

# 407 relay - Latching, safety critical, 40 contacts

## Datasheet



### Description

The 407 is a latching relay with 2 stable magnetically latched states. When 1 coil is energized, the relay actuates from magnetically latched position 1 to 2. When the other coil is energized, the relay actuates back from magnetically latched position 2 to 1.

The Relay has 40 double break contacts (Form X & Y - per customers specification) in all N/O and N/C combinations and with weld no transfer feature as standard. The plug-in design offers secure locking feature for maximum ease of maintenance (no wires need to be disconnected or other hardware removed for relay inspection or replacement).

The 407 relay can be plugged in the COR OU type socket.

### Application

The 407 latching relay is especially built for double driver desk equipped locomotives and used to switch all controls of a drivers desk in a locomotive at once to the other driver desk on the other side of the locomotive. It is also used in track side applications to give the opportunity to install a new train control system. The relay can be used to commute during the night from an existing system to a new system. In that case the authorities allow the new contractor to work only during the night and for a limited number of hours. The relay saves time by eliminating the time consuming task of verifying each time the connection and disconnection of the existing system to the new system.

### Features

- Latching relay using 2 separate coils and magnetic rocker mechanism
- Plug-in design with secure locking feature for maximum ease of maintenance
- 40 double break contacts in all N/O and N/C combinations
- Weld-no-transfer safety contacts standard
- Positive mechanical keying of relay to socket is done during manufacturing

### Benefits

- Proven reliable
- Long life cycle
- Easy to maintain and replace
- Used in safety critical operation
- Low life cycle cost
- No maintenance

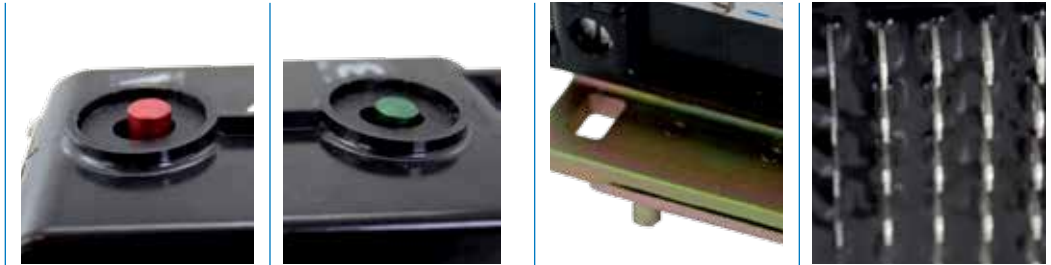
### Railway compliancy

- NF F 62-002 Rolling stock Instantaneous relays and sockets
- NF F16-101/102 Fire behaviour - Railway rolling stock (approved to go on the English/French train channel shuttle)

