

:: Class certification

ABS
ABS TECHNICAL OFFICE
Busan Engineering Services

CERTIFICATE NUMBER: 05-BK130633-PDA
DATE: 14 December 2005

CERTIFICATE OF Design Assessment

This is to Certify that a representative of this Bureau did, at the request of **SB Fuse Co., Ltd**

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate. It will remain valid for five years from the date of issue or until the Rules or specifications used in the assessment are revised (whichever occurs first).

PRODUCT: Fuse Link (Non-Renewable Cartridge Type)
MODEL: SB-C1
ABS RULE: 2005 Steel Vessel Rules 4-6-3/5.3.4
OTHER STANDARD: JIS C813 and C852 (1983)

AMERICAN BUREAU OF SHIPPING
Jeong-Yong Kim
Engineering Type Approval Coordinator

Certificate of Quality Approval, Issue 2

DAS CERTIFICATION

QUALITY MANAGEMENT SYSTEM Certificate of Approval

This is to certify that the quality management system of

SB CO., LTD.
#628 Saengcheol-ri, Saengnim-myeon, Gimhae-si, Gyeongsangnam-do, Korea

Has been assessed and found to meet the requirements of:
ISO 9001:2000 / KS A 9001:2001

The certificate valid for the following scope of operation:
Design, Development, Manufacture and Service of Cable Fuse, Current Limiting Fuse and Fuse Holder and Fuse Cover

Date of Certificate Issue: 18-October-2006
Certificate Valid until: 18-October-2009
Certificate Number: K01-1321

Authorized: *[Signature]*
Date: 18-October-2006

DAS CERTIFICATION Ltd.
Company Number: 3184526
1 Wellington Close,
Hemel Hempstead, Herts AL3 1HN
Telephone: +44 (0) 1292 397888
www.dascertification.co.uk
Email: info@dascertification.co.uk

IAF Registered ISO 9001:2000
UKAS Registered 17-A

Type Approval Certificate Germanischer Lloyd

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No. 13 784 - 99 HH
Company SB Co., Ltd.
628, Saeng Chul-ri, Saengnim-myeon
Gimhae-city, Kyungsangnamdo, KOREA

Product Description Fuse-link
Type SB-C1
Environmental Category C
Technical Data / Range of Application Fuse-link SB-C1: non renewable cartridge type
Rated current I_n: 1-60 A (Fuse link)
Rated current I_n: 30-60 A (Fuse holder)
Rated operational voltage U_e: 500 V AC / 250 V DC
Rated insulation voltage U_i: 2500 V AC / 2000 V DC
Rated frequency f_e: 50/60 Hz
Rated breaking capacity: 100 kA (A.C.) with ACL 100
Rated breaking capacity: 50 kA (D.C.) with DCL 50
Fusing factor: 1.35 x is
Characteristic: A
status indication optional
Application: distribution panels for marine and off-shore system

Test Standard Regulations for the Performance of Type Tests
IEC 60269-1-98
Documents Test report:
S. B-Fuse-Standard SQ40125-FL (rev.1, 06-10-25)
KIMM No. 2007287823, dated 2007-12-14

Remarks For ambient temperature reference is made to IEC 60269-1:1999

Valid until 2013-02-17
Page 1 of 1
File No. LL98
Hamburg, 2008-02-18

Germanischer Lloyd
[Signatures]
Wolfgang Vob
Joachim Zepke

KR
KOREAN REGISTER OF SHIPPING

TYPE APPROVAL CERTIFICATE

형식 승인증서

Certificate No. : GCH04247-EL002
Product : Fuse Link
Manufacturer : SB Corporation
628 Saengnim-myeon, Gimhae-si, Kyeongsangnam, Korea

Date of Approval : 8th August, 2000.

Product Description : Non Renewable Cartridge Type Fuse Link (Type : SB-C1)
- Rated current(I_n) : 1 ~ 60 A (Fuse Link)
- Rated operational voltage(U_e) : 500 V AC / 250 V DC
- Rated insulation voltage(U_i) : 2500 V AC / 2000 V DC
- Rated frequency(f_e) : 50/60 Hz
- Rated breaking capacity : 100 kA(AC) with ACL 100
- Rated breaking capacity : 50 kA(DC) with DCL 50
- Fusing factor : 1.35 x is
- Characteristic : A

Approval Condition : 1. This approval is granted on the basis of the test report no. 990182 issued by Korea Electrotechnology Research Institute and MP-A01000379 & MP-99/013724 issued by QESI.
2. No product certificate required.

THIS IS TO CERTIFY that the above-mentioned product has been approved in accordance with the relevant requirement of this Society's Rules and / or of the recognized standards as follows and entered in the "List of Approved Manufacturers and Type Approved Equipment".
Pt. 6, Ch. 1, Art. 802 of the Rules for Classification, Steel Ships.

This Certificate is valid until 7th August, 2010.
Issued at Daejeon, Korea on 13th October, 2005.

Man-Eung Kim
General Manager of Materials and Equipment Team

Note : 1. The approval will be automatically suspended and the Certificate become invalid from the expiry date of the Certificate in the event that the extension has not been granted or is not under attendance for completion of the renewal survey.
2. Any significant changes of products and/or manufacturing process render this certificate invalid.

AC-24(2004.02)

Lloyd's Register

Type Approval Certificate Extension

This is to certify that Certificate No. 00/00102 for the undernoted products is extended and renumbered as shown.

This certificate is issued to:

PRODUCER : S.B. Co. Ltd.
PLACE OF PRODUCTION : 628 Saengchul-ri, Saengnim-myeon, Gimhae, Kyungnam, Korea, Republic of

DESCRIPTION : Non-renewable cartridge fuse-link
TYPE : SB-C1
APPLICATION : Marine, offshore and industrial applications.

SPECIFIED STANDARD : JIS C 8352-83: General requirement for fuses for the production of low-voltage cables and lines.
JIS C 8314-83: Particular requirement for low-voltage fuses.
IEC 60269-1: Low-voltage fuses

Rated Fuse Link Current (A)	Rated AC Breaking Capacity (kA)	Rated DC Breaking Capacity (kA)	Rated Voltage AC/DC (V)	Rated Frequency (Hz)	Fusing Factor (in)
1, 2, 3, 4, 5, 6, 8, 10, 15, 20, 25, 30, 40, 50 & 60	100	50	500/250	50 & 60	1.35

Certificate No. 00/00102(E1)
Issue Date 11 February 2006
Expiry Date 17 August 2010
Sheet 1 of 2

Lloyd's Register EMEA
71 Fenchurch Street, London EC3M 4BS

M. A. Ruffalo
M.H.A. Ruffalo
London Plan Approval
Lloyd's Register EMEA

NIPPON KAIJI KYOKAI

Certificate No. TA65574M

Certificate of Type Test

MANUFACTURER: S B Co., Ltd. Kyungnam, Korea
PRODUCT: Non-renewable Cartridge Type Current Limiting Fuse Link
TYPE NO.: SB-C1
TYPE TEST NO.: 00T101

PARTICULARS: Rated voltage a.c. 500V, d.c. 250V
Rated current 1, 2, 3, 4, 5, 6, 8, 10, 15, 20, 25, 30, 40, 50, 60A
Rated frequency 50/60Hz
Rated breaking capacity a.c. 100kA, d.c. 50kA
Minimum fusing factor 1.35

DOCUMENTATION: SQ40125-FL

THIS IS TO CERTIFY that the above mentioned product has been approved by the NIPPON KAIJI KYOKAI in accordance with the Society's type test requirements for electrical equipment and cables.

This certificate is valid until the 14th day of November, 2009.
Issued at Tokyo on the 15th day of November, 2005

[Signature]
S. Ogata
General Manager
Machinery Department

Note: The manufacturer, if desired, is requested to apply to the Society for renewal prior to the expiration date.

CS-24-2002-01



SB CO.,LTD

#703-3 Bugok-ri Jangyu-myeon Kimhae-city Kyungnam, Korea

Tel. 82-(0)55-338-3113

Fax. 82-(0)55-336-9105

E-mail. sbfuse@sb21c.com

www.sb21c.com



SB

www.sb21c.com

Fuse links for Marine & Off-Shore

SB-C1 & FH-1550N FH-2075N



“ Patient people who rise to the challenge of product innovation with an industrious mindset ”

"Patient people who rise to the challenge of product innovation with an industrious mindset"

SB Co., Ltd. was established as Sambu Fuse with the management policy of "Let's be patient people who rise to the challenge of product innovation with an industrious mindset" at Youngdo-gu, Busan City in 1990. The company had endeavored to localize fuse-links for ships and had received type approval for AC 500V 10KA fuse-link from the Korean Register of Shipping (KR) in 1992. The company has continuously endeavored to develop fuses for ships since then. Consequently the company has received type approvals for fuse links of the rated voltage of AC 500V DC 250V and rated ampere from 1A to 60A, breaking current of AC 100KA, DC 50KA from ABS, BV, GL, LR, KR, and NK, which is the first in Korea. The company currently supplies the fuses to almost all ships which are built in Korea and offshore. The company is now meeting the challenge to develop innovative products such as electrical parts for ships for its second take off.

We will do our best to become a comprehensive manufacturer of electrical parts for ships with our continuous R&D efforts and provide our customers with our innovative products.

Please continue to encourage us with your constant guidance and assistance in order for us to be a successful company.

Thank you very much.

Park, woon-han, Representative director of SB Co., Ltd.



Company History

1990. 06	Sambu Fuse was established at Youngdo-gu, Busan City.
1992. 07	Acquired type approval of SC-1 Type Fuse-Links (AC 500V 10KA) from the Korean Register of Shipping (KR).
1997. 05	Korea Electric Power Corporation (KEPCO) approved development test o f electric wire fuse.
1997. 07	The company was qualified as a competitive bidder for electric wire fuse by the Korea Electric Power Corporation.
1998. 03	The company started to supply electric wire fuses to the Korea Electric Power Corporation.
1998. 04	The company participated in INNO-BIZ which is managed by the Small and Medium Business Administration (SMBA).
1999. 09	The company was incorporated and its name was changed to SB Fuse Co.,Ltd Its head office and plant moved to Saha-gu, Busan City.
2000. 02	Company research and development certificate. (Sangihyup 20003023)
2000. 03	Participated in INNO-BIZ (SMBA).
2000.05~10	SB-C1 Type Fuse-Links were approved by ABS, BV, GL, LR, KR, and NK.
2000. 06	Registered utility model. (fuse structure)
2000. 10	ISO 9001 certificate.
2001. 08	INNO-BIZ certificate. (SMBA)
2001. 12	Registered utility model. (Tube type holder)
2002. 05	Specialized Components and Materials Enterprise. (the Ministry of Commerce, Industry and Energy)
2002. 06	Chinese office was established in Zhejiang province, China.
2004. 10	The company name was changed to SB Co., Ltd. and its head office and plant were moved to Saengrim-myeon, Gimhae City, Gyeongnam Province.
2008. 03	The company registered utility model (fuse holder).
2008. 04	China plant was established. (Wenzhou SB Electric Co., Ltd.)
2009. 08	The company head office and plant were moved to Jangyu-myeon, Gimhae City, Gyeongnam Province.
2009. 10	Participated in "Marine week 2009" at Bexco in Korea
2009. 12	Participated in "Marintec China 2009" at Shanghai New International Expo center
2010. 04	Prticipated in " Sea Japan 2010" at Tokyo Big Sight in Japan

C.o.n.t.e.n.t.s

02_	CEO Message
03_	Company History / Contents
04~06_	Fuse-Links
07~10_	Fuse-Holder
11_ 12	Fuse-Cover
13_	Fuse-Puller

► Model number SB-C1

(Non-renewable cartridge type current limiting fuse-links)

► Service Conditions

- The ambient temperature is within the range of the maximum 45°C and the minimum -25°C.
Provided that the average temperature during 24H shall not exceed 35°C.
- Not affected by shot

► Specifications

- **Rated voltage** AC 500V/DC 250V
- **Rated current** 1A, 2A, 3A, 4A, 5A, 6A, 8A, 10A, 15A, 20A, 25A, 30A, 40A, 50A, 60A
- **Rated frequency** 50Hz, 60Hz
- **Rated breaking capacity (Interrupting capacity).** AC 100,000A/DC 50,000A.
- **Classification class** "A" (Fusing factor 1.35In)

► Marine/Off-Shore Type Approvals for SB-C1 Fuse Links

- American Bureau of Shipping(ABS)
- Germanischer Lloyd(GL)
- Lloyd Register of shipping(LR)
- Korea Register of shipping(KR)
- Nippon Kaiji Kyokai(NK)
- KS A 9001/ISO 9001



■ Table Standard Ratings

Model Number	Rated voltage(V)	Rated current(A)	Rated frequency(Hz)	Rated breaking capacity(KA)	Fusing factor	Approved number
SB-C1	AC 500 DC 250	1A, 2A, 3A, 4A, 5A, 6A, 8A, 10A, 15A, 20A, 25A, 30A, 40A, 50A, 60A	50~60	AC 100 (ACL 100) DC 50 (DCL 50)	1.35In	ABS 05-BK130633-PDA GL 13784-99HH LR 00/00102(E1) KR GCH04247-EL002 NK 00T101 ISO DQ-090436

