

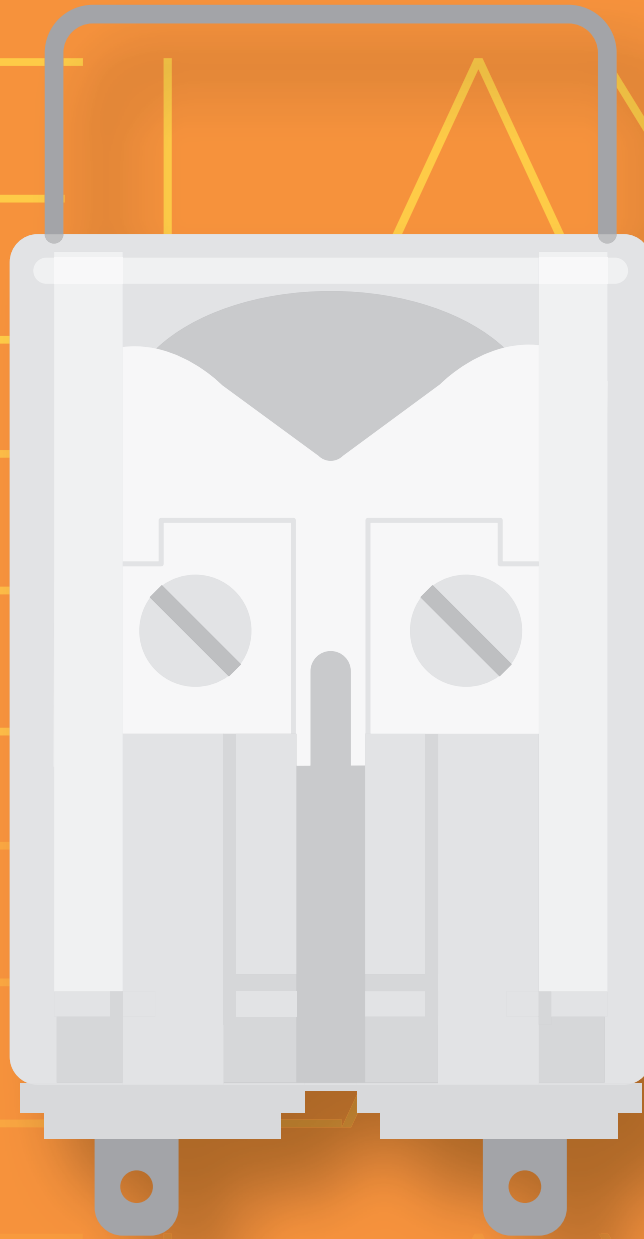
RELAYS

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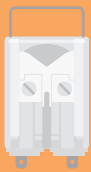
RELAYS

RELAYS

RELAYS



TIME DELAY RELAYS (ON PICK-UP OR DROP-OUT), LOGIC FUNCTION



RELAYS

MULTIFUNCTION MULTISCALE TIMER DELAY WITH 4 CONTACTS

TMM SERIES

USER SECTORS



Power generation



Nuclear



Power transmission



Rolling stock



Fixed railway installations



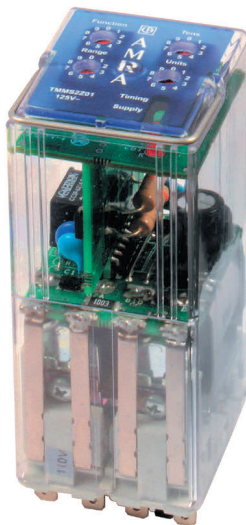
Shipbuilding



Petroleum industry



Heavy industry



TMM

PRODUCT ADVANTAGES

- Plug-in relay with time delay, multifunction
- Ten different time delay functions
- Four time delay contacts or two time delay contacts + two instantaneous contacts
- Wide time setting range from 0.1 seconds to 99 hours, extreme accuracy across the adjustment range
- High electromagnetic interference immunity
- Solid and rugged construction for heavy or intensive duty
- Long life expectancy
- Independent and self-cleaning contacts
- Magnetic arc blow-out standard
- Separate arc breaking chambers
- Excellent shock and vibration resistance
- Wide range of sockets
- Wide variety of configurations and customizations
- Retaining clip for secure locking of relay on socket
- Transparent cover, pull-out handle
- Positive mechanical keying for relay and socket

DESCRIPTION

The **TMM series** is a range of multifunction relays with electronic time delay, consisting of two models with four change-over contacts, rated 10 A (nominal). They are obtained by assembling the electromechanical units of the POKS series with a digital electronic circuit. The electromechanical part features the **reliability and ruggedness of relays belonging to the POKS series**, while the electronics offers high reliability thanks to the use of a circuit requiring few components and to the careful choice of professional products.

A single TMM series relay offers **ten different timer functions, freely programmable** by the user; these include, by way of example, time delay on pick-up or on drop-out, flasher, one-shot, etc.

The switching time can be selected within a wide range extending from 0.1 seconds to 99 hours, with **extreme accuracy** guaranteed across the full scale of adjustment. This is made possible by providing the relay with **ten intermediate scales**.

The timer function, the scale and the switching time are adjustable by means of four rotary switches, each having ten positions, located on the front of the relay.

The electronic circuit is immune to high electromagnetic interference, typical of high voltage electricity distribution stations. 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.

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

Models	Nominal current	Number of contacts		Rolling stock application
		Time-delayed	Instantaneous	
TMM2	10 A	2	2	•
TMM4	10 A	4	-	•

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

Coil specifications

Nominal voltages U_n ⁽¹⁾	DC: 12-24-36-48-72-110-125-132-144-220 AC: 12-24-48-110-127-220-230
Maximum consumption at U_n (DC/AC)	TMM2: 5.5 W / 7.5 VA TMM4: 4.5 W / 6.5 VA
Operating range ⁽¹⁾	80 - 115 % U_n
Rolling stock version ^{(2) (3)}	DC: 70 - 125 % U_n
Type of duty	Continuous
Drop-out voltage ⁽⁴⁾	> 15 % U_n

⁽¹⁾ Other values on request.

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

⁽³⁾ For operating ranges different to that specified by EN 60077, refer to table "Special operating ranges" on page 65.

⁽⁴⁾ Limit value for supply voltage, expressed as % of the nominal value, beneath which the relay is certainly de-energized.

Contact specifications	TMM2	TMM4
Number and type	2 timed + 2 instantaneous CO, form C	4 timed, CO, form C
Current	10 A	
Nominal ⁽¹⁾	10 A	
Maximum peak (1 s) ⁽²⁾	20 A (1 min) / 40 A (500 ms)	
Maximum pulse (10 ms) ⁽²⁾	150 A	
Example of electrical life expectancy ⁽³⁾	0.7 A – 132 V _{DC} – L/R 40 ms: 10 ⁵ operations	
1,800 operations / hour	1 A – 110 V _{DC} – L/R 0 ms: 10 ⁵ operations	
Making capacity	30 A (for 200 ms) – 110 V _{DC} – L/R 0 ms: 2,000 operations	
Minimum load	500 mW (20 V, 20 mA)	
Standard contacts	100 mW (10 V, 5 mA)	
Gold-plated contact P4GEO ⁽⁴⁾	50 mW (5 V, 5 mA)	
Gold-plated contact P8 ⁽⁴⁾	250 V _{DC} / 350 V _{AC}	
Maximum breaking voltage	AgCu	
Contact material	DC ⁽⁷⁾ – AC	
Operating time at U_n (ms) ^{(5) (6)}	≤ 20 - ≤ 20	
Pick-up (NO contact closing)	≤ 15 - ≤ 20	
Drop-out (NC contact closing)		

⁽¹⁾ On all contacts simultaneously, reduction of 30 %.

