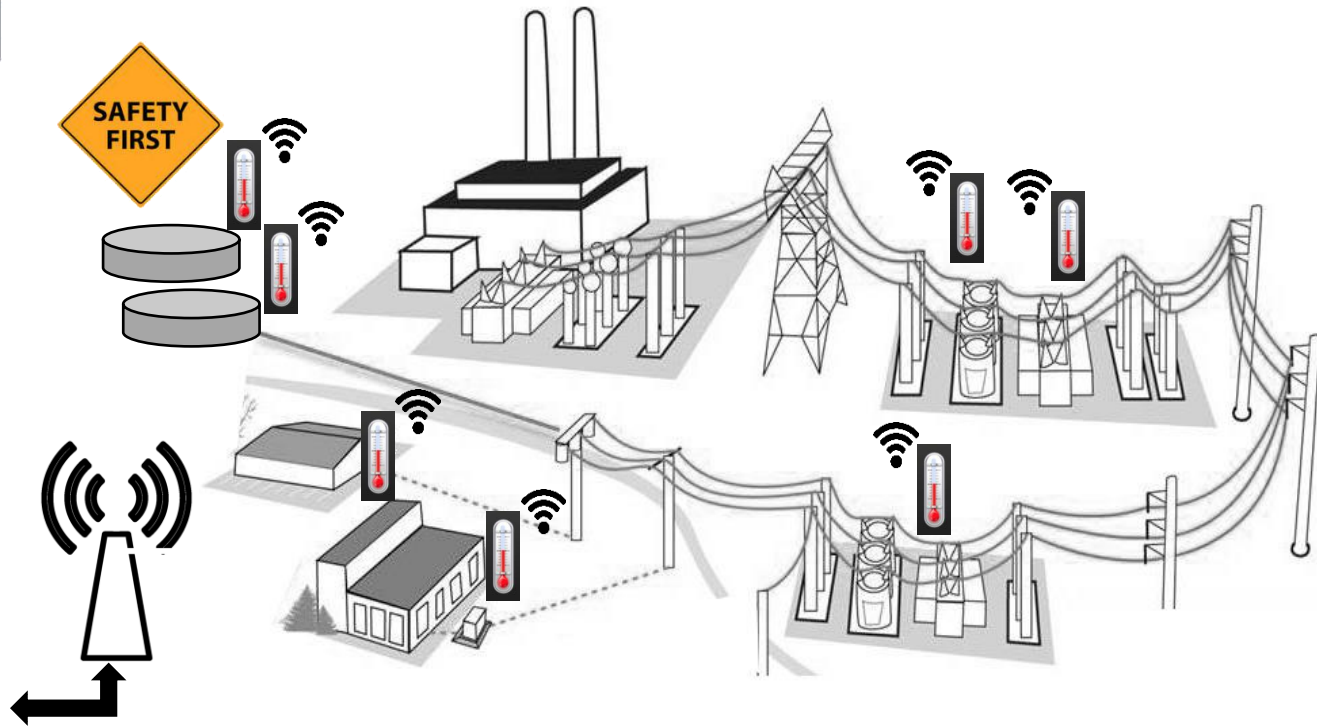
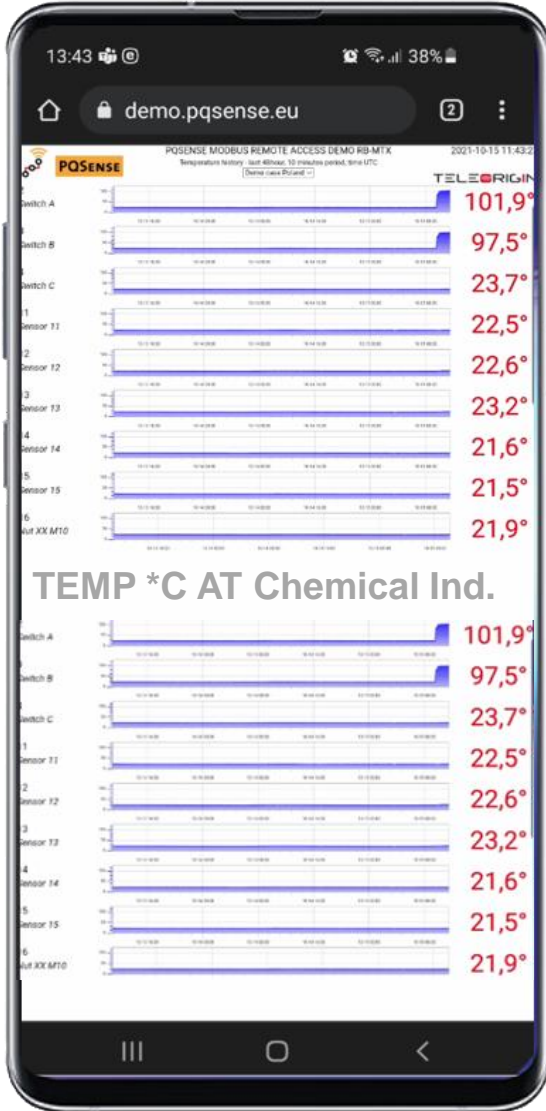




# “Better safe than sorry”

Next Generation 24/7 constant **temperature**  **monitoring**  
The fire protection of SWGR at critical industry4.0



# PQSense Introduction

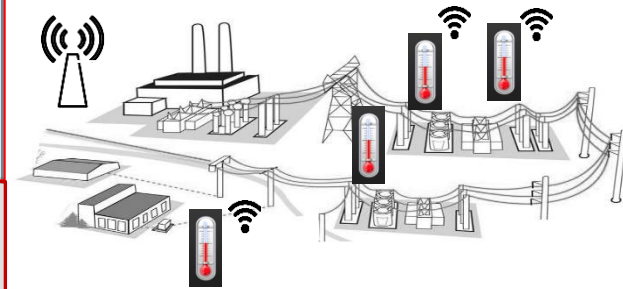
[www.pqsense.eu](http://www.pqsense.eu)



