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## **An Explanation of Discrimination**

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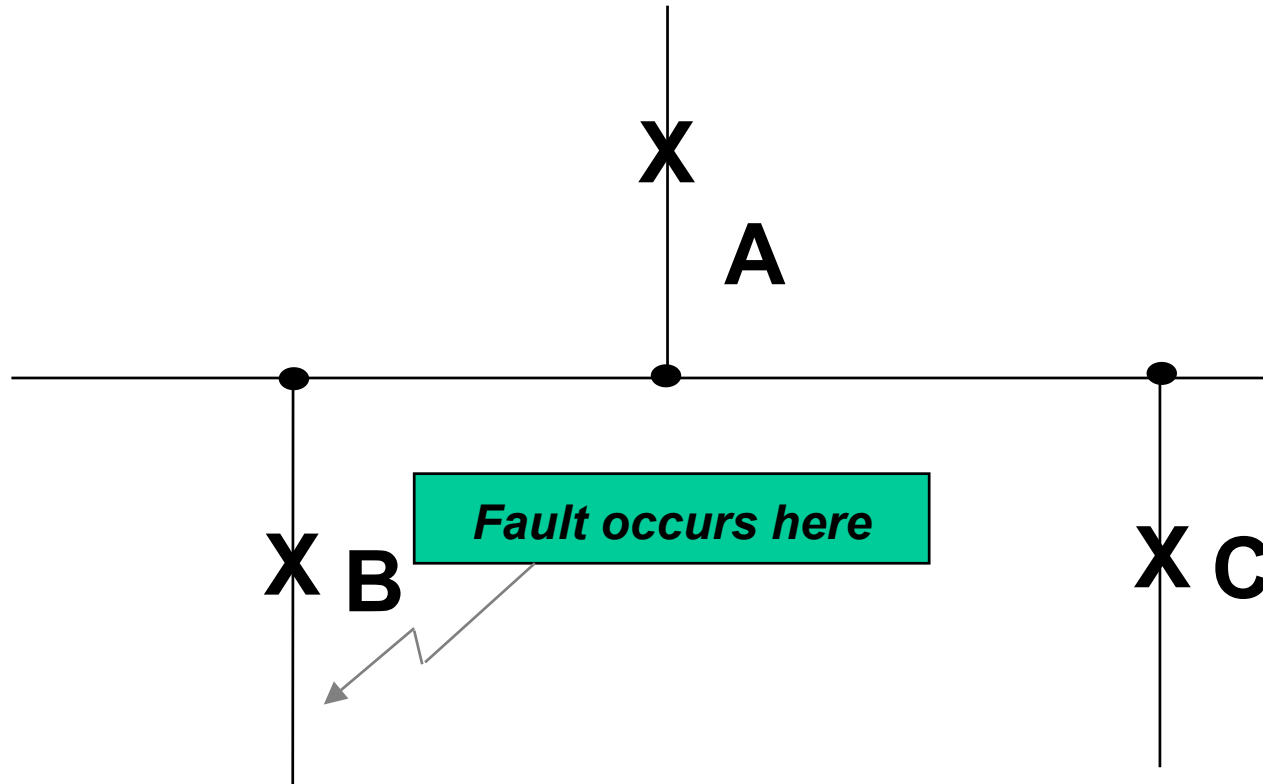
## Philosophy of protection

Circuit protection whether by fuse, circuit breaker or relays cannot prevent faults from occurring, however they can limit the damage that could occur if the fault current was allowed to continue to flow. When considering the co-ordination of circuit protection devices, we must not lose sight of the requirement to protect both personnel and the installation as the first and most important factor