► Construction and Dimensions

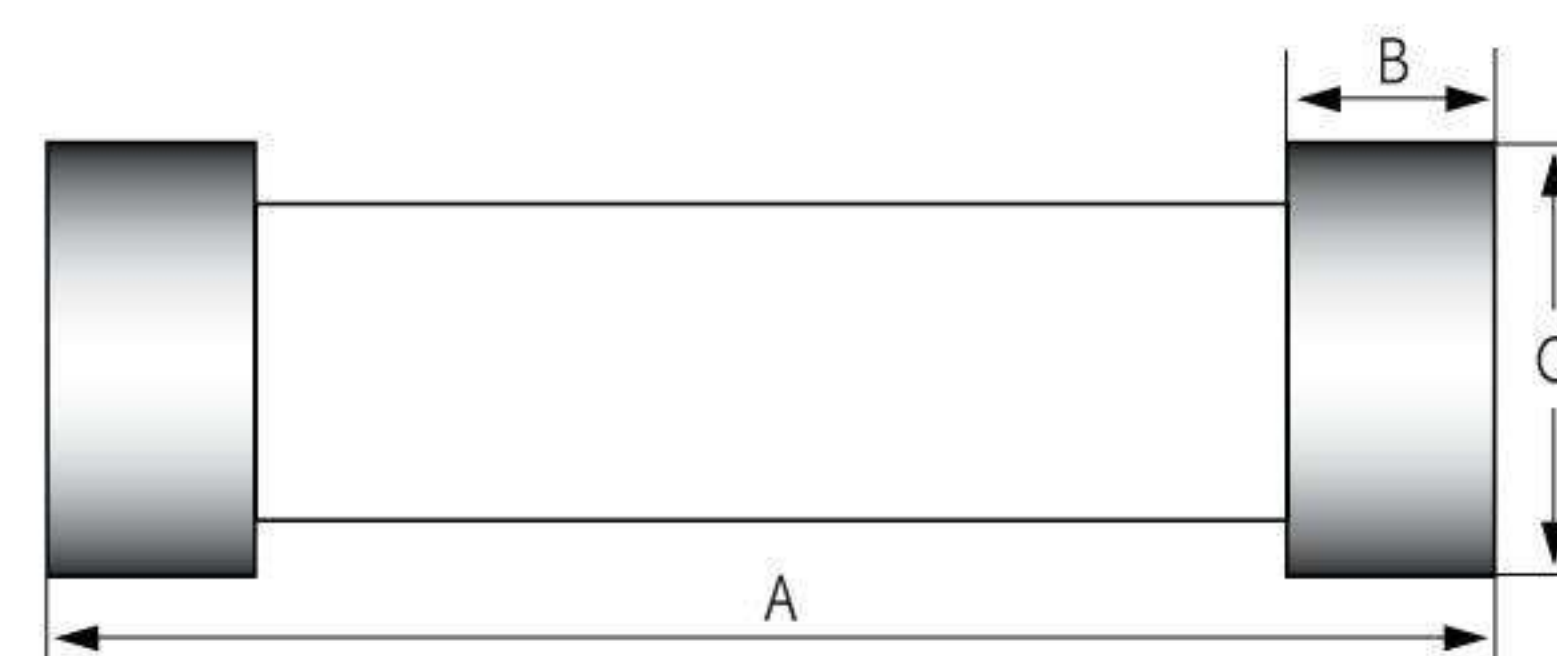
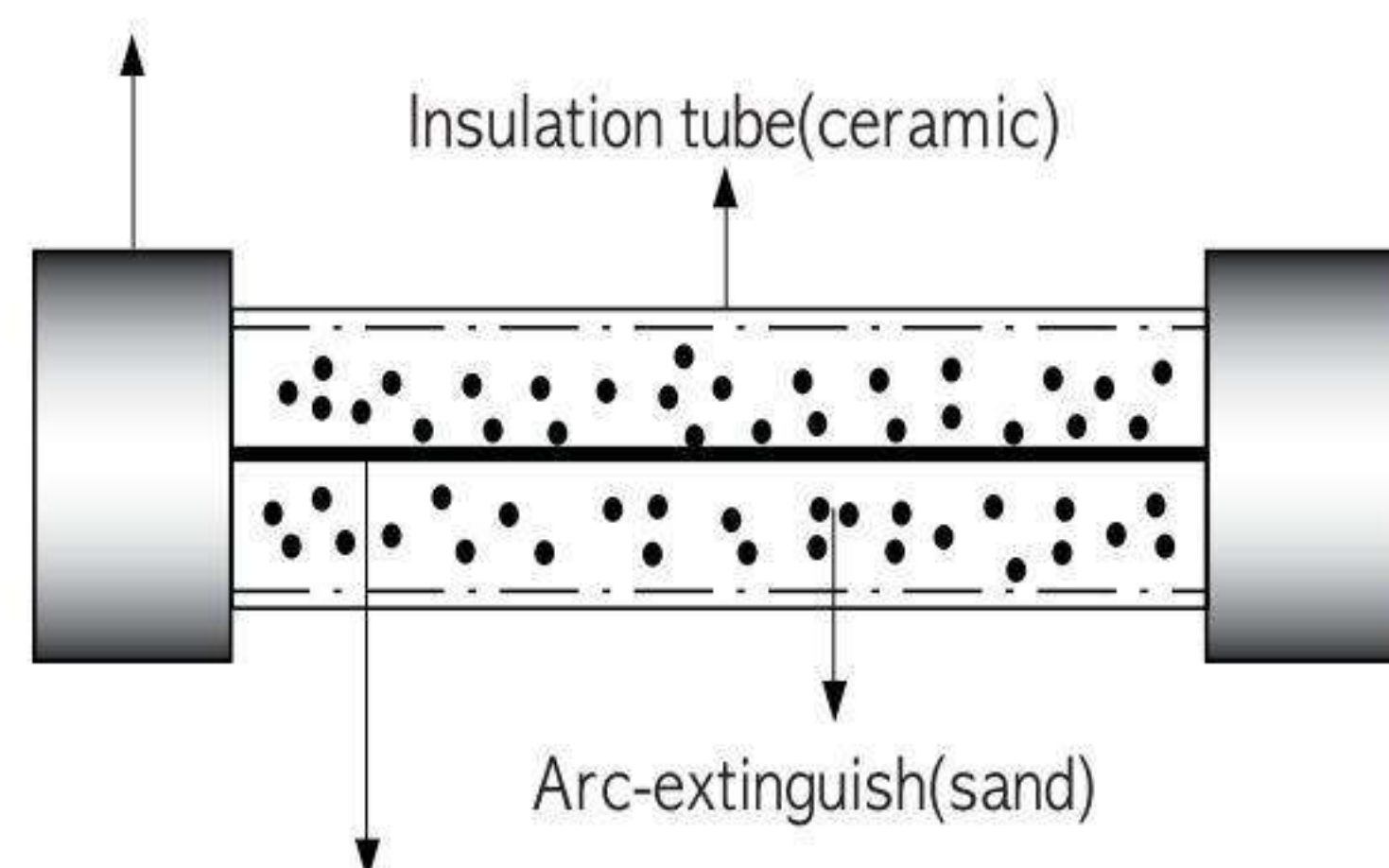
- The fuse element is made of silver alloy with special treatment applied.
- The insulating tube is made of special ceramics having high heat-resistance and sand is used as arc-extinguishing filler.
- The materials for current carrying metal fitting is of copper alloy.

Out & Inner cap(Sn-plated copper alloy)

Insulation tube(ceramic)

Arc-extinguish(sand)

Element(silver alloy)



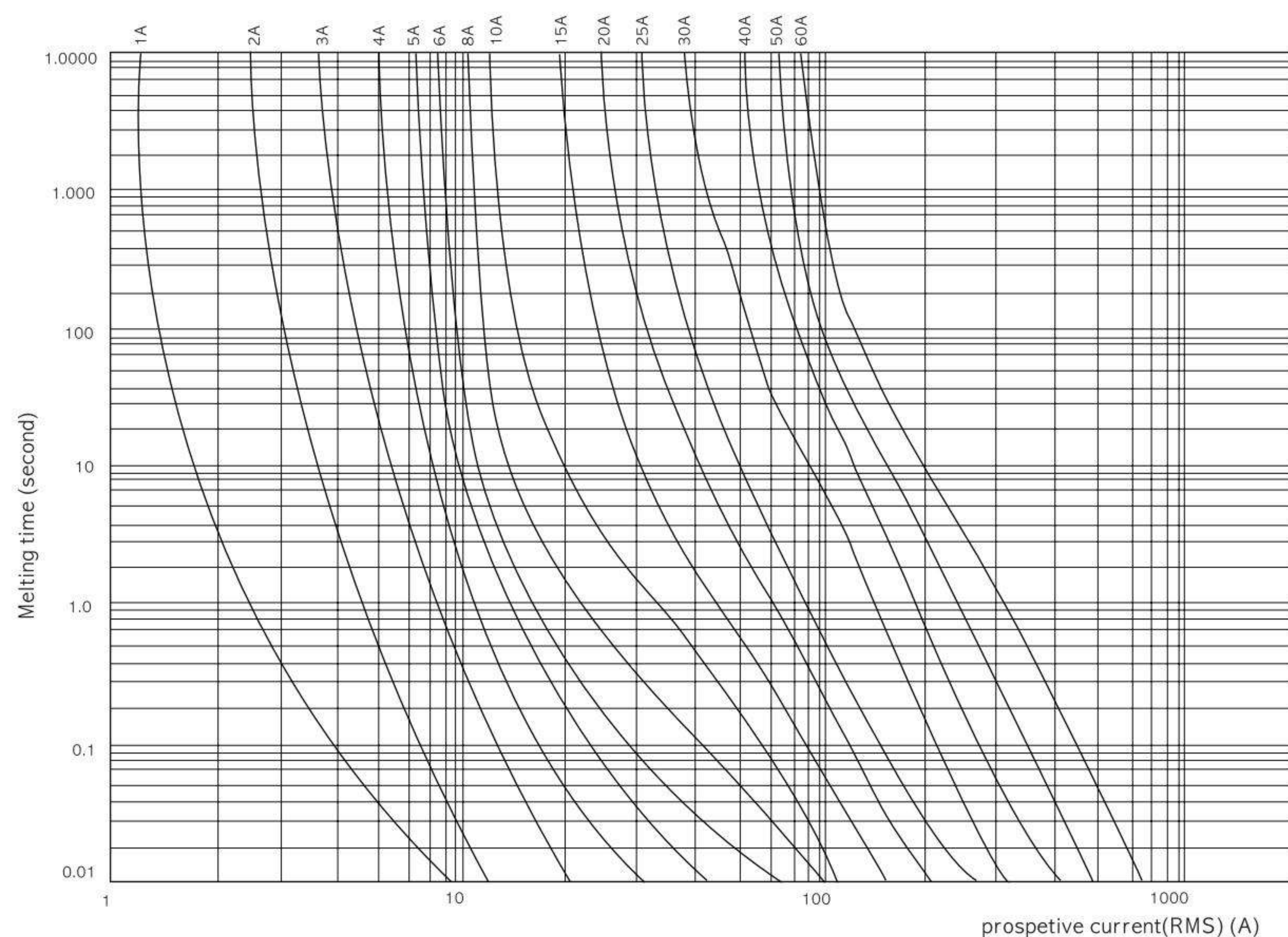
■ Table Dimension

Model Number	Rated current(A)	Dimension(mm)			Weight (g/pc's)
		A	B	C	
SB-C1	1A, 2A, 3A, 4A, 5A, 6A, 8A, 10A, 15A, 20A, 25A, 30A	50	13	15	22
	40A, 50A, 60A	75	16	20	56

