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TIME-LAG AUXILIARY RELAY

This document may be subject to changes. Contact ARTECHE to confirm the characteristics and availability of the products described here.

Moving together

INDEX

ANSWERS FOR ANY APPLICATION

ARTECHE relays are designed to guarantee the best features and complete security even in the harshest environment. Only thus it is possible to have more than 3,000,000 working relays all over the world.

The action of the output contacts of the time-lag relays is directed by a timing. This timing can be pick-up timing, drop-out timing or cyclic timing ... very accurate timing ranges from a few milisecond till several hours, all of them available in the same relay.

The time-lag relay needs auxiliary supply, in order to operate. Both the auxiliary supply and the command signal can be independent. In the event that the command signal and the auxiliary supply share the same power supply, you must choose the option “Dependent command signal”. If both signals come from different power supplies you must choose “Independent command signal” (please see pg. 20, in order to choose the corresponding number from the model selection table).

ELECTRICAL UTILITIES

- Direct operation upon MV / HV (circuit breaker, sectionalizer).
- Timings where high accuracy time measure is needed.
- Specific relays for nuclear power plants.
- Contact multiplication in power plants and HV / MV substation controls.

RAILWAYS

- Traction Substation and Traction system.
- Door opening and closing control in trains.
- Lighting system actuation.

HEAVY INDUSTRY (PETROCHEMICAL, CONCRETE, IRON INDUSTRY,...)

- Critical process surveillance.
- Alarms for signalization and telecontrol.

ADVANTAGES

- Multifunction time lag relays with multi time setting ranges.
- Relays designed for working in permanence in the whole voltage range in high temperature environments.
- Self cleaning contacts.
- Adapted to vibration and seismic conditions (EN61373 Standard).
- Security contacts and voltage range +25% - 30% of nominal voltage, for high security applications.
- Easy installation (plug in relays, sockets for DIN rail).
- No maintenance.
- Possibility of working in 100% relative humidity ambiences.

GENERAL CHARACTERISTICS

The main features of ARTECHE's auxiliary relays are the followings:

- Security contacts (EN 50205 Standard).
- Capable to withstand vibrations and seismic conditions (EN 61373; IEEE 344; IEEE 323; IEEE C37.98 Standards).
- Capable to operate under low duty loads, activate digital inputs, and operate without any load.
- Wide range of auxiliary voltage levels (Vdc and Vac).
- Sturdy design.
- Self-cleaning contacts.
- Designed to allow continuous operation even in high temperature ambient, within the whole voltage range.
- High level of electrical insulation between input and output circuits.
- An internal diode is included to avoid damaging the relay when connecting with inverse polarity.
- In compliance with the most demanding test standards: IEC, EN, IEEE and bearing the CE mark.
- High protection degree (IP40), with transparent cover, making them suitable for use in salty and tropical atmospheres.
- Capable to work under ambients with relative humidity around 100%.
- Simplicity of installation (plug-in relays in a wide range of sockets with different installation configurations).
- No need of maintenance after installation.

In addition, the different number of alternatives that are offered when the equipment is selected, both technically (increase of the breaking capacity by serial contacts) and in the assembly method (front, rear or flush mounted sockets, with screws or fastons), ...

TECHNICAL STANDARDS

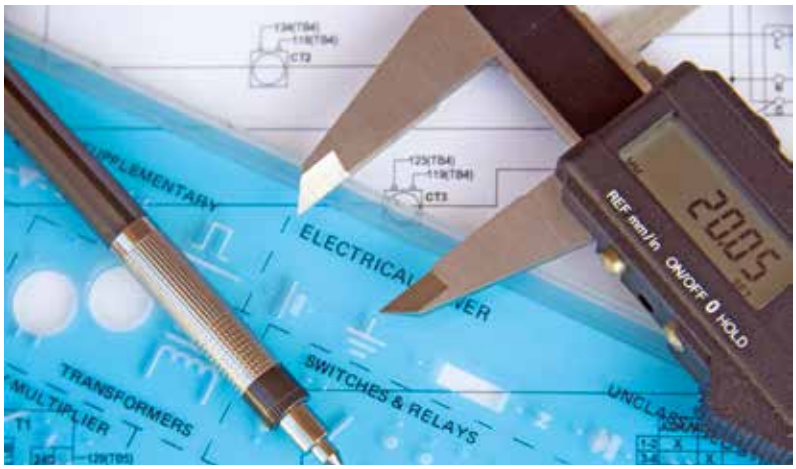
RAILWAY APPLICABLE STANDARDS

- **EN 60077 Series.** Rolling stock equipment.
  - Part 1: General conditions in service and general terms.
  - Part 2: Electrotechnical components.
- **EN 50155** (IEC 60571 equivalent). Railway applications - Rolling stock equipment.
- **IEC 61373.** Railway applications - Shock and vibration tests.
- **NF F 16-101 y NF F 16-102.** Rolling stock fire behaviour.
- **RIA 12.** Protection from transient and surges.
- **EN 50121-3-2:2006.** Electromagnetic compatibility.
- **EN 50205.** Relays with forcibly mechanically guided contacts. WELD NO TRANSFER
- **NF F 70-031.** Contact weld resistance tests. NO WELD CONTACTS

GENERAL STANDARDS

In addition to the specific applicable standards, ARTECHE auxiliary relays are designed based on the fulfilment of the following standards:

- **IEC 61810:** Electromechanical all-or-nothing relays.
- **IEC 60255:** Electrical relays. Measuring relays and protection equipment.
- **IEC 61812:** Specified time relays for industrial use.
- **IEC 60947:** Low-voltage switchgear and controlgear.
- **IEC 61000:** Electromagnetic compatibility.



