

CLR

CLR



CIRCUIT BREAKER

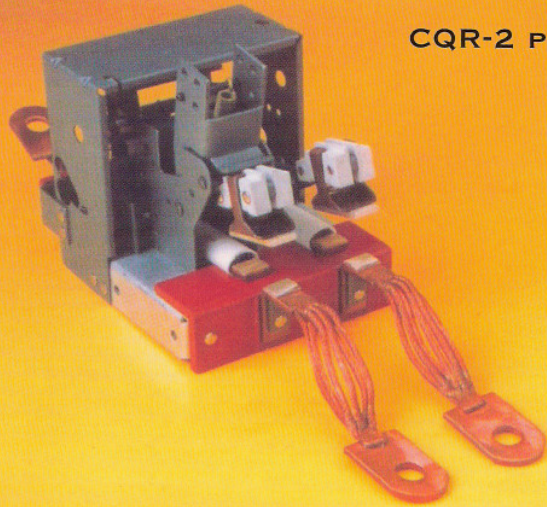
FOR COMPLETELY SELF PROTECTED (CSP)
DISTRIBUTION TRANSFORMERS

CQR

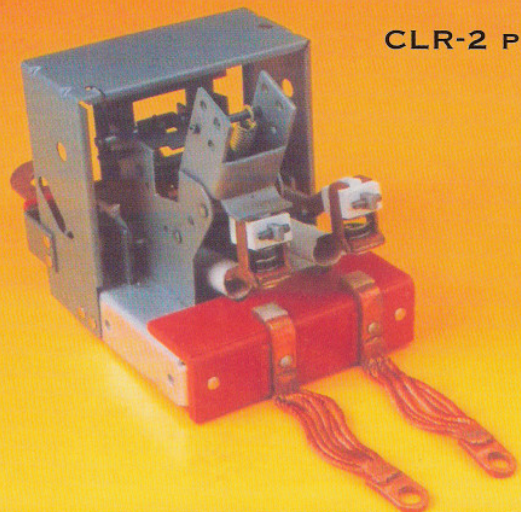
CQR

CQR

CQR-2 POLE



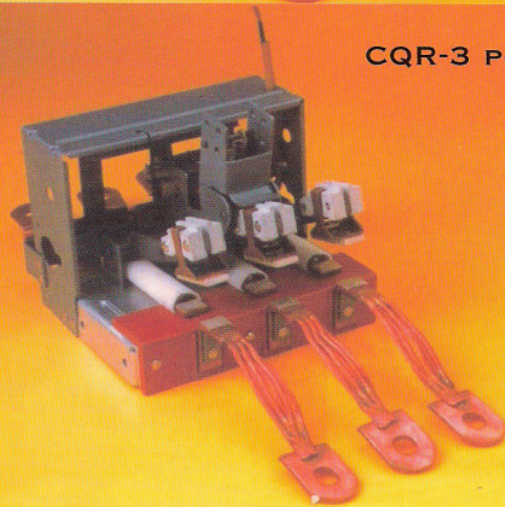
CLR-2 POLE



CLR-3 POLE



CQR-3 POLE



ADVANTAGES OF SAMRAKSHANA BREAKER

STANDARD FEATURES

THERMAL AND MAGNETIC TRIP

The Type CQR breaker, as a standard feature, is furnished with an instantaneous magnetic trip element in addition to the standard bimetallic thermal trip element. The magnetic trip element increases the opening speed of the breaker under high fault current conditions. This increased opening speed permits the circuit breaker to interrupt higher values of fault current than would be normally possible without greatly increasing the size of the breaker.

LOW LOSSES

Samrakshana breaker has been designed to minimise the electrical losses incurred in the breaker. For any given load current, a distribution transformer breaker's losses are a cumulative result of three resistances: bimetal element resistance, contact resistance, and lead resistance. *Samrakshana* breaker has been designed to minimise these resistance in the following manner:

BIMETAL RESISTANCE

Samrakshana breaker is designed using state-of-the-art bimetals, which provide reliable and accurate performance with minimum losses. These bimetals are actually trimetals consisting of an iron and nickel alloy, copper and manganese. This combination of metals produces a bimetal with a higher flexibility than previously available, which allows for a shorter active length of the bimetal, while maintaining the same high degree of sensitivity. By using a shorter active length bimetal, the distance the current must travel through the bimetal is less, thus lowering the resistance, which in turn lowers the losses.

CONTACT RESISTANCE

Samrakshana breaker has contacts comprising of 65% tungsten, 35% copper, silver plated. This material provides a low resistance conductor, without sacrificing the ability of the contacts to perform multiple make and break operations under short circuit conditions. The contact material, in conjunction with sufficient contact pressure, ensures low resistance contacts.