⁽²⁾ The maximum 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 (>6 μ)** **P8: gold-cobalt alloy (>5 μ), knurled contact**

b. When the gold-plated contact is subject to heavy loads, it will be degraded on the surface. In such case, the specifications of the standard contact should be taken into consideration. This does not impair relay operation.

⁽⁵⁾ Times for the instantaneous component of the relay (TMM2 model).

⁽⁶⁾ Unless specified otherwise, the operating time signifies until stabilization of the contact (including bounces). They should be added to the preset delay time.

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



Mechanical specifications

Mechanical life expectancy	10 x 10 ⁶ operations
Maximum switching rate Mechanical	3,600 operations / hour
Degree of protection (with relay mounted)	IP40
Dimensions (mm) ⁽¹⁾ Weight (g)	40 x 50 x 97 ~ 220

⁽¹⁾ Excluding output terminals



Environmental specifications

Operating temperature Standard Version for railways, rolling stock	(-13 to 131) °F (-25 to 55) °C (-13 to 158) °F (-25 to 70) °C
Storage and shipping temperature	(-40 to 158) °F (-40 to 70) °C
Relative humidity	Standard: 75 % RH, Tropicalized: 95 % RH
Resistance to vibrations	5 g - 10 to 55 Hz - 1 min
Resistance to shock	20 g - 11 ms
Fire behavior	V0



Standards and reference values

EN 61810-1, EN 61810-2, EN 61810-7 EN 61812-1 EN 60695-2-10 EN 61000 EN 60529	Electromechanical elementary relays Timer relays Fire behavior Electromagnetic compatibility Degree of protection provided by enclosures
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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 96 kPa and 50 % humidity. Tolerance for coil resistance, nominal electrical input and nominal power is ± 7 %.



Railways, rolling stock - Standards

EN 60077 EN 50155 EN 61373 EN 45545-2 ASTM E162, E662	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
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Railways, rolling stock - Special operating ranges ⁽¹⁾

Nominal voltage	Minimum pick-up voltage	Maximum operating voltage	Order symbol ⁽¹⁾
24 V _{DC}	16.8	32	Z01
72 V _{DC}	55	104	Z01
110 V _{DC}	77	144	Z01

⁽¹⁾ To request the special range, indicate the “Z0x” symbol in the “Keying position” field in the “Ordering scheme” table. The special range may be subject to operating specifications different from standard specifications. Please contact us for further information.



Configuration options

P2	Tropicalization of coil with epoxy resin for exposure to 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 acidic or saline atmospheres.
P4GEO	Gold plating of contacts with gold-nickel alloy, thickness ≥ 6 μ. 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 ≥ 5 μ, knurled fixed contact. This finish allows further improvement of the performance provided by gold-plated contact, compared to P4GEO treatment.
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⁾	Keying position ⁽³⁾
TMM2 TMM4	E: Energy Railway Fixed Equipment R: Railway Rolling Stock	1: Standard 2: Diode // 3: Varistor 7: Transil	0: Standard 2: P2 4: P4 GEO 5: P5 GEO 6: P6 GEO 7: P7 8: P8	F	C: V _{DC} A: V _{AC} 50 Hz	012 - 024 - 036 048 - 072 - 100 110 - 125 - 127 132 - 144 - 220 230	XXX

Example

TMM2	E	1	8	F	C	024	
TMM2E18F-C024 - TMM2 relay, ENERGY series, nominal voltage 24 V _{DC} , with P8 finish (gold-plated contacts)							
TMM4	R	1	0	F	C	110	
TMM4R10F-C110 - TMM4 relay, ROLLING STOCK series, nominal voltage 110 V _{DC}							

⁽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 specifications according to EN 60077.

Other product series available:

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”.

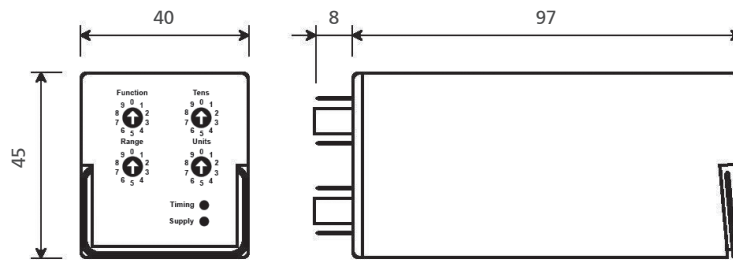
STATIONS: ENEL approved material meeting LV15/LV16 specifications. For the list of ENEL approved and conforming products, consult the dedicated catalog “STATIONS SERIES – LV15-LV16-LV20”.

⁽²⁾ Other values on request.

⁽³⁾ Optional value. The positive mechanical keying is applied according to the manufacturer’s model.

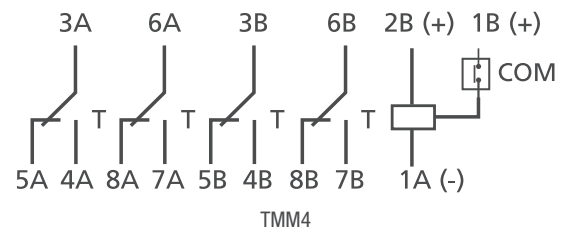
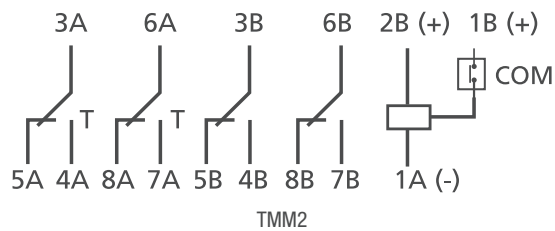
⁽⁴⁾ Rolling Stock version, V_{DC} only available.

Dimensions and indicators



Timing = Green LED: time delay activated
Supply = Red LED: auxiliary power on

Wiring diagram



- T= time delay contacts
- Terminals 2B and 1A are allocated to the auxiliary power supply.
- Terminal 1B is allocated to CONTROL. The negative of the control circuit is common with that of the auxiliary power supply.
- Certain functions require an auxiliary power supply to guarantee operation of the time delay (terminal 2B).

