

Monitoring Zone Substations (Australia)

A PowerMonic power quality analyzer may be installed at zone substations for either short-term investigations or for long-term monitoring to meet the following needs:

- **Compliance with regulator or state code requirements** – In some states, regulations require installation of a power quality monitor at each zone substation.
- **Power quality check before payment of claims** – Customers increasingly file claims against power companies for damaged electrical equipment. Power quality analyzers can verify the quality of the supply leaving the zone substation at the time of the alleged incident, either verifying or disproving the customer claim.
- **Monitoring zone substation capacity** – A power quality analyzer enables continuous monitoring of available zone substation capacity, thus minimizing overloads and loss of supply.
- **Connecting large customers and providing power quality indices** – The collation of power quality indices can be beneficial to the new customers, especially when they connect directly from the zone substation. These measures allow customers to ensure that the power they receive meets their plant and equipment specifications.
- **Monitoring the operation of zone substation protection equipment** – When a network problem occurs, power quality analyzers can verify if protection equipment has performed as it should. An exceedance may show that a circuit breaker did not work as intended.
- **Checking frequency injection or ripple signal loads** – frequency injection signals can cause large jumps in load if the controller connections are not adequately controlled.



A PowerMonic 45 is installed on a transformer panel for temporary power quality monitoring.

Installation of the Power Quality Analyzer

Power quality analyzers must be configured to capture required data from voltage transformers. The nominal voltage must be set to the nominal output voltage of the VT.

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The power quality analyzer should be connected to the zone substation output busbar’s VT supply and the power transformer’s current transformers (CT). Alternatively, the analyzer can be connected to a feeder circuit breaker CTs. The connection to CTs is best performed with a GridSense Substation CT Converter Kit, which isolates the CT circuit from the PowerMonic to ensure integrity of the CT circuit.

The analyzer is now configured and operable. A landline or cellular modem may be connected for remote data communication. A data storage system is needed to ensure that data is readily available for analysis or long-term trending of power quality indices.

Case in Point

A power company received customer complaints that correlated with a zone substation supplying a large level of commercial load. The zone substation was supplied from a long transmission network that also supplied numerous other zone substations.

A PowerMonic 45 power quality analyzer was installed at the zone substation on the output from the substation power transformer. Fig. 2 shows that the voltage output from the zone substation was drooping at peak load times. Following an analysis of the graph, engineers suspected that the transformer tap changer was running out of boost taps. They analyzed tap position information from the data acquisition system at the zone substation and verified their suspicions.

As a short-term method to boost supply voltage at peak times, the transmission company included line drop compensation settings on their supply. This solved the problem and a long-term fix was scheduled for the following year.