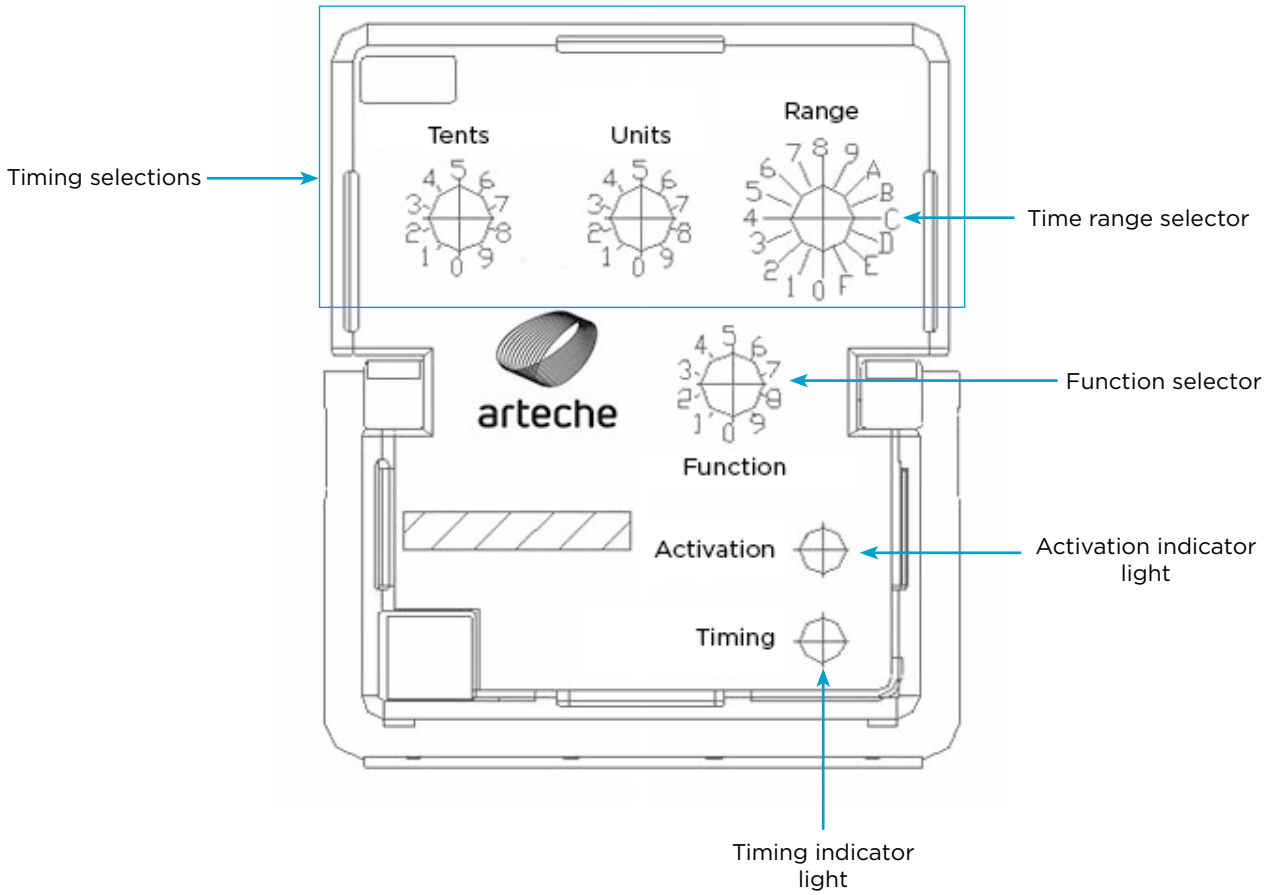
E322124

UL Recognized Component Marks for USA and Canada: The combined UL signs for the USA and Canada are recognized by the authorities of both countries. All auxiliary relays identified with this mark meet the requirements of both countries.

FUNCTIONAL CHARACTERISTICS

ARTECHE time-lag relays allow 16 timing ranges (from 30 ms to 99h) and 10 different functions (F0, F7, F9: pick-up timing - F1: pickup timing acceleration - F2, F3, F8: drop-out timing - F6: flashing timing - F4, F5: special timing). All of it being easily adjustable from the front of the relay. According to the most demanding test standards: IEC, EN, IEEE, and bearing the CE mark.

The great power of the output contacts makes possible direct action on HV and MV switchgear, because their making/breaking capacities, continuous through-current and overvoltage capacity guarantee perfect insulation. Absolutely reliable for use in salty, tropical atmospheres, and in general in those atmospheres which need protection with transparent cover.



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TIMING

To choose the desired timing, the relays have 3 selectors available on the front part: All the selectors are of discrete step not continuous, and for this reason the arrow cannot stay in an intermediate position.

The 16 position selector with the indication “Range”, on top right part, allows to choose between the different 16 time ranges available. Each of the ranges is determined by a low limit and a top limit, as well as, by a step, as it is shown in the following table. This same table is printed on the left side of the relay.