- PQ Sense established 2009
- 25 Employee (2021)
- Taiwan



- 2016 1<sup>st</sup> generation
- 2019 2<sup>nd</sup> generation
- The Plug & Play inst.
- 2021 SWGR 4000+



- ELPRONA Poland (EU)
- PQ Sense partner since 2009



- 50 Employee (2021)
- Poland, EU

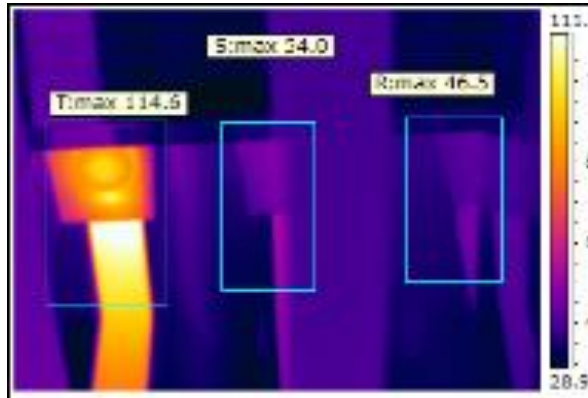
# Why temperature sensing important?

**The abnormal \*C temp. raise is the early warning indicator**

contacts is abnormal ...

contact temp. raises ...

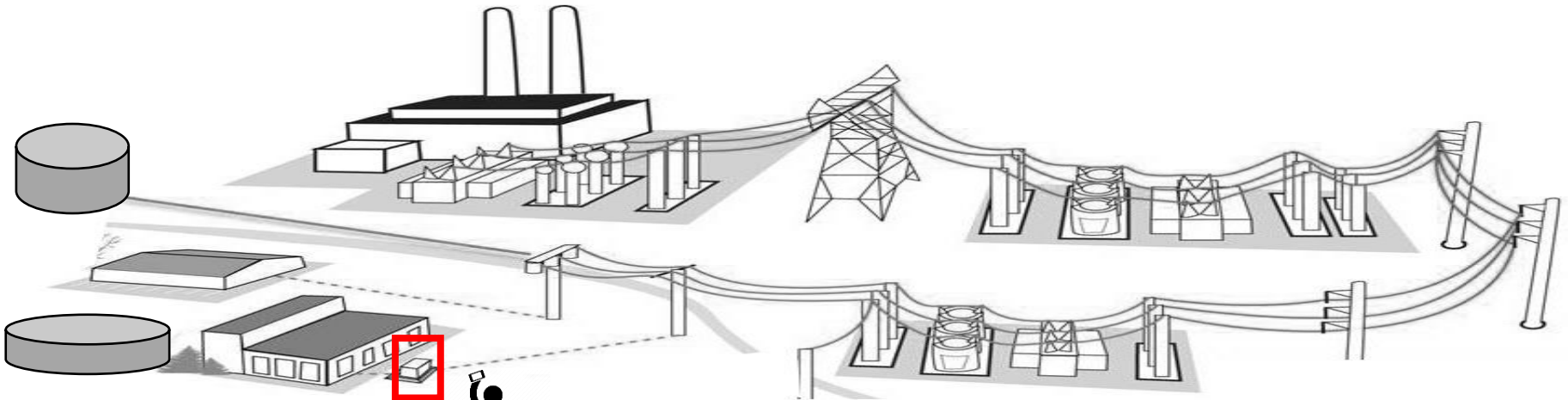
... and after few months



## Better Safe Than Sorry

**The temperature sensing can detect early abnormality and avoid the catastrophe that cost a lot of money**

# Old manual thermo-camera check



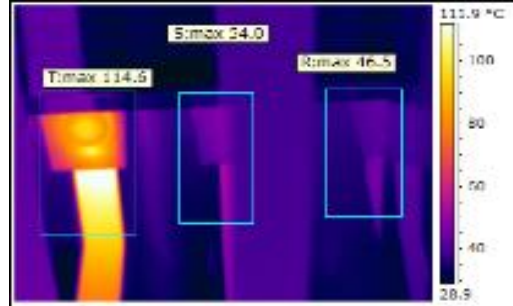
Switchgear (power substation)






