



Book 6

Technical Specification and Requirements of Solid Dielectric Three-Phase Automatic Circuit Reclosers, Outdoor Type



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Technical Specification and Requirements of Solid Dielectric Three-Phase Automatic Circuit Reclosers, Outdoor Type for Microgrid Development Project at Betong District, Yala Province Provincial Electricity Authority (PEA)

1. Introduction

This technical specification presents the PEA's requirement concerning the automatic circuit reclosers for Betong microgrid. Figure 1 shows a connection diagram of Betong microgrid (MGBT), which the recloser is denoted for the complete set of the circuit interrupting device, control unit, voltage transformer, interconnecting control cable, mounting frame and accessories. The reclosers' functions mainly designed in order to fulfill microgrid operation such as fault detection, islanding operation with synchronization, fault location isolation and supply restoration (FLISR) function and also waveshape monitoring. The detail of each function was described in Book 2 Technical Specification and Requirements of Microgrid Controller.

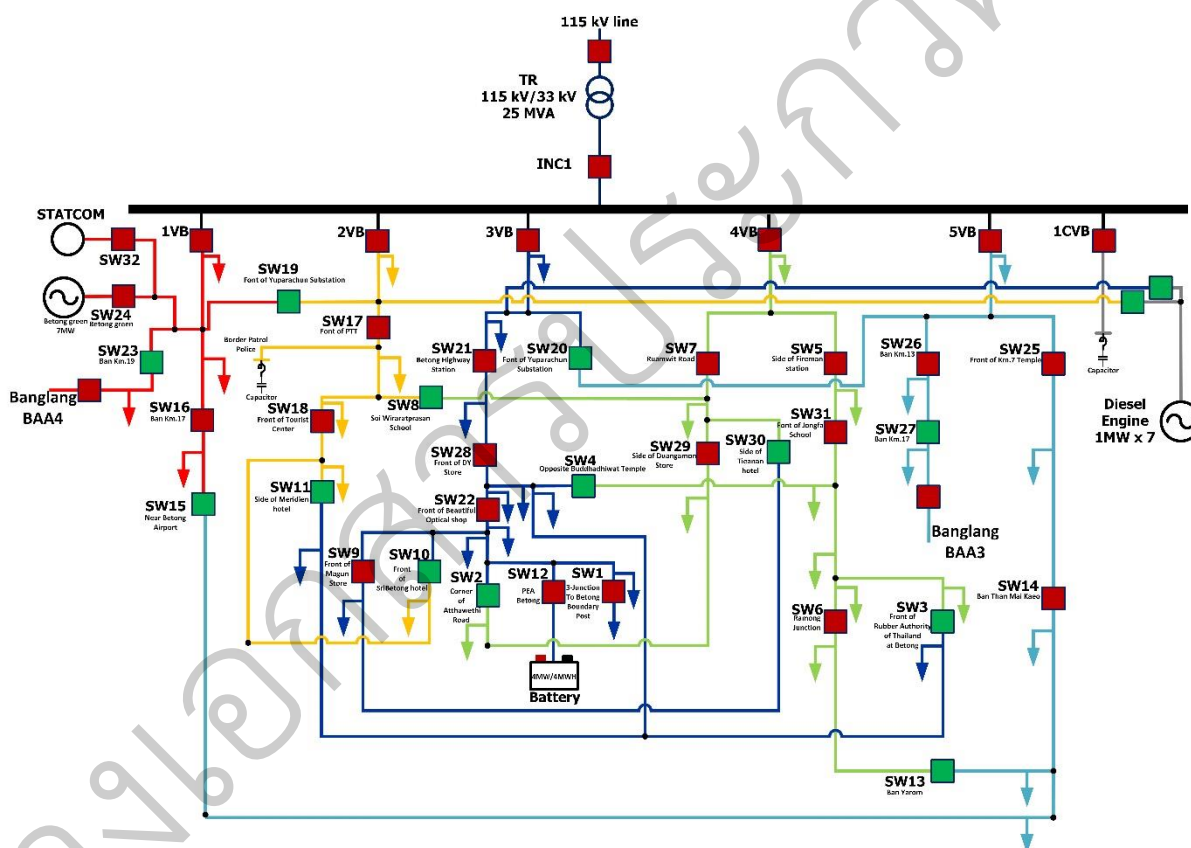


Figure 1 Connection diagram of Betong microgrid (wait for update)



