



RELAYS

TIMER RELAY WITH 4 CONTACTS

TOK SERIES

USER SECTORS



Power generation



Nuclear



Power transmission



Rolling Stock



Fixed railway installations



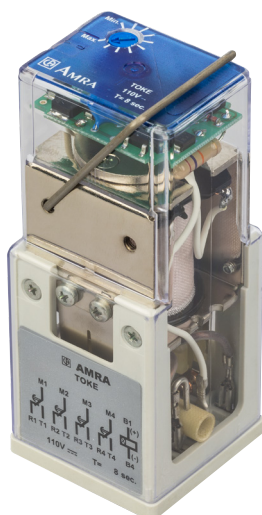
Shipbuilding



Petroleum industry



Heavy industry



TOK

PRODUCT ADVANTAGES

- TOK: Relay with time delay on pick-up or on drop-out
- Wide range of time settings available
- Solid and rugged construction for heavy or intensive duty
- Very long electrical life expectancy and exceptional endurance
- Independent and self-cleaning contacts with high breaking capacity
- Patent operating mechanism, designed to ensure high contact pressure
- Magnetic arc blow-out for higher breaking capacity
- 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 **TOK series** are monostable types with time delay, using 4 CO contacts. Manufactured following the same basic electromechanical design of the OK Series, they embody all the features and benefits of this product. These models are suitable for use in the most demanding of sectors such as, for example, electricity generating stations, electrical transformer stations, industries using continuous production processes, and railways - fixed equipment and rolling stock alike. An ample clearance between open contact elements is instrumental in ensuring optimum performance when breaking high loads. The use of a **magnetic arc blow-out** helps to achieve a considerable increase in breaking capacity, even when handling **highly inductive loads**.

TOK Series

The TOKe and TOKr relays provide time delays on **pick-up and drop-out respectively**, using 4 CO contacts. Intended originally for use in nuclear power plants, these relays are designed to guarantee particularly **high reliability and superior strength**. The time interval is adjusted by way of a potentiometer with a flat-head slotted screw, accessed from the top of the cover. A LED indicates energized status of the coil.

For further details of electromechanical construction, see chapter 1.2 "OK series".



Models	Function		Number of contacts	Magnetic arc blow-out	Adjustable	Fixed time delay, capacitor controlled	Rolling stock application
	Pick-up	Drop-out			Time delay		
TOKe	•		4	•	•		•
TOKr		•	4	•	•		•



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



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

(1) Other values on request.

(2) See "Ordering scheme" table for order code.

(3) Limit value for supply voltage, expressed as % of the nominal value, beneath which the relay is certainly de-energized.



Contact specifications		TOKe - TOKr
Number and type		4 CO, form C
Current	Nominal ⁽¹⁾	10 A
	Maximum pulse (1 s) ⁽²⁾	20 A
	Maximum pulse (10 ms) ⁽²⁾	150 A
Example of electrical life expectancy ⁽³⁾		0,7 A – 132 Vdc – L/R = 40 ms: 10 ⁵ operations
Minimum load	Standard contacts	500 mW (20 V, 20 mA)
	Gold-plated contacts P4GEO ⁽⁴⁾	100 mW (10 V, 5 mA)
	Maximum breaking voltage	350 Vdc / 440 Vac
	Contact material	AgCu
Operating time at Un (ms) ⁽⁵⁾		
	Pick-up (NO contact closing)	≤ 38
	Drop-out (NC contact closing)	DC: ≤ 8 AC: ≤ 80

(1) Nominal current: on all contacts simultaneously.

(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 gold-plated 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.

(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) e(t) = DC < 15% / AC < 20% of selected time delay.



