

Product loadability

Problematic choice of suitable relay contact for a particular load switched with a product is described below.

Mostly we experience problems with incorrect choice of load (meaning incorrect relay for a particular load) which results in permanent switching of contact (sealing) or damage on relay contact – which then results in malfunction.

What load can you use?

Detailed types of load according to standard EN 60947 are described in charts below – categories of use.

Category of use	Typical use	EN
AC current, $\cos\phi = P/S$ (-)		
AC-1	<u>Non-inductive or slightly inductive load, resistance furnace</u> Includes all appliances supplied by AC current with power factor ($\cos \phi$) 0,95. Examples of use: resistance furnace, industrial loads	60947-4
AC-2	<u>Motors with slip-ring armature, switching off</u>	60947
AC-3	<u>Motors with short-circuit armature, motor switching when in operation</u> This category applies to switching off motors with short-circuit armature while in operation. While switching, contactor switches current which is 5 up to 7 times rated current of motor.	60947-4
AC-4	<u>Electro-motors with short-circuit armature: start up, braking by backset, changeover</u>	60947
AC-5a	<u>Switching of electrical gas-filled lights, fluorescent lights</u>	60947-4
AC-5b	<u>El. bulb switching</u> Enables low contact loading due to resistance of cold fiber is many times smaller than the one of hot fiber.	60947-4
AC-6a	<u>Switching of transformers</u>	60947-4
AC-6b	<u>Switching of capacitors</u>	60947-4
AC-7a	<u>Switching low inductive loads of home appliances and similar applications</u>	60947
AC-7b	<u>Load of motors for home appliances</u>	60947
AC-8a	<u>Switching of hermetically sealed motors of cooling compressors with manual reset switches against overload</u> Hermetically sealed cooling compressors have to be placed in one box without external shaft or shaft padding and motor must operate with cooling liquid	60947
AC-8b	<u>Switching of hermetically sealed motors of cooling compressors with manual reset switches against overload</u> Hermetically sealed cooling compressors have to be placed in one box without external shaft or shaft padding and motor must operate with cooling liquid	60947
AC-12	<u>Switching of semiconductor loads with separation transformers</u>	60947-5
AC-13	<u>Switching of semiconductor loads with separation transformers</u>	60947-5-1
AC-14	<u>Switching of low electro-magnetic loads (max.72 VA)</u>	60947-5-1
AC-15	<u>Management of alternating electro-magnetic loads</u> This category applies to switching inductive loads with input for closed electro-magnetic circuit higher than 72 VA Use: switching coils of contactors	60947-5
AC-20	<u>Connecting and disconnecting in unloaded states</u>	60947-3
AC-21	<u>Switching resistive loads, including low loading</u>	60947-3
AC-22	<u>Switching of mixed resistive and inductive loads, including low overloading</u>	60947-3
AC-23	<u>Switching of motor loads or other high inductive loads</u>	60947-3
AC-53a	<u>Switching of motors with short-circuit armature with semiconductor contactors</u>	60947
Note: Category AC 15 replaces formerly used category AC 11		
DC current, $t = L/R$ (s)		
DC-1	<u>Non-inductive or low inductive load, resistive furnaces</u>	60947-4
DC-3	<u>Shunt motors: start-up, braking by backset, reversion, resistive braking</u>	60947-4-1
DC-5	<u>Series motor: start-up, braking by backset, reversion, resistive braking</u>	60947-4-1
DC-6	<u>Non-inductive or low inductive loads, resistive furnaces – el. bulbs</u>	60947-4-1
DC-12	<u>Management of resistive loads and fixed loads with insulation by opto-electric element</u>	60947-5-1
DC-13	<u>Switching of electromagnets</u>	60947-5-1
DC-14	<u>Switching of electromagnetic loads in circuits with limiting resistor</u>	60947-5-1
DC-20a(b)	<u>Switching and breaking without load (a: frequent switching ,b: occasional switching)</u>	60947-3
DC-21a(b)	<u>Switching ohmic loads including limiting overloading (a: frequent switching ,b: occasional switching)</u>	60947-3
DC-22a(b)		60947-3
DC-23	<u>Switching of highly inductive loads (e.g. series motors)</u>	60947-3

How can you distinguish for which load is our product (relay) designated?

Our company record this information on a products and also in our catalogue, instruction manual and other promotional and technical material (web-site etc.).

It is important to realize that it is not always possible to point out load because of lack of information about the device (user cannot measure $\cos \phi$) or it is not possible because of inconstancy of parameters of switched device.



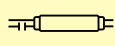
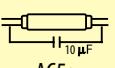

Manufacturer of relays record always guaranteed parameters in ideal conditions which are done by a norm (temperature, pressure, humidity, etc.) and reality can be in a lot of cases different.

Category of use (classification) of a particular relay is done by material of output contacts.



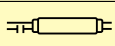
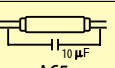

Basic types of materials which are used for production of contacts for high-performance relay are:

- AgCd – suitable for switching ohmic loads. Before of harmfulness of Cd, this type of contact is remitted.
- AgNi – designated for switching resistive loads , good quality switching and conducting (contact doesn't oxidate) small currents/voltages ,it is not designated for surge currents and loads with inductive component
- AgSn or AgSnO –suitable for switching loads with inductive component , not suitable for switching small currents/voltages, it is more resistive to surge currents, suitable for DC voltage switching, less suitable for switching loads of ohmic type
- Wf (wolfram)-special contact designated for switching surge currents with inductive component
- with gold (AgNi/Au)- it is used for "improving" contacts for low currents/ voltages , prevents oxidation.