Range	Low Limit	Top Limit	Step
0	30 ms	990 ms	10 ms
1	30 ms	2,97 s	30 ms
2	0,1 s	9,9 s	100 ms
3	0,2 s	19,8 s	200 ms
4	0,5 s	49,5 s	0,5 s
5	1s	99 s	1 s
6	3 s	297 s	3 s
7	5 s	495 s	5 s
8	10 s	990 s	10 s
9	0,5 min	49,5 min	0,5 min
A	1 min	99 min	1 min
B	3 min	297 min	3 min
C	5 min	495 min	5 min
D	10 min	990 min	10 min
E	0,5 h	49,5 h	0,5 h
F	1 h	99 h	1 h

- **NOTE 1:** If the tens selector is placed on the 0 and the unit one on the 0 or on the 1, the relay temporizes the step of the selected range.
- **NOTE 2:** As the relay cannot temporize less than 30 miliseconds, if by the selectors it is chosen an option that would suppose a timing lower than this value, the relay will temporize 30ms. (for example, if it is selected the range 0, tens 0, and units 1 or 2, according to what was mentioned on the preceding page, the timing would be 10 ms or 20 ms respectively, but the relay will temporize 30 ms as it is the minimum timing limit). On the rest of the positions the timing will be the selected value.
- **NOTE 3:** If all the selectors are placed on 0 (Tens 0, Units 0, Range 0 and Function 0), the timing will be disabled and the relay will operate in the minimum time possible (electronical and mechanical initialization delay). This time is a bit lower than 20ms. In a relay with an instantaneous coil, both coils the instantaneous and the time-lag will operate at the same time.
- **NOTE 4:** The accuracy of the timing will be ±5ms or ±1%, the one which is higher.

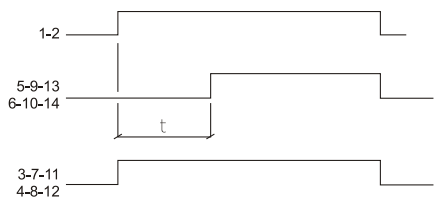
SELECTABLE FUNCTIONS

Below the 3 timing selectors, there is a forth 10 position selector, which allows to choose the different functions that the relay can execute. The way to make the selection is the same as ones explained before, by the point of the arrow.

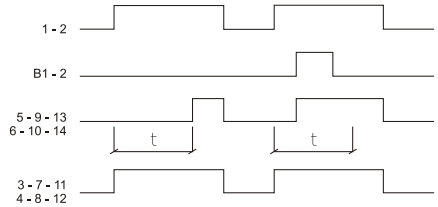
The time diagrams for each of the functions available are printed on the right side of the relay.

Time diagram

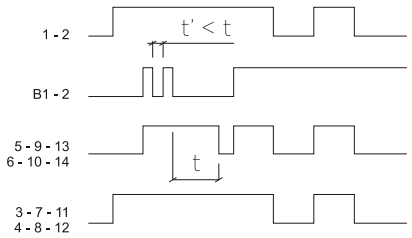
F0
F9



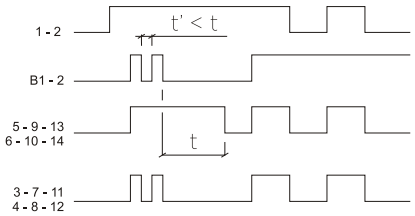
F1



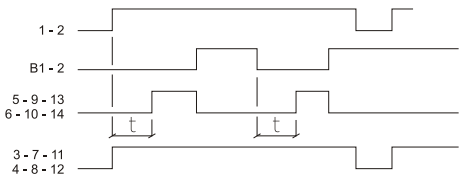
F2



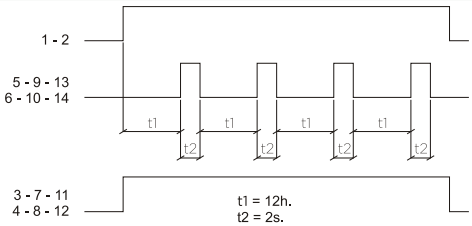
F3



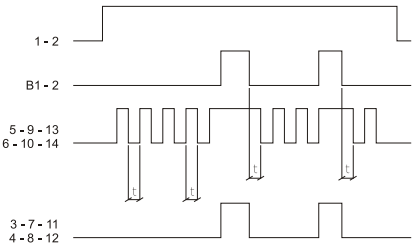
F4



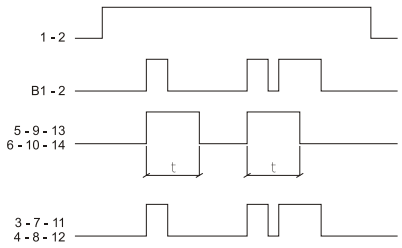
F5



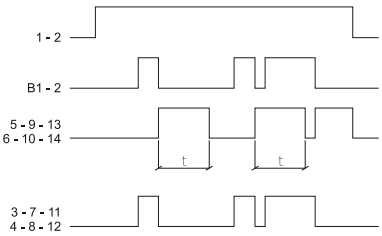
F6



F7



F8



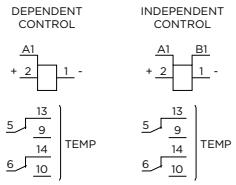
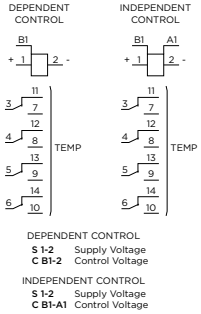
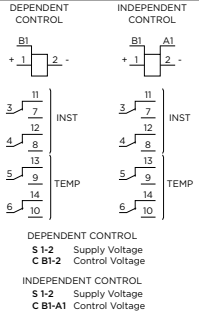
These time-diagrams are for TDF-22 relay with dependent command signal.
For TDF-4, the time-diagram of contacts 3-7 and 4-8 would be the same than for the contacts 5-9 and 6-10.

