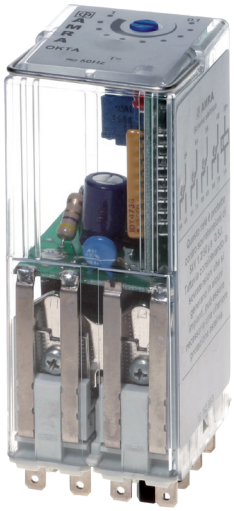
TIMER RELAY WITH 4 CONTACTS

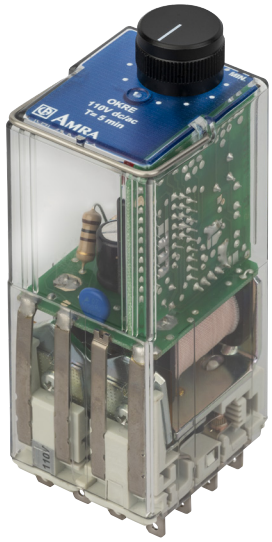
OKT | OKR SERIES

USER SECTORS

- Power generation
- Nuclear
- Power transmission
- Rolling Stock
- Fixed railway installations
- Shipbuilding
- Petroleum industry
- Heavy industry



Time setting flat head slotted screw



Time setting knob

PRODUCT ADVANTAGES

- Plug-in relay with time delay on pick-up or on drop-out
- Time delay setting from 0.1 second up to 1 hour
- Wide range of time settings available
- Operation using d.c. or a.c. power supply with a single product
- Solid and rugged construction for heavy or intensive duty
- Long life expectancy
- Separate arc breaking chambers
- Magnetic arc blow-out standard
- Independent and self-cleaning contacts
- Excellent shock and vibration resistance
- 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

DESCRIPTION

The relays in the **OKR and OKT series** are monostable types with time delay, using 4 or 3 COfollowing the same basic electromechanical design of the POK model, they embody all the features and benefits of this product.

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.). In particular, with their notable **shock and vibration resistance**, they are ideal for use on rolling stock.

The electronic timing circuit is designed using analog technology: by adopting a limited number of select components, the end product is guaranteed to meet high standards of quality and reliability.

OKRe and OKTa models offer **time delay on pick-up**, whereas **OKRr and OKTr models** offer **time delay on drop-out.**
In the case of the OKTr model, one of the 4 contacts must be connected to the power coil (see functional diagram). This obviates the need for connection of an auxiliary power supply to the relay, separate from the control. In this situation, the contacts available for switching purposes are 3 in number.

Models are available with different full scale time values (from 1 second up to 60 minutes), so as to offer a wide range of time delay settings. The full scale value is a fixed, factory set value determined as part of the manufacturing process. The end user can adjust the response time from a minimum 10% up to 100% of full scale with absolute ease, by way of the knob-operated or slotted screw-driven potentiometer located on the top of the relay housing. Power can be supplied to the relay from a d.c. or an a.c. source operating at 50 or 60 Hz.

For further details of electromechanical construction, see the chapter on the "POK series".

Models	Function		Number of time delayed contacts	Setting control		Rolling stock application	
	Pick-up	Drop-out		Knob	Flat head slotted screw		
OKTa	•		4	•	•	•	•
OKTr		•	3	•	•	•	•
OKRe	•		4	•	•	•	•
OKRr		•	4	•	•	•	•

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

Coil specifications

Nominal voltages Un (1)	**DC / AC:** 24-36-48-72-110-125-132-144-220 -230
Max. consumption at Un (DC/AC)	4 W / 5 VA
Operating range (1)	80...115% Un
Rolling stock version (2) (3)	**DC**: 70...125% Un
Type of duty	Continuous
Drop-out voltage (4)	> 5% Un

(1) Other values on request. Operation with d.c. or a.c. power supply.
(2) See "Ordering scheme" table for order code.
(3) For operating ranges different to that specified by EN60077, refer to table "Rolling stock versions - Special Ranges".
(4) Limit value for supply voltage, expressed as % of the nominal value, beneath which the relay is certainly de-energized.

Contact specifications		OKTa	OKTr	OKRe - OKRr
	Number and type	4 CO, form C	3 CO, form C	4 CO, form C
Current	Nominal (1)	5 A		
	Maximum peak (1 s) (2)	10 A		
	Maximum pulse (10ms) (2)	100 A		
Example of electrical life expectancy (3)		0.5A - 110 Vdc - L/R = 40 ms: 10^5 operations, 1,800 operations/hour		
Minimum load	Standard contacts	500 mW (20 V, 20 mA)		
	Gold-plated contacts **P4GEO** (4)	100 mW (10 V, 5 mA)		
	Gold-plated contacts **P8** (4)	50 mW (5 V, 5 mA)		
Maximum breaking voltage		250 Vdc / 350 Vac		
Contact material		AgCu		
Switching time at Un (ms) (5) (6)		DC - AC		
Pick-up (NO contact closing)		≤ 20 - ≤ 20		
Drop-out (NC contact closing)		≤ 15 - ≤ 20		

(1) Nominal current: 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) 1,800 operations/hour - For other values, see electrical life expectancy curves.
(4) Specifications of gold-plated contacts on new relay
a) Plating material: **P4 GEO: 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). It should be added to the preset delay time.
(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	20x10^6 operations
Maximum switching rate	Mechanical	3600 operations/hour
	Degree of protection (with relay mounted)	IP40
	Dimensions (mm)	40x45x97 (1)
	Weight (g)	~ 220

(1) Excluding output terminals and adjuster knob, if specified.

