

DATA ACQUISITION SYSTEM (BETA VERSION)- OVERVIEW



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DATA ACQUISITION SYSTEM (BETA VERSION)- OVERVIEW



Vigo Meeting

CONTENT

1. Introduction, description of the monitoring and datalogger system
2. Overview of the radio devices (zigbee, mesh network)
3. Overview of the BMS, "BUILDING MANAGEMENT SYSTEM"
4. Live demo of the system



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INTRODUCTION, MONITORING SYSTEM



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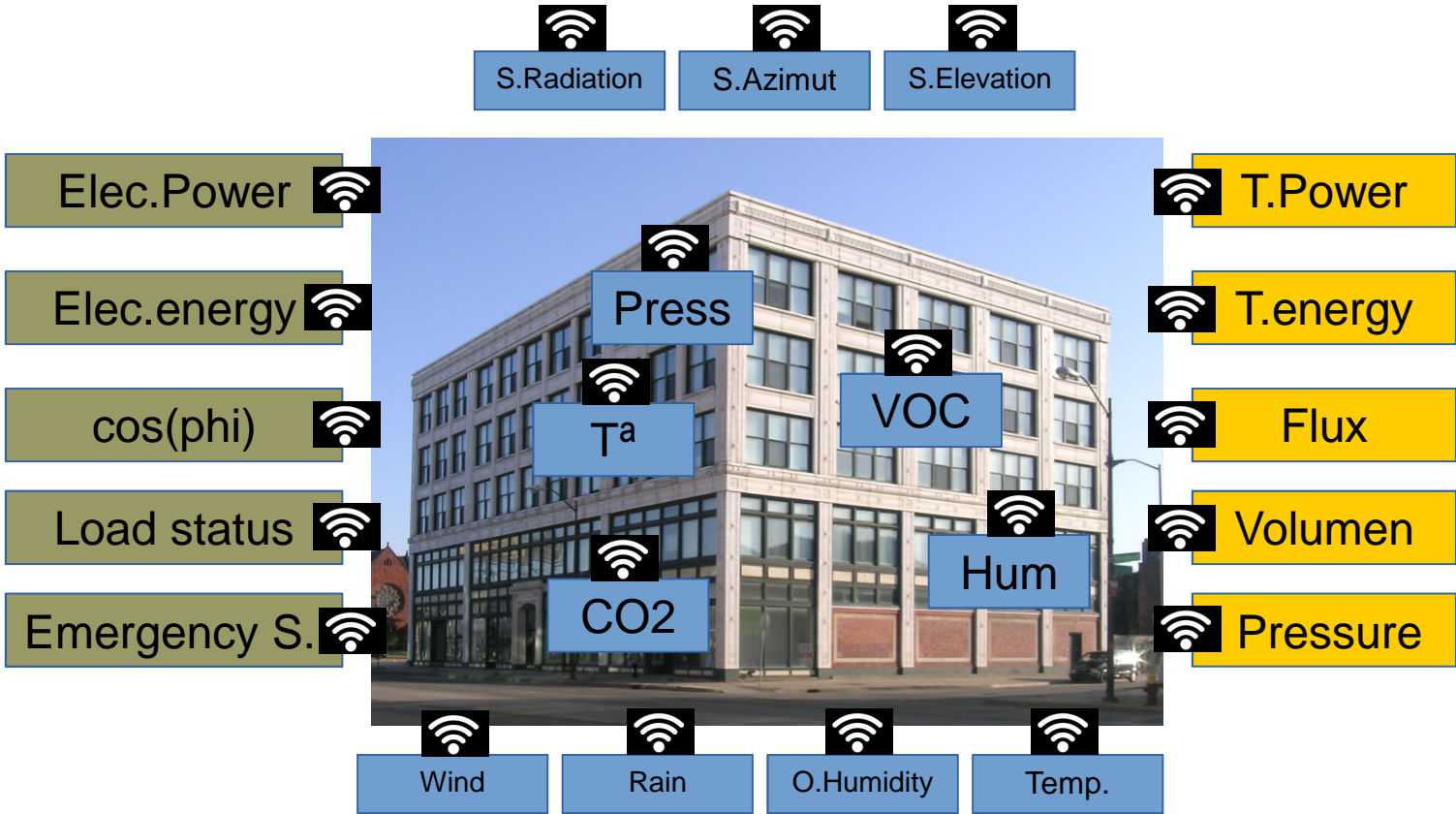
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MONITORING SYSTEM

