

TDF2

INDEPENDENT TIME RELAY

2 CO CONTACTS PROGRAMMABLE DEFINITE TIME RELAY



APPLICATIONS

- > Direct operation on MV/HV primary equipment.
- > Galvanic isolation between the control system and the primary equipment.
- > Applications where is required high breaking capacity.
- > Timed contact multiplication in control systems of HV/MV installations and power plants.
- > Low duty loads control, with control for digital inputs.
- > Edge to pulse conversion.

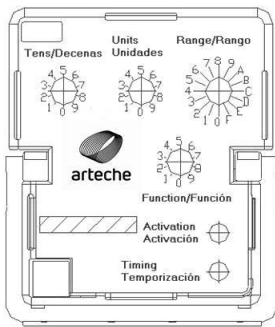
Substations, Power plants and Industry

- > Critical process automation.
- > Command and Control.
- > Alarm signaling and filtering.
- > Low duty loads.

MAIN FEATURES

- > Designed to allow continuous operation even in high temperature ambient, within the whole voltage range.
- > Self-cleaning contacts.
- > High level of electrical insulation between circuits.
- > Capable to operate under low duty loads, activate digital inputs, and operate without any load.
- > 1% time accuracy operation.
- > Tested to comply seismic Standards. (EN61373; IEEE 344; IEEE 323; IEEE C37.98 Standards.)
- > Sturdy design.
- > Several programmable modes, with different timing from tens of milliseconds to tens of hours.
- > High protection degree (IP40), with transparent cover, making them suitable for use in salty and tropical atmospheres.
- > Wide range of auxiliary voltage levels (Vdc and Vac).
- > Versatile installation (plug-in relays in a wide range of sockets with different installation configurations).
- > The ruggedness of the output contacts makes possible direct action on HV and MV switchgear, as their making/breaking capacities, continuous through-current and overvoltage capacity guarantee very high insulation.

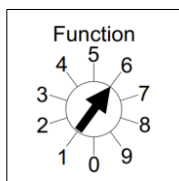
FUNCTIONALITY



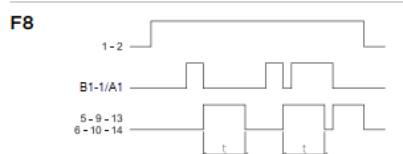
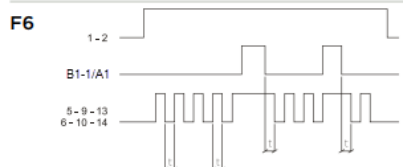
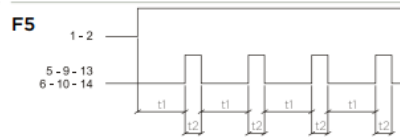
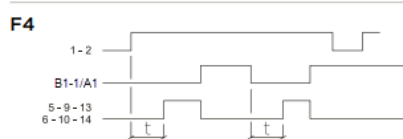
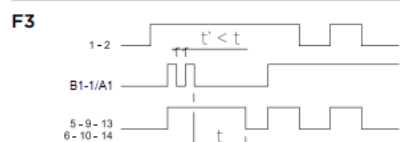
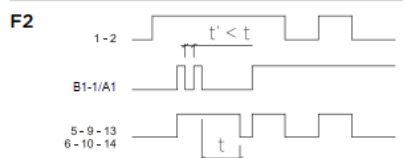
Time-delay relays feature 16 configurable time ranges, selectable using the first three selectors, and 10 timing functions selectable through the fourth selector. These functions include pick-up & drop-out timing, flashing timing and special timing functions.

To set the relay time delay, the arrow indicator must be positioned to one of the 10 available functions (F0 to F9). Then, a time range must be selected, which determines minimum and maximum time values and the step between them. Finally, the tens and units selectors must be set to multiply the selected time range's step, allowing timings from 30 ms to 99h.

1. FUNCTION SELECTOR



The fourth position selector allows the user to choose among the 10 time-delay functions available in the relay, using the arrow indicator. The time diagrams for each function are printed on the right side of the relay (F0, F7, F9: pick-up timing - F1: pickup timing acceleration - F2, F3, F8: drop-out timing - F6: flashing timing - F4, F5: special timing).



