Instantaneous monostable relay 2-4-6-8-12 contacts

POK Series

POK

BIPOK

TRIPOK

QUADRIPOK

OVERVIEW

- Compact plug-in monostable instantaneous relays
- Solid and rugged construction for heavy or intensive duty
- Considerable long-life
- Independent and self-cleaning contacts
- Separate arc breaking chambers
- Magnetic arc blow-out standard
- Excellent shock and vibration resistance
- Option for use in geothermal sites available
- Also available in current-monitoring version
- Also available in PCB-mount version
- Wide variety of configurations and customizations
- Wide range of sockets
- Retaining clip for secure locking of relay on socket
- Transparent cover, pull-out handle
- Positive mechanical keying for relay and socket

APPLICATIONS

Shipbuilding · *Petroleum industry* · *Heavy industry* · *Power generation* · *Power distribution* · *Railway equipment* · *Rolling stock*

DESCRIPTION

The POK series is made up of 5 basic models, created from a single module with 2 contacts that can be used in multiple combinations to provide solutions with 2 - 4 - 6 - 8 and 12 change-over contacts.

The construction of the relays and careful choice of the materials are such that they ensure long life and considerable ruggedness even in harsh operating environments and in the presence of strong temperature fluctuations.

A specific treatment (P5GEO or P6GEO) combining coil tropicalization with gold-plated contacts allows the use of these items in geothermal electric power stations, as relays for signalling functions, for controlling intermediate devices and for all non-power circuits.

Excellent electrical and mechanical performance levels allow the product to be used in the most demanding of sectors such as, for example, control and signalling functions in electricity generating stations, electrical transformer stations, rail transport or in industries with continuous production processes (chemical industry, petroleum industry, rolling mills, cement factories, etc.). Above all, the excellent ability to withstand shock and vibration allow their use on rolling stock.

Safe and reliable operation is guaranteed by

- Contact terminals without connecting braids and soldered joints. The terminals connecting with the socket are provided by a direct extension of the contacts.
- Mechanism without return springs.
- Adoption of all-metallic operating mechanism, unaffected by the thermal ageing that typically degrades organic materials, such as plastics.
- Excellent shock and vibration resistance.
- Notable resistance to high operating temperatures and high thermal shocks.

The self-cleaning contacts are independent, being anchored neither one to another nor to a common operating mechanism. Positioned in separate chambers, they enable better breaking of the arc. In addition, they are equipped with magnetic arc blow-out, guaranteeing a particularly efficient break of direct current loads. The common contact is mounted to a separate return device, consisting in a flexible blade designed to ensure uniformity of the pressures on break contacts. Given their dimensions and specifications, POK relays provide the logical complement to power relays of the OK series.

Models	Number of contacts	Nominal current	Rolling stock application
POK	2	5 A	•
POKS	2	10 A	•
BIPOK	4	5 A	•
BIPOKS	4	10 A	•
TRIPOK	6	5 A	•
TRIPOKS	6	10 A	•
QUADRIPOKS	8	10 A	•
ESAPOKS	12	10 A	

FOR CONFIGURATION OF PRODUCT CODE, SEE "ORDERING SCHEME" TABLE

Coil data	POK - POKS	BIPOK - BIPOKS	TRIPOK - TRIPOKS	QUADRIPOKS	ESAPOKS
Nominal voltages Un (1)	DC: 12-24-36-48-72-110-125-132-144-220 AC: 12-24-48-110-127-220-230				
Max. consumption at Un (DC/AC)	2.5W / 3.5 VA	3W / 4 VA	3.5W / 5.5 VA	6W / 8 VA	7W / 11 VA
Operating range (1) Rolling stock version (2) (3)	DC: 80…115% Un AC: 85…110% Un DC: 70…125% Un				
Type of duty	Continuous				
Drop-out voltage (4)	DC: > 5% Un AC: > 15% Un				

1. Other values on request. For ESAPOKS, values > 24V.
2. See "Ordering scheme" table for order code.
3. For operating ranges different to that specified by EN60077, refer to table "Railways, rolling stock - Special operating ranges".
4. Limit value for supply voltage, expressed as % of the nominal value, beneath which the relay is certainly de-energized.

Contact data	POK - POKS	BIPOK - BIPOKS	TRIPOK - TRIPOKS	QUADRIPOKS	ESAPOKS
Number and type	2 SPDT, Form C	4 SPDT, Form C	6 SPDT, Form C	8 SPDT, Form C	12 SPDT, Form C
	POK - BIPOK - TRIPOK			POKS - BIPOKS - TRIPOKS - QUADRIPOKS - ESAPOKS	
Current Nominal (1)	5 A			10 A	
Maximum peak (1 min) (2)	10 A			20 A	
Maximum pulse (10 ms) (2)	100 A			150 A	
Example of electrical life expectancy (3)	0.2 A – 110 Vdc – L/R 40 ms : 10^5 operations			0.5 A – 110 Vdc – L/R 40 ms : 10^5 operations	
1800 operations/h	0.7 A – 110 Vdc – L/R 0 ms : 10^5 operations			1 A – 110 Vdc – L/R 0 ms : 10^5 operations	
Minimum load Standard contacts	500 mW (20V, 20 mA)				
Gold-plated contact **P4GEO** (4)	100 mW (10V, 5 mA)				
Gold-plated contact **P8** (4)	50 mW (5V, 5 mA)				
Maximum breaking voltage	250 Vdc / 350 Vac				
Contact material	AgCu			Ag / AgCu	
Operating time at Un (ms) (5) (6)	DC – AC				
Pick-up (NO contact closing)	≤ 20 - ≤ 20	≤ 25 - ≤ 25	≤ 25 - ≤ 25	≤ 25 - ≤ 25	≤ 25 - ≤ 25
Drop-out (NC contact closing)	≤ 15 - ≤ 20	≤ 20 - ≤ 40	≤ 20 - ≤ 45	≤ 20 - ≤ 40	≤ 20 - ≤ 45

1. On all contacts simultaneously, reduction of 30%.
2. The max. peak and pulse currents are those currents that can be handled, for a specified time, by the contact. They do not refer to steady or interrupted currents.
3. For other values, see electrical life expectancy curves.
4. Specifications of contacts on new relay
   a. Plating material: **P4GEO**: gold-nickel alloy (>6µ) **P8**: gold-cobalt alloy (>5µ), knurled contact
   b. When the gold-plated contact is subject to heavy loads, it will be degraded on the surface. In this case, the characteristics of the standard contact should be taken into consideration. This does not impair relay operation.
5. Unless specified otherwise, the operating time signifies until stabilization of the contact (including bounces).
6. Addition of a flyback diode connected in parallel with the coil (DC version only) causes an increase in operating time when the relay drops out.