- **Function 0:** Pick up timing
- **Function 1:** Pick up timing with acceleration by external control
- **Function 2:** Drop out timing, the instantaneous part of the TDF-22 follow the auxiliary supply
- **Function 3:** Drop out timing, the instantaneous part of the TDF-22 follow the external control
- **Function 4:** Timing with continuity control
- **Function 5:** Permanent cycle timing
- **Function 6:** Flashing timing
- **Function 7:** Pick up timing
- **Function 8:** Drop out timing
- **Function 9:** Pick up timing with reduced reseting time

TECHNICAL FEATURES PER MODEL

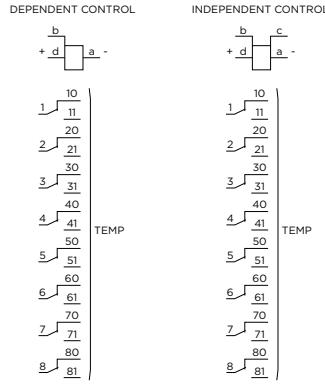
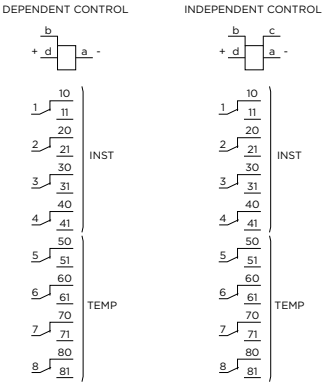
› World-class range of auxiliary relays for energy sector, specially designed for the most demanding applications

TIME-LAG RELAYS (I)

Model	TDF-2	TDF-4	TDF-22
			
Applications	Electrical command timing		
Construction characteristics			
Timing Contacts no.	2 Changeover	4 Changeover	2 Changeover
Instantaneous contact no.	0 Changeover	0 Changeover	2 Changeover
Connections			
Options (With OP options)			
Weight (g)	265		
Dimensions (mm)	42,5 x 50,4 x 96,6 (F large type)		
Coil characteristics			
Standard voltages[1]	24, 48, 72, 96, 110, 125, 220, 250 [4] Vdc/Vac (50-60 Hz)		
Voltage range	+25% -30% U_N (except range 250: +10% -20%)		
Pick-up / Release voltage	See power supply-temperature charts for time-lag relays		
Average consumption in permanence (U_N)	2,6 W	3,85 W	5,35 W
Operating time			
Time range	between 0,03 s and 99 h		
Pick-up time	< 23 ms		
Drop-out time	< 50 ms		
Contacts			
Contact type	2 Changeover	4 Changeover	
Contact material	AgNi		
Contact resistance[2]	≤ 30 mΩ (standard range) / ≤ 15 mΩ (FF range)		
Distance between contacts	1,2 mm		
Permanent current	10 A		
Instantaneous current	30 A during 1 s / 80 A during 200 ms / 200 A during 10 ms		
Max. making capacity	40 A, 0,5 s, 110 Vdc / 30A, 1 s, 36 Vdc, 30.000 operations (1 op/ 15 s)		
Breaking capacity	See breaking capacity curves		
Max. breaking capacity	See value for 50,000 operations		
U_{max} opened contact	250 Vdc / 400 Vac		
General data			
Mechanical endurance	10^7 operations		
Dielectric strength	2,2 kV (between independent circuits) / 1,5 kV (between open contacts)		
Impulse voltage	5 kV (between independent circuits) / 2,5 kV (between open contacts)		
Insulation resistance	>1000 GΩ		
Operating temperature	Up to 125Vdc -40ºC +70ºC / 220Vdc – 250Vdc -40ºC +55ºC		
Storage temperature	-40ºC +85ºC		
Max. operating humidity	93% / +40ºC		
Operating altitude[3]	<2000 m		

[1] Other voltage upon request
[2] Guarantee data for relays just manufactured
[3] Ask for higher altitudes
[4] Voltage not recognized by UL

TIME-LAG RELAYS (II)

