

# Reactive and Active use Power Quality monitoring

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## Agenda

### Reactive use of PQM

- Contractors install temporary PQ loggers
- Overvoltage
- Harmonics
- Motor shorting

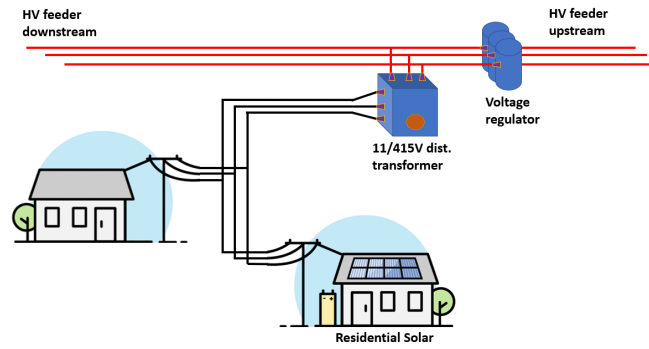
### Active use of PQM

- Reason of active use
- CT and VT comments
- Field based PQM setup
- Substation based setup

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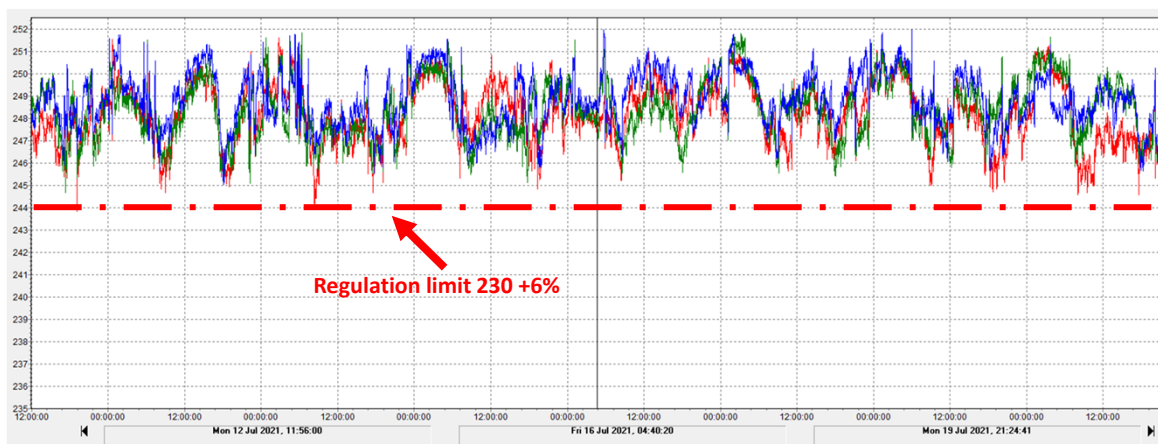
## 1.1 Overvoltage – Common issues

- Solar Injection into weak network
- Contractors not applying the right tap setting to dist TX.
- Unintended consequence of upstream works