SWGR



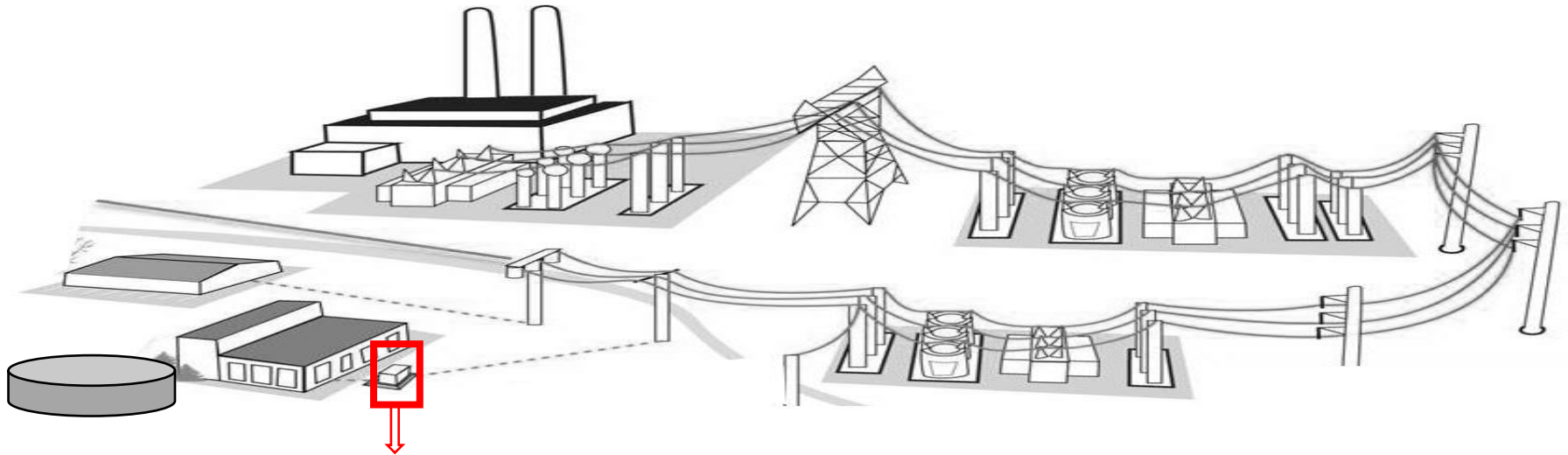
Manual



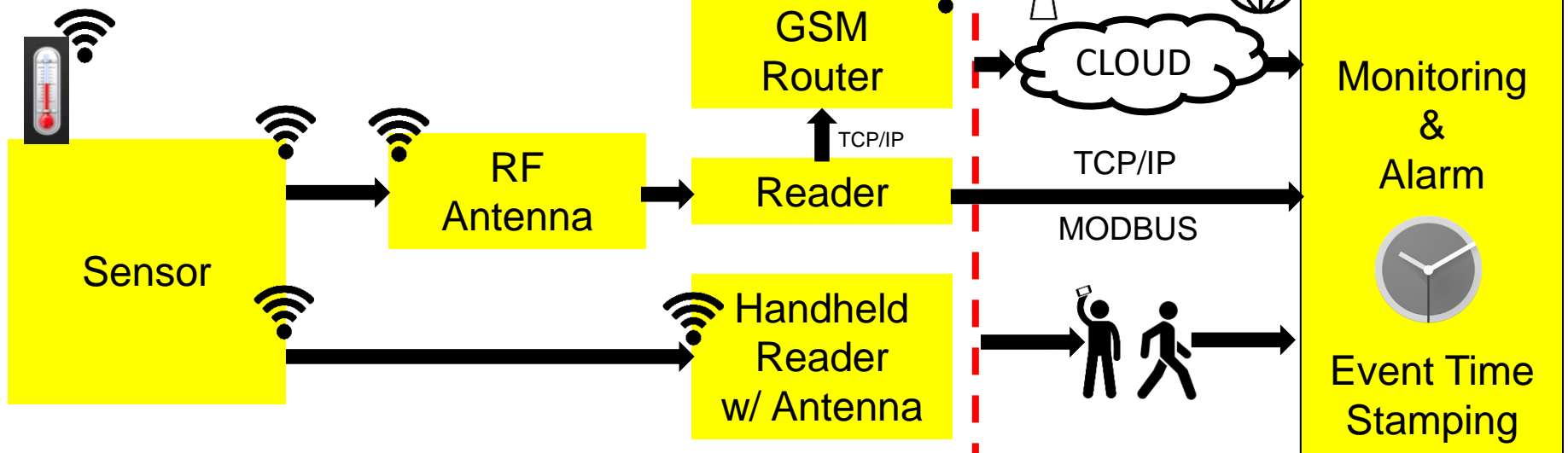
- Periodic check,   
=> no continuous monitoring
- Open Switchgear,   
=> cause safety concern
- What you can't see,   
=> you can't measure