2. Scope of works

The contractor shall supply the complete set of solid dielectric three-phase automatic circuit reclosers, outdoor type for 33 kV 50 Hz distribution system totally thirty-two (32) sets with the spare parts of reclosers shall not less than three (3) sets. The technical specification and requirements were specified in Appendix A.

Latitude and Longitude of each installation location for reclosers will be given by PEA after the final of bid consideration.

3. Communication

The communication media that connect recloser to each other and to microgrid controller (MGC) shall be fiber optic cable. The communication network and others are described in Book 4 Technical Specification and Requirements of Communication System.

4. Demolition and installation

Demolition and installation plan shall be provided for approval within 120 days after signed contract. Delivery time is also one of the important factors to be considered.

Demolition and installation shall be PEA's responsibility. At least 2 sets of installation tools shall be provided by contractor. Manufacturer's experienced installation supervisor for automatic circuit reclosers shall be prepared at site. The contractor shall have experienced supervisors to witness with PEA team at site, and for more details are in Bidding document.

5. Control panel

(Refer to Appendix: A, Page: 6, Item: 1c.3.1 Control panel)*

The control panel shall be designed and erected for initiating control actions and viewing the status indicators of the reclosers. As minimum, the control panel shall include the following:

(4) A Remote/Local switch. While this switch is in the "Local" position, control shall be permitted only from the control panel (i.e. remote control shall be prohibited). While the switch is in "Remote" position, control shall be permitted both the Distribution Management System (DMS) and microgrid controller (MGC).

6. Control cabinet

(Refer to Appendix: A, Page: 7, Item: 1c.3.2 Control cabinet)*

The control cabinet shall include space for mounting the Ethernet switch. The control cabinet shall have a hinged front access door with at least two-point latch locking system and latch operating lockable handle.

The control cabinet shall include at least two (2) weather-sealed holes with cable glands, on the bottom of the cabinet for routing communication cable connected to ODF as described in Book 4 and power cable to Ethernet switch.



7. Distribution Management System (DMS) and Microgrid Controller (MGC) interface

(Refer to Appendix: A, Page 8, Item: 1c.3.3 Distribution Management System (DMS) interface)*

The reclosers shall have capabilities to be controlled and monitored by the telecommunication system of the DMS and MGC.

The control of the reclosers shall communicate with DMS and MGC via fiber optic cable.

The control unit shall have an internal clock for data collection coordination and time tagging. This shall include both sequence of events (SOE) and fault data reporting with a resolution of ± 1 ms relative to internal clock.

The time that communicated with the DMS shall be configurable to Greenwich Mean Time (GMT) or local time by selecting and the time display on control panel shall be of local time.

For physical communication port and network protocol are described in book 4.

8. Analog signals

(Refer to Appendix: A, Page 9, Item: 1c.3.3.1 Analog signals)*

The control unit shall accept voltage input signals with a normal input signal of 110 V AC. The sampling rate for AC quantities shall be at least 12 samples per cycle. The analog-to-digital (A/D) converters shall have a digital resolution of at least 12 bits plus sign. The overall accuracy of the analog input system shall be at least ± 0.2 % of full scale over the temperature range 0 to 60 OC. Linearity shall be better than ± 0.05 %. The control unit shall be able to report all analog values that have changed by more than a programmable dead-band from the last value, only the last changed value was successfully reported to the DMS and MGC. The dead-band and point type (DI or SOE) shall be specified for each point individually. In addition, the ability of the control unit to alarm analog high and low limit violations is desirable.

