ПРОТОН
ИМПУЛЬС

SOLID-STATE RELAYS for
general industrial applications

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proton-impuls.com

Closed Joint-Stock Company 'Proton-Impulse' was established in 1995 based on the largest enterprise for the development and manufacturing of optoelectronic products – Open Joint-Stock Company 'Proton.' We preserve the best traditions of our team while simultaneously improving and developing all management processes.

One of our work principles is a close connection with consumers. Our regular partners in the market are the largest defense industry corporations and leading design research institutes and design bureaus.

The company actively conducts research and development through two specialized development departments, organizing a complete production cycle for the developed products – from casting to assembly.

The product line of Closed Joint-Stock Company 'Proton-Impulse' is constantly updated, and today the main groups of manufactured products include:

- Microassemblies of series 2609KP, 2625KV, 2625KR, 2609KV
- Semiconductor emitters of series IP
- Semiconductor lamps of series LP

The company's quality management system is certified by the Certification Association.

30 years in the electronics industry

СИСТЕМА ДОБРОВОЛЬНОЙ СЕРТИФИКАЦИИ РАДИОЭЛЕКТРОННОЙ АППАРАТУРЫ, ЭЛЕКТРОННОЙ КОМПОНЕНТНОЙ БАЗЫ И МАТЕРИАЛОВ ВОЕННОГО, ДВОЙНОГО И НАРОДНОХОЗЯЙСТВЕННОГО НАЗНАЧЕНИЯ «ЭЛЕКТРОНСЕРТ»
(рег. № РОСС RU.В268.04КМН0)
Орган по сертификации систем менеджмента качества

Акционерное общество «Авиаприбор»
125167, г. Москва, пер. Авиационный, д. 5, № ЭС.06.041.0003-2024 от 31 мая 2024 г.

СЕРТИФИКАТ СООТВЕТСТВИЯ

№ ЭС 06.093.0397-2024

Зарегистрирован в Реестре СДС «Электронсерт» 24 июня 2024 г.

Выдан Закрытому акционерному обществу «Протон-Импульс»
ОГРН 1025700826458

Юридический адрес 302040, г. Орел, ул. Лескова, 19, этаж 4, помещение 9

НАСТОЯЩИЙ СЕРТИФИКАТ УДОСТОВЕРЯЕТ, что система менеджмента качества применительно к
разработке, производству

продукции классов ЕК 001-2023: 5963, 5980, 6240

соответствует требованиям
ГОСТ Р ИСО 9001-2015, ГОСТ РВ 0015-002-2020, ГОСТ РВ 0020-57.412-2020

Руководитель органа по сертификации СМ Р.М. Нурулов

Действителен до 28 июня 202

Действует с Приложением

003732

'Russian Register' and the international certification body IQNET for compliance with the requirements of the international standard ISO 9001:2015.

Regarding the development and production of semiconductor emitters and microassemblies, the company has obtained a Certificate confirming that the quality management system meets the requirements of GOST RV 0015-002-2012 'System for the Development and Production of Military Equipment' (in terms of electronic components), ES RD 009-2014, and the existence of conditions ensuring the fulfillment of state defense orders within the 'Electronsert' system."

TTR 1 - MT 063 12 L1 DS

Service functions:
S - self-monitoring
«» - no service outputs

Output overvoltage protection type:
D - protection diodes;
V - varistor + RC circuit
(only varistor in the DC TTR);
N - no protection

Enclosure modification:
1 - enclosure without connector
2 - enclosure with terminal connector
3 - enclosure with flat cable connector
4 - enclosure for a 3-phase relay

The identifier of the product design - L

Switching current voltage:
02,04,08,12 - device class (1/100 of the maximum switching voltage of the output element, V)

Rated current:
007…150 is the maximum switching current (three digits), A

Control current:
T - current 10…25 mA (DC)
A - voltage in the range of 3…32 V (DC)
(actual values according to the data sheet)
B - voltage 3…32 V (DC) + additionalpower supply,
V - voltage 90…280 V (AC)
Y - voltage 20…265 V (AC)/18..240 V (DC)

Switching type identifier:
M - AC relay with switching during phase transition through "0"
N - AC relay with switching at peak voltage
C - AC relay without switching voltage phase control
D - DC relay

ID of the number of relay channels:
1 - single channel
2 - two-channel
3 - three-channel

SOLID STATE RELAYS SERIES TTR1-MA...-L1D

Single-channel AC SSR relays with zero-crossing switching

Features:

- Control signal - 3.5...32 VDC
- Zero-crossing switching
- Maximum switching current: 10/40/63/80/100/125 A
- The relay is housed in an innovative case and has an ON indication
- Overvoltage protection on the output using protective diodes or varistors
- Special protective cover to prevent electric shock

Product selection

Operating current	25A	40A	63A	80A	100A	125A
Product	TTR1-MA02512-L1D	TTR1-MA04012-L1D	TTR1-MA06312-L1D	TTR1-MA08012-L1D	TTR1-MA10012-L1D	TTR1-MA12512-L1D

Input specifications

Parameter name, unit of measurement	25A	40A	63A	80A	100A	125A
Input voltage in the ON state, V	3,5...32 DC					
Input voltage in the OFF state, V	-3,5...1,6 DC					
Turn-on time, ms (f=50 Hz)	10					
Turn-off time, ms (f=50 Hz)	10					

TTR1-MA...-L1D

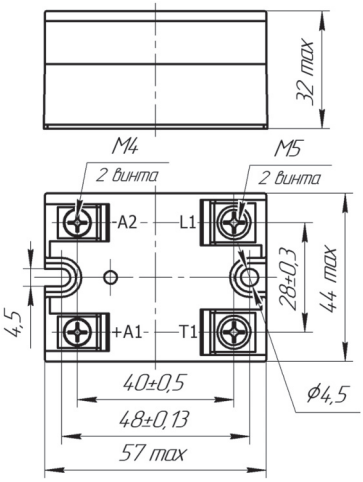
Output specifications

Parameter name, unit of measurement	25A	40A	63A	80A	100A	125A
Operating voltage, root mean square value, V	24...510					
Maximum Peak Voltage, V	±800*					
Output leakage current, mA	±1,0					
Critical Rate of Rise of Output Voltage, V/μs	500					
Maximum operating Current, Root Mean Square Value, A	25	40	63	80	100	125
Surge Current, A	250	400	630	800	1000	1200
Maximum Residual Voltage, V	1,5					
Thermal resistance junction-to-heat sink, °C/Вт	1,8	1	0,6	0,3	0,3	0,25
Limited by the protection scheme*						

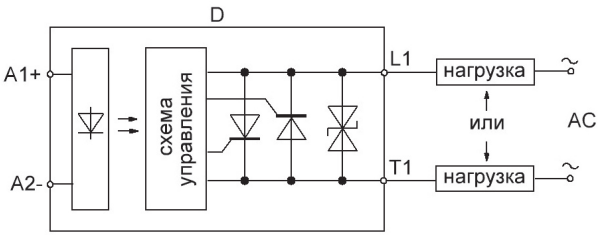
General specifications

Parameter name, unit of measurement	25A	40A	63A	80A	100A	125A
DC insulation voltage, input-output, (input + output) - radiator, V	3750					
Operating temperature range, °C	- 40...+85					
Storage temperature range, °C	- 40...+85					

Dimensional drawing



Connection diagram



D - the relay

SOLID-STATE RELAYS OF THE TTR1-MV...-L1D SERIES

single-channel AC SSRs
with switching at zero crossing

Features:

- Control signal - 90...280 VAC
- Switching at the phase "zero"
- Maximum switching current: 10/25/40/63/80/100/125 A
- The relay is made in an innovative housing and has an on indication
- Overvoltage protection at the output using protective diodes or varistors
- Special protective cover to prevent electric shock

Product selection

Operating current	10A	25A	40A	63A	80A	100A	125A
Product	TTR1-MV01008-L1D	TTR1-MA02512-L1D	TTR1-MV02508-L1D	TTR1-MV06312-L1D	TTR1-MV08012-L1D	TTR1-MV10012-L1D	TTR1-MV12512-L1D

Input specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
Input voltage in the ON state, V	90...280 AC						
Input voltage in the OFF state, V	0...10,0 AC						
Turn-on time, ms (f=50 Hz)	20						
Turn-off time, ms (f=50 Hz)	50						

TTR1-MV...-L1D

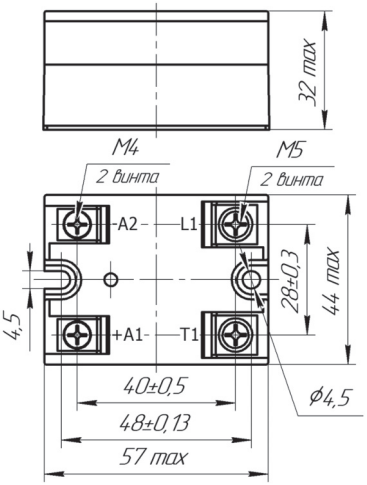
Output specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
Operating voltage, root mean square value, V	12...280			24...510			
Maximum Peak Voltage, V	±400 *			±800 *			
Output leakage current, mA	±1,0						
Critical Rate of Rise of Output Voltage, V/μs	500						
Maximum operating Current, Root Mean Square Value, A	10	25	40	63	80	100	125
Surge Current, A	70	180	280	600	800	1000	1200
Maximum Residual Voltage, V	1,5						
Thermal resistance junction-to-heat sink, °C/Вт	2,2	1,8	0,7	0,6	0,4	0,35	0,25
Limited by the protection scheme*							

