

Power Supply Upgrade.

For an effective and reliable power supply system, the following changes should be implemented at IS31:

- New step-down 30kV/10kV transformer to be installed at the old CRF location to supply power over the existing and refurbished 10 kV overhead line to a new CRF building at the existing Technical Site. The capacity of the transformer shall be defined by the Contractor but should not be less than 100 kVA.
- New step-down 10kV/0.4 kV transformer shall be installed at the old CRF / Remote Monitoring Facility (RMF) in order to provide power to the RMF. The capacity of the transformer shall be defined by the Contractor but should not be less than 5 kVA.
- Bare wires of the existing 10 kV line between the old and new CRF locations to be replaced by a cable in order to reduce risk of lightning and other severe weather effects on this section of the installation.
- Cables between the array elements and the new CRF location shall be replaced following the minimal cross-sections shown in Figure 2 and Table 1 below. Since cable connections between the CRF and the elements with lengths of several hundreds of meters are vulnerable to lightning strikes, either direct to the cable or nearby the cable route, Type 1 surge protection (SPD) shall be installed at both ends (CRF and element) entry of the cable. The new cables shall be armored and suitable for direct trench installation.
- New power distribution switchboard shall be installed at the CRF. 10A circuit breakers for each line going to the elements shall be installed in the main electric distribution.
- A central UPS, sufficient to maintain 1000 W load for 10 minutes before the start of a back-up generator shall be provided and installed at the CRF location. The UPS shall provide 230 VAC power to the array elements.
- A new back-up generator shall be installed at the CRF. Recommended generator size is 20 kVA, 230 VAC, 3-phase. The generator shall provide power for CRF installation and array elements. An automatic switch shall start the generator within 5 minutes after loss of mains power. The generator shall have fuel tank for 10 days of operation minimum.
- Lightning protection system of the station shall be upgraded in accordance to CTBTO Earthing and Lightning Protection Guide. (See Attachment B)

As an alternative option, the Contractor can propose bringing directly 30kV aerial cable from the old CRF to the new CRF. In this case step-down 30 kV/0.4 kV transformers shall be installed at the new CRF and at the RMF.

Detailed power supply diagrams are presented in the attached drawings.

