



# Technical Instruction

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Approved By:	J Lansley

Part of the Energy Queensland Group

**Subject: TSD0202 Use of Fence Detection Systems in Substations**

Target Audience: **EQL**

## 1. Amendment Record

Version	Date	Author	Amendments
Initial	21/10/2019	J Lansley	Initial Issue

## 2. Introduction

This memo introduces the use of fence detection systems for security of Energy Queensland substations.

## 3. Current Practices for Substation Security

Energex and Ergon Energy have the following documents with regards to substation security:

RED375	Substation Security – Key Tactical & Operational Requirements
SS-1-9.5	Substation Security
StdsA271	Changes to Substation Security Fences

These documents provide a risk assessment process based on ENA Doc-015 National Guidelines for Prevention of Unauthorised Access to Electricity Infrastructure (2006). They also give advice on security options as a result of these assessments. Both organisations work on the principle of a defence in depth approach, where there are a series of layers around the assets inside the substation that become increasingly more difficult for an intruder to penetrate.

Options for substation security include:

- Perimeter fencing
- Internal fencing around ground mounted items that do not have suitable ground clearance (e.g. capacitor banks)
- Electric fences
- Security cameras
- Swipe card access
- Padlocks

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## 4. Fence Detection System

### 4.1. Features

An alternate security option to an electric fence is a fence detection system.

- Alternative lower cost solution to electric fence
- Fence detection systems use a sensor cable designed to operate on fences where it detects vibrations caused by a person cutting or climbing the fence and precisely locates the point of intrusion, by using Time Domain Reflectometry (TDR) or similar technology depending on manufacturer type on the detection wire.
- An initial calibration walk establishes a sensitivity level along the perimeter. Disturbances in excess of these threshold values will trigger an alarm.
- The technology should be able to distinguish alarms along the length of the cable to within 3 meters of the alarm point
- The same cable is used to communicate with each Processor Module (PM II) as well as provide power to these modules and auxiliary sensors along the perimeter with no other equipment or wiring.
- The Processor Module can be fence mounted or mounted inside the control building. In this situation, non-detection zones can be setup to mask signals between the Processor Module and the fence.
- Each Processor Module can communicate back to the System Controller (GCM II) or back to a network switch via RS232 or RS422.
- Generally used in conjunction with video surveillance cameras and audible warning systems.
- The system offers other buried sensors such as microwave spot sensors or buried sensor cable.
- Used by Queensland Rail on track security fences and as prison boundary security.
- Initial site for trial – Beerwah Substation (SSBWH).
- Stainless steel ties used to tie sensor wire to the fence.
- Each processor can detect 200m of cable in each direction
- Commissioning takes account of natural vibration from wind, traffic etc.
- Processor can be mounted inside or in a panel in lieu of fence.

### 4.2. Implementation

Implementation of these systems and network requirements should be discussed with Corporate Security. A network switch is generally required with enough ports to communicate to the PM II unit(s) plus any additional security cameras or security loudspeakers.

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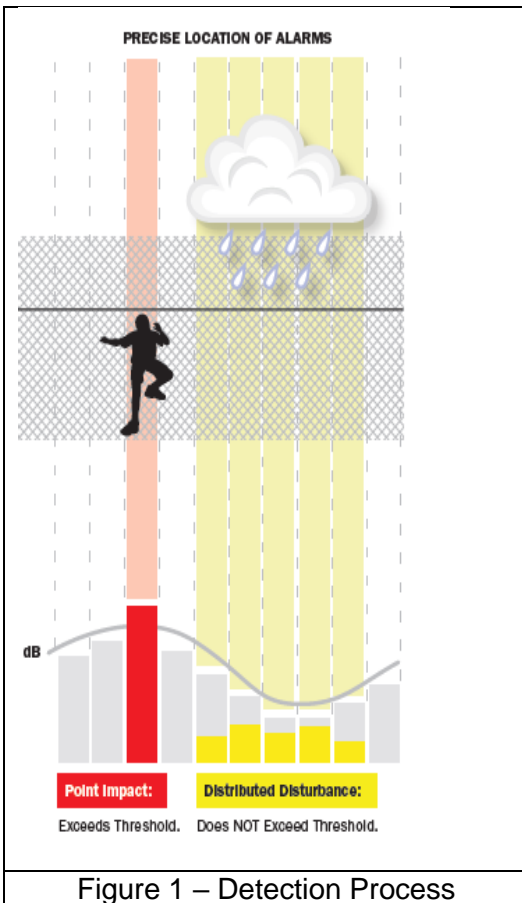