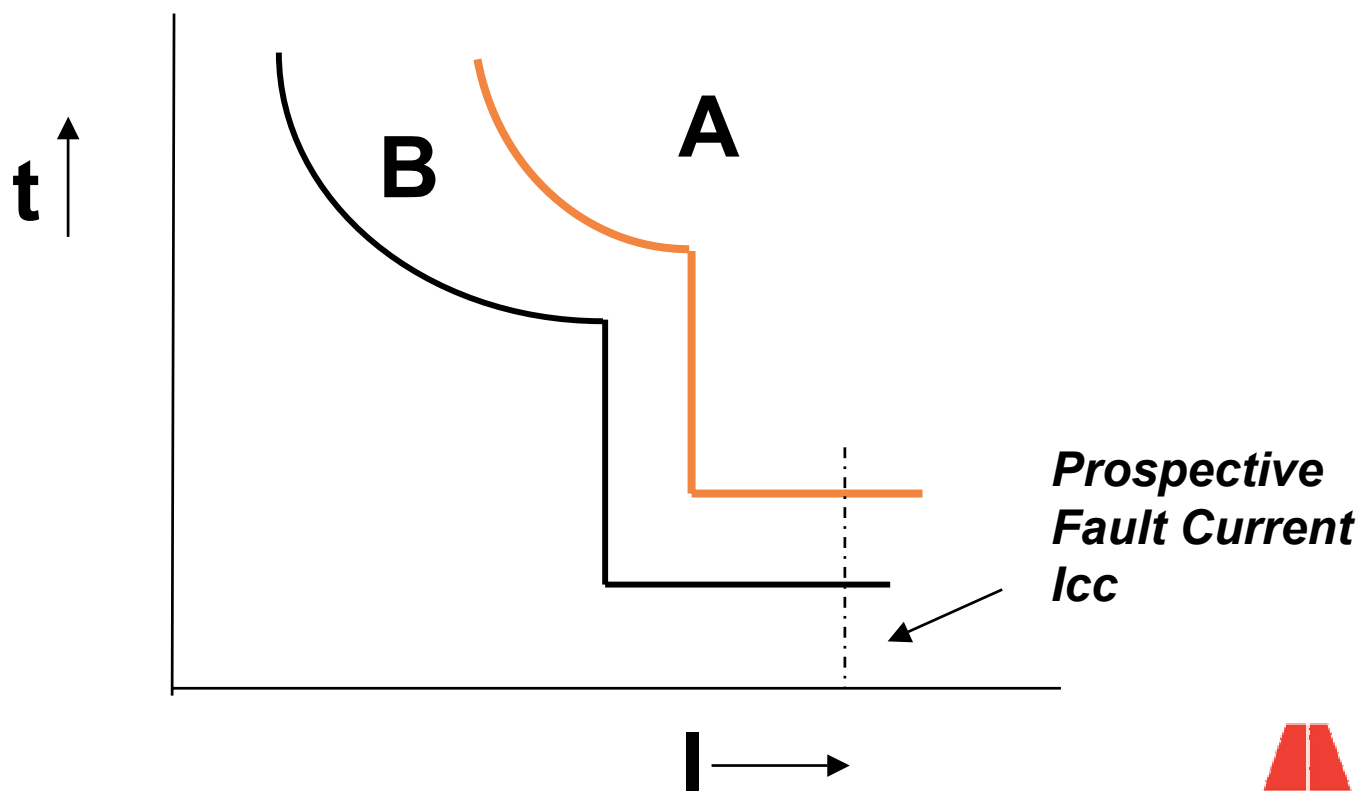
## Discrimination Philosophy

Once protection is assured at all points of an installation, the next step is to minimise the supply disruption a fault causes to fault-free areas of the installation – for example a fault in a microwave oven within a canteen area of a school should not cause the whole electrical supply to fail this is **Discrimination or Selectivity**