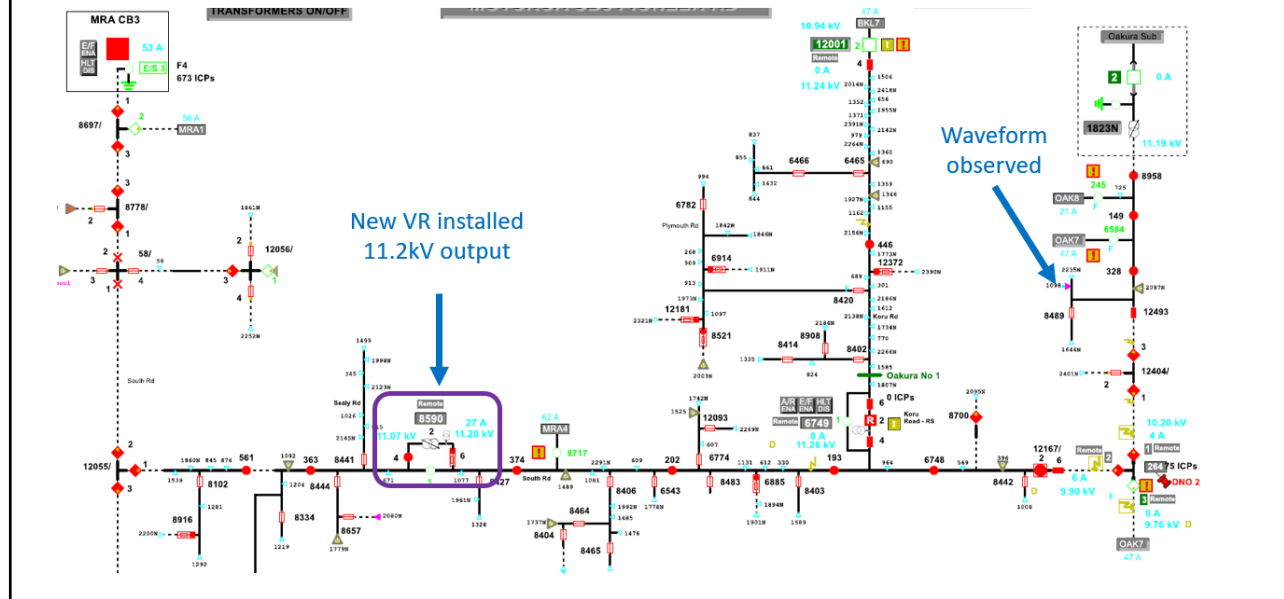
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## 1.2 Overvoltage – Waveform



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## 1.3 LV Overtoltage – cause



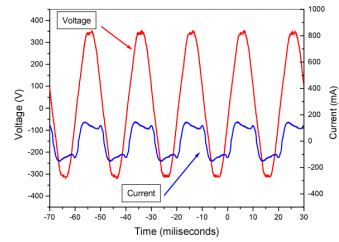
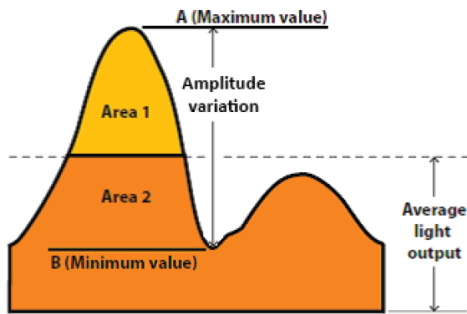
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## 1.4 Harmonics - Customer Investigation

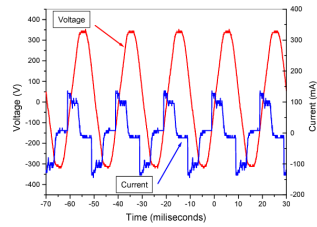
- Harmonics (Integer multiples)
  - Part of the connection approval process
  - Allocation per AS/NZS 61000
- Inter-harmonics (non-Integer multiples)
  - Visible phenomenon is light flicker
  - Depend on the quality of the product

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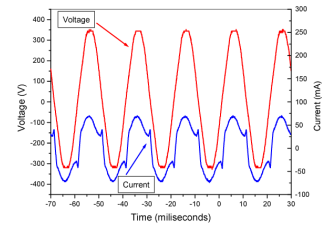
# 1.5 Light Flicker Phenomenon



