

"QUARTZ" LLC

SAFETY FUSES PP57U SERIES

Technical description and user manual

UITSG 674 351.010 RE

1. Purpose

Series PP57U Fuses (hereinafter "fuses") are intended for protection of electric circuits of alternating current of 50-60 Hz frequencies with voltages up to 1250 V and DC circuits with voltages up to 1000 V at short circuits in semiconductor converters and other complete devices containing power semiconductor devices.

The fuses comply with the requirements of TU U 31.2-19274160-001-2002 and DSTU EN 60269-1:2015. Climatic modification of UHL3 according to GOST 15150.

External mechanical factors affecting the group M39 GOST 17516.1.

By the degree of protection fuses of unprotected performance - IP 00 in accordance with GOST 14254.

By design, fuses are non-separable, designed to be installed on the wires of the complete device. The structure of the conventional designation of fuses is given in Appendix A.

2. Technical data

2.1. The types and basic parameters of the fuses correspond to the data in Table 1.

Table 1

Fuse type	Rated fuse current, A	Rated current of the fusible insert, A	Rated AC voltage, V	Maximum operating DC voltage, V	Dimensional drawings according to Annex B
PP57U-3137 PP57U-3437 PP57U-3737 PP57U-3937	100 250 400 630	40; 63; 100 160; 250 315; 400 500; 630	380	440	Fig. 1
PP57U-3167 PP57U-3467 PP57U-3767 PP57U-3967	100 250 400 630	63; 100 160; 250 315; 400 500; 630	660	600	Fig. 1
PP57U-3797 PP57U-3997	400 630	315; 400 500; 630	1250	1000	Fig. 1
PP57U-3738 PP57U-3768	400 400	315; 400 315; 400	380 660	440 600	Fig. 2 and 3
PP57U-3938 PP57U-4038 PP57U-3968 PP57U-4068	630 800 630 800	500; 630 800 500; 630 800	380 380 660 660	440 440 600 600	Fig. 4
PP57U-3998	630	500; 630	1250	1000	Fig. 5

Note: In Table 1 and below, the types of fuses are indicated without a designation for the presence of an operation indicator and a free contact and without a climatic designation.

2.2. Overall and connecting dimensions and weight of the fuses are given in Appendix B. As agreed with the manufacturer, the fuses can be manufactured with a different design of the terminals.

2.3. Rated fuse operation mode is continuous.

2.4. With regard to breaking capacity and speed, fuses are of the type aR according to DSTU EN 60269-1:2015 - high-speed with breaking capacity in the part of the range of tripping currents.

The fuses disconnect all currents from the minimum tripping current to the current of the highest breaking capacity specified in Table 2 with the following trip circuit parameters:

a) power factor of the circuit with alternating current at tripping currents:

up to 10 kA - not less than 0,3;

from 10 to 20 kA - not less than 0,2;

more than 20 kA - not less than 0,1;

b) the time constant of the circuit on a direct current is not more than 20 ms.

Table 2

Fuse type	Rated voltage of alternating current, V	Maximum permissible value of DC voltage, V	Rated current of the fusible insert I_H , A	Minimal breaking current	Maximum breaking current, kA	
					AC (Alternating current)	DC (Disruptive current)
PP57U-3137 PP57U-3437 PP57U-3737 PP57U-3738 PP57U-3937 PP57U-3938 PP57U-4038	380	440	40; 63; 100 160; 250 315; 400 315; 400 500; 630 500; 630 800	$9I_H$ $9I_H$ $9I_H$ $9I_H$ $9I_H$ $9I_H$ $9I_H$	100	100
PP57U-3167 PP57U-3467 PP57U-3767 PP57U-3768 PP57U-3967 PP57U-3968 PP57U-4068	660	600	63; 100 160; 250 315; 400 315; 400 500; 630 500; 630 800	$10I_H$ $10I_H$ $10I_H$ $10I_H$ $10I_H$ $10I_H$ $10I_H$	100	100
PP57U-3797 PP57U-3997 PP57U-3998	1250	1000	315; 400 500; 630 500; 630	$10I_H$ $10I_H$ $10I_H$	100 100 80	100 100 80

2.5. The position of the fuses in space is vertical or horizontal in relation to the longitudinal axis of the housing. This eliminates the installation of a fuse above or under the buses that closes the movement of the cooling air.

2.6. Fuses are designed to be connected to them using bolted copper buses:

fuses per 100 A - $[3 \times 30]$ mm²;

fuses at 250 A - $[6 \times 35]$ mm²;

fuses at 400 A - $[(4 \times 40) \times 2]$ mm²;

fuses at 630 A - $[(5 \times 60) \times 2]$ mm²;

fuses at 800 A - $[(6 \times 60) \times 2]$ mm².

2.7. The power terminals of the fuses are silver coated SR3-6 in accordance with GOST 9.303 and allow operation at the temperature of contact connections up to 135 °C.

2.8. The fuses must have the following versions for the presence of a signal device for the fuse:

without an operating indicator and without a free contact (microswitch);

with a trigger indicator and free contact;

with indication of operation without free contact.

2.9. The fuse triggering indicator operates at a voltage of at least 100 V AC or DC.

2.10. The free contact of the fuse (microswitch) has one normally open (NO) and one normally closed (NC) contacts, which allow switching current of 100 mA at a voltage of 220 V DC and an AC voltage of 50 Hz.