LEAD RESISTANCE

The amount of resistance in the leads is a function of the type of lead and its length. A strap type copper lead, although somewhat less flexible than a braided copper lead, will (for a given length) have a lower total resistance (losses) because it has a larger cross sectional area of conductor. *Samrakshana* Electricals breakers are available with a combination of both braided and strap type leads, thus providing high flexibility yet low total resistance resulting in minimum losses for any given lead length. Furthermore, if the breaker is mounted in the horizontal position, an additional saving in lead length is obtained because the overall length of the breaker bridges some of the distance between the low voltage bushings and the transformer coils.

RUGGED CONSTRUCTION

All mechanical load carrying members of the *Samrakshana* breaker are metal, thus providing a physically rugged breaker. In addition, each breaker has a metal wrapper above the trip mechanism to provide further protection against damage in handling and installation.

FLEXIBILITY IN MOUNTING

Samrakshana Electricals' breaker can be mounted in either the vertical position with the back slightly elevated, or the horizontal position. This feature makes the *Samrakshana* breaker directly interchangeable with that of other manufacturers.

Although both mountings are available, the preferred mounting is in the horizontal position. This mounting allows several additional benefits:

- The Bimetal element is mounted as close as possible to the top oil level, which is the hottest oil, thus permitting maximum thermal protection.
- The contacts are as far as possible below oil, so should there be a leak in transformer tank, the danger of breaking an arc above oil is minimum.
- Finally, the length of lead is minimised because the breaker bridges part of the distance between the low voltage winding and the low voltage outlet bushing.

SHORT CIRCUIT CAPACITY

Samrakshana Breaker has a short circuit capacity of 10,000 symmetrical amperes at a maximum of 350 volts per pole, provides sufficient interruption rating for a worst case fault. In other words, a bolted fault between the low voltage breaker lead and the neutral bushing (ground).

Furthermore, the breaker's own internal impedance (mostly resistance) plus the extra impedance of the arc being drawn apart substantially limits the fault current through the breaker, thus providing additional protection to the transformer from short circuits.

RELIABILITY

Samrakshana breaker was submitted to a battery of tests including:

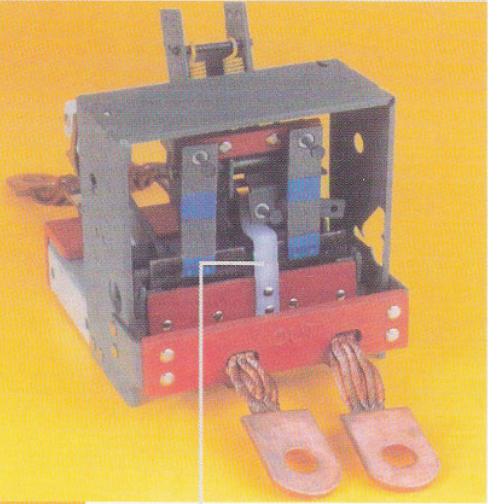
Interruption Capability Test

Insulation and Di-electric Test

Electrical Resistance Test

Calibration Repeatability Test

Thermal and Mechanical Stability Test



MAGNETIC TRIP

Samrakshana breaker provides overload and short circuit protection for both pad mounted and overhead distribution transformers. The breaker is applied immersed in the transformer oil on the low voltage side to protect the transformer against excessive overloads and secondary faults.

FEATURES

- Thermal Trip
- Magnetic Trip
- Low losses
- Rugged construction
- Flexibility in mounting
- Short circuit capacity
- Reliability
- Signal light circuit
- Emergency control

Samrakshana breaker has passed all the above mentioned tests. As part of production testing, all Samrakshana breakers are also resistance tested and calibration tested (thermal and magnetic) to ensure strict quality control. This combination of design tests and production tests ensures reliable performance of the breaker throughout a distribution transformer's life cycle.

OPTIONAL FEATURES

SIGNAL LIGHT CIRCUIT

The Signal Light, which operates at 25°C below the breaker trip temperature, functions as an inexpensive load study tool warning of potential overloads.

EMERGENCY CONTROL

The Emergency Control feature increases the breaker trip temperature to 20°C above its original level. This prevents the breaker from tripping in the event of sustained moderate overloads. When this feature is activated, it severely limits the breaker's thermal protection of the transformer.

THE SAMRAKSHANA BREAKERS ARE AVAILABLE FOR THE FOLLOWING DISTRIBUTION TRANSFORMER RATINGS:

CLR		CQR	
Single Phase	50HZ / 60HZ	Single Phase	50HZ / 60HZ
Single Pole or Two Pole		Two Pole	
KVA	Low Voltage (V)	KVA	Low Voltage (V)
10	110, 230, 440	upto 30	110, 230, 440
15	110, 230, 440	upto 50	230, 440
25	230, 440		
Three Phase	50HZ / 60HZ	Three Phase	50HZ / 60HZ
Three Pole		Three Pole	
KVA	Low Voltage	KVA	Low Voltage
upto 25	110, 230, 440	upto 50	110, 230, 440
upto 50	230, 440	upto 100	230, 440
upto 100	440	upto 200	440