Insulation	
Insulation resistance (at 500Vdc)	
between electrically independent circuits and between these circuits and ground	> 1,000 MΩ
between open contact parts	> 1,000 MΩ
Withstand voltage at industrial frequency	
between electrically independent circuits and between these circuits and ground	2 kV (1 min) - 2.2 kV (1 s)
between open contact parts	1 kV (1 min) - 1.1 kV (1 s)
between adjacent contacts	2.5 kV (1 min) - 3 kV (1 s)
Impulse withstand voltage (1.2/50µs - 0.5J)	
between electrically independent circuits and between these circuits and ground	5 kV
between open contact parts	3 kV

Mechanical specifications

	Mechanical life expectancy		DC: 20 x 10^6 AC: 10 x 10^6 operations		
Maximum switching rate	Mechanical		3,600 operations / hour		
	Degree of protection (with relay mounted)		IP40		
	POK-POKS	BIPOK-BIPOKS	TRIPOK-TRIPOKS	QUADRIPOKS	ESAPOKS
Dimensions (mm) (1)	20 x 50 x 45	40 x 50 x 45	60 x 50 x 45	80 x 61 x 45	120 x 50 x 45
Weight (g)	~ 90	~ 170	~ 250	~ 340	~ 520

1. Output terminals excluded.

Environmental specifications

Operating temperature	Standard	-25° to +55°C
	Version for railways, rolling stock	-25° to +70°C
Storage and shipping temperature		-50° to +85°C
Relative humidity		Standard: 75% RH - Tropicalized: 95% RH
Resistance to vibrations		5g - 10 to 55 Hz - 1 min
Resistance to shock		20g - 11 ms
Fire behaviour		V0

Standards and reference values

EN 61810-1, EN 61810-2, EN 61810-7	Electromechanical elementary relays
EN 60695-2-10	Fire behaviour
EN 50082-2	Electromagnetic compatibility
EN 60529	Degree of protection provided by enclosures

Unless otherwise specified, the products are designed and manufactured according to the requirements of the above-mentioned European and International standards.
In accordance with EN 61810-1, all items of technical data are referred to ambient temperature 23 °C, atmospheric pressure 96kPa and 50% humidity.
Tolerance for coil resistance, nominal electrical input and nominal power is ±7%.

Railways, rolling stock - Standards

EN 60077	Electric equipment for rolling stock - General service conditions and general rules
EN 50155	Electronic equipment used on rolling stock
EN 61373	Shock and vibration tests, Cat 1, Class B
EN 45545-2	Fire behaviour, Cat E10, Requirement R26, V0
NF F 16-101/102	Fire behaviour, Cat A1 rolling stock
ASTM E162, E662	Fire behaviour
UNI CEI 11170-3	Fire behaviour, Level of risk 4

Railways, rolling stock - Special operating ranges for POK(s) - BIPOK(s) relays (1)

Nominal voltage	Minimum pick-up voltage	Maximum operating voltage	Order symbol (1)
24 Vdc	18	33	Z01
24 Vdc	16	32	Z02
24 Vdc	16,8	32	Z03
24 Vdc	19	30	Z04
36 Vdc	28	46	Z01
72 Vdc	55	104	Z01
72 Vdc	55	96	Z02
110 Vdc	77	144	Z01

(1) To order the relay with the special operating range, indicate the "Z0x" symbol in the "Keying position" field of the ordering scheme. The special range may be subject to operating specifications different from standard specifications. Please contact us for further information.

Configurations - Options

P2	Tropicalization of the coil with epoxy resin for use with 95% RH (@ T 50 °C). This treatment also protects the coil against corrosion which could occur by combination of the humidity with certain chemical agents, such as those found in acid atmospheres (typical of geothermal power stations) or saline atmospheres.
P4GEO	Gold plating of contacts with gold-nickel alloy, thickness ≥ 6µ. This treatment ensures long-term capacity of the contact to conduct lower currents in harsh ambient conditions such as acid atmospheres (typical of geothermal power stations) or saline atmospheres.
P5GEO	**P4GEO** gold-plating of contacts + **P2** coil tropicalization.
P6GEO	**P4GEO** type gold-plating, but applied to contacts, contact terminals and output terminals + **P2** coil tropicalization.
P7	AgCdO (silver cadmium oxide) contacts.
P8	Gold plating of contacts with gold-cobalt alloy, thickness ≥ 5µ, knurled fixed contact. This finish allows further improvement of the performance provided by gold-plated contact, compared to P4GEO treatment.
LED	LED indicator showing presence of power supply, wired in parallel with the coil.
FLYBACK DIODE	Polarized component connected in parallel with the coil (type 1N4007 or BYW56 for rolling stock version) designed to suppress overvoltages generated by the coil when de-energized.
VARISTOR	Non-polarized component connected in parallel with the coil, designed to suppress overvoltages higher than the clamping voltage, generated by the coil when de-energized.
TRANSIL	Non-polarized component connected in parallel with the coil. Behaviour is similar to that of a varistor, with faster operating times.
LOW TEMPERATURE	Minimum operating temperature **-50°C**, only for rolling stock version (option "L").
C.S.	PCB-mount version (for POK-POKS-BIPOK-BIPOKS only).

Ordering scheme

Model	Number of SPDT contacts	Product code	Application (1)	Configuration A	Configuration B	Type of power supply	Nominal voltage (V) (2)	Keying position (3) / option
POK POKS BIPOK BIPOKS TRIPOK TRIPOKS QUADRIPOKS ESAPOKS	2 - 5A 2 - 10A 4 - 5A 4 - 10A 6 - 5A 6 - 10A 8 - 10A 12 - 10A	POK POKS BPOK BPOKS TPOK TPOKS QPOK EPOK	**E:** Energy **F:** Railway Fixed Equipment **R:** Railway Rolling Stock	1: Standard 2: Diode // 3: Varistor 4: Led 5: Diode // + Led 6: Varistor + Led 7: Transil 8: Transil + Led	0: Standard 2: P2 4: P4 GEO 5: P5 GEO 6: P6 GEO 7: P7 8: P8	C: Vdc A: Vac 50 Hz H: Vac 60 Hz	012 - 024 - 036 048 - 072 - 100 110 - 125 - 127 132 - 144 - 220 230	XXX **CS =** PCB-mount version **L =** low temperature

Example

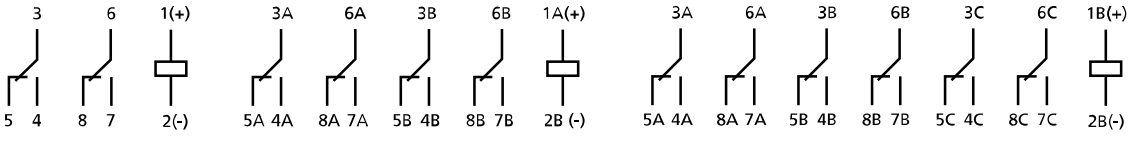
TPOKS	**E**	**3**	**0**	**A**	**230**	
TPOKSE30-A230 - TRIPOKS relay, ENERGY series, nominal voltage 230 Vac, equipped with varistor						
BPOKS	**R**	**5**	**8**	**C**	**024**	
BPOKSR58-C024 - BIPOKS relay, ROLLING STOCK series, nominal voltage 24 Vdc, equipped with diode, LED, with P8 finish (gold-plated contacts)						
POK	**R**	**1**	**0**	**C**	**110**	**L**
POKR10 - C110 L - POK relay, rolling stock series, nominal voltage 110 Vdc with option "L" (low temp.)						