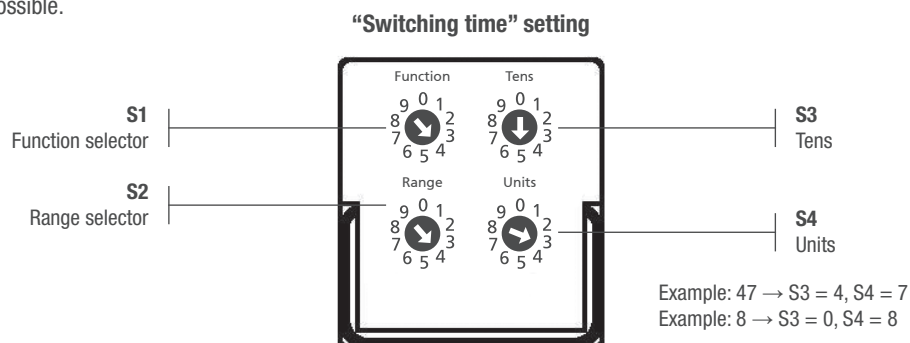
Time delay – Switching time setting

Controls setting function, range and time	4 rotary switches with 10 positions (0 - 9)
Time setting range	100 ms...99 h
Intermediate scales	10, from 9.9 seconds to 99 hours
Resolution of switching time setting	1 % of intermediate scale
Accuracy, time delay (0.8...1.1 U _n , t=20 °C)	DC: ± 1 % of selected time or ± 10 ms ⁽¹⁾ AC: ± 1 % of selected time; 0.1 s - 10 s: ± 2 % ± 20 ms
Accuracy, repeatability	DC: ± 0.5 % AC: ± 0.5 % + 20 ms
Reset	< 200 ms during time delay interval < 400 ms
“COM” control signal	> 10 ms

⁽¹⁾ Whichever of the two values is higher.

The function and switching time are adjustable by means of four rotary-switch selectors located on the front of the relay, each having ten positions, with which the user can select time delay settings between 100 ms and 99 hours.

The position of the arrow point on each rotary switch indicates the number selected. Adjustments are made by discrete steps, which means that no intermediate settings are possible.



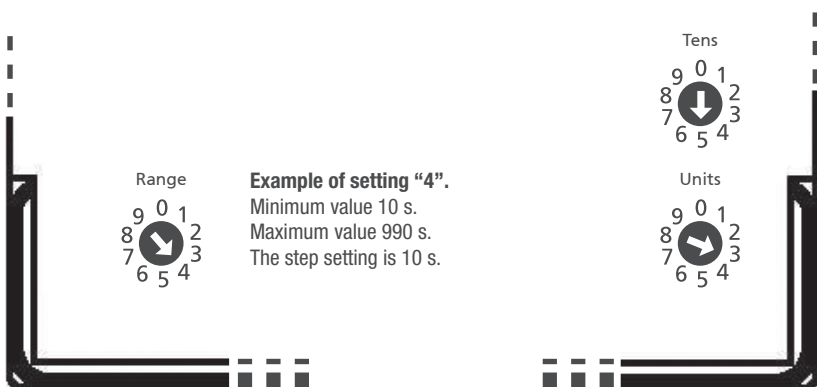
Adjustment of switching time (except for function F6)

To adjust the switching time, the first step is to adjust the intermediate scale T(s), by selecting one of the 10 available scales using the S2 rotary switch. The values available are given in Table 1.

Scale	Minimum value	Maximum value	Step
0	0.1 s	9.9 s	100 ms
1	1 s	99 s	1 s
2	3 s	297 s	3 s
3	5 s	495 s	5 s
4	10 s	990 s	10 s
5	1 min	99 min	1 min
6	3 min	297 min	3 min
7	5 min	495 min	5 min
8	10 min	990 min	10 min
9	1 h	99 h	1 h

Table 1 – Available scales

Next, the switching time is adjusted by means of rotary-switch selectors S3 and S4. The combination of these two 10-position controls, located on the right, allows the selection of a number between 1 and 99. The number selected with the “Tens” arrow combined with the number selected with the “Units” arrow represents the multiplier of the step selected via the “Range” control. The resulting value gives the time used by the relay in operation.



Example of setting “4”.
Minimum value 10 s.
Maximum value 990 s.
The step setting is 10 s.

Example of setting “53”.

The scale selected previously is number 4, which has an adjustment step of 10 s. The time used by the relay in operation will be: $53 \times 10 \text{ s} = 530 \text{ seconds}$.



Setting's changes have to be operate with relays switched off. Setting's changes with energized relay have no effect.

Adjustment of switching time for function F5 – Asymmetric flash

Function F5 pilots an asymmetric flash. The “ON” time and the “OFF” time are adjustable independently

“ON” time (t) → selector S4

“OFF” time (T) → selector S3

In this instance, selector S3 and selector S4 are both calibrated in UNITS. Position “0” assumes the value of 10 integers.

Once the scale has been set by means of selector S2, selectors S3 and S4 are used to set the number that will provide the multiplier for the step of the selected scale.

Example: S2 = 1 → unit of time: seconds

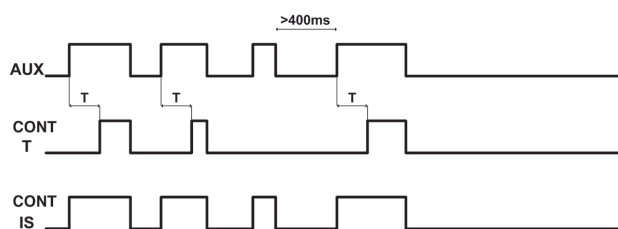
S4 = 3 → t = 3 seconds

S3 = 0 → T = 10 seconds

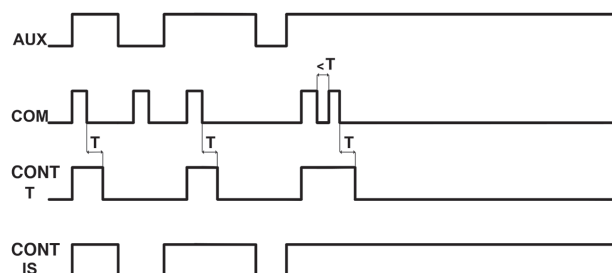
SELECTING THE FUNCTION

The function is selected by positioning the arrow of selector S1 so that the point is aligned with the number of the required function.

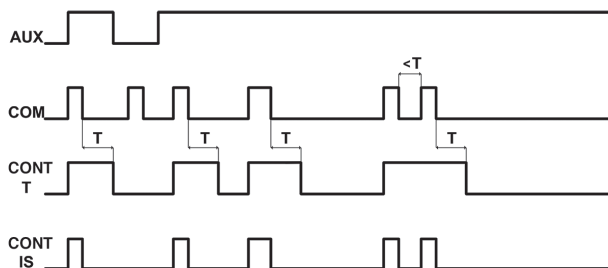
Function	Description
F0	Time delay on pick-up.
F1	Time delay on drop-out. Instantaneous contacts follow the status of the auxiliary power supply.
F2	Time delay on drop-out, instantaneous contacts on "CONTROL". Instantaneous contacts follow the status of the control signal.
F3	One-shot function.
F4	Flasher, symmetrical. The "ON" time and the "OFF" time are the same.
F5	Flasher, asymmetrical. The "ON" time and the "OFF" time are different, and adjustable independently.
F6	One-shot function on "CONTROL". The timing cycle starts on activation of the control signal.
F7	One-shot function with fixed pulse (3 s), delayed at pick-up. Pulse delay adjustable.
F8	One-shot function, on "CONTROL", with fixed pulse (3 s), delayed at pick-up. The timing cycle starts on activation of the control signal. Pulse delay adjustable.
F9	Step function.