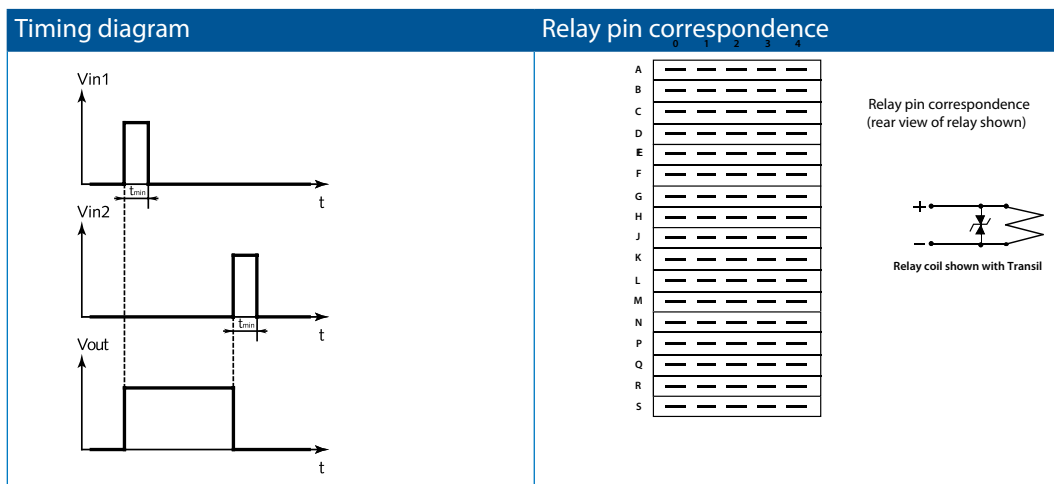


# 407 relay

## Technical specifications



### Functional diagram



# 407 relay

## Technical specifications

### Connection diagrams

**Connection diagram 1**

Coil 1  
+ A0  
- A1

B0 to B4  
D0 to D4  
F0 to F4  
H0 to H4  
K0 to K4  
M0 to M4  
P0 to P4  
R0 to R4

C0 to C4  
E0 to E4  
G0 to G4  
J0 to J4  
I0 to I4  
N0 to N4  
Q0 to Q4  
S0 to S4

Coil 2  
+ A3  
- A4

Contact arrangement  
15 NC and 25 NO

Relay operation:  
To operate this relay, it is recommended that the coil be actuated with a pulse of 200 ms minimal duration. Assuming that before any voltage is applied to either coil all contacts are as shown in the left schematic, operation is as follows:

When a signal is applied to terminals 'Coil 1 A0-A1', the relay actuates closing all N/O contacts and opening all N/C contacts (shown in schematic) and magnetically latches in this new position.

A subsequent signal supplied to terminals 'Coil 2 A3-A4' actuates the relay contacts back to their former position (as shown in schematic) and magnetically latches in this position.

Note: a pulse of 200 ms minimal duration is required to operate the relay and that only one coil can be energized at a time.

**Connection diagram 2**

This coil controls closing of N/O contacts and opening of N/C contacts.

This coil controls closing of N/C contacts and opening of N/O contacts.

(Shown with optional transil protection)  
Contact arrangement 20 N/C and 20 N/O  
Schematic of operation

Operation:  
This relay is designed for actuation of the coil with a permanent voltage. Assuming that before any voltage is applied to either coil, all contacts are as shown in above schematic, operation is as follows:

When coil 1 (a0-a1) is energized, knob B (green colour) goes and remains down. When coil 2 (a3-a4) is energized, knob A (red colour) goes and remains down while knob B goes and remains up.



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## Technical specifications

### Coil data (other voltages on request)

U <sub>nom</sub> (VDC)	U <sub>operating</sub> (VDC)	P <sub>nom</sub> (W)	R <sub>coil</sub> (Ω) <sup>(1)</sup>	L/R coil 1 (ms) <sup>(2)</sup>	L/R coil 2 (ms) <sup>(2)</sup>
72	48 / 90	2.6	2000	70	50
24	16 / 33	2.6	220	70	50
110	75 / 138	3	4600	70	50

(1) Coil resistance tol.: ± 8% at 20° C, (2) Valid for closed relay.

### Contact data – standard version (Ag contacts)

Nominal current	8 A resistive
Nominal breaking capacity and life	2.4 A at 72 VDC      L/R : 0 ms      Electrical life: 3 x 10 <sup>6</sup> ops 0.8 A at 72 VDC      L/R : 30 ms      Electrical life: 3 x 10 <sup>6</sup> ops
Contact closure pick-up time	Coil 1: ≤ 75 ms / Coil 2: ≤ 75 ms
Contact opening drop-out time	Coil 1: ≤ 75 ms / Coil 2: ≤ 75 ms
Minimum contact continuity	20 mA at 24 VDC
Number of contacts	40 double break contacts (Forms X & Y)
Contact material	Hard silver overlay laminated to copper
Contact resistance - initial	18 to 25 mΩ

### Electrical characteristics

Dielectric strength	2200 VAC, 1 m > 1500 VAC 1m for 24VDC coil
Insulation resistance	≥ 1000 MΩ at 500 VDC