(1) **ENERGY**: all applications except for railways.
RAILWAYS, FIXED EQUIPMENT: application on fixed power systems and electrical railway traction. Construction according to RFI (FS Group) specification no. RFI DPRIM STF IFS TE 143 A, if applicable. For list of RFI approved and conforming products, consult dedicated catalogue "RAILWAY SERIES – RFI APPROVED".
RAILWAYS, ROLLING STOCK: excluding ESAPOKS. Application on board rolling stock (rail-tram-trolley vehicles). Electrical characteristics according to EN60077.
Also available is the STATIONS series, with ENEL approved material meeting LV15/LV16 specifications. For the list of ENEL approved and conforming products, consult the dedicated catalogue "STATIONS SERIES – LV15-LV16-LV20".

(2) Other values on request.

(3) Optional value. PCB-mount version available for POK - POKS - BIPOK - BIPOKS only. Multiple selection possible (e.g. CS - L). The positive mechanical keying is applied according to the manufacturer's model (not available for PCB-mount versions).

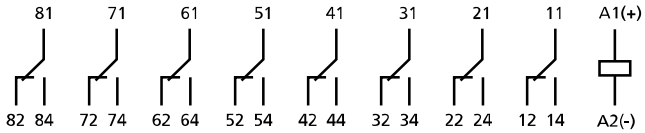
Wiring diagram



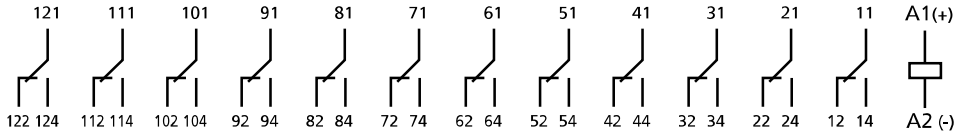
POK - POKS

BIPOK - BIPOKS

TRIPOK - TRIPOKS

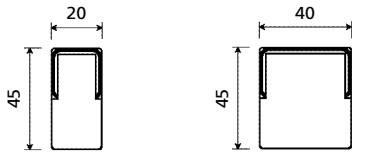


QUADRIPOKS



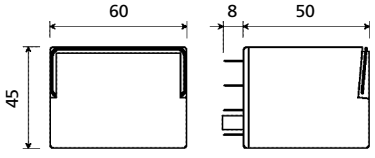
ESAPOKS

Dimensions

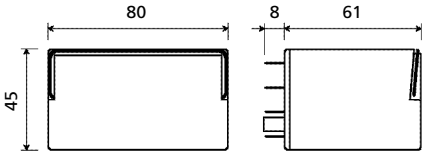


POK - POKS

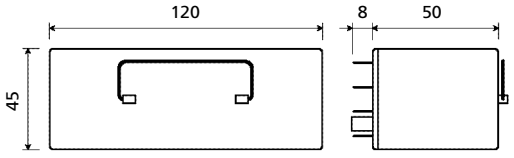
BIPOK - BIPOKS



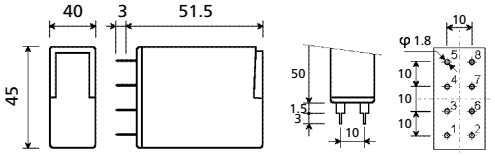
TRIPOK - TRIPOKS



QUADRIPOKS

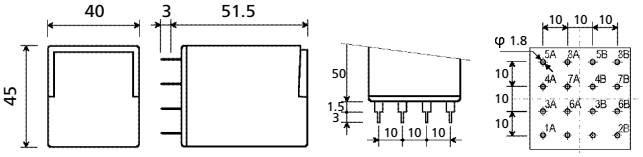


ESAPOKS



POK-CS - POKS-CS

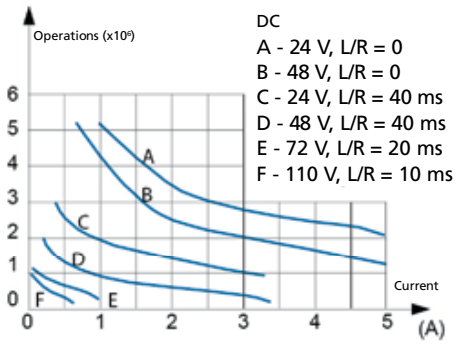
Hole layout
(from solder side)



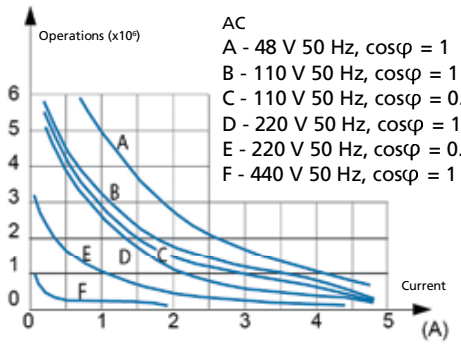
BIPOK-CS - BIPOKS-CS

Hole layout
(from solder side)

Electrical life expectancy



DC
A - 24 V, L/R = 0
B - 48 V, L/R = 0
C - 24 V, L/R = 40 ms
D - 48 V, L/R = 40 ms
E - 72 V, L/R = 20 ms
F - 110 V, L/R = 10 ms



AC
A - 48 V 50 Hz, cosφ = 1
B - 110 V 50 Hz, cosφ = 1
C - 110 V 50 Hz, cosφ = 0.7
D - 220 V 50 Hz, cosφ = 1
E - 220 V 50 Hz, cosφ = 0.7
F - 440 V 50 Hz, cosφ = 1

(1) Switching frequency 1,200 operations/hour, 50% cycle.

