
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 203-8214
SRP Section: 08.03.01 – AC Power Systems (Onsite)
Application Section: 8.3.1
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Question No. 08.03.01-18

DCD, Tier 2, Section 8.3.1.1.2, “Class 1E Onsite AC Power System,” states that “The Class 1E 480V MCC buses are connected to the Class 1E load center buses”.

The single line diagrams, Figures 8.1-1 and 8.3.1-1, show one circuit breaker as the connector between the load center and the motor control center (MCC) as typical. GDC 17 states that onsite power systems shall provide sufficient capacity and capability in the event of postulated accidents. Please clarify why an incoming breaker (Main Disconnect) at the MCC is not provided for protection of the MCC. Otherwise, please discuss how protection of the MCC with selective protection coordination is achieved from electrical faults.

Response

KHNP does not place incoming breakers at the motor control centers (MCCs) because of the inherent characteristics of molded case circuit breakers (MCCBs) used, which trip instantaneously when fault current flows through the MCCB.

In order to enable selective protection upon a fault at the MCC feeders, the 480V load center (LC) feeder breakers and the 480V MCC feeder breakers are properly coordinated such that the circuit breaker nearest to the fault location clears the fault before the upstream circuit breakers.

Further details of the selective protection between the 480V LCs and 480V MCCs is provided below.

Protection characteristics of 480V LC and MCC

The 480V LC feeders including the MCC main buses are protected by the LC feeder breakers, air circuit breaker (ACB) type, whose trip device is equipped with long time (LT) and short time (ST) trip elements of the overcurrent relay. For ground fault protection, the ground overcurrent

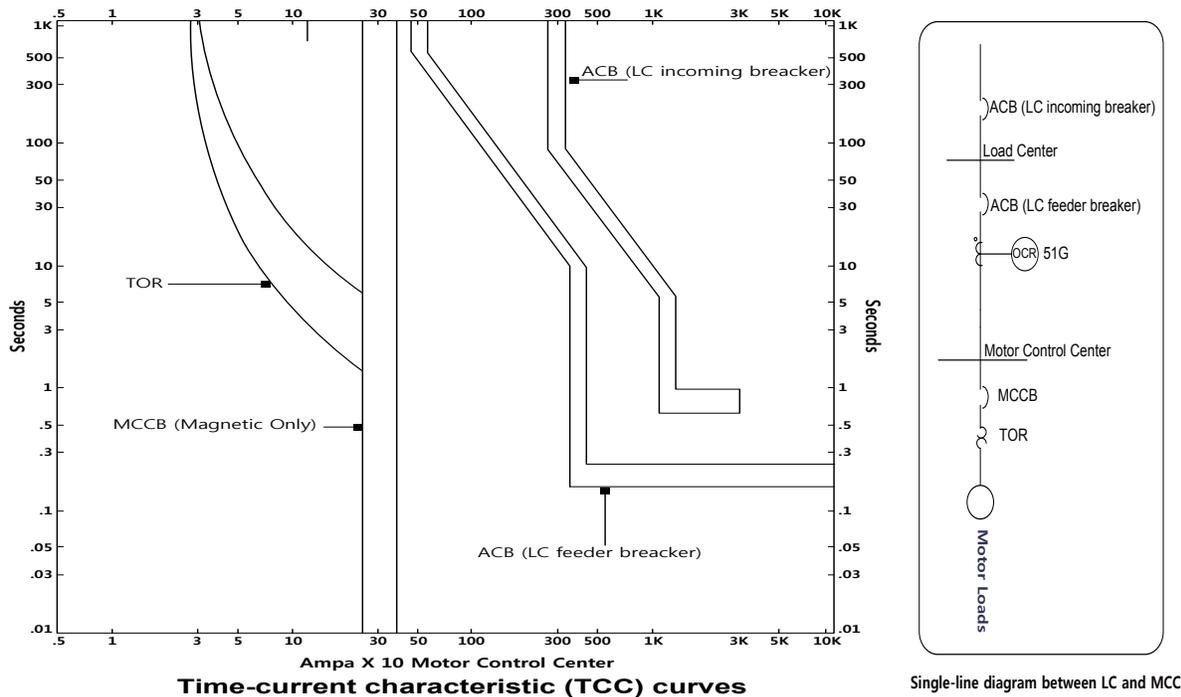
relay (51G) and ground sensor (50GS) provide protection for the feeder to the 480V MCC and to a LC single load.

The 480V MCC feeders are protected by the MCC feeder breakers, which are two types of MCCB; one is magnetic-only (MO) type and the other is thermal-magnetic (TM) type. The MO type with the overload relays, magnetic contactors, and motor starters is used for motor loads and the TM type is used for non-motor loads such as transformers, heaters, and receptacles, etc. The ground sensor (50GS) is also provided for ground fault protection according to the capacity and location of the load.

Selective protection coordination between 480V LC and MCC

The MO type MCCB or TM type MCCB provides primary protection for the MCC feeders with instantaneous and overload (with time delay) protection characteristics.

The ACB which has LT and ST trip elements of the overcurrent relay provides primary protection for the MCC main bus and also backup protection for the MCC feeders. The ACB protection elements are designed to properly coordinate with the primary protection of the MCCB such that the selective protection coordination precludes nuisance trips of the LC feeder breaker upon a trip at the MCC feeders. To illustrate the preceding, an example of the time-current characteristic (TCC) curves with a single line diagram between the LC and MCC is provided below.



Impact on DCD

There is no impact on the DCD.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical, or Environmental Report.