Model	TDJ-8	TDJ-44
		
Applications	Electrical Command Timing	
Construction characteristics		
Timing Contacts no.	8 Changeover	4 Changeover
Instantaneous contact no.	0 Changeover	4 Changeover
Connections	DEPENDENT CONTROL / INDEPENDENT CONTROL 	DEPENDENT CONTROL / INDEPENDENT CONTROL 
Options (With OP options)	**S d-a** Supply Voltage **C b-a** Control Voltage / **S d-a** Supply Voltage **C b-c** Control Voltage	**S d-a** Supply Voltage **C b-a** Control Voltage / **S d-a** Supply Voltage **C b-c** Control Voltage
Weight (g)	500	
Dimensions (mm)	82,5 x 50,4 x 96,6 (J large type)	
Coil characteristics		
Standard voltages[1]	24, 48, 72, 96, 110, 125, 220, 250 [4] Vdc/Vac (50-60 Hz)	
Voltage range	+25% -30% U_N (except range 250: +10% -20%)	
Pick-up / Release voltage	See power supply-temperature charts for time-lag relays	
Average consumption in permanence (U_N)	6 W	7,9 W
Operating time		
Time range	between 0,03 s y 99 h	
Pick-up time	<23 ms	
Drop-out time	<50 ms	
Contacts		
Contact type	8 Changeover	
Contact material	AgNi	
Contact resistance [2]	≤ 30 mΩ (standard range) / ≤ 15 mΩ (FF range)	
Distance between contacts	1,2 mm	
Permanent current	10 A	
Instantaneous current	30 A during 1s / 80 A during 200 ms / 200 A during 10 ms	
Max. making capacity	40 A, 0,5 s, 110 Vdc / 30A, 1 s, 36 Vdc, 30.000 operations (1 op/ 15 s)	
Breaking capacity	See breaking capacity curves	
Max. breaking capacity	See value for 50,000 operations	
U_{max} opened contact	250 Vdc / 400 Vac	
General data		
Mechanical endurance	10^7 operations	
Dielectric strength	2,2 kV (between independent circuits) / 1,5 kV (between open contacts)	
Impulse voltage	5 kV (between independent circuits) / 2,5 kV (between open contacts)	
Insulation resistance	>1000 GΩ	
Operating temperature	Up to 125Vdc -40ºC +70ºC / 220Vdc – 250Vdc -40ºC +55ºC	
Storage temperature	-40ºC +85ºC	
Max. operating humidity	93% / +40ºC	
Operating altitude[2]	<2000 m	

[1] Other voltage upon request
[2] Guarantee data for relays just manufactured
[3] Ask for higher altitudes
[4] Voltage not recognized by UL

BREAKING CAPACITY

› With devices operating worldwide, also heavy industries like oil & gas sector trust in our relays.

BREAKING CAPACITY

The breaking capacity is a critical parameter on the design and the applications of the relays. Its mechanical life could be considerably reduced, depending on the value of the load (especially with heavy duty loads), the number of operations and the environmental conditions in which the relay is operating.

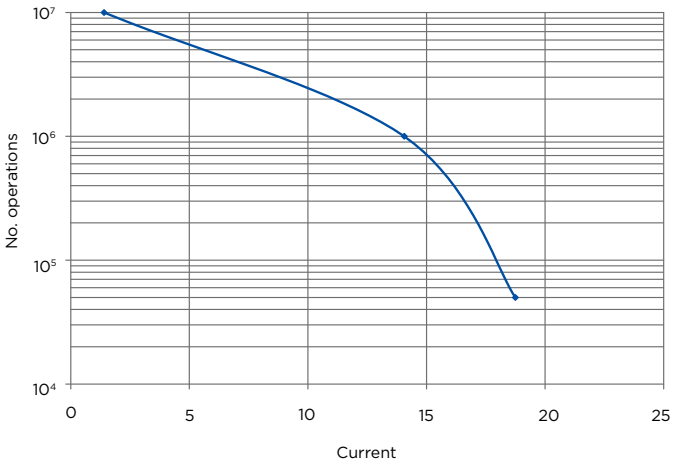
In any configuration, ARTECHE's auxiliary relays have a high breaking capacity values. These limits are showed in the table below, in terms of power and current values. In all the cases, these relays guarantee a right performance during 50,000 operations.

Likewise, the values showed in the following charts have been obtained in standard conditions in the laboratory, and they could be different in real conditions. In any case, connecting serial contacts or a bigger distance between contacts makes these values to be considerably increased.

24 Vdc voltage
Different loads configurations.

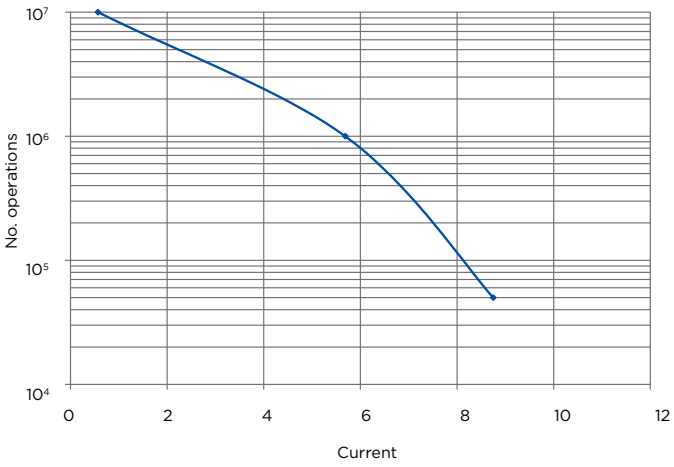
Resistive load:

› L/R= 0 ms.



Highly inductive load:

› L/R= 40 ms.