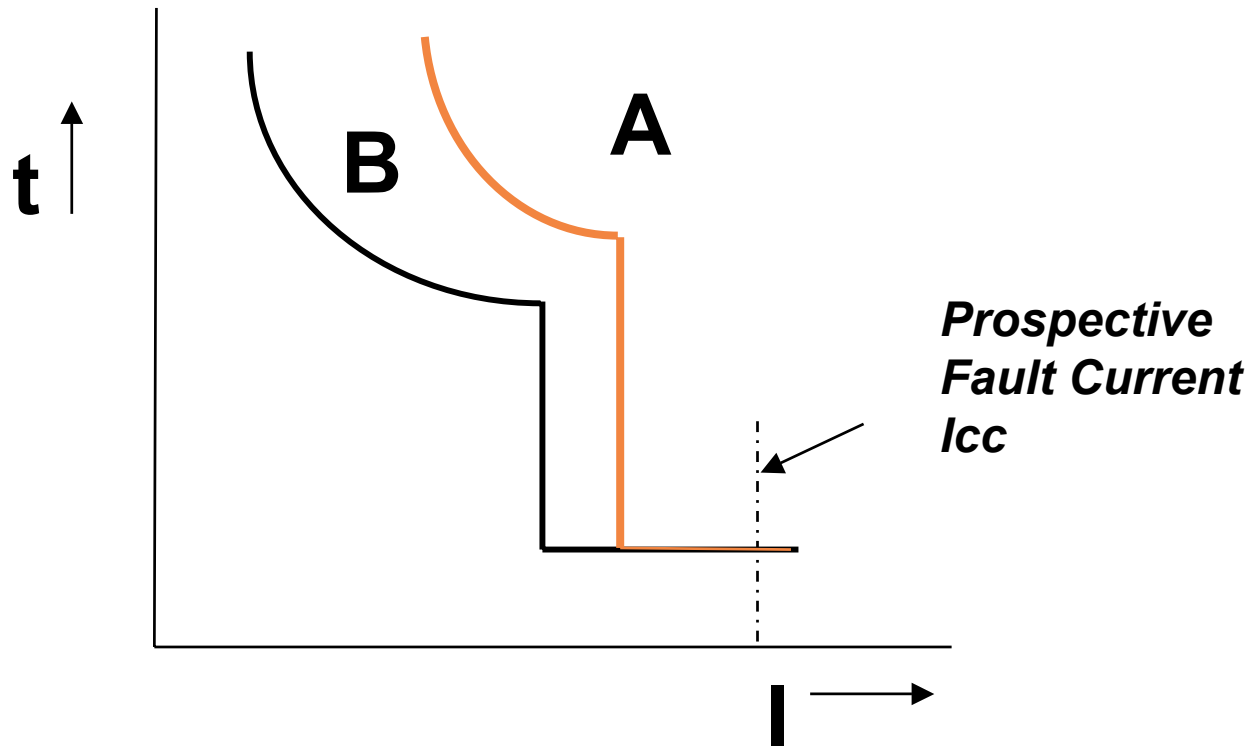
- Definition : Discrimination or Selectivity
  - To make it possible to isolate a part of an installation involved in a fault condition from the overall system such that only the device located immediately on the supply side of the fault intervenes



- Total Discrimination
  - This means that the isolation described occurs for all fault levels possible at each point of the circuit



