Overview

Effect of Higher Operating Voltages

Betagard MCB is designed to operate at 240/415V, 50Hz. However the device can operate at 480V, 50Hz with a reduction in breaking capacity of 50%.

DC Operation

Single pole MCBs can be used up to 60V DC and double pole up to 110V DC.

However, they should not be used below 18V DC. Though the thermal operation is delayed but this is negligible. The instantaneous tripping characteristic must be increased by 40% (e.g. a Type 'C' MCB has a magnetic tripping characteristic between 5 and 10 times the rated current. This magnetic tripping characteristic would therefore become between 7 and 14 times the rated current.

Frequency Variation

MCBs may be used up to their normal voltage rating on 400Hz supplies; however the magnetic tripping characteristic must be increased by 30% (e.g. Type 'C' MCB with magnetic characteristics between 5 and 10 times the rated current would become between 6.5 and 13 times rated current.

Effect of temperature on tripping characteristics :

Betagard MCBs are designed to meet the requirements of IS 8828 / IEC 60898 for tripping performance at ambient temperature 30°C. At other operating temperature the overload tripping band is modified by approximately 5% per 10° kelvin temperature difference, which increases for lower and decreases for higher temperatures than 30°C.

"D" Characteristics

D characteristics MCBs are used for protection of electrical circuits involving significant inrush currents like solenoid valves, capacitor banks, transformers, etc.

The main use of D characteristics MCBs is to ensure correct sizing of the device wherein high inrush currents are prevailing.

This characteristics allows to use in a high in rush current circuits without requiring the MCB to be over sized.

D characteristics MCB shall take the in rush current with peak up to 10 times In, (Rated current) and can be used best advantage for handling much higher in rush circuits eg: Switching solenoids/capacitor banks/transformers etc.

Under D characteristics, the magnetic operating limits (for short circuit operations) are between 10 to 20 times the rated current of MCB.

For example the instantaneous mechanism of 10A MCB will operate between 100A and 200A in an over current situation.

Selectivity of miniature circuit-breakers/fuses

Generally, distribution networks are configured as radial networks. An overcurrent device must be provided at each reduction of the conductor cross section. This results in a cascade graded according to the rated current, which should, where possible, provide selectivity.

Selectivity means, that in the event of a fault, only the protective device in the vicinity of the fault trips. Thus, parallel current paths can continue to provide the necessary power.

For MCBs with upstream fuses, the selectivity limit essentially depends on the current limits and tripping characteristics of the MCB as well as on the pre-arcing I^2t value of the fuse. Therefore, MCBs with different characteristics and rated breaking capacities also have different selectivity limits. The subsequent tables show the currents up to which selectivity is provided between MCBs and upstream fuses according to DIN VDE 0636 Part 21. The values specified in kA are limit values which have been determined under unfavourable test conditions. In practice, better values can be obtained, depending on the type of the upstream fuse.

In the event of a short circuit, when using the 5SX4, MCBs and fuses according to DIN VDE 0636 Part 21, Selectivity is provided up to the indicated values in kA.

Miniature Circuit Breakers (MCBs) : Type 5SP4

General

Siemens Betagard range of MCBs type 5SP4 offer high short circuit breaking capacity equal to 10kA as per IEC 60898 / IS 8828. These MCBs have excellent current limiting and selectivity characteristics. MCBs are available with C as well D tripping characteristics with current range of 80A - 125A and 80A - 100A respectively.

Features at a glance

- Current limiting class 3 MCBs
- Finger touch proof terminals (FTPT)
- Trip free mechanism
- Suitable for AC/DC circuits
- DIN rail and screw mounting possible
- Accessories like auxiliary contact, shunt trip, undervoltage release, fault signal contact

Applications

- Mainly as an incomer MCB in residential, industrial and commercial applications
- C characteristics MCBs suitable for general line protection especially with higher starting current lamps, motors etc.
- D characteristics MCBs suitable for high inrush current applications line transformers generating significant pulses, solenoid valves etc.

Technical Data – 5SP4 MCBs

Standards	IS 60898 Part I : 2002	
Series	5SP4	
Tripping characteristics	C	D
Current range	80A, 100A and 125A	80A and 100A
Rated voltage	240/415V AC and 60V DC/pole	
Operational voltage (max)	250/440V AC and 60V DC/pole	
Poles	SP, DP, TP, FP	
Rated breaking capacity	AC 10kA (as per IS 8828 / IEC 60898)	
	AC 20kA* (as per IS 13947 / IEC 60947)	
Depth	70mm	
Terminal tightening torque	3 to 3.5Nm	
Conductor cross sections		
Solid and stranded	0.75 – 50mm^2	
Fine stranded with end sleeves	0.75 – 35mm^2	
Supply connection	As required, top or bottom Polarity to be observed for DC applications	
Ambient temperature	-25°C to +45°C occasionally +55°C, max. 95% humidity, storage temp. -40°C to +75°C	
Service life	Average 20,000 operation at rated load	

* 15kA for 80A, 100A in 'D' characteristics

Tripping characteristics

Tripping characteristic	**Thermal releases Test currents:**			**Electromagnetic releases Test currents:**		
	limiting no-damage current I_1	minimum no-damage current I_2	tripping time $I_n > 63$ A	hold I_4	latest tripping instant I_5	tripping time t
C	1.13 x I_n	1.45 x I_n	> 2 h < 2 h	5 x I_n	10 x I_n	≥ 0.1 s < 0.1 s
D	1.13 x I_n	1.45 x I_n	> 2 h < 2 h	10 x I_n	20 x I_n	≥ 0.1 s < 0.1 s