Figure 1 – Detection Process

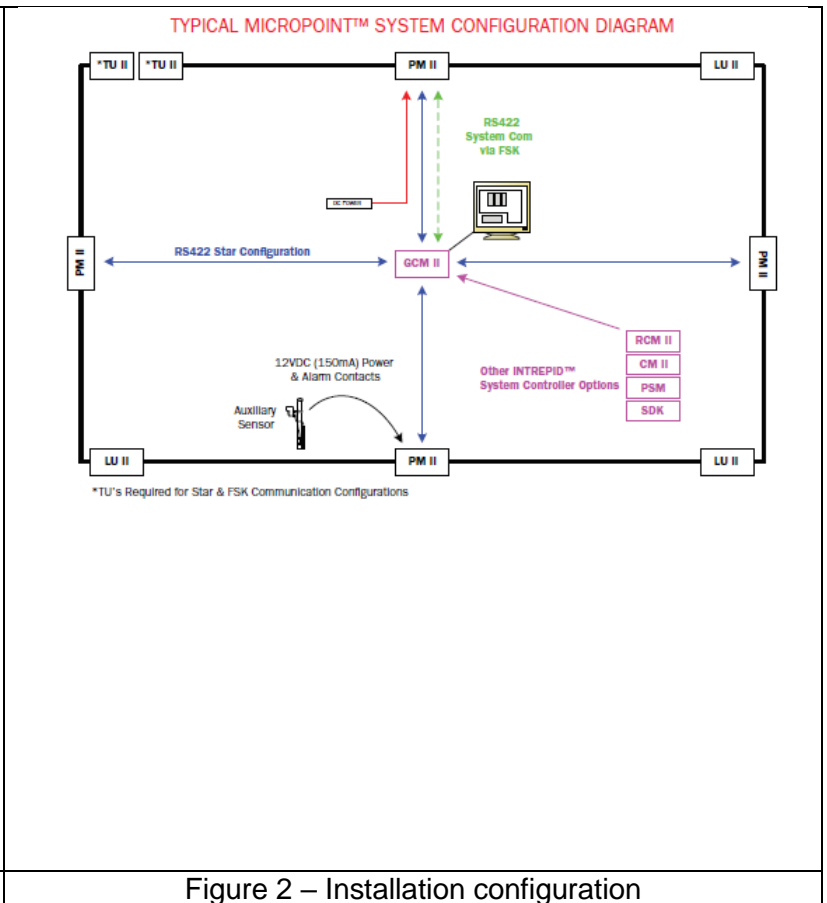


Figure 2 – Installation configuration



Figure 3 – PMII module mounted on fence

The fence detection systems may be used in lieu of electric fences in situations where an electric fence was previously prescribed (i.e. some high risk substations). Electric fences may still be used in situations where a greater deterrent is required for site specific reasons.

The fence detection system should be interfaced with the site access control and alarm system to send perimeter alarms to the EQL security monitoring centre. The use of CCTV cameras is also highly recommended to verify any perimeter alarms.

The fence detection cable is attached to the fence and swing gates, white communications underground conduits are required at the following locations for the cable:

- From the main building (housing the head-end system or alarm panel) to the fence line;
- Under each gate opening (gate post to gate post); to allow the continuous run of the cable from fence section to fence section.

## 5. Further Information

For further information, please contact John Lansley, 07 3664 4666, email [john.lansley@energyq.com.au](mailto:john.lansley@energyq.com.au)

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