CASE STUDY

MONITORING LEVEL, FLOW, PRESSURE AND TEMPERATURE

WATER SUPPLY FOR INDUSTRIAL UNIT

Setting up a solution for monitoring the water supply and reserve system for the industrial unit.

OBJECTIVE

Collect and send data from sensors and equipment that monitor and manage the water tank level that serve an industrial infrastructure for the Tekon IoT Platform.

Bring together, in a single interface, all the data derived and relevant to the process.

Monitor the sensors condition through data analysis and observe standard values for normal function and failures.

SOLUTION

TRANSMITTER

TWP-4AI4DI1UT transmitter made it possible to aggregate the central equipment of the entire process, ensuring that it would gather all the sensors and equipment that independently support and monitor each variable, in a single device. The analog and digital inputs combined with the universal temperature input form a complete and extensive solution for the industrial context.

GATEWAY

The WGW420 gateway of the PLUS product family, is the central point of the wireless network to which the transmitters send all the collected data. WGW420 analog outputs are used to share the value of the variables digitalized by the transmitters with local devices used for data visualization. The Modbus protocol allows integration with automation, essential to make data available in the cloud for later viewing and saving on the Tekon IoT Platform.

TEKON IoT PLATFORM

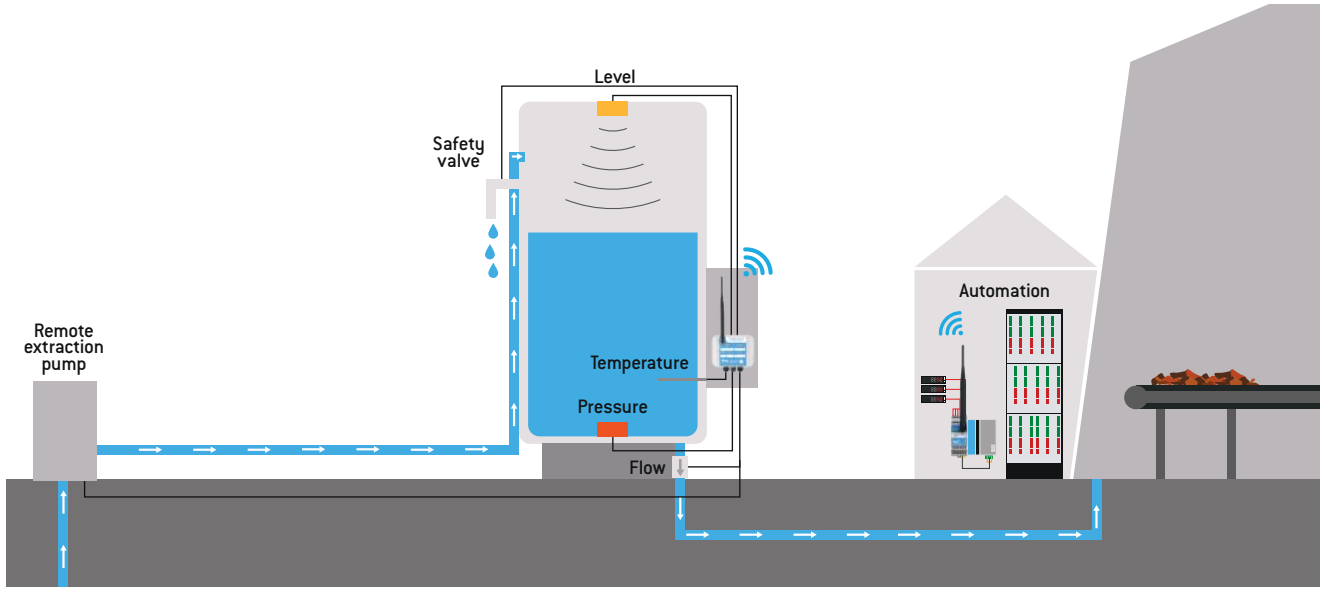
Tekon IoT Platform is the tool that highlights the added value of the entire solution with the use of the TWP-4AI4DI1UT transmitter. The platform allows the user to observe all data in real time and create a risk profile for its application, through alarms oriented to the specificity of each sensor and variable.