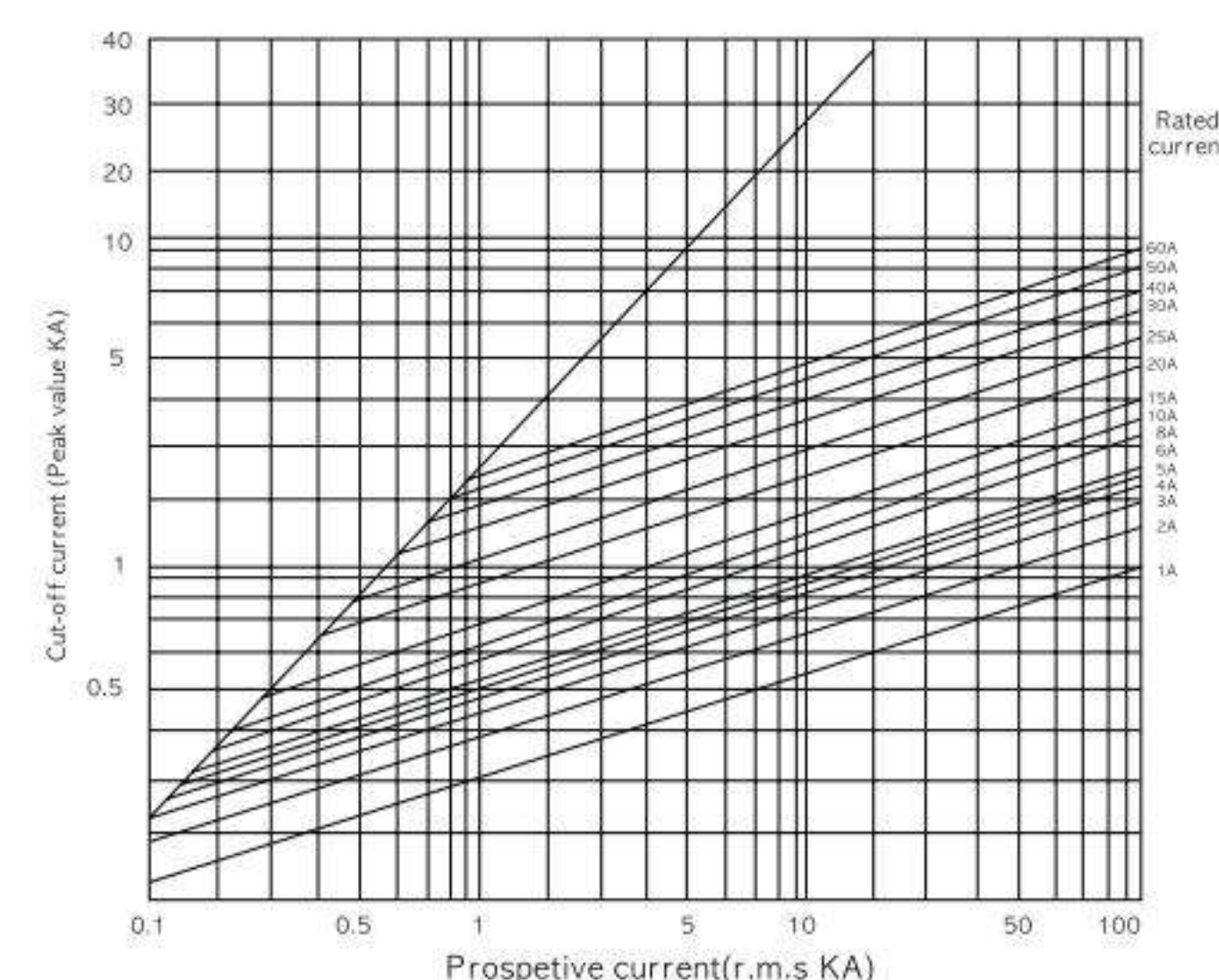


PERFORMANCE

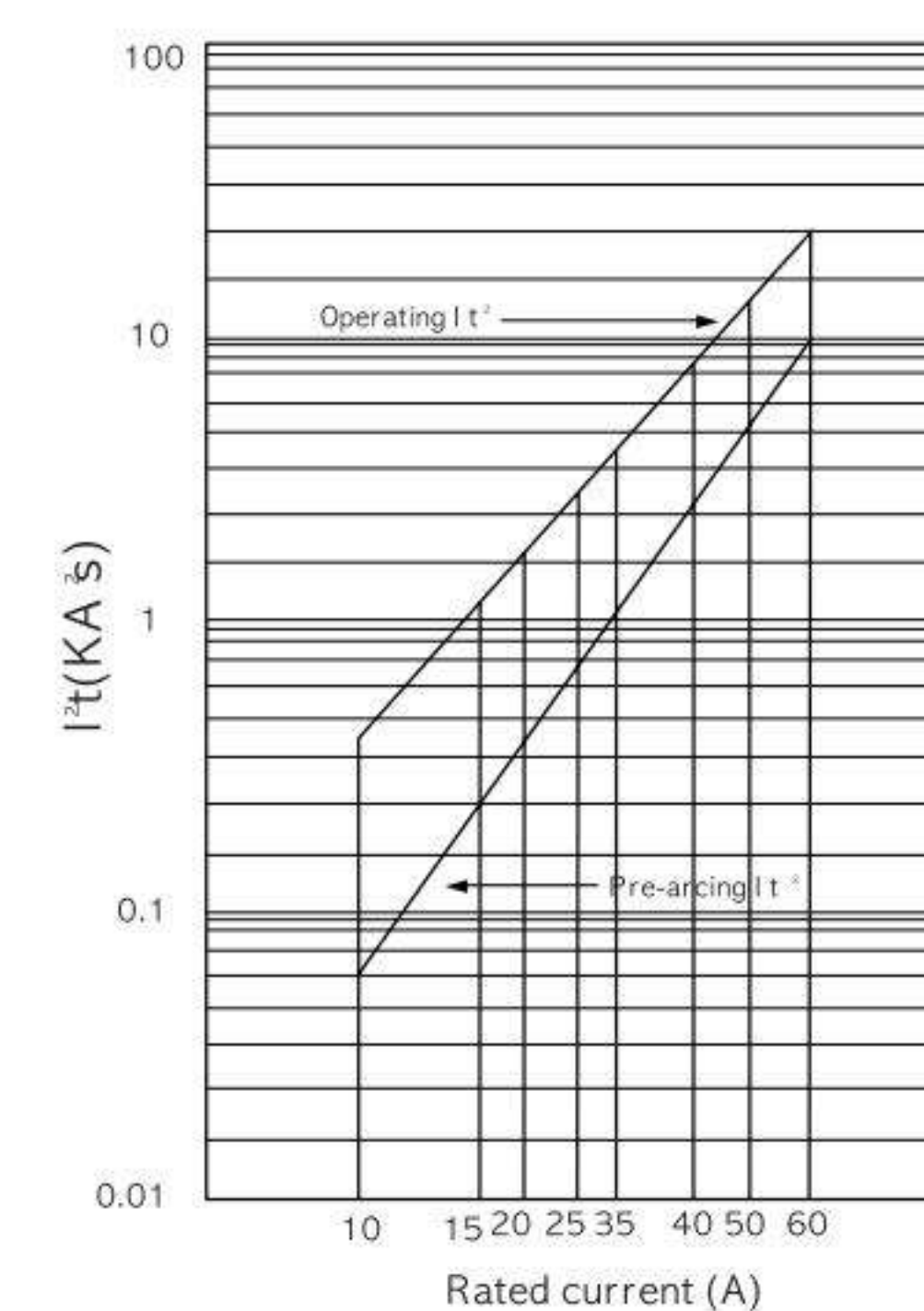
Pre-arcing time/current characteristic
1–60Amperes, 500VAC(Fusing Factor–1.35In)



Cut-off characteristics



$I^2 t$ characteristics

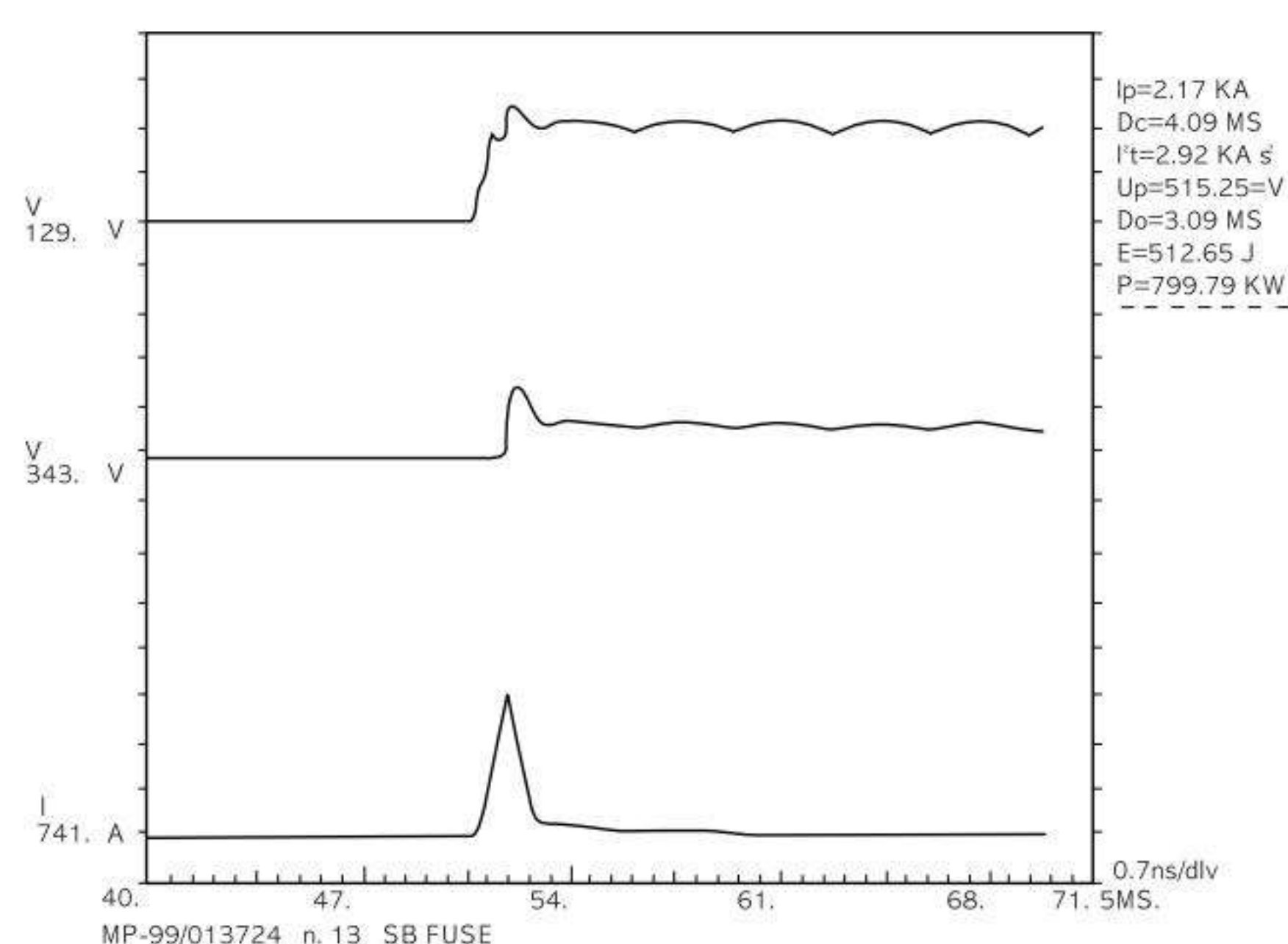


Verification of breaking performance I_1 at DC

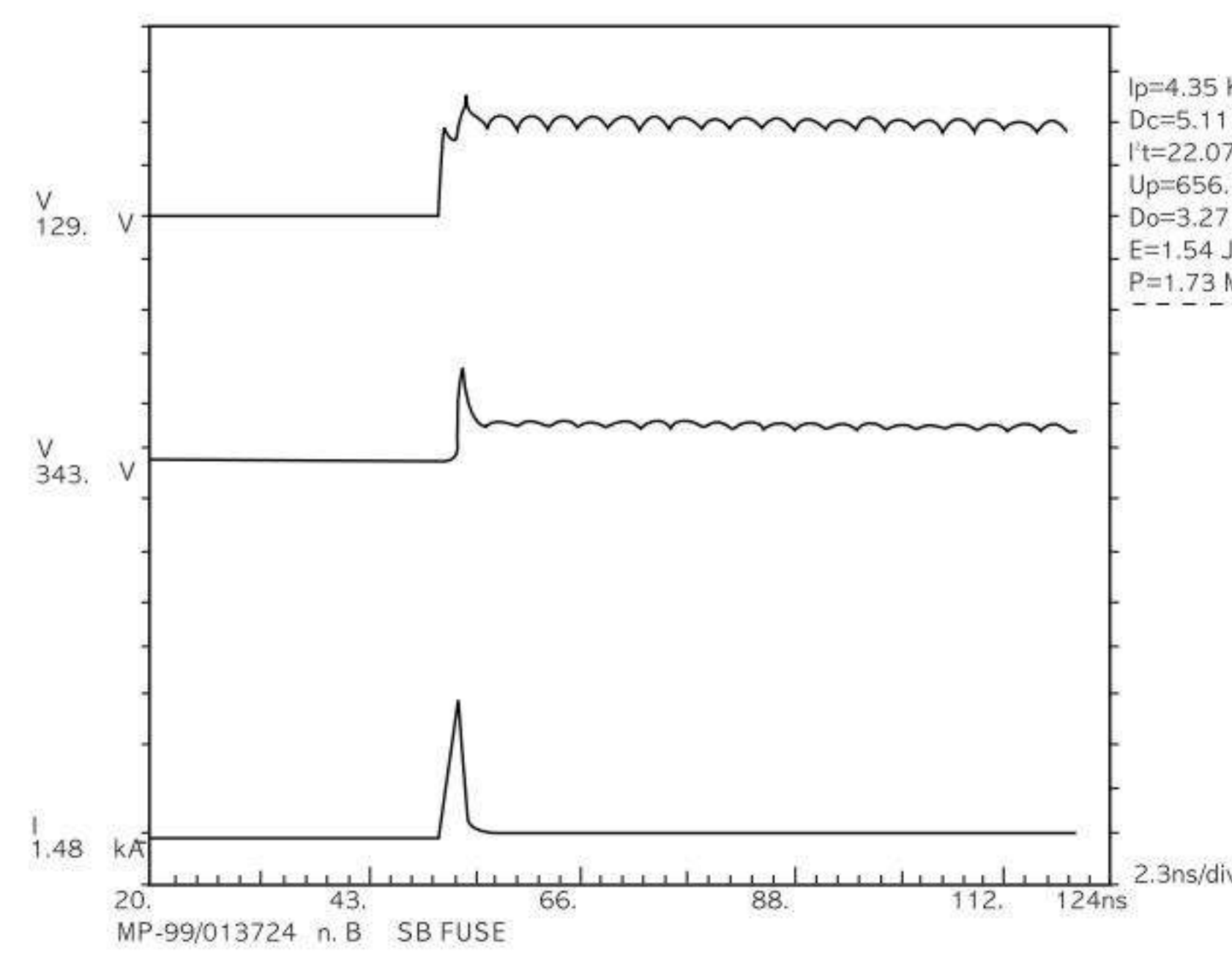
- Applied voltage DC 254V
- Steady-state current 51,980A
- Peak current 52,410A
- Time constant 15.1ms

Table

Type	Rated current(A)	Cut-off current(A)	Time(ms)		$I^2 t$ (KA ² S)		Switching voltage(KV)	Insulation resistance after operation(MΩ)
			pre-arcing	arcing	melting	arcing		
SB-C1	1	142	0.10	0.086	0.00130	0.00080	1.267	>500
	1	144	0.10	0.086	0.00132	0.00028	0.269	>500
	1	144	0.09	0.088	0.00129	0.00032	0.270	>500
	30	2170	1.00	2.690	1.26	1.66	0.515	>500
	30	2180	1.01	2.880	1.32	1.56	0.565	>500
	30	2170	1.01	2.720	1.27	1.60	0.558	>500
	40	2610	1.17	2.430	2.18	2.53	0.571	>500
	40	2530	1.14	2.680	2.08	2.49	0.583	>500
	40	2580	1.16	2.520	2.17	2.64	0.573	>500
	60	4320	1.83	3.280	10.40	10.85	0.646	>500
	60	4350	1.84	3.270	10.72	11.35	0.656	>500
	60	4370	1.89	2.850	10.88	9.73	0.653	>500



Interrupting(I_1) oscillogram of type SB-C1 30A at DC 250V









Interrupting(I_1) oscillogram of type SB-C1 60A at DC 250V

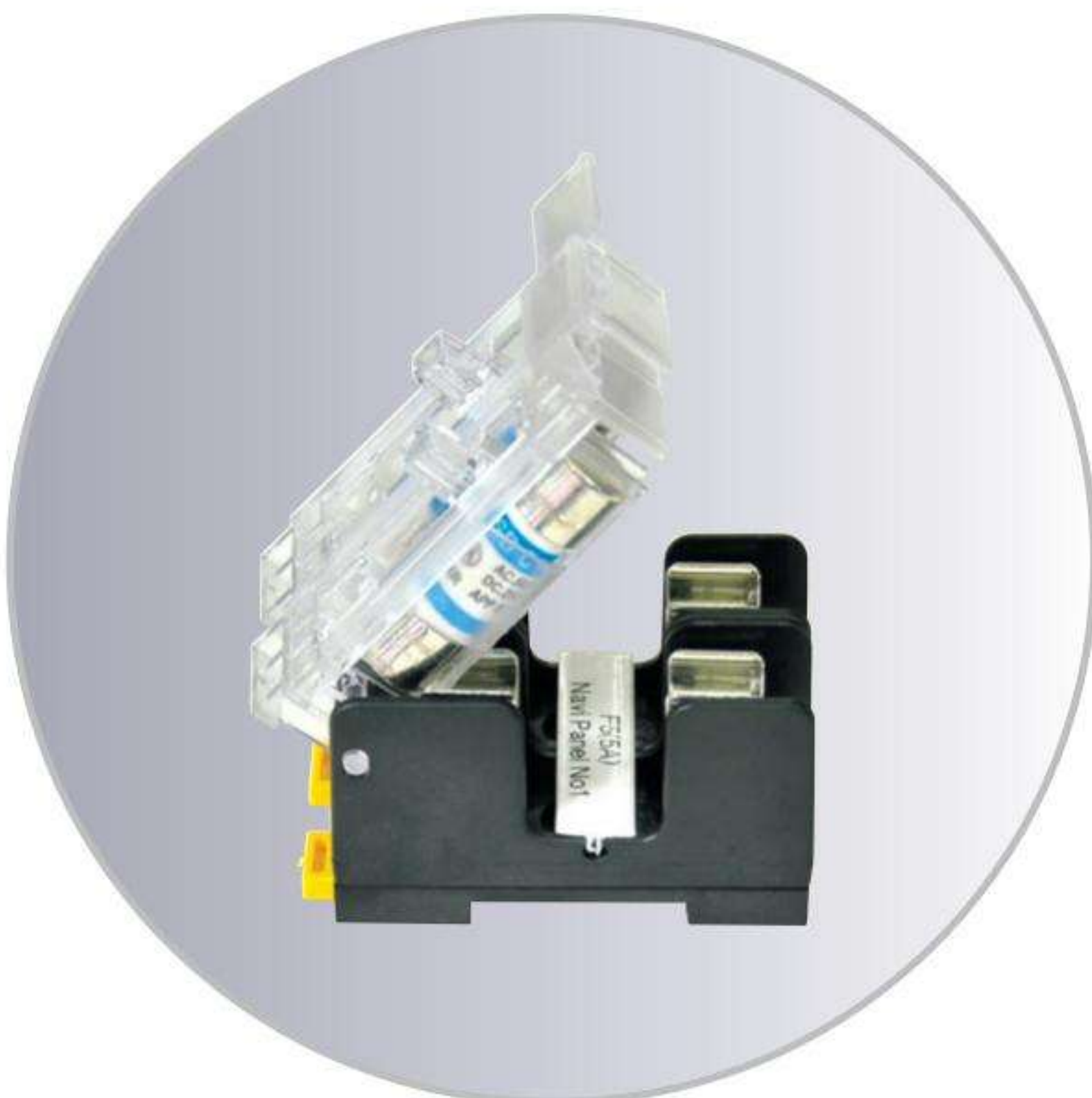
:: Ordering Information



■ Table

Model Number	Rated current(A)	Order Number	Weight(g/pcs)	QT' Y/box(pcs)	Apporoved
SB-C1	1A	1-SB-01	24	20	<div></div> <div></div> <div></div> <div></div> <div></div> <div></div>
	2A	1-SB-02			
	3A	1-SB-03			
	4A	1-SB-04			
	5A	1-SB-05			
	6A	1-SB-06			
	8A	1-SB-08			
	10A	1-SB-10			
	15A	1-SB-15			
	20A	1-SB-20			
	25A	1-SB-25			
	30A	1-SB-30			
	40A	1-SB-40			
	50A	1-SB-50	56	5	
	60A	1-SB-60			