2.11. Resistance of insulation of free contacts of dry and clean fuses that have not been used in the cold state:

a) between free contacts and power terminals of fuses - not less than 50 MOhms;

c) between open free contacts - not less than 10 MOhms.

2.12. Insulation of free contacts of dry and clean fuses that have not been in operation, in a cold state, withstands for one minute a 50 Hz alternating current test voltage:

a) between free contacts and power terminals of the fuse - 4000 V;

b) between open free contacts - 2000 V.

2.13. Power losses in the fuses at the rated current do not exceed the values indicated in Table 3.

Table 3

Fuse type	Rated current of the fusible insert, A	Power loss, no more than, W
PP57U-3137	40	10
	60	18
	100	25
PP57U-3437	160	45
	250	60
PP57U-3737	315	70
	400	95
PP57U-3738	315	75
	400	110
PP57U-3937	500	120
	630	145
PP57U-3938	500	120
	630	180
PP57U-4038	800	150
PP57U-3167	63	20
	100	30
PP57U-3467	160	50
	250	70
PP57U-3767	315	80
	400	110
PP57U-3768	315	80
	400	110
PP57U-3967	500	150
	630	170
PP57U-3968	500	170
	630	200
PP57U-4068	800	200
PP57U-3797	315	115
	400	130
PP57U-3997	500	165
	630	185
PP57U-3998	500	165
	630	185

2.14. The maximum values of the Joule integral (I^2t) of the fuse disconnection at a switch-off time of not more than 10 ms do not exceed the values indicated in Table 4.

Table 4

Fuse type	Rated current of the fusible insert, A	Value of the Joule integral (I^2t) of the fuse disconnection, $A^2 \cdot c \cdot 10^3$
PP57U-3137	100	80
PP57U-3437	250	230
PP57U-3737 PP57U-3738	400	450
PP57U-3937 PP57U-3938	630	1500
PP57U-4038	800	3500
PP57U-3167	100	60
PP57U-3467	250	470
PP57U-3767 PP57U-3768	400	1400
PP57U-3967 PP57U-3968	630	3000
PP57U-4068	800	3900
PP57U-3797	400	600
PP57U-3997 PP57U-3998	630	1700

2.15. The ratio of the values of the Joule integral (I^2t) of the fuse switch-off at the switch-off time is no more than 10 ms to the value of the Joule integral (I^2t) to the predecessor of the same fuse, not more than 9.

2.16. Minimum time of fuse melting during overloads in the range from 0,01 s to 100 s - not less than specified on the time characteristics of Appendix B.

2.17. The voltage value when the fuse operates does not exceed 150% of the amplitude value of the returning voltage.

2.18. The value of the ohmic resistance of fuses in the cold state is indicated in the passports.

3. Structure and operation of the fuse

3.1. The fuse consists of a silver fusible element placed in a ceramic case filled with an arc extinguish filler, sealed with quartz sand, power current leads with a silver or nickel coating and metal covers with seals covering the fuse housing from the ends. Depending on the design, the fuse can be equipped with an operating indicator equipped with a striker acting on the free contact (microswitch). The microswitch is mounted on one of the fuse covers by means of a clamp.

On the outputs of the fuse, the marking of the rated current of the fuse-link is stamped out, on the cover - the nominal voltage and other marking data.

The silver content in the fuse is indicated in the passport for the specific design of the fuse.

3.2. The fuse is capable of continuously transmitting the rated current for a suitable cross section of live buses and the temperature of the cooling air. In the event of a short-circuit current, the fusible element melts, and the resulting electric arc is extinguished in the sand. After operation, the fuse can only be restored at the factory.

4. Requirements for safety and environmental protection

4.1. Fuses comply with the safety requirements of GOST 2817 (GOST 12.2.007.6-93).

4.2. The user is protected from electric shock; the fuses belong to the class "O" according to GOST 12.2.007.0 - having an isolated housing and open ungrounded current-carrying terminals.

4.3. Installation and operation of fuses should be carried out in accordance with the requirements of section 5 of this operating manual.

4.4. Maintenance of fuses in existing electrical installations should be carried out by specially trained electrical personnel who have been instructed and tested knowledge in accordance with the requirements of the "Rules for safe operation of consumer electrical installations".

4.5. Replacement of fuses in electrical installations should be carried out with the removal of the voltage.

5. Instructions for installation and operation

5.1. Fuses should be operated under the following conditions of external influencing factors:

- the upper value of the operating temperature +40 °C;
- the lower value of the operating temperature is -60 °C;
- the relative humidity of air should not exceed 90% in the entire range of change in operating temperatures;
- The atmosphere should not contain corrosive substances in concentrations that reduce the fuse parameters to unacceptable limits;
- vibration loads should not exceed the permissible values for group M39 according to GOST 17516.1, shock loads are not allowed.

5.2. It is allowed to operate the fuses at the upper value of the operating temperature of the medium to +60 °C when the load decreases in accordance with the data in Table 5.