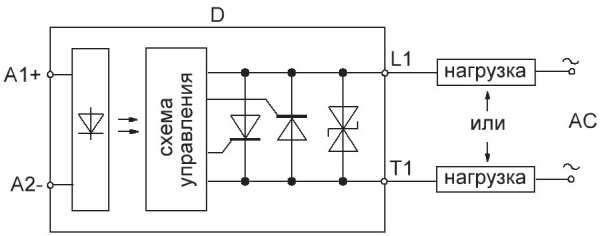
General specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
DC insulation voltage, input-output, (input + output) - radiator, V	3750						
Operating temperature range, °C	- 40...+85						
Storage temperature range, °C	- 40...+85						

Dimensional drawing



Connection diagram



D - the relay

SOLID-STATE RELAYS OF THE TTR1-MT...-L1D SERIES

single-channel AC SSRs
with switching at zero-crossing of the phase

Features:

- Control signal - 10...25 mA
- Switching at zero-crossing of the phase
- Maximum switching current 25/40/63/80/100/125 A
- Relay housed in an innovative enclosure
- Overvoltage protection on the output
using protective diodes, varistors, or without protection
- Special protective cover to prevent electric shock

Product selection

Operating current	10A	25A	40A	63A	80A	100A	125A
Product	TTR1-MT01008-L1D	TTR1-MT02508-L1D	TTR1-MT04008-L1D	TTR1-MT06312-L1D	TTR1-MT08012-L1D	TTR1-MT10012-L1D	TTR1-MT12512-L1D

Input specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
The input signal in the on state, mA	10...25						
Input voltage in the OFF state, V	-7,0...1,6						
Turn-on time, ms (f=50 Hz)	10						
Turn-off time, ms (f=50 Hz)	10						

TTR1-MT...-L1D

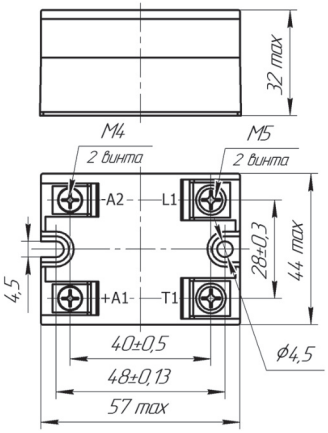
Output specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
Operating voltage, root mean square value, V	12...280			24...510			
Maximum Peak Voltage, V	±400 *			±800 *			
Output leakage current, mA	±1,0						
Critical Rate of Rise of Output Voltage, V/μs	500						
Maximum operating Current, Root Mean Square Value, A	10	25	40	63	80	100	125
Surge Current, A	70	180	280	600	800	1000	1250
Maximum Residual Voltage, V	1,5						
Thermal resistance junction-to-heat sink, °C/Вт	2,2	1,8	0,7	0,6	0,4	0,3	0,25
Limited by the protection scheme*							

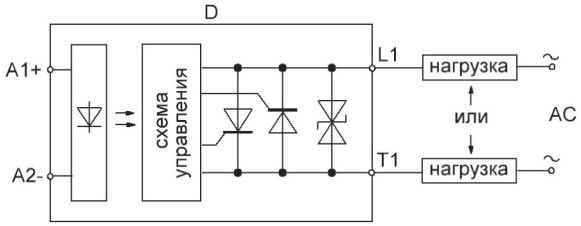
General specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
DC insulation voltage, input-output, (input + output) - radiator, V	3750						
Operating temperature range, °C	- 40...+85						
Storage temperature range, °C	- 40...+85						

Dimensional drawing



Connection diagram



D - the relay

SOLID-STATE RELAYS SERIES TTR1-SA...-L1D

single-channel AC SSRs without phase control
of the switched voltage
(triggering without delay)

Features:

- Control signal - 3.5...32 VDC
- Switching without phase control of the switched voltage
- Maximum switching current of 10/25/40/63/80/100/125 A
- Relay is housed in an innovative case and has indication
- Overvoltage protection at the output using protective diodes
- Special protective cover to prevent electric shock

Product selection

Operating current	10A	25A	40A	63A	80A	100A	125A
Product	TTR1-SA01008-L1D	TTR1-SA02508-L1D	TTR1-SA04008-L1D	TTR1-SA06312-L1D	TTR1-SA08012-L1D	TTR1-SA10012-L1D	TTR1-SA12512-L1D

Input specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
Input voltage in the ON state, V	3,5...32 DC						
Input voltage in the OFF state, V	-7,0...0,8 DC						
Turn-on time, ms (f=50 Hz)	50						
Turn-off time, ms (f=50 Hz)	10						

TTR1-SA...-L1D

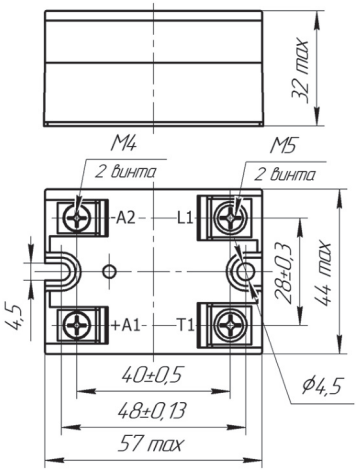
Output specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
Operating voltage, root mean square value, V	12...280			24...510			
Maximum Peak Voltage, V	±400 *			±800 *			
Output leakage current, mA	±1,0						
Critical Rate of Rise of Output Voltage, V/μs	500						
Maximum operating Current, Root Mean Square Value, A	10	25	40	63	80	100	125
Surge Current, A	70	180	280	600	800	1000	1250
Maximum Residual Voltage, V	1,5						
Thermal resistance junction-to-heat sink, °C/Вт	2,2	1,8	0,7	0,6	0,4	0,3	0,25
Limited by the protection scheme*							

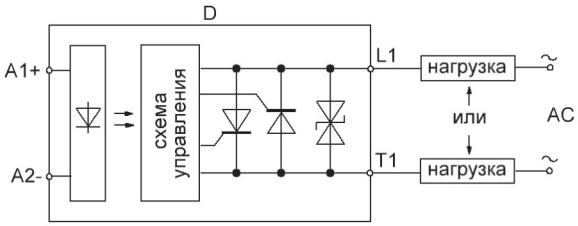
General specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
DC insulation voltage, input-output, (input + output) - radiator, V	3750						
Operating temperature range, °C	- 40...+85						
Storage temperature range, °C	- 40...+85						

Dimensional drawing



Connection diagram



D - the relay

SOLID STATE RELAYS SERIES TTR1-SV...-L1D

Single-channel AC SSR without phase control
of the switched voltage
(triggering without delay)

Features:

- Control signal - 90...280 VAC
- Switching without phase control of the switched voltage
- Maximum switching current of 10/25/40/63/80/100/125 A
- Relay housed in an innovative case, with power-on indication
- Overvoltage protection at the output using protective diodes
- Special protective cover to prevent electric shock

Product selection

Operating current	10A	25A	40A	63A	80A	100A	125A
Product	TTR1-SV01008-L1D	TTR1-SV02508-L1D	TTR1-SV04008-L1D	TTR1-SV06312-L1D	TTR1-SV08012-L1D	TTR1-SV10012-L1D	TTR1-SV12512-L1D

Input specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
Input voltage in the ON state, V	90...280 AC						
Input voltage in the OFF state, V	0...10,0 AC						
Turn-on time, ms (f=50 Hz)	20						
Turn-off time, ms (f=50 Hz)	20						

TTR1-SV...-L1D

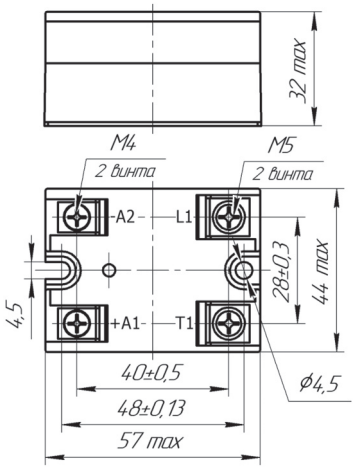
Output specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
Operating voltage, root mean square value, V	12...280			24...510			
Maximum Peak Voltage, V	±400 *			±800 *			
Output leakage current, mA	±1,0						
Critical Rate of Rise of Output Voltage, V/μs	500						
Maximum operating Current, Root Mean Square Value, A	10	25	40	63	80	100	125
Surge Current, A	70	180	280	600	800	1000	1250
Maximum Residual Voltage, V	1,5						
Thermal resistance junction-to-heat sink, °C/Вт	2,2	1,8	0,7	0,6	0,4	0,3	0,25
Limited by the protection scheme*							

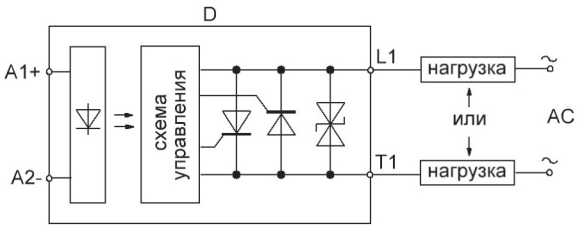
General specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
DC insulation voltage, input-output, (input + output) - radiator, V	3750						
Operating temperature range, °C	- 40...+85						
Storage temperature range, °C	- 40...+85						