FH-1550N



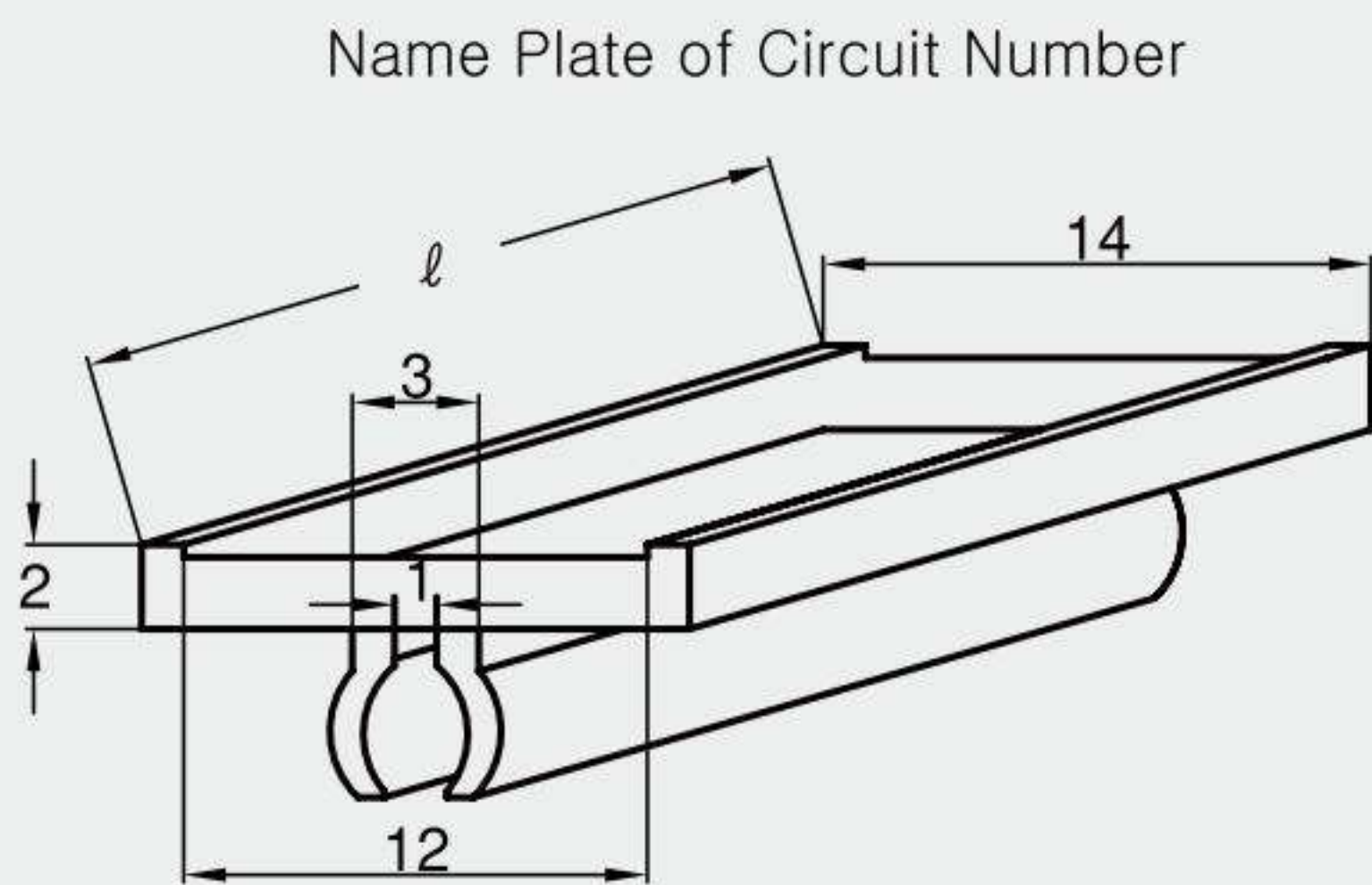
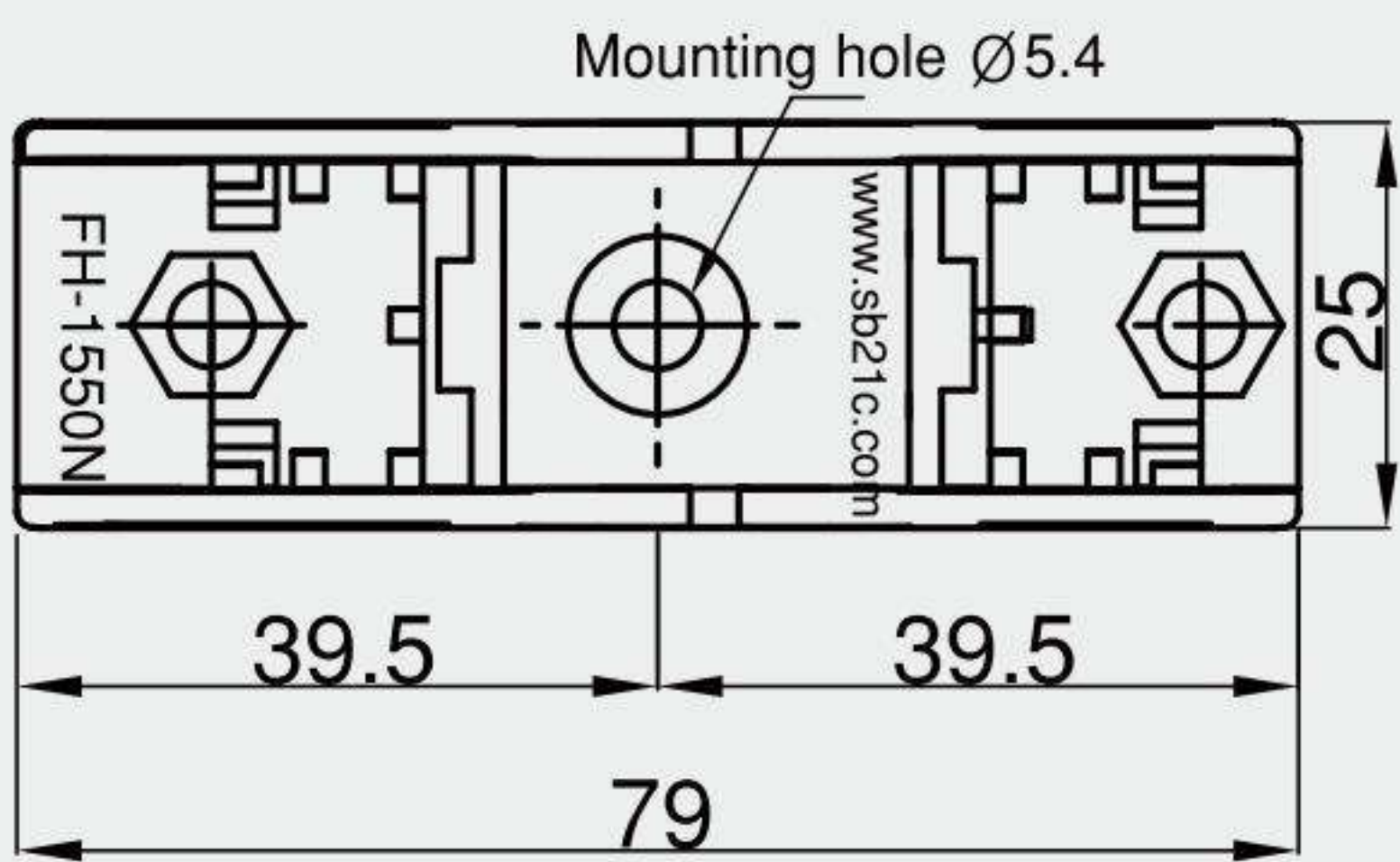
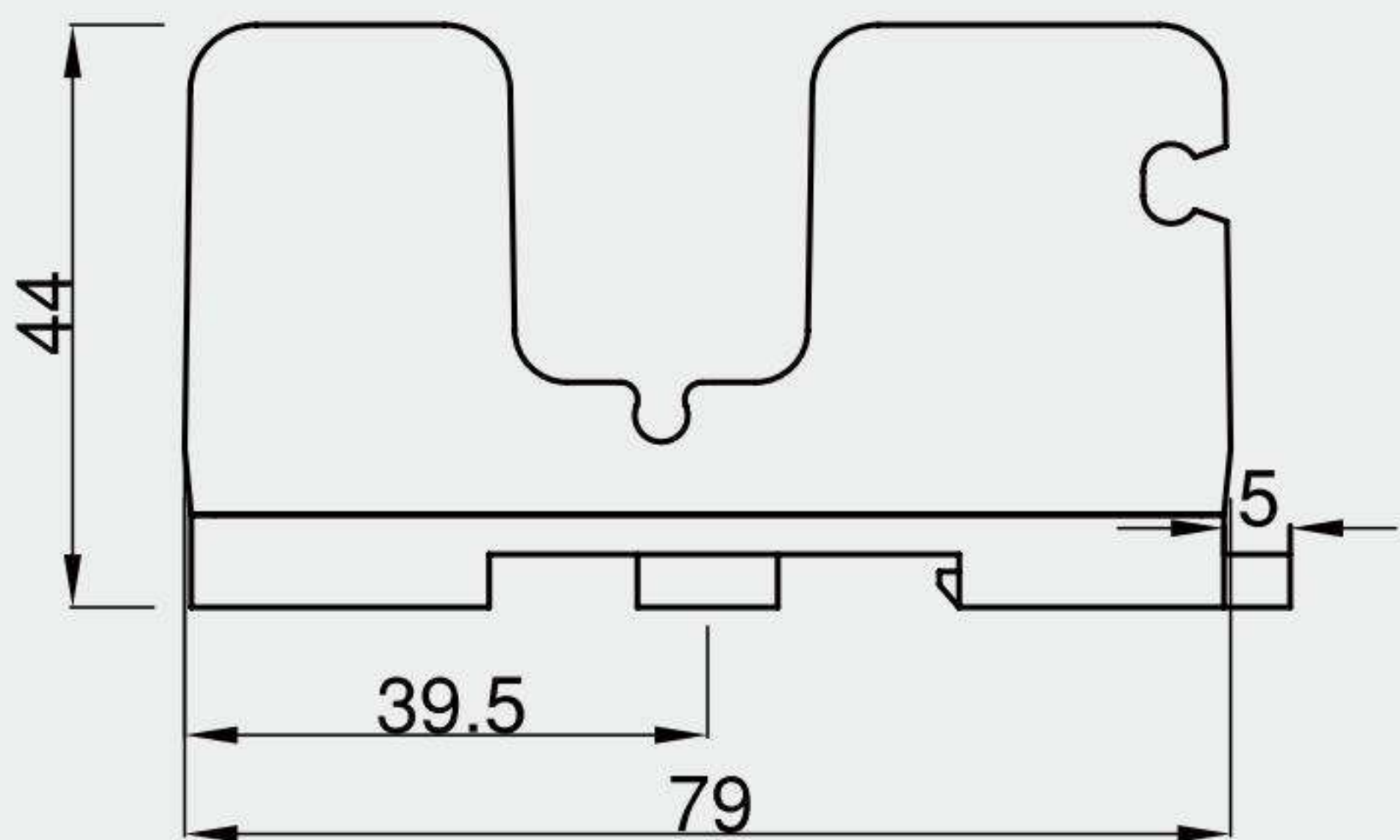
► Specifications

Fixing Method	Rail & Botton Mounting
Application Fuse-Links	SB-C1(15Ø × 50L)
Rated Voltage	AC690V / DC300V
Rated Current	30A Maximum
Clip	Copper with Sn coated
Screws	Steel with Zn coated
Name plate of	ABS
Circuit number	

► Ordering Information

Order number	Name	Weight(g)	QT' Y(box)
1-FH-1550N	Fuse-holder	51g	30 pcs
1-CN-30-1P	Name Plate-30-1P		100 pcs
1-CN-30-2P	Name Plate-30-2P		100 pcs
1-CN-30-3P	Name Plate-30-3P		100 pcs