# New automatic 24/7 continuous measurement

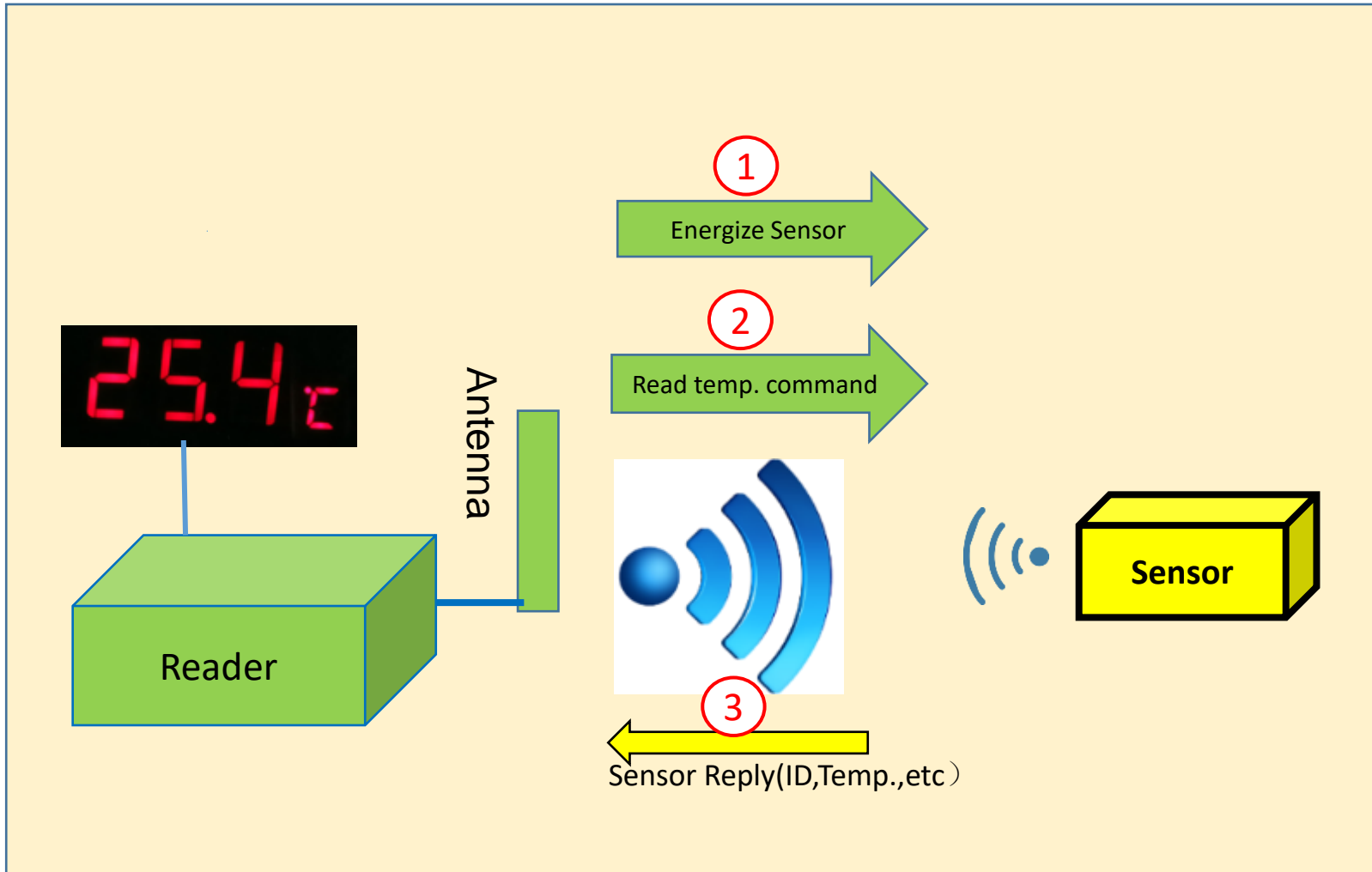
www.pqsense.eu



Switchgear (power substation)



# RFID Sensing Principle



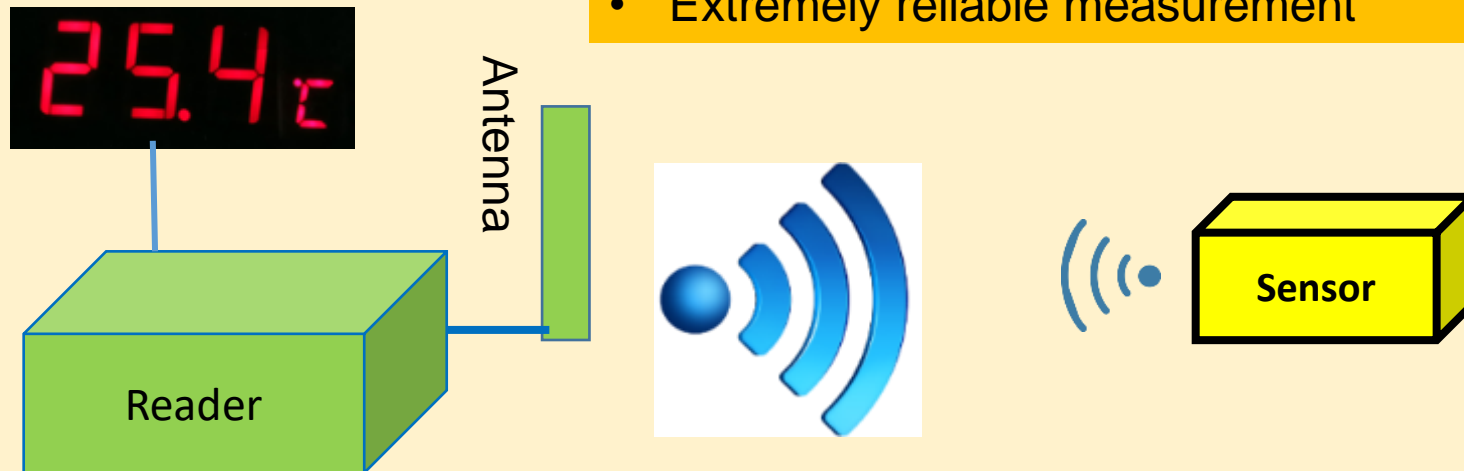
# RFID Sensing Principle

Technology Advantage:

- Full Passive Sensor, No battery
- Each sensor has unique ID
- Digital Comm. Protocol used



- Plug and play installation
- Extremely reliable measurement



# System Main Components

## Sensors



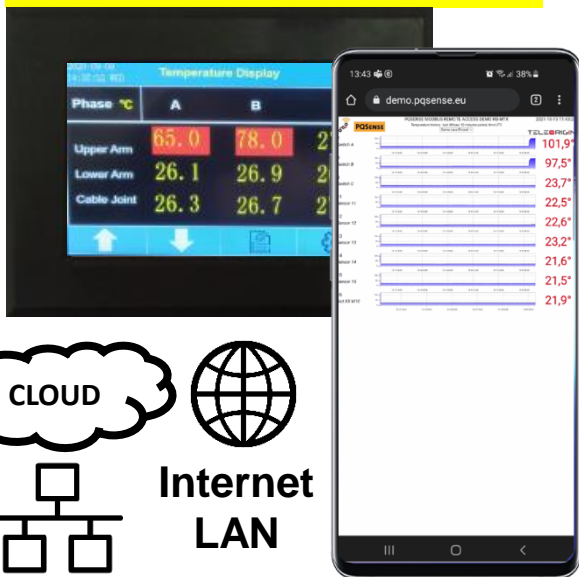
## RF Antennas



## Readers



## Remote Metering



## Handheld Reader+Ant



## GSM Wireless Router







# Product – Sensors

## RFID sensors



- Passive RF sensors (no battery)
- Measuring range  $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$
- Long life 20+ years of operation
- Wireless digital communication

- RFID UHF technology (max. 3m from RF-antenna) 
- CRC error auto-checking
- FHSS frequency hopping 
- REMOTE access via GSM/LTE/5G