TECHNICAL DETAILS

The industrial unit where this application was implemented has a high degree of dependence on the prompt and constant supply and availability of water. The water supply is made through an exploration carried out next to the infrastructure, but which is limited by the flow and consistency of supply. In order to overcome the capping that the direct water supply represents for the industrial unit, a water tank was installed to provide the necessary support and ensure and immediate supply base. Its filling, once that it is done through a channel connected to the adjoining exploration, is carried out gradually, in concert with the exploration response capacity. The reservoir it is considered the primary water supply for the industrial unit.

To ensure that the water supply provides the necessary response by maintaining the reservoir level within the level considered sufficient to sustain the entire unit, a whole set of sensors has been installed to monitor the water supply, storage and drainage processes surrounding this unit reservoir.

The water level is measured by an ultrasonic sensor placed on the top of the reservoir. The pressure exerted is logged by a sensor installed at the bottom. The registration of water flow is already done in the pipeline that transports water between the reservoir and the industrial unit. Three sensors with analog output (4 to 20mA or 0 to 10V) were chosen so that their physical connection was made to the TWP-4AI4DI1UT analog inputs.



TECHNICAL DETAILS

The water temperature is a variable with increased significance for the process and is monitored through a PT100 probe that crosses the reservoir wall that is directly connected to the universal temperature input of the TWP-4AI4DI1UT wireless transmitter.

The failure of the sensors can cause a weakness in the monitoring and allow the system to be avoided. In order to reduce the risk of damage caused by the pressure exerted by the water in the reservoir, a safety valve, controlled by the automation, was placed near the top, which is opened whenever the water reaches a critical level. The safety valve is directly connected to a digital input of the transmitter, to report its status in each communication.

The reservoir is filled by a pump installed next to the water extraction point, which can be turned on and off based on two criteria:

• **time**: from x to x minutes, the pump is actuated;

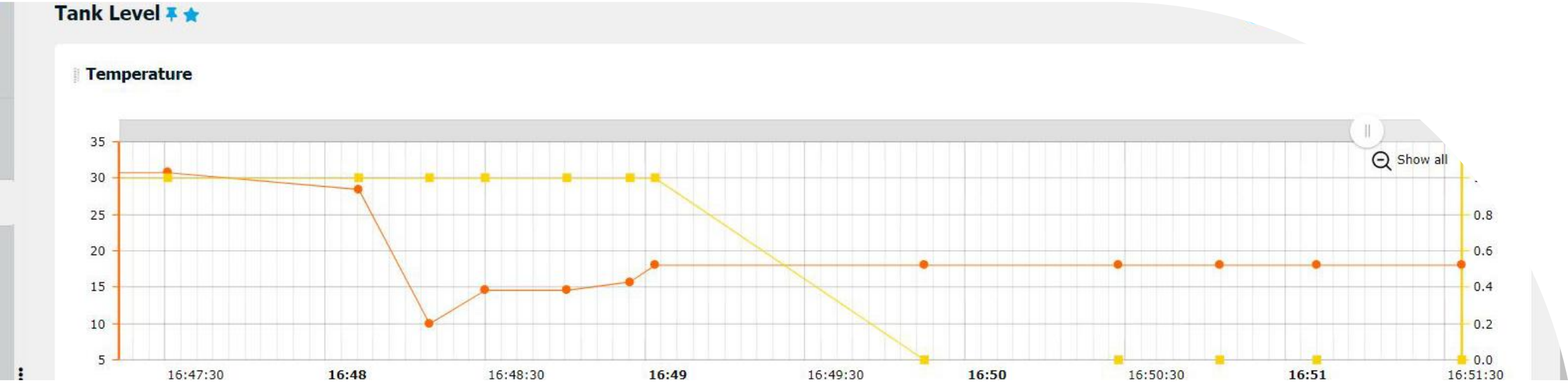
• **level**: when the reservoir reaches a certain level, it is activated. The remote control output is used along with the automation

TECHNICAL DETAILS

The connection to the local automation turns it possible to have a bidirectional communication and allow the use of the digital remote control output of the TWP-4AI4DI1UT transmitter that allows to power the pump. In the configuration of the transmitter, the parameters related to the remote control output allow to guarantee that in case of failure of the RF connection with the WGW420 gateway, the transmitter assumes the state of the digital output in order to guarantee the due and safe state of the filling pump. These and other configurations are made locally and defined according to the needs of the application. The connection failure between the TWP-4AI4DI1UT transmitter and the WGW420 gateway is signalled locally through the dedicated digital output, which triggers an event signal light.