Table 5

Rated fuse current, A	Permissible fuse current at ambient temperature			
	45 °C	50 °C	55 °C	60 °C
40	35	32	28	25
63	53	50	45	40
100	90	80	71	63
160	140	125	112	100
250	225	200	180	160
315	300	280	250	235
400	375	355	335	315
500	475	450	425	400
630	600	560	530	500
800	750	710	670	630

5.3. Installation and operation of fuses must comply with the requirements of the following documents:

- "Rules for mounting of electrical installations";
- "Rules of technical operation of electrical installations of consumers";
- "Rules for safe operation of electrical installations of consumers";
- "Manual for the operation of fuses PP57U."

5.4. Fuses should be installed on live buses of the complete device via a bolted connection. The permissible current load of the fuse depends on the specific installation conditions and the cooling conditions of the fuses-the length and cross-section of the current-buses, the temperature and the speed of the cooling air.

5.5. The electrical clearances from parts of the fuse under live voltage to other live or grounded parts of the complete device shall be not less than:

- 12 mm - for the voltage of 380 and 440 V;
- 25 mm - for voltage 600 and 660 V;
- 40 mm - for the voltage of 1000 and 1250 V.

5.6. Before installing the fuse, you must:

- perform a technical inspection of the fuse and make sure that there are no cracks on the casing, loosening of the lid and leakage of sand;
- check the conformity of the fuse's identification data (voltage and current) to the parameters of the electrical installation;
- check the integrity of the free contact (microswitch), if any, and secure it to the fuse holder using the screws provided on it.

5.7. Before putting the fuses into service in the electrical installation, check the resistance and insulation strength of the free contact circuits (if any). At the same time, the resistance and insulation strength standards are set by the consumer or the installation organization for the electrical installation as a whole, taking into account local conditions, but should not exceed the norms established for fuses that were not in operation.

5.8. Fuses in service must be periodically subjected to maintenance and preventive testing.

Technical inspection of the fuses should be carried out within the time limits provided for the complete device as a whole, but at least once a year. At the same time, the fuses must be cleaned from dust and inspected externally to ensure that the fuse housing is not damaged, there is no leakage of sand, and that the microswitch is functioning correctly (if any). If the indicator strikes, the integrity of the fuse-link must be checked by the tester.

Preventive tests are carried out after performing a technical inspection only for fuses with the indication of operation and free contact, which consist in checking the resistance and electrical strength of the insulation of the microswitches with respect to the power circuits and between the contacts. At the same time, the test times, the permissible insulation resistance values and the test voltage value are set by the consumer for the electrical installation as a whole, taking into account local conditions, but they should not be stiffer than for fuses that were not in use.

5.9. It is recommended to repair the burnt fuses at the manufacturer's factory. This requires special technological equipment and special materials.

5.10. Fuses do not contain harmful substances and materials. Disposal of fuses must be carried out in accordance with the procedure stipulated by the decisions of the regional organization of sanitary and epidemiological surveillance.

6. Transportation and storage

6.1. The conditions for the transportation and storage of fuses and the permissible periods of conservation in the manufacturer's packaging prior to commissioning shall be in accordance with Table 6.

Table 6

Types of supplies by climatic conditions in accordance with GOST 15150	Designation of transport conditions in terms of impact		Designation of storage conditions in accordance with GOST 15150	Permissible storage time in the packaging of the supplier
	Mechanical factors according to GOST 23216	Climatic factors in accordance with GOST 15150		
For shipping in regions with temperate and cold climate	S	8 (OZh3)	2 (S)	2 years
For shipping in the regions of Far North and non-accessible area	Zh	8 (OZh3)	2 (S)	2 years

