



# Equipment Strategy for Post Type High Voltage Current Transformers and Metering Units

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## 1. Introduction

### 1.1 Purpose

Equipment Strategies document Powerlink’s vision for equipment technologies, to provide both Powerlink and Suppliers with consistent planning and project management platforms for the life of the Strategy. The document expresses Powerlink’s vision in terms of the equipment performance requirements. It is not a detailed contract specification.

The intent of this Current Transformers and Metering Units strategy is to specify the Powerlink preference of the equipment type to be used in both regulated and non-regulated applications. This document will direct the development of detailed technical and procurement specifications for Current Transformers.

It is envisaged that the Equipment Strategy for Current Transformers will have a life of ten (10) years. Review of this equipment strategy is required in the fifth (5<sup>th</sup>) and the eighth (8<sup>th</sup>) years to enable inclusion of new technologies that have matured or a business need that triggers a review whichever comes first.

Equipment Strategy for post type high voltage current transformers and metering units has been developed in consultation with relevant stakeholders within Powerlink.

### 1.2 Scope

This document covers post type high voltage current transformers and metering units ranging from 72.5kV to 550kV for use in new and existing air insulated substations (AIS) for replacement, refurbishment and augmentation projects

### 1.3 References

Document code	Document title
<a href="#">IEC 61850</a>	IEC (2013) <i>Communication networks and systems for power utility automation</i>
AS 61869.2:2021 and IEC 61869-1:2023	Instrument Transformers – Part 1: General Requirements
<a href="#">ISO/IEC 17025</a>	ISO (2005) <i>General requirements for the competence of testing and calibration laboratories</i>
<a href="#">NER</a>	National Electricity Rules

### 1.4 Defined Terms

Terms	Definition
AEMO	Australian Energy Market Operator
APLAC	Asia Pacific Laboratory Accreditation Cooperation
ILAC	International Laboratory Accreditation Cooperation
Metering unit	Combined current transformer and voltage transformer in a single unit. Typically is produced using gas as main insulation medium.
NATA	National Association of Testing Authorities
NCIT	Non-Conventional Instrument Transformers
NER	National Electricity Rules
SAP	Software package used for computerised maintenance management system and asset register



## 2. Strategy

### 2.1 Projected Use of Equipment

All post type high voltage current transformer and metering units to be purchased will be used for energy metering and measurements and protection transmission lines, transformers, generators, capacitors/reactors, SVCs or for bus-coupling.

### 2.2 Strategy Requirements

The vision that drives equipment strategy documents is based on historical experience, research and investigations into new products available on the market, reliability centered maintenance analysis and lifecycle cost experience over the expected service life of the equipment.

The main features of the vision for post type high voltage current transformers and metering units are as follows

#### General

- Preference is to adopting standardized equipment in accordance with the power industry standards to eliminate the necessity for customization.
- Annual Operation and Maintenance cost less than 0.5% of the asset value.
- Designed for an operating life of 40 years in Queensland climate conditions.
- Safe operation, availability and reliability to meet network requirement.
- Appropriate monitoring and remote interrogation facilities to allow maintenance staff to optimise site visits.
- Standard variants to cover operational requirements.
- Service and spare parts support during the complete life of equipment with preference for Australian based support.
- Designed to have minimal routine inspection/maintenance.
- Minimal site assembly and installation time.
- Evaluation and assessment through Life Cycle Cost Analysis (LCCA)
- Appropriately sealed secondary terminal box which does not require any more frequent visual inspection than once every 12 years

#### Safety and Environmental

- The risk of explosive failure is to be kept low (0.0003 failures per year), so far as is reasonably practicable.
- Failure modes should be non-life threatening and as safe as reasonably practicable for personnel working in the yard.
- The design of the unit allows for safe and environmentally appropriate disposal.
- Gas used in equipment should be recyclable and/or recoverable.
- Meeting standard requirements for noise and radio interference voltage (RIV).
- Only Polymer insulators with service life of 40 years shall be used for housing.
- Minimal leakage rates in case of insulating gas with the aim of being less than 0.1% per annum, with a maximum guaranteed of less than 0.5% per annum. This is in order to meet or exceed environment standards and reduce operational costs.

**Equipment Strategy for Post Type High Voltage Current Transformers and Metering Units****Maintenance**

- Minimal maintenance requirement:
  - Minimal routine inspections, no more than once a year.
  - Long service intervals, being at least 12 years between services.
  - Services should be non-intrusive as far as possible and achieved while the equipment is in operation.
  - Enables addition of online condition monitoring.
  - There will be provision for taking gas samples allowing use of modern accuracy testing methods.

**2.3 Technologies available Now**

Currently available technologies are SF6 gas, alternate gas and Oil insulated Current Transformers and metering units with mix of Polymer and Porcelain insulators having both live tank and dead tank designs.

Non-Conventional Instrument transformers (NCIT) are yet to be considered a commercially viable solution for Powerlink. A number of trials are being conducted in order to gain service experience with various construction types of NCITs. National Electricity Rules do not have provisions for accuracy testing and requirements for NCITs

However development is ongoing and it is expected for NCITs to become viable during the life of this equipment strategy.

**2.4 Additional Requirements**

The future post type high voltage current transformers and metering units specification shall include the following main features:

- Live tank Design with Composite Insulators and insulating medium using SF6 gas or an alternative gas.
- Provision for gas / oil sampling.
- Inclusion of overpressure devices (for example, rupture disks).
- Analog on-line density monitoring of gas available to be fed into the substation automation system.
- Preference will be given to design which actively minimizes the chance of corrosion in all aspects. Anti-corrosion measures applied especially in areas of known corrosion e.g. unprotected flanges, rupture disks, gas ports, gas pipes, etc. and/or external weather sealant on all flange joints will be well regarded.
- Demonstrate the calibration of measuring / testing equipment used by NATA certified laboratory or by facilities accredited to ISO/IEC 17025 and has mutual recognition through ILAC or APLAC. Evidence of this shall be provided with routine test reports.
- Equipment shall be designed and constructed, packaged and transported to withstand transport shocks on non sealed roads, and to ensure and demonstrate the equipment is delivered in good condition.
- The manufacturer's ability to be able to provide support for the whole of life of the equipment .

**2.5 Concurrent Investigations**

The market position for Non-Conventional Instrument Transformers / Circuit breaker with Fibre Optic Current Sensors (FOCS) and Electronic Current Transformer (ECT) / Electronic Voltage Transformer (EVT) with merging units integrating with IEC 61850 secondary systems will continue to be monitored. Powerlink will continue to collaborate with AEMO to modify NER to allow for their use for metering and protection and will work on development of testing procedures.