



**ELECTRUM AV**

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MO17A, MO18A

**OPTOELECTRONIC MODULES FOR DC COMMUTATION  
ON BIPOLAR TRANSISTOR  
MO17A, MO18A**

**USER'S MANUAL**



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## 1. APPLICATION AND PRODUCED MODULES

Optoelectronic modules for DC commutation on bipolar transistor (semiconductor optoelectronic normally opened unipolar relay with low switch-on current on bipolar transistor) of types MO17, MO18 are intended to use in automatics devices as a switching element with maximum peak voltage 60 V and DC up to 12 A. The optoelectronic modules for DC commutation (hereinafter - modules) are represented with the following versions:

**MO17A** – a module based on bipolar transistor shunted a voltage limiter with control current 3...35 mA. The control – direct (to control LED glow corresponds open state of power transistor). Maximum DC of power circuit is 5 A or 12 A; maximum peak voltage of power circuit is 60 V.

**MO18A** – a module based on bipolar transistor shunted with a voltage limiter with control current 3...35 mA. The control – inverse (to control LED glow corresponds closed state of power transistor). Maximum DC of power circuit is 5 A or 12 A; maximum peak voltage of power circuit is 60 V.

On Figure 1.1 is shown module's name explanation.

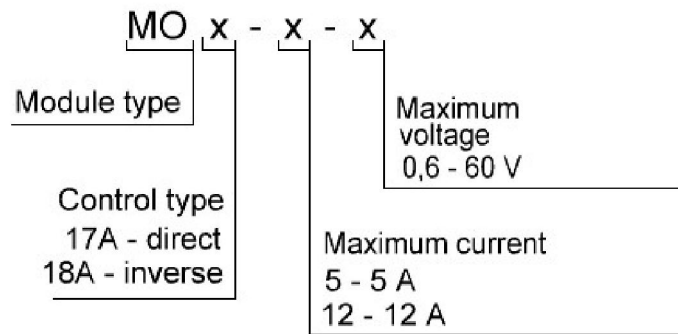


Figure 1.1 – Modules names explanation

For example, module MO18A-5-0,6: a module with inverse control, with maximum permissible collector-emitter voltage 60 V and maximum DC 5 A.

## 2. GENERAL DIRECTION

Functional circuits combined with switching circuits of modules MO17, MO18 are represented on Figures 2.1.

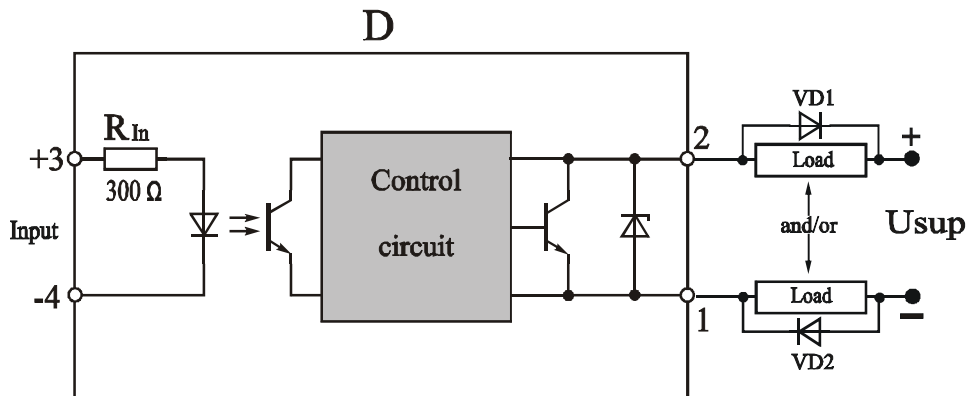


Figure 2.1 – Functional circuit of MO17, MO18

### 3. BASIC PARAMETERS

Reference, basic and maximum permissible parameters of the modules at temperature 25<sup>0</sup>C are shown in Table 3.1.