The interior space of the industrial unit reserved for automation, and where the WGW420 gateway was placed, is a constant crossing point of various operators. It was identified the demand to place digital displays with the values of some variables of the process - level, temperature, pressure and flow. The analog outputs of the WGW420 gateway were used to connect digital displays that provide locally the values of these 4 variables of greatest relevance for monitoring.

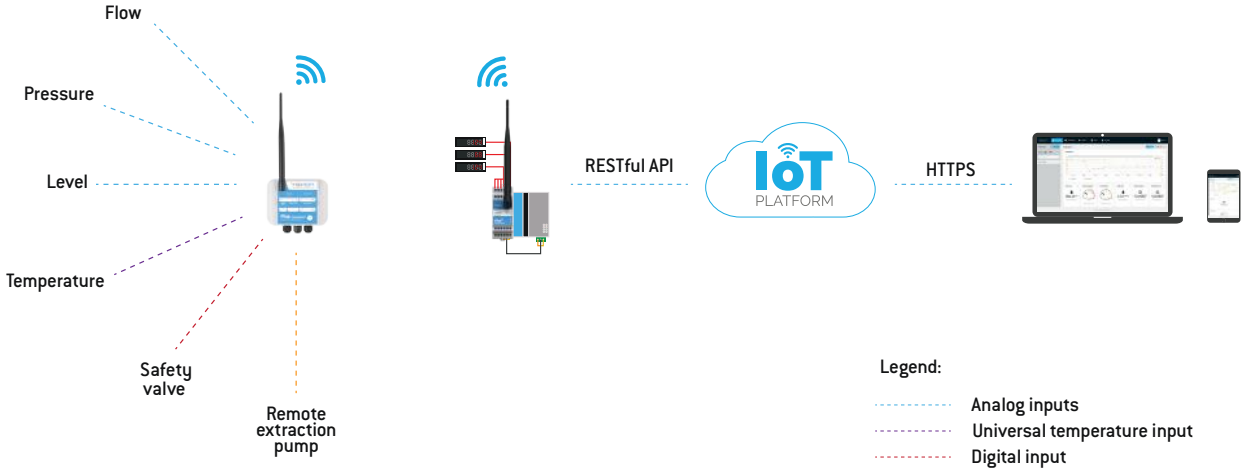
The integration of the PLUS solution with the automation, already existing in the industrial unit, takes place between the RS-485 port of the PLUS WGW420 gateway and the RS-485 port of the industrial gateway already connected to the client-side automation. The communication protocol that links the two devices is the Modbus RTU protocol.



TECHNICAL DETAILS

The WGW420 PLUS gateway works as a Modbus Slave and answers to all data requests from the Modbus Master, which corresponds to the customer's industrial gateway. As a Slave, the WGW420 gateway will only communicate with the automation part when there is an express request. Although there is a two-way communication channel between the two devices, communications only take place in reply to requests.

The submission of data to the cloud is done by the automation structure. The industrial gateway, through Ethernet ports, allows direct access to the internet. The implementation of a framework of simple configuration, allowed the acquisition of data by the Modbus protocol and sending it to the Tekon IoT Platform cloud, using a REST API. The same process could be performed using the MQTT communication protocol, also supported by the Tekon IoT Platform.