F0 – Time delay on pick-up.

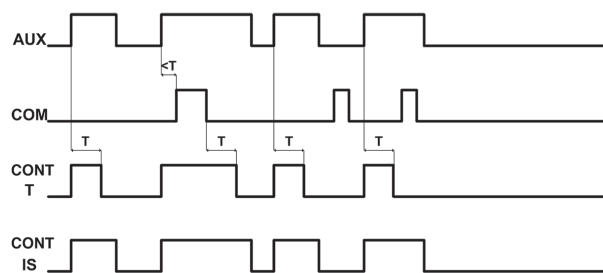


F1 – Time delay on drop-out, instantaneous contacts follow the status of the auxiliary power supply.
The instantaneous contacts follow the status of the auxiliary power supply (2B terminal).



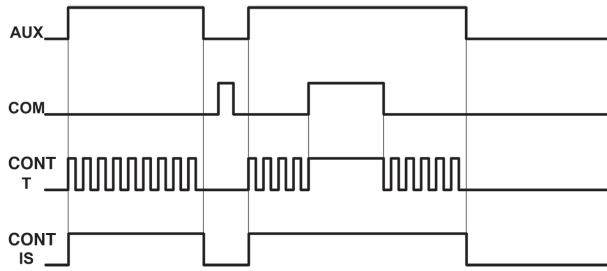
F2– Time delay on drop-out.

The instantaneous contacts follow the status of the control signal ("COM", 1B terminal).



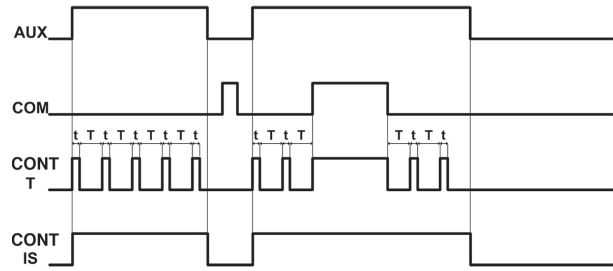
F3 – One-shot function.

The control signal ("COM", 1B terminal) resets the time "t", on drop-out.



F4 – Flasher, symmetrical.

The control signal ("COM", 1B terminal) stops the flash.



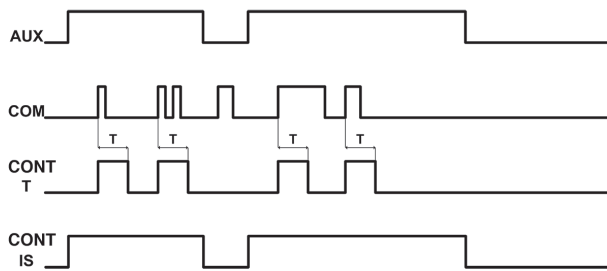
F5 – Flasher, asymmetrical.

The control signal ("COM", 1B terminal) stops the flash t and T are adjustable using the same unit of time.

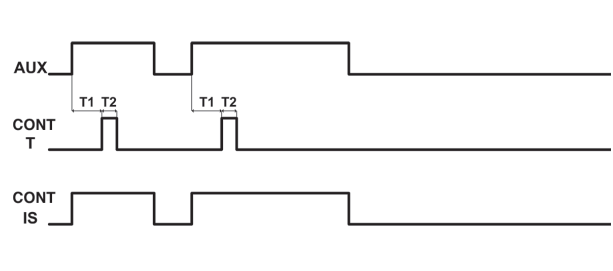
Example: $S2 = 1\Phi$ unit of time: seconds

$S4 = 3\Phi t = 3$ seconds

$S3 = 0\Phi T = 10$ seconds



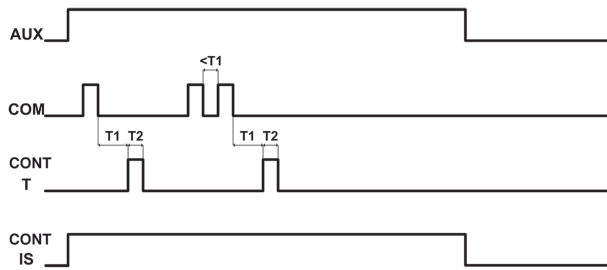
F6– One-shot function on "CONTROL" (COM).



F7 – One-shot function with fixed pulse (3s), delayed at pick-up.

T1: adjustable by way of selector S3 / S4

T2: fixed, 3 seconds



F8 – One-shot function, on "CONTROL", with fixed pulse (3s), delayed at pick-up.

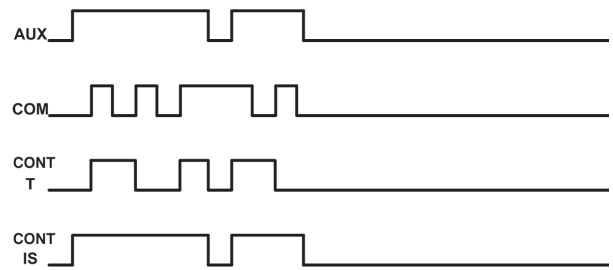
T1: adjustable by way of selector S3 / S4

T2: fixed, 3 seconds

Control signal ("COM", 1B terminal) starts time delay T1

Control signal ("COM", 1B terminal) restarts the time,

if this appears during the time delay.



F9 - Step function

The S3 and S4 switches have no effect on the relay operation.

Applicable note for all operating diagrams:

AUX: 2B - 1A terminals

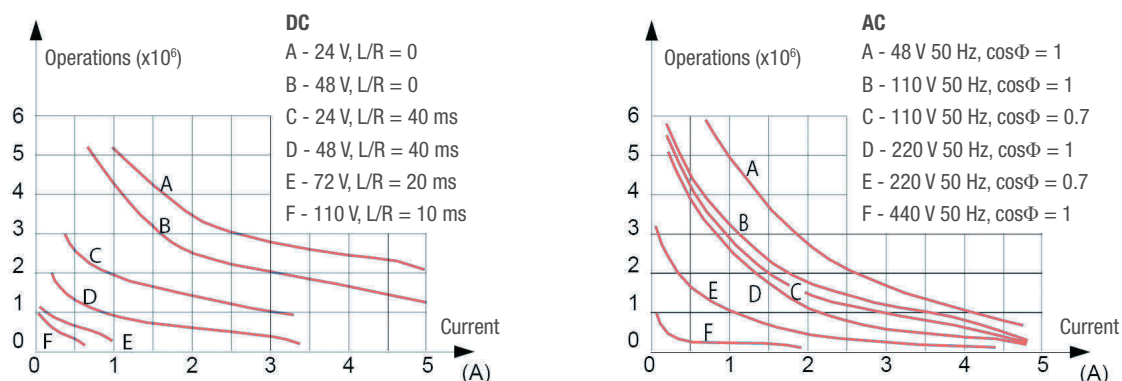
COM: 1B terminal

CONT T: timed contacts

CONT I: instantaneous contacts

See "Wiring diagram" on page 66 to identify the instantaneous and timed contacts terminals.