Table 3.1 – Basic and maximum permissible parameters of control of modules MO17, MO18

Parameter name, unit	Symbol	Current, A	
		5	12
<b>Control parameters</b>			
Switch-on voltage MO17, V	U <sub>IH</sub>	2.5...10	
Switch-on voltage MO18, V		-5...0.6	
Switch-off voltage MO17, V	U <sub>IL</sub>	-5...0.6	
Switch-off voltage MO18, V		2.5...10	
Input current at U <sub>IH</sub> = 2.5 V (max), mA	I <sub>IN</sub>	3	
Input current at U <sub>IH</sub> = 10 V (max), mA		35	
Input resistor resistance (typical), Ω	R <sub>IN</sub>	300	
On / off duration (max), μs	t <sub>on/off</sub>	20 / 100	
<b>Power circuits parameters</b>			
Collector-emitter voltage (max), V	V <sub>CES</sub>	60	
Power circuit direct voltage, V	V <sub>DC</sub>	3...35	
Power circuit DC, A	I <sub>DC</sub>	0.02...5	0.02...12
Pulse current of power circuit at t <sub>pul</sub> = 1 sec (max), A	I <sub>p</sub>	8	20
Output residual voltage (max), V	V <sub>CE(on)</sub>	1.5	
Leakage current of power switch (max), mA	I <sub>CES</sub>	1.5	
<b>Reference materials</b>			
Junction temperature (max), °C	T <sub>j</sub>	125	
Junction-base thermal resistance (max), °C/W	R <sub>th(j-a)</sub>	1.5	1.2
Breakdown voltage of protective Zener diode, V	V <sub>VD</sub>	60...70	
Transfer capacity (typical), pF	C <sub>IO</sub>	10	
Insulation strength, (DC), V	V <sub>ISOL</sub>	1000	
Insulation resistance (min), Ω	R <sub>ISOL</sub>	10 <sup>10</sup>	

### 4. INSTRUCTIONS FOR USE

#### General requirements

It is recommended to operate the module at operating value of the average current not more than 80% from specified one in the name of the module and the junction temperature not more than (70÷80)% from the maximum one.

It is not allowed to operate the module in modes at simultaneous influence of two or more maximum permissible values.

In the electric circuit of equipment with using of the modules should be provided the fast-speed protection against prohibitive overloads, SCs and commutating overloads.

#### Module mounting

The module is mounted in the equipment to cooler (chassis, application housing, metal plates, etc.) in any orientation with screws M4 with torque (5±0.5) N·m, with obligatory installation of flat and spring washers. The module should be located in such a way to protect it against additional heat from neighbor elements. The planes of cooler ribs should be oriented in the direction of air flow.

The contact area of the cooler should have roughness not more than 2.5 μm and flatness tolerance – not more than 30 μm. Cooler surface should not have any rough edges, honeycombs. There should not be extraneous particles between the module and cooler. To improve the heat balance the module installation to mounting area or cooler should be carried out by instrumentality of heat conducting pastes or having similar heat conducting properties.

When mounting, you should provide uniform pressure of module housing to cooler. For this purpose you should tighten all screws uniform in 2 – 4 steps by turns: first, located on one diagonal, then on the other one. When dismantling the module the screw tightening should be done in the reverse order.

Not earlier than in 3 hours after mounting the screws should be rotated to the end, keeping the prescribed torque, because the part of heat conducting paste under pressure will outflow and the fastening can fail.

You can mount the several modules without additional insulating spacer to one cooler, on condition that voltage between outputs of different modules will not exceed the minimum value of isolation breakdown voltage of each of them or when cooler is grounded.

### Connection to module

Electric wires and cables will be connected to power contacts of the module by means of screws M6 or M5 with torque  $(4 \pm 0.5)$  N·m or by means of bolts M8 or M10 with torque  $(5 \pm 0.5)$  N·m and the washers that are supplied in the package.

