

Application Note - 4 Pole ACBs with Double Rated Neutral Switching

Terasaki, a world specialist in low voltage circuit breakers, was the first company to introduce fully rated neutrals on their ACB range more than twenty years ago.

At that time some people labelled this as an over specification as the majority of installations were using half rated neutral conductors. At that time the average office may have had only one PC/word processor.

In the last decade very few people would have expected the phenomenal growth in non linear loads and resulting harmonics. Low voltage networks incorporating half rated neutrals had many loads incorporating hundreds of pcs, variable speed drives and UPS.

These systems are now becoming dangerously close to overheating, particularly on the neutral conductor.

The problem with harmonic profiles is trying to predict how these will increase over the years.

Many installations require reliable power supply 24/7 and all design parameters must work towards this. These include:

- Financial institutions and Banking Corporations
- Broadcasting Companies and Television studios
- Telecommunication and Internet Data Centres
- Key Commercial properties.



The Copper Development Association (CDA), during a series of lectures on harmonics has recently highlighted the demand for a 4 pole ACB with a double rated neutral, in power systems.

David Chapman, project manager at CDA advises that ***"today's neutral currents in installations such as these can easily approach twice the phase currents. This would mean a requirement for a 4 pole ACB with a double rated neutral"***

Terasaki have the widest range of double rated neutral ACBs on the global market. Solutions are available from 800A to 6300A. Other key benefits include:

High short time withstand

to provide superior selectivity and match busbar ratings

Early Make, Late Break Neutral

to eliminate abnormal line to neutral voltage and provide stable voltage reference point for sensitive electronic equipment.

TemPower Double Neutral ACB Selection Guide

ACB Frame Size	AR 2-4P	AR 3-4P	AR 3-4P	AR 4-4P	AH5-4P	AH6-4P	AH5-5P	AH6-5P
Type	S	S	S	S	H	H	H	H
In Rated Current (A)	800	1250	1600	2000	2500	3200	5000	6300
IN Rated Current (A) in the Neutral Pole	1600	2500	3200	4000	5000	6300	10000	10000
ACB Model	AR208S-DN	AR212S-DN	AR216S-DN	AR220S-DN	AH25S-DN	AH32S-DN	AH50-DN	AH60-DN
ICS SERVICE BREAKING CAPACITY (kA, symmetrical r.m.s)	50	65	65	75	85	85	85	85
690V	65	85	85	100	120	120	120	120
440V	65	85	85	100	120	120	120	120
Icm MAKING CAPACITY (kA, asymmetrical peak)	105	143	143	165	187	187	187	187
690V	143	187	187	220	264	264	264	264
440V	143	187	187	220	264	264	264	264
Icw SHORT-TIME WITHSTAND (kA rms)	65	85	85	100	100	120	100	120
1 Second	50	65	65	85	70	70	70	70
3 Seconds								
Endurance (With maintenance)	30000	20000	20000	15000				
(Without maintenance)	15000	10000	10000	8000	1500	1500	1500	1500
(Without maintenance AC 460V)	12000	7000	7000	5000	500	500	500	500
(Without maintenance AC 690V)	10000	5000	5000	5000				
Number of operating cycles								
Times								
Breaking Time (second) maximum.	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Spring Charging Time (second) maximum.	10	10	10	10	10	10	10	10
Closing Time (second) maximum.	0.08	0.08	0.08	0.08	0.04	0.04	0.04	0.04
Dimensions								
Drawout Type	W	580	580	801	937	937	1126	1126
(mm)	H	460	460	460	685	685	685	685
	D	290	345	375	589	589	589	589

1 With Instantaneous Protection

Applicable standards:

- IEC 60947-2
- EN 60947-2
- JIS C8372 (New JIS C8201)
- AS 3947-2
- NEMA PUB NO. SG3
- ANSI C37.13

These specifications are common throughout the whole range :

- Rated Operational Voltage [Ue] (V, 50/60Hz)-690
- AC Rated Insulation Voltage [Ui] (V, 50/60Hz)-1000
- Rated Impulse Withstand Voltage [Uimp] (kV)-12 (8 for AH ACBs)