Environmental specifications

Operating temperature		
	Standard	-10 to +55 °C
	Version for rolling stock	-25 to +70 °C
Storage and shipping temperature		-25 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 - 11ms
Fire behavior		V0

Standards and reference values

EN 61810-1, EN 61810-2, EN 61810-7	Electromechanical elementary relays
EN 61812-1	Timer relays
EN 60695-2-10	Fire behavior
EN 61000	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 behavior, Cat E10, Requirement R26, V0
ASTM E162, E662	Fire behavior

Railways, rolling stock – Special operating ranges

Nominal voltage	Minimum pick-up voltage	Maximum operating voltage	Order symbol (1)
24 Vdc	18	33	Z01
72 Vdc	55	104	Z01
110 Vdc	77	140	Z01
128 Vdc	85	155	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 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** type gold-plating + **P2** coil tropicalization.
P6GEO	Gold-plating of contacts, contact terminals and output terminals + **P2** coil tropicalization.
P7	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 gold-plated contact performance compared to the treatment P4GEO.
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.
TRANSIL	Non-polarized component connected in parallel with the coil. Behavior is similar to that of a varistor, with faster operating times.

Ordering scheme

Product code	Application (1)	Configuration A	Configuration B	Label	Type of power supply	Nominal voltage (V) (2)	Setting control	Full scale time	Keying position (3)
OKRe OKTa OKRr OKTr	**E:** Energy 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	F	T: Vdc/ac C: Vdc (4)	024 - 036 - 048 072 - 110 - 125 132 - 144 - 220 230	M: Knob C: Flat head slotted screw	01S: 1 s 05 : 5 s 10S: 10 s 15S: 15 s 30S: 30 s 01M: 1 min 02M: 2 min 05M: 5 min 10M: 10 min 15M: 15 min 30M: 30 min 60M: 60 min	XXX

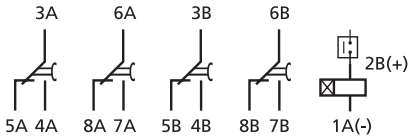
Example

OKRe	**E**	**1**	**0**	**F**	**T**	**110**	**M**	**05S**	
OKReE10F-T110-M05S - OKRe relay, ENERGY series, nominal voltage 110Vdc, full scale 5 seconds, knob setting control									
OKRr	**R**	**5**	**0**	**F**	**C**	**072**	**C**	**30M**	
OKRrR50F-C072-C30M - OKRr relay, rolling stock series, nominal voltage 72Vdc, special range 55-104V, equipped with diode, led, full scale 30 minutes, slotted screw setting control									

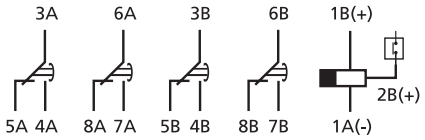
(1) **E = ENERGY**: all applications, except for railways rolling stock.
Suitable on energy production, transport and distribution plants, railways fixed equipment, petrolchemical and heavy industry.
R = RAILWAYS, ROLLING STOCK: Application on board rolling stock (rail-tram-trolley vehicles). Electrical characteristics according to EN60077.
Availables also the product series:
RAILWAYS, FIXED EQUIPMENT: Approved and conforming relays and products to RFI (FS Group) specification no. RFI DPRIM STF IFS TE 143 A
For the list of RFI approved and conforming products, consult dedicated catalog "RAILWAY SERIES – RFI APPROVED".
STATIONS: ENEL approved material meeting LV15/LV16 specifications.
For the list of ENEL approved and conforming products, consult the dedicated catalog "STATIONS SERIES – LV15-LV16-LV20".

(2) Other values on request.
(3) Optional value. The positive mechanical keying is applied according to the manufacturer's model.
(4) Rolling Stock version, Vdc only available.