Dimensional drawing



Connection diagram



D - the relay

SOLID STATE RELAYS SERIES TTR1-ST...-L1D

Single-channel AC SSR without phase control
of the switched voltage
(triggering without delay)

Features:

- Control signal - 10...25 mA
- Switching without phase control of the switched voltage
- Maximum switching current of 10/25/40/63/80/100/125 A
- Relay housed in an innovative case
- Overvoltage protection at the output using protective diodes or varistors
- Special protective cover to prevent electric shock

Product selection

Operating current	10A	25A	40A	63A	80A	100A	125A
Product	TTR1-ST01008-L1D	TTR1-ST02508-L1D	TTR1-ST04008-L1D	TTR1-ST06312-L1D	TTR1-ST08012-L1D	TTR1-ST10012-L1D	TTR1-ST12512-L1D

Input specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
The input signal in the on state, mA	10...25						
Входное напряжение Input voltage in the OFF state, V	-7,0...1,6						
Turn-on time, ms (f=50 Hz)	50						
Turn-off time, ms (f=50 Hz)	10						

TTR1-ST...-L1D

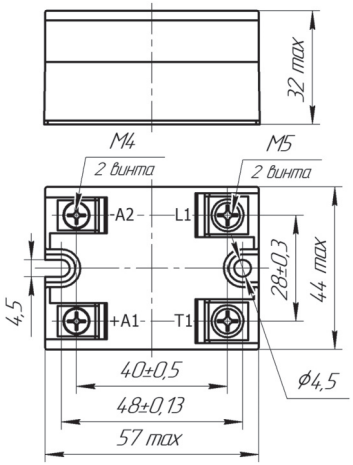
Output specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
Operating voltage, root mean square value, V	12...280			24...510			
Maximum Peak Voltage, V	±400 *			±800 *			
Output leakage current, mA	±1,0						
Critical Rate of Rise of Output Voltage, V/μs	500						
Maximum operating Current, Root Mean Square Value, A	10	25	40	63	80	100	125
Surge Current, A	70	180	280	600	800	1000	1250
Maximum Residual Voltage, V	1,5						
Thermal resistance junction-to-heat sink, °C/Вт	2,2	1,8	0,7	0,6	0,4	0,3	0,25
Limited by the protection scheme*							

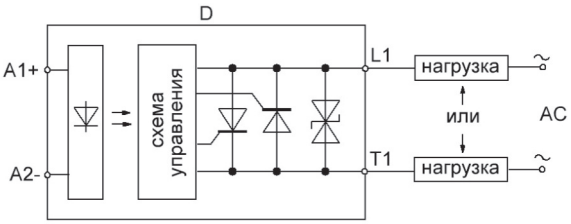
General specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A	125A
DC insulation voltage, input-output, (input + output) - radiator, V	3750						
Operating temperature range, °C	- 40...+85						
Storage temperature range, °C	- 40...+85						

Dimensional drawing



Connection diagram



D - the relay

SOLID-STATE RELAYS OF THE TTR1-MB...-L3DS SERIES

Single-channel AC SSRs with zero-crossing switching and self-diagnostic function.

Features:

- Control signal: 3...32 VDC
- Zero-crossing switching
- Maximum switching current: 25/40/63/80/100/125 A
- Feedback to the controller (monitoring of operation and load disconnection)
- Error signal is generated using an "open-collector" configuration, allowing for accurate detection of power supply interruptions to the TTR
- Separate indication for power presence/control signal/functionality error
- Overvoltage protection on the output using protective diodes or varistors

Product selection

Operating current	25A	40A	63A	80A	100A	125A
Product	TTR1-MB02512-L3DS	TTR1-MB04012-L3DS	TTR1-MB06312-L3DS	TTR1-MB08012-L3DS	TTR1-MB10012-L3DS	TTR1-MB12512-L3DS

Input specifications

Parameter name, unit of measurement	25A	40A	63A	80A	100A	125A
Input voltage in the ON state, V	3...32 DC					
Input voltage in the OFF state, V	-3,5...0,8 DC					
Turn-on time, ms (f=50 Hz)	10					
Turn-off time, ms (f=50 Hz)	10					
Power supply voltage range, V	4,2...32 DC					

TTR1-MB...-L3DS

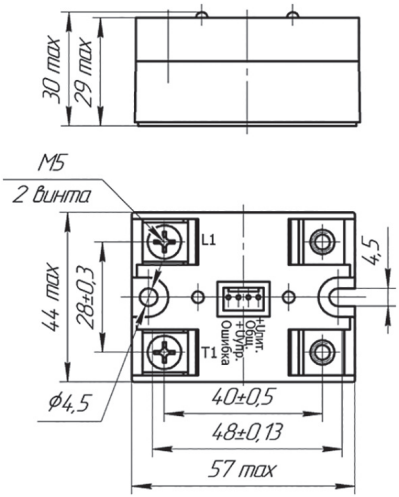
Output specifications

Parameter name, unit of measurement	25A	40A	63A	80A	100A	125A
Operating voltage, root mean square value, V	24...510					
Maximum Peak Voltage, V	± 800 *					
Output leakage current, mA	±3,0					
Critical Rate of Rise of Output Voltage, V/μs	500					
Maximum operating Current, Root Mean Square Value, A	25	40	63	80	100	125
Surge Current, A	250	400	600	800	1000	2000?
Maximum Residual Voltage, V	1,5					
Thermal resistance junction-to-heat sink, °C/Вт	1,8	1,0	0,6	0,3	0,3	0,25
Limited by the protection scheme*						

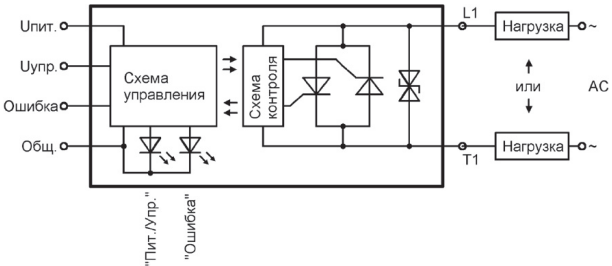
General specifications

Parameter name, unit of measurement	25A	40A	63A	80A	100A	125A
DC insulation voltage, input-output, (input + output) - radiator, V	3750					
Operating temperature range, °C	- 40 ... +85					
Storage temperature range, °C	- 40 ... +85					

Dimensional drawing



Connection diagram



Series Solid-State Relays

Single-channel AC SSR relays with zero-crossing switching and additional power supply for controlling small currents

Features:

- Control signal: 3...32 VDC
- Control current up to 1 mA
- Zero-crossing switching
- Maximum switching current: 10/25/40/63/80/100 A
- The relay is housed in an innovative casing and features an on-indication.

Product selection

Operating current	10A	25A	40A	63A	80A	100A
Product	TTR1-MB01008-L3D	TTR1-MB02508-L3D	TTR1-MB04008-L3D	TTR1-MB06308-L3D	TTR1-MB08008-L3D	TTR1-ST10008-L3D

Input specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A
The input signal in the on state, mA	3...32 DC					
Input voltage in the OFF state, V	-3,5...0,8					
Turn-on time, ms (f=50 Hz)	10					
Turn-off time, ms (f=50 Hz)	10					
Input current, mA	≤ 1					
Power supply voltage range, V	20...30 AC/DC					

TTR1-MB...-L3D

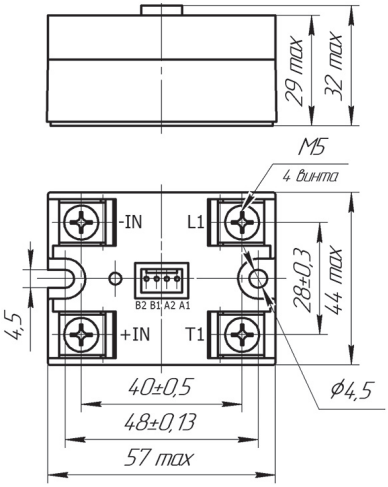
Output specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A
Operating voltage, root mean square value, V	12...280					
Maximum Peak Voltage, V	±400 *					
Output leakage current, mA	±1,0					
Critical Rate of Rise of Output Voltage, V/μs	500					
Maximum operating Current, Root Mean Square Value, A	10	25	40	63	80	100
Surge Current, A	70	180	280	600	800	1000
Maximum Residual Voltage, V	1,5					
Thermal resistance junction-to-heat sink, °C/Вт	2,2	1,8	0,7	0,6	0,4	0,3
Limited by the protection scheme*						

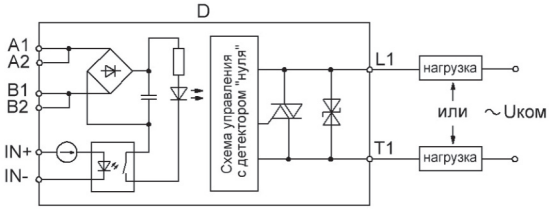
General specifications

Parameter name, unit of measurement	10A	25A	40A	63A	80A	100A
DC insulation voltage, input-output, (input + output) - radiator, V	3750					
Operating temperature range, °C	-40...+85					
Storage temperature range, °C	-40...+85					

