COIL SUPPLY VOLTAGE

The power supply used by relays is characterized by a number of factors, and principally:

NOMINAL VOLTAGE (U_n): voltage value which is sufficient to actuate the contacts

OPERATING RANGE: the voltage range within which the relay functions correctly, expressed usually as a percentage of the nominal voltage

CONSUMPTION: power drawn by the relay during operation

DROP-OUT VOLTAGE: standard value (expressed as percentage of nominal voltage) defining the voltage at which drop-out/ de-energization of the relay is certain to occur.

Some applications require particularly wide operating ranges, for example 0.7 to 1.25 U_n in the case of electromechanical components used on rolling stock.

PROTECTION DEVICES

On a relay, when the power supply is discontinued, energy stored in the coil inductance creates an electromotive force contrary to that of the power supply. This stray voltage can reach values measured in thousands of volts. In this situation it is possible to install voltage suppression components, such as **FLYBACK DIODES**, **VARISTORS** or **TRANSIL DIODES**.

FLYBACK DIODE

The most widely adopted suppression component. This component provides a very low recirculation resistance for the energy accumulated at the terminals of the coil.

DIODE TRANSIL

UNIDIRECTIONAL TRANSILS

These block disturbances in one direction only, whereas in the presence of voltages with opposite polarity they respond as normal diodes.

BIDIRECTIONAL TRANSILS

These are installed in circuits where an alternating voltage is present; they consist of two Transil diodes connected in anti-series.

VARISTOR

A variable resistor (non-polarized), whose resistance value depends on the applied voltage.

MAIN FEATURES OF OUR RELAYS

CONTACT

TYPE

FORM C	FORM D
This operates on the principle of **Break Before Make** (BBM). When the coil is energized, the COM (common) pole first breaks electrical continuity with the NC (normally closed) pole, then establishes electrical continuity with the NO (normally open) pole. Versions available with 2 to 20 contacts.	This operates on the principle of **Make Before Break** (MBB).

SYMBOL DEFINITION

		
Normally open (Make)	Normally closed (Break)	Changeover (CO)

CONTACT LOAD

Depending on the type of load circuit to be broken, contacts can be specified with different materials or finishes, and mounted in conjunction with a magnetic blow-out function that helps to extinguish the electric arc generated by the electrical load to which the relay is connected. It is important to take note of the difference between the nominal current (range) of the contact and its **breaking capacity**:

- **NOMINAL CURRENT:** The current that can flow through a contact for an indefinite period of time without the contact suffering damage.
- **THE BREAKING CAPACITY:** Depending on its specific attributes, the relay can break high or low power loads. The breaking capacity, expressed in amperes, is the maximum level of current that can be broken by the particular relay under specific conditions.

By determining these parameters, it is possible to establish the electrical life expectancy of the contact/relay. The contacts of relays are subject to wear; depending on the type of use envisaged, the manufacturer indicates an electrical life expectancy and a mechanical life expectancy.

LIFE EXPECTANCY

ELECTRICAL	MECHANICAL
The number of successful operations that can be accomplished by a contact, breaking or making a given load circuit at a selected hourly frequency, with no impairment of its electrical specifications.	The number of successful operations that can be accomplished by a contact under no-load conditions (no electrical load) at a selected hourly frequency, with no impairment of specifications designed to ensure correct operation of the relay.

PROTECTION

MAGNETIC ARC BLOW-OUT	Permanent magnet allowing an electric arc to be extinguished more quickly, thus increasing the breaking capacity.
GOLD-PLATING OF THE CONTACTS	This has the effect of lowering surface resistance and enabling the conduction of lower currents than would be possible with an untreated contact.

POK relay with gold-plated contacts and terminals plus tropicalized coil.

MAIN FEATURES OF OUR RELAYS

CONTACT

ENVIRONMENTAL AND OPERATING CONSTRAINTS

To ensure that you choose the right relay for a given application, any environmental constraint must first be interpreted correctly.

Depending on the application for which it has been chosen, any relay may be exposed to diverse environmental constraints which may prevent correct operation and accelerate its deterioration if it is incorrectly assessed. The following factors need to be taken into consideration for correct analysis:

OPERATING TEMPERATURE RANGE	The ambient temperature at which the relay is required to operate. In the event of conditions being variable, worst case minimum and maximum values must be considered.
RELATIVE HUMIDITY	Percentage value indicating the level of ambient humidity; for values higher than 75 % and up to 95 %, selection of a relay with tropicalized coil is advisable.

RAIL, TRAM, TROLLEY AND METRO

In the case of transport applications (rail, tram, and metro), consideration must be given to the regulations governing this sector, with specify more stringent operating constraints than those of standard product regulations.

Harmonized European and extra-European standards tend to regulate the following parameters:

RESISTANCE TO SHOCK AND VIBRATION	These can damage the component or cause contacts to open spontaneously.
REACTION TO FIRE	The specified requirements are intended to protect passengers and crew in the event of fire breaking out on board.
OPERATING RANGE	The operating range is wider than indicated normally for standard electromechanical components, as relays can also be battery-powered.
OPERATING TEMPERATURE	In rolling stock, the temperature range will usually be wider than the range indicated for industrial applications.

ELECTRICAL POWER GENERATION

Electricity generating stations are complex environments. The loads supervised by control systems often use DC voltages, so the relay contacts must be suitable for switching these loads.

Nuclear, thermoelectric, hydroelectric and wind power installations are also required to withstand heavy duty, non-stop operating conditions. They impose particularly stringent requirements in terms of guaranteeing continuity of service and long-term reliability. In the case of hydroelectric and wind power generating facilities located in places where access is difficult (mountains or offshore platforms), maintenance costs tend to be high.

Particular care must also be taken where there are significant variations in temperature and vibration for these applications.

K3 QUALIFICATION	Category K3 (seismic stresses) corresponds to EDF qualification for use of our products in nuclear power plants.