(b) Lamp 6 LED 22W



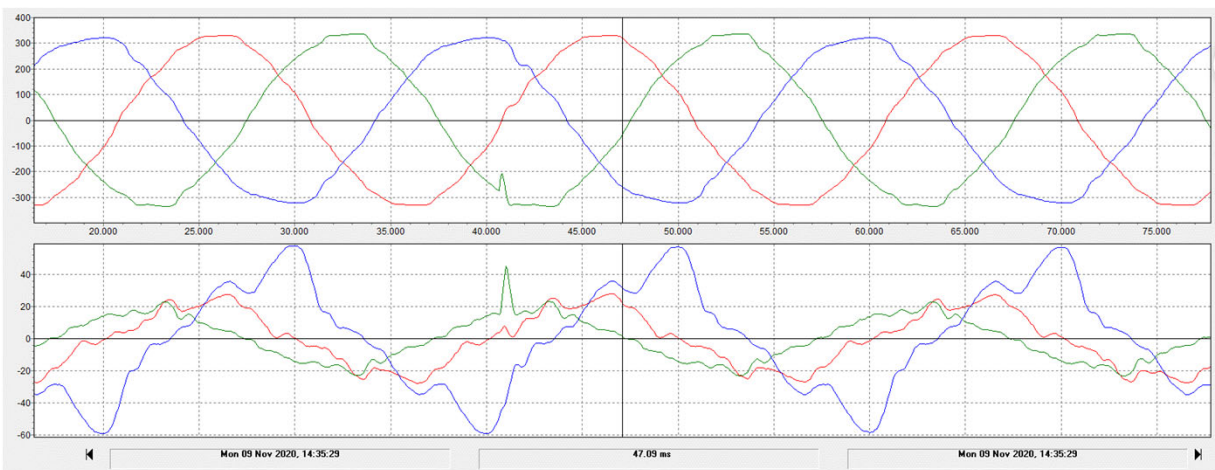
(c) Lamp 9 LED 9W



(d) Lamp 3 LED 10W

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# 1.6 Light Flicker – Waveform



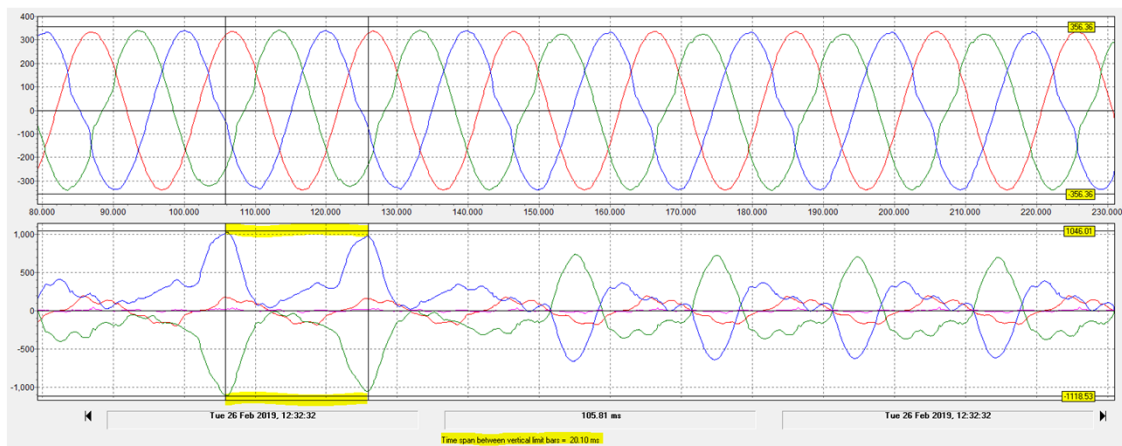
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## 1.7 Motor Shorting

- Company complain about one of their machines was shorting out
- They suspected Poor supply quality as the cause
- They pointed to a nearby windfarm recently commissioned.
- PQ logger was placed to investigate the machine

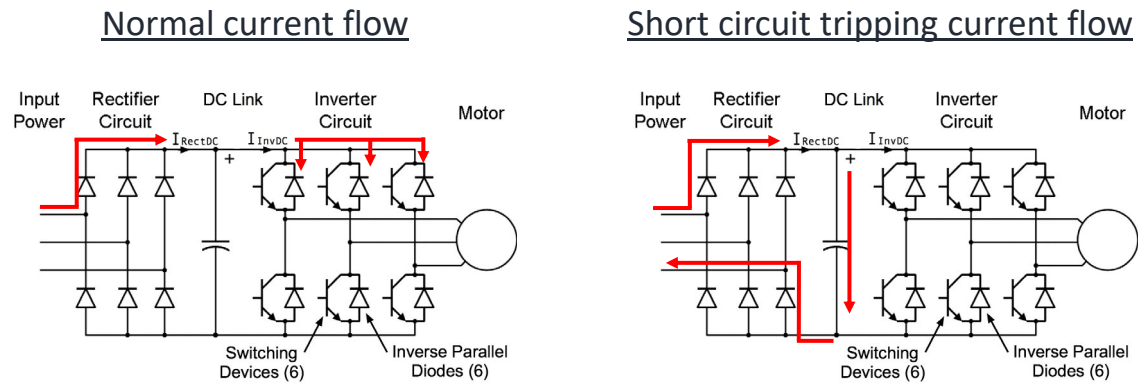
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## 1.8 Motor Shorting – oscilloscope capture



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## 1.9 Motor Shorting – suspected cause



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## 2.1 Reason for active use of PQ monitoring

- Understand the non-traditional generation and loads interaction with the network.
- PQ Data can be used for asset assessment.
- Attempt to detecting smalling disturbance before they come an issue.