Some examples of electrical life expectancy

48Vdc – 5 A – L/R = 10 ms : 5 x 10^5 operations
80Vdc - 5 A – Resistive : 5 x 10^5 operations
110Vdc – 0.5 A – L/R = 10 ms : 5 x 10^5 operations
220Vdc – 0.2 A – L/R = 10 ms : 10^5 operations
110Vac - 5 A – Cosφ = 0.7 : 5 x 10^5 operations
220Vac - 3 A – Cosφ = 0.7 : 5 x 10^5 operations
440Vac - 0.2 A – Resistive : 5 x 10^5 operations

Sockets	POK - POKS	BIPOK - BIPOKS	TRIPOK - TRIPOKS	QUADRIPOKS	ESAPOKS
Number of terminals	8	16	24	32	48
For wall or rail mounting					
Spring clamp, wall or DIN H35 rail mounting	PAIR080	PAIR160	PAIR240	PAIR320	PAIR480
Screw, wall or DIN H35 rail mounting	50IP20-I DIN	48BIP20-I DIN	78BIP20-I DIN	96IP20-I DIN	156IP20-I DIN
Screw, wall mounting	50L	48BL	78BL	96BL	156BL
Double faston, wall mounting	51L	48L	78L	-	-
For flush mounting					
Double faston (4.8 x 0.8 mm)	ADF1	ADF2	ADF3	ADF4	ADF6
Screw	53IL	43IL	73IL	-	-
For mounting on PCB					
	65 (1)	65	-	-	-

(1) Suitable for mounting 2 relays side by side.

Retaining clips – correspondence with sockets	POK - POKS	BIPOK - BIPOKS	TRIPOK - TRIPOKS	QUADRIPOKS	ESAPOKS
Number of clips per relay	1	1 (1)	2	2	2
SOCKET MODEL	CLIP MODEL				
For wall or rail mounting					
PAIR080, PAIR160, PAIR240, PAIR320, PAIR480	RPB48	RPB48	RPB48	RQ48	RPB48
50IP20-I DIN, 48BIP20-I DIN, 78BIP20-I DIN, 96IP20-I DIN, 156IP20-I DIN	RPB48	RPB48	RPB48	RQ48	RPB48
50L, 48BL, 78BL, 96BL, 156BL	RPB48	RPB48	RPB48	RQ48	RPB48
51L, 48L, 78L	RPB48	RPB48	RPB48	-	-
For flush mounting					
ADF1, ADF2, ADF3, ADF4, ADF6	RPB48	RPB48	RPB48	RQ48	RPB48
ADF, 53IL, 43IL, 73IL (2)	RPB43	RPB43	RPB43	-	-
For mounting on PCB					
65	RPB43	RPB43	-	-	-

(1) Assume two clips for use on rolling stock.
(2) Insert the clip before fastening the socket on the panel.

Mounting tips

The preferred mounting position is on the wall, with the relay positioned horizontally in the reading direction on the nameplate.
For correct use of the relays, they should be spaced apart by at least 5 mm in the horizontal direction and 20 mm in the vertical direction. This is to allow correct upward dissipation of the heat generated by the coil. Set these distances according to the socket used. Distances can be reduced depending on the environmental application conditions and on the relay duty cycle.
For safe and secure operation, it is advisable to use retaining clips.
No special maintenance is required.
Condensation can form inside the relay when powered up and the outside ambient temperature is cold; this is quite normal and does not affect the operation of the relay. The plastic materials of the relay do not possess hygroscopic properties.

Instantaneous monostable relay 4-8-12 contacts

OK Series

OKS

OKUIC

OVERVIEW

- Plug-in monostable instantaneous relay
- Solid and rugged construction for heavy or intensive duty
- Very high electrical life expectancy and exceptional endurance
- Patent operating mechanism, designed to ensure high contact pressure
- Ample clearance between open contact elements (from 1.2 to 4 mm)
- Independent and self-cleaning contacts with high breaking capacity
- Magnetic arc blow-out for higher breaking capacity
- Excellent shock and vibration resistance
- Wide variety of configurations and customizations
- Option for use in geothermal sites available
- Wide range of sockets
- Retaining clip for secure locking of relay on socket
- Transparent cover, pull-out handle
- Positive mechanical keying for relay and socket

APPLICATIONS

Shipbuilding · *Petroleum industry* · *Heavy industry* · *Power generation* · *Power distribution* · *Railway equipment* · *Rolling stock*

DESCRIPTION

The OK series is made up of 7 basic models, created from a common operating mechanism of patent design, equipped with 4 contacts. Solutions with 8 or 12 contacts are obtainable by using 2 or 3 relays in combination.

The construction of the relays and careful choice of the materials are such that they ensure long life and considerable ruggedness even in harsh operating environments and when subject to strong thermal shocks.

A specific treatment (P5GEO or P6GEO) combining coil tropicalization with gold-plated contacts allows the use of these items in geothermal electric power stations, as final relays for controlling field devices and for all power circuits.

Relays of the OK series utilize a patent switching mechanism designed to minimize friction, resulting in a mechanical life expectancy of at least 100,000,000 operations. This is made possible thanks to:

- the use of a solenoid with a core drawn in toward the main air gap, located at the centre of the coil, the only position in which the available magnetic flux can be exploited to the full
- the core motion being limited to the minimum, thereby optimizing mechanical forces and reducing friction. The motion is amplified by means of a W linkage, which allows an appreciable displacement of the contact (> 4 mm in the case of the version with NO contacts)
- the coil of elongated cylindrical geometry, best able to ensure high efficiency and effective dissipation of the heat produced.

Each contact is mounted to individual and independent blades, which are able to provide optimum shock and vibration resistance. In particular, this generates pressure of around 0.8...1N on the make and break contacts, which is unparalleled by other products. The common contact slides against the fixed poles (NO and NC contacts) both when opening and when closing, which ensures a notably effective self-cleaning action.

With ample clearance between the open contact elements, it becomes possible to guarantee an impulse withstand voltage of 5 kW between the poles of the single contact.

Excellent electrical and mechanical performance levels allow the product to be used in the most demanding of sectors such as, for example, control and signalling functions in electricity generating stations, electrical transformer stations, rail transport or in industries with continuous production processes (chemical industry, petroleum industry, rolling mills, cement factories, etc.). Above all, the excellent ability to withstand shock and vibration allow their use in seismic environments or on rolling stock.

Description of models

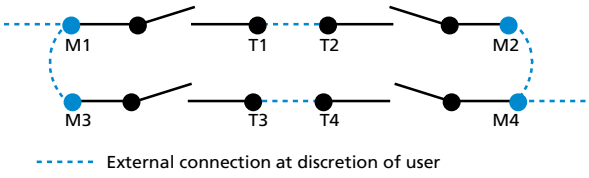
Relays of the OK series are made in 7 models (OK, OKS, OKFC, OKSFC, OKSCD, OKSGcCd and OKUIC). The outputs are available on 16 terminals of standard dimensions 5x0.8mm, evenly and symmetrically divided into 4 rows spaced 10mm apart, in both directions. Internal connections are ordered symmetrically. Turning the relay through 180° on its connector has the effect simply of changing the contacts, without affecting operation (except in the case of relays with a polarized power input).