Power wires should be connected by means of connectors with corrosion-inhibiting cover, which are purified of foreign layers. When the screws (bolts) are tightened it is recommended to fasten the connection with paint. It is recommended to tighten screws (bolts) repeatedly in 8 days and in 6 weeks after the start of operating. Afterwards tightening should be controlled at least once a half year.

When mounting and operating it is necessary to make protection measures against static electricity impact and overvoltage in gate circuit; on mounting personnel should use a ground band and grounded low-voltage soldering irons with transformer supply.

### Operation requirements

The module should be used under mechanical loads in accordance with Table 4.1.

Table 4.1 – Mechanical loads impact

External exposure factor	External exposure factor value
Sinusoidal vibration: - acceleration, $m/s^2$ (g); - frequency, Hz	150 (15) 0.5 - 100
Multiple-acting mechanic shock: - peak shock acceleration, $m/s^2$ (g); - shock acceleration duration, ms	40 (4) 50
Linear acceleration, $m/s^2$ (g)	5000 (500)

The module should be used under climatic loads in accordance with Table 4.2.

Table 4.2 – Climatic loads impact

Climatic factor	Climatic factor value
Reduced ambient temperature: - operating, °C; - maximum, °C	- 40 - 45
High ambient temperature: - operating, °C; - maximum, °C	+ 85 + 100
Relative humidity at temperature 35 °C without moisture condensation, %, max	98

### Safety requirements

1. Working with the module should only be performed by qualified personnel.
2. Do not touch the power terminals of the module when applying a voltage.
3. Do not connect or disconnect wires and connectors while the power to the circuit module is applying a voltage.
4. Do not touch the module radiator, if it is not grounded in and is applying a voltage on it.
5. Do not touch the cooler and the module housing during its operation, since their temperature can be very high.
6. Immediately turn off the power supply of the module if it discharges smoke, odor or abnormal noises, check if the module correctly connected.
7. It is not allowed to penetrate water and other liquids to the module.

## 5. RELIABILITY REQUIREMENTS

The manufacturer guarantees the quality of the module all the requirements of the passport if the consumer observes terms and conditions of storage, installation and operation, as well as guidance on the application specified in the user's manual.

Operating warranty is two years from the acceptance date, in case of requalification – from the date of the requalification.

Reliability probability of the module for 25000 hours must be at least 0.95.

Gamma percentage life ( $T_\gamma$ ) of module at  $\gamma = 90\%$  in typical operation conditions should not be less than 50 000 hours within lifetime.

Gamma-percent service life of the modules, subject to cumulative operating time is not more than gamma-percent life, not less than 10 years, at  $\gamma = 90\%$ .

Gamma-percent storageability time of the modules, at  $\gamma = 90\%$  and storing – 10 years.

## 6. OVERALL AND CONNECTING DIMENSIONS

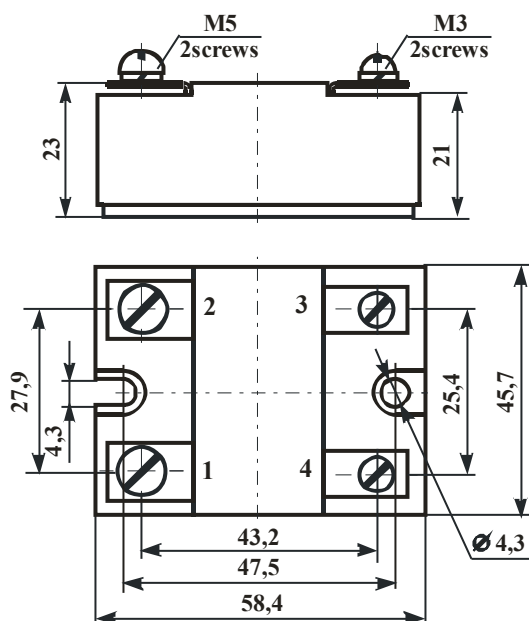


Figure 6.1 – Overall drawing of modules MO17, MO18