► Drawing



Pole	1P	2P	3P
	24.0	49.0	74.0

FH-1550NS



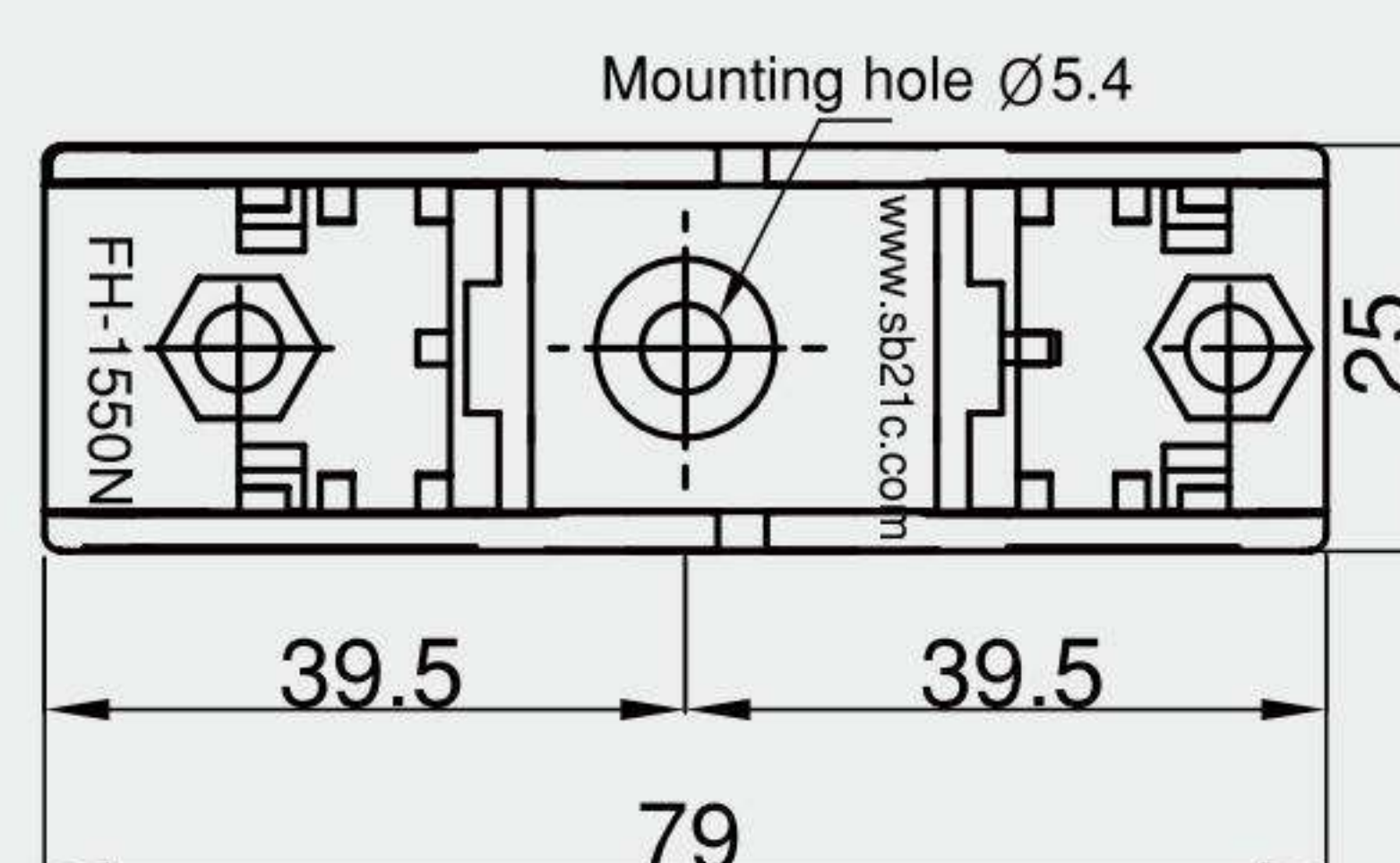
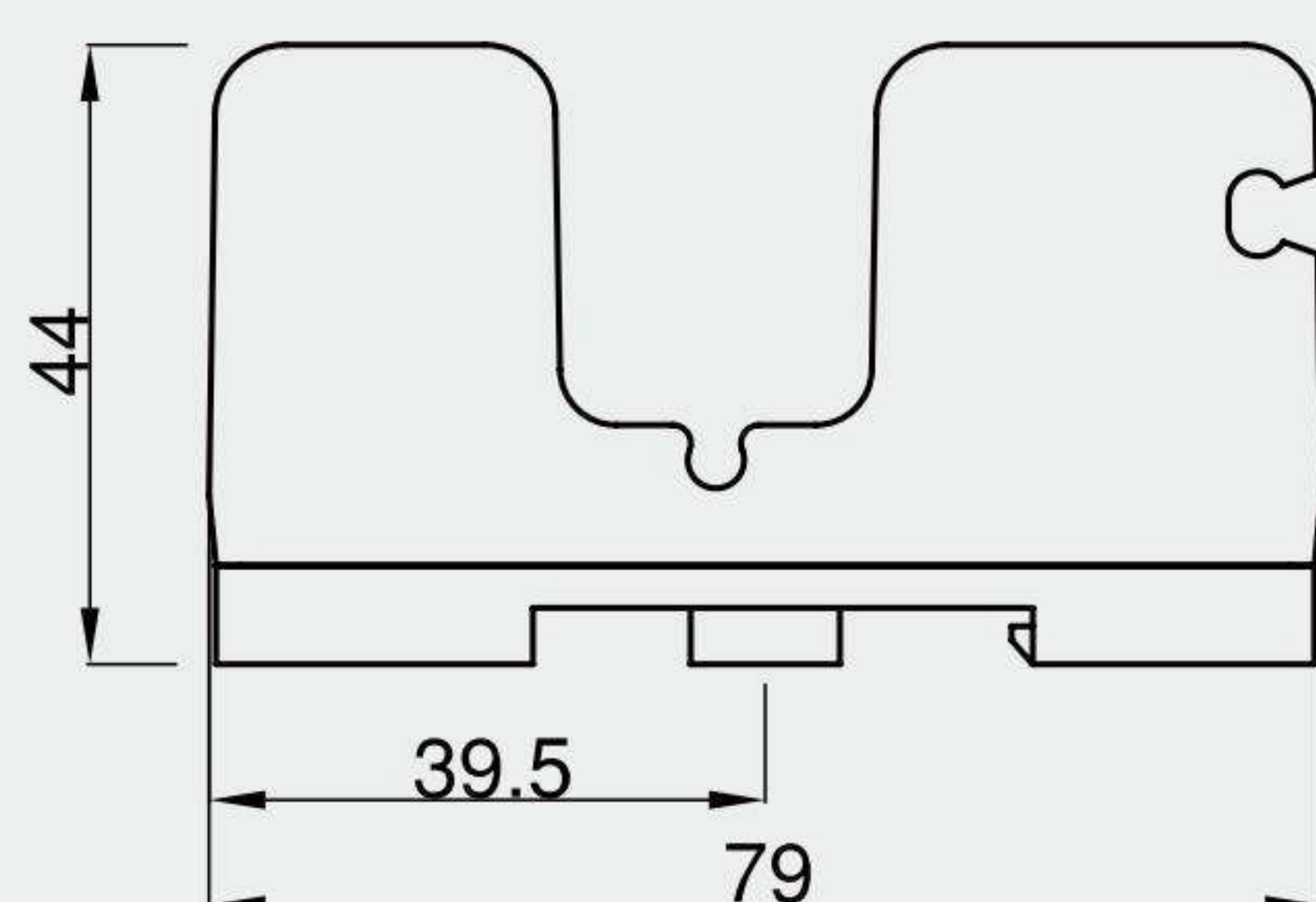
► Specifications

Fixing Method	Bottom Mounting
Application Fuse-Links	SB-C1(15 \varnothing × 50L)
Rated Voltage	AC 690V / DC 300V
Rated Current	30A Maximum
Clip	Copper with Sn coated
Terminal	Copper alloy with Sn coated
Screws	Steel with Zn coated
Name plate of	ABS
Circuit number	

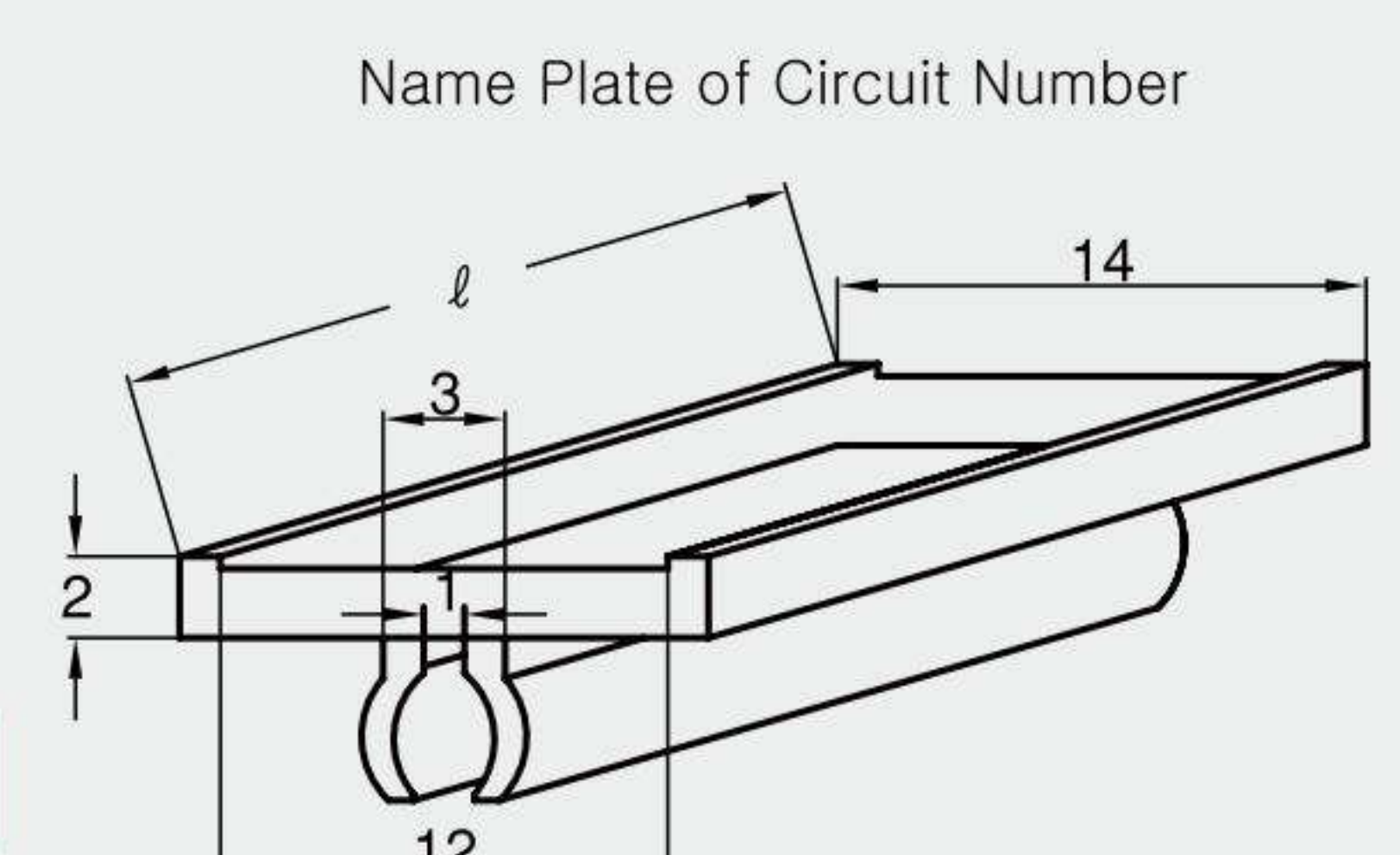
► Ordering Information

Order number	Name	Weight(g)	QT' Y(box)
1-FH-1550NS	Fuse-holder	50g	30 pcs
1-CN-30-1P	Name Plate-30-1P		100 pcs
1-CN-30-2P	Name Plate-30-2P		100 pcs
1-CN-30-3P	Name Plate-30-3P		100 pcs