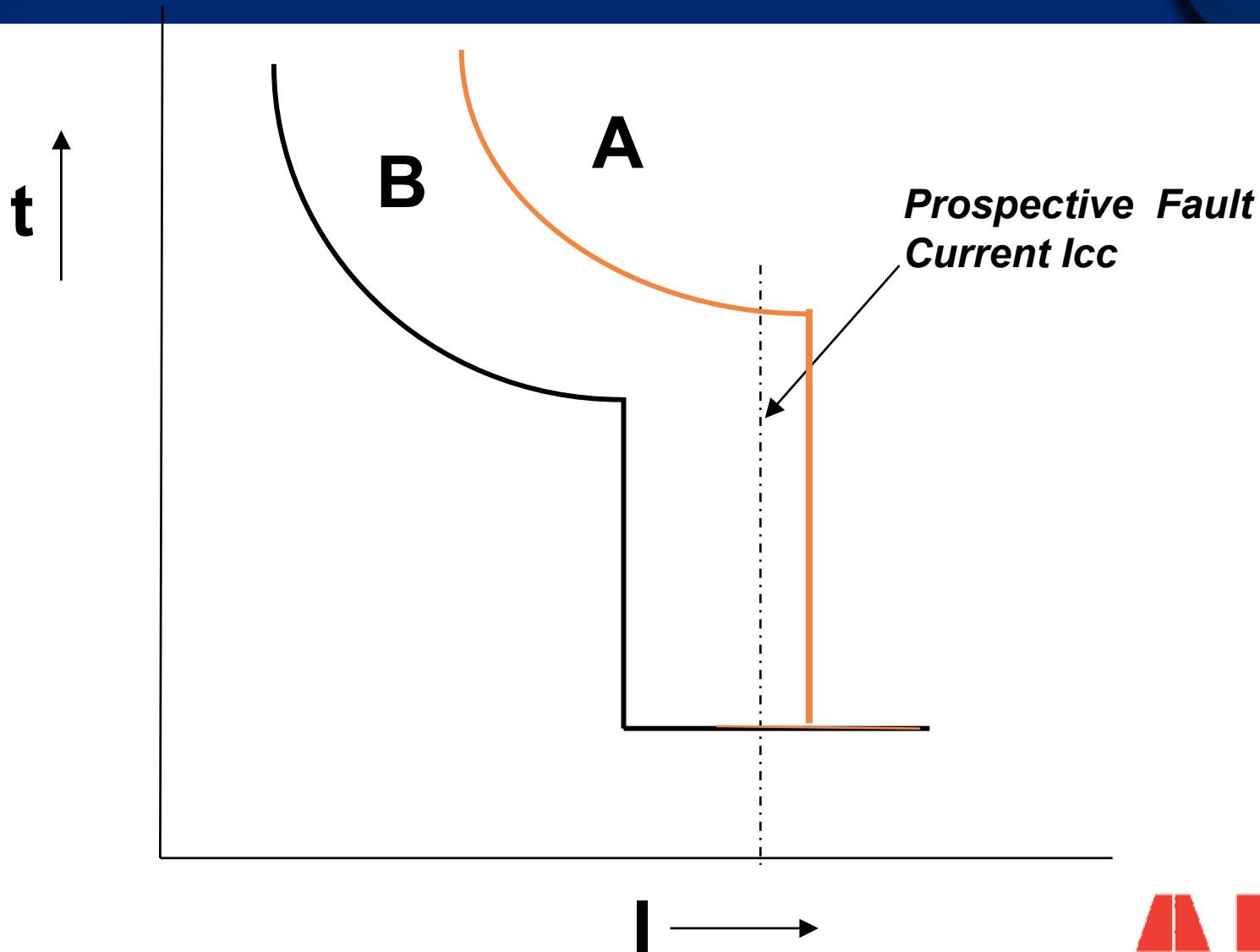
- Partial Discrimination
  - This means that above certain current levels there is simultaneous operation of more than one protection device



- Current discrimination
  - This type of discrimination is carried out using non current-limiting devices such as ACBs where discrimination is achieved by setting the trip threshold of the instantaneous magnetic releases of the devices to different values. The greater the difference between the rated currents of the devices, the more effective the discrimination
  - Current discrimination is total if prospective short circuit current is lower than the instantaneous magnetic trip of the supply device