Dimensional drawing



Connection diagram



Функциональное назначение выводов реле

Withdrawal	Functional purpose
A1, A2	Power conclusions
B1, B2	
IN+	Positive control output
IN-	Negative control output
L1	Switching circuit conclusions
T1	

Series Solid-State Relays

Single-channel AC SSRs with peak voltage switching
(designed for switching inductive loads)

Features:

- Control signal: 4.2...32 VDC
- Peak voltage switching
- Maximum switching current: 25/40/63/80/100/125 A
- The relay is housed in an innovative casing and features an on-indication
- Overvoltage protection at the output using protective diodes
- Recommended load type: inductive
- Minimal current overload when switching inductive loads
- Special protective cover to prevent electric shock

Product selection

Operating current	25A	40A	63A	80A	100A	125A
Product	TTR1-PA02512-L1D	TTR1-PA04012-L1D	TTR1-PA06312-L1D	TTR1-PA08012-L1D	TTR1-PA10012-L1D	TTR1-PA12512-L1D

Input specifications

Parameter name, unit of measurement	25A	40A	63A	80A	100A	125A
Input voltage in the ON state, V	4,2 ... 32 DC					
Input voltage in the OFF state, V	-3,5 ... 1,6 DC					
Turn-on time, ms (f=50 Hz)	40					
Turn-off time, ms (f=50 Hz)	10					

TTR1-PA...-L1D

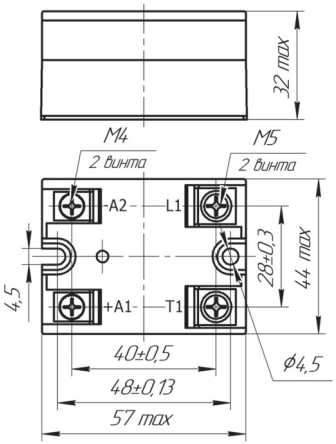
Output specifications

Parameter name, unit of measurement	25A	40A	63A	80A	100A	125A
Operating voltage, root mean square value, V	60...510					
Maximum Peak Voltage, V	±800 *					
Output leakage current, mA	±6,0					
Critical Rate of Rise of Output Voltage, V/μs	500					
Maximum operating Current, Root Mean Square Value, A	25	40	63	80	100	125
Surge Current, A	250	400	600	800	1000	1200
Maximum Residual Voltage, V	1,5					
Thermal resistance junction-to-heat sink, °C/Вт	1,8	1	0,6	0,3	0,3	0,25
Limited by the protection scheme*						

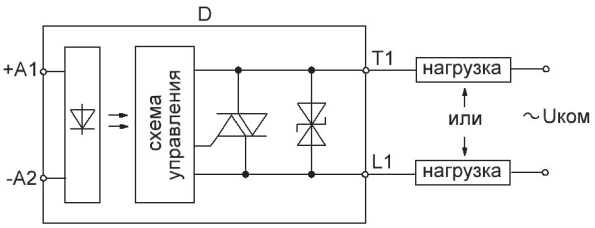
General specifications

Parameter name, unit of measurement	25A	40A	63A	80A	100A	125A
DC insulation voltage, input-output, (input + output) - radiator, V	3750					
Operating temperature range, °C	- 40 ... +85					
Storage temperature range, °C	- 40 ... +85					

Dimensional drawing



Connection diagram



D - the relay

SOLID STATE RELAYS OF THE SSR2-MA...-L2D SERIES

dual-channel AC SSRs with zero-crossing switching

Features:

- Control signal - 7.5...25 VDC
- Switching at zero crossing
- Switching current range: 25/50/63 A
- Two galvanically isolated switching channels with independent control
- The relay is housed in an innovative enclosure and features an on indicator."

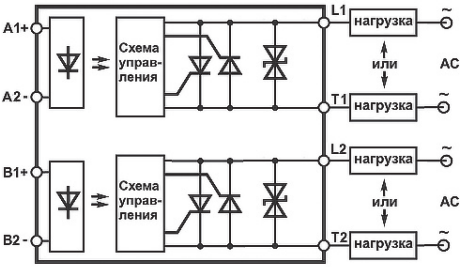
Product selection

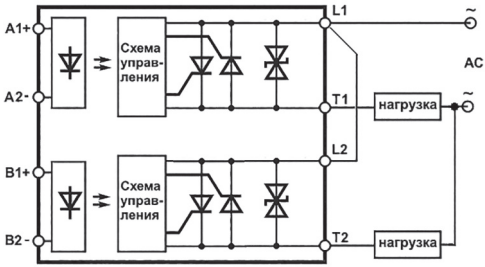
Operating current	25A	50A	63A
Product	TTR2-MA02512-L2D	TTR2-MA05012-L2D	TTR2-MA06312-L2D

Input specifications

Parameter name, unit of measurement	25 A	50 A	63 A
Input voltage in the ON state, V	7,5...25 DC		
Input voltage in the OFF state, V	-3,5...1,6 DC		
Turn-on time, ms (f=50 Hz)	10		
Turn-off time, ms (f=50 Hz)	10		

Connection diagram





TTR1-MA...-L2D

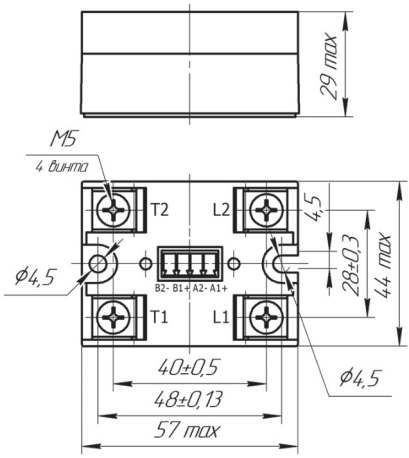
Output specifications

Parameter name, unit of measurement	25A	50A	63A
Operating voltage, root mean square value, V	24...510		
Maximum Peak Voltage, V	±800 *		
Output leakage current, mA	±1,0		
Critical Rate of Rise of Output Voltage, V/μs	500		
Maximum operating Current, Root Mean Square Value, A	25	50	63
Surge Current, A	250	500	600
Maximum Residual Voltage, V	1,5		
Thermal resistance junction-to-heat sink, °C/Вт	1,0	0,7	0,6
Limited by the protection scheme*			

General specifications

Parameter name, unit of measurement	25 A	50 A	63 A
DC insulation voltage, input-output, (input + output) - radiator, V	3750		
Operating temperature range, °C	- 40 ... +85		
Storage temperature range, °C	- 40 ... +85		

Dimensional drawing



Solid State Relays for Direct Current

TTR1-DA

Features:

- For use as a switch with 'normally open contacts'
- Used in automation devices as a powerful interface
- The relay is designed in an innovative housing and features an on-indicator
- Special protective cover to prevent electric shock

Product selection

Operating current	5A	7A	12A	15A	25A
Product	TTR1-DA00506-L1V	TTR1-DA00702-L1N TTR1-DA00704-L1N	TTR1-DA01 202-L1N TTR1-DA01 204-L1N	TTR1-DA01504-L1V	TTR1-DA02504-L1V

Main electrical parameters (at Tokr = 25 °C)

Parameter name, unit of measurement	Letter designation	5A	7A	12A	15A	25A
Input current, mA, no more than	I_{vh}	20				
Leakage current at output in off state, mA, no more than	I_{ut}	0,3				
DC insulation voltage (input-output, (input+output)-rad), V, not less than	U_{iz}	3750				
Turn-on time, ms, not more than	ton	5	0,1	0,1	5	5
Turn-off time, ms, not more than	toff	1	0,1	0,1	1	1
Built-in protective element		varistor			varistor	varistor

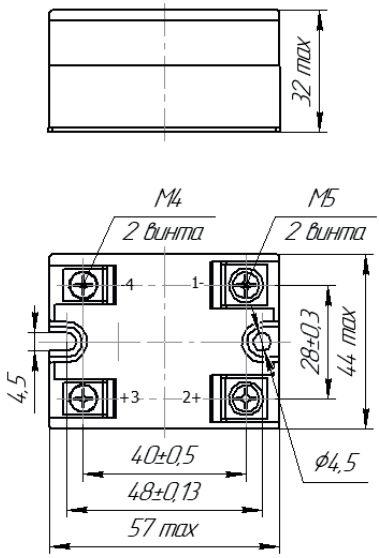
TTR1-DA

Maximum allowable operating conditions

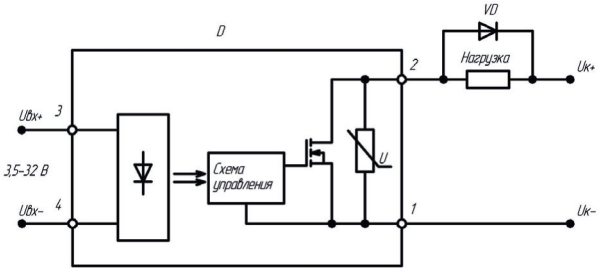
Parameter name, unit of measurement	Letter designation	5A	7A	12A	15A	25A
Switching voltage, V, maximum	U_{kom}	600	200* 400**	200* 400**	400	400
Switching current, A, maximum	I_{kom}	5	7	12	15	25
Input voltage in the on state, V, range	U_{on}	3,5 ... 32				
Input voltage in the off state, V, range	U_{off}	- 0,5 ... 1				
Operating temperature range, °C	T_{okr}	- 40 ... + 80				