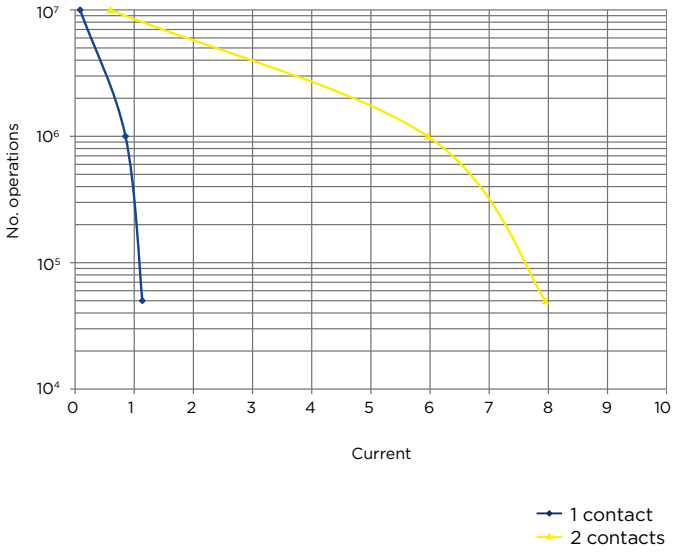


	0 ms		20 ms		40 ms	
Vdc	P(W)	I(A)	P(W)	I(A)	P(W)	I(A)
24	450	18,75	300	12,50	210	8,75

110 Vdc voltage
Different loads configurations.

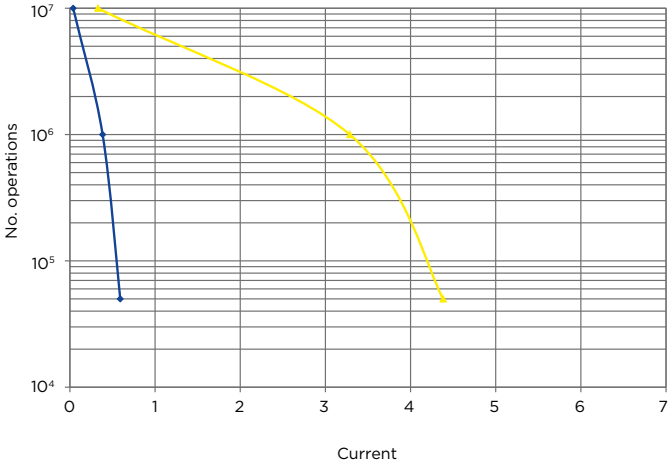
Resistive load:

› L/R= 0 ms.



Highly inductive load:

› L/R= 40 ms.



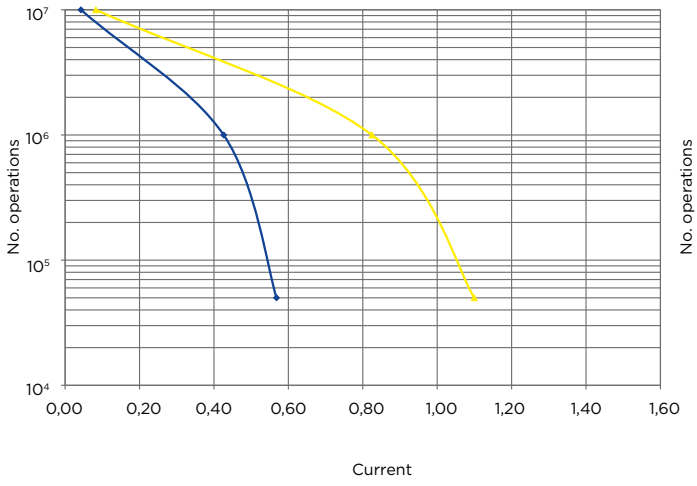
1 contact
2 contacts

		0 ms		20 ms		40 ms	
Vdc	Contact configuration	P(W)	I(A)	P(W)	I(A)	P(W)	I(A)
110	1 contact	125	1,14	100	0,91	65	0,59
	2 contacts	874	7,95	742	6,74	482	4,38

220 Vdc voltage
Different loads configurations.

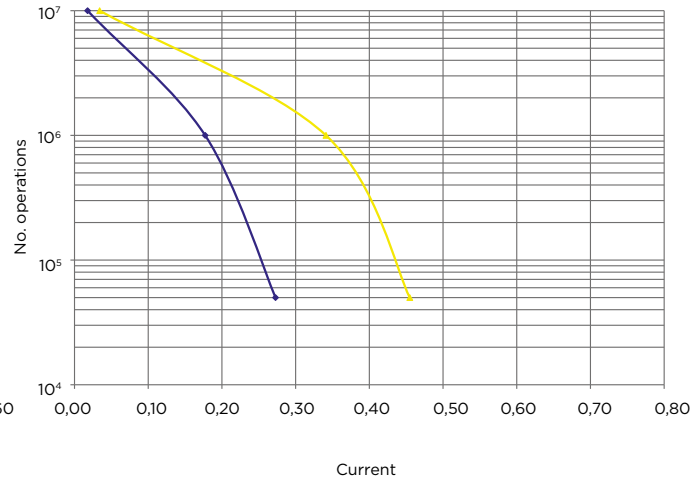
Resistive load:

› L/R= 0 ms.



Highly inductive load:

› L/R= 40 ms.



1 contact
2 contacts

		0 ms		20 ms		40 ms	
Vdc	Contact configuration	P(W)	I(A)	P(W)	I(A)	P(W)	I(A)
220	1 contact	125	0,57	104	0,47	60	0,27
	2 contacts	242	1,10	177	0,81	100	0,45

HOW THE BREAKING CAPACITY CAN BE INCREASED

ARTECHE's auxiliary relays are power relays, designed specially to have a high breaking capacity. Thus, there are applications where the loads are so high that it is necessary to even increase the breaking capacity, keeping the reliability of the contacts of the auxiliary relays.