OK – OKS

The OK relay offers features of ruggedness, easy installation, high breaking capacity (with magnetic arc blow-out, model OKS), safe operation and adaptability to any kind of circuit, making it suitable for all heavy duty applications in the field of remote control systems and automation. The distance between contacts is 2.2mm. Superior shock and vibration resistance ensures that contacts are able to hold their operating position even when exposed to a shock force of 30g - 1ms. No opening of break contacts up to 3g. On the OKS model, a powerful magnetic arc blow-out located between the 4 change-over contacts has the effect of generating a permanent magnetic field. When an inductive load circuit is broken, the resulting arc is swiftly extended and finally extinguished through the action of the magnetic field created by the blow-out.

OKFC - OKSFC - OKUIC

The OKFC relay is an energy saving component. The distance between contacts is 1.2mm. Contact pressures and shock and vibration resistance are the same as specified for OK/OKS models. In the case of d.c. loads, the breaking capacity is reduced from that of the OK relay, although the addition of the magnetic arc blow-out (model OKSFC) provides breaking capacity of up to 15 A at 120Vdc (see example of electrical life expectancy).
On the OKSFC model, a powerful magnetic arc blow-out located between the 4 change-over contacts has the effect of generating a permanent magnetic field. When an inductive load circuit is broken, the resulting arc is swiftly extended and extinguished through the action of the magnetic field created by the blow-out. With direct current, breaking capacity is doubled. For d.c. and a.c. currents that can be broken without the blow-out, the effect of having this feature available will be to reduce wear on the contacts, doubling electrical life expectancy.
The connection of 2 contacts in series increases electrical life expectancy and doubles breaking capacity when handling direct current.
The connection of 2 contacts in parallel likewise increases electrical life expectancy.
In the event that the 4 contacts are all available for breaking purposes, it is possible to use a series/parallel connection arrangement as illustrated below.
In the case of high voltages, from 250V upwards, it is best to avoid breaking opposite polarities on adjacent contacts.



The use of the OKFC or OKSFC relay is advisable whenever the requirement is for detecting loss of voltage, hence where relays are permanently powered up, or when the ambient temperature may reach 70 °C. These relays can be powered up permanently, even at the maximum voltage of the specified operating range; they can also handle wide fluctuations in voltage and consequently are able to respond, for example, to standards for rolling stock, as in the case of the OKUIC model, which has a coil with a wide operating range.

OKSCD

The silver-coated contacts of normal relays can fuse together when closed if exposed to a peak current of 50 A for at least 5 ms. Using cadmium oxide contacts, the surfaces will fuse only at currents higher than 150 A. With magnetic arc blow-out fitted as standard to these relays, there is no possibility of the arc creating a hot spot between the contacts that could cause them to become welded together.
This relay is especially suitable for handling highly inductive direct current loads, and circuits with filament lamps where the closing of contacts can produce current peaks of up to 10 or 15 times the nominal strength (public or industrial lighting systems). It can also be used for starting small electric motors and other appliances that produce high transient currents. The OKSCD relay has an electrical life expectancy equal to that of the OKS relay, but is also suitable for use with circuits generating high transient currents, given the factors indicated above. Controlling a circuit with 600W filament lamps connected to a 110Vac supply, for example, the OKSCD relay is capable of 1,500,000 operations.

OKSGcCd

The OKSGcCd relay has a longer electrical life expectancy than the OKSCd model. It has 4 normally open contacts, and a distance between contacts of > 4mm. Magnetic arc blow-out is fitted as a standard feature. The OKSGcCd relay can be used with heavily inductive d.c. loads, where there is no need for change-over contacts.

SPECIAL ITALIAN NAVY SPECIFICATION

OK, OKS, OKFC and OKSFC models can be made in a special Italian Navy version, which features gold-plated terminals and contacts and tropicalization of the relay coil. A special fixing bracket can be supplied, made of 304 grade stainless steel, which replaces the classic retaining clip.

Models	Number of contacts	Continuous duty	Magnetic arc blow-out	AgCdO contacts	Long travel	Rolling stock application
OK	4 (1)					
OKS			•			
OKFC		•				
OKSFC		•	•			
OKSCd			•	•		
OKSGcCd			•	•	•	
OKUIC		•	•			•

1. Versions with 8 and 12 contacts available (excluding OKUIC, OKSCd and OKSGcCd).

FOR CONFIGURATION OF PRODUCT CODE, SEE "ORDERING SCHEME" TABLE

Coil data	OK - OKS	OKFC - OKSFC	OKSCd - OKSGcCd	OKUIC
Nominal voltages Un (1)	**DC**: 12-24–36-48–72-110–125–132-144-220		**AC**: 12-24–48–110–115-127–220–230-380	
Max. consumption at Un (DC/AC) (2)	4.5 W / VA	3.5 W / VA	5 W / VA	3.5 W
Operating range (1)	DC: 80…110% Un AC: 85…115% Un	DC: 80…120% Un AC: 85…115% Un	DC: 80…110% Un AC: 80…110% Un	DC: 70…125% Un (3)
Type of duty	Continuous at Un (4)	Continuous	Continuous at Un (4)	Continuous
Drop-out voltage (5)	DC: > 5% Un		AC: > 15% Un	

1. Other values on request.
2. For versions with 8 and 12 contacts, double and treble the value respectively.
3. For operating ranges different to that specified by EN60077, refer to table "OKUIC - Special Ranges".
4. Continuous duty is possible at the maximum voltage of the operating range at Tmax: 40 °C.
5. Limit value for supply voltage, expressed as % of the nominal value, beneath which the relay is certain to be de-energized.