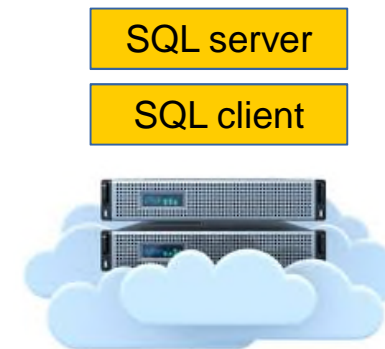
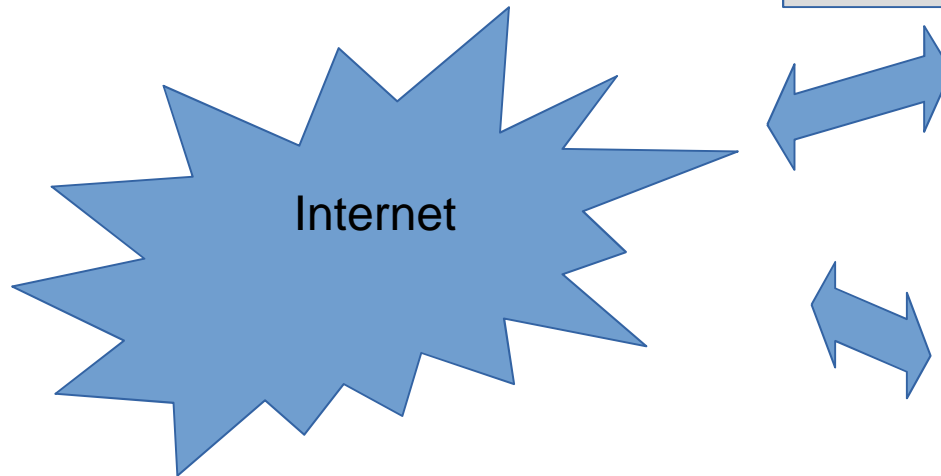
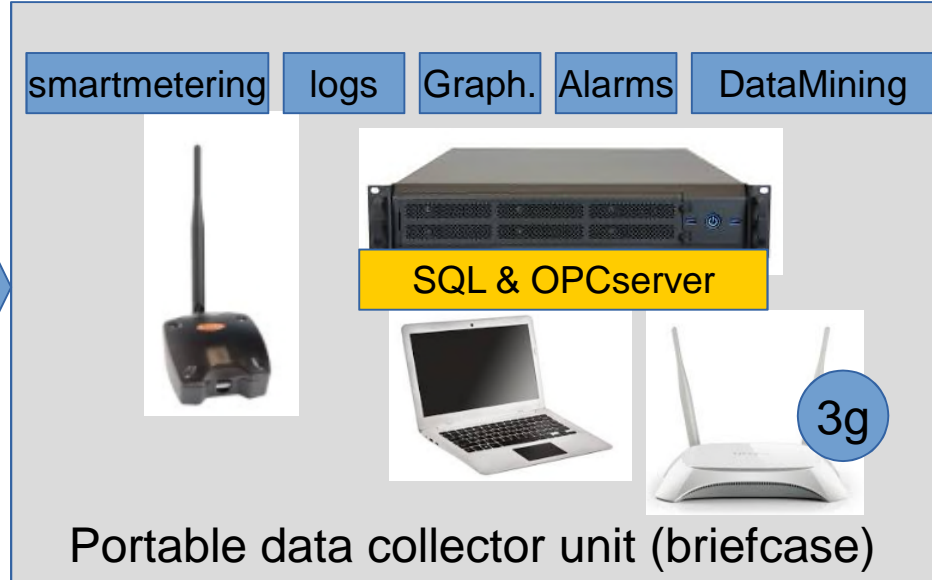
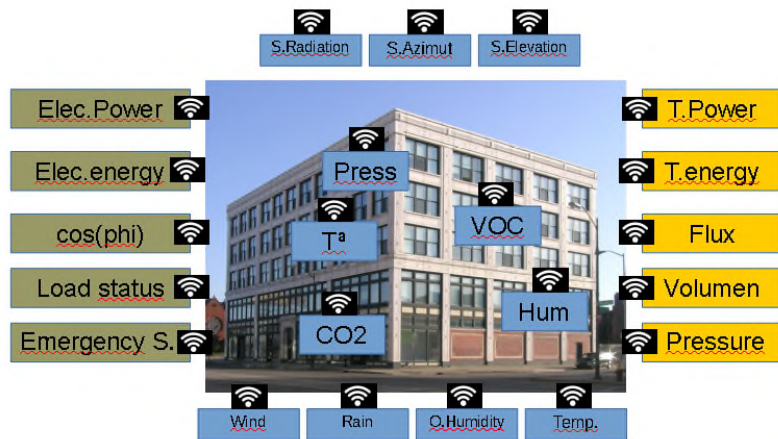
Building characterization Fase 1: Sensor network deployment & Integration of present measurement devices