- 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 resetting time

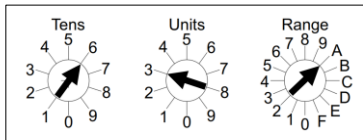
2. MODES WITH DEPENDENT AND INDEPENDENT TRIGGERING

The connection diagrams for TDF2 include two triggering configurations: dependent and independent. The trigger mode and voltage used needs to be specified in the relay ordering OP code (Options for this relay section).

In the dependent triggering configuration, the trigger is applied between terminals B1 and 1. In this case, the trigger and the relay power supply share the same source, both referenced to terminal 1.

In the independent triggering configuration, the trigger circuit does not share the reference (negative) with the relay power supply. This allows the use of a separate trigger power source. The triggering signal is applied between terminals B1 and A1, where B1 is the positive terminal and A1 is the reference (negative).

3. TIME SELECTION



To select the desired timing, the relays are equipped with three selectors on the front panel. All selectors are of the discrete step type (non-continuous); therefore, the arrow must not be set in an intermediate position.

The 16-position selector labeled 'Range', located in the upper right area, allows selection among the 16 available time ranges. Each range is defined by a minimum and maximum value, as well as a step, as shown in the table below. This table is also printed on the left side of the relay. The tens and units selectors determine the multiplication factor applied to the step of the selected range.

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.

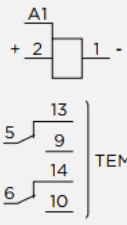
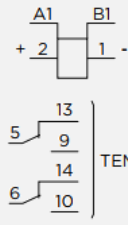
NOTE 2: As the relay cannot temporize less than 30 milliseconds, if by the selectors it is chosen an option that would suppose a timing lower than this value, the relay will temporize 30ms. (for example, if it is selected the range 0, tens 0, and units 1 or 2, according to what was mentioned on the preceding 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 (electrical 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 $\pm 5\text{ms}$ or $\pm 1\%$, the one which is higher.

TECHNICAL SPECIFICATIONS

Construction Characteristics

Applications	General purpose instantaneous relay
Contacts	2 Definite time changeover contacts
Connections	DEPENDENT CONTROL  INDEPENDENT CONTROL  DEPENDENT CONTROL S 2-1 Supply Voltage C A1-1 Control Voltage INDEPENDENT CONTROL S 2-1 Supply Voltage C A1-B1 Control Voltage
Weight (g)	265
Dimensions (mm)	42.5 x 50.4 x 96.6 (F large type)

Electrical Characteristics

Coil characteristics	Standard voltages	24, 48, 72, 96, 110, 125, 220, 250 Vdc / Vac (50-60 Hz)
	Voltage range	+25% -30% (250 Vdc: +10% - 20%) Un
	Pick-up / release voltage	See pick-up/release voltage-temperature curves
	Average consumptions	< 4.5 W
Contacts	Contact material	AgNi
	Contacts resistance	≤ 30 mΩ (≤ 15 mΩ LDL range)
	Distance between contacts	1,8 mm
	Continuous current capacity	10 A
	Short-time current capacity	30 A 1s. 80 A 200 ms. 200 A 10 ms.
	Making capacity	40A, 0,5s, 110Vdc 30A, 1s, 36Vdc 30.000 operations (1op/15s)
	Breaking capacity	100.000 operations
	Max. breaking capacity	*See curves
Dielectric strength independent circuits	Umax opened contact	250 Vdc / 400 Vac
		2 kV. 50Hz. 1 min
Dielectric strength open contacts		1,5 kV. 50Hz. 1 min
Impulse voltage independent circuits		5 kV. 0,5 J. 1,2/50 μs
Impulse voltage Open contacts		2,5 kV. 0,5 J. 1,2/50 μs
Insulation resistance		500 Vdc.; > 100MΩ

