

3.3 System Control Hierarchy

The control function required for the HVDC link is performed using the hierarchical control structure.

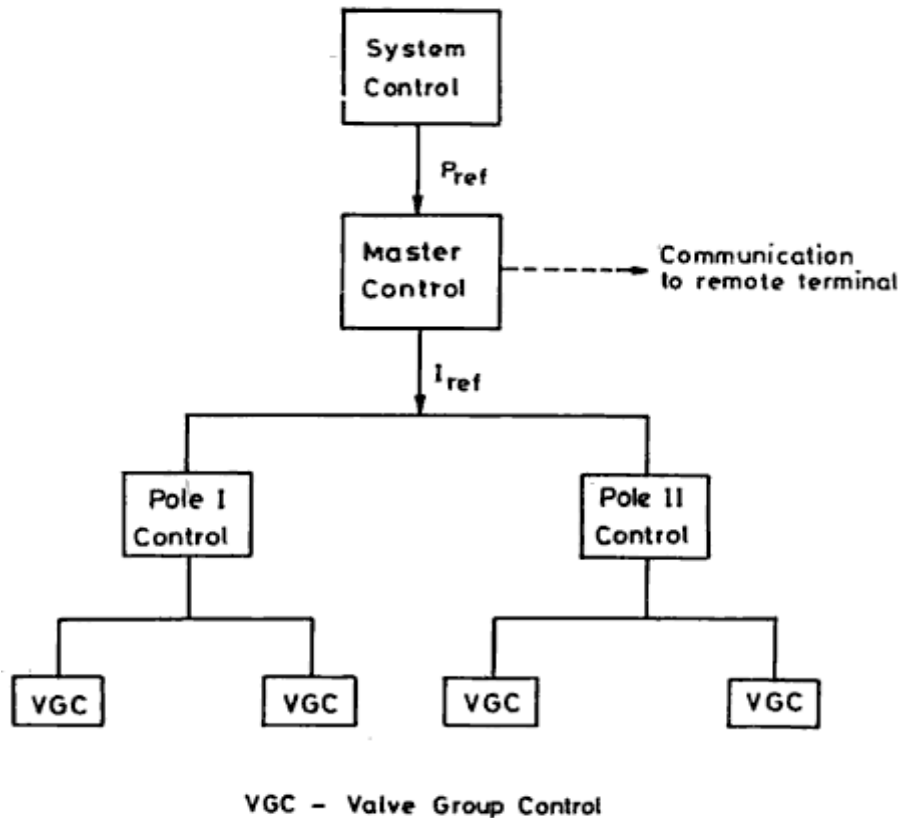


Figure 3.3.1 Hierarchical control structure for DC link

[Source: "HVDC Power Transmission Systems" by K.P.Padiyar, page93]

The master controller for a bipole is located at one of the terminals and is provided with the power order (P_{ref}) from the system controller (from energy control centre). It also has other information such as AC voltage at the converter bus, DC voltage etc. The master controller transmits the current order (I_{ref}) to the pole control units which in turn provide a firing angle order to the individual valve groups (converters). The valve group or converter control also oversees valve monitoring and firing logic through the optical interface. It also includes bypass pair selection logic, commutation failure protection, tap changer control, converter start/stop sequences, margin switching and valve protection circuits.

Master Controller

- The master controller for a bipole is located at one of the terminals and is provided with the power order (P_{ref}) from the system controller.

- The master controller transmits the current order (I_{ref}) to the pole control units which in turn provide a firing angle order to the individual valve groups (converters).
- The master controller which oversees the complete bipole includes the functions of frequency control, power modulation, AC voltage and reactive power control and torsional frequency damping control.

Pole control units

- Provides the firing angle order to individual valve group.
- The pole control incorporated pole protection, DC line protection and optional converter paralleling and deparalleling sequences.

The valve group or converter control:

- The valve group or converter control also oversees valve monitoring and firing logic through the optical interface.
- It also includes bypass pair selection logic, commutation failure protection, tap changer control, converter start/stop sequences, margin switching and valve protection circuits.

The pole control incorporated pole protection, DC line protection and optional converter paralleling and deparalleling sequences. The master controller which oversees the complete bipole includes the functions of frequency control, power modulation, AC voltage and reactive power control and torsional frequency damping control.

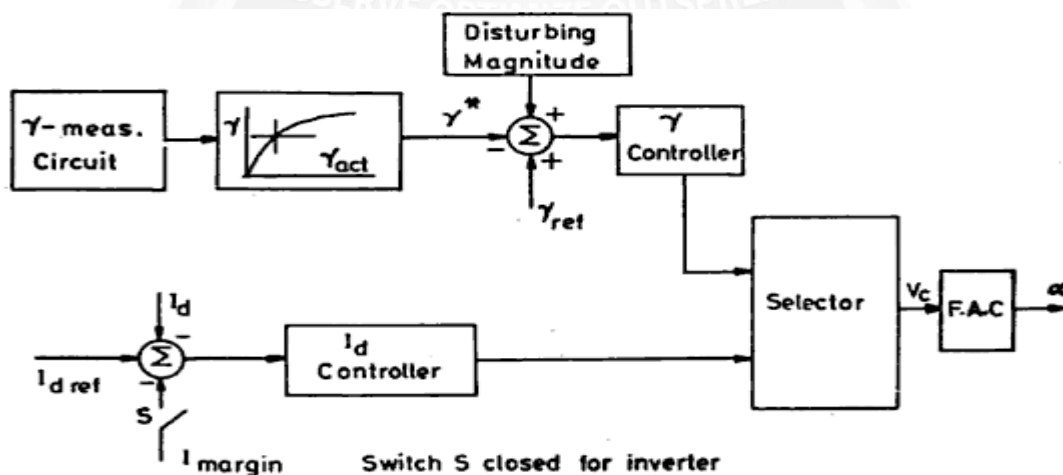


Figure 3.3.2 Block diagram of pole and converter controllers

[Source: "HVDC Power Transmission Systems" by K.P.Padiyar, page94]

The current or extinction angle controller generates a control signal V_c which is related to the firing angle required. The firing angle controller generates gate pulses in response to the control signal V_c . The selector picks the smaller of the α determined by the current and CEA controllers.