Thus, ARTECHE relays have the following alternatives and recommendations:

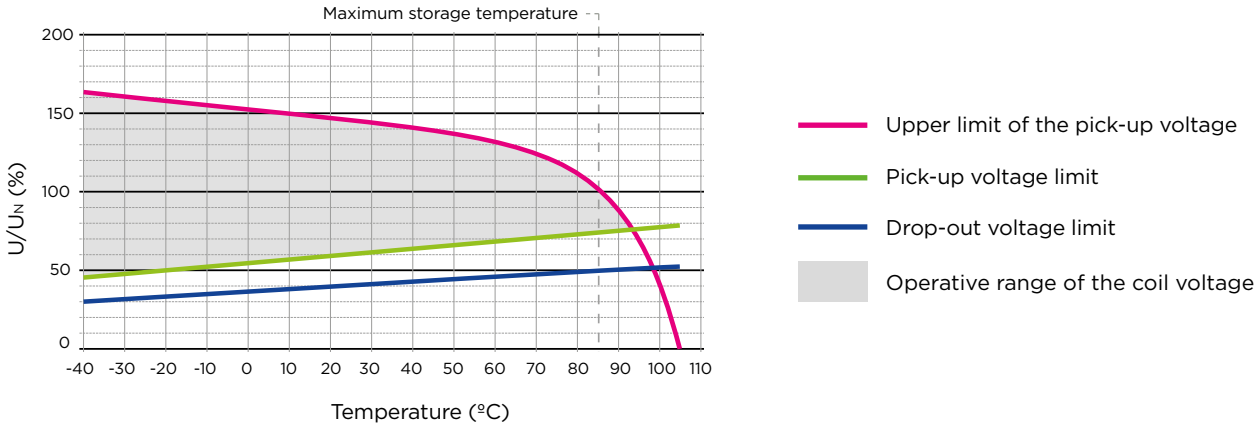
- Possibility of external connection of equipment (serial contacts) getting an important increase of breaking capacity in these equipment is shown, guaranteeing the right performance during a high number of operations.

PICK-UP VOLTAGE/RELEASE VOLTAGE-TEMPERATURE CHARTS

Variability of operative voltage range against temperature for the time-lag relays.

TIME-LAG RELAYS

Operative range against ambient temperature.



MODEL SELECTION

Timers	Model	FF Range*	Aux. Supply	Options			
Model Selectión ▶▶				OP	0		0
General purpose range							
Relay with 2 timer contacts	TDF-2				0**	0	0**
Relay with 4 timer contacts	TDF-4				0**	0	0**
Relay with 2 instantaneous contacts + 2 timer contacts	TDF-22				0**	0	0**
Relay with 8 timer contacts	TDJ-8				0**	0	0**
Relay with 4 instantaneous contacts + 4 timer contacts	TDJ-44				0**	0	0**

Standard model

FF Range		
	No	-
Rolling stock applications or low duty loads***	Yes	FF

Aux. Supply			
Indicate voltage level (ex.: 24Vdc/Vac)			

Options			
Command signal voltage	Dependent Standard		0
	Independent Different power suppliers for the comand signal and the auxiliary supply	24 Vdc • Vac	1
		48 Vdc • Vac	2
		60 Vdc • Vac	3
		72 Vdc • Vac	4
		96 Vdc • Vac	5
		110 Vdc • Vac	6
		125 Vdc • Vac	7
		220 Vdc • Vac	8

* Indicate just if FF range is required.

** Mandatory option.

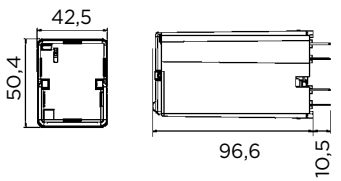
*** For more information refer to railway application brochure.

DIMENSIONS OF THE RELAYS

Relay dimensions

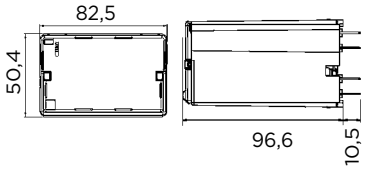
F Type

F large



J Type

J large



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RETAINING CLIPS

RETAINING CLIPS	OP SOCKET	RELATED PLUGGED RELAY	
E0	Universal (D and F sized sockets require 2 units ; J sized sockets require 4 units)	RD; RF; RJ; TDF; TDJ	Universal (Bag of 20 units)
			Universal (Bag of 100 units)
E41	DN-DE IP, DN-DE 2C IP	RD OP	
E50	DN-TR OP, DN-TR 2C OP	RD OP	
E40	FN-DE IP, FN-DE 2C IP	RF OP	
E43	FN-DE IP, FN-DE 2C IP	TDF OP	
E42	FN-TR OP, FN-TR 2C OP	RF OP	
E44	FN-TR OP, FN-TR 2C OP	TDF OP	
E31	FN-DE IP, FN-DE 2C IP	BF	
E21	FN-TR OP, FN-TR 2C OP	BF	
E45	JN-DE IP, JN-DE 2C IP	RJ OP	
E47	JN-DE IP, JN-DE 2C IP	TDJ OP	
E46	JN-TR OP, JN-TR 2C OP	RJ OP	
E48	JN-TR OP, JN-TR 2C OP	TDJ OP	
E29	JN-DE IP, JN-DE 2C IP	BJ; UJ	
E27	JN-TR OP, JN-TR 2C OP	BJ; UJ	
OTHER ACCESSORIES			
Security pins for RD; RF; RJ; TDF; TDJ relays (bag of 100 units)			