### Environmental & mechanical characteristics

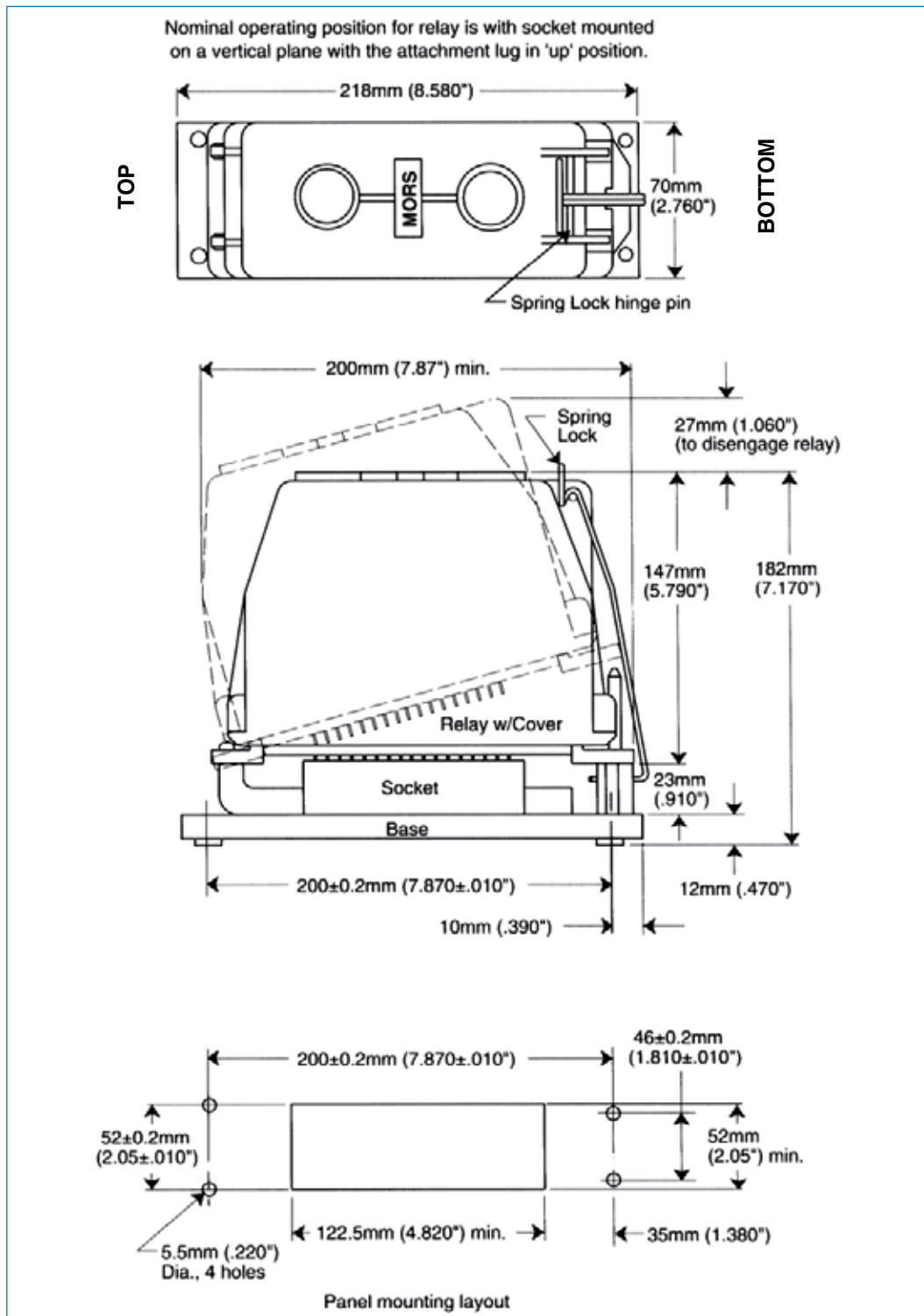
Operating temperature	- 50 °C...+70 °C
Humidity	Meets the requirements of NFC 20603 category 3B and NFC 20604 category 4B
Environmental	Meets the provisions of specifications NF C 20600: 25/070/04.
Operating position	Maybe mounted in any attitude, however, see recommendations in Installation section
Contact life (mechanical)	100 million cycles
Weight	1.8 kg (63.9 ounces)
Vibration	The tests are conducted in the X, Y & Z planes at resonant frequency between 5 & 50 cycles at 1 g, or if indeterminate at 10 Hz (sinusoidal)
Shock	The shock is applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 15 g, 11 milliseconds
Protection	IP40 (relay on socket)
Materials cover	Phenolic compound
Materials base	Polyester



