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Karnataka Power Transmission Corporation Ltd.,

Corporate Identity Number (CIN): U40109KA1999SGC025521

No : KPTCL/B25/CEE/RT&R&D/KCO-78/
45923/2016-17/138

Encl :

Corporate Office,

Kaveri Bhavan,

Bengaluru - 560 009.

Dated: 11.0 APR 2017

OFFICIAL MEMORANDUM

- Sub :** Enabling Auto Re-closure (AR) feature in protection of 220KV and above voltage Class of Transmission Lines in KPTCL – reg.
- Ref :**
1. Section no: 43(4) (c) [refer sl.no (1) (f)] under Schedule-V of CEA (Technical Standards for construction of Electrical Plants and Electrical Lines) Regulation-2010.
 2. Section no: 9.6(h) of Karnataka Electricity Grid Code-2015.
 3. CBIP Guidelines (Publication 274).
 4. Minutes of 60th Protection Coordination Sub Committee meeting of SRPC.
 5. Discussion had during 30th SRPC meeting.
 6. Chief Engineer Electy., (RT and R&D) Note No. CEE/RT and R&D/KCO-78/ 45926/2016-17/138 Dt.08.03.2017.

Preamble:

Transmission lines are subjected to various types of faults while they are in operation. Many of the faults in Transmission system which are single phase to earth faults will be transient/temporary in nature. In case of such transient faults involving any one of the three phases and Earth and, if only the phase involved in fault is allowed to open and automatically re - close after a predefined time called dead time, the line may get successfully energised provided the temporary fault gets cleared within the time of reclosing. This feature termed as Single Pole Auto Re-closure (AR) is a standard practice followed in protection of 220KV and above voltage class lines. Due to AR, service of the line gets restored automatically in the event of transient faults and outage duration will be reduced thereby improving availability of Transmission system. If the fault persists, all the three poles of the Circuit Breaker will be tripped and AR will be treated as unsuccessful. As a standard protection philosophy followed in KPTCL, AR feature is enabled for all the 400KV lines and in case of 220KV lines, so far AR was not mandate, except for some of the Inter-State Lines and Lines connected to Generating Station.

Regulations/guidelines cited under reference (1), (2) and (3) insist for providing Single phase High Speed Auto Re-closure (HSAR) for 220KV and above voltage class lines. Keeping in line with these Regulations/guidelines and in the larger interest in maintaining grid security,

EE (I) [Signature] AEE-4/AE-1

SRPC and SRLDC are insisting for enabling AR for 220KV voltage class lines also and they have insisted to furnish plan of action for implementation of the same.

Further, Chief Engineer Elec (RT & R and D) expressed that the status of implementation of AR for all 220KV lines are now being taken up for regular review in Protection Coordination Sub Committee (PCSC) meetings. During the 60th Protection Coordination Sub Committee (PCSC) meeting held on 27.12.2016, all utilities of Southern Grid were directed to implement AR scheme for 220KV and above voltage class lines in their respective control areas except for **specific/exceptional cases like 220KV Under Ground lines, 220KV overhead lines assorted with U.G Lines, 220KV Radial Single Circuit Lines without PLCC, 220KV radial service lines without PLCC connected to EHV consumers and any other Lines as a special case.**


With the normal single phase AR scheme, both ends of the feeder will have uniform setting and hence they get open simultaneously (with a dead-time setting of 1 sec and reclaim-time of 25 sec). Owing to severity of damage caused due to re-closure in case of heavy fault within the substation owing to failure of surge arrestor etc., and effect on Generators closing on to un cleared faults additional logics like **current limit for AR and time differentiated AR** have been agreed by SRPC forum which have to be implemented while enabling AR scheme for 220KV lines emanating from Sub Stations having higher fault level and in cases involving 220KV lines evacuating power from Generating Stations.

In AR scheme with Current limit, AR will be blocked and all the three poles of Circuit Breaker will be tripped if the initial fault current measured is more than the 60% of the Bus fault level of that substation and in time differentiated AR scheme for the lines connected to the Generating station, the grid end of the line will be auto-reclosed as usual after the elapse of its dead-time of 1 sec. However, the generator end relay will check for the line voltage after elapse of an elongated dead time of 0.3 to 0.5 seconds over and above 1.0 seconds and reclose after 1.3 sec to 1.5 sec if the AR is successful at the grid end of the line. If the grid end AR is unsuccessful, after a dead time of 1.3 sec to 1.5 sec, one of the voltages will still be low and hence 3-ph trip will be given at Generating station end to open the other two poles also.

In the interest of Grid security and keeping in line with Regulation/Code, Chief Engineer Elec (RT & R and D) opined that AR scheme shall be enabled in all the 220 KV & above transmission lines **with exceptions to those lines which are brought out above at para (3)** with justification in case the same cannot be enabled.

Hence, the following orders thereon :

- 1) The concerned TL &SS Division in coordination with jurisdictional R.T Division shall arrange to enable AR feature during the retrofit of Main-2 relay in place of OC/EF relays of 220KV lines.
- 2) The TL&SS Division shall arrange to procure / modify / replace the minor components if found necessary to suit the requirement.
- 3) SEE, SCADA shall arrange to monitor the availability of PLCC links for all 220KV and above voltage class lines. Any problems if reported shall be attended at the earliest to restore the links.
- 4) The jurisdictional TL&SS Division shall coordinate with other neighboring Transmission utilities and Generating stations as the case may be who are connected with KPTCL's 220 KV voltage system for enabling Auto Re-closure.
- 5) AR shall be enabled as per the scheme approved for R&U project by Chief Engineer Electy., RT and R&D.
- 6) Provision shall be made in Line control panels of the upcoming 220KV and above voltage class line and such lines shall be commissioned with AR enabled.
- 7) Proper monitoring of AR operation during tripping shall be done by TL&SS Division in coordination with concerned R.T Division. In case of problems, arrangements shall be made to restore AR feature at the earliest.
- 8) The AR feature in the distance scheme relay shall be checked for proper operation during the periodic testing of relay by concerned R.T Division. Necessary line clears if required shall be arranged by TL&SS Division.


Deputy General Manager (Tech),
KPTCL, Kaveri Bhavan.

Copy to:

1. All Chief Engineers Electy., KPTCL.
2. All Superintending Engineer (EI), KPTCL.
3. All Executive Engineers (EI), TL&SS Division / MW Division/ R.T Division, KPTCL.
4. PS to Managing Director /Director (Transmission)/ Director (Finance)/ Director (A&HR) and Director & Company Secretary, KPTCL, Kaveri Bhavan, Bengaluru-09
- with a request to bring this to the kind notice of Directors.

Copy to:

✓ The SEE, IT&MIS, KPTCL, Kaveri Bhavan, Bangalore with a request to arrange to upload the order in the KPTCL website.