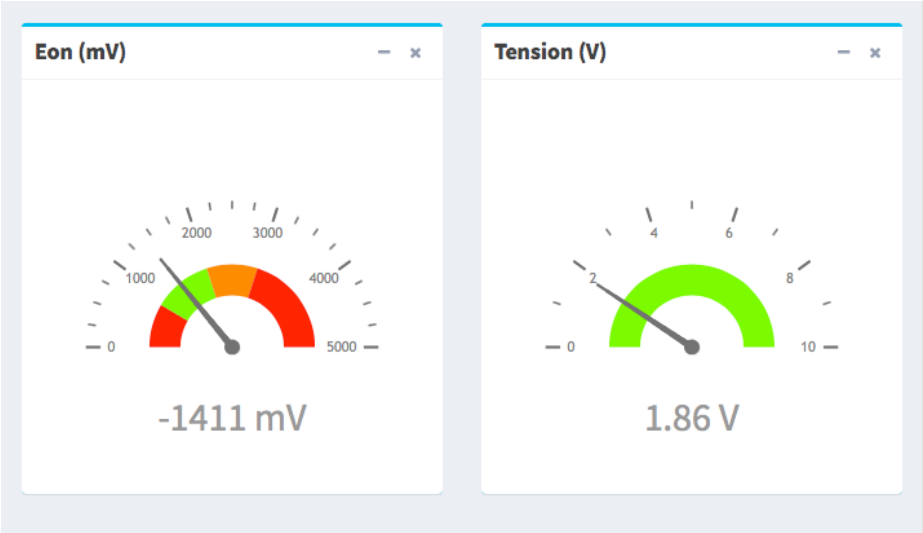
Scotty IoT

communication system for cathodic protection

Introduction

Anotec introduces with Scotty IoT the **first intelligent Internet of Things application for use in cathodic protection systems**. As well galvanic as impressed current cathodic protection systems are under permanent surveillance using Scotty IoT.

The low cost Scotty IoT module has very small dimensions and sends out the cathodic protection system's data twice a day to a computer server. The receiving computer server sends the data to a dashboard which is accessible for the user. In case of a major change in one of the received data (current - voltage - corrosion potential) the server uses Anotec's algorithm to indentify the cause of the defect.



Smart algorithm

The computer algorithm is based on Anotec's 25 years experience in fuel station and pipeline cathodic protection systems. Different problems may be detected at distance (depending on type of module) :

- potential too high
- potential too low
- electrical power defect
- anode cable defect
- cathode cable defect
- grounding problem
- anode bed defect

Cost benefits

This information enables the Scotty IoT user to :

- send out a technician for repair anticipating the yearly physical cathodic protection inspection
- to minimize the repair time due to problem identification
- to take correct decisions by a non-technical literate person (eg help desk)
- to contact the workers at location in case of ongoing works (immediate repair)
- less corrosion damage : in case of a cathodic protection failure detection with a physical check once a year, the steel structure is unprotected for 180 days on average.
- to get insight in influencing parameters eg. stray currents, soil humidity influences, influences from other CP systems,…

Use cases

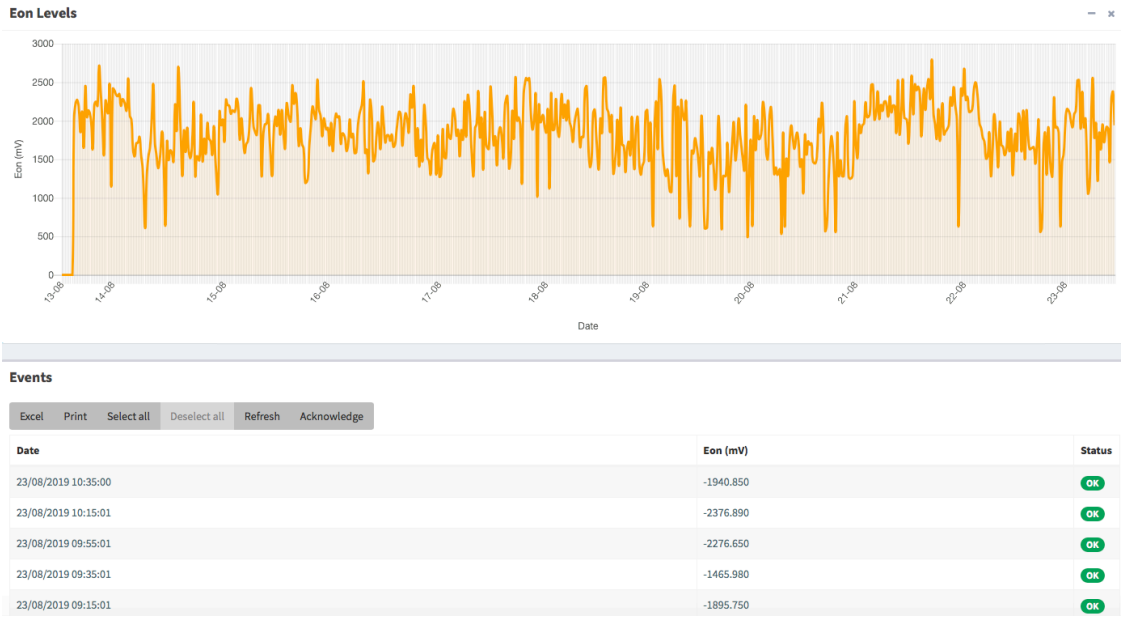
impressed current cathodic protection systems for fuel stations, pipelines, jetties, quay walls, above ground storagetanks, offshore wind farms, etc.
galvanic cathodic protection systems