► Drawing



Pole	1P	2P	3P
ℓ	24.0	49.0	74.0



FH-2075N



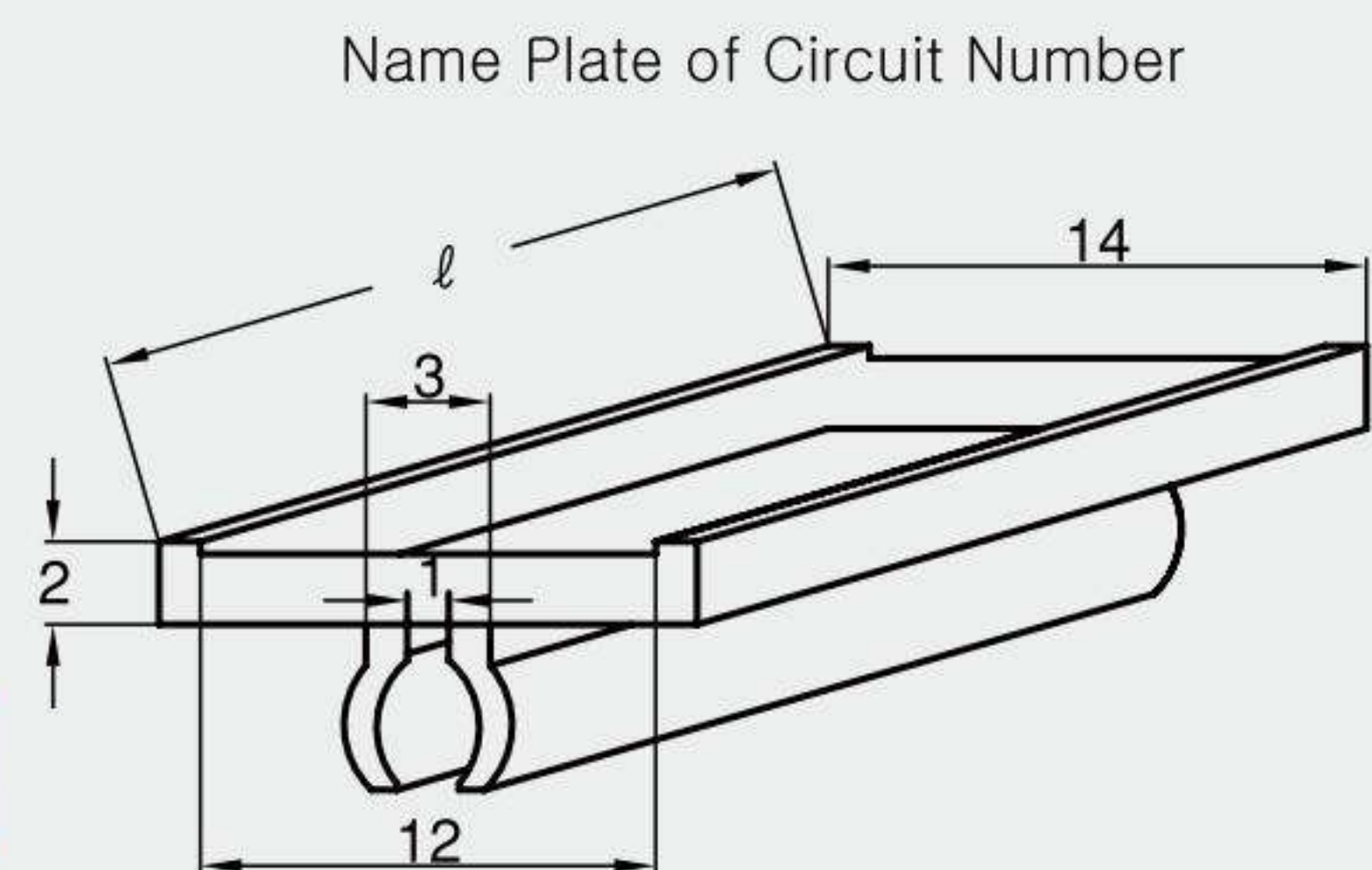
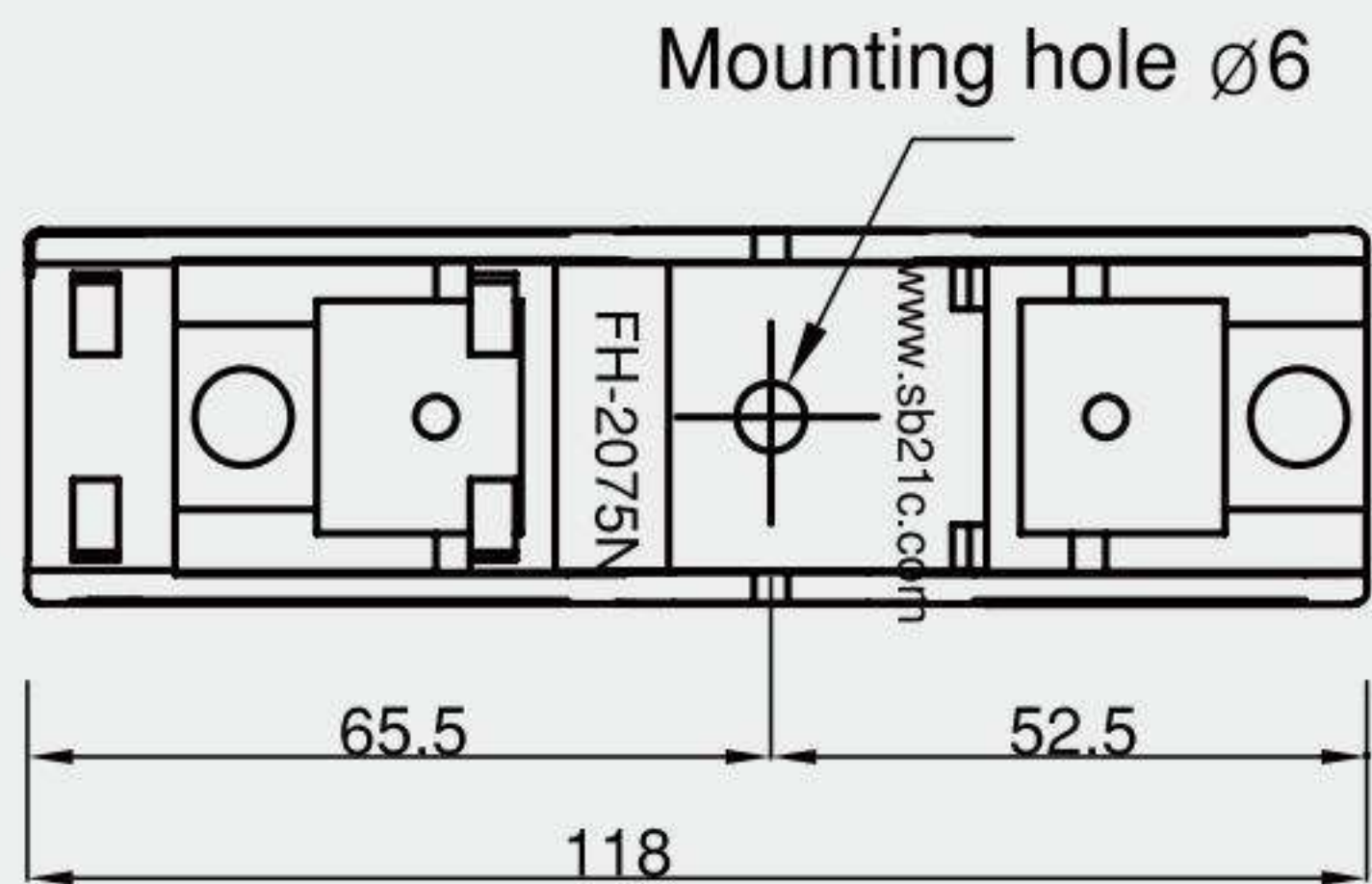
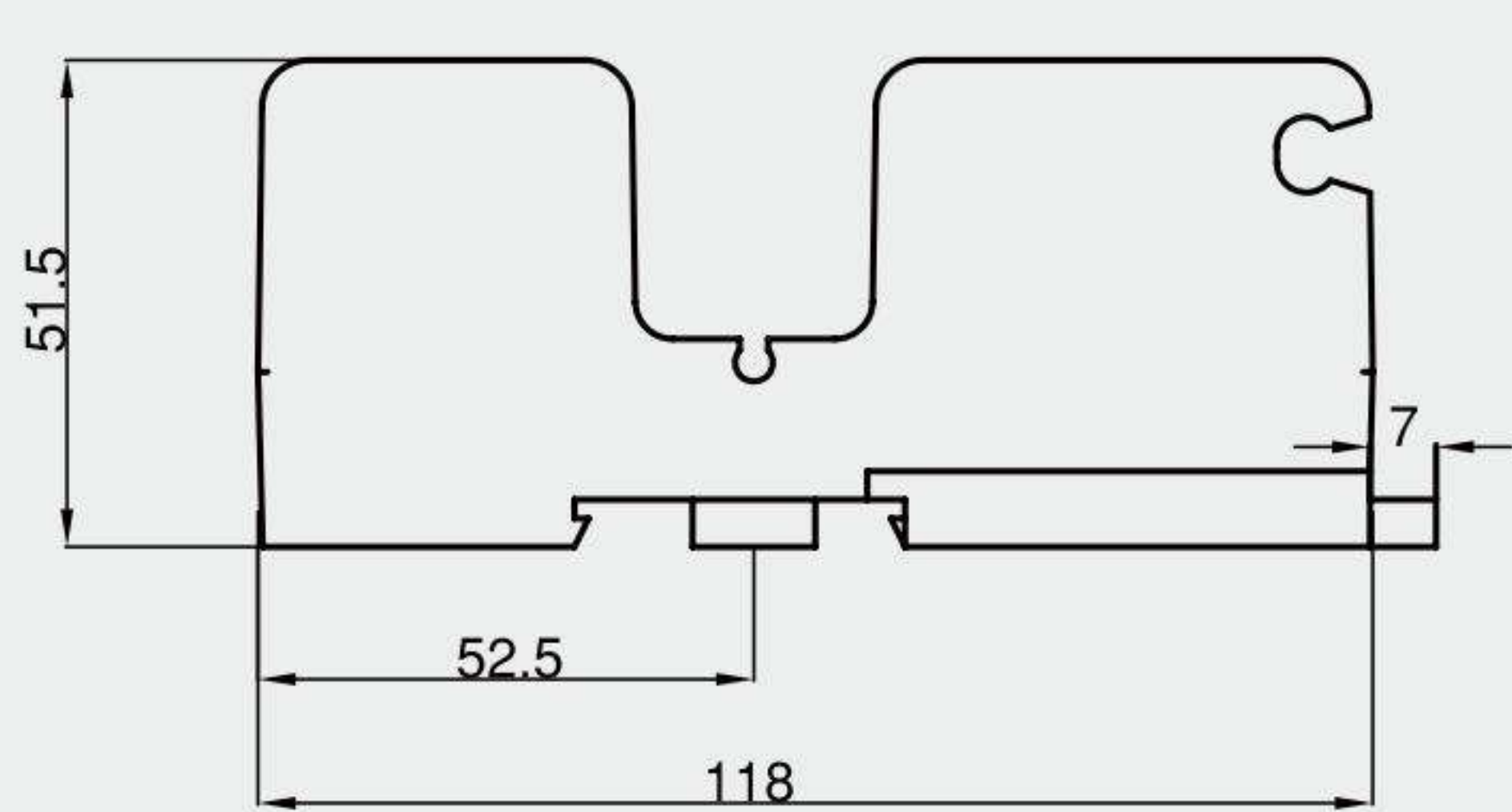
► Specifications

Fixing Method	Rail & Bottom Mounting
Application Fuse-Links	SB-C1(20 \varnothing × 75L)
Rated Voltage	AC 690V / DC 300V
Rated Current	60A Maximum
Clip	Copper with Sn coated
Terminal	Copper alloy with Sn coated
Screws	Steel with Zn coated
Name plate of	ABS
Circuit number	

► Ordering Information

Order number	Name	Weight(g)	QT' Y(box)
1-FH-2075N	Fuse-holder	126g	10 pcs
1-CN-60-1P	Name Plate-60-1P		100 pcs
1-CN-60-2P	Name Plate-60-2P		100 pcs
1-CN-60-3P	Name Plate-60-3P		100 pcs

► Drawing



Pole	1P	2P	3P
ℓ	32.0	65.0	97.0

FH-2075NS



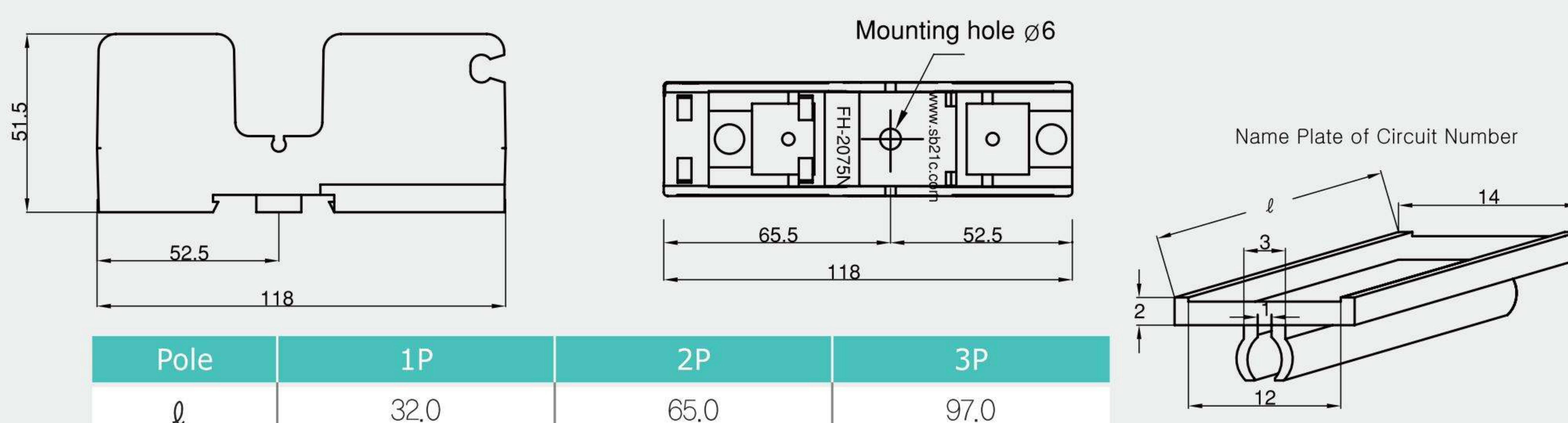
► Specifications

Fixing Method	Bottom Mounting
Application Fuse-Links	SB-C1(20 \varnothing × 75L)
Rated Voltage	AC 690V / DC 300V
Rated Current	60A Maximum
Clip	Copper with Sn coated
Terminal	Copper alloy with Sn coated
Screws	Steel with Zn coated
Name plate of	ABS
Circuit number	

► Ordering Information

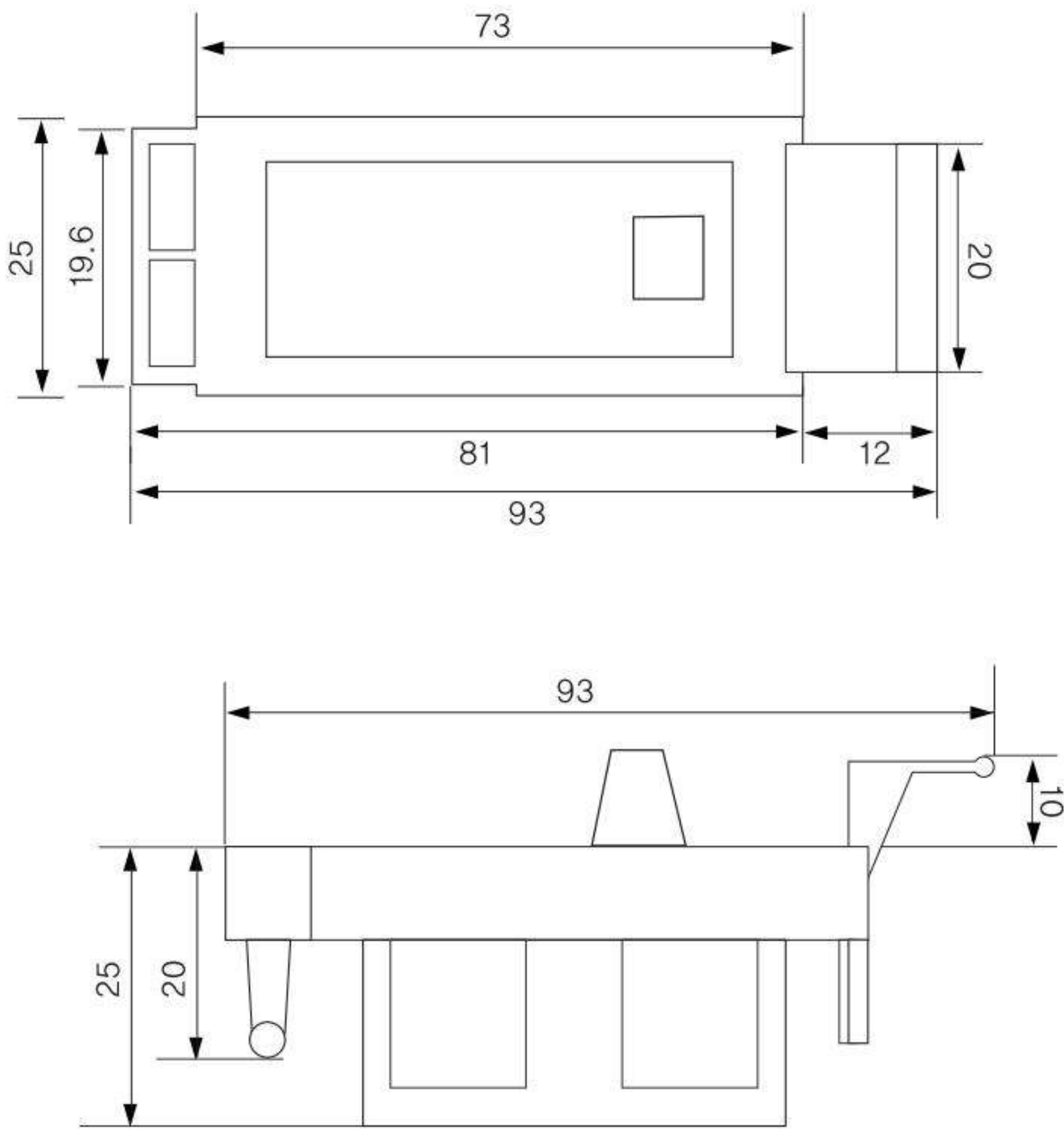
Order number	Name	Weight(g)	QT' Y(box)
1-FH-2075NS	Fuse-holder	125g	10 pcs
1-CN-60-1P	Name Plate-60-1P		100 pcs
1-CN-60-2P	Name Plate-60-2P		100 pcs
1-CN-60-3P	Name Plate-60-3P		100 pcs