Endurance Characteristics

Mechanical endurance

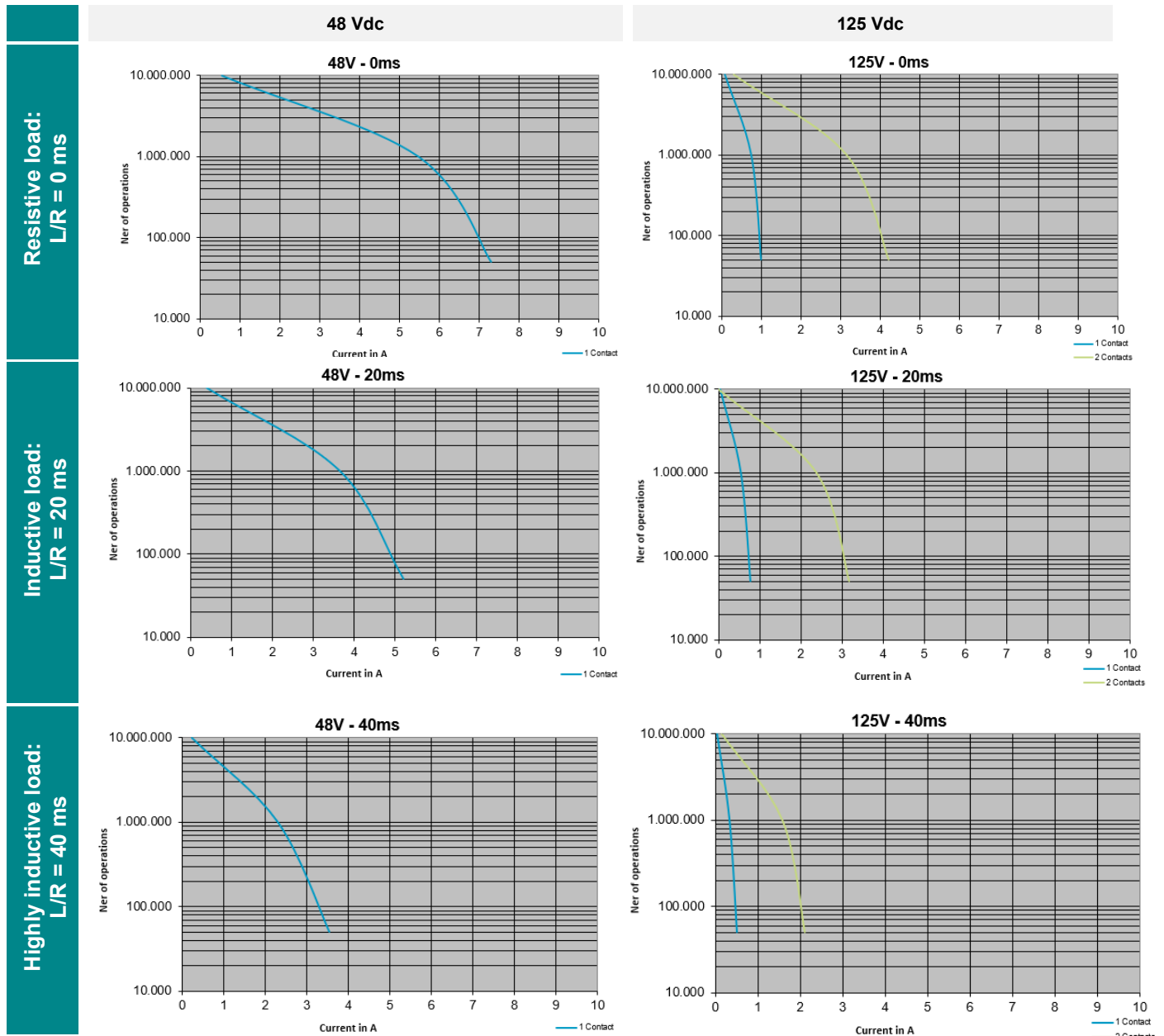
1*10⁷ operations

Other Standard Compliances

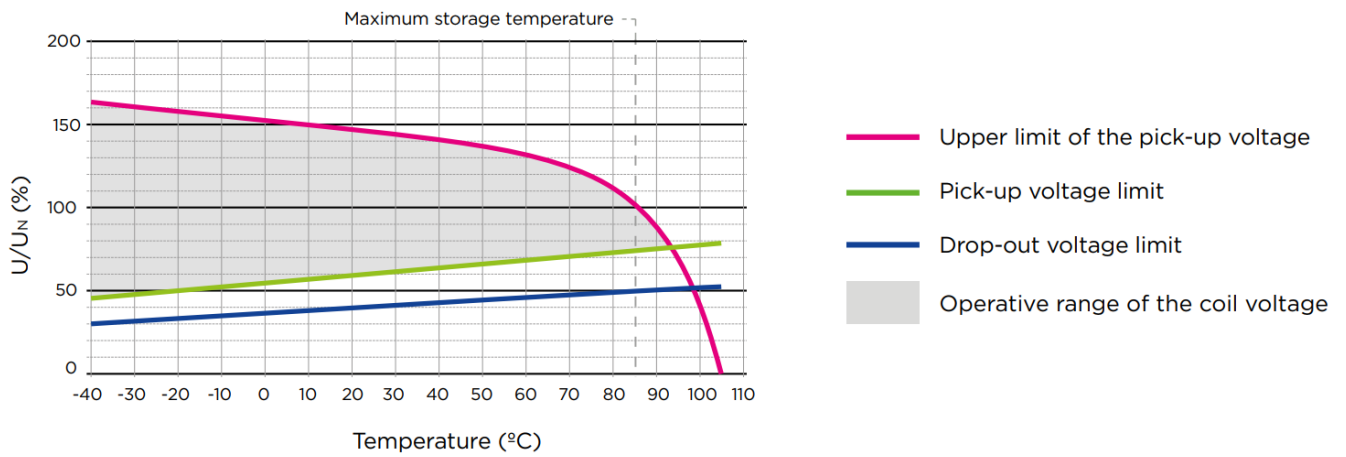
Mechanical Vibration and Bump	Vibration and shock Stress during operation	60255-21-1	Class II
		60255-21-2	Class I
	Vibration and shock Stress during transport	60255-21-1	Class II
		60255-21-2	Class I
	Seismic qualification for nuclear power stations	IEEE 344-2004 IEEE 323-2003 ANSI/IEEE C37.98-1987	Relay relapsed >3,5 g +10% Relay operated >5 g +10%
EMC Immunity	High frequency 1MHz burst disturbance test	IEC 61000-4-18(2006) + A1 (2010)	Common mode: 2,5kV 1MHz and 100 kHz Differential mode: 1kV, 1MHz and 100 kHz
	Electrical fast transient	EN 61000-4-4	Common mode: 4 kV, 5kHz, 1min Differential mode: 2 kV, 5kHz, 1min
	Surge	EN 61000-4-5	Common mode: 2kV 1,2/50µs. (voltage) 8/20µs. (current) Differential mode: 1kV 1,2/50µs. (voltage) 8/20µs. (current)
	Radiated electromagnetic field	EN 61000-4-3	80-1000MHz, 10V/m, 80% AM (1kHz)
	Digital telephones radiated electromagnetic field	EN 61000-4-3	80-1000MHz and 1400-2700MHz, 10V/m, 80%