BREAKER RATINGS

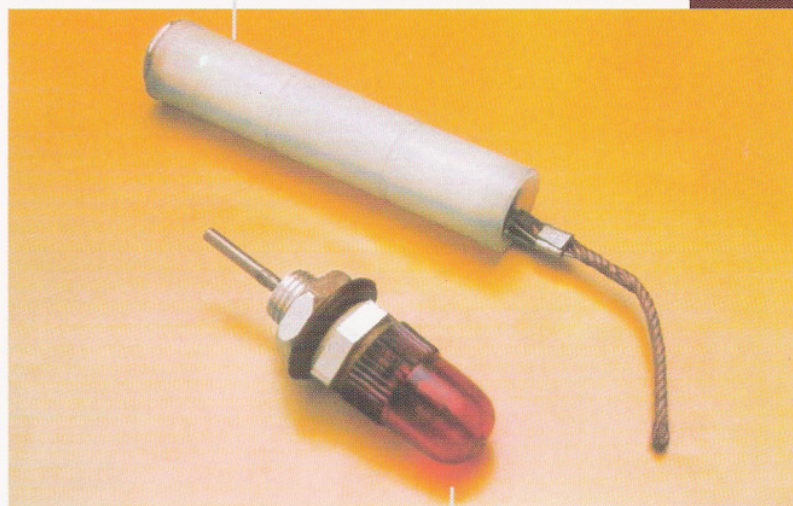
Maximum Volts per Pole - 350 Volts

Nominal Current	
CLR	110 Amperes per Pole
CQR	210 Amperes per Pole
Maximum Continuous Current	
CLR	185 Amperes Per Pole
CQR	355 Amperes per Pole
Interrupting Ratings:	
CLR	425 - 4000 } Symmetrical Amperes 594 - 6000 } at a maximum of 350 551 - 7500 } volts per pole.
CQR	10,000 Symmetrical Amperes at a maximum of 350 volts per pole
BIL	30 KV
50 HZ / 60 HZ one minute withstand	10KV.
Maximum temperature in air	135°C



BREAKER OPERATING MECHANISMS

HT FUSE LINK



SIGNAL LIGHT

ALL SAMRAKSHANA BREAKERS ARE FACTORY TESTED TO ENSURE THAT THE MAXIMUM GUARANTEED RESISTANCE VALUE IS NOT EXCEEDED. TABLE SHOWS THE MAXIMUM GUARANTEE AND AVERAGE VALUES OF RESISTANCE FOR THE DIFFERENT BIMETAL CODES OF BREAKERS.

		Resistance per pole in milli ohms			
		Average		Maximum Guaranteed	
Type	Bimetal code	at 25°C	at 85°C	at 25°C	at 85°C
CLR	425	1.080	1.328	1.105	1.359
CLR	594	0.615	0.756	0.640	0.787
CLR	551	0.480	0.590	0.505	0.621
CQR	551	0.397	0.488	0.407	0.501
CQR	520	0.413	0.508	0.479	0.589
CQR	514	0.366	0.450	0.439	0.540

Notes: Resistance measured between breaker outlet terminals (neglecting outlet leads) with clean contacts, without tarnish or oxidation.
Conversion factor for resistance from 25°C to 85°C is approximately 1.23

STYLE NUMBER SELECTION FOR THE SAMRAKSHANA BREAKER

The style number of a Samrakshana breaker completely describes the breaker and its features. The following steps will aid in selection of the particular breaker required:

Number of Poles Code	
1.	Single Phase, 1 Pole at 350 volts per pole
2.	Single Phase, 2 Pole at 350 volts per pole
3.	Three Phase, 3 Pole at 350 volts per pole

Breaker Type Code	
SR - Standard CLR	MR - Standard CQR

Bimetal Code	
CLR	425, 594, 551
CQR	551, 520, 514

Internal Feature Code	
A.	With optional signal light circuit and optional emergency control.
B.	With optional emergency control only.
C.	Standard design.
D.	With optional signal light circuit only.

General Feature Code	
C.	Standard leads with terminal on front and rear leads.
K.	Customer choice leads with terminal on front and rear leads.

Trip Temperature Code	Bimetal Trip Temperature °C
10	110
20	120
25	125
30	130
35	135
40	140
45	145
50	150
55	155
60	160

Note: For any other lead arrangement or any other features or combination of features, please consult Samrakshana Electricals Limited.

SHOWN BELOW IS THE STYLE NUMBER FOR A SAMRAKSHANA BREAKER AND A TYPICAL EXAMPLE.

STYLE NUMBER	0	00	000	0	0	00
Number of Poles Code						
Breaker Type Code						
Bimetal Code						
Internal Feature Code						
General Feature Code						
Trip Temperature Code						

EXAMPLE	2	MR	514	A	C	40
2 Poles at 350 volts per pole						
Standard CQR						
Bimetal Code 514						
Signal Light Circuit and Emergency Control						
Standard Leads						
140°C trip Temperature						



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