## ■ Variety mounting style & size

- Busbar big (67x27x23mm)
- Busbar small (25x25x4mm)
- Cable (47x25x2mm)
- Male contact (14x9x4mm)
- Plum contact (14x9x4mm)
- Nut RMU (10x5x3mm)

# Product – Sensors (continued)

## Busbar (big)

67x27x23mm



## Plum contact

14x9x4mm



## Male contact

14x9x4mm



## Cable connection

47x25x2mm



## Busbar (small)

25x25x4mm



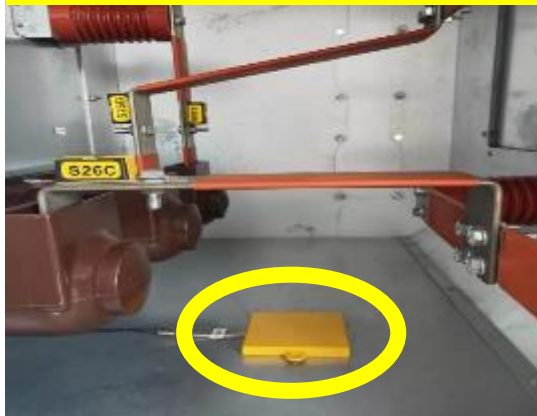
## Nut (RMU)

10x5x3mm

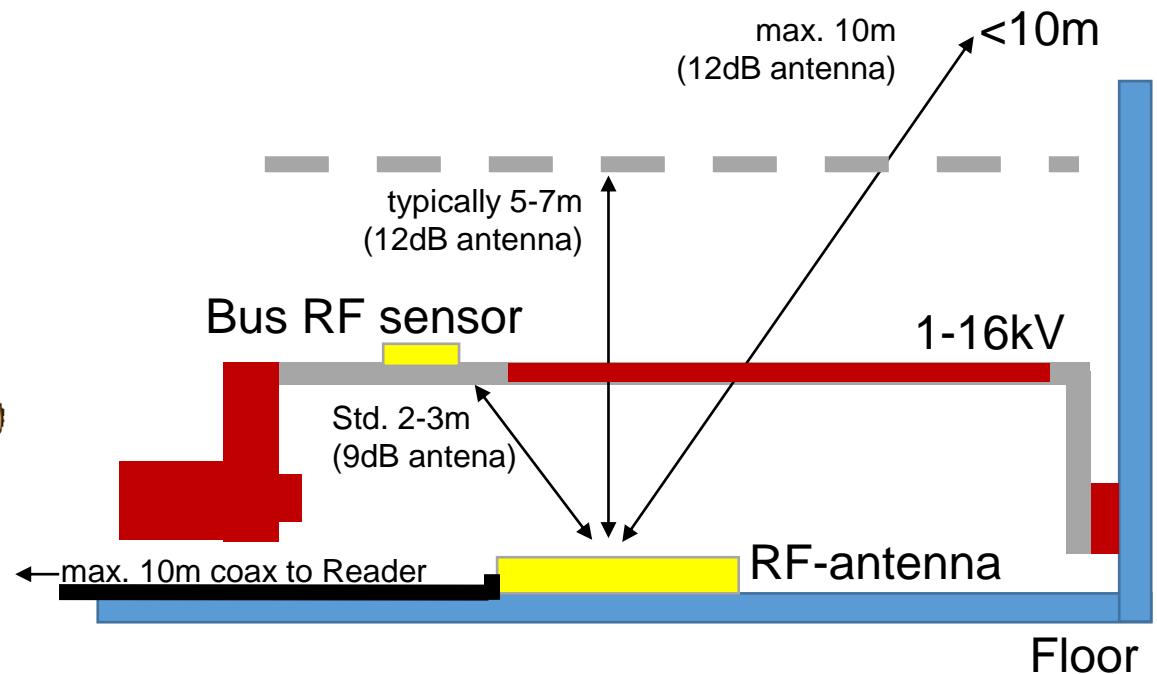


# Product – RF Antennas for Readers

RF Antennas



- RFID UHF communication
- Max. 48 sensors per single Reader
- 4 or 8x RF-antennas per Reader
- Max. dist. 2-3m(9dB) 5-7m(12db)

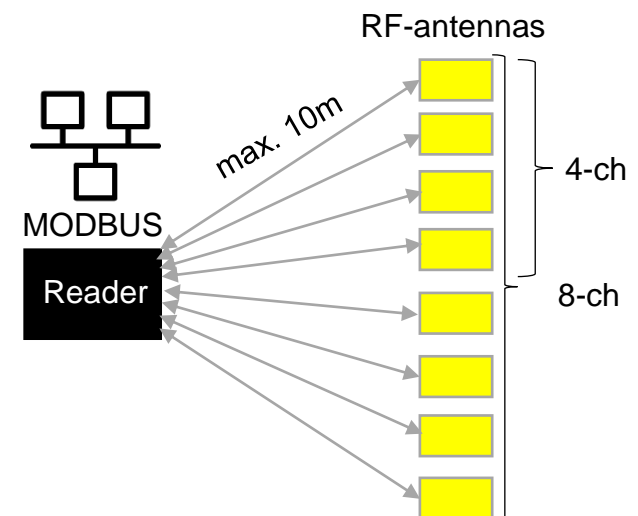
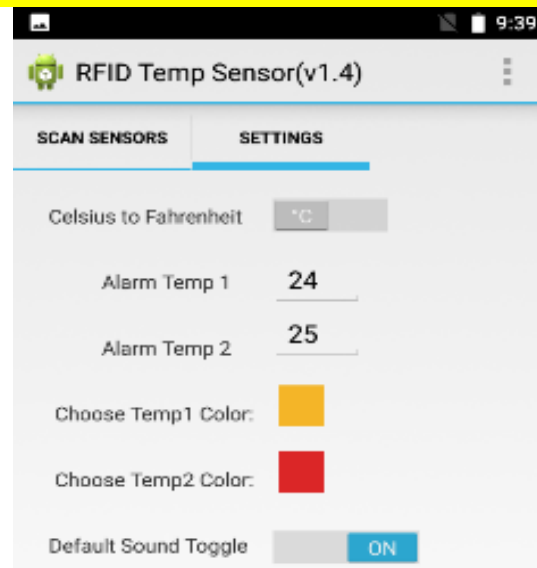