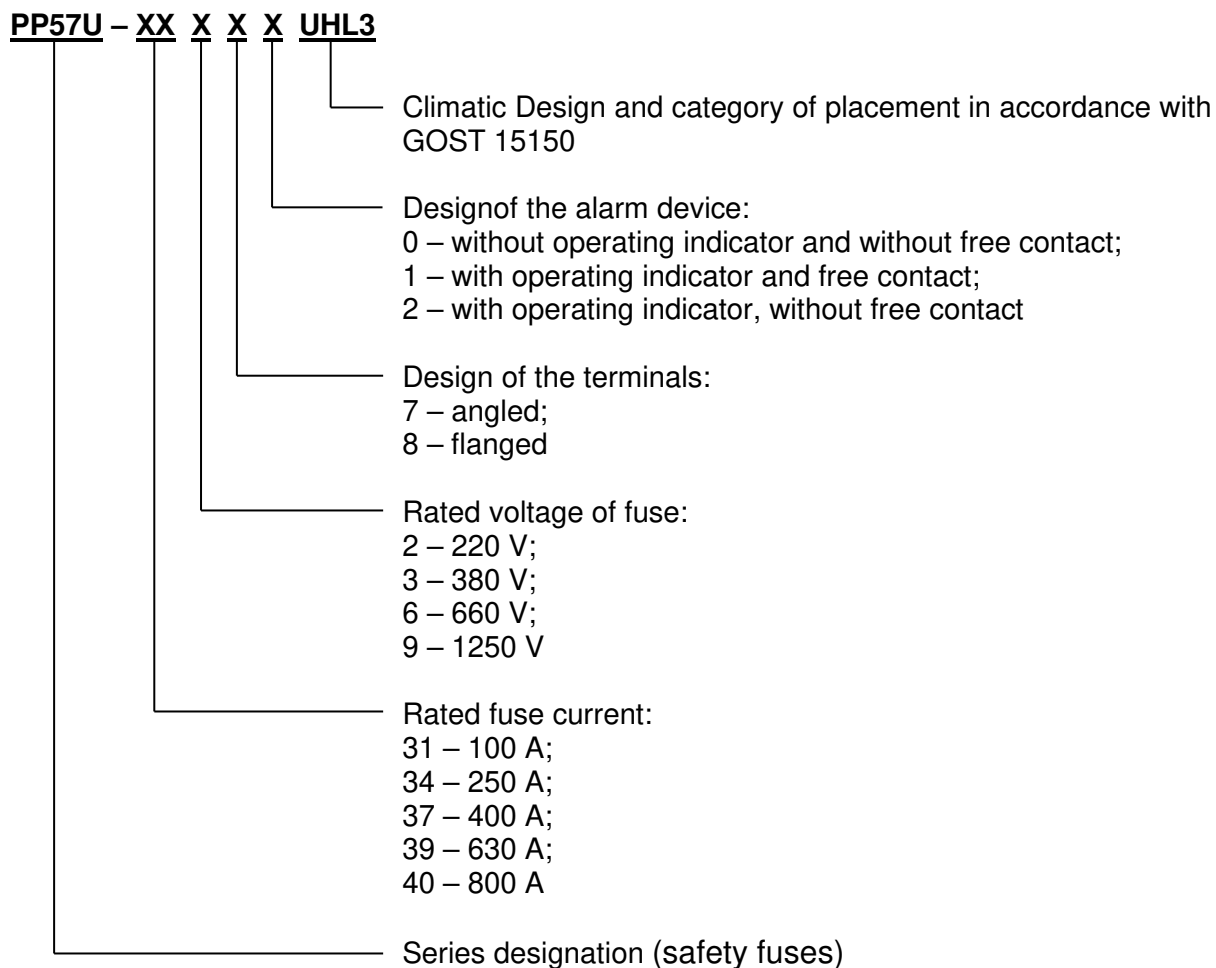
6.2. Fuses must be transported only by a closed transport (in railway cars, containers, closed vehicles, holds, etc.), which excludes the possibility of direct exposure to atmospheric precipitation and corrosive environments. When loading, unloading and transporting the fuses should not be subjected to impacts.

7. Warranty

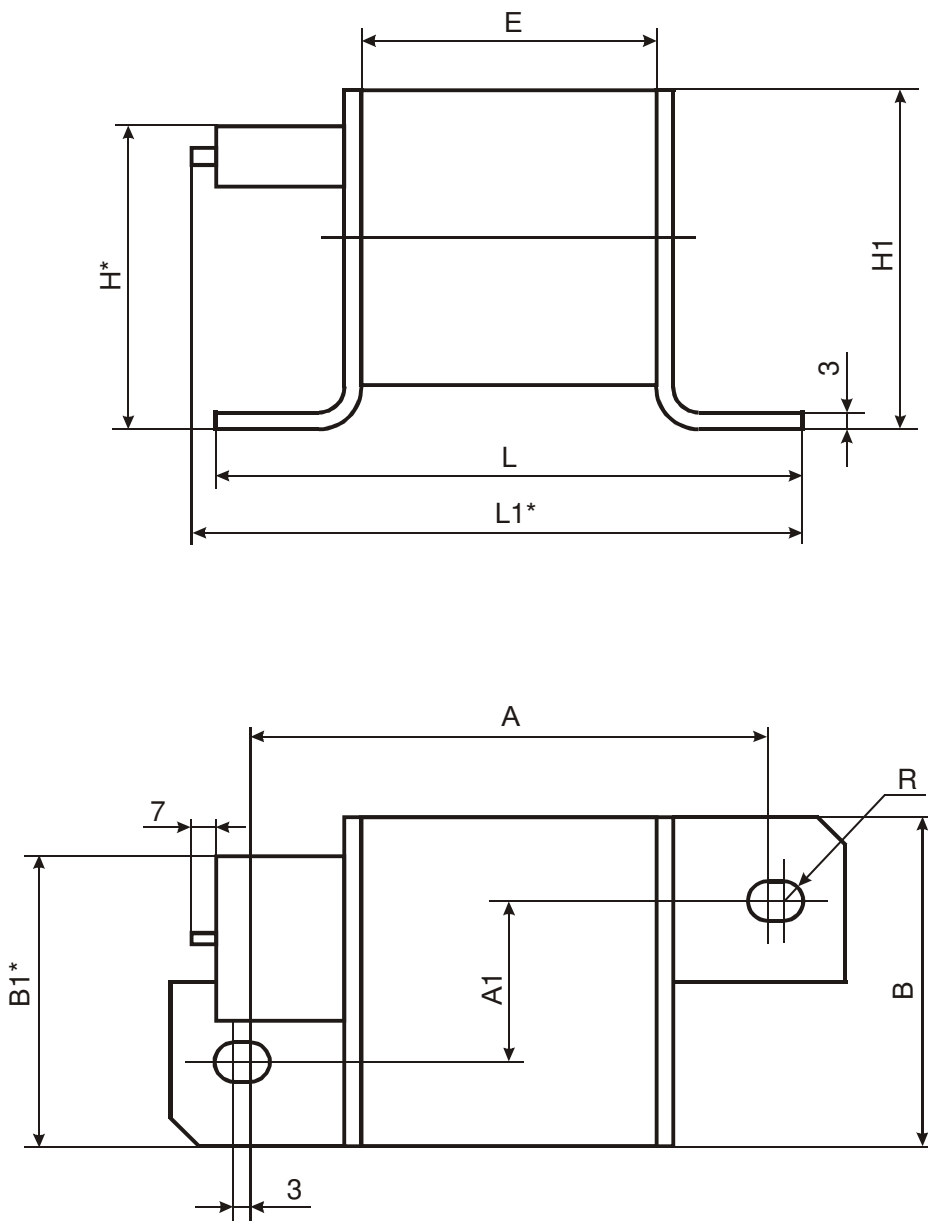
7.1. The manufacturer guarantees that the quality of the fuses meets the requirements of TU U 31.2-19274160-001-2002 if the user observes the conditions of transportation, storage, installation and operation in this operating manual.