* for products TTP1-DA00702-L1H, TTP1-ДА01202-L1H
** for products TTP1-DA00704-L1H, TTP1-ДА01204-L1H

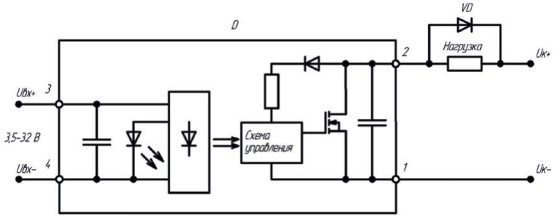
Dimensional drawing



Connection diagram



D - relay
VD - diode, installed under inductive load



D - relay
VD - diode, installed under inductive load

SOLID-STATE RELAYS FOR DIRECT CURRENT

TTR1-DA...-L1D

Features:

• Designed for use as a switch with "normally open contacts"
• Used in automation devices as a powerful interface
• The relay is housed in an innovative enclosure and has an on-indicator
• Special protective cover to prevent electric shock
• A transformer is used for galvanic isolation
• High speed: relay turn-on time is 30 μs, t urn-off time is 50 μs

Product selection

Operating current	15A	25A
Product	TTR1-DA01504-L1V	TTR1-DA02504-L1V

Main electrical parameters (at Tokr = 25 °C)

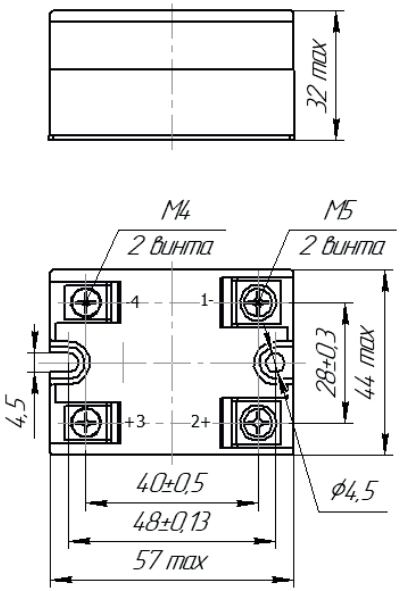
Parameter name, unit of measurement	Letter designation	15A	25A
Input current, mA, no more than	I_{yh}	25	
Output resistance in the open state, no more than	R_{otk}	0,16	0,015
Leakage current at output in off state, mA, no more than	I_{ut}	0,3	
Insulation voltage of direct current (inp-outp, (inp+outp)-rad), V, not less than	U_{iz}	3750	
Turn-on time, ms, not more than	ton	0,03	
Turn-off time, ms, not more than	toff	0,05	

TTR1-DA...-L1D

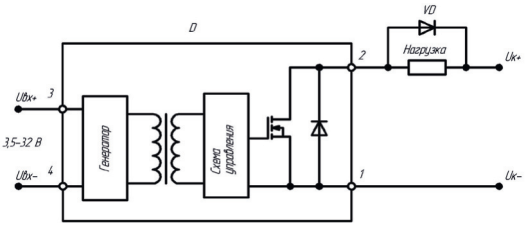
Maximum allowable operating conditions

Parameter name, unit of measurement	Letter designation	15A	25A
Switching voltage, V, maximum	U_{kom}	400	
Switching current, A, maximum	I_{kom}	15	25
Input voltage in the on state, V, range	U_{on}	3,5 ... 32	
Input voltage in the off state, V, range	U_{off}	- 0,5 ... 1	
Operating temperature range, °C	T_{okr}	- 40 ... + 85	

Dimensional drawing



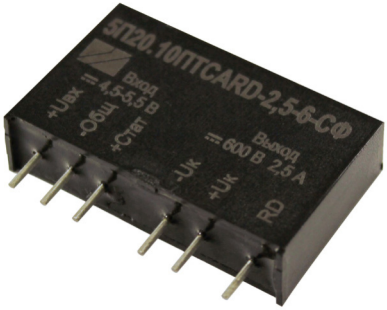
Connection diagram



D - relay
VD - diode, installed under inductive load

DC RELAY

with short-circuit protection
5P20.10PTCARD-2.5-6-SF



Features:

- Short-circuit protection, overcurrent protection of the output channel
- Status signal for protection activation (open collector type)
- Built-in RD circuit for use with inductive loads
- Galvanic isolation between relay input and output

Maximum allowable and limit operating modes

Parameter name, unit of measurement	Norm	
	no less	no more
Opening DC control circuit voltage, V	4,5	5,5
Closing DC control circuit voltage, V	- 0,5	1
Switching channel current, A	0,02	2,5
Impulse permissible voltage in the channel circuit, V		600
Current of the status signal, mA		20
Electric insulation of alternating voltage between the control circuit and the channel Under normal climatic conditions, V	-	1500
Operating temperature range, °C	- 50	70

Applied to:

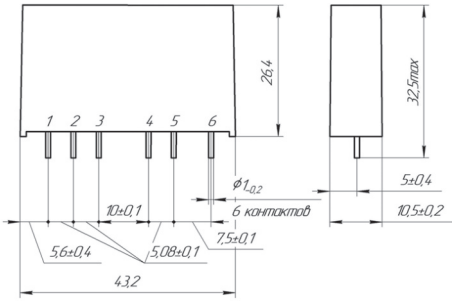
- In the rolling stock of Russian Railways (RZD)
- In critical circuits
- Where protection against short circuits and overcurrent is required

5P20.10PTCARD-2.5-4-SF

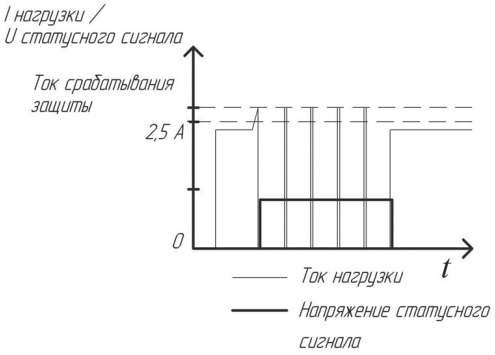
Electrical parameters (25°C)

Parameter name, unit of measurement	Norm	
	no less	no more
Control circuit current, mA		20
Closed channel current, mA		0,001
Time to turn on the channel, ms		0,4
Time to turn off the channel, ms		0,6
Tripping current of protection, A	2,7	3,3
Restart time, ms		100
Channel switching frequency, Hz		10
Resistance of the open channel, Ohms		0,3
Current of the status output in the closed state, μA		1

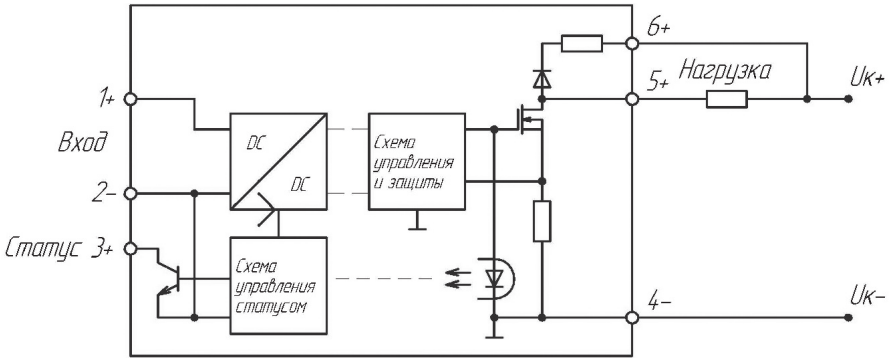
Dimensional drawing



Algorithm for the status signal operation

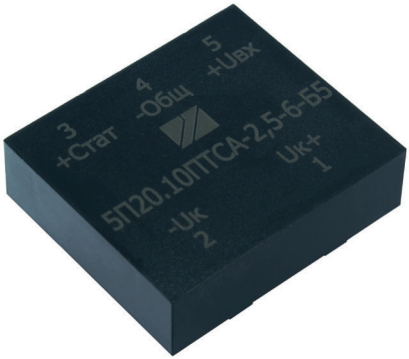


Electrical circuit



DC RELAY

with short circuit protection
5P20.10PTSA-2.5-6-SF



Features:

- Short circuit protection, overcurrent protection of the output channel
- Status signal for protection activation (open collector type)
- Galvanic isolation between relay input and output

Maximum allowable and limit operating modes

Parameter name, unit of measurement	Norm	
	no less	no more
Opening DC control circuit voltage, V	4,5	5,5
Closing DC control circuit voltage, V	- 0,5	1
Switching channel current, A	0,02	2,5
Impulse permissible voltage in the channel circuit, V		600
Current of the status signal, mA		20
Electric insulation of alternating voltage between the control circuit and the channel Under normal climatic conditions, V	-	1500
Operating temperature range, °C	- 50	+ 70

Used in:

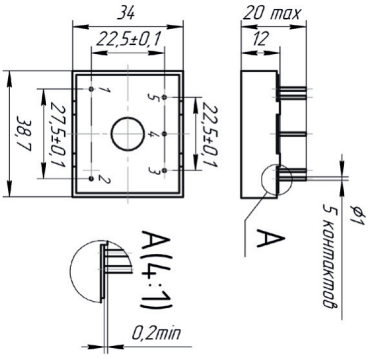
- In the rolling stock of Russian Railways (RZhD)
- In critical circuits
- Where short circuit protection and overcurrent protection are required