# Product - Readers

## Readers



## Mobile Handheld Readers



# Product – Displays & Remote Access

LED Display  
96x48x135 mm

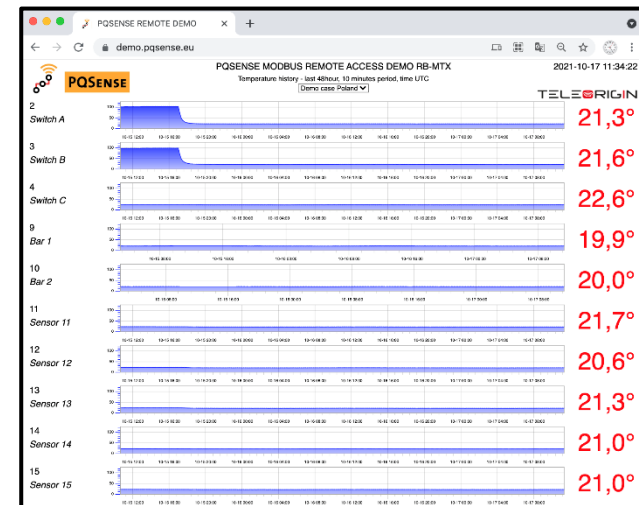


Reader

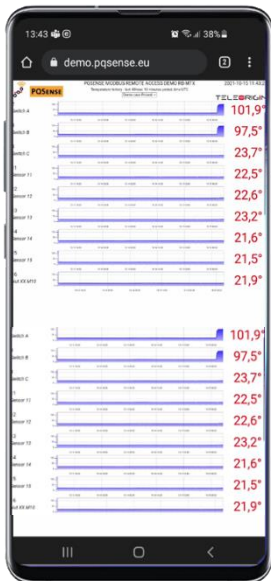
5" Touch Display  
160x107x21.4 mm



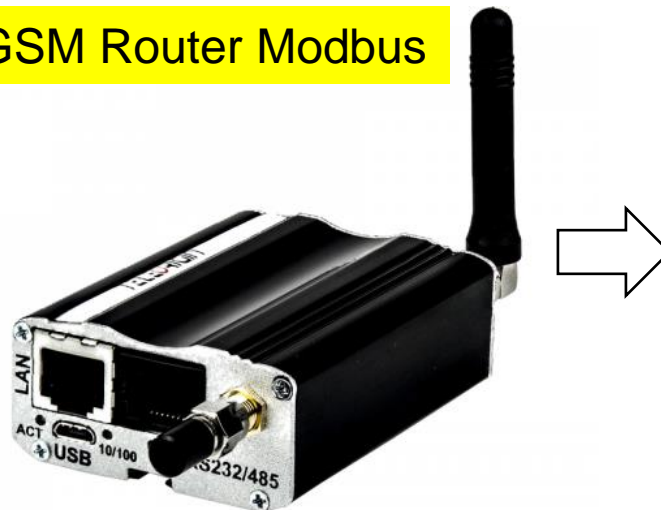
PC



Mobile



GSM Router Modbus



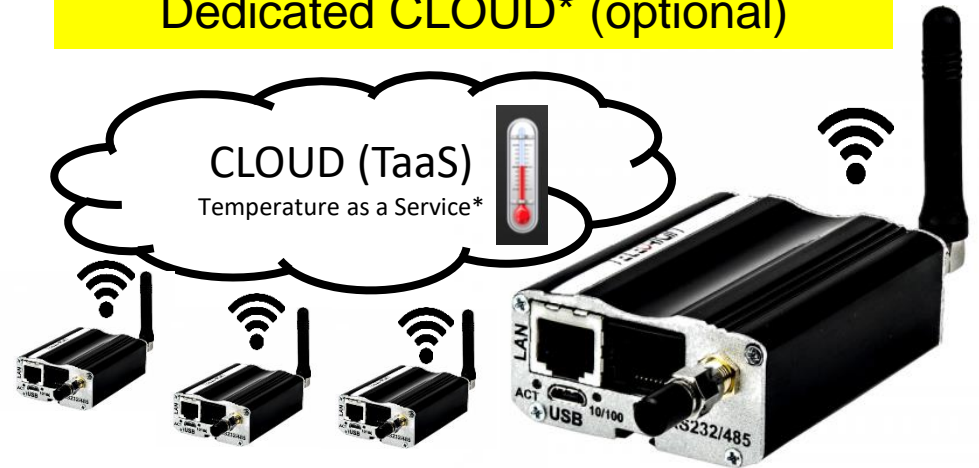
# Product – Value Add Functions & Accessories

www.pqsense.eu

## Live demo w/ heated copper bars



## Dedicated CLOUD\* (optional)



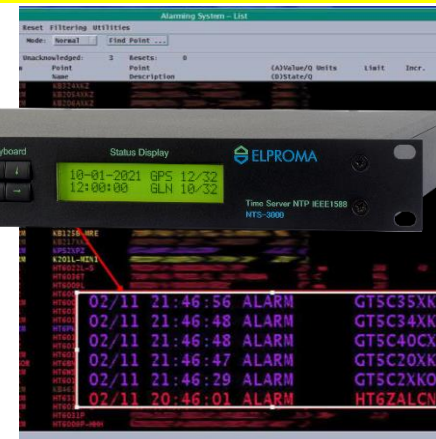
## LOG Trusted Timestamping\* (optional)



### Time Servers



- NTP/PTP/TSA Servers
- LOG event chronology
- Temp. measurement:
  - non repudiation
  - originality & integrity
  - authenticated trusted UTC in use



## *Better safe than sorry*



# Market & Business

Especially, addressing 2 target groups:

- 1) fire at substation or SWGR might trigger the domino-chain of large scale destruction

(e.g. chemistry/gas/oil industry ...)