# 407 relay

## Technical specifications

### Dimensions (mm)



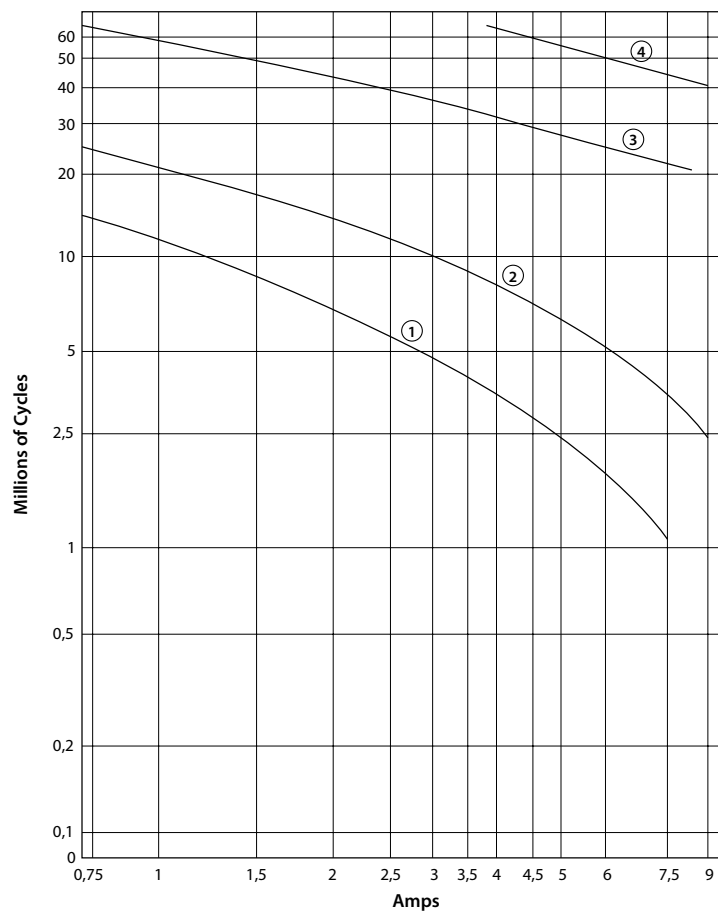
# 407 relay

## Technical specifications

### Dynamic relay selection curve No 1

AC Current breaking capacity versus life expectancy in millions of cycles.  
 Rate of contacts opening and closing = 1200 operations per hour.  
 Curves shown for resistive load (Power factor = 1)

