Electronic trip units

FK frame

SMR1 range
SMR1e, s and g types are designed to allow the user to conveniently tailor his protection to meet individual circuit requirements. The available options include adjustable overload pickup values, overload trip time characteristics, short time pickup circuit values, short time delay circuit trip times and energy values. The trip unit can be equipped with a ground-fault protection and provides a flexible solution to all protection scenarios.

This easy-to-use trip unit with overload and selective short-circuit protection is equippeed with an overload signalling option and has a built-in temperature sensor to prevent the breaker and electrical components in its immediate vicinity from overheating. The 4 pole units are equipped with a switchable neutral protection option, allowing the user to set the neutral at 0, 50 or 100% of the phase ratings.

Overload protection LT (long time)
The **L**ong **T**ime or overload protection is adjustable from 0.4 to 1 x the chosed sensor ratings in 8 steps. The SMR1e has a fixed time band of 5seconds at 7.2 x Ir whilst the SMR1s and g variants have a choice of 5 time bands (**LTD**) each designed to match specific load characteristics. (For time band classes see EN 60 947-4.1).
All devices are equipped with three LED's for signalling purposes.
A green LED that indicates that the trip unit is powered up and is measuring and operating correctly. (30% of chosen sensor rating).
A yellow LED that will astart to blink at 95% of the set Ir current (3 flashes a second) when the current level reaches 105% of the Ir setting and a trip is imminent the LED will light up constantly.
An over temperature in the trip unit is clearly indicated on the breaker front face. On the SMR1s and G variants a over temperature will trip the breaker.

Short-circuit Protection ST (short time)
Offerering a selective protection against low value short-circuits the **S**hort **T**ime protection is settable from 1.5 to 10 x the adjusted LT protection (Ir).
The SMR1e has a fixed time band of 50 milliseconds, a setting that provides discrimination with downstream FG devices.
Tthe SMR1s and g variants have a choice of four time setting bands (**STD**), designed to allow selectivity between different breaker sizes. Here the **STD** device can be set to an 'energy curve mode' that changes the reaction of the device from a fixed delay and reaction time value when the set current level is reached to a reaction time that depends on the energy flowing in the circuit.

Ground fault protection
Designed for protection against indirect contact the ground fault device measures the vectorial sum of the three phase currents and, if present, that of the neutral conductor. If the sum of these values exceeds the set current thresholds for a period of time greater than the set time delay, the breaker is tripped.
The **G**round **F**ault protection option is adjustable from 0.1 to 1 x the chosed sensor ratings in 4 steps. The user can also define one of 4 delay time bands (**GFD**) designed to allow selectivity between different sensor ratings. The groundfault device is available in the SMR1g trip unit type.

Short-circuit Protection I (instantaneous)
Offerering a protection against short-circuits the Instantaneous protection is set at a fixed value depending on the chosen frame/ contact size. The **I** device has no time delay band so that the breaker trips as immediatley when the set threshold is reached. The fixed instanatneous (**I**) is set at a current value allows discrimination between different frame sizes and at a level that limits the current and thermal stress in the protected circuit

Zone Selective Interlock
A device that allows the user to achieve selectivity combined with the fastesrt possible fault reaction time. With connected ZSI the SMR1s and SMR1g trip unit will always trip the breaker as quickly as possible, ignoring the time delays set by means of the **STD** or **GFD** devices. However when a **ZSI** signal is recieved from a downstream breaker equipped with an SMR1a, 1g and 2 the **STD** or **GFD** of the upstream device reverts to wherever the adjustment is set. The Ground Fault and Short Time Zone Selective Interlock signals are shared on one in/out put .
The device only works when auxiliary power is present and operates up to a distance between breakers of 1 kilometer. The use of shielded cable is required. A maximum of five SMR 1s, g or SMR2 trip units can be linked in this manner. (not available in the SMR1e)

Use and Testing

Each SMR1e, s or g trip unit comes with a transparent, tamper-free (sealable) cover, this to prevent unauthorized manipulation of the breaker settings. The device is supplied with an electronic actuator coil that fits into a pocket in the breaker housing and is then connected to the trip unit. In order to verify a correct operation of the combination a simple test device is available to test the assembly.