7.2. The warranty period is 24 months from the date of commissioning, but not later than 36 months from the date of manufacture.

Structure of the conventional symbol of fuses type



**Overall, mounting, connecting dimensions
and weight of fuses**



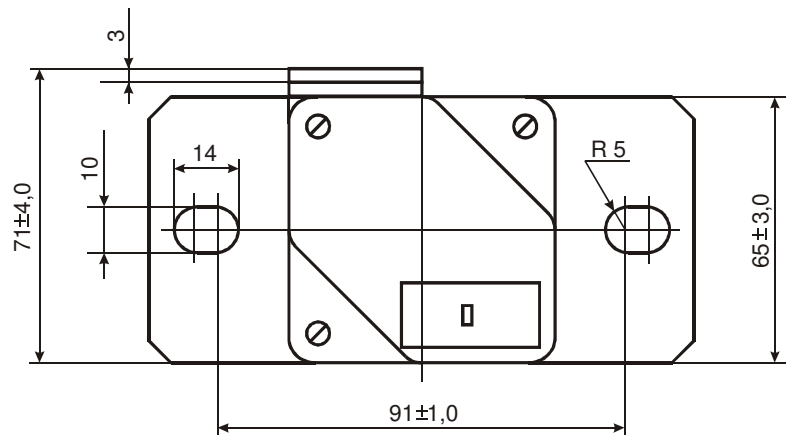
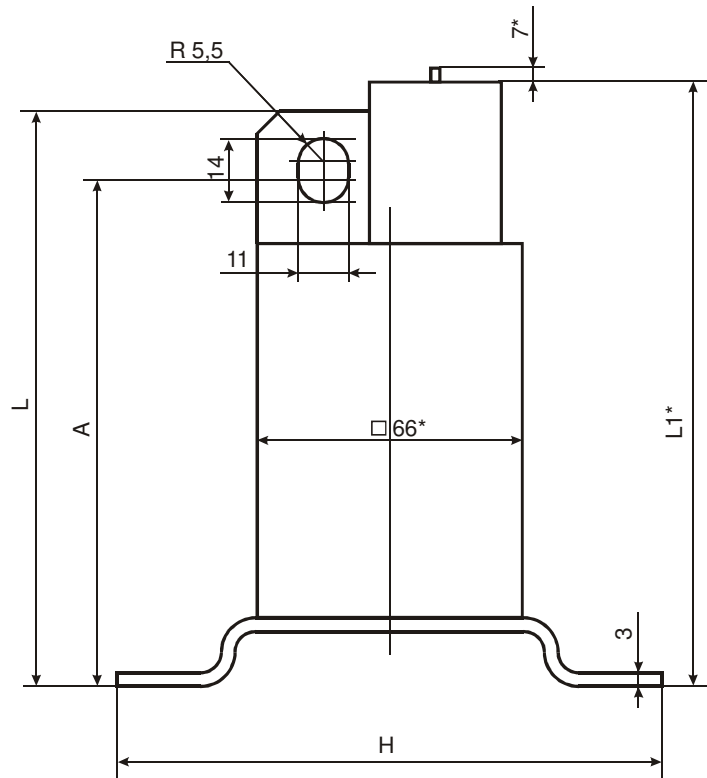
Types and sizes are listed in Table B.1.

* Dimensions for reference

Fig. 1. Fuses with angled terminals.