Curves	1	2	3	4
VAC	220	125	48	24



# 407 relay

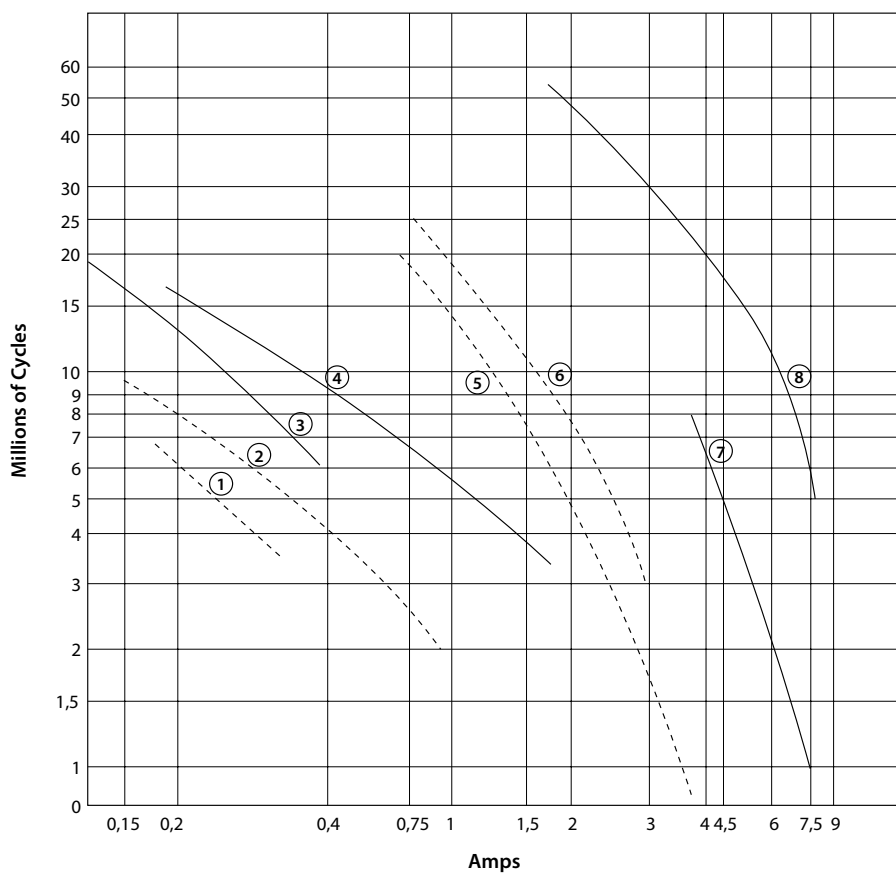
## Technical specifications

### Dynamic relay selection curve No 2

DC Current breaking capacity versus life expectancy in millions of cycles.  
 Rate of contacts opening and closing = 1200 operations per hour.  
 Curves shown for inductive loads:.