We strongly recommend the use of this test device.

Connection of trip unit

Each SMR1 s or g trip unit has a connector located on the right side of the breaker. This connector is normally hidden behind a break-away cover and is required to connect the following:

Auxiliary power supply (24V DC), ZSI in and out, long time pre-alarm signal, connection of external CT for 4 pole groundfault on three pole breakers.

FK800, FK1250 and FK1600 breakers - Electronic trip unit overview

FK frame					Electronic trip unit overview									
					In	LT pick-up band 1.05÷1.3 Ir			ST pick-up band ± 20% Im			Neutral protection Switchable type		
					[A]	Ir setting	min [A]	max [A]	Im setting	min [A]	max [A]	4P4T	4P 3TN	4P3T
SMR 1e	N	H	L	FK800	800	0.4 x1 In in 8 steps	320	800	1.5-10 Ir in 8 steps	480	8000	=Ir	=Ir/2	not protected
				FK1250	1000		400	1000		600	6000	=Ir	=Ir/2	
					1250		500	1250		750	12500	=Ir	=Ir/2	
				FK1600	1600		640	1600		960	16000	=Ir	=Ir/2	
					In	LT pick-up band 1.05÷1.3 Ir			ST pick-up band ± 20% Im			Neutral protection Switchable type		
					[A]	Ir setting	min [A]	max [A]	Im setting	min [A]	max [A]	4P4T	4P 3TN	4P3T
SMR 1s	N	H		FK800	800	0.4 x1 In in 8 steps	320	800	1.5-10 Ir in 8 steps	480	8000	=Ir	=Ir/2	not protected
				FK1250	1000		400	1000		600	6000	=Ir	=Ir/2	
					1250		500	1250		750	12500	=Ir	=Ir/2	
				FK1600	1600		640	1600		960	16000	=Ir	=Ir/2	
						LTD(1)			STD(2)					
						Setting	min [sec.]	max [sec.]	Setting	min [msec.]	max [msec.]			
						10	8	12	0.1	0.095	0.17			
						20	16	24	0.2	0.175	0.29			
						30	24	36	0.3	0.255	0.41			
					In	LT pick-up band 1.05÷1.3 Ir			ST pick-up band ± 20% Im			Neutral protection Switchable type		
					[A]	Ir setting	min [A]	max [A]	Im setting	min [A]	max [A]	4P4T	4P 3TN	4P3T
SMR 1g*	N	H		FK800	800	0.4 x1 In in 8 steps ❶	320	800	1.5-10 Ir in 8 steps ❸	480	8000	=Ir	=Ir/2	not protected
				FK1250	1000		400	1000		600	6000	=Ir	=Ir/2	
					1250		500	1250		750	12500	=Ir	=Ir/2	
				FK1600	1600		640	1600		960	16000	=Ir	=Ir/2	
						LTD(1)			STD(2)					
						Setting	min [sec.]	max [sec.]	Setting	min [msec.]	max [msec.]			
						5	4	6	0	0.015	0.05			
						10 ❷	8	12	0.1	0.095	0.17			
						20	16	24	0.2 ❹	0.175	0.29			
						30	24	36	0.3	0.255	0.41			
						GF pick-up band ± 20% Im				GFD(2)				
						Ig setting	min [sec.]	max [sec.]	Setting	min [msec.]	max [msec.]			
						❺ 0.1 x1 In in 4 steps	80	1000	0.1	0.095	0.17			
							100	1250	0.2	0.175 ❻	0.29			
							128	1600	0.3	0.255	0.41			

(1) At 7.2 x Ir : Min. is minimum settable delay: Max: Is maximum total tripping time.
(2) At set value : Min. is minimum settable delay: Max: Is maximum total tripping time.