Contact data	OK - OKS - OKFC - OKSFC - OKUIC	OKSCd	OKSGcCd
Number and type (1)	4 SPDT, Form C	4 SPDT, Form C	4 N.O.
Current Nominal (2)	10 A	10 A	
Maximum peak (1 min) (3)	20 A	20 A	
Maximum pulse (10 ms) (3)	150 A	250 A	
Example of electrical life expectancy (4) 1,800 operations/hour	OK: 0.7 A – 120 Vdc – L/R 0 ms : 5.5 x 10^5 operations		
	OKS: 1 A – 120 Vdc – L/R 40 ms : 5 x 10^5 operations		
	OKFC: 0.5 A – 110 Vdc – L/R 40 ms : 10^5 operations		
	OKSFC - OKUIC: 0.7 A – 132 Vdc – L/R 40 ms : 10^5 operations		
	OKSCd: 1 A – 120 Vdc – L/R 40 ms : 5 x 10^5 operations		
	OKSGcCd: 5 A – 110 Vdc – L/R 20 ms : 2 x 10^5 operations		
Minimum load Standard contacts	500 mW (20V, 20 mA)		
Gold-plated contacts (5)	200 mW (20V, 5 mA)		
Maximum breaking voltage	350 Vdc / 440 Vac		
Contact material	AgCu	AgCdO	
	OK-OKS-OKSCd	OKFC-OKSFC	OKSGcCd	OKUIC
Operating time at Un (ms) (6) (7)	DC – AC			
Pick-up (NO contact closing)	≤ 28 - ≤ 40	≤ 38 - ≤ 40	≤ 30 - ≤ 45	≤ 40
Drop-out (NC contact closing)	≤ 20 - ≤ 70	≤ 18 - ≤ 80	-	≤ 18

1. Versions with 8 and 12 SPDT contacts available, excluding OKUIC, OKSCd and OKSGcCd.
2. On all contacts simultaneously.
3. The max. peak and pulse currents are those currents that can be handled, for a specified time, by the contact. They do not refer to steady or interrupted currents.
4. For other values, see electrical life expectancy curves.
5. Specifications of contacts on new relay
   a. Plating material: **P4GEO**: gold-nickel alloy (>6µ).
   b. When the gold-plated contact is subject to heavy loads, it will be degraded on the surface. In such case, the characteristics of the standard contact should be taken into consideration. This does not impair relay operation.
6. Unless specified otherwise, the operating time signifies until stabilization of the contact (including bounces).
7. Addition of a flyback diode connected in parallel with the coil (DC version only) causes an increase in operating time when the relay drops out.

Insulation

Insulation resistance (at 500Vdc)	
between electrically independent circuits and between these circuits and ground	> 1,000 MΩ
between open contact parts	> 1,000 MΩ
Withstand voltage at industrial frequency	
between electrically independent circuits and between these circuits and ground	2 kV (1 min) - 2.2 kV (1 s)
between open contact parts	2 kV (1 min) - 2.2 kV (1 s)
between adjacent contacts	2 kV (1 min) - 2.2 kV (1 s)
Impulse withstand voltage (1.2/50µs - 0.5J)	
between electrically independent circuits and between these circuits and ground	5 kV
between open contact parts	5 kV

Mechanical specifications

		Mechanical life expectancy	100 x 10^6 operations			
Maximum switching rate		Mechanical	3,600 operations / hour			
		Degree of protection (with relay mounted)	IP20			
Type of power supply, n° SPDT		VDC, 4 SPDT	VAC, 4 SPDT	VDC, 8 SPDT	VAC, 8 SPDT	VDC, 12 SPDT	VAC, 12 SPDT
Dimensions (mm) [1] [2]		45x97x45	45x109x45	91.5x97x45	91.5x109x45	138x97x45	138x109x45
Weight (g)		~ 280	~ 280	~ 590	~ 590	~ 890	~ 890

1. Output terminals excluded.
2. OKUIC relay: H 109mm for standard version, H 97mm for version with LED, DIODE, VARISTOR.

Environmental specifications

Operating temperature		-25° to +55°C
	OKUIC	-25° to +70°C
Storage and shipping temperature		-40° to +85°C
Relative humidity		Standard: 75% RH - Tropicalized: 95% RH
Resistance to vibrations		5g - 10 to 60 Hz - 1 min
Resistance to shock		30g - 11 ms
Fire behaviour		V0

Standards and reference values

EN 61810-1, EN 61810-2, EN 61810-7	Electromechanical elementary relays
EN 60695-2-10	Fire behaviour
EN 50082-2	Electromagnetic compatibility
EN 60529	Degree of protection provided by enclosures

Unless otherwise specified, products are designed and manufactured according to the requirements of the European and International standards indicated above.
In accordance with EN 61810-1, all items of technical data are referred to ambient temperature 23 °C, atmospheric pressure 96kPa and 50% humidity.
Tolerance for coil resistance, nominal electrical input and nominal power is ±7%.

Railways, rolling stock - Standards

EN 60077	Electric equipment for rolling stock - General service conditions and general rules
EN 50155	Electronic equipment used on rolling stock
EN 61373	Shock and vibration tests, Cat 1, Class B
EN 45545-2	Fire behaviour, Cat E10, Requirement R26, V0
NF F 16-101/102	Fire behaviour, Cat A1 rolling stock
ASTM E162, E662	Fire behaviour
UNI CEI 11170-3	Fire behaviour, Level of risk 4

Railways, rolling stock - Special operating ranges for OKUIC relay [1]

Nominal voltage	Minimum pick-up voltage	Maximum operating voltage	Order symbol [1]
24 Vdc	18	33	Z01
36 Vdc	28	48	Z01
72 Vdc	55	110	Z01
110 Vdc	77	144	Z01
128 Vdc	85	160	Z01

(1) To order the relay with the special operating range, indicate the "Z0x" symbol in the "Keying position" field of the ordering scheme. The special range may be subject to operating specifications different from standard specifications. Please contact us for further information.

Configurations - Options	
P2	Tropicalization of the coil with epoxy resin for use with 95% RH (@ T 50 °C). This treatment also protects the coil against corrosion which could occur by the combination of humidity with certain chemical agents, such as those found in acid atmospheres (typical of geothermal power stations) or saline atmospheres.
P4GEO	Gold plating of contacts with gold-nickel alloy, thickness ≥ 6µ. This treatment ensures long-term capacity of the contact to conduct lower currents in harsh ambient conditions such as acid atmospheres (typical of geothermal power stations) or saline atmospheres.
P5GEO	**P4GEO** gold-plating of contacts + **P2** coil tropicalization.
P6GEO	**P4GEO** type gold-plating, but applied to contacts, contact terminals and output terminals + **P2** coil tropicalization.
LED	LED indicator showing presence of power supply, wired in parallel with the coil.
FLYBACK DIODE	Polarized component connected in parallel with the coil (type 1N4007 or BYW56 for rolling stock version) designed to suppress overvoltages generated by the coil when de-energized.
VARISTOR	Non-polarized component connected in parallel with the coil, designed to suppress overvoltages higher than the clamping voltage, generated by the coil when de-energized.
TRANSIL	Non-polarized component connected in parallel with the coil. Behaviour is similar to that of a varistor, with faster operating times.
IP40	IP40 protection with "6" handle or closure with screws.
8 CONTACTS	Version with 8 change-over contacts, obtained using 2 x 4 SPDT relay, coils connected in series.
12 CONTACTS	Version with 12 change-over contacts, obtained using 3 x 4 SPDT relay, coils connected in series.

