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**Title of the Research:** Research Pilot Project and preparation of technical specifications for providing the KVAR compensation on 11 KV AGDOM feeders, by remotely monitored and controlled through GPRS Communicable 11 KV Pole Mounted Fixed and Dynamic Shunt Capacitor bank system with 11 KV step less voltage regulator.

**Present System:**

The reactive load flow in any power system plays a major role in the health of the power system and thus the uncompensated reactive power in the power system, resulting into undue losses, overburdening of the system and overrating of the network. There are the provisions in Grid code and supply code to compensate the reactive power and maintain the power factor up to 0.9 by the motive power consumers but due to lack of knowledge and unawareness, the consumers generally do not take corrective steps for it. Hence, utility compulsorily provide the reactive power requirements of the power system by means of fixed rating MV shunt capacitor banks on the feeder, capacitors at substation end, LV capacitors on distribution transformers etc.

**Limitations of the present system:**

- The location of shunt capacitor banks on the feeders are not worked out for its optimized locations where power factor corrections considering the local conditions cannot be achieved;
- Once installed in the field, there is no provision for monitoring of the effective working of the capacitor bank;
- Though it operates effectively as per the local reactive power requirement, it will not serve the total feeder reactive power requirement;
- The fixed rating shunt capacitor bank shall not operate for the various loading conditions of the feeder specifically in AGDOM feeder category;
- Due to above all, the effective working hours and cost benefit from the system would be reduced.

**Detail report of Innovation/solution:**

By analyzing limitations of various prevailing VAR compensation systems, a new concept has been developed and designed by the GPRD team, for the compensation of the VAR requirement of the feeder. In this concept, various fixed capacitor banks having different rating and at least one dynamic capacitor bank of lower rating with step less voltage regulator shall be installed at key optimized locations with required components like switching contactors, intelligent slave controller unit and GPRS base modem or IOT base gateway. One central intelligent IoT base master controller unit at the substation end. As per the periodic reactive power requirement

of the feeder, various field capacitor banks shall be operated, controlled and monitored by master controller. For the various loading conditions of the feeder, step less voltage regulator shall monitor and operate the capacitor bank installed with it. With this new development and concept, the effective monitoring, controlling and operation of the MV capacitor banks for variable loading conditions of the feeder throughout the year can be obtained.

**Field study report:**

Two technical DEMOs for the 11 KV Shunt Capacitor Bank of 600 KVAR rating, have been carried out to check the results for this new concept, they are on 11 KV Chhipdi AGDOM feeder of MGVCL and 11 KV Randesan AGDOM feeder of UGVCL. From the real time monitoring of these two banks and controlling the banks as per the requirement of the feeders from substation end, it was assured that the usability and power factor improvement of the bank increased remarkably.

**How does new innovation help to overcome Limitations of the present system:**

Irrespective of local parameters and requirement of the reactive power where the shunt capacitor bank installed, the central monitoring and controlling from the substation end shall effective increase the usability of the banks and improvement in the power system, reduce peak power loss, reduce the $I^2R$ losses, improve the voltage profile at the tail end of the feeder etc.