5P20.10PTSA-2.5-6-SF

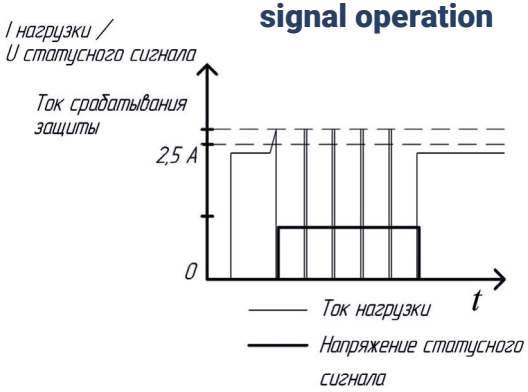
Electrical parameters (25°C)

Parameter name, unit of measurement	Norm	
	no less	no more
Control circuit current, mA	10	20
Closed channel current, mA		0,01
Time to turn on the channel, ms		0,6
Time to turn off the channel, ms		0,8
Tripping current of protection, A	4,5	5
Restart time, ms		200
Channel switching frequency, Hz		10
Resistance of the open channel, Ohms		0,25
Current of the status output in the closed state, μA		20

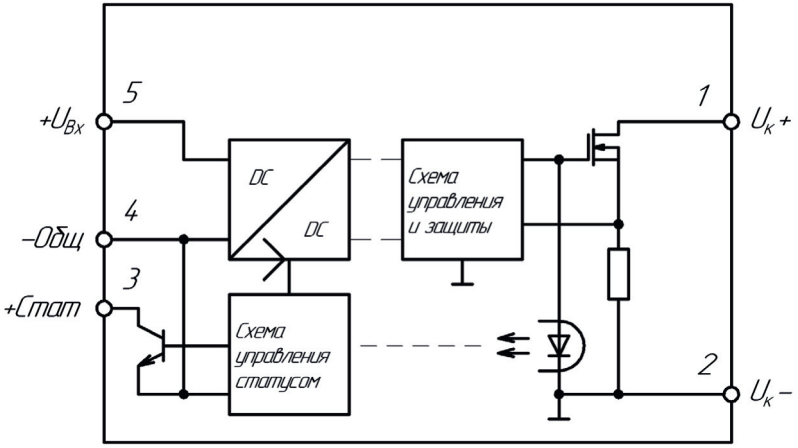
Dimensional drawing



Algorithm for the status signal operation



Electrical circuit



THREE-PHASE SOLID-STATE RELAYS FOR ALTERNATING CURRENT WITH ZERO-CROSSING COMMUTATION

Features:

- Control signal 4...32 VDC
- Zero-crossing commutation
- Maximum switching current: 10/25/40/63/100/150 A
- The relay is housed in an innovative enclosure and features an on-indication
- Overvoltage protection on the output using built-in varistors and RC circuits

Product selection

Operating current	10A	25A	40A	63A	100A	150A
Product	TTR3-MA01012-L4B	TTR3-MA02512-L4B	TTR3-MA04012-L4B	TTR3-MA06312-L4B	TTR3-MA10012-L4B	TTR3-MA15012-L4B

Input specifications

Parameter name, unit of measurement	10A	25A	40A	63A	100A	150A
Input voltage in the ON state, V	4...32 DC					
Input voltage in the OFF state, V	-3,5...1,6 DC					
Turn-on time, ms (f=50 Hz)	10					
Turn-off time, ms (f=50 Hz)	10					

TTR3-MA...-L4B

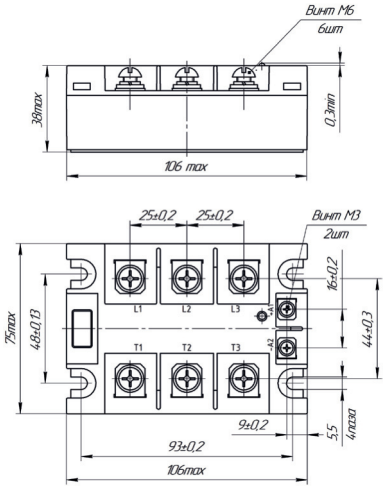
Output specifications

Parameter name, unit of measurement	10A	25A	40A	63A	100A	150A
Operating voltage, root mean square value, V	24...510					
Maximum Peak Voltage, V	±720 *					
Output leakage current, mA	±1,0					
Critical Rate of Rise of Output Voltage, V/μs	500					
Maximum operating Current, Root Mean Square Value, A	10	25	40	63	100	150
Surge Current, A(t_imp = 10 ms)	100	250	400	600	1000	1500
Maximum Residual Voltage, V	1,5					
Thermal resistance junction-to-heat sink, °C/Вт	1,4	1,2	0,6	0,4	0,3	0,13
Limited by the protection scheme * Switching elements of class 12 are used						

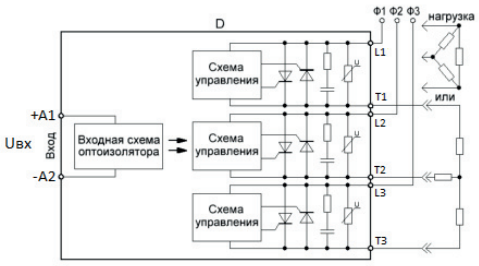
General specifications

Parameter name, unit of measurement	10A	25A	40A	63A	100A	150A
DC insulation voltage, input-output, (input + output) - radiator, V	3750					
Operating temperature range, °C	- 40 ... + 85					
Storage temperature range, °C	- 40 ... + 85					

Dimensional drawing



Connection diagram



D - relay
F1, F2, F3 - switching voltage phases

THREE-PHASE SOLID-STATE RELAYS FOR ALTERNATING CURRENT WITH ZERO-CROSSING COMMUTATION

Features:

- Control signal 90...280 VAC
- Switching in the 'zero' phase
- Maximum switching current: 10/25/40/63/100/150 A
- The relay is housed in an innovative enclosure and features an on-indication
- Overvoltage protection at the output using built-in varistors and RC circuits"

Product selection

Operating current	10A	25A	40A	63A	100A	150A
Product	TTR3-MB01012-L4B	TTR3-MB02512-L4B	TTR3-MB04012-L4B	TTR3-MB06312-L4B	TTR3-MB10012-L4B	TTR3-MB15012-L4B

Input specifications

Parameter name, unit of measurement	10A	25A	40A	63A	100A	150A
Input voltage in the ON state, V	90...280 AC					
Input voltage in the OFF state, V	0...10 AC					
Turn-on time, ms (f=50 Hz)	10					
Turn-off time, ms (f=50 Hz)	10					

ТТР3-МВ...-Л4В

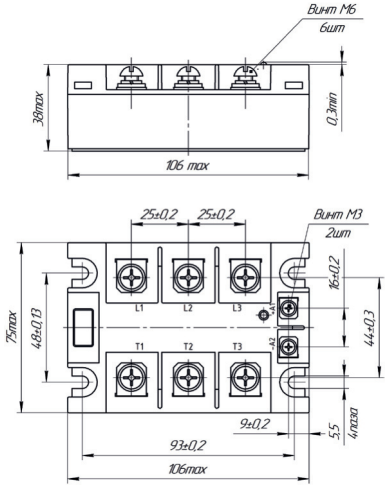
Output specifications

Parameter name, unit of measurement	10A	25A	40A	63A	100A	150A
Operating voltage, root mean s quare value, V	24...510					
Maximum Peak Voltage, V	±740 *					
Output leakage current, mA	±1,0					
Critical Rate of Rise of Output Voltage, V/μs	500					
Maximum operating Current, Root Mean Square Value, A	10	25	40	63	100	150
Surge Current, A(t_imp = 10 ms)	100	250	400	630	1000	1500
Maximum Residual Voltage, V	1,5					
Thermal resistance junction-to-heat sink, ºC/Вт	1,4	1,2	0,7	0,4	0,3	0,13
Limited by the protection scheme * Switching elements of class 12 are used						

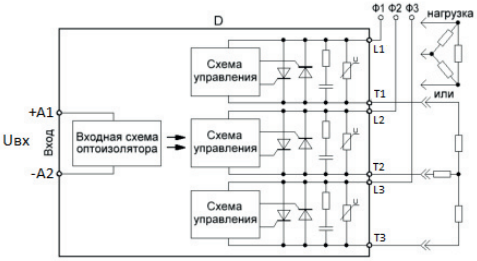
General specifications

Parameter name, unit of measurement	10A	25A	40A	63A	100A	150A
DC insulation voltage, input-output, (input + output) - radiator, V	3750					
Operating temperature range, ºC	- 40 ... + 85					
Storage temperature range, ºC	- 40 ... + 85					

Dimensional drawing



Connection diagram



D - relay
F1, F2, F3 - switching voltage phases

THREE-PHASE SOLID STATE RELAYS FOR ALTERNATING CURRENT

without phase control of the switched voltage
(triggering without delay)

Features:

- Control signal: 4...32 VDC
- Switching at zero crossing
- Maximum switching current: 10/25/40/63/100/150 A
- The relay is housed in an innovative enclosure and features an on-indication light
- Overvoltage protection on the output using built-in varistors and RC circuits

Product selection

Operating current	10A	25A	40A	63A	100A	150A
Product	TTR3-CA01012-L4B	TTR3-CA02512-L4B	TTR3-CA04012-L4B	TTR3-CA06312-L4B	TTR3-CA10012-L4B	TTR3-CA15012-L4B

Input specifications

Parameter name, unit of measurement	10A	25A	40A	63A	100A	150A
Input voltage in the ON state, V	4...32 DC					
Input voltage in the OFF state, V	-3,5...1,6 DC					
Turn-on time, ms (f=50 Hz)	10					
Turn-off time, ms (f=50 Hz)	10					

TTR3-CA...-L4B

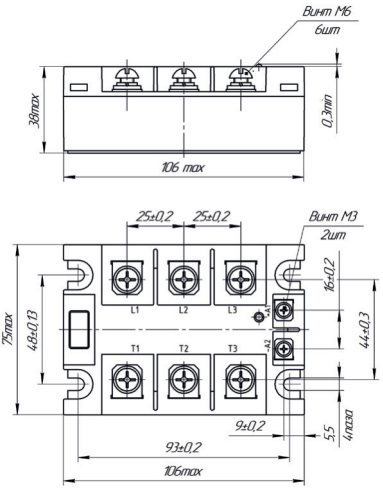
Output specifications

Parameter name, unit of measurement	10A	25A	40A	63A	100A	150A
Operating voltage, root mean square value, V	24...510					
Maximum Peak Voltage, V	±720 *					
Output leakage current, mA	±1,0					
Critical Rate of Rise of Output Voltage, V/μs	500					
Maximum operating Current, Root Mean Square Value, A	10	25	40	63	100	150
Surge Current, A(t_imp = 10 ms)	100	250	400	600	1000	1500
Maximum Residual Voltage, V	1,5					
Thermal resistance junction-to-heat sink, °C/Вт	1,4	1,2	0,6	0,4	0,3	0,13
Limited by the protection scheme * Switching elements of class 12 are used						

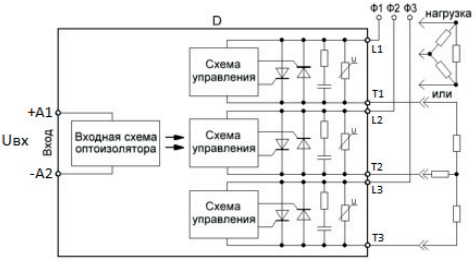
General specifications

Parameter name, unit of measurement	10A	25A	40A	63A	100A	150A
DC insulation voltage, input-output, (input + output) - radiator, V	3750					
Operating temperature range, °C	- 40 ... + 85					
Storage temperature range, °C	- 40 ... + 85					

Dimensional drawing



Connection diagram



D - relay
F1, F2, F3 - switching voltage phases

THREE-PHASE SOLID STATE RELAYS FOR ALTERNATING CURRENT

without phase control of the switched voltage
(triggering without delay)

Features:

- Control signal: 90...280 VAC
- Switching without phase control of the switched voltage
- Maximum switching current: 10/25/40/63/100/150 A
- The relay is housed in an innovative enclosure and features an on-indication light
- Overvoltage protection on the output using built-in varistors and RC circuits

Product selection

Operating current	10A	25A	40A	63A	100A	150A
Product	TTR3-CB01012-L4B	TTR3-CB02512-L4B	TTR3-CB04012-L4B	TTR3-CB06312-L4B	TTR3-CB10012-L4B	TTR3-CB15012-L4B

Input specifications

Parameter name, unit of measurement	10A	25A	40A	63A	100A	150A
Input voltage in the ON state, V	90...280 AC					
Input voltage in the OFF state, V	0...10 AC					
Turn-on time, ms (f=50 Hz)	10					
Turn-off time, ms (f=50 Hz)	10					

TTR3-CB...-L4B

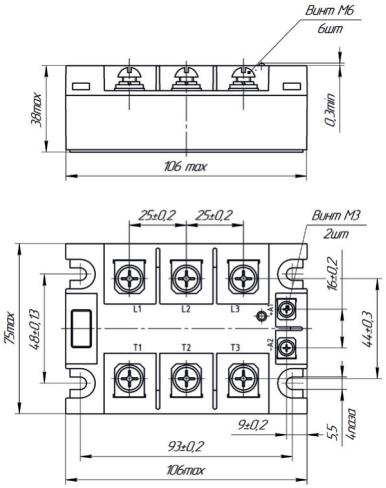
Output specifications

Parameter name, unit of measurement	10A	25A	40A	63A	100A	150A
Operating voltage, root mean square value, V	24...510					
Maximum Peak Voltage, V	±740 *					
Output leakage current, mA	±1,0					
Critical Rate of Rise of Output Voltage, V/μs	500					
Maximum operating Current, Root Mean Square Value, A	10	25	40	63	100	150
Surge Current, A(t_imp = 10 ms)	100	250	400	630	1000	1500
Maximum Residual Voltage, V	1,5					
Thermal resistance junction-to-heat sink, °C/Вт	1,4	1,2	0,7	0,4	0,3	0,13
Limited by the protection scheme * Switching elements of class 12 are used						

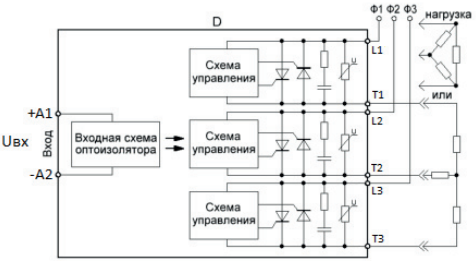
General specifications

Parameter name, unit of measurement	10A	25A	40A	63A	100A	150A
DC insulation voltage, input-output, (input + output) - radiator, V	3750					
Operating temperature range, °C	- 40 ... + 85					
Storage temperature range, °C	- 40 ... + 85					

Dimensional drawing



Connection diagram



D - relay
F1, F2, F3 - switching voltage phases

SOLID-STATE AC RELAY

5P19.10TMA1-25-12- L7b

Features:

- With phase control via "0"
- Low height profile
- Possibility of mounting with screws on the surface of printed circuit boards and using power wires with tips in the assembly cabinets
- Designed to be used as a key with "normally open contacts"
- Used in automation devices as a powerful interface

Basic electrical parameters (at Current = 25 °C)

Parameter name, unit of measurement	Parameter designation	Parameter value		Measurement modes
		no less	no more	
Leakage current at the output, mA	Iut.ex	-	±1,0	At Uvc = 1.6; Uvc = ± 800V
Output residual voltage, V	Uos	-	±1,6	At Uvc = 4V; Ivx = ~ 25 A
Input current, mA	Iвх	7	12	At Uvc = 4V
		11	16	At Uvc = 32V
Prohibition voltage, V	Uз	-	20	At Uvc = 5V
DC insulation voltage (ex-ex, ex-glad, ex-glad), In	Uиз	3750		At t = 1 min; Iut.of < 10 μA

Recommended operating modes

Parameter name, unit of measurement	Parameter designation	Parameter value	
		no less	no more
Switching voltage, RMS value, In	Ucom	~ 50	~ 420
Switching current, RMS value, And	Iсом	~ 0,3	~ 25
Input voltage when switched on, In	Uvx.on	5	25
Input voltage in the off state, In	Uvh.off	0	1
Operating temperature range, °C	Tokp	-40	+85
Frequency of the switched alternating voltage, Hz	F	50	400

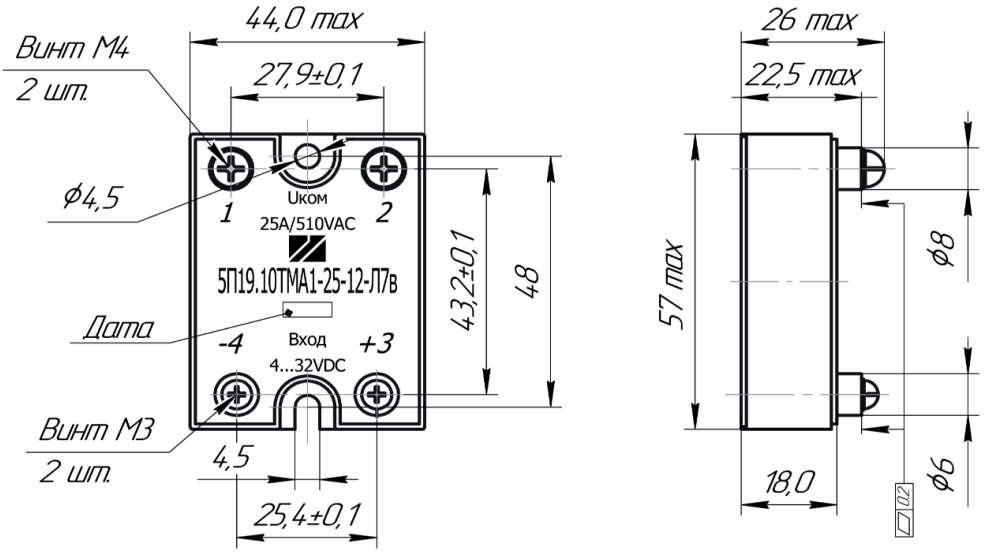
5P19.10TMA1-25-12- L7b

Maximum permissible operating modes

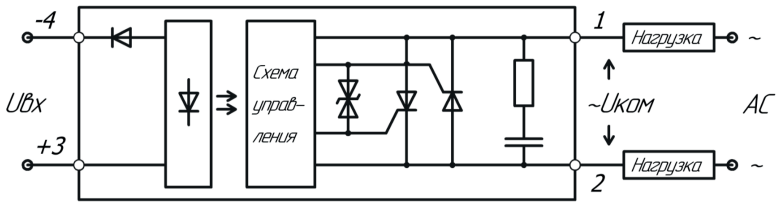
Parameter name, unit of measurement	Parameter designation	Parameter value	
		no less	no more
Maximum peak output voltage in the off state, In	Upik	-	± 800*
Switching current, RMS value, And	Icom	~ 0,2	~ 25
Switching voltage, RMS value, In	Uсщь	~ 30	~ 510
Input voltage when switched on, In	Uvx.on	4	32
Input voltage in the off state, In	Uvh.off	-3,5	1,6