Table B.1

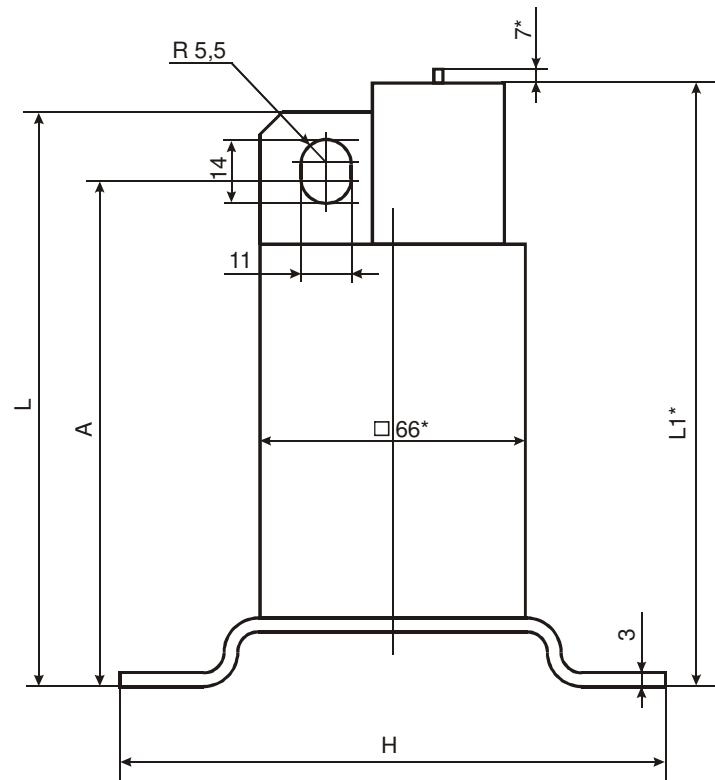
Type of fuse	Rated fuse current, A	Dimensions, mm										Weight (no more than kg)
		A	A1	B	B1*	L	L1*	H*	H1	R	E*	
PP57U-3137	100	100±2,5	20±2,5	40±3,0	43,5±3,0	123±3,0	139±3,0	48±3,0	45±3,0	3,5	55±2,5	0,39
PP57U-3437	250	108±2,5	25±2,5	50±3,0	50±3,0	140±3,0	147,5±3,0	59±3,0	55±3,0	5,5		0,66
PP57U-3737	400	118±3,0	33±2,5	66±4,5	66±3,0	146±3,0	151±4,0	72±3,0	71±4,5	5,5		1,15
PP57U-3937	630	122±3,0	40±2,5	80±4,5	80±3,0	166±3,0	161±4,5	81±3,0	85±4,5	8,5		1,65
PP57U-3167	100	130±3,0	20±2,5	40±3,0	43,5±3,0	153±3,0	169±3,0	48±3,0	45±3,0	3,5	85±2,5	0,60
PP57U-3467	250	138±3,0	25±2,5	50±3,0	50±3,0	170±3,0	177,5±3,0	59±3,0	55±3,0	5,5		0,87
PP57U-3767	400	148±3,5	33±2,5	66±4,5	66±3,0	176±3,5	181±3,5	72±3,0	71±4,5	5,5		1,45
PP57U-3967	630	152±3,5	40±2,5	80±4,5	80±3,0	196±4,0	191±4,0	81±3,0	85±4,5	8,5		2,05
PP57U-3797	400	148±3,5	33±2,5	66±4,5	66±3,0	176±3,5	181±3,5	72±3,0	71±4,5	5,5		1,45
PP57U-3997	630	152±3,5	40±2,5	80±4,5	80±3,0	196±4,0	191±4,0	81±3,0	85±4,5	8,5		2,05



Type of Fuse	Nominal fuse current, A	Dimensions, mm				Weight (no more than kg)
		A	L	L1*	H	
PP57U-3738	400	99±3,0	113±3,0	118	120±3,0	1,15
PP57U-3768		129±3,0	143±3,0	148		1,40

* Dimensions for reference.

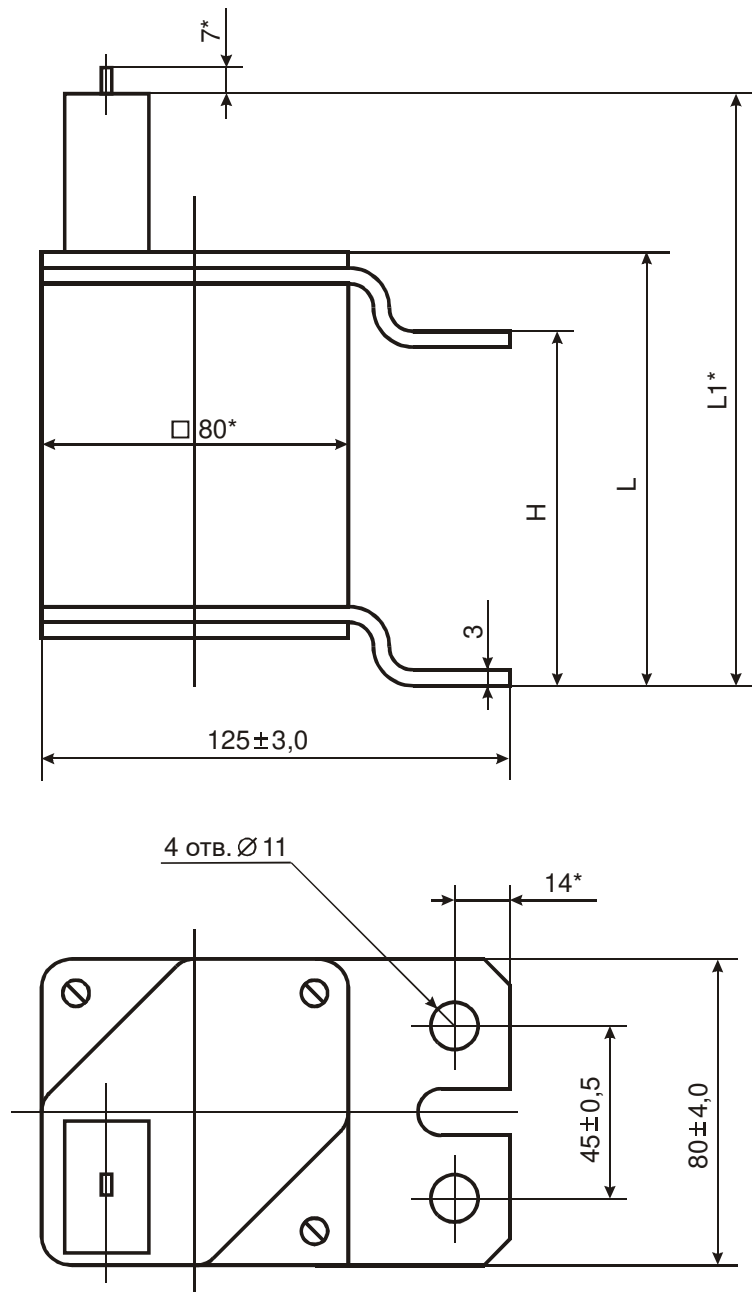
Fig. 2. Fuses with flange terminal PP57U-3738, PP57U-3768, version 1 (symmetric).