	Conducted disturbances induced by radio frequency fields	EN 61000-4-6	0.15-80MHz, 10V, 80% AM (1kHz)
	Electrostatic discharges	EN 61000-4-2	Contact ±15 kV Air mode ±15 kV
	Magnetic fields at power frequency	EN 61000-4-8	100 A/m 1min. 1000 A/m 1s.
EMC emissions	Radio disturbance	CISPR11, CISPR22	Cover: 30Mhz-1GHz Group 1 class A Power supply: 0.15-0.5 MHz, 79dB(µV) (quasi peak) / 66dB (average) 0.5-30 MHz, 73dB(µV) (quasi peak) / 60dB (average)
Thermal test	Maximum temperature in the relay parts	EN 61810-7	Maximum ambient T, 10A through half the contacts. Time until thermal stability
	Thermal endurance	EN 61810-7	Maximum ambient T, Vmax, 10A through half the contacts. 1.000 hours
Environmental Tests	Cold test	EN 60068-2-1 (Test Ab)	- 40°C, 96 hours
	Dry heat test	EN 60068-2-2 (Test Bc)	70°C, 96 hours
	Sudden changes of temperature	EN 60068-2-14 (Test Na)	TA = -40°C; TB = +70°C
	Damp heat test (Cyclic)	EN 60068-2-30 (Test Db)	55°C, 6 cycles
	Damp heat, steady state	EN 60068-2-78 (Test Cab)	40°C, 93% Rh, 56 days
Functional Tests	Immunity to capacitive discharges	ESI 48-4	EB1: Low burden
Protection Degree			IP4X
Operating altitude			<2000 m