- L/R - 20 ms continuous current
- - - L/R = 40 ms continuous current

Curves	1-3	2-4	5-7	6-8
VDC	220	125	48	24



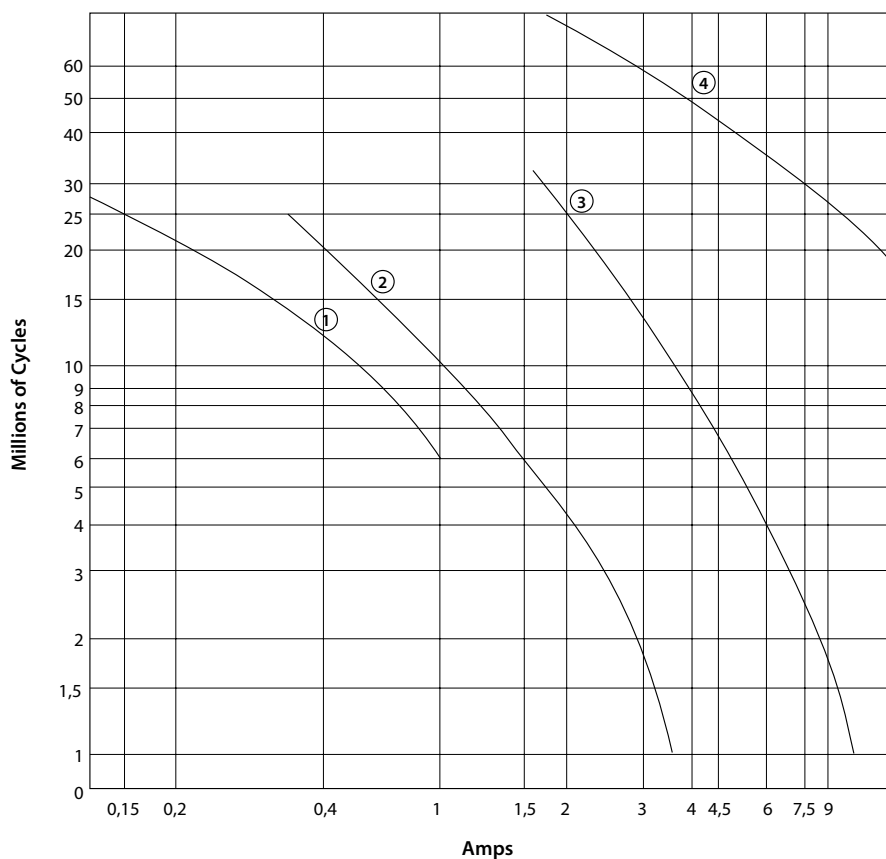
# 407 relay

## Technical specifications

### Dynamic relay selection curve No 3

DC Current breaking capacity versus life expectancy in millions of cycles.  
Rate of contacts opening and closing = 1200 operations per hour.  
Curves shown for resistive load ( $L/R = 0$ ). Continuous current.

Curves	1	2	3	4
VDC	220	125	48	24





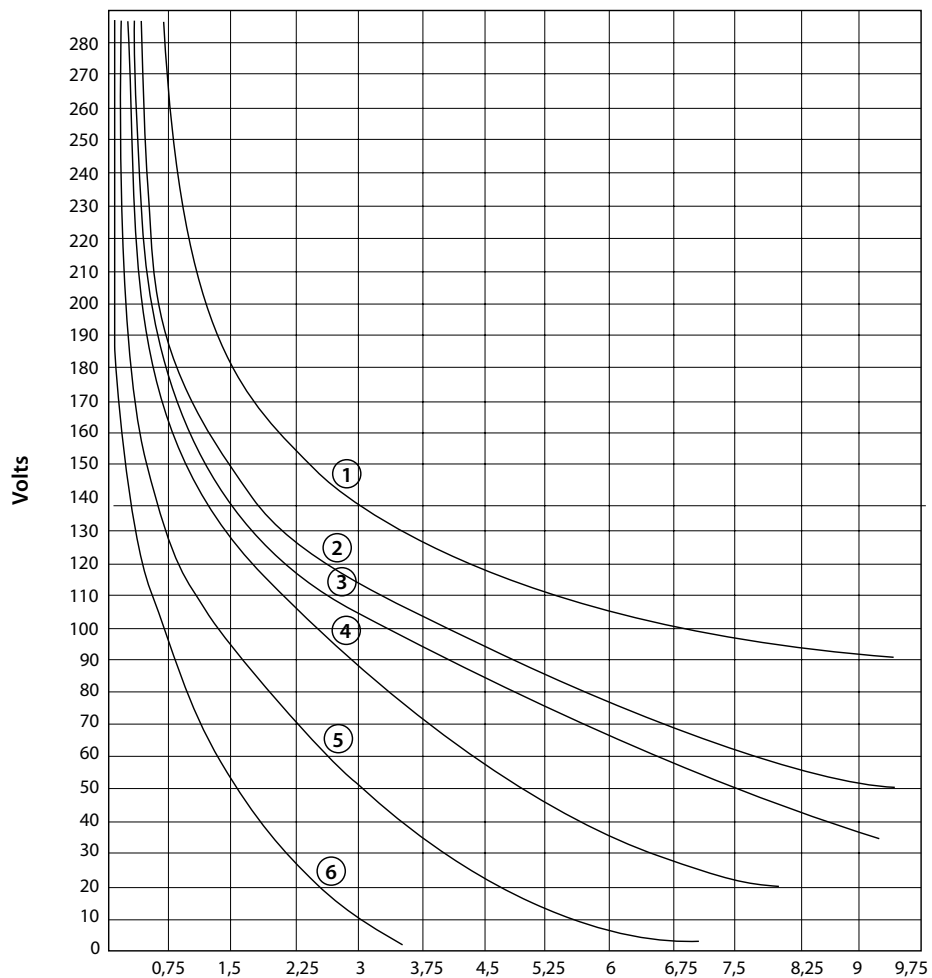
# 407 relay

## Technical specifications

### Dynamic relay selection curve No 4

Maximum contact breaking capacity versus voltage for a given L/R.  
 Rate of contacts opening and closing = 600 operations per hour.  
 Curves shown for resistive load (L/R = 0) and inductive loads, continuous current.