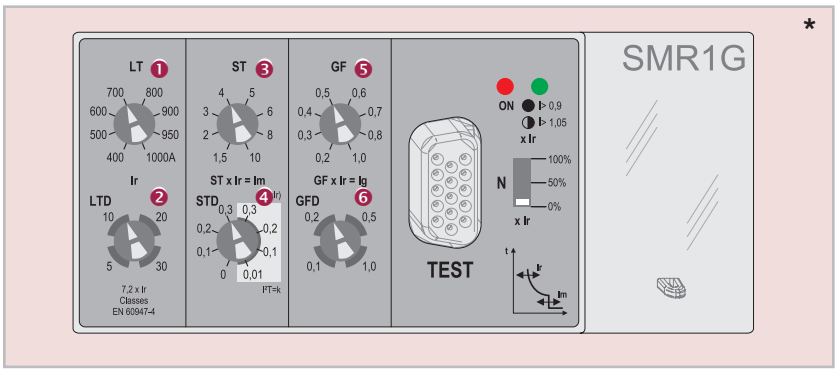
Trip units are available in 4 ratings and 3 different versions depending on the frame rating and the chosen functionality.

FK800 frame size
800A, SMR 1e, s or g

FK1250 frame size
1000 and 1250A,SMR 1e, s or g

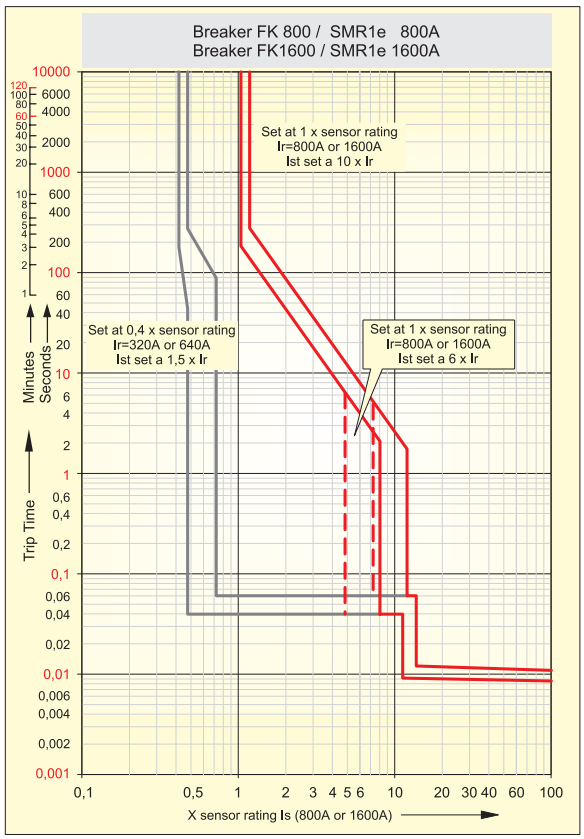
FK1600 frame size
1600A,SMR 1e, s or g

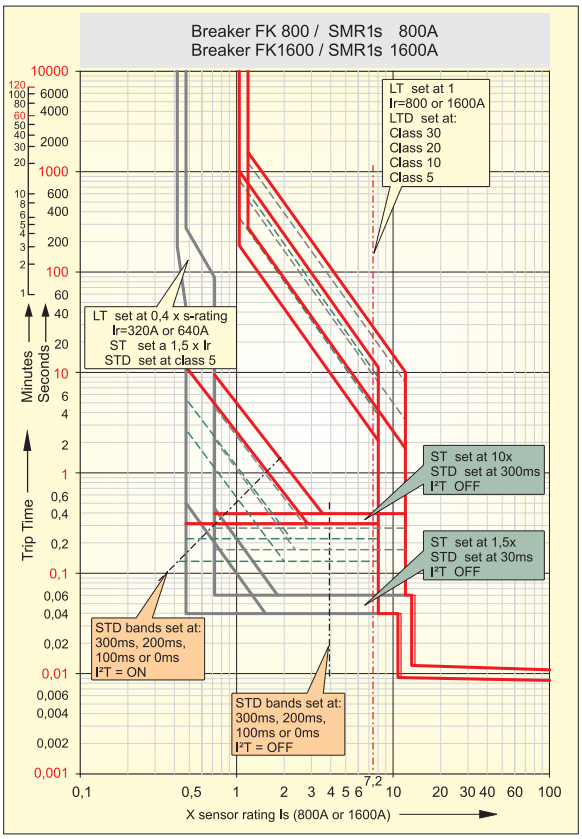
The trip units are an integral part of the breaker and are NON interchangeable.

