

# Remote Substation Monitoring

## Transformer monitoring

One of the primary reasons to perform remote substation monitoring is to get real-time data and alerts for a critical transformer. Using the PQube® 3, precise power quality monitoring may also include:

- Load-side voltage and current
- Power flow through the transformer
- Transformer efficiency (if potentials and currents are available on the high side)
- Coolant pressure
- Coolant temperature
- Coolant conductivity
- Ambient temperature, humidity
- Transformer vibration
- Harmonics, transients, high frequency emissions

The PQube® 3 provides a continuous assessment of a transformer's health by supplying data on environmental factors such as temperature and pressure, and in some cases noting when high frequency current emissions are present. If high-side current transformers (CTs) and potential transformers (PTs) are available, users can calculate efficiency by operating a PQube® 3e in dual-voltage mode. Harmonics may be calculated on both sides of the transformer, yielding valuable information — and if existing coolant sensors are PQube® 3-compatible, transformer coolant conditions can be monitored as well.

The PQube® 3 can be programmed to generate transformer-specific alerts, with snapshot data, when thresholds or trends are exceeded. These alerts can be custom-set to notify personnel only in cases where monitoring indicates that intervention is required. This reduces unnecessary trips to the remote substation and/or application of intensive alternative online fluid conditioning and bushing monitoring of the transformer.

## Communications flexibility

It's not necessary to install costly SCADA communications to a remote substation when only a few critical data points are needed.

**The PQube® 3 can use existing communications at a substation** — such as DNP3, Modbus, HTTPS and others — to backhaul data to the operation center. Data can also be viewed by dialing into a PQube® 3 through a cellular modem, which can be packaged into the unit.

Users may also view PQube® 3 data and stay apprised of real-time conditions at the remote substation **via the QubeScan cloud software**, either as a standalone unit or as part of a fleet dashboard. High-accuracy time stamping is also available through our accessory modules.

## Mounting options

The compact design of the PQube® 3 and its accessories allows for **an easy fit** inside existing cabinets, control houses and even switchgear. For remote substations, where space can be hard to find, a DIN rail kit can be requested to simplify mounting inside existing spaces or on walls.

Powerside also has experience with fitting the PQube® 3 into enclosures, along with accessories like battery backup modules, GPS antennae and cellular modems and antennas. **We have “ready to go” enclosure designs available to meet your needs.**

In some cases, we can create custom cabinet configurations to meet specific requirements and applications. These enclosures may be weatherproofed and mounted outdoors on building or equipment walls. We also offer several pole mounting options and designs.



## Benefits

Remote station monitoring with the PQube® 3 offers positive impacts on both your operations and budget.

### Operational benefits:

- Teams can receive transformer and breaker alarms through emailed alerts
- Trends and real-time data for the substation are captured remotely, viewable from any location
- Critical loads at the remote substation can be monitored through the PQube® 3's analog and digital inputs
- Accurate fault data and directional data helps operators verify local problems

### Examples of cost savings:

- Reduce unnecessary trips to remote locations by prioritizing work crews based on PQube® 3 data
- Avoid costly equipment failure by discovering maintenance needs sooner
- Eliminate need for a SCADA system at a remote site by relying on PQube® 3 communications capabilities

## Application examples

### Small spaces:

Remote substations and taps often don't have control houses where SCADA equipment can be installed. Due to its small but rugged form factor, the PQube® 3 can fit into small existing cabinets and be mounted on poles. Our manufacturing center offers several "ready to order" mounting options that have been used successfully for utilities and cooperatives.

### Unique loads:

The PQube® 3 can be ideal for monitoring remote substations with unique loads like pumps, cooperative taps and small generation. In some cases, customers have critical loads in remote locations, and utilities and cooperatives can do alerting for problems that arise at these locations. For instance, cellular towers often have generators for backup power. In the case of a utility or cooperative outage, data could still be available for the cellular tower location via the PQube® 3 and its cellular modem communications capability.

### Temporary needs:

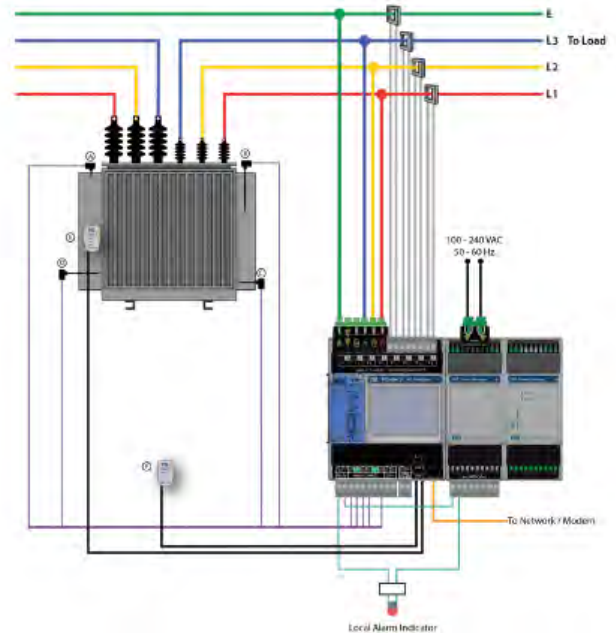
During substation maintenance and construction projects, portable transformers are often used to bypass the substation. In these situations, communications can be added to the PQube® 3 to serve as a self-powering portable monitor for the temporary transformer. The PQube® 3 can also provide data to the utility or cooperative on the voltage, current and flow at that substation in those cases when the normal SCADA system is bypassed or out of service. The PQube® 3 works seamlessly with PQView and can easily be integrated as required.

### Metering:

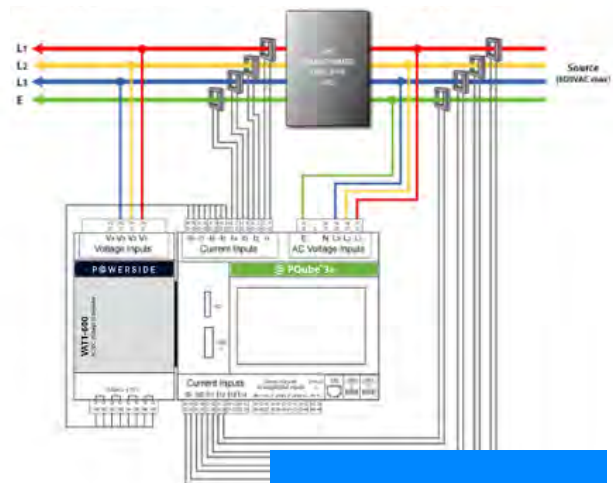
The PQube® 3 can provide revenue quality metering, if the PTs and CTs are revenue grade.

### Sensors for remote distribution transformer monitoring

- A) Coolant pressure
- B) Top and C) bottom coolant temperature
- D) Coolant conductivity
- E) Vibration & Coolant Level
- F) Ambient temperature, humidity



### PQube® 3e Upstream/Downstream Dual Voltage and Current Monitoring Application



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