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	20x10 ⁶ operations
Maximum switching rate	Mechanical	3,600 operations/hour
	Degree of protection (with relay mounted)	IP20
	Dimensions (mm)	45x45x109 ⁽¹⁾
	Weight (g)	~ 330

(1) Excluding output terminals



Environmental specifications

Operating temperature	Rolling stock version	-10 to + 55 °C
		-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 60 Hz - 1 min.
Resistance to shock		30g - 11ms
Fire behavior		V0



Standards and reference values

EN 61810-1, EN 61810-2, EN 61810-7	Electromechanical elementary relays Timer relays Fire behavior Electromagnetic compatibility Degree of protection provided by enclosures
EN 61812-1	
EN 60695-2-10	
EN 61000	
EN 60529	

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 $\pm 7\%$.



Railways, rolling stock - Standards

EN 60077	Electric equipment for rolling stock - General service conditions and general rules Electronic equipment used on rolling stock Shock and vibration tests, Cat 1, Class B Fire behavior, Cat E10, Requirement R26, V0 Fire behavior
EN 50155	
EN 61373	
EN 45545-2	
ASTM E162, E662	



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 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 $\geq 6\mu$. 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.



TOKx Ordering scheme

Product code	Application ⁽¹⁾	Configuration A	Configuration B	Label	Type of power supply	Nominal voltage (V) ⁽²⁾	Full scale time	Keying position ⁽³⁾
TOKe TOKr	E: Energy Railway Fixed Equipment R: Railway Rolling Stock	4: Led (as standard)	0: Standard 2: P2 4: P4 GEO 5: P5 GEO 6: P6 GEO	F	C: Vdc ⁽⁴⁾ A: Vac 50 Hz H: Vac 60 Hz	024 - 036 - 048 072 - 110 - 125 132 - 144 - 220 230	01S: 1 s 02S: 2 s 04S: 4 s 08S: 8 s 16S: 16 s 32S: 32 s 01M: 1 min 02M: 2 min 04M: 4 min 08M: 8 min 16M: 16 min 32M: 32 min 64M: 64 min	XXX

Example

TOKe	E	4	0	F	C	110	04S	
TOKeE40F-C110-04S - TOKe relay, ENERGY series, 110Vdc coil, full scale 4 seconds								
TOKr	R	4	4	F	C	024	08M	
TOKrR44F-C024-08M - TOKr relay, ROLLING STOCK series, 24Vdc coil, full scale 8 minutes, with P4GEO finish (gold-plated contacts)								

(1) **E = ENERGY:** all applications, except for railways rolling stock.

Suitable on energy production, transport and distribution plants, railways fixed equipment, petrochemical and heavy industry.

R = RAILWAYS, ROLLING STOCK: Application on board rolling stock (rail-tram-trolley vehicles). Electrical characteristics according to EN60077.

Available 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.

MONOSTABLE
INSTANTANEOUS

INSTANTANEOUS
MONOSTABLE WITH
FORCIBLY GUIDED
CONTACTS

BISTABLE

FAST-ACTING
MONOSTABLE
(AND BISTABLE)

TIME DELAY
(ON PICKUP
OR DROP-OUT)

TIME DELAY WITH
FORCIBLY GUIDED
CONTACTS

MEASUREMENT

SOCKET
NUMBERING
EXPLANATIONS

FRONT
CONNECTION

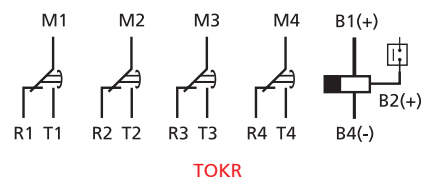
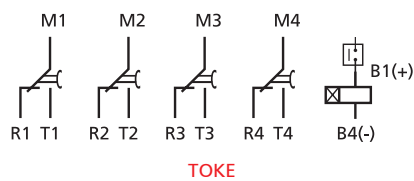
BACK
CONNECTION