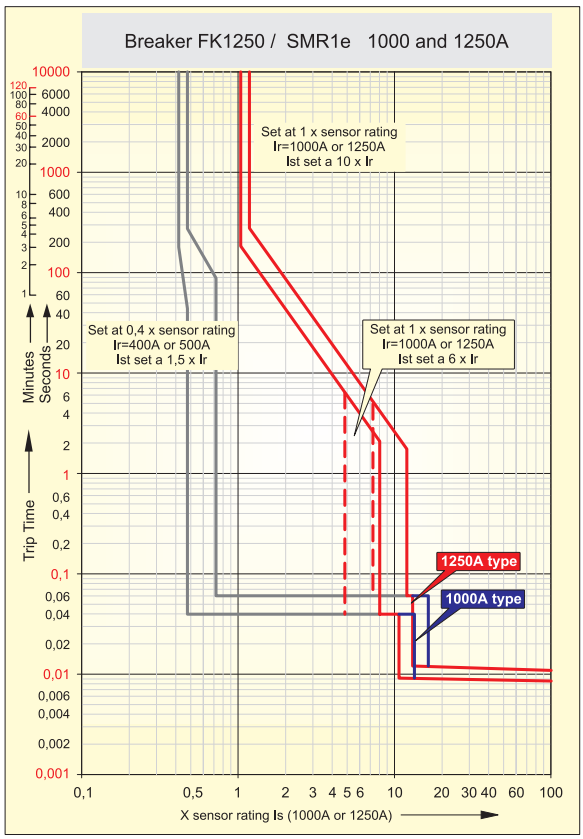


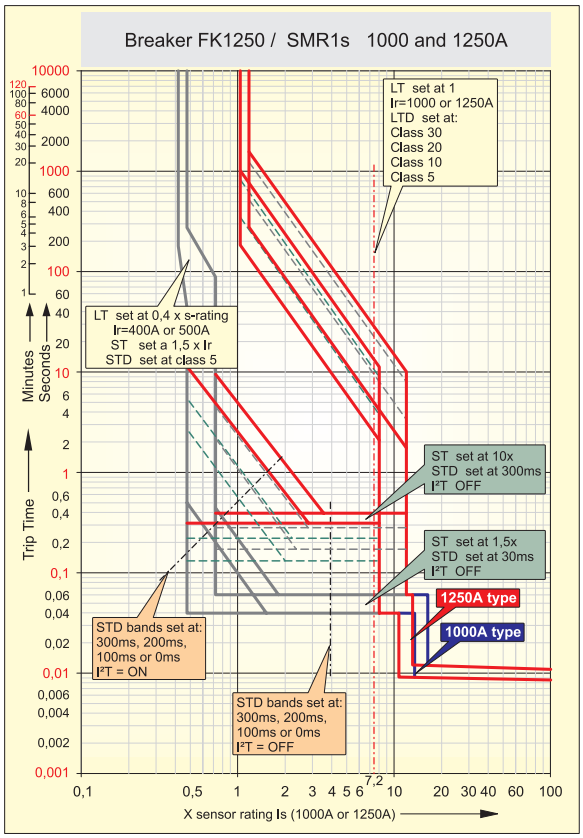
Time Current Curves

FK frame

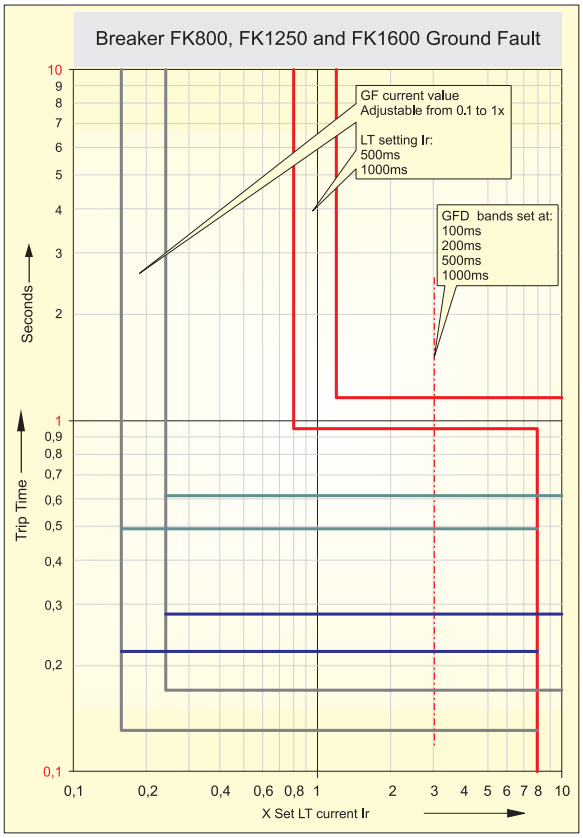


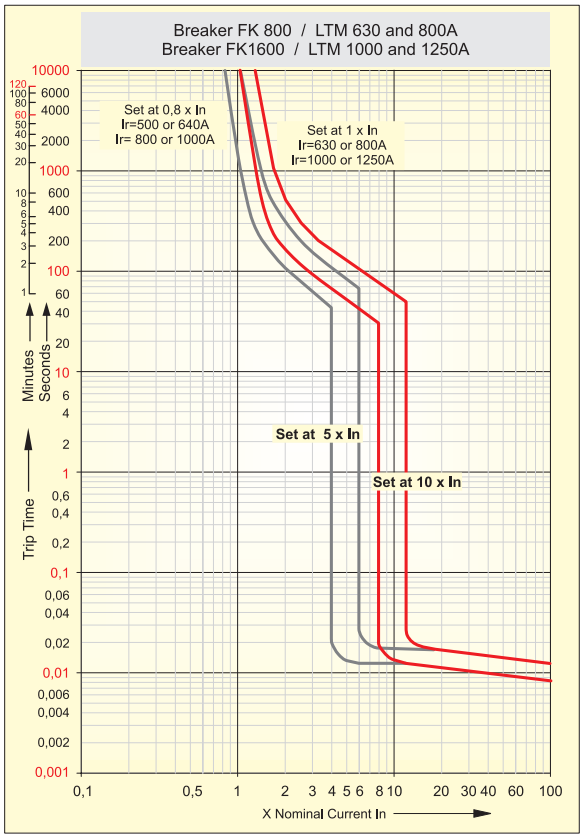


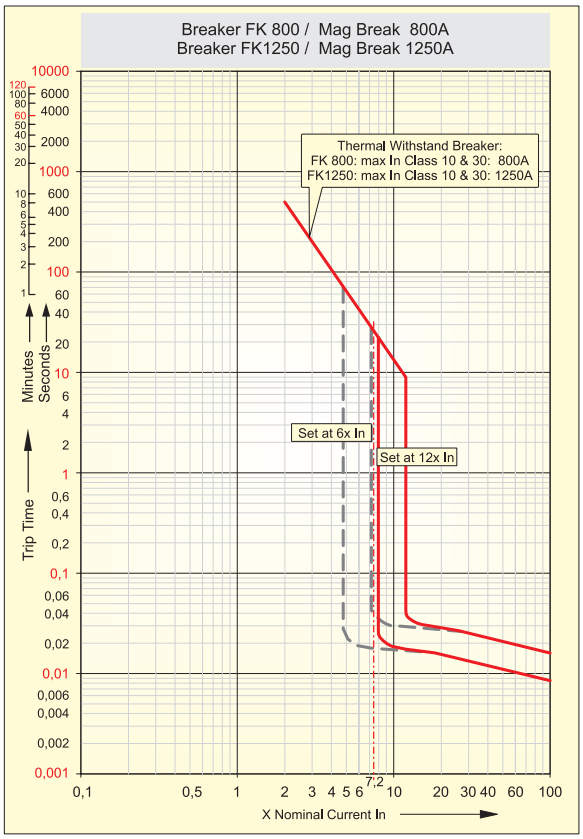




Time Current Curves







Electronic Trip Units

Accessories for SMR1 and SMR2 types

Long time module SMR1 (FAMLT)(1)

This external DIN-rail mounted device with modular dimensions is directly connected to the SMR1electronic trip unit. The device is equipped with a NC 1A/400V AC contact that opens to a signal which indicates that a LT trip will shortly be initiated by the SMR1. The SMR1 emits this before a trip action is initiated. When set to motor protection this occurs 0.5 seconds before the tripping event and at 0.05 seconds when set to line protection. Module remains on until breaker is reset

Test kit SMR1 & SMR2 (FAT) and SMR1e,s,g (FNT)

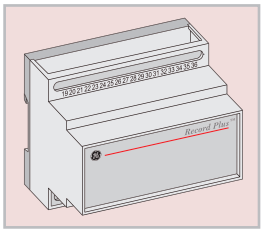