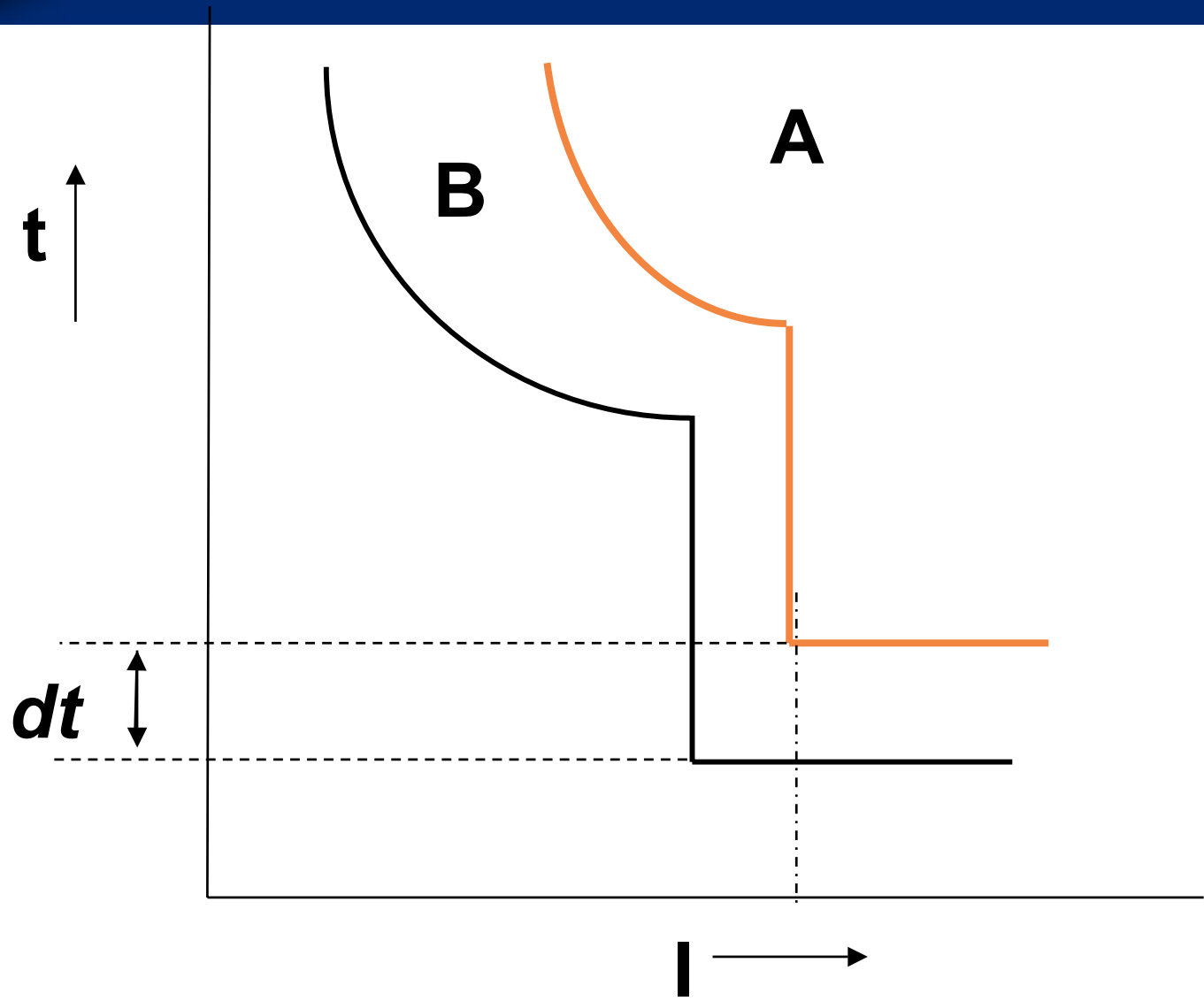


# Meet the experts



- Time discrimination
  - This type of discrimination is carried out using devices fitted with intentional trip delays sometimes called **Selective short circuit**
  - The following graph shows how the supply device intervenes with a set delay (dt) in relation to the load side device above a certain current threshold