Electrical life expectancy ⁽¹⁾



Examples of electrical life expectancy:

12 V_{DC} - 10 A - Resistive: 10⁵ operations
 48 V_{DC} - 5 A - L/R 10 ms: 5 × 10⁵ operations
 80 V_{DC} - 5 A - Resistive: 5 × 10⁵ operations
 110 V_{DC} - 0.5 A - L/R 10 ms: 5 × 10⁵ operations
 110 V_{DC} - 1 A - L/R 0 ms: 10⁵ operations

132 V_{DC} - 0.7 A - 132 V_{DC} - L/R 40 ms: 10⁵ operations
 220 V_{DC} - 0.2 A - L/R 10 ms: 10⁵ operations
 110 V_{AC} - 5 A - $\cos\Phi$ 0.7: 5 × 10⁵ operations
 220 V_{AC} - 3 A - $\cos\Phi$ 0.7: 5 × 10⁵ operations
 440 V_{AC} - 0.2 A - Resistive: 5 × 10⁵ operations

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

Sockets and retaining clips

Number of terminals (standard dimensions 5 x 0.8 mm)	16	Retaining clip
For wall or rail mounting		
Spring clamp, wall or DIN H35 rail mounting	PAIR160	RT48
Screw, wall or DIN H35 rail mounting	48BIP20-I DIN	RT48
Screw, wall mounting	48BL	RT48
For flush mounting		
Spring clamp	PRIR160	RT48
Double faston (4.8 × 0.8 mm)	ADF2	RL48
Screw	43IL ⁽¹⁾	RT43
For mounting on PCB		
	65	RT43

⁽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.



RELAYS

MULTISCALE MONOSTABLE TIMER RELAYS WITH 4 CONTACTS

TM SERIES

USER SECTORS



Power generation



Nuclear



Power transmission



Rolling stock



Fixed railway installations



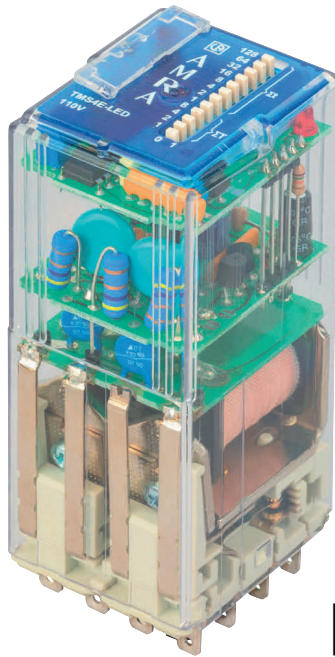
Shipbuilding



Petroleum industry



Heavy industry



TM

EAC

PRODUCT ADVANTAGES

- Plug-in relay with time delay on pick-up or on drop-out
- 4 time delay contacts or 2 time delay contacts + 2 instantaneous contacts
- Wide time setting range from 0.1 s to 9 hours, great accuracy over the entire adjustment range
- High electromagnetic interference immunity
- Solid and rugged construction for heavy or intensive duty
- Long life expectancy
- Independent and self-cleaning contacts
- Magnetic arc blow-out standard
- Separate arc breaking chambers
- 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

DESCRIPTION

The **TM series** is a range of relays with electronic time delay on pick-up or drop-out, consisting of eight models with 4 change-over contacts, from 5 to 10 A (nominal). They are obtained by assembling the electromechanical units of the POK or BIPOK series with a digital electronic circuit. The electromechanical part features the **reliability and ruggedness** of relays belonging to the POK series, while the electronics offers high reliability thanks to the use of an electronic circuit requiring few components and to the careful choice of professional products.

With the same product it is possible to obtain switching **times ranging from 0.1 second to over 9 hours**, with the greatest of accuracy over the entire setting range. This is thanks to the fact that the relay has 16 intermediate scales, freely selectable by the user.

Switching time is adjustable by means of two DIP switches, 4- and 8-bit respectively, located on the front of the relay. The 4-bit DIP switch serves for selecting the most suitable intermediate scale, while the 8-bit DIP switch is used for precision selection of the switching time.

On request, the models are available with fixed switching time to avoid modifications to the time setting.

The electronic circuit is immune to high electromagnetic interference, typical of high voltage electricity distribution stations.

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.

Excellent electrical and mechanical performance levels allow the product to be used in the most demanding of sectors such as, for example, control and signaling 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.). 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 signaling functions, for controlling intermediate devices and for all non-power circuits.

Above all, the excellent ability to withstand shock and vibration allow their use on rolling stock.

Models	Function		Nominal current		Number of contacts		Rolling stock application
	Pick-up	Drop-out	5 A	10 A	Time-delayed	Instantaneous	
TM2E	•		•		2	2	•
TM4E	•		•		4	-	•
TMS2E	•			•	2	2	•
TMS4E	•			•	4	-	•
TM2R		•	•		2	2	•
TM4R		•	•		4	-	•
TMS2R		•		•	2	2	•
TMS4R		•		•	4	-	•

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

Coil specifications	
Nominal voltages U_n ⁽¹⁾	DC: 12-24-36-48-72-96-110-125-132-144-220 AC: 12-24-48-110-127-220-230
Maximum consumption at U_n (DC/AC)	4 W / 5 VA
Operating range ⁽¹⁾	80 - 115 % U_n
Rolling stock version ^{(2) (3)}	DC: 70 - 125 % U_n
Type of duty	Continuous
Drop-out voltage ⁽⁴⁾	DC: > 5 % U_n AC: > 15 % U_n

⁽¹⁾ Other values on request.

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

⁽³⁾ For operating ranges different to that specified by EN 60077, refer to table "Special operating ranges" on page 75.

⁽⁴⁾ Limit value for supply voltage, expressed as % of the nominal value, beneath which the relay is certainly de-energized.

Contact specifications		TM2E - TM2R	TM4E - TM4R	TMS2E - TMS2R	TMS4E - TMS4R
Number and type		2 + 2 instantaneous CO, form C	4 CO, form C	2 + 2 instantaneous CO, form C	4 CO, form C
Current	Nominal ⁽¹⁾	5 A		10 A	
	Maximum peak (1 s) ⁽²⁾	10 A		20 A	
	Maximum pulse (10 ms) ⁽²⁾	100 A		150 A	
Example of electrical life expectancy ⁽³⁾	1,800 operations / hour	0.2 A – 110 V _{DC} – L/R = 40 ms: 10 ⁵ operations		0.5 A – 110 V _{DC} – L/R = 40 ms: 10 ⁵ operations	
		0.7 A – 110 V _{DC} – L/R = 0 ms: 10 ⁵ operations		1 A – 110 V _{DC} – L/R = 0 ms: 10 ⁵ operations	
Minimum load	Standard contacts	500 mW (20 V, 20 mA)			
	Gold-plated contact P4GEO ⁽⁴⁾	100 mW (10 V, 5 mA)			
	Gold-plated contact P8 ⁽⁴⁾	50 mW (5 V, 5 mA)			
Maximum breaking voltage		250 V _{DC} / 350 V _{DC}			
Contact material		AgCu		Ag / AgCu	
Operating time at U_n (ms) ^{(5) (6)}		DC ⁽⁷⁾ – AC			
Pick-up (NO contact closing)		≤ 20 - ≤ 20			
Drop-out (NC contact closing)		≤ 15 - ≤ 20			

⁽¹⁾ On all contacts simultaneously, reduction of 30 %.