In general the Scotty IoT communication system may be used for :

- Solitary cathodic protection systems (fuel stations, jetties, immerged pumps, offshore windmills, LPG tanks, filter equipment, etc)
- Complex cathodic protection systems eg pipeline hot spot control, bridges (concrete rebar), etc.

Eon readings

In general, the Scotty IoT system is a permanent watchdog indicating of "ON" potentials and installation voltage values. Of course, cathodic protection systems should be checked on their "OFF" potentials at the moment of commissioning the cathodic protection system, 24 hour readings, etc. By keeping the "ON" potential steady, which is, ceteris paribus, in direct relationship with the underlying OFF potential, all cathodic protection parameters are perfectly under control.



Events

Excel | Print | Select all | Deselect all | Refresh | Acknowledge

Date	Eon (mV)	Status
23/08/2019 10:35:00	-1940.850	OK
23/08/2019 10:15:01	-2376.890	OK
23/08/2019 09:55:01	-2276.650	OK
23/08/2019 09:35:01	-1465.980	OK
23/08/2019 09:15:01	-1895.750	OK

Internet of Things (IoT)

The Scotty IoT communication system is based on the LoRaWan IoT netwerk. LoRa uses license-free sub-gigahertz radio frequency bands like 169 MHz, 433 MHz, 868 MHz (Europe) and 915 MHz (North America). LoRa enables long-range transmissions (more than 10 km in rural areas) with low power consumption. The technology is presented in two parts:
LoRa, the physical layer and LoRaWAN (Long Range Wide Area Network), the upper layers. In case of Scotty IoT the battery lifetime will be over 5 years. LoRa is a spread spectrum modulation technique derived from chirp spread spectrum (CSS) technology, and is the first low-cost implementation of chirp spread spectrum for commercial usage. The Scotty IoT LoRa chipsets have reduced power consumption, increased transmission power, reduced size compared to the older generation.
Lora devices have geolocation capabilities used for triangulating positions of devices via timestamps from gateways.
LoRa and LoRaWAN permit long-range connectivity for Internet of Things (IoT) devices in different types of industries.

Scotty IoT hardware features

The Scotty IoT module is composed of :
1 pce IP 65 housing
1 pce antenna
1 pce 3.5 V battery
2 pcs wiring

Dimensions HxWxD 106x30x50 mm

The Scotty IoT module sends out two data :
DC output voltage (V) Protection potential (mV)

The limited dimensions make it possible to mount the Scotty IoT module into every kind of test post or rectifier.

The module will preferably be installed outside concrete structures and above ground.

All data are collected in a computer server and made available in a dashboard.
The dashboard gives an overview of each test post / transformer-rectifier as well in a table as on a map.
Potential and voltage values (or current values) are displayed in a time graph.
Depending on the values and the way changes in both variables are occuring, a smart algorithm gives information on the type of anomaly or defect.

Following cables have to be connected to the cables :

Scotty cable number	Connect with cable
1	Anode
2	Cathode
3	Reference electrode

By holding a magnet close to an indicated dot the module can be started. At the bottom side a yellow-green light starts to blink, first slowly, then faster. Once the blinking stops, the system starts automatically.

Types of Scotty IoT modules

Type	Use case
FS	Fuel stations -> data : U / Eon
PL	Pipeline test posts -> data : Eon
TR	Transformer-rectifiers pipelines -> data U / I
	Other cathodic protection applications may be monitored by FS types

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