Designed to test the actuator trip unit combinations the device is plugged into the test jack on the trip unit front face. Just remove the test jack cover, insert and plug in the test device.
Releasing the push button on the tester FAT front should now initiate a trip event.The tester requires a 9V battery and is also equipped with a battery status indicator.
FNT initiates a trip event when the push buttom is depressed more than two seconds. It requires an external 9V supply.

Rating plug tool SMR1 & SMR 2 (FAR)

A rating plug can be removed by using two small screwdrivers.
In case of repeated removal the ***Record Plus™*** rating plug removal tool is advised to enhance the ease and safety of this operation.

(1) Use of an RC suppressor is recommended.
(See Controls and Automation catalogue)

Contact module SMR2 (FAECM2)



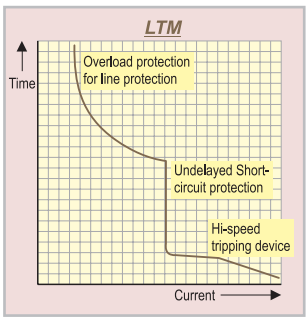
This external DIN-rail mounted device with modular dimensions is directly connected to the SMR2 electronic trip unit. The device is equipped with four NC 1A/400V AC contacts that can be programmed to operate to a maximum of four signals produced by the SMR2 trip unit. A maximum of two modules can be used.

The following trip unit outputs can be used:
Long time trip
Short Time trip
Instantaneous trip
Ground fault trip or Ground Fault Alarm
Load shedding channel 1
Load shedding channel 2
Zone Selective interlock occurence
Breaker trip due to over-temperature.

Trip units

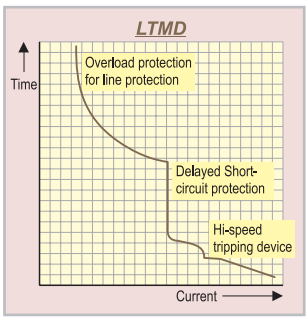
Overview of available types

LTM - Line thermal magnetic



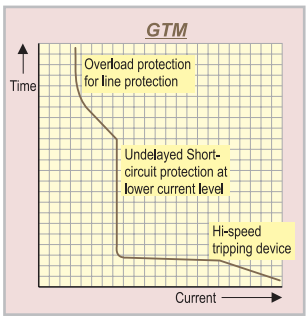
This trip unit offers overload and short-circuit protection. The overload protection is adjustable from 0.8 to 1 x the chosen rating whilst the short-circuit protection is set at 10 x the chosen rating (FD frame) or adjustable from 5 to 10 x the chosen rating (FE and FK frame).
The unit is designed to protect the lines and/of loads present in standard circuits.