► Drawing



FC-1550N

(Non Indicating type Fuse-Cover)



FH-1550N + FC1550N

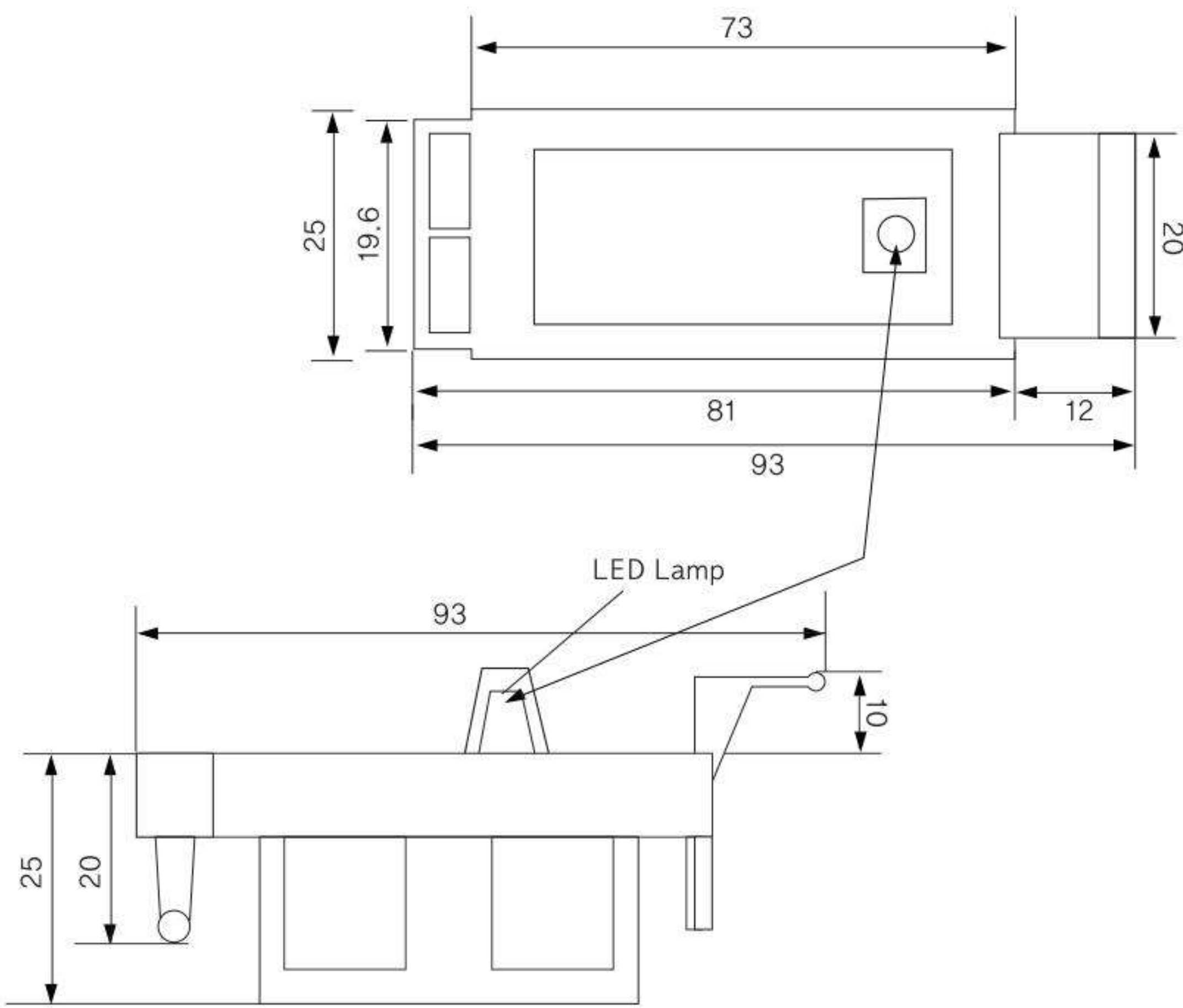
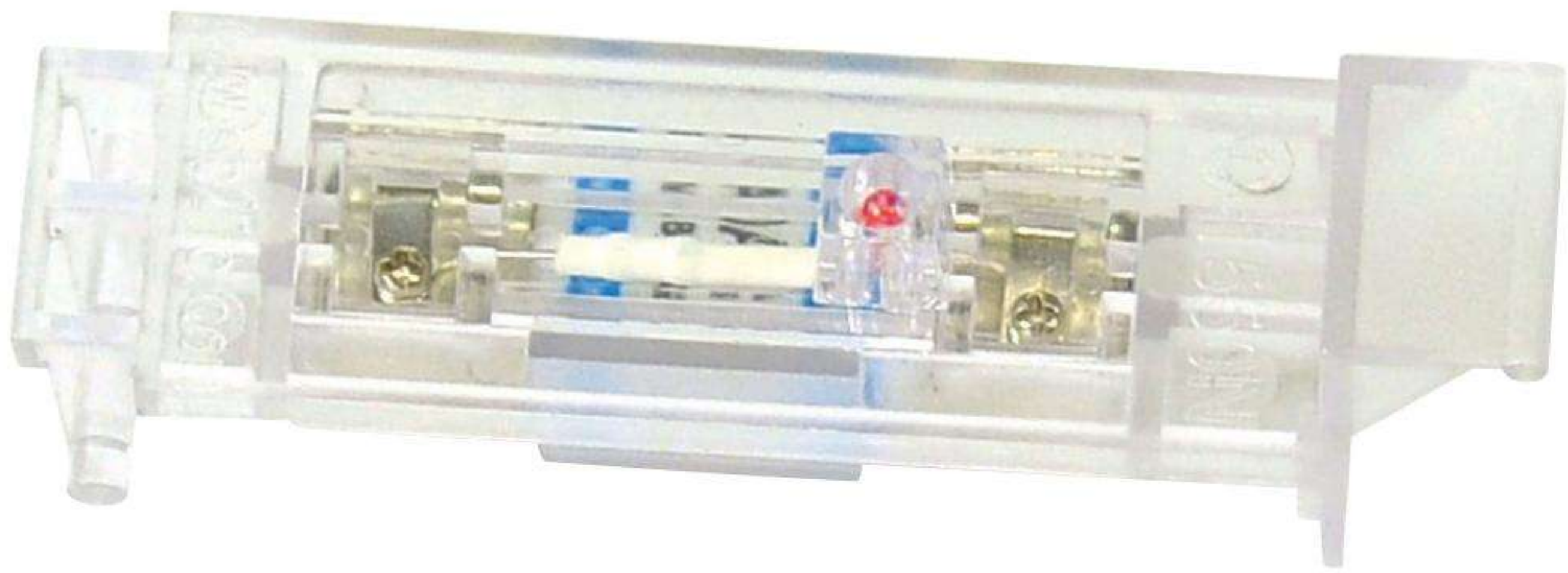
► Specifications

Application Fuse-Links	SB-C1(15Ø × 50L)
Application Fuse Holder	FH1550N

FC-1550N i

(Indicating type Fuse-Cover)

For DC type indicating cover, please inquire before ordering.



FH-1550N + FC1550Ni

► Specifications

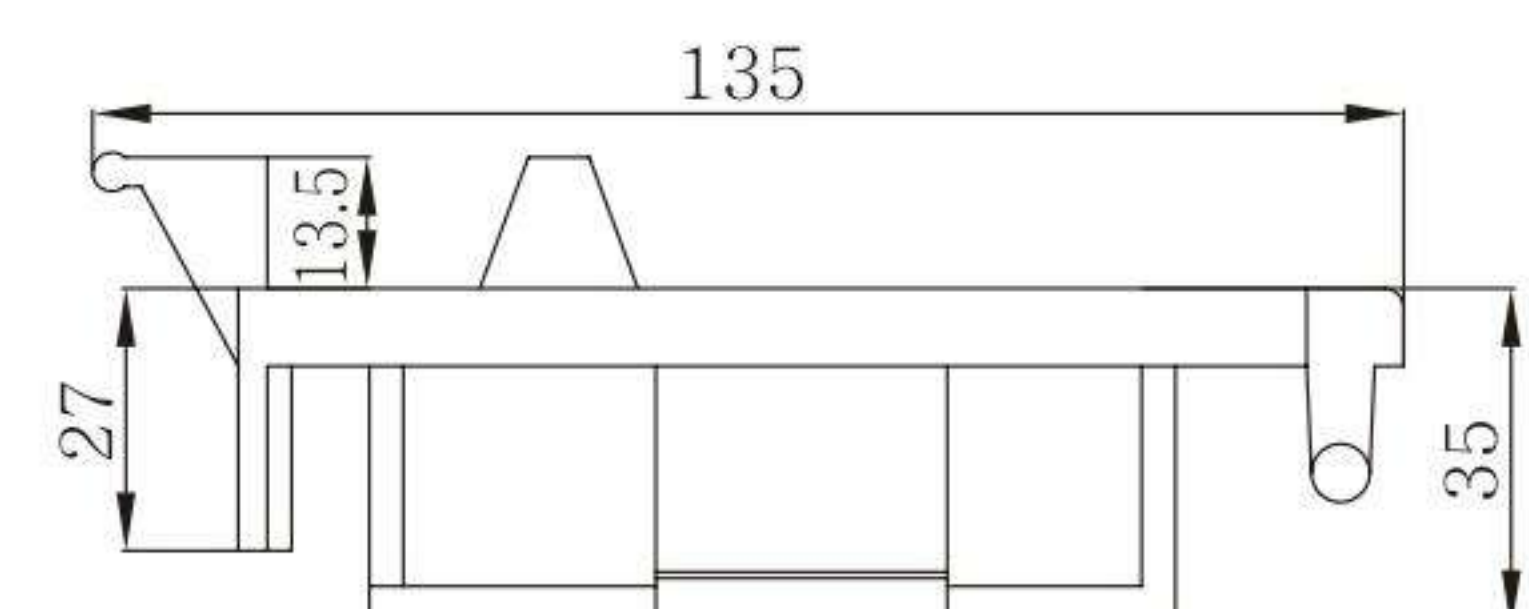
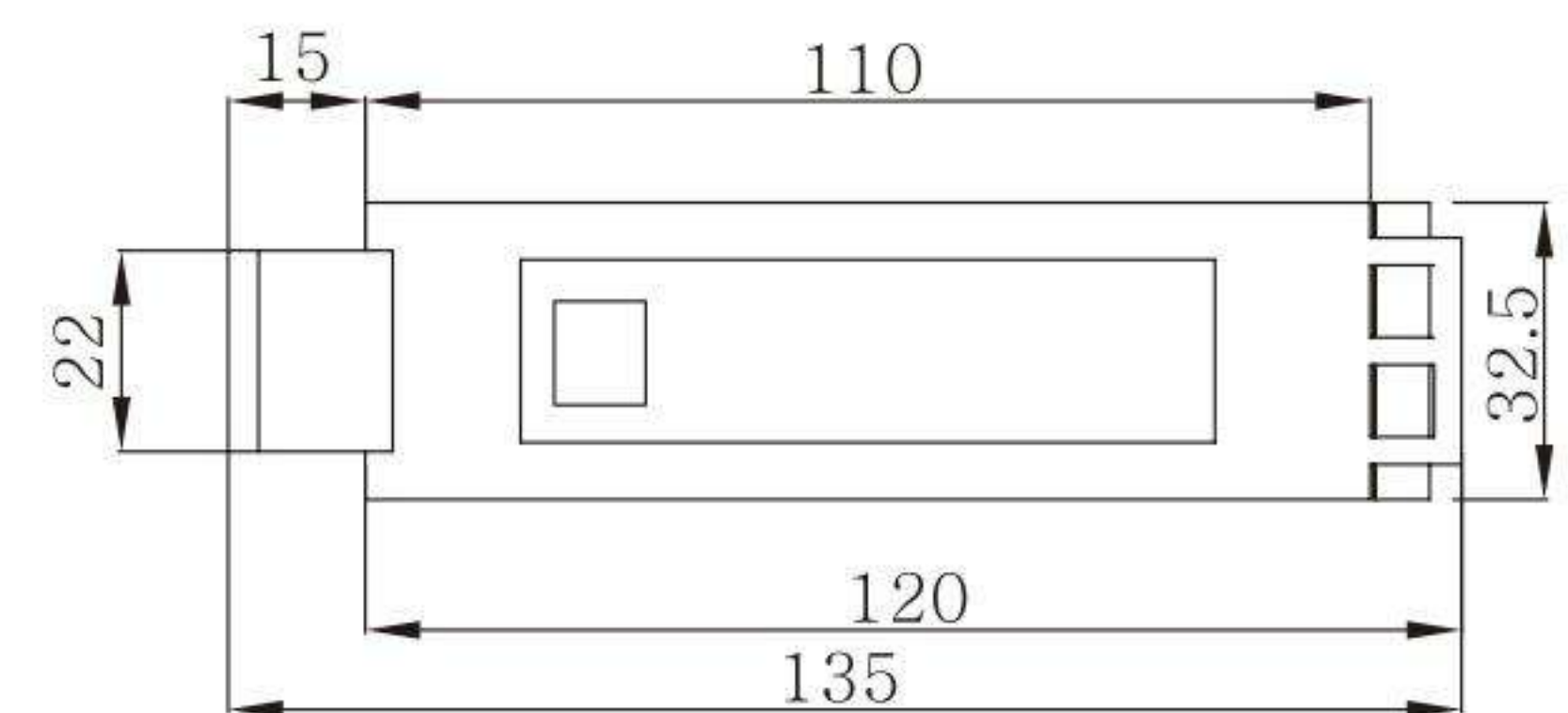
Application Fuse-Links	SB-C1(15Ø × 50L)
Application Fuse Holder	FH1550N
Indicator	LED Lamp

► Ordering Information

Order number	Name	Weight(g/pc' s)	QT' Y(box)
1-FC-1550N	Fuse-cover(Non indicator)	13	30 pcs
1-FC-1550N i	Fuse-cover(With indicator)	20	30 pcs

FC-2075N

(Non Indicating type Fuse-Cover)