BREAKING CAPACITY CURVES

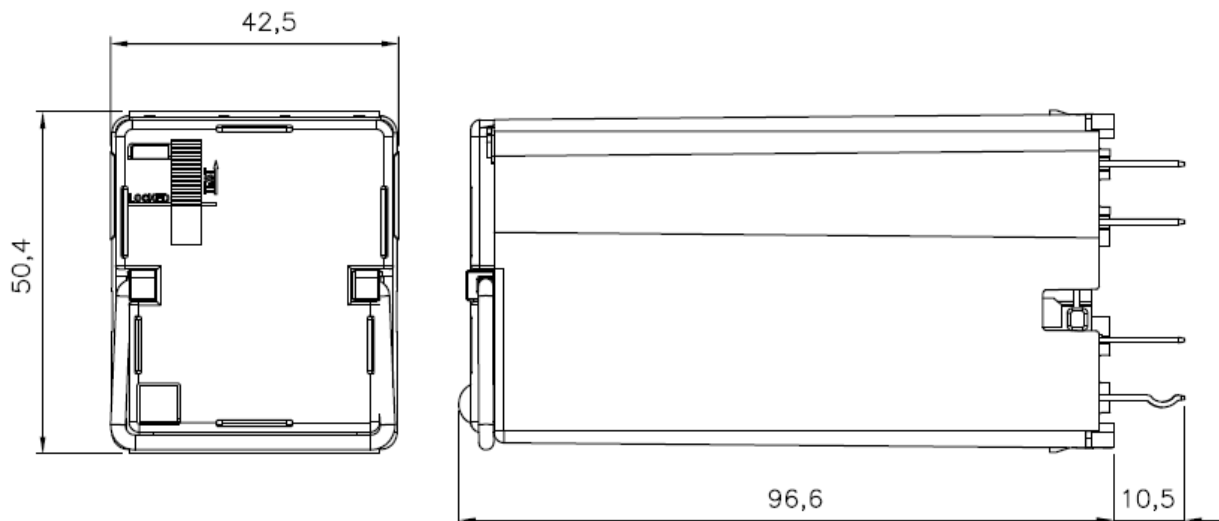
The breaking capacity is a critical parameter on the design and the application of the relay. Its mechanical life could be considerably reduced, depending on the value of the load (especially with heavy duty loads), the number of operations and the environmental conditions in which the relay is operating.



PICK-UP & RELEASE VOLTAGE-TEMPERATURE CHARTS

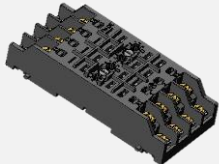
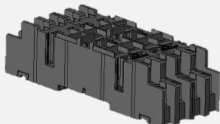
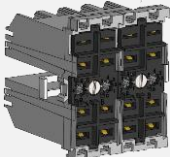
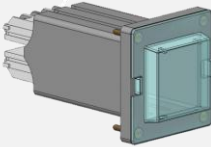
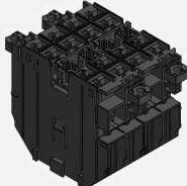
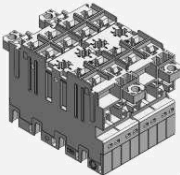
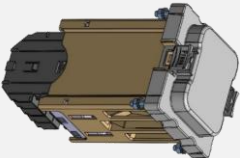
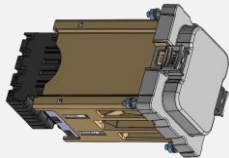


RELAY DIMENSIONS



SOCKETS AND RETAINING CLIPS

The dimensional and format of the sockets for the TDF2 relay are “F” type. Please refer to the document “MU_BASES_RELES_EN” for further and more precise details. The sockets & clips available for this model are:

Sockets	
FN DE IP10 FN DE2C IP10	
FN DE IP20 FN DE2C IP20	
FN TR OP FN TR2C OP	 In allocation
F DE CL IP20	
F EMP OP	 In allocation
FW TR	
FW TRCL	
FW EMP TR LG	
FW EMP TRCL LG	

Clips

Plastic E0
E43 (FN DE)
E44 (FN TR)

-

OPTIONS FOR THIS RELAY

This relay must be ordered indicating the chosen options

Relay Model	Coil rated voltage	Variant			Dependent / independent trigger	
TDF2	125 Vdc/Vac	--/LDL	OP:	0	n	0

Dependent/independent triggering:

This option is selected in the second digit of the OP code, with this encoding:

n	Trigger voltage level in volts dc/ac
0	Dependent triggering
1	24 Vdc/Vac
2	48 Vdc/Vac
3	60 Vdc/Vac
4	72 Vdc/Vac
5	96 Vdc/Vac
6	110 Vdc/Vac
7	125Vdc/Vac
8	220 Vdc/Vac