MONITORING SYSTEM

Building characterization Fase 2: Data collector unit





MONITORING SYSTEM HOW TO ... access data:

The screenshot shows the pgAdmin 4 interface. A SQL query is entered in the 'Query-1' window:

```
1 SELECT * FROM logs_v_log_alarm  
2 LIMIT 100  
3
```

The 'Data Output' window displays a table with columns: id, message, processpointname, condition, threshold, and value. The data shows various alarm events with their corresponding process points and conditions.

SQL request

OPC client



WebServer

The screenshot shows a web browser displaying the 'Engency: U.Vigo' monitoring page. The page title is 'ZigBee CO2 meter:'. It features a 'Monitorización' section with various status indicators and a 'Dispositivos' section with a list of device parameters. A graph shows 'CO2 Instant value' and 'CO2 Average' over time. On the right, there are several control buttons for the ZigBee network, including 'GW ZigBee1', 'CO2 ZigBee', 'Analog Input / Output ZigBee', 'Plug 1 ZigBee', 'Plug 2 ZigBee', 'Switch 1 meter ZigBee', 'Switch 2 meter ZigBee', 'Multisensor: Light, humidity, temperature', 'Multisensor: Digital IO + NTC 4C', 'Interfaz 1 Contadores de pulsos / optics', and 'Interfaz 2 Contadores de pulsos / optics'.

DEVICES - OVERVIEW



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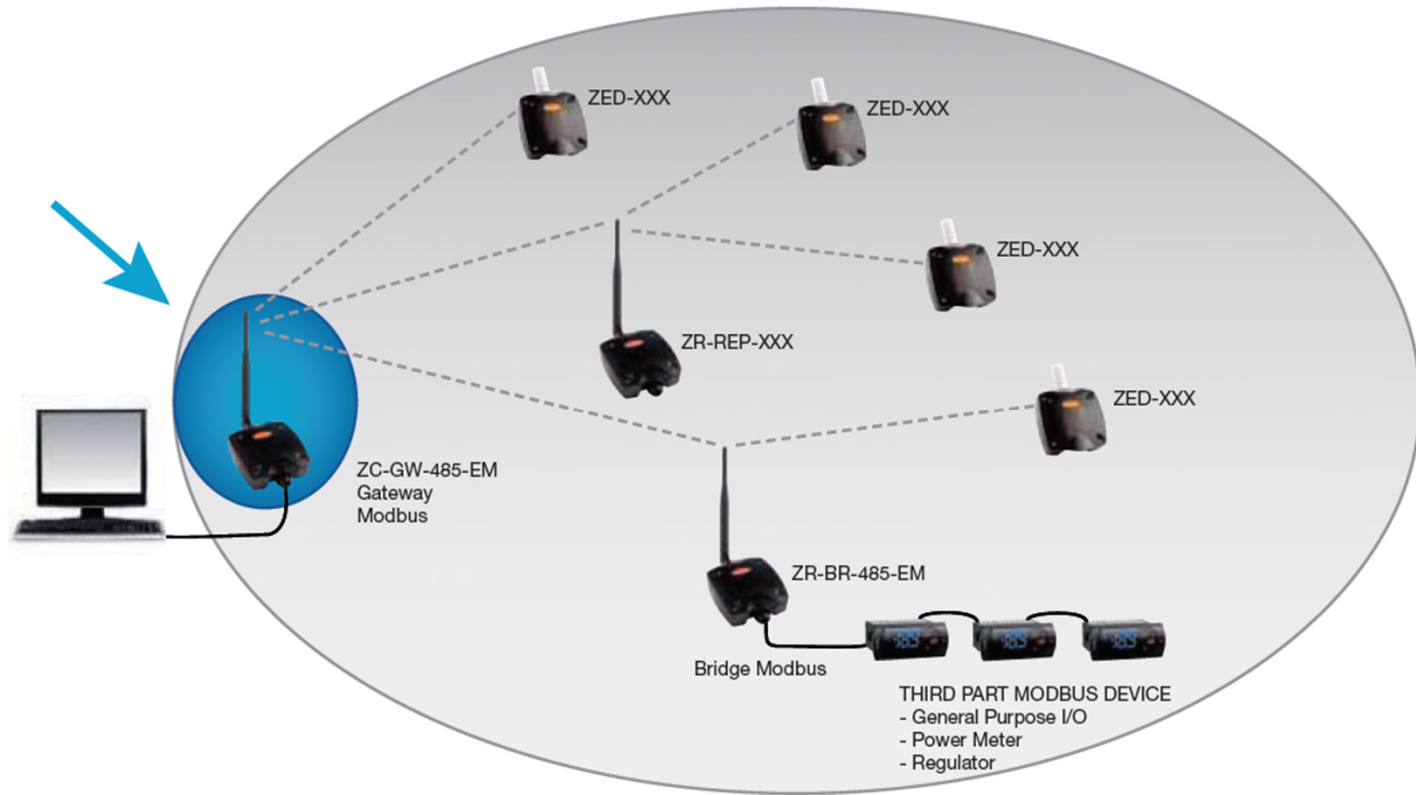