Ordering scheme

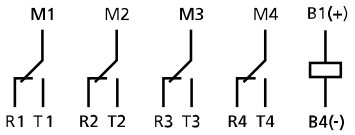
Product code	Number of contacts	Application (1)	Configuration A	Configuration B	Type of power supply	Nominal voltage (V) (2)	Keying position code (3)
OK OKS OKFC OKSFC OKUIC OKSCd OKSGcCd	**4:** SPDT (4) **8**: 8 SPDT **12**: 12 SPDT	**E:** Energy **F:** Railway Fixed Equipment **R:** Railway Rolling Stock **M:** MMI	1: Standard 2: Diode // 3: Varistor 4: Led 5: Diode // + Led 6: Varistor + Led 7: Transil 8: Transil + Led	0: Standard 2: P2 4: P4 GEO 5: P5 GEO 6: P6 GEO 7: P7 8: P8	C: Vdc A: Vac 50 Hz H: Vac 60 Hz	012 - 024 - 036 048 - 072 - 100 110 - 115 - 125 127 -132 - 144 220 - 230 - 380	XXX

Example

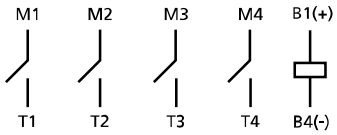
OKS		**M**	**1**	**6**	**H**	**115**	
OKSM16-H115 - OKS relay, ITALIAN NAVY series, nominal voltage 115 Vac 60 Hz, with P6 GEO finish (P4GEO gold-plated contacts + P2 coil tropicalization)							
OKSFC		**E**	**2**	**0**	**C**	**110**	
OKSFCE20-C110 - OKSFC relay, ENERGY series, nominal voltage 110 Vdc, equipped with flyback diode							

(1) **ENERGY**: all applications except for railway.
RAILWAYS, FIXED EQUIPMENT: application on fixed power systems and electrical railway traction. Construction according to RFI (FS Group) specification no. RFI DPRIM STF IFS TE 143 A, if applicable. For list of RFI compliant and type-approved products, consult dedicated catalogue "RAILWAY SERIES – RFI APPROVED".
RAILWAYS, ROLLING STOCK: OKUIC only. Application on board rolling stock (rail-tram-trolley vehicles). Electrical specifications according to EN60077.
MMI: Italian Navy specification. OK, OKS, OKFC, OKSFC, OKSCd only. P6 GEO treatment as standard (see Configuration B).
Also available is the **STATIONS** series, with ENEL approved material meeting LV15/LV16 specifications. For list of ENEL compliant and type-approved products, consult dedicated catalogue "STATIONS SERIES – LV15-LV16-LV20".
(2) Other values on request. Voltage 380V available as Vac only.
(3) Optional value. The positive mechanical keying is applied according to the manufacturer's model.
(4) For the standard version with 4 contacts, the field must be left empty.

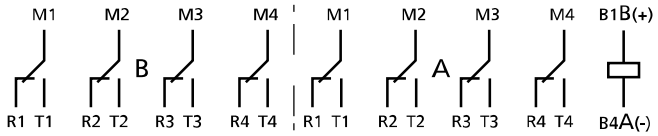
Wiring diagram



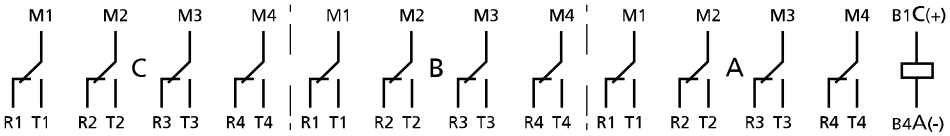
OK-OKS-OKFC-OKSFC-OKSCd-OKUIC



OKSGcCd

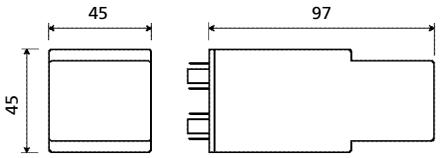


Version with 8 contacts



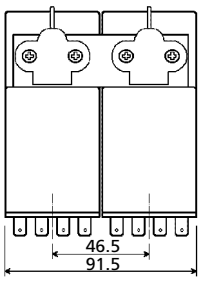
Version with 12 contacts

Dimensions

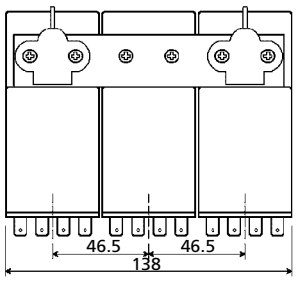


All OK d.c. relays and OKUIC
with Diode and/or Led option

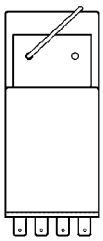
All a.c. OK and OKUIC relays



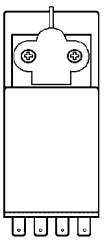
Version with 8 contacts



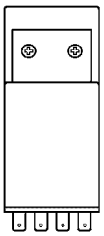
Version with 12 contacts



6B handle IP20
(standard)



6 handle IP40
(OKUIC)



Closure with
screws IP40

Examples of electrical life expectancy

	U (Contact)	I (A)	L/R (ms) cosφ	Operations	Notes		U (Contact)	I (A)	L/R (ms) cosφ	Operations	Notes
OK	540Vac	3	cosφ = 0.5	15,000	②	OKFC	220Vac 110Vdc 80Vdc 48Vdc	10 0.5 1 5	cosφ = 0.7 cosφ = 5 cosφ = 0 cosφ = 0	500,000 1,000,000 2,000,000 1,000,000	
	380Vac	15 10 3x3.3	cosφ = 1 cosφ = 1 cosφ = 0.8	10,000 200,000 200,000	❷ ◆						
	220Vac	20 15 10 3x6 5 5 2.5 2 1.25	cosφ = 1 cosφ = 0.5 cosφ = 1 cosφ = 0.8 cosφ = 1 cosφ = 1 cosφ = 0.25 cosφ = 1 cosφ = 1	20,000 20,000 400,000 200,000 1,500,000 3,000,000 2,000,000 15,000,000 30,000,000	❷ ❷ ◆ ● 	OKSFC OKUIC	120Vdc	15 8 6 3 1	L/R = 0 L/R = 0 L/R = 10 L/R = 10 L/R = 10	100 2,000,000 500,000 100,000 500,000	❷ ③ ②
	120Vdc	1.5	L/R = 0	550,000			80Vdc	25 15 10 7.5 5	L/R = 0 L/R = 20 L/R = 0 L/R = 0 L/R = 10	100 100 400,000 1,500,000 400,000	❷ ❷
	48Vdc	10 1.5	L/R = 0 L/R = 5	1,000,000 18,000,000							
OKS	400Vdc	6	L/R = 10	100	③	OKSCd	400Vdc	6	L/R = 10	100	③
	250Vdc	15 3 1 0.1	L/R = 0 L/R = 20 L/R = 10 L/R = 15	1,000 300,000 30,000 3,500,000	■ ② ②		250Vdc	15 3 1 1 0.1	L/R = 0 L/R = 20 L/R = 10 L/R = 0 L/R = 15	1,000 300,000 30,000 1,000,000 3,500,000	 ② ② ②
	120Vdc	30 20 10 10 5 2 1 1	L/R = 0 L/R = 0 L/R = 10 L/R = 0 L/R = 10 L/R = 100 L/R = 40 L/R = 10	100 10,000 1,000 300,000 60,000 50,000 500,000 1,000,000	③■ ②■ ■ ②		120Vdc	20 10 10 5 1 1	L/R = 0 L/R = 10 L/R = 0 L/R = 10 L/R = 40 L/R = 10	10,000 1,000 300,000 60,000 500,000 1,000,000	❷ ②
	48Vdc	10 1.5	L/R = 0 L/R = 5	2,600,000 25,000,000			48Vdc	10 3 1.5	L/R = 0 L/R = 30 L/R = 5	2,600,000 400,000 25,000,000	
	24Vdc	30	L/R = 50	200,000	❹		24Vdc	30	L/R = 50	200,000	❹