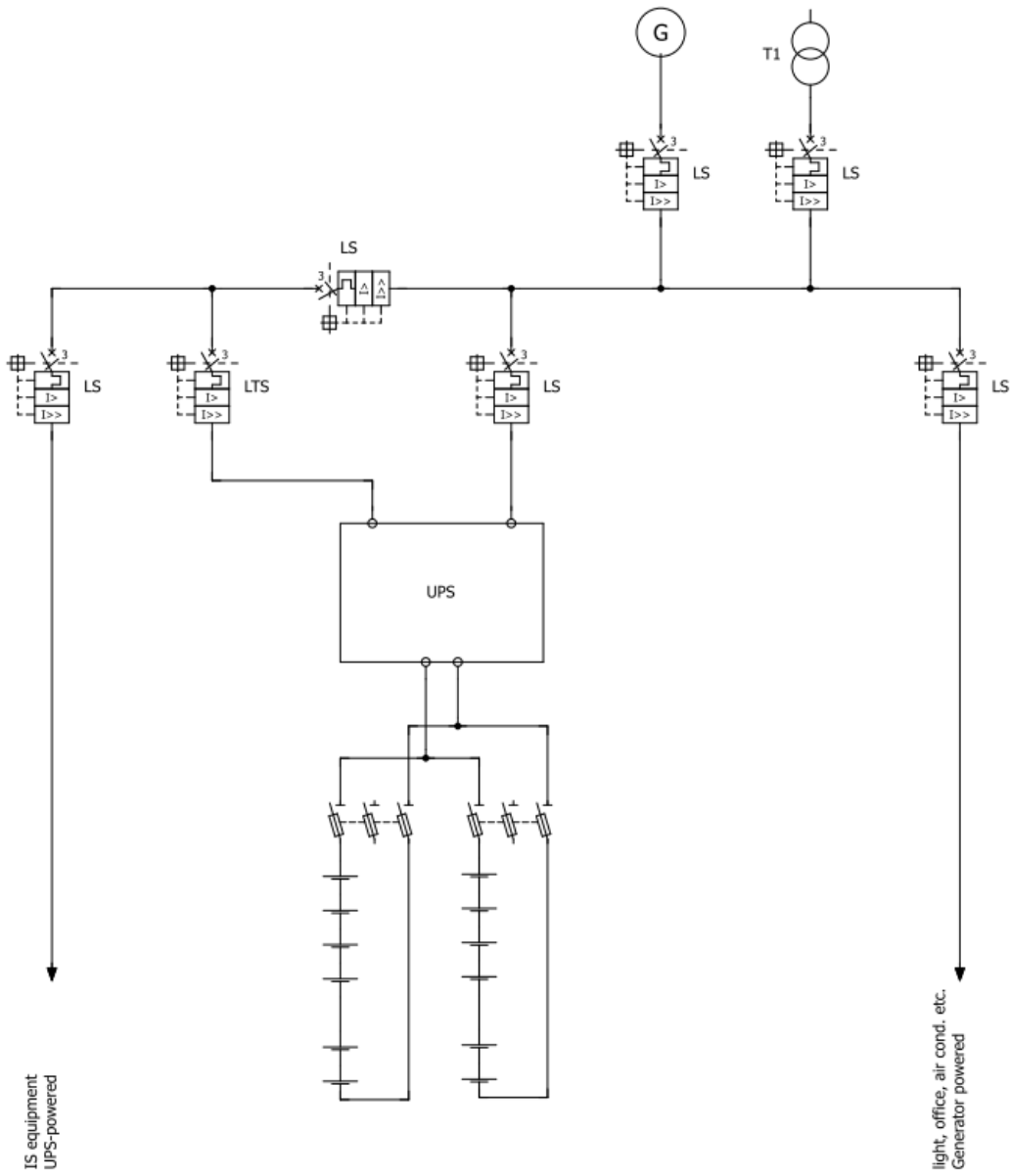


Fig. 1: Basic concept for the power supply of a new installation of IS 31

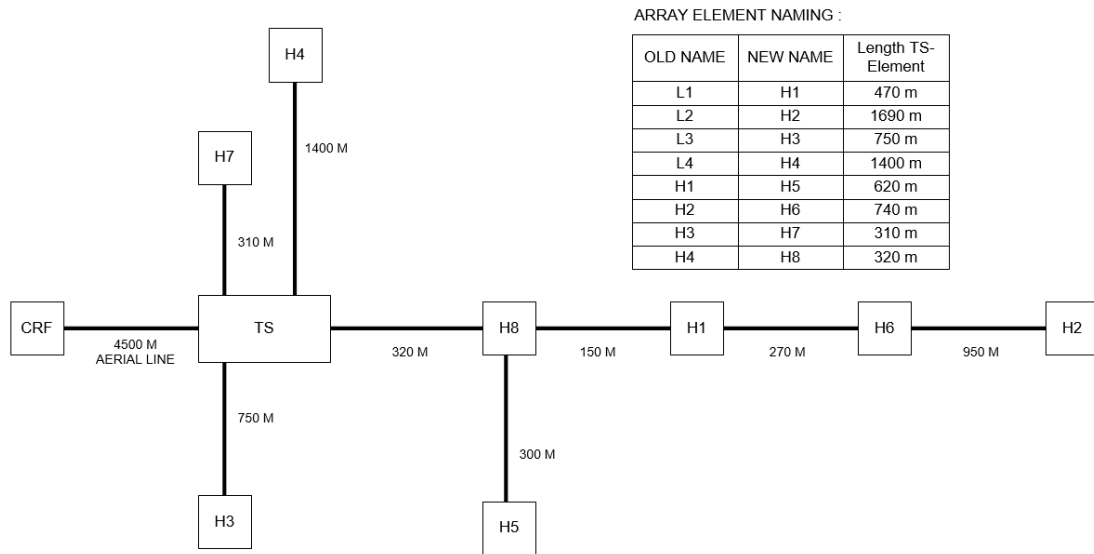


Fig. 2: Required cable lengths of the new electric installation used for the calculation of the voltage drop and to determine the minimum wire cross sections

Table 1: Minimum cross section of the single phase 230V cables (copper) connecting CRF with the elements

Element	Length (m)	Peak Power (kW)	Min. Crossection (mm ²)	Votage drop (%)
H1	470	1	16	1.98
H2	1690	1	50	2.28
H3	750	1	25	2.03
H4	1400	1	35	2.70
H5	620	1	16	2.62
H6	740	1	25	2.00
H7	310	1	10	2.09
H8	320	1	10	2.16