



MR 46/2017

**DESIGN SERVICES FOR 132KV TRANSMISSION
LINE PROTECTION UPGRADE**

ADDENDUM No. 1

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No	Description
1	<p>3. Objective of the Assignment and Scope of Work</p> <p>Replace “</p> <ul style="list-style-type: none"> • <i>Assessment of existing As-built drawings and identifying how the existing relays can be replaced, and new schemes can be integrated with existing CB Fail schemes and inter-tripping schemes</i> • <i>Preparation of design drawings, including specification of protection relay for procurement, and protection relay settings files</i> • <i>Preparation of design report and operator notes</i> • <i>Preparation of I/O list for SCADA interconnection of new protection relays</i> • <i>Preparation of installation guidelines, for minimum impact to the transmission line availability</i> • <i>Review of existing distance protection settings for the 132kV transmission lines”</i> <p>With “</p> <ul style="list-style-type: none"> • <i>Assessment of existing As-built drawings and identifying how the existing relays can be replaced, and new schemes can be integrated with existing CB Fail schemes and inter-tripping schemes</i> • <i>Preparation of design drawings, including specification of protection relay for procurement, and protection relay settings files</i> • <i>Preparation of design report and operator notes</i> • <i>Preparation of I/O list for SCADA interconnection of new protection relays</i> • <i>Preparation of installation guidelines, for minimum impact to the transmission line availability</i> • <i>Review of existing distance protection settings for the 132kV transmission lines and update to new protection settings</i> • <i>Providing commissioning support (Designer shall indicate whether this will be on-site or remote)</i> • <i>As-building of site as-built markups and return of CAD files to FEA within one month of issue of site as-built markups“</i>
2	<p>17. Inputs/Facilities Provided</p> <p>Replace “FEA will provide copies of as-built drawings for the transmission lines covered in the project.”</p> <p>With “FEA will provide copies of as-built drawings in CAD format and protection settings files in rdb format for the transmission lines covered in the project. In addition to this, FEA will provide office space for 1x personnel to be stationed at FEA’s Head Office in Suva for any design meetings in Fiji or on-site commissioning support.”</p>
3	<p>Replace “Appendix 1: 132kV Transmission Line Protection Drawings</p> <p>Refer to attached pdf drawings.”</p> <p>With “Appendix 1: Overview of Existing 132kV Transmission Line Protection Scheme</p>

Existing 132kV transmission line protection scheme consists of line differential protection and communications-assisted distance protection scheme. They are referred to as "Protection 1" and "Protection 2".

The line-differential protection is provided by SEL311L protection relays (Protection 1). These are configured with single-shot single-pole trip and auto-reclose scheme. Three-pole auto-reclose scheme is not configured yet. The SEL311L relays are also configured for backup distance protection. The following functions are configured in the SEL311L:

- a. Line Differential Protection with single & 3 phase trip outputs:
 - Three phase differential trip
 - Single phase differential trip
- b. Zone 1 Distance Protection with single & 3 phase trip outputs:
 - Three phase zone 1 distance trip
 - Single phase zone 1 distance trip
- c. Backup protection functions are enabled
 - 2 forward zones of distance protection: Zone 2 and 4
 - 1 reverse zone of distance protection: Zone 3
 - Backup directional EF protection with long time delay. This is blocked
 - while a pole of the CB is open during a reclose cycle.
- d. Backup Negative sequence OC protection that is only enabled for a total communications failure in protection 1 AND 2; such as a broken OPGW fibre cable and is blocked while a pole of the CB is open during a reclose cycle.

The SEL421 provides distance protection and is configured as a POTT scheme (Protection 2). It is also configured for single shot single-pole trip and auto-reclose scheme. The following functions are configured in the SEL421:

- a. Switch onto fault trip (SOTF) logic that is active at the moment of closing the CB. This will trip immediately at the moment of closing for either:
 - Zone 2 pickup (M2P, Z2G)
 - Phase overcurrent pickup
 - Phase overcurrent combined with Undervoltage on at least one phase (where current will be too low for a plain OC setting). A short time delay required to allow UV to reset following normal line energisation.
- b. Permissive trip (POTT) scheme with inputs from zone 2 distance element and optional input from directional earth fault (67G2) if DCEF is applied. Signaling inputs from the remote end are PTA, B, C: separate signals for each phase.
- c. Command Intertrip for CBFail conditions: DTA, B, C.
- d. 3 forward zones of distance protection: Zone 1, 2 and 4
- e. 1 reverse zone of distance protection: Zone 3
- f. Backup directional EF protection with long time delay 67G4. This is blocked while a pole of the CB is open during a reclose sequence.
- g. Backup directional negative sequence OC protection that is only enabled for a total communications failure in protection 1 AND 2; (such as a broken OPGW fibre cable). This element is blocked while a pole of the CB is open during a reclose sequence.

Both protections have independent CTs. Both protections share a common VT, but via separate VT secondary wires from switchyard.

Both protections provide SCADA indication of various protection trips, individual CB pole statuses and

The protection relays are installed in Rittal 600x800x2200mm. "