Curves	1	2	3	4	5	6
L/R	0 ms	15 ms	20 ms	40 ms	60 ms	100 ms



# 407 relay

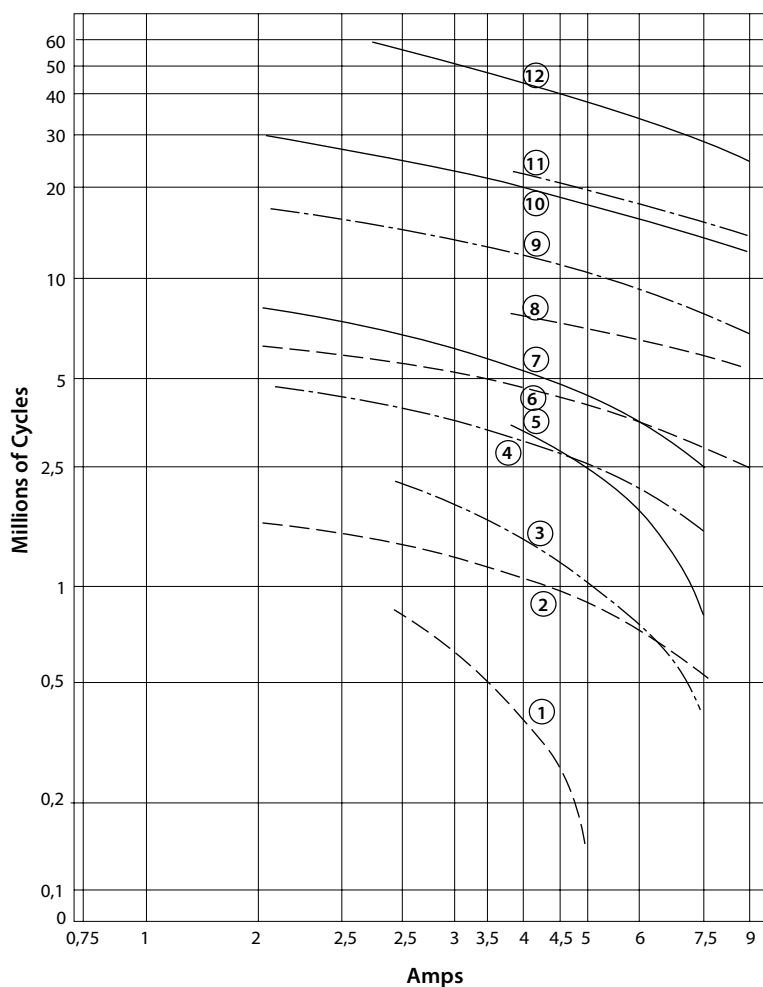
## Technical specifications

### Dynamic relay selection curve No 5

AC Current breaking capacity versus life expectancy in millions of cycles.  
 Rate of contacts opening and closing = 1200 operations per hour.  
 Values shown for inductive loads:

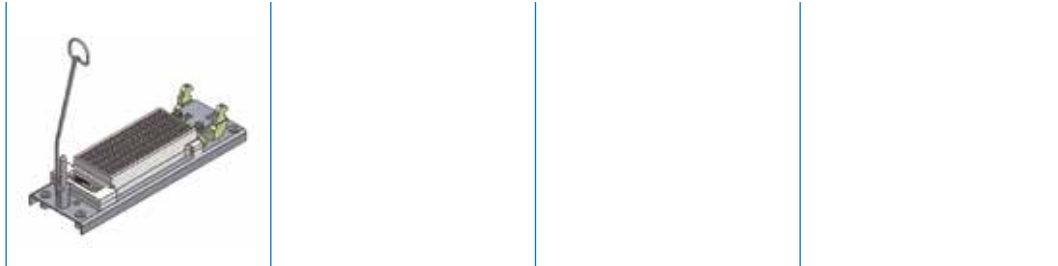
- Cos  $\varnothing$  = 0.7
- - - Cos  $\varnothing$  = 0.5
- - - - Cos  $\varnothing$  = 0.3