⁽²⁾ The maximum 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 (>6 μ)** **P8: gold-cobalt alloy (>5 μ), knurled contact**

b. When the gold-plated contact is subject to heavy loads, it will be degraded on the surface. In such case, the specifications of the standard contact should be taken into consideration. This does not impair relay operation.

⁽⁵⁾ Times for the instantaneous component of the relay.

⁽⁶⁾ Unless specified otherwise, the operating time signifies until stabilization of the contact (including bounces). They should be added to the preset delay time.

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



Mechanical specifications

Mechanical life expectancy	DC: 20 x 10 ⁶ AC: 10 x 10 ⁶ operations
Maximum switching rate	3,600 operations / hour
Degree of protection (with relay mounted)	IP40
Dimensions (mm) ⁽¹⁾	40 x 50 x 97
Weight (g)	~ 220

⁽¹⁾ Excluding output terminals



Environmental specifications

Operating temperature	Standard (-13 to 131) °F (-25 to 55) °C Version for railways, rolling stock (-13 to 158) °F (-25 to 70) °C
Storage and shipping temperature	(-40 to 185) °F (-40 to 85) °C
Relative humidity	Standard: 75 % RH, Tropicalized: 95 % RH
Resistance to vibrations	5 g - 10 to 55 Hz - 1 min
Resistance to shock	20 g - 11 ms
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 96 kPa 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
CU TR 001/2011	Safety of railway rolling stock - EAC certification



Railways, rolling stock - Special operating ranges ⁽¹⁾

Nominal voltage	Minimum pick-up voltage	Maximum operating voltage	Order symbol ⁽¹⁾
24 V _{DC}	18	33	Z01
24 V _{DC}	16	32	Z02
24 V _{DC}	16.8	32	Z03
72 V _{DC}	55	104	Z01
110 V _{DC}	77	144	Z01

⁽¹⁾ To request the special range, indicate the “Z0x” symbol in the “Keying position” field in the “Ordering scheme” table. The special range may be subject to operating specifications different from standard specifications. Please contact us for further information.



Configuration options

P2	Tropicalization of coil with epoxy resin for exposure to 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 acidic or saline atmospheres.
P4GEO	Gold plating of contacts with gold-nickel alloy, thickness ≥ 6 μ. 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 ≥ 5 μ, 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.
TRANSIL	Non-polarized component connected in parallel with the coil. Behavior 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”).



Ordering scheme

Product code	Application ⁽¹⁾	Configuration A	Configuration B	Label	Type of power supply	Nominal voltage (V) ⁽²⁾	Keying position ⁽³⁾
TM2E TM4E TMS2E TMS4E TM2R TM4R TMS2R TMS4R	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	C: V _{DC} A: V _{AC} 50 Hz H: V _{AC} 60 Hz	012 - 024 - 036 048 - 072 - 096 100 - 110 - 125 127 - 132 - 144 220 - 230	XXX L= Low temperature

Example	TMS2R	E	4	2	F	A	230	
	TMS2RE42F-A230 - TMS2R relay, ENERGY series, nominal voltage 230 V _{AC} , provided with LED, with P2 finish (tropicalized coil)							
	TM4R	4	1	8	F	C	024	L
TM4RR18F-C024 - TM4R relay, ROLLING STOCK series, nominal voltage 24 V _{DC} , with P8 finish (gold-plated contacts) and option “L” (low temp.)								

⁽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 specifications according to EN 60077.

Other product series available:

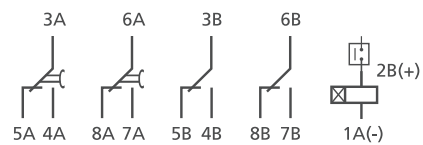
RAILWAYS, FIXED EQUIPMENT: Approved and conforming relays and products to RFI (FS Group) specification no. RFI DPRIM STF IFS TE 143 A. For the list of RFI approved and conforming products, consult dedicated catalog “RAILWAY SERIES – RFI APPROVED”.

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”.

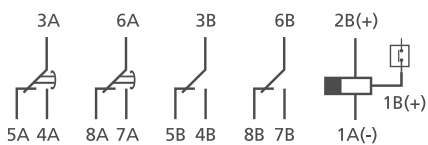
⁽²⁾ Other values on request.

⁽³⁾ Optional value. The positive mechanical keying is applied according to the manufacturer’s model.

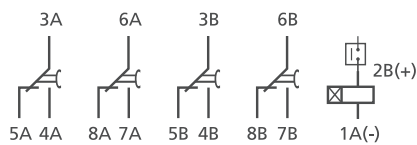
Wiring diagram



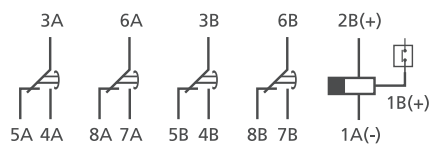
TM2E - TMS2E



TM2R - TMS2R



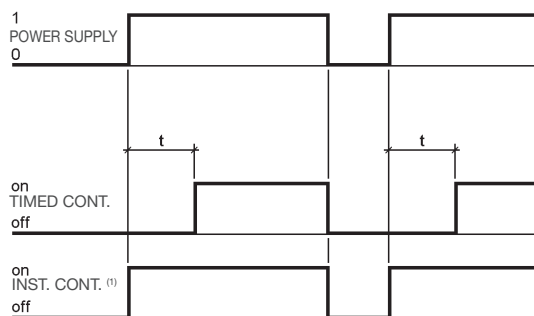
TM4E - TMS4E



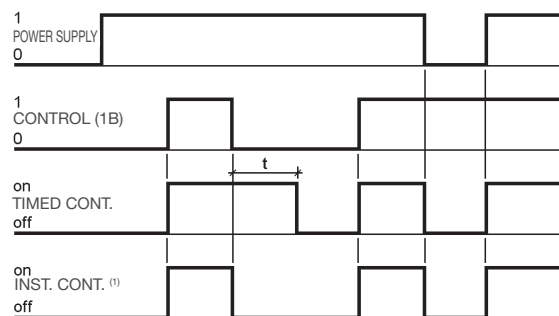
TM4R - TMS4R

Relays with time delay on drop-out require an auxiliary power supply to ensure correct timing (terminal 2B)

Functional diagram



Time-delay on pick-up (version 2E, 4E)



Time-delay on drop-out (version 2R, 4R)

⁽¹⁾ Instantaneous contacts are present only on versions "2E" and "2R"