- 2) fire can break delivery of electricity  
(stock exchange ....)

and

make lose of assets

(e.g. datacenters, ....)





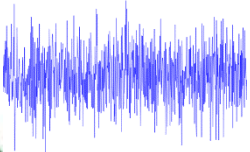


# RFID Sensing vs. SAW Sensing

# RFID vs SAW – Sensing Technology Compare

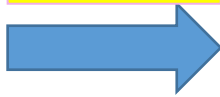


**SAW  
Analog**

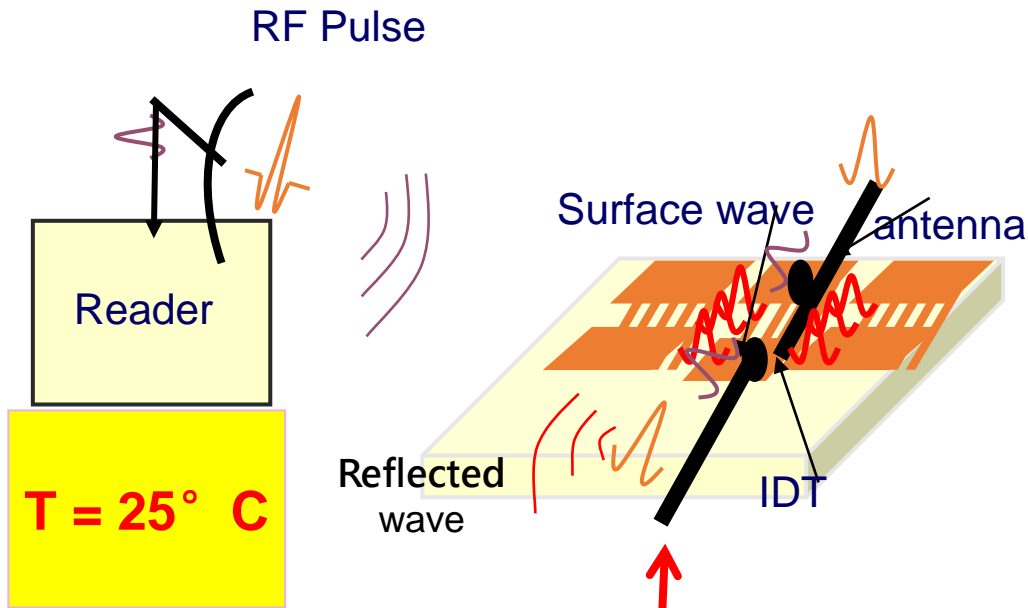


**RFID  
Digital**

**T = 25° C**



# SAW operation principle



SAW operation theory :

1. Surface temperature cause signal frequency shift
2. Reader calculates temperature differences via reflected frequency deviation

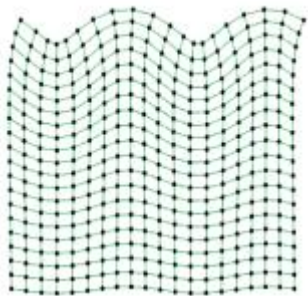
SAW



RFID



SAW is similar to bumpy road will cause car speed change.



# RFIS vs. SAW

<b>RFID Technology</b>	<b>SAW Technology</b>
<b>Sensor with ID ensure correct reading</b>	<b>No ID, cross reading cause wrong reading</b>
<b>Digital communication Interference cause re- transmission</b>	<b>Analog communication , interference cause wrong reading</b>
<b>Variety sensor size</b>	<b>Limited sensor types</b>