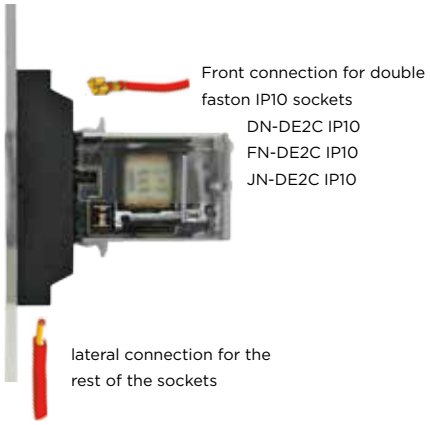
› E0 retaining clips

› E** retaining clips

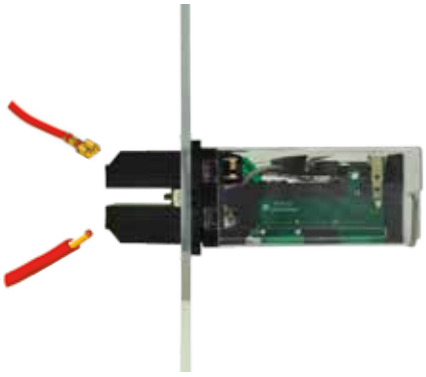
SOCKETS, DIMENSIONS AND CUT-OUT

Sockets		Options		
Relay	Type	Screw	Double faston	Weight (g)
F	IP10 Front connection	FN-DE IP10	FN-DE2C IP10	110
	IP20 Front connection	FN-DE IP20	FN-DE2C IP20	110
	IP10 Rear connection	FN-TR OP	FN-TR2C OP	90
	IP10 Flush mounting	F-EMP OP		300
J	IP10 Front connection	JN-DE IP10	JN-DE2C IP10	225
	IP20 Front connection	JN-DE IP20	JN-DE2C IP20	225
	IP10 Rear connection	JN-TR OP	JN-TR2C OP	180
	IP10 Flush mounting	J-EMP OP		400

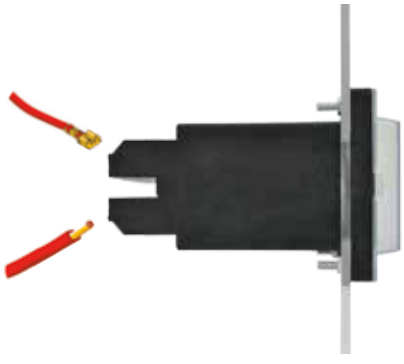
Accessories
Retaining clips
Function signs on the extraction ring
Security pins



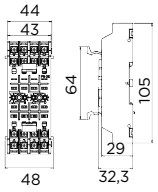
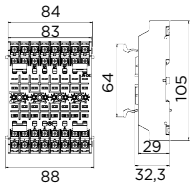
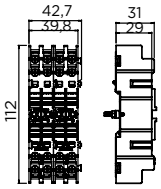
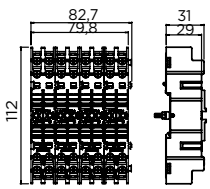
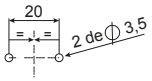
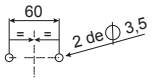
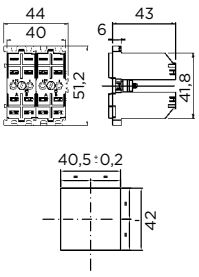
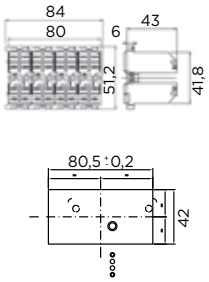
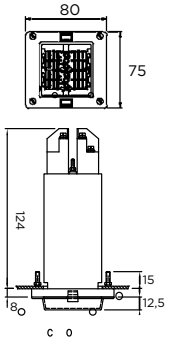
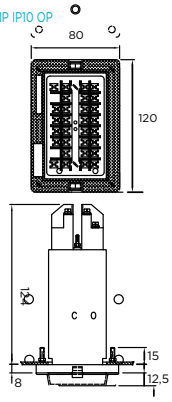
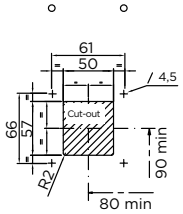
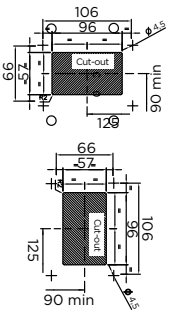
› Front connection socket



› Rear connection socket



› Flush mounting socket

	Type F Relays	Type J Relays
Sockets for DIN rail (1) (2)	FN-DE IP10 • FN-DE2C IP10 	JN-DE IP10 • JN-DE2C IP10 
	FN-DE IP20 • FN-DE2C IP20 	JN-DE IP20 • JN-DE2C IP20 
	Fix Drilling 	Fix Drilling 
Sockets for rear connection	FN-TR IP10 OP • FN-TR2C IP10 OP 	JN-TR IP10 OP • JN-TR2C IP10 OP 
Sockets for flush mounting	F-EMP IP10 OP 	J-EMP IP10 OP 
Cut-out		

(1) DIN rail according to EN50022 DIN46277/3

(2) Minimum distance between sockets will depend on type of relay and sockets. Please request sockets user manual for more detailed information.

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Moving together

Updates: ARTECHE_CT_Time-lag-Auxiliary-Relay_EN
Versión: A6