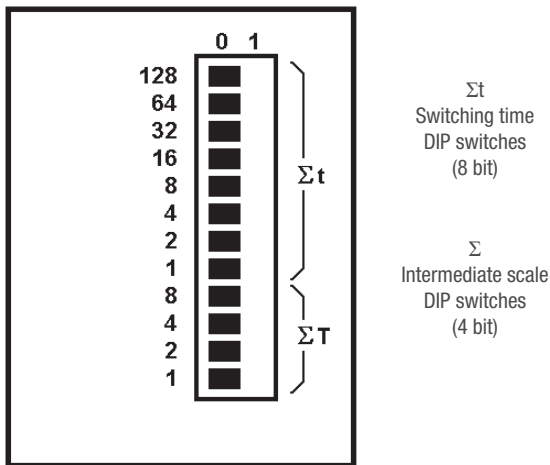
Time delay – Switching time setting

Time setting	By way of DIP switches
Time setting range	100 ms - 32,768 s
Intermediate scale	16, from 1 second to 32,768 seconds
Resolution of switching time setting	1/256 of the selected scale
Accuracy, time-delay ⁽¹⁾	± 1 % of the switching time, ± 0.5 % of the scale
Accuracy, repeatability	DC: ± 0.5 % AC: ± 0.5 % + 20 ms
Reset	< 100 ms in time-delay phase < 400 ms
Insensitivity to voltage drops	< 100 ms

⁽¹⁾ Additional error for drop-out versions: 100 ms

The switching time is adjustable via the DIP switches (4- and 8-bit respectively) located on the front of the relay, through which it is possible to obtain time delays from 100 ms to 32,768 seconds (about 9 hours). To adjust the switching time, the first step is to adjust the intermediate scale T(s), by selecting one of the 16 available scales using the 4-bit DIP switch. The values available are given in table 1. The value of the T(s) scale should be the next highest numerically than the value of the required switching time. E.g. Switching time: 3,600 seconds → intermediate scale to set: 4,096 seconds The T(s) scale is set by identifying the switches that add up to the ΣT value indicated in table 1, and positioning them at “1”.

Next, proceed to set the switching time by means of the 8-bit DIP switch.



T(s)	ΣT	Switch reference			
		8	4	2	1
		Switch position			
1	0	0	0	0	0
2	1	0	0	0	1
4	2	0	0	1	0
8	3	0	0	1	1
16	4	0	1	0	0
32	5	0	1	0	1
64	6	0	1	1	0
128	7	0	1	1	1
256	8	1	0	0	0
512	9	1	0	0	1
1,024	10	1	0	1	0
2,048	11	1	0	1	1
4,096	12	1	1	0	0
8,192	13	1	1	0	1
16,384	14	1	1	1	0
32,768	15	1	1	1	1

Table 1

The switching time is set by identifying the 16-bit DIP switches that add up to the ΣT value, as calculated below, and positioning them at “1”:

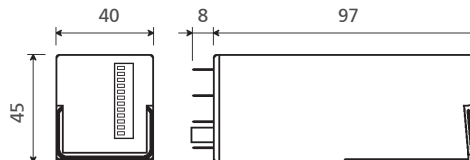
$$\Sigma t = \frac{t \times 256}{T}$$

where t(s): required switching time, and T(s): full scale time set previously

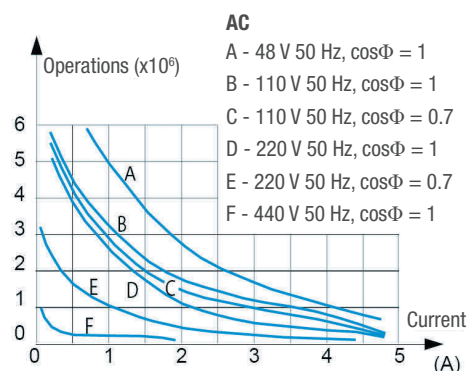
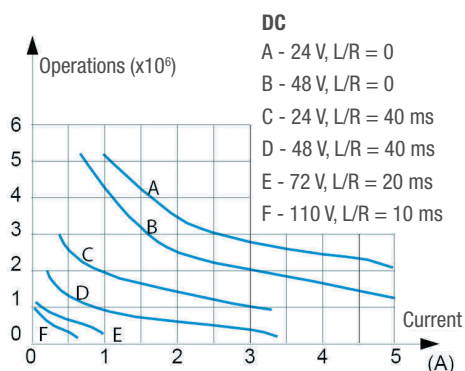
Example: Relay with time delay 22 s and full scale time 32 s.

For the full scale time of 32 s, select value 5 in the ΣT column (see table), then identify the switches corresponding to 4 and 1 (4+1=5) and position them at “1”. For the delay time of 22 s, set an Σt value of 176 (i.e. 22x256/32), then identify the switches corresponding to 128, 32 and 16 (128+32+16=176) and position them at “1”.

Dimensions



Electrical life expectancy ⁽¹⁾



Examples of electrical life expectancy:

48 V_{DC} - 5 A - L/R 10 ms: 5 × 10⁵ operations
 80 V_{DC} - 5 A - Resistive: 5 × 10⁵ operations
 110 V_{DC} - 0.5 A - L/R 10 ms: 5 × 10⁵ operations

220 V_{DC} - 0.2 A - L/R 10 ms: 10⁵ operations
 110 V_{AC} - 5 A - cosΦ 0.7: 5 × 10⁵ operations
 220 V_{AC} - 3 A - cosΦ 0.7: 5 × 10⁵ operations
 440 V_{AC} - 0.2 A - Resistive: 5 × 10⁵ operations

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

Sockets and retaining clips

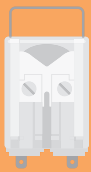
	Number of terminals	16	Retaining clip
For wall or rail mounting			
Spring clamp, wall or DIN H35 rail mounting		PAIR160	RT48
Screw, wall or DIN H35 rail mounting		48BIP20-I DIN	RT48
Screw, wall mounting		48BL	RT48
Double faston, wall mounting		48L	RT48
For flush mounting			
Double faston (4.8 × 0.8 mm)		ADF2	RT48
Screw		43IL ⁽¹⁾	RT43
For mounting on PCB			
		65	RT43

⁽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.



RELAYS

TIMER RELAY WITH 4 CONTACTS

TOK SERIES

USER SECTORS



Power generation



Nuclear



Power transmission



Rolling stock



Fixed railway installations



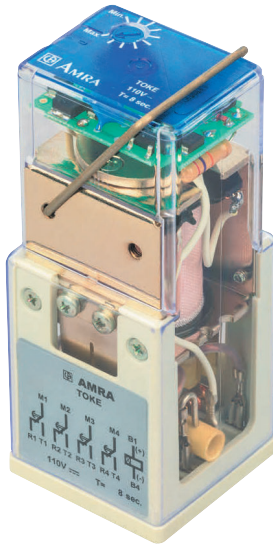
Shipbuilding



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 four 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 four 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 "OK series" on page 26.