LTMD - Line thermal magnetic, selective type



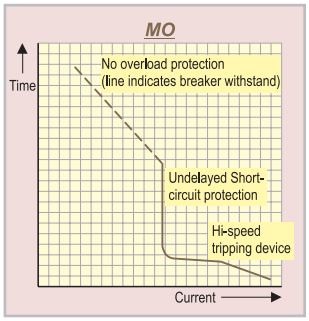
This trip unit offers overload and short-circuit protection. The overload protection is adjustable from 0.8 to 1 x the chosen rating whilst the short-circuit protection is set at 10 x the chosen rating (FD frame) or adjustable from 5 to 10 x the chosen rating (FE frame).
The unit is designed to offer discrimination with downstream protection devices. It also protects the lines and/of loads present in standard circuits.

GTM - Line thermal magnetic



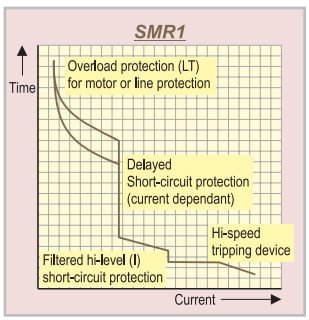
A trip unit de signed to offer overload and short-circuit protection. The overload protection is adjustable from 0.8 to 1 x the chosen rating whilst the short-circuit protection is set at about 4 x the chosen rating (FD frame) or adjustable from 2.5 to 5 x the chosen rating (FE frame).
Due to its low short-circuit current setting the unit can be used to protect long cable runs or to provide generator protection.

MO - Magnetic Only



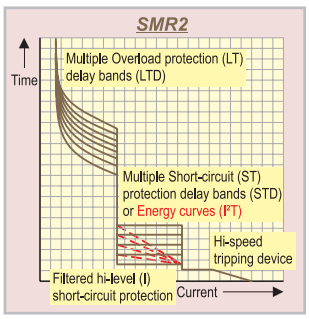
This trip unit offers short-circuit protection only, the device is adjustable from 10 to 15 x the chosen rating. In order to prevent the protection device (Circuit Breaker) from overheating, the current of the circuit that it protects, needs to be limited. (see dotted line)
The unit is primarily designed to be used with thermal relays in motor protection circuits.

SMR1 (e)- Selective Electronic Protection[2]



A trip unit designed to offer a overload (LT) and short-circuit protection (ST). The overload protection is adjustable from 0.4 to 1 x the chosen rating and has two protection bands (LTD), one for line protection and one for motor protection (class 10)[1]. To ensure full discrimination the short-circuit protection has a current dependant fixed time setting that varies per frame size.
The device is adjustable from 2 to 13* x the set LT current value.
The unit is designed to protect all circuit types and to offer a high level of discrimination with downstream devices.

SMR2 (1s & 1g) - Enhanced Electronic Protection[2]



A trip unit designed to offer a overload (LT) and short-circuit protection (ST). The overload protection is adjustable from 0.4 to 1 x the chosen rating and has multiple protection bands (LTD). The short-circuit protection (ST) is adjustable from 2 to 13 x the set LT value and has multiple protection bands (STD). The short-circuit protection can also be set to an energy mode. The unit is designed to protect all circuit types and to offer a high level of discrimination with downstream devices. Different modules allow the user to expand the device including groundfault, load shedding and communications etc.

(1) Not available on FK frame execution.
(2) Text applicable for SMR1/2. For SMR1e, SMR1s and g see relevant section.