* Limited by the protection circuit. Class 1200 V thyristors are used

Dimensional drawing



Switching scheme



POWER MANAGEMENT UNIT DIRECT CURRENT

BUP-30-150 DIN

Features:

- An indication notifying of the operation of the overcurrent protection
- Protection of power circuits from overvoltage
- Indication of the quality of mains voltage 2
- Indication of the connected network
- Indication of the unit activation
- Cooler to ensure the required thermal operation
- DIN rail mounting

Basic electrical parameters (at Current = 25 °C)

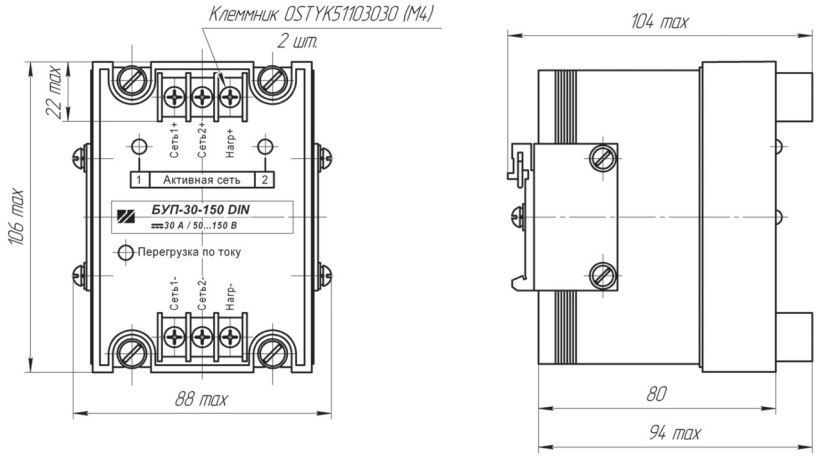
Parameter name, unit of measurement	units.	Parameter designation	Parameter value		Measurement modes
			no less	no more	
Current consumption at the network inputs 1 (2)	мА	$I_{пот}$	-	10	Uсети1(2) = 70 В
Mains connection voltage 1(2)	В	$U_{подкл}$	72	74	
Mains deviation voltage 1(2)	В	$U_{откл}$	67	69	
Residual voltage on key 1(2) when switched on	В	$U_{ост.вкл}$		0,7	Iком = 30 А
leakage current at the output (load) in the off state	мкА	Iут	-	100	Uсети1(2) = 70 В
Operating current of the overcurrent protection	А	$I_з$	32	35	
Turn-on time	мс	$t_{вкл}$		800	Uсети1 = Uсети2 = 0 → 80 В
Network connection time 1	мс	$t_{подкл1}$		70	Uсети2 = 80 В; Uсети1 = 0 → 80 В
Network connection time 2	мс	$t_{подкл2}$		30	Uсети2 = 80 В; Uсети1 = 80 → 0 В
Network switching delay time (dead time)	мс	$t_{пер}$	4	6	
Insulation voltage	В	$U_{из}$	~2500	-	Iут ≤ 1 мА, t = 60 с, f = 50 Гц
Insulation resistance	Ом	$R_{из}$	$1 \cdot 10^7$	-	Uиз = 500 В

BUP-30-150 DIN

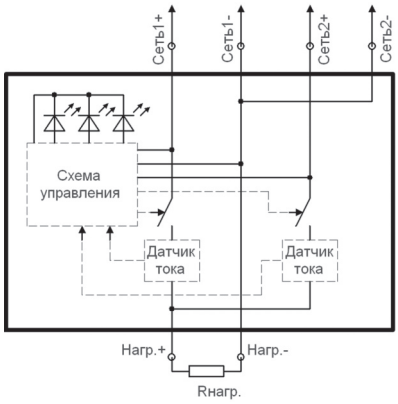
Maximum permissible operating modes

Parameter name, unit of measurement	units.	Parameter designation	Parameter value	
			no less	no more
Switching mains voltage 1 (2)	В	Uком	50	150
Pulse mains voltage 1(2)	В	Uком.имп	-	600
Constant switching current	А	Iком	0	30
Operating temperature	°С	Траб	-50	+60

Dimensional drawing



Electrical diagram



GENERAL PURPOSE TWO-CHANNEL RELAY

5P19.20PTGSG1-3-4 DIN

Features:

- Has protection of control and word circuits from overvoltage
- Consumes little power through the control circuit
- Has no contact rattling
- Power circuits are based on high-voltage MOSFET transistors
- Has an indication of overcurrent of power circuits and status output
- DIN rail mounting

Basic electrical parameters (at Current = 25 °C)

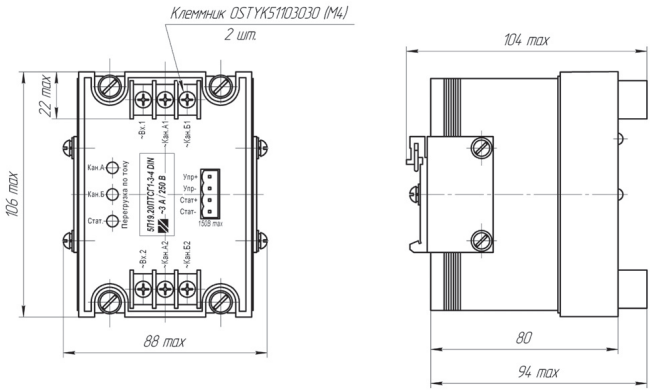
Parameter name, unit of measurement	units.	Parameter designation	Parameter value		Measurement modes
			no less	no more	
Current consumption in the control circuit	мА	$I_{упр.}$	-	20	$U_{упр}$= 70В
Operating current of overcurrent protection of power circuits RMS value	А	$I_{защ.}$	~3,1	~3,6	
Operating current of the overcurrent protection of the status output	мА	$I_{защ.стат.}$	15	20	
Leakage current at output 1(2) (load)	мА	$I_{ут.вых.}$	-	1	$U_{упр.}$=10 В, $U_{ком.}$=±400 В
Leakage current at the status output	мА	$I_{ут.стат.}$	-	1	$U_{стат.}$=150 В
Residual voltage in the open state, RMS value	В	$U_{ост.}$	- -	~2	$I_{ком1(2)}$=~3 А
Residual voltage at the status output in the open state	В	$U_{ост.стат.}$	-	1,5	$I_{стат.}$=10 мА
Turn-on time	мс	$T_{вкл.}$	-	150	$U_{упр.}$=10В⟶70В
Shutdown time	мс	$T_{выкл.}$	-	20	$U_{упр.}$=70В⟶10В
Insulation voltage	В	$U_{из.}$	~2500	-	$I_{ут}$≤1мА, t=60 с, f=50 Гц
Insulation resistance	Ом	$R_{из.}$	$1 \cdot 10^7$	-	$U_{из}$=500 В

5P19.20PTGSG1-3-4 DIN

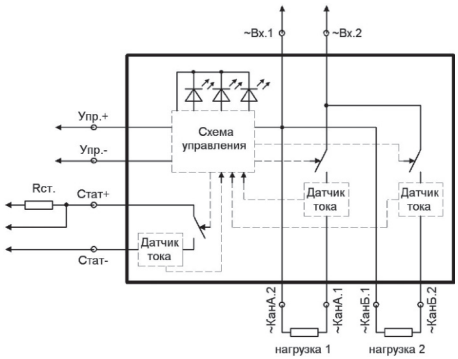
Maximum permissible operating modes

Parameter name, unit of measurement	units.	Parameter designation	Parameter value	
			no less	no more
Control voltage in on mode	В	$U_{упр.вкл.}$	70	150
The control voltage is off in the mode	В	$U_{упр.выкл.}$	-150	10
Switching voltage, RMS value	В	$U_{ком}$	-	~250
Switching pulse voltage	В	$U_{ком.имп.}$	-	1000
Switching voltage frequency	Гц	$f_{вх.}$	50	400
Switching current	А	$I_{ком}$	-	~3
Switching frequency	Гц	$F_{ком}$	-	5
Status output current	мА	$I_{стат}$	-	10
Voltage at the status output	В	$U_{стат}$	-150	150
Operating temperature	°С	$T_{раб}$	-50	+60

Dimensional drawing



Electrical diagram



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