Type of Fuse	Nominal fuse current, A	Dimensions, mm			Weight (no more than kg)
		A	L	L1*	
PP57U-3738	400	99±3,0	113±3,0	118	1,15
PP57U-3768		129±3,0	143±3,0	148	1,40

* Dimensions for reference.

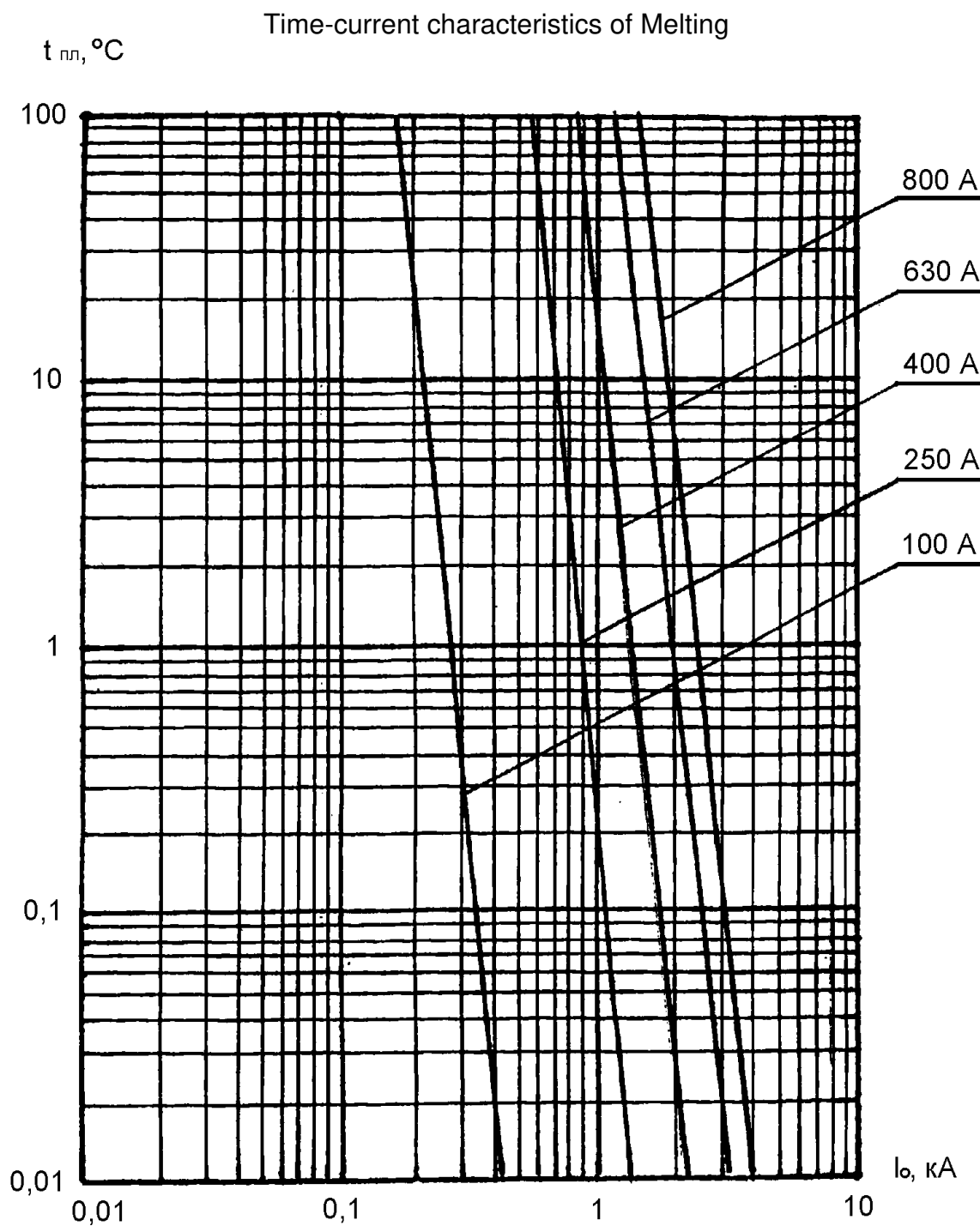
Fig. 3. Fuses with flange terminal PP57U-3738, PP57U-3768, version 2 (nonsymmetric).