Legend:

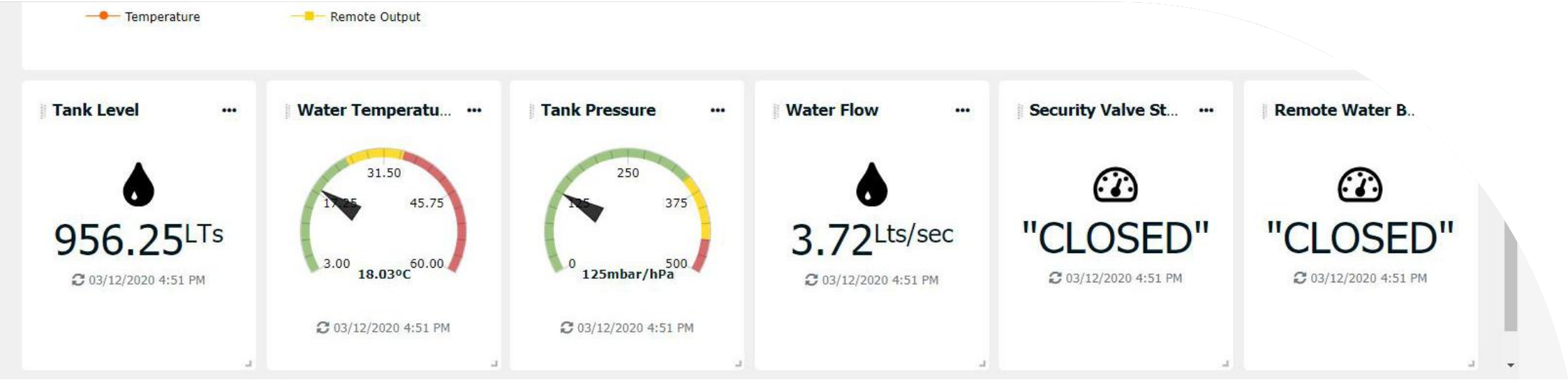
- Analog inputs
- Universal temperature input
- Digital input
- Remote control output

TECHNICAL DETAILS

The Tekon IoT Platform is the end of line for the entire application, which allows the user to have an overview of the status of the monitoring system, with a graphic translation applied to all installed data logging points. The output signals from the analog sensors are easily translated into the reference variable and scale, being easily interpreted and configured to be displayed in the widgets available for this purpose.

The alarm functionality of the Tekon IoT Platform provides a supplementary and invisible security layer, capable of operating based on the registered values. The user creates alarms that act under a single variable, where the fundamental parameters for monitoring are defined.

The profiling of alarms allows to establish a time base of action - the alarm can be operating in configurable intervals of hours and / or days or simply be operational every day. The alarm system brings greater robustness to all actions that are included in what we call real-time monitoring.



CONCLUSION

The real-time monitoring of the supply process of the industrial unit is essential to ensure the longest possible uptime of the entire infrastructure. The unit's production process is directly related to the availability of a basic resource - water - and any situation that blocks the supply of this resource, immediately translates into losses and costs that reduce the organization's sustainability.

The PLUS TWP-4AI4DI1UT wireless transmitter is a device that becomes inclusive to many applications, having a leading role claimed by the versatility that its connections offer. The modernization or adaptation to already implemented systems saves time and money in the installation and potentially the efficiency of the processes.

	7	Firmware Version	String	-	-	-		
	8	Hardware Version	String	-	-	-	-	
	9	Level	Float	lts (LTs)	Float	From 4 - 20 to 0 - 1000	Round 2 d.p.	
	10	Pressão	Float	Pressure (mbar/hPa)	Float	From 4 - 20 to 0 - 500	Round 2 d.p.	
	11	Flow	Float	lts/sec (Lts/sec)	Float	From 4 - 20 to 0.1 - 3	Round 2 d.p.	
	12	Temperature	Float	Degree celsius (ºC)	Float	From 4 - 20 to 3 - 40	Round 2 d.p.	
	13	Remote Output string	String	-	Bool	True: OPEN ; False: CLOSED	-	
	14	Security Valve	String	-	Bool	True: OPEN ; False: CLOSED	-	
	15	Remote Output	Int	-	-	-	-	

WIRELESS SENSORS TECHNOLOGY

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