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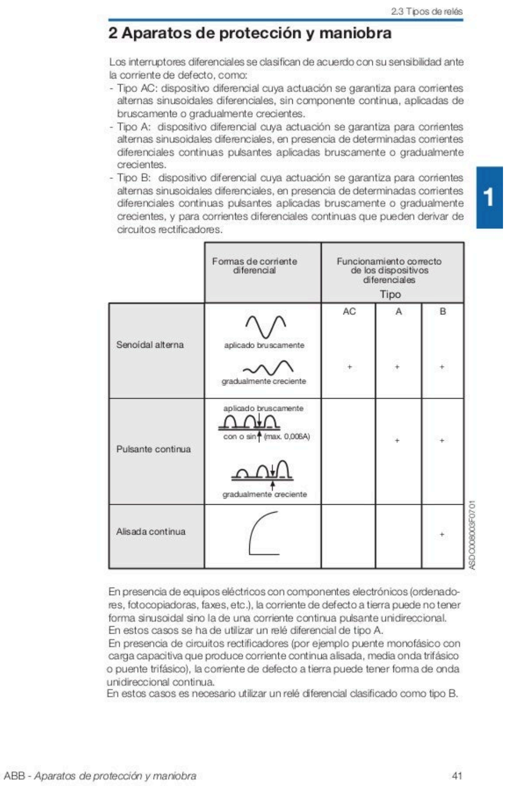
2.3 Tipos de relés

2 Aparatos de protección y maniobra

Los interruptores diferenciales se clasifican de acuerdo con su sensibilidad ante la corriente de defecto, como:
- Tipo AC: dispositivo diferencial cuya actuación se garantiza para corrientes alternas sinusoidales diferenciales, sin componente continua, aplicadas de bruscamente o gradualmente crecientes.
- Tipo A: dispositivo diferencial cuya actuación se garantiza para corrientes alternas sinusoidales diferenciales, en presencia de determinadas corrientes diferenciales continuas pulsantes aplicadas bruscamente o gradualmente crecientes.
- Tipo B: dispositivo diferencial cuya actuación se garantiza para corrientes alternas sinusoidales diferenciales, en presencia de determinadas corrientes diferenciales continuas pulsantes aplicadas bruscamente o gradualmente crecientes, y para corrientes diferenciales continuas que pueden derivar de circuitos rectificadores.

1

	Formas de corriente diferencial	Funcionamiento correcto de los dispositivos diferenciales Tipo		
		AC	A	B
Senoidal alterna	aplicado bruscamente gradualmente creciente	+	+	+
Pulsante continua	aplicado bruscamente con o sin (max. 0,006A) gradualmente creciente		+	+
Alisada continua				+

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En presencia de equipos eléctricos con componentes electrónicos (ordenadores, fotocopiadoras, faxes, etc.), la corriente de defecto a tierra puede no tener forma sinusoidal sino la de una corriente continua pulsante unidireccional.
En estos casos se ha de utilizar un relé diferencial de tipo A.
En presencia de circuitos rectificadores (por ejemplo puente monofásico con carga capacitiva que produce corriente continua alisada, media onda trifásico o puente trifásico), la corriente de defecto a tierra puede tener forma de onda unidireccional continua.
En estos casos es necesario utilizar un relé diferencial clasificado como tipo B.

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Fig. 2Dynamic characteristic of the circuit breaker.Fig. 2 The analysis of single line diagrams of low and medium voltage power systems, based on the data of the measurement campaign, also made possible the selection of suitable circuit breakers and the definition of the required characteristics for their operation. The choice of the appropriate parameters characterizing the behavior of the current carrying components of the circuit breaker has not been a simple task, due to the specific behavior of some components of the series electric circuit breaker and their mutual interactions. In fact, the design of this device can involve a difficult trade-off between an increase in the volume of the circuit breaker, resulting in a significant reduction of the maximum available current with a consequent rise in the electromagnetic and thermal effects in the components of the circuit breaker, or else the use of a device with a reduced volume and a consequent increase in the available current that however, would have an adverse effect on the electromagnetic compatibility and the electromagnetic radiation from the circuit breaker. In the present case, the following parameters were considered: effective resistance, the capacitor voltage and the winding inductance. The *effective resistance* is the resistance of the current carrying components of the circuit breaker from the electromagnet to the load and it represents the resistance of the circuit breaker in the current carrying mode. The series-connected inductance of the winding of the circuit breaker is equal to the sum of the windings of each phase in series. The effective resistance, the capacitor voltage and the windings inductance are among the parameters that characterize the functioning of the circuit breaker, and their determination is not trivial. The values of these parameters were extracted from the measurement campaign and evaluated based on their influence on the performance of the circuit breaker. The first objective of the circuit breaker is to limit the current in the circuit breaker. For this purpose, there are two ways of analysis that must be considered, namely: the *maximum operating current* and the *minimum triggering current* \[[@bib4]\]. The maximum operating current is the maximum value of the current that the circuit breaker can carry. It is an important parameter to evaluate the performance of the circuit breaker, especially in the presence of simultaneous switching of several sources. The first step to determine the maximum operating current is to analyze the maximum value of the current carried by the circuit breaker in the current carrying mode (DC), when the circuit breaker is fully switched on and the electronic trip is activated, as shown in [Fig. 3](#fig3){ref- 82157476af