PCB MOUNT

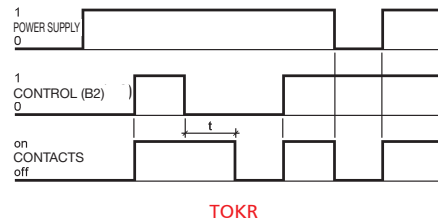
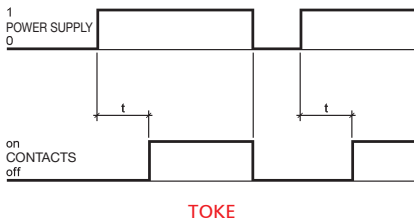
RETAINING CLIPS

KEYING

Wiring diagram



Functional diagram

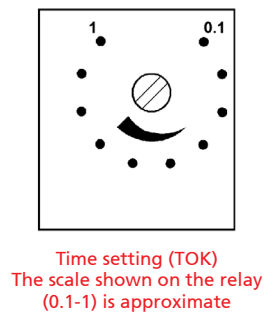
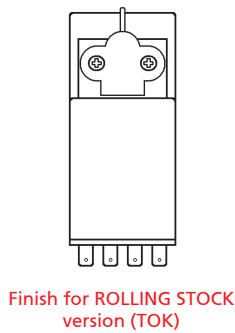
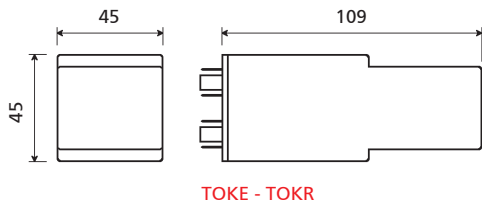


e(t): DC<15% / AC < 20% of time t.

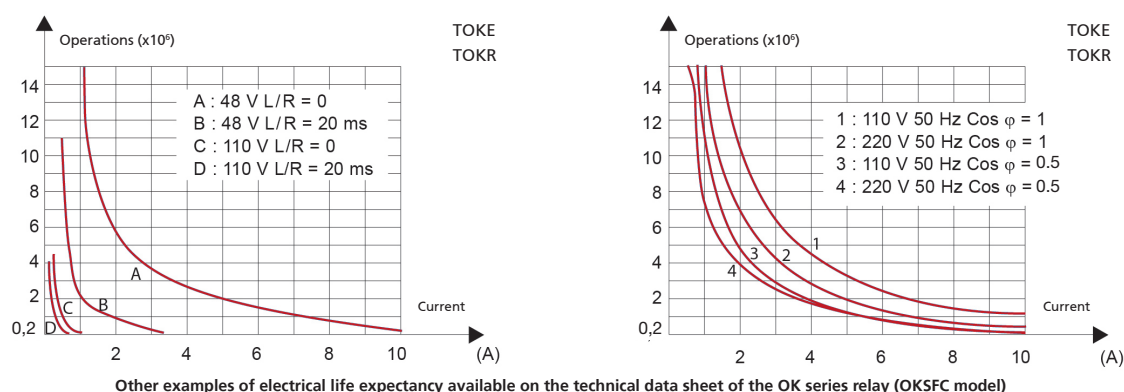
⌚ Time delay – Switching time setting	TOKe - TOKr
Time setting	By way of potentiometer, with slotted head screw
Full scale times available	1-2-4-8-16-32 seconds, 1-2-4-8-16-32-64 minutes
Time setting range	10...100 % of full scale
Accuracy, setting (0.8...1.1 Un, t=20°C)	± 5% of time delay
Accuracy, repeatability	DC: ± 0.5% / AC: ± 0.5% + 20ms
Reset	< 100ms - in time-delay phase < 1s

(1) The time varies by the same percentage as the input voltage fluctuation, within limits of ± 10%.

Dimensions



Electrical life expectancy



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	RL48
Screw, wall or DIN H35 rail mounting	48BIP20-I DIN	RL48
Screw, wall mounting	48BL	RL48
Double faston, wall mounting	48L	RL48
For flush mounting		
Double faston (4.8 x 0.8 mm)	ADF2	RL48
Screw	43IL ⁽¹⁾	RL43
For mounting on PCB	65	RL43

(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 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.