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## 2.2 CT and VT comments

1. IEC 61869 define test methods and accuracies limits for the measuring instruments
2. Accuracy requirements are based on rated system frequency. Accuracy requirement for harmonic error are specified up to the 13th harmonic.
3. Ideal to select CT and VT for PQ monitoring based on its frequency response test results

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## 2.3 Instrument transformer options

### VT option

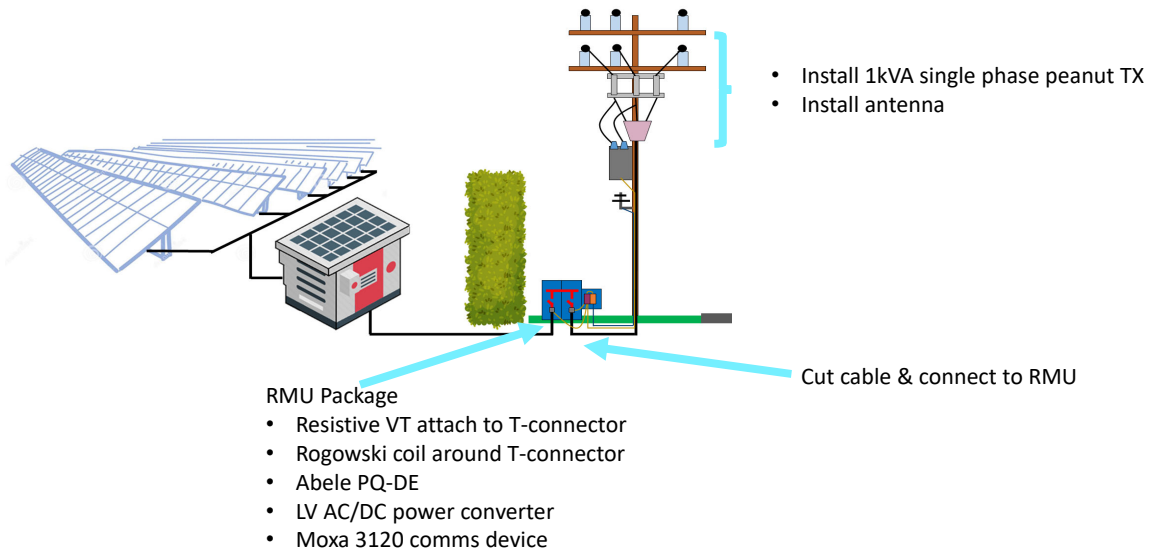
1. Standard Inductive VT
2. Capacitive VT
3. Resistive VT
4. Optical VT

### CT option

1. Standard single core CT
2. Rogowski coil
3. Optical CT

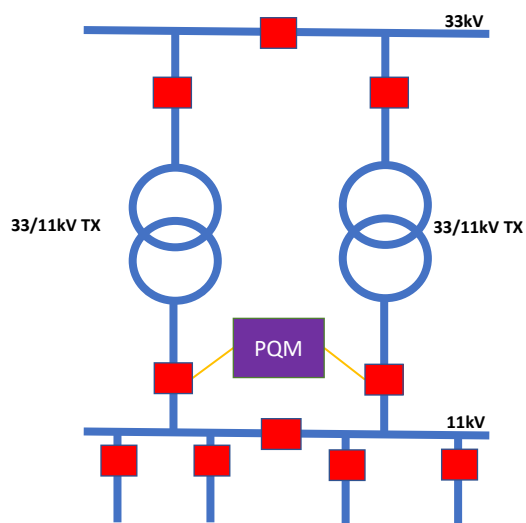
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## 2.4 Field based PQM setup - Example



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## 2.5 Substation based PQM setup – Example



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# Questions