9. Status signals

(Refer to Appendix: A, Page 10, Item: 1c.3.3.2 Status signals)*

The state of each status point shall be reported to the DMS and MGC on an exception basis. That is, a status point shall not be reported to the DMS and MGC during normal scanning unless the point state has changed from the last normal scan. The control unit shall also report the state of selected status points upon receipt of a demand scan request from the DMS and MGC. All status point shall be able to be specified point type (DI or SOE) for each point individually.



10. Control signals

(Refer to Appendix: A, Page 11, Item: 1c.3.3.3 Control signals)*

The control unit shall include the following types of control points to support control actions initiated by the DMS master stations and MGC.

To support the above capabilities, the control unit shall include momentary control outputs and latching control outputs. Latching outputs shall remain in a given state until a subsequent command changes the control output state.

Control point selection by the DMS and MGC shall be canceled if the operate command is not received within a programmable time period measured at the control unit by a “Command Receipt” timer. The control unit’s Command Receipt timer shall be in addition to the “Select Verification” timer in the DMS and MGC. The Command Receipt timer shall be adjustable between 10 and 60 seconds. The time period shall initially be set at 10 seconds.

All control points shall follow a Select-Check back-Before-Operate (SCBO) procedure for control operation.

Control Unit shall able to send the control-related status code to DMS and MGC following the communication protocol as described in Book 4 Technical Specification and Requirements of Communication System.

11. Terminal blocks

(Refer to Appendix: A, Page 13, Item: 1c.3.6 Terminal blocks)*

Terminal blocks shall be provided for connecting power cables from the control unit and the communication equipment. Terminal blocks shall be of bare wire compression type.

The terminal blocks shall be of heavy-duty, moulded block type with moulded insulating barrier between terminals. Each terminal block and individual terminal shall have removable white marking strip for marking circuit designation.

No more than two (2) wires shall be connected to any terminal. Adequate space and hardwares shall be provided for routing of the field wiring within the control cabinet.

12. Power supply

(Refer to Appendix: A, Page 14, Item: 1c.7 Power supply)*

The power supply shall supply 12 (+15%, -5%) VDC, 5 A, THD $\leq 3\%$ at rated terminal voltage, to the terminal blocks for the communication equipment, for at least 40 VA, separately and separate ground.

The battery charger shall be fully temperature compensated and have the facilities to select input voltage between 110 V AC and 230 V AC.

The battery shall be of sealed lead acid or dry type or better.

13. Training

(Refer to Appendix: A, Page 16, Item: 1c.11 Training)*

Training courses shall be provided by contractor as described in Bidding document.



14. ACCEPTANCE TEST

(Refer to Appendix: A, Page 20, Item: 1d.3 Acceptance tests)*

PEA's acceptance committee will inspect and randomly sampling the reclosers for testing. The number of the samples is described as per Bidding document.

***Other Term and Conditions:** Book 6: Technical Specification and Requirements of Solid Dielectric Three-Phase Automatic Circuit Reclosers, Outdoor Type and PEA's technical specifications for solid dielectric three-phase automatic circuit reclosers, outdoor type, for 22 kV and 33 kV 50 Hz distribution system (specification no.: RPRO-034/2561) attached in Appendix A hereto as and made a part of this TOR. If there is any conflict between the Book 6 and Appendix A, the Book 6 Technical Specification and Requirements of Solid Dielectric Three-Phase Automatic Circuit Reclosers, Outdoor Type shall prevail.



Appendix A

**PEA's technical specifications for SOLID DIELECTRIC THREE-PHASE AUTOMATIC CIRCUIT RECLOSERS, OUTDOOR TYPE, FOR 22 kV AND 33 kV 50 Hz DISTRIBUTION SYSTEM
(Specification no.: RPRO-034/2561)**