INTRODUCTION

Building characterization using radio sensors. In this example, Zigbee:

System elements

Gateway



Repeater





INTRODUCTION

Building characterization using radio sensors:

Sensors (End of system)



- Measurement Dual Wavelength NDIR
- Autocalibration
- Long term stability and accuracy
- Internal antenna
- Slim size
- Routing function
- Sampling and transmission rates are configurable
- Wall mounting



- Temperature, humidity and light measurements for indoor/outdoor use
- Alarm thresholds
- Sampling and transmission rates are configurable
- Battery powered
- Long life battery
- Internal antenna



INTRODUCTION

Building characterization using radio sensors:

Actuators (With repeater function)



- 1 analogical input for voltage signal reading between 0 and 10 Vdc
- 1 analogical output 0-10 Vdc
- 1 digital input with pulse counting functionality
- 1 NTC thermal resistor input
- 12-24 Vdc/Vac supply
- RF power amplifier: 10 mW
- Routing function
- External antenna



- Real Time Electricity Active Power Measurement up to 2,5 kW
- Electricity Energy Counter
- Remote switch up to 2,5kW
- Stand-by killer
- Override push-button
- ModBus profile on ZigBee platform
- Router function



- Real Time Electricity Active Power Measurement up to 2,5 kW
- Electricity Energy Counter
- Remote switch up to 2,5 kW
- Stand-by killer
- Override push-button
- Pass-Through Socket for many countries available
- ModBus profile on ZigBee platform
- Router function



INTRODUCTION

Building characterization using radio sensors:

Pulse counter (With repeater function)



- LED pulse counter of electricity and energy meter settable from 1 to 99 Wh/pulse
- It manages electricity and energy meter in Wh
- Digital input for remote alarms
- Compatible with ENEL energy meter (single phase/three phase); other European energy meters under development



INTRODUCTION

Building characterization using radio sensors:

Energy meter (With repeater function)



- Real Time three phase Electricity Active Power or six single phase Electricity Active Power
- Measurement up to 100A by phase with external CT included
- ModBus profile on ZigBee platform
- Supply 230 Vac
- Star configuration only
- External antenna
- Diagnostic led
- Din rail mounted



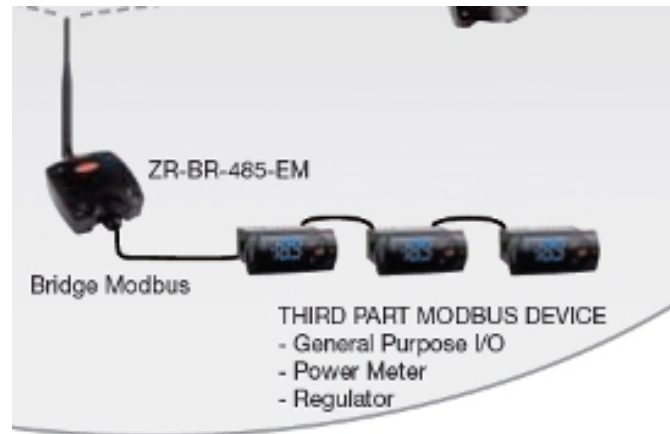
INTRODUCTION

Building characterization using radio sensors:

Bridge (With repeater function) for the integration of existing measurement devices



- Connecting Modbus devices to the ZigBee network
- Using Modbus/RTU protocol and RS485 interface
- Routing function
- RF power 1mW
- External antenna



BMS OVERVIEW



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BMS INPUTS: KNX, MODBUS, BACNET, ZIGBEE AND OTHERS (VIA GW)