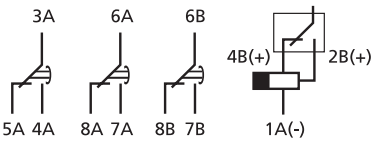
Functional diagram



OKRe - OKTa

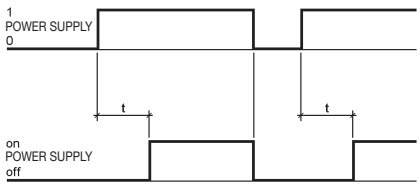


OKRr

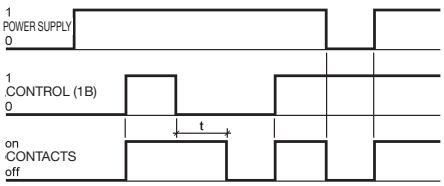


Connect terminals 1B and 3B together
OKTr

Functional diagram



OKRe - OKTa



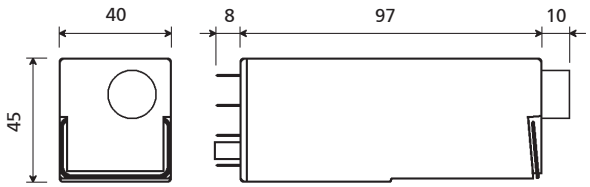
OKRr-OKTr

Time delay - Switching time setting

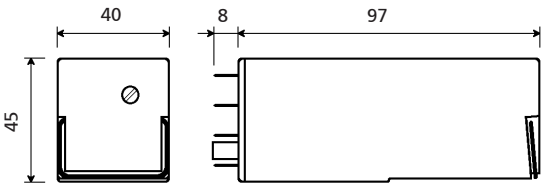
Time setting	By way of potentiometer, with knob or flat head slotted screw setting control
Full scale times available	1-5-10-15-30 seconds, 1-2-5-10-30-60 minutes
Time setting range	10...100 % of full scale
Accuracy, setting (0.8...1.1 Un, t=20°C)	± 10% of time delay
Accuracy, repeatability	± 0.5% (Vdc) - ± 0.5% + 20ms (Vac)
Reset	< 100ms - in time-delay phase < 1s

The setting scale shown on the front of the relay (0.1 ... 1) is approximate.

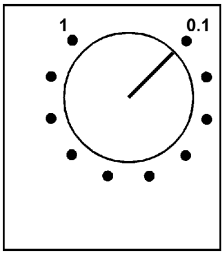
Dimensions



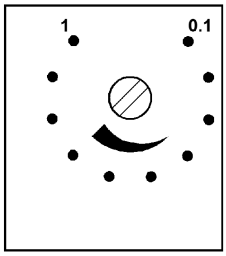
Relay with knob setting control



Relay with flat head slotted screw setting control



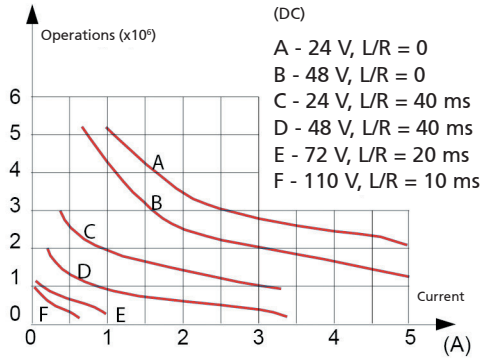
Knob setting control

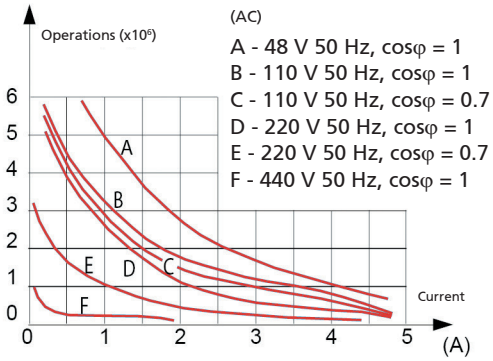


Flat head slotted screw setting control

The scale shown on the relay (0.1-1) is approximate

Electrical life expectancy





Some examples of electrical life expectancy

48 Vdc - 5 A – L/R = 10 ms: 5 x 10^5 operations
80 Vdc - 5 A – Resistive: 5 x 10^5 operations
110 Vdc - 0,5 A – L/R = 10 ms: 5 x 10^5 operations
220 Vdc - 0,2 A – L/R = 10 ms: 10^5 operations
110 Vac - 5 A – Cosφ = 0.7: 5 x 10^5 operations
220 Vac - 3 A – Cosφ = 0.7: 5 x 10^5 operations
440 Vac - 0,2 A – Resistive: 5 x 10^5 operations

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

Sockets and retaining clips		
Number of terminals (standard dimensions 5x0.8mm)	16	Retaining clip
For wall or rail mounting		
Spring clamp, wall or DIN H35 rail mounting	PAIR160	RC48
Screw, wall or DIN H35 rail mounting	48BIP20-I DIN	RC48
Screw, wall mounting	48BL	RC48
Double faston, wall mounting	48L	RC48
For flush mounting		
Double faston (4.8 × 0.8 mm)	ADF2	RC48
Screw	43IL (1)	RC43
For mounting on PCB	65	RC43

(1) Insert the clip before fastening the socket on the panel.
For more details, see specifications of mounting accessories.

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 maximum reliability in 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.