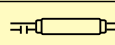
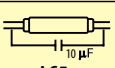

Product loadability

RELAY CONTACT 16 A	LOAD								
	 AC5b	 AC5a	 AC5a	 AC5a	 AC5a	AC1	AC3	AC15	DC1 (24/110/220 V)
AgSnO ₂	2000 W	1000 W	1000 W	750 W	500 W	4000 VA	0.9 kW	750 VA	16 A/0.5 A/0.35 A



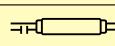
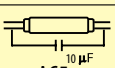

It is valid for following products: CRM-4, CRM-42, SHT-1, SHT-1/2, SHT-3, SOU-1, MR-41, MR-42, VS116K, VS316, VS116U, VS316/24, VS316/230, TER-3, SMR-B

RELAY CONTACT 8 A	LOAD								
	 AC5b	 AC5a	 AC5a	 AC5a	 AC5a	AC1	AC3	AC15	DC1 (30/110/220 V)
AgNi	500 W	×	×	×	×	2500 VA	×	125 VA	10 A/0.49 A/0.33 A



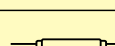
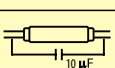

It is valid for following products: CRM-61, SOU-2, HRN-54, HRN-54N, HRN-55, HRN-55N, HRN-56, HRN-57, HRN-57N PRI-32, PRI-51, TER-9

RELAY CONTACT 16 A	LOAD								
	 AC5b	 AC5a	 AC5a	 AC5a	 AC5a	AC1	AC3	AC15	DC1 (24/110/220 V)
AgNi	1000 W	×	×	×	×	4000 VA	0.9 kW	750 VA	16 A/0.5 A/0.35 A

It is valid for following products: CRM-81J, CRM-91H, PRM-91H, CRM-91HE, CRM-2HE, CRM-2H, CRM-2T, PDR-2/A, PDR-2/B, SJR-2, HRH-2, HRN-33, HRN-34, HRN-35, HRN-37, HRN-41, HRN-42, HRN-43, HRN-43N, HRN-63, HRN-64, HRN-67, PRI-41, PRI-42, HRH-1, COS-1, TER-4, TEV-1, TEV-2, TEV-3, Thermo

RELAY CONTACT 8 A	LOAD								
	 AC5b	 AC5a	 AC5a	 AC5a	 AC5a	AC1	AC3	AC15	DC1 (24/110/220 V)
AgNi	500 W	×	×	×	×	2000 VA	×	375 VA	8 A/0.4 A/0.25 A



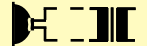
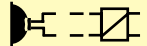
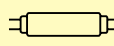
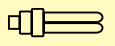

It is valid for following products: CRM-83J, CRM-93H, PRM-92H, PRM-2H, CRM-82T0, VS308K, VS308U, TER-7




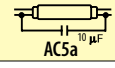


RELAY CONTACT 3 A	LOAD								
	 AC5b	 AC5a	 AC5a	 AC5a	 AC5a	AC1	AC3	AC15	DC1 (24/110/220 V)
AgNi	500 W	×	×	×	×	1250 VA	×	0.75 A/ 240V	5 A/0.5 A/0.3 A

It is valid for following products: CRM-2T/480

RELAY CONTACT	MINIMUM LOAD	
	mW	V / mA
AgSnO ₂	1000	10/100

RELAY CONTACT	MINIMUM LOAD	
	mW	V / mA
AgNi	300	5/10

LOAD (symbols)	LAMP, HALOGEN LIGHT	LOW-VOLTAGE EL.BULBS 12-24V WOUND TRANSFORMERS	LOW-VOLTAGE EL.BULBS 12-24V ELECTRONIC TRANSFORMERS	UNCOMPENSATED FLUORESCENT LAMPS	EKONOMIC FLUORESCENT LAMPS	SWITCHING MANAGEMENT	SWITCHING MANAGEMENT
		  HAL. 230 V					
TYPE OF LOAD	RESISTIVE R	INDUCTIVE L	CAPACITIVE C	ACCORDING TO BALLAST	ACCORDING TO BALLAST	INCLINE EDGE	DESCENDING EDGE
SMR-T	•	•	×	×	×	×	×
SMR-H	•	•	×	×	×	×	×
SMR-B	•	•	×	•	•	×	×

SYMBOLS	 AC5b	 AC5a	 AC5a	 AC5a	 AC5a	 R, L, C	AC-1	AC-3	AC-15	DC-1
COMMENTS	lamp, halogen light	uncompensated fluorescent lamps	compensated fluorescent lamps in series	compensated fluorescent lamps in parallel	ekonomik fluorescent lamps	Dimmer with defi ned load: R - resistive L - inductive C - capacitive	Non-inductive or low-inductive loads, resistive furnace	Squirrel-cage motors, switching of motors in operation	Controlling of alternative electro-magnetic loads	Non-inductive or low-inductive loads, resistive furnaces