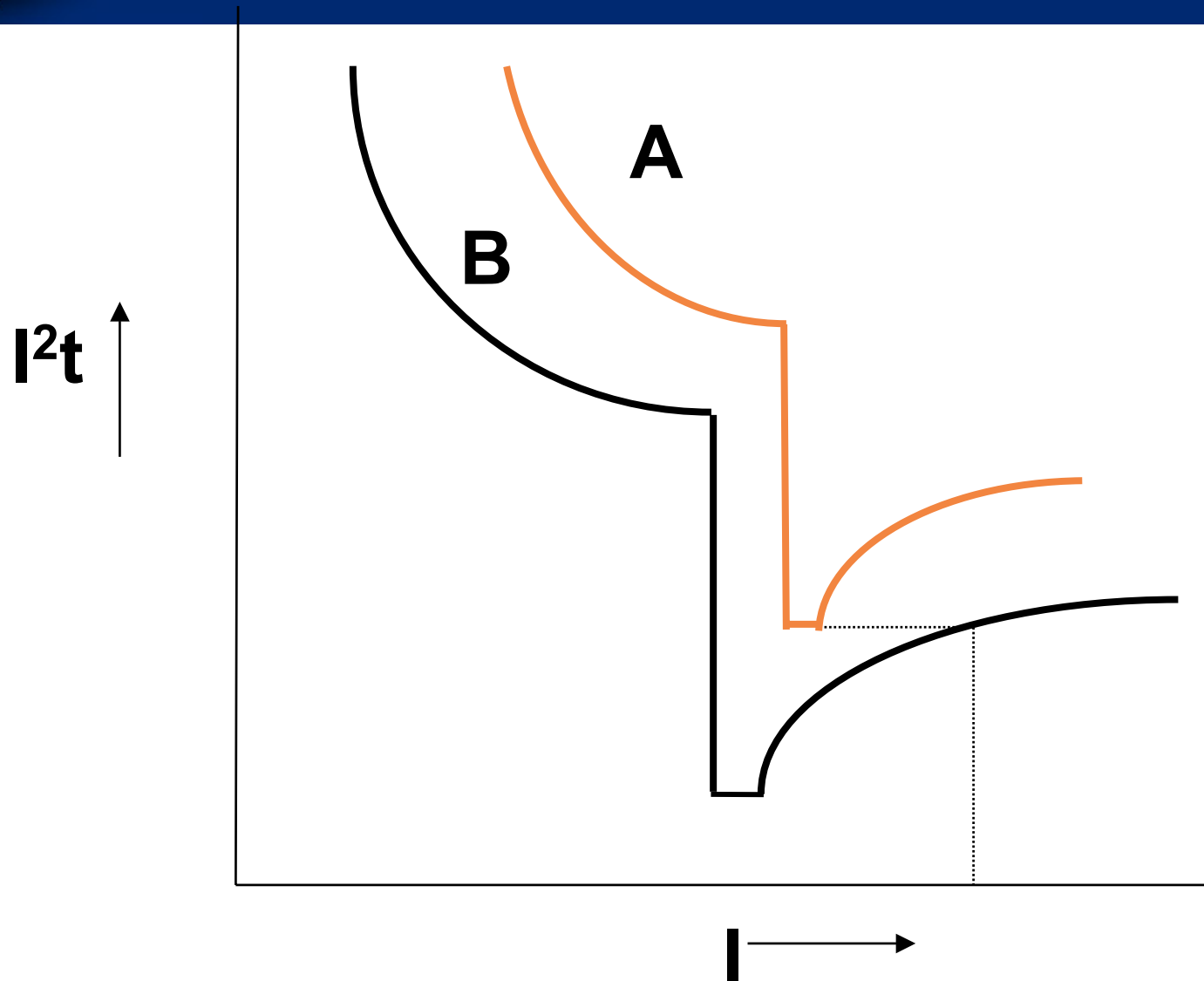
# Meet the experts



- Many Low Voltage protection devices such as Circuit breakers and Fuses have the ability to limit the peak of the current let through them to a value lower than the prospective short circuit peak.
- Any protective device which clears short circuits in less than  $\frac{1}{2}$  cycle of the sinusoidal wave (i.e 10mS for 50Hz) will current limit to a certain degree

- Energy Discrimination

- Energy based discrimination is the only way to determine true discrimination between current-limiting devices i.e. devices which have total breaking times less than 10ms at a frequency of 50Hz. These types of devices include Fuses, MCBs & most MCCBs
- Total discrimination is achieved if the amount of energy ( $i^2t$ ) let through by the load device is less than that required to activate the trip unit of the supply device
- Only practical way of determining full level of discrimination is by using the discrimination tables supplied by manufacturers



## Tmax T1 - S270 @ 400V

			Supply s.	T1										
			Version	B,C,N										
			Release	TM										
			I <sub>n</sub> [A]	160										
Load s.	I <sub>cu</sub> [kA]	Char.	I <sub>n</sub> [A]	16	20	25	32	40	50	63	80	100	125	160
S270	15	C	≤2	T	T	T	T	T	T	T	T	T	T	T
		C	3	T	T	T	T	T	T	T	T	T	T	T
		C	4	T	T	T	T	T	T	T	T	T	T	T
		B-C	6	5.5	5.5	5.5	5.5	5.5	5.5	10.5	T	T	T	T
		B-C	8		5.5	5.5	5.5	5.5	5.5	10.5	T	T	T	T
		B-C	10			3	3	3	4.5	7.5	8.5	T	T	T
		B-C	13				3	3	4.5	7.5	7.5	12	T	T
		B-C	16					3	4.5	5	7.5	12	T	T
		B-C	20						3	5	6	10	T	T
		B-C	25							5	6	10	T	T
		B-C	32								6	7.5	12	T
		B-C	40									7.5	12	T
		B-C	50										7.5	10.5
		B-C	63											10.5

## Any Questions?