Curves	1,3 & 4	2, 5 & 7	6, 9 & 10	8, 11 & 12
VAC	220	125	48	24



# 407 relay

## Mounting possibilities



COR OU type

## Mounting possibilities/sockets

### Panel/flush mounting

COR OU XX	Socket - Alkyd compound
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*\* X indicates relay keying code*



# 407 relay

## User specifications

### Installation

Install socket and connect wiring correctly according identification to terminals. Plug relay into socket. Reverse installation into socket not possible due to mechanical blocking by snap-lock.

Don't reverse polarity of coil connection.

Relays can be mounted (tightly) next to each other and in any attitude. However, we recommend the following:

- If the relay is mounted **vertical**; the direction of contact closure should be oriented transverse to the direction of forward motion.
- If the relay is mounted **horizontal**; the direction of contact closure should be oriented so that gravity will cause the contacts to revert to their de-energised position.

**Warning!** Never use silicon near by relays

### Operation

Before operating always apply voltage to coil to check correct operation.

Long term storage may corrode the silver on the relay pins. Just by plugging the relay into the socket, the female bifurcated receivers will automatically clean the corrosion on the pins and guarantee a good connection.

Do not use the relay in places with flammable gas as the arc generated from switching could ignite gasses.

### Maintenance

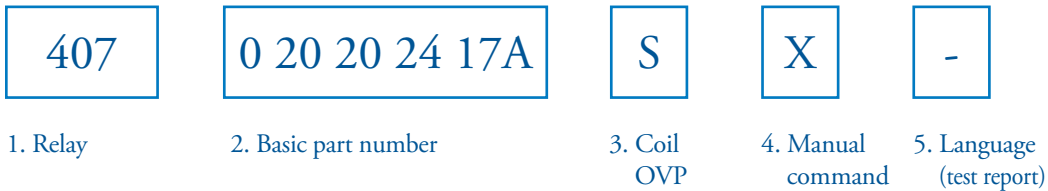
When the relay doesn't seem to operate correct, please check presence of coil voltage. Use a multimeter.

If LED is used, coil presence should be indicated. If coil voltage is present, but the relay doesn't work, a short circuit of suppression diode is possible (The coil connection was reversed). If relay doesn't work after inspection, please replace relay unit by a similar model. Send defective relay back to manufacturer. Normal wear and tear excluded.



# 407 relay

## Ordering scheme



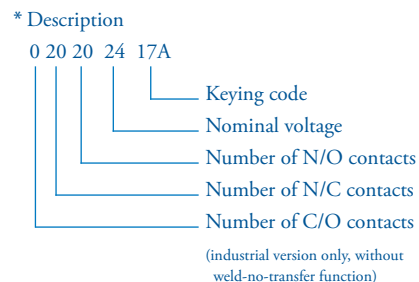
This example represents a 407 0 20 20 24 17A S X .  
 Description: 407 relay, contact configuration: 20 N/C + 20 N/O with  $U_{nom}$ : 24 VDC, transil coil protection, without manual command, test report in French

### 1. Relay

**407**

### 2. Basic part number\*

<b>0 15 25 72 6A</b>	15 N/C + 25 N/O - 72 VDC
<b>0 20 20 24 17A</b>	20 N/C + 20 N/O - 24 VDC
<b>0 15 15 110 6B</b>	15 N/C + 15 N/O - 110 VDC



### 3. Coil overvoltage protection

-	No coil protection
S	Transil coil protection

### 4. Manual command

-	With manual command
X	Without manual command

### 5. Language on test report

-	French
1	English
2	Spanish





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