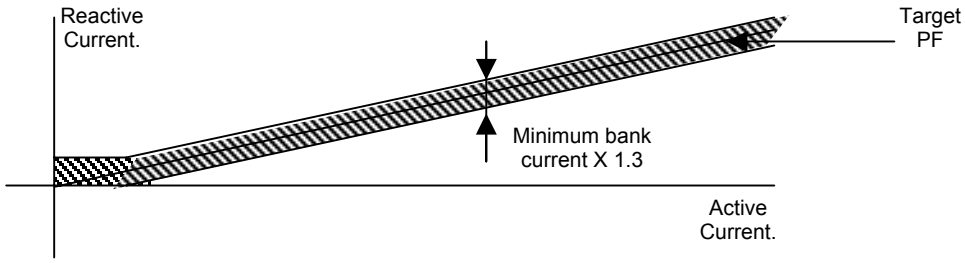
## Technical Note on PF correction Characteristics:

Conventional Method used by PF correction Relays:




Conventional PF correction relays senses the Mains supply current and resolves it into active and reactive parts. Normally these relays are supplied by the CT secondary current.
In these conventional PF relays, there is no provision to enter the physical values of Primary current of the CTs as well as there is no provision to enter the separate smallest bank capacitor current.

Then PF measurement is carried out by the formula: PF = $I_{active}$ / $I_{total}$. As in conventional PF relays, we do not know the absolute values, these values are always taken as a % of full capacitor current values. PF term being a ratio can still be calculated.

Now, the PF correction relay can switch the capacitor banks that can generate the Reactive current only (Capacitive). The steps in which this reactive current value increases depends on the smallest capacitor bank current. (System resolution)

There is normally a target Power Factor setting done by user in this PF relay. But the accuracy at which this target PF can be achieved will depend on how near the PF relay can adjust its switched banks. Therefore if compensation is capacitive than the target PF, the PF relay would try to switch the banks off and if compensation is inductive than the target PF, the PF relay would try to switch the banks on.
This way the PF relay will go on hunting around the target PF for every correction cycle. To prevent the same, we need to create the band of reactive current component around the target PF. In such band if the value is residing, then PF relay will not turn on or off the capacitor banks. This avoids hunting.

But this band if too thick will cause inaccuracies and if too thin, will cause hunting. Therefore an optimal reactive current band is required to be created around the target PF.
Therefore, these relays are required to be programmed with what is commonly known as C/K ratio.
This is the ratio of "Smallest bank capacitor current" to "Rated primary current of the CT". This ratio will therefore be able to give us the band that can be created around target PF so that hunting can be prevented. Normally, the capacitor current varies with the mains voltage. So to take care of that, normally the safety factor of 1.3 to 1.5 is used.

This optimal value of C/K ratio will help these PF relays to provide capacitive current compensation accurately at the same time prevent hunting of capacitor banks.

