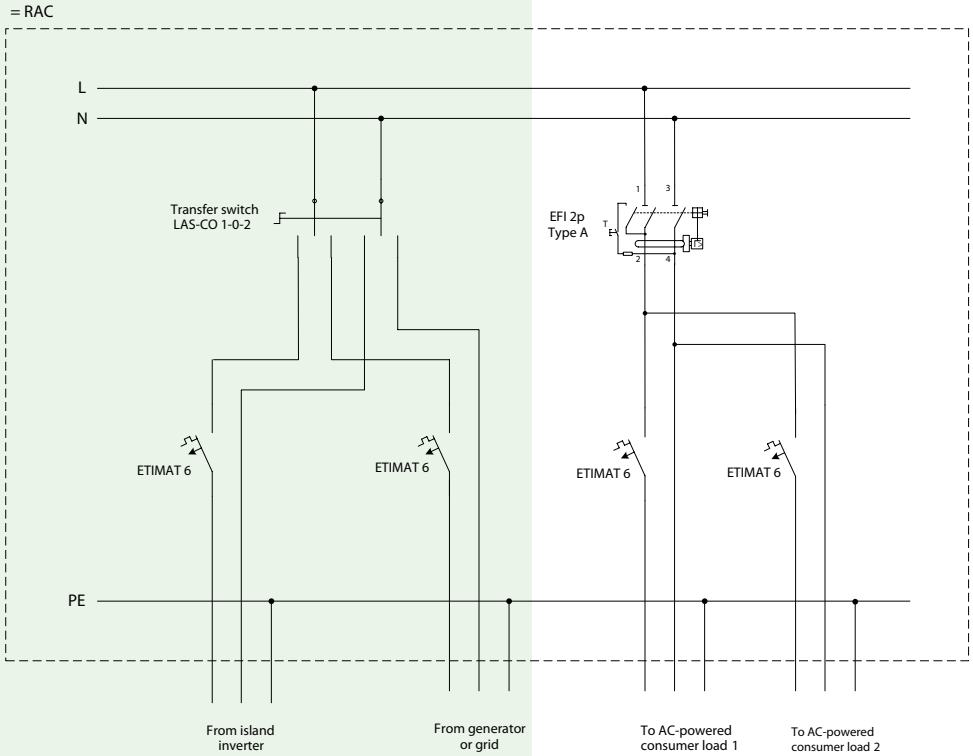
PROTECTING MAIN POWER LINES



AC DISTRIBUTION BOX



Panel type: ECH-12
RCB: EFI 2, type A
MCB: ETIMAT 6
Transfer switch: LAS CO



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