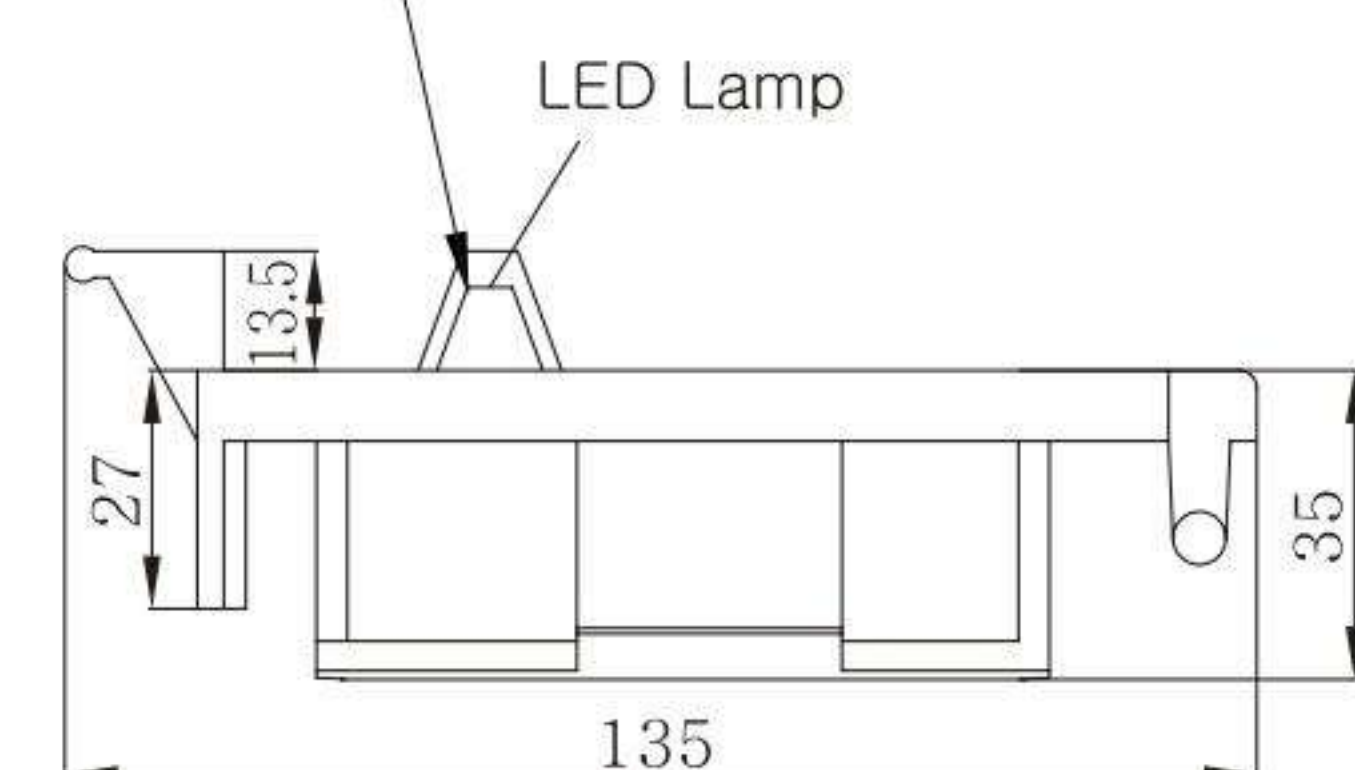
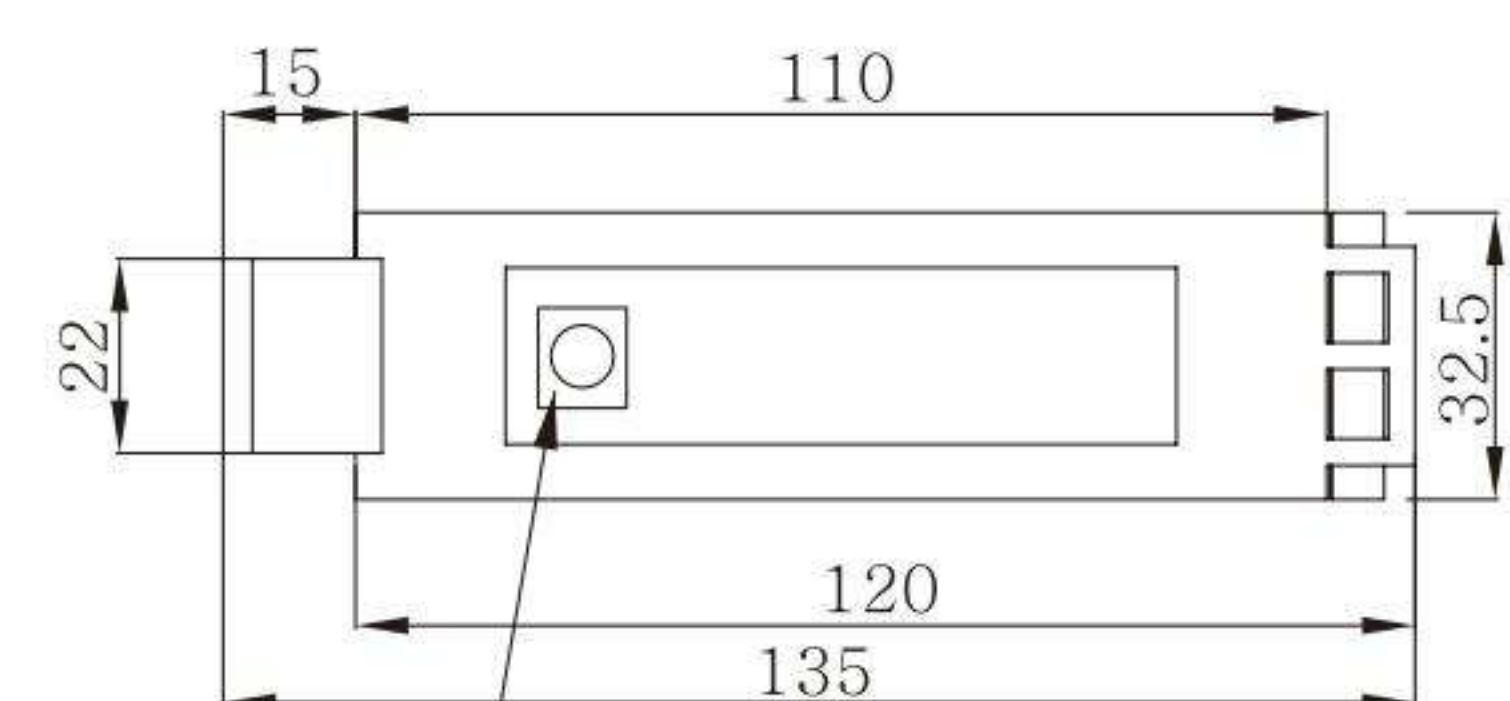
► Specifications

Application Fuse-Links	SB-C1(20 \varnothing × 75L)
Application Fuse Holder	FH2075N

FC-2075Ni

(Indicating type Fuse-Cover)

For DC type indicating cover, please inquire before ordering.



► Specifications

Application Fuse-Links	SB-C1(20 \varnothing × 75L)
Application Fuse Holder	FH2075N
Indicator	LED Lamp

► Ordering Information

Order number	Name	Weight(g/pc' s)	QT' Y(box)
1-FC-2075N	Fuse-cover(Non indicator)	38	10 pcs
1-FC-2075N i	Fuse-cover(With indicator)	42	10 pcs

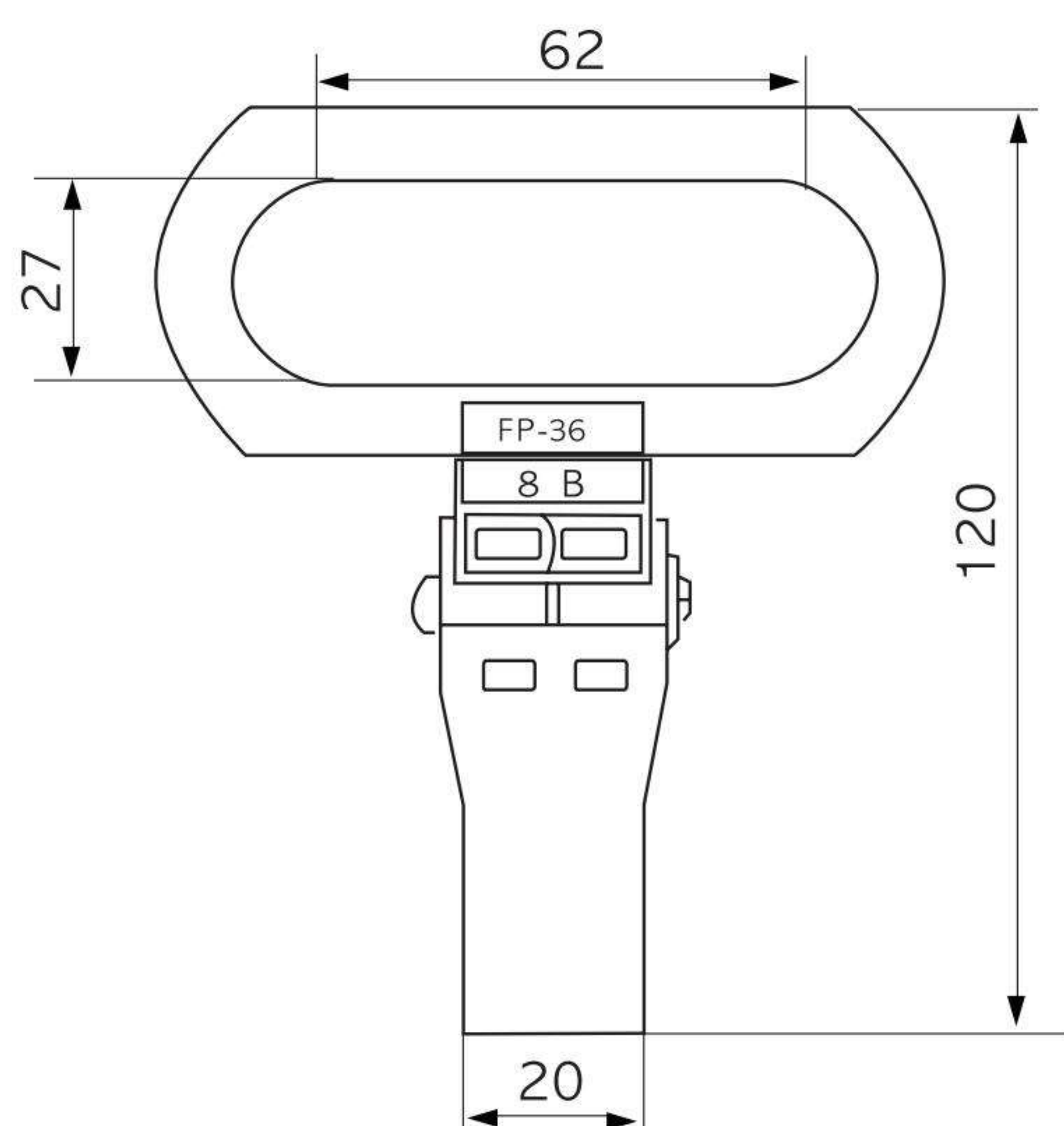
FP-36 (Fuse-Puller)



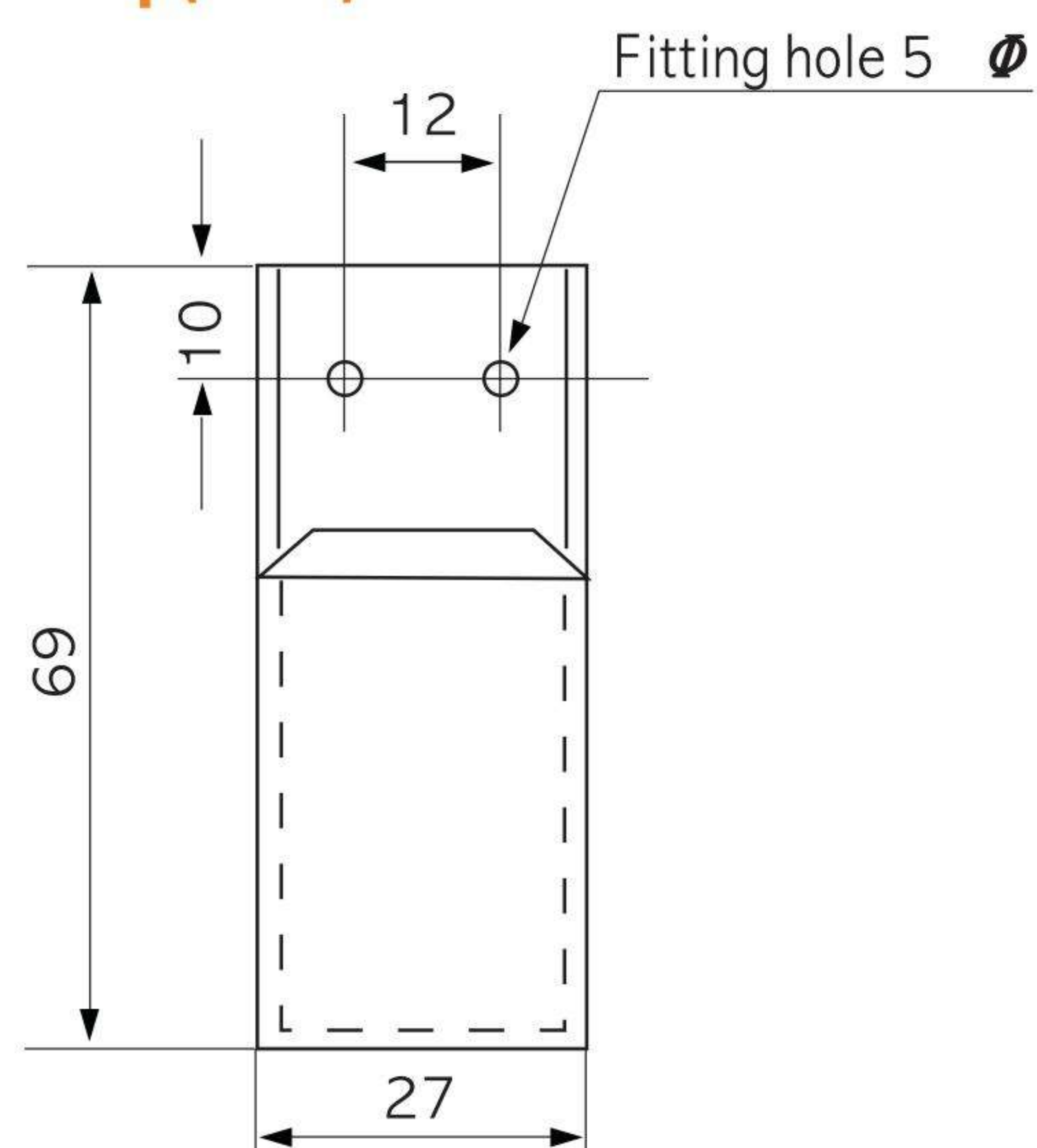
► Specifications

Application Fuse-Links	SB-C1(15 \varnothing × 50L, 20 \varnothing × 75L)
Clip & Screw	Steel with Zn Coated
Spring	Stainless Steel

► Fuse-puller(FP-36)



► Clip(P-30)



► Ordering Information

Order number	Name	Weight(g/pc; s)	QT' Y(box)
1-FP-36	Fuse-puller	72	10 pcs
1-P-30	Clip	59	—