# Installation Example

# Installation examples in Asia

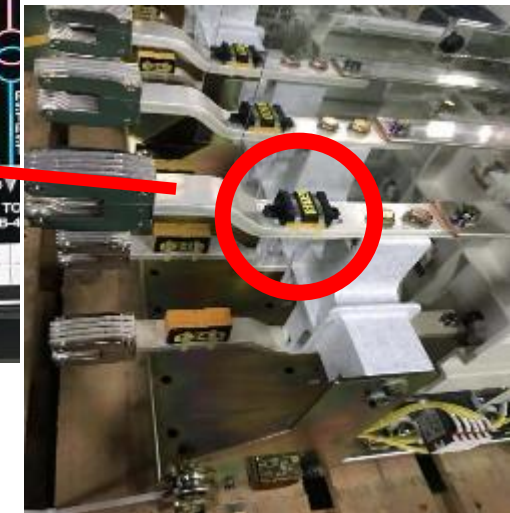
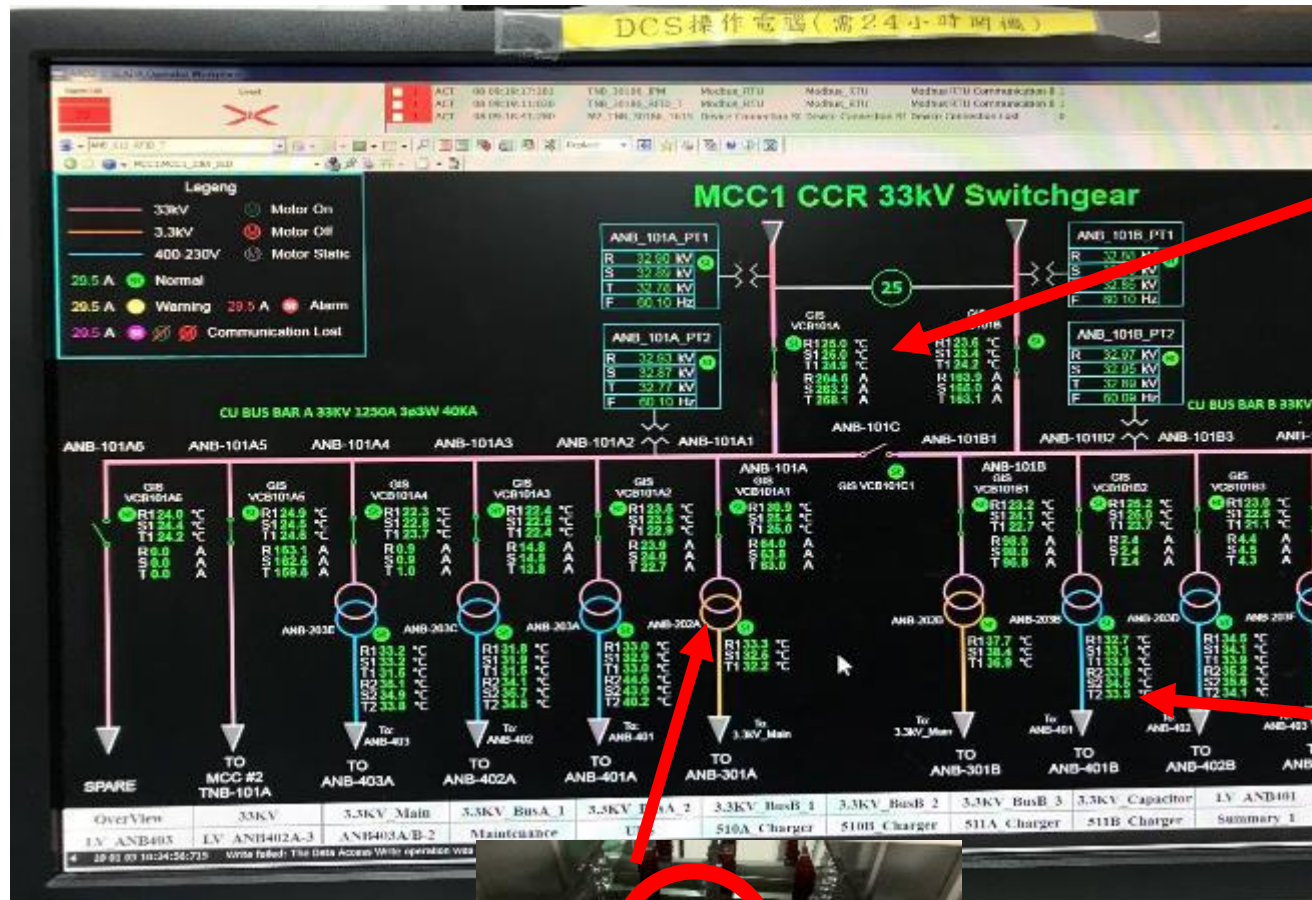


## PQSense RFID Temperature Monitoring Installation

Update:2020\_01\_02

No.	Country	Client	Location	Level	Quantity	Construction
1	Taiwan	Formosa SUMCO Tech	MaiLiao_F200 Area	3.3kV	5	2020
2	Taiwan	Formosa Plastics	LinYuan_PE Factory	11.4kV	2	2020
3	Taiwan	Formosa Chemical & Fibre	MaiLiao_ AROMA-3 Factory	33/11.4/3.3KV/380V	424	2020
4	Taiwan	Formosa Plastics	MaiLiao_Carbon Fiber Plant	3.3kV	4	2020
5	Taiwan	Formosa SUMCO Tech	MaiLiao_F200 Area	3.3kV	4	2020
6	Taiwan	Formosa Plastics	Renwu_AI R & D Center	11.4kV/380V	6	2020
7	Taiwan	Nan YA Plastics	Jinxing_Power Plant	3.3kV	2	2020
8	Taiwan	Formosa Plastics	RenWu_Tairyln A1	380V	2	2020
9	Taiwan	Nan YA Plastics	Jinxing Plant I	3.3kV	2	2020
10	Taiwan	Nan YA Plastics	Nantong_Aluminum Mould	10kV	4	2019
11	Taiwan	Nan YA Plastics	Nantong_Thermal Power Plant	20kV	3	2019
12	China	Z&Z Optoelectronics Tech	Chengdu China	10kV	4	2019
13	China	Southern Grid Corp	Guangzhou	10kV	128	2019
14	China	Schneider Electric	Shanghai	10kV	6	2019
15	China	Schneider Electric	Beijing	10kV	74	2019
16	China	Schneider Electric	Suzhou	10kV	18	2019
17	China	FUJIAN Fuxin Special Steel	Cold Rolling And Public Auxiliary Area	10kV	138	2019
18	Taiwan	Formosa Chemical & Fibre	MaiLiao_Vinegar Factory	11.4kV/3.3kV	33	2019
19	Taiwan	Formosa Plastics	Hsinkang_SAP Factory	3.3kV	12	2019
20	Taiwan	Formosa Plastics	RenWu_Tairyln	3.3kV	18	2019
21	Taiwan	Formosa Chemical & Fibre	MaiLiao_PP Factory	3.3kV	2	2019

# Installation Photos



# Installation Photos

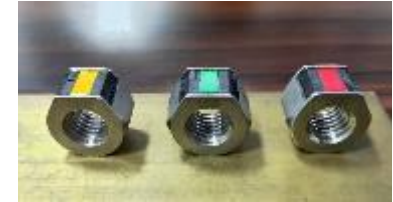




# Installation Photos



# Installation Photos





# Thank You !

Visit us at  
<https://pqsense.eu>

Contact:  
Tomasz Widomski  
[t.widomski@pqsense.eu](mailto:t.widomski@pqsense.eu)