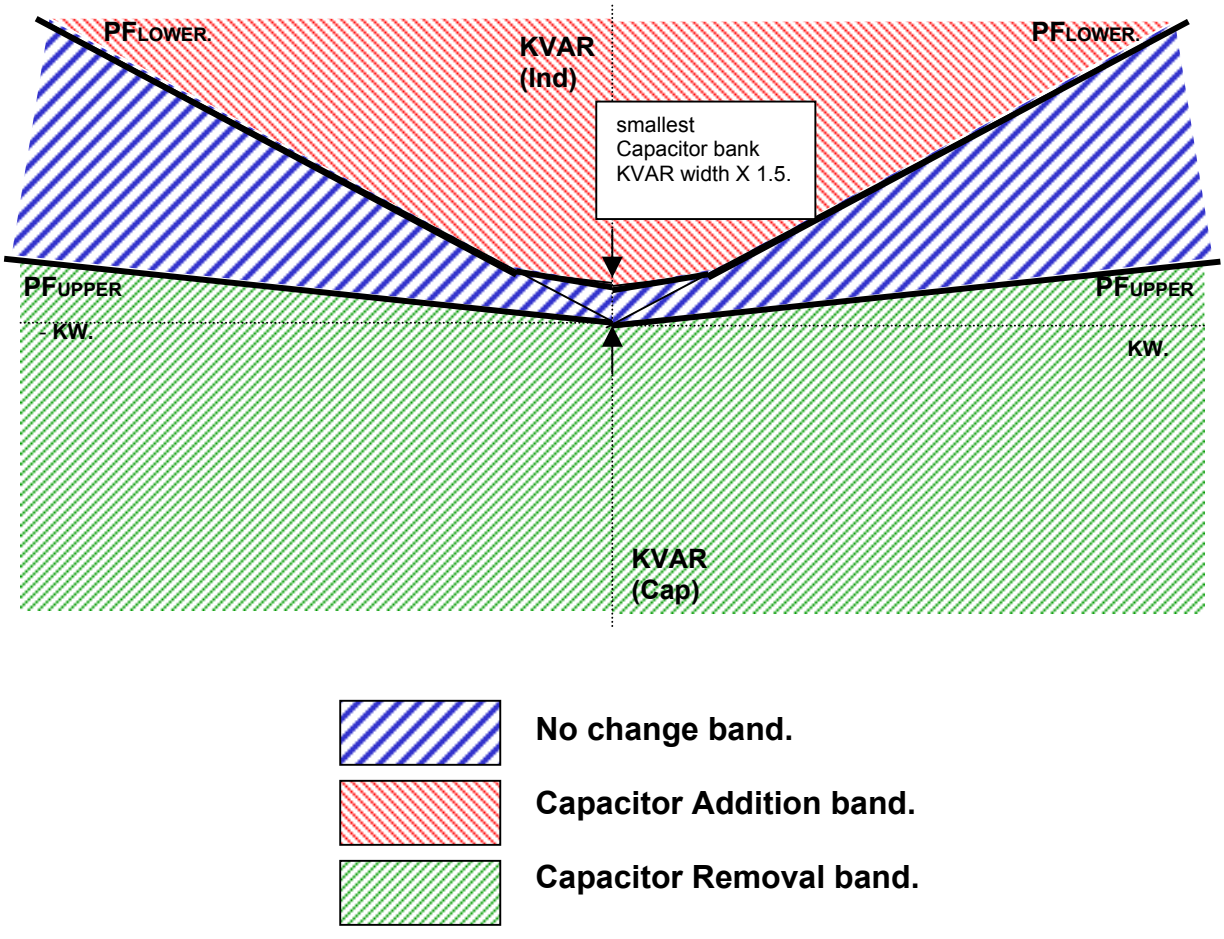
Why there is no requirement of C/K ratio definition in TAS make PF relays:

TAS make PF relays allows the user to define the following parameters:

- Feedback CT rated primary current.
- Smallest bank kVAr value.
- System and Capacitor voltages.
- Duel set band target PF. (Upper target PF and Lower target PF).

Due to these settings, if the kVAr band between the Upper target PF and Lower target PF is less than 1.5 times the smallest capacitor bank kVAr value, it creates a minimum band of 1.5 times the smallest bank kVAr above the upper target PF.
This prevents the hunting of the capacitor banks at lower loading conditions at the same time broader band prevents the frequent ON/OFF operations even with the fluctuating loads if PF is within the desired limits.

The diagram for the same can be seen as:



The diagram shown above shows clearly the non switching region as broader with higher loads that gives advantage of lesser number of switching under fluctuating loading conditions as compared to the conventional PF relays.
At the same time for lower loading conditions, gives optimal kVAr value width so that any hunting is prevented.

The TAS make LCPF-02 or SPF-03 controllers therefore do the same job with more efficiency as compared to conventional PF relays. That too without defining the parameter C/K, which is in most cases not understood by general user.

END.