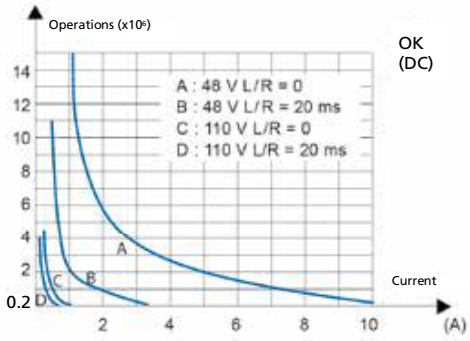
Notes:

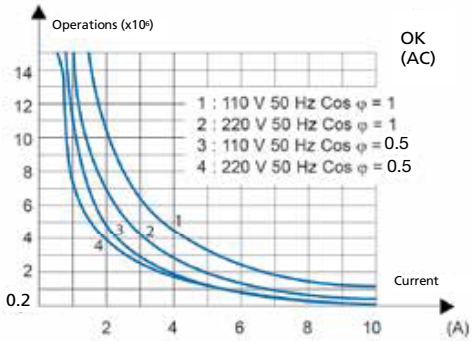
② 2 contacts connected in series
③ 3 contacts connected in series
❷ 2 contacts connected in parallel
❸ 3 contacts connected in parallel
❹ 4 contacts connected in parallel

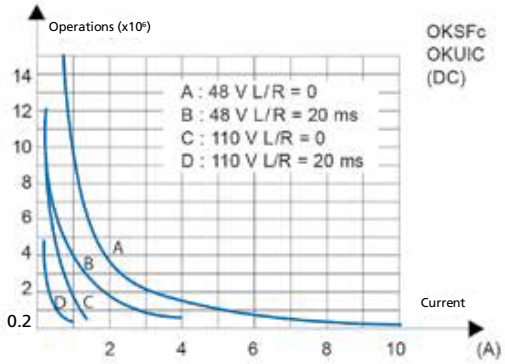
■ Electric arc to core
◆ 3Hp motors
● Incandescent lamps

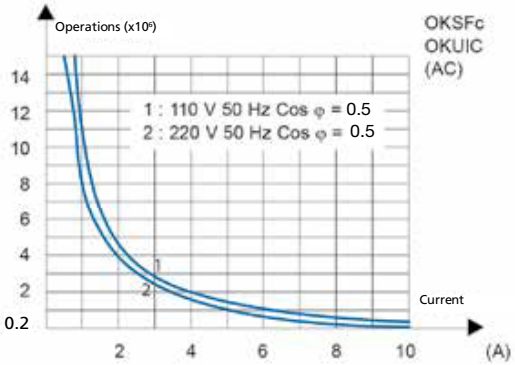
The breaking capacity is the level of current that the relay can break and handle without being destroyed, and without causing an electric arc of unacceptable and hazardous duration. Breaking capacity is also referred to as interrupting capacity, or rating.

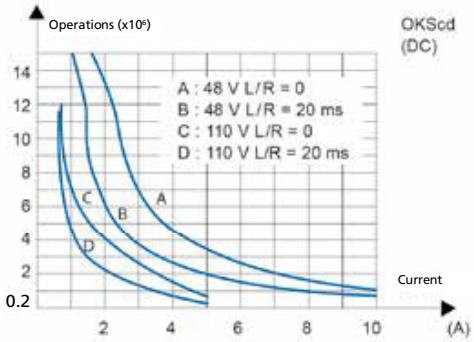
Electrical life expectancy

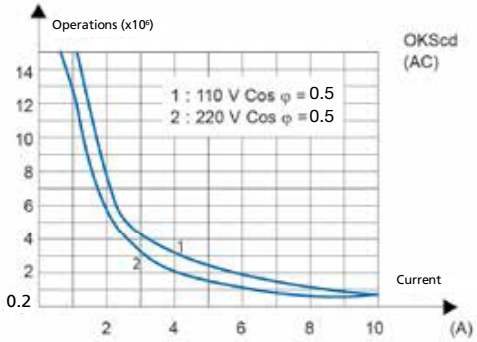


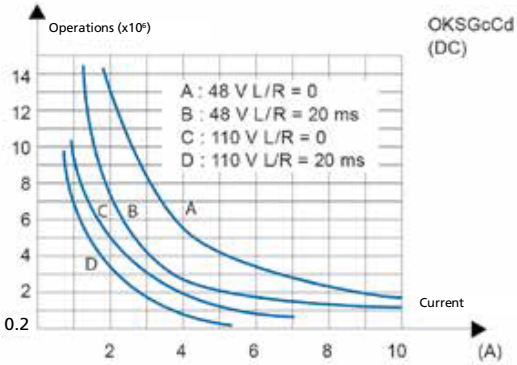


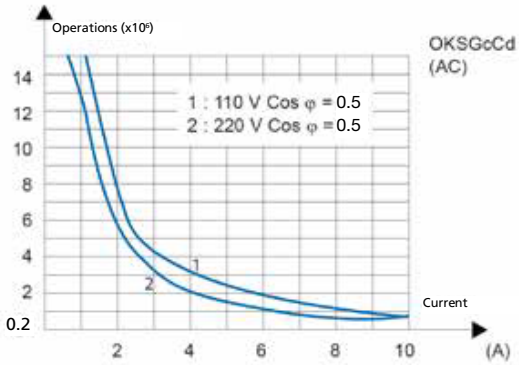












(1) Switching frequency 1,200 operations/hour, 50% cycle.