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

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

Coil specifications

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

⁽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 peak (1 s) ⁽²⁾	20 A
	Maximum pulse (10 ms) ⁽²⁾	150 A
Example of electrical life expectancy ⁽³⁾	1,800 operations / hour	0.7 A – 132 V _{DC} – 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 V _{DC} / 440 V _{AC}
Contact material		AgCu
Operating time at U_n (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 maximum 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 (>6 μ).

b. When the gold-plated contact is subject to heavy loads, it will be degraded on the surface. In such case, the specifications 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 500 V _{bc}) between electrically independent circuits and between these circuits and ground between open contact parts	> 1,000 MΩ > 1,000 MΩ
Withstand voltage at industrial frequency between electrically independent circuits and between these circuits and ground between open contact parts between adjacent contacts	2 kV (1 min) - 2.2 kV (1 s) 2 kV (1 min) - 2.2 kV (1 s) 2 kV (1 min) - 2.2 kV (1 s)
Impulse withstand voltage (1.2/50 μs - 0.5 J) between electrically independent circuits and between these circuits and ground between open contact parts	5 kV 5 kV



Mechanical specifications

Mechanical life expectancy	20 x 10 ⁶ operations
Maximum switching rate Mechanical	3,600 operations / hour
Degree of protection (with relay mounted)	IP20
Dimensions (mm) ⁽¹⁾ Weight (g)	45 x 45 x 109 ~ 330

⁽¹⁾ Excluding output terminals



Environmental specifications

Operating temperature Standard Version for railways, rolling stock	(14 to 131) °F (-10 to 55) °C (-13 to 158) °F (-25 to 70) °C
Storage and shipping temperature	(-13 to 185) °F (-25 to 85) °C
Relative humidity	Standard: 75 % RH, Tropicalized: 95 % RH
Resistance to vibrations	5 g - 10 to 60 Hz - 1 min
Resistance to shock	30 g - 11 ms
Fire behavior	V0



Standards and reference values

EN 61810-1, EN 61810-2, EN 61810-7 EN 61812-1 EN 60695-2-10 EN 61000 EN 60529	Electromechanical elementary relays Timer relays Fire behavior Electromagnetic compatibility Degree of protection provided by enclosures
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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 96 kPa and 50 % humidity. Tolerance for coil resistance, nominal electrical input and nominal power is ± 7 %.



Railways, rolling stock - Standards

EN 60077 EN 50155 EN 61373 EN 45545-2 ASTM E162, E662	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
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Configuration 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.



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: V _{DC} ⁽⁴⁾ A: V _{AC} 50 Hz H: V _{AC} 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, 110 V _{DC} coil, full scale 4 seconds								
TOKr	R	4	4	F	C	024	08M	
TOKrR44F-C024-08M - TOKr relay, ROLLING STOCK series, 24V _{DC} 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 specifications according to EN 60077.

Other product series available:

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, V_{DC} only available.

INSTANTANEOUS
MONOSTABLE

INSTANTANEOUS
MONOSTABLE WITH
FORGIBLY GUIDED CONTACTS

TIME DELAY
(ON PICK-UP
OR DROP-OUT)

EXPLANATION OF
SOCKET NUMBERING

FRONT
CONNECTION

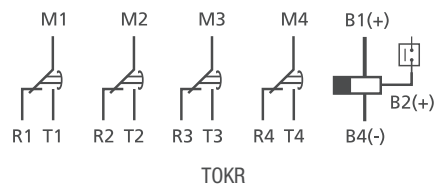
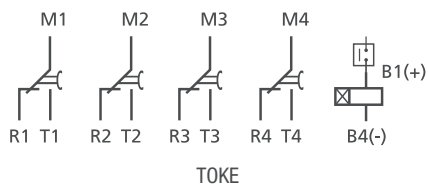
BACK
CONNECTION

PCB MOUNT

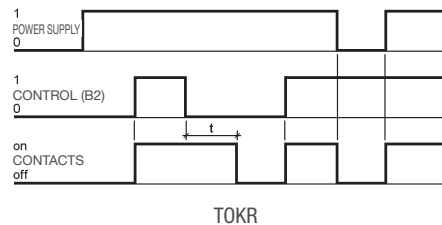
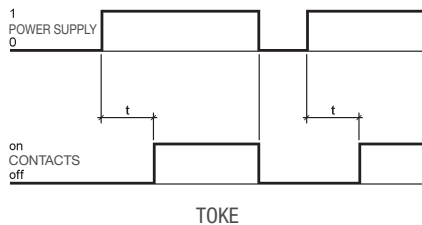
RETAINING CLIPS

KEYING PINS

Wiring diagram



Functional diagram



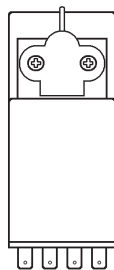
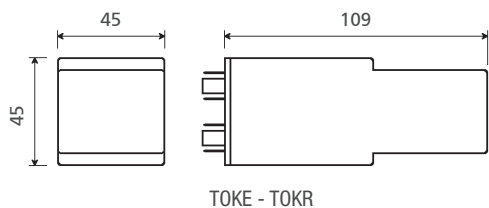
e(t): DC < 15 % / AC < 20 % of time t.

Time delay – Switching time setting

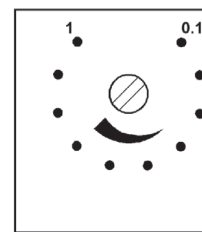
Time setting	By way of potentiometer, with slotted head screw
Full scale times available	1-2-4-8-16-32 seconds, 1-2-4-8-16-32-64 minutes
Time setting range	10 - 100 % of full scale ⁽¹⁾
Accuracy, setting (0.8...1.1 U _n , t = 20 °C)	± 5 % of time delay
Accuracy, repeatability	DC: ± 0.5 % / AC: ± 0.5 %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

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

Dimensions

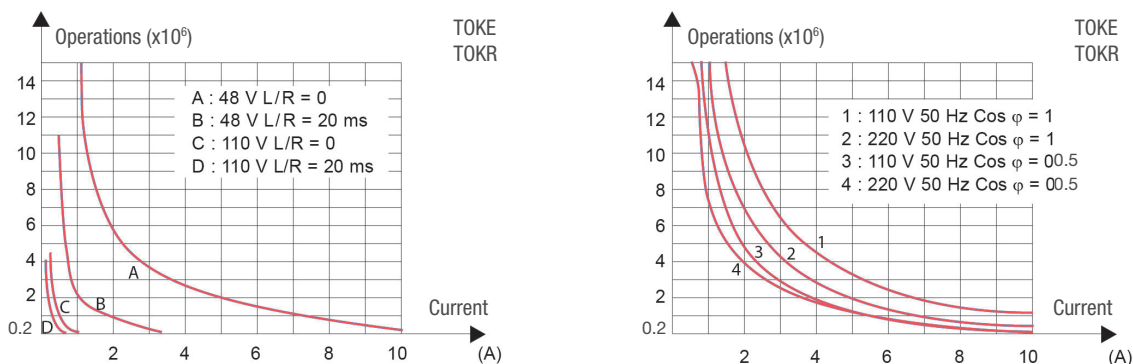


Finish for ROLLING STOCK version (TOK)



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

Electrical life expectancy



Sockets and retaining clips

	Number of terminals (standard dimensions 5 x 0.8 mm)	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.