Type of Fuse	Nominal fuse current, A	Dimensions, mm			Weight (no more than kg)
		L	L1*	H	
PP57U-3938	630	79±3,0	121,5±3,0	64±3,0	1,70
PP57U-4038	800	79±3,0	121,5±3,0	64±3,0	
PP57U-3968	630	109±3,0	151,5±3,0	94±3,0	2,15
PP57U-3998	630	109±3,0	151,5±3,0	94±3,0	
PP57U-4068	800	109±3,0	151,5±3,0	94±3,0	

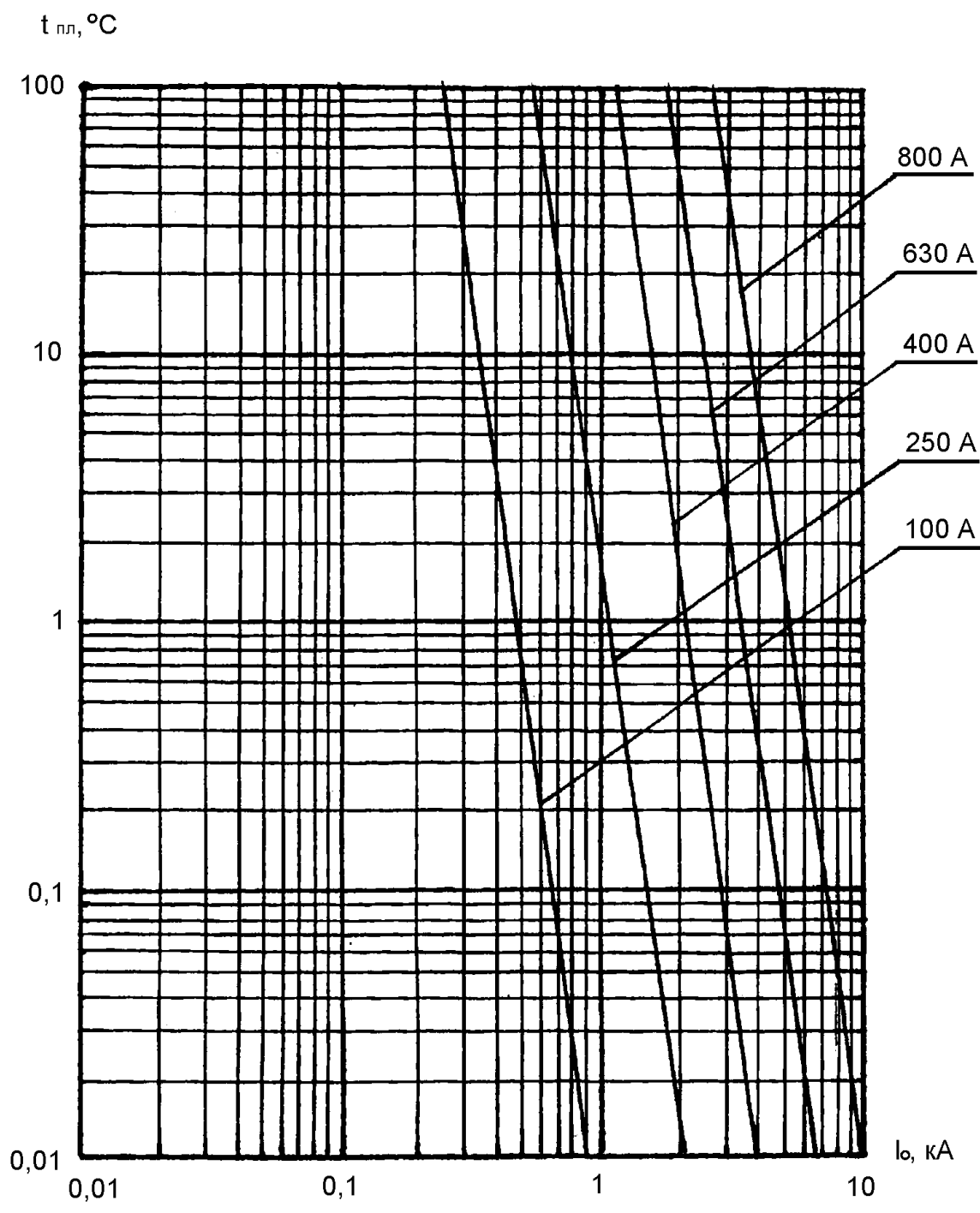
* Dimensions for reference.

Fig. 4. Fuses with console outputs PP57U-3938, PP57U-4038, PP57U-3968, PP57U-3998, PP57U-4068.



I_0 – Melting current, kA
 t_{mn} – Time of melting, s.

Fig. 1. Fuses series PP57U-3137, PP57U-3437, PP57U-3737, PP57U-3937, PP57U-3938, PP57U-4038.



I_o – Melting current, kA
 t_{mn} – Time of melting, s.

Fig. 2. Fuses series PP57U-3167, PP57U-3467, PP57U-3767, PP57U-3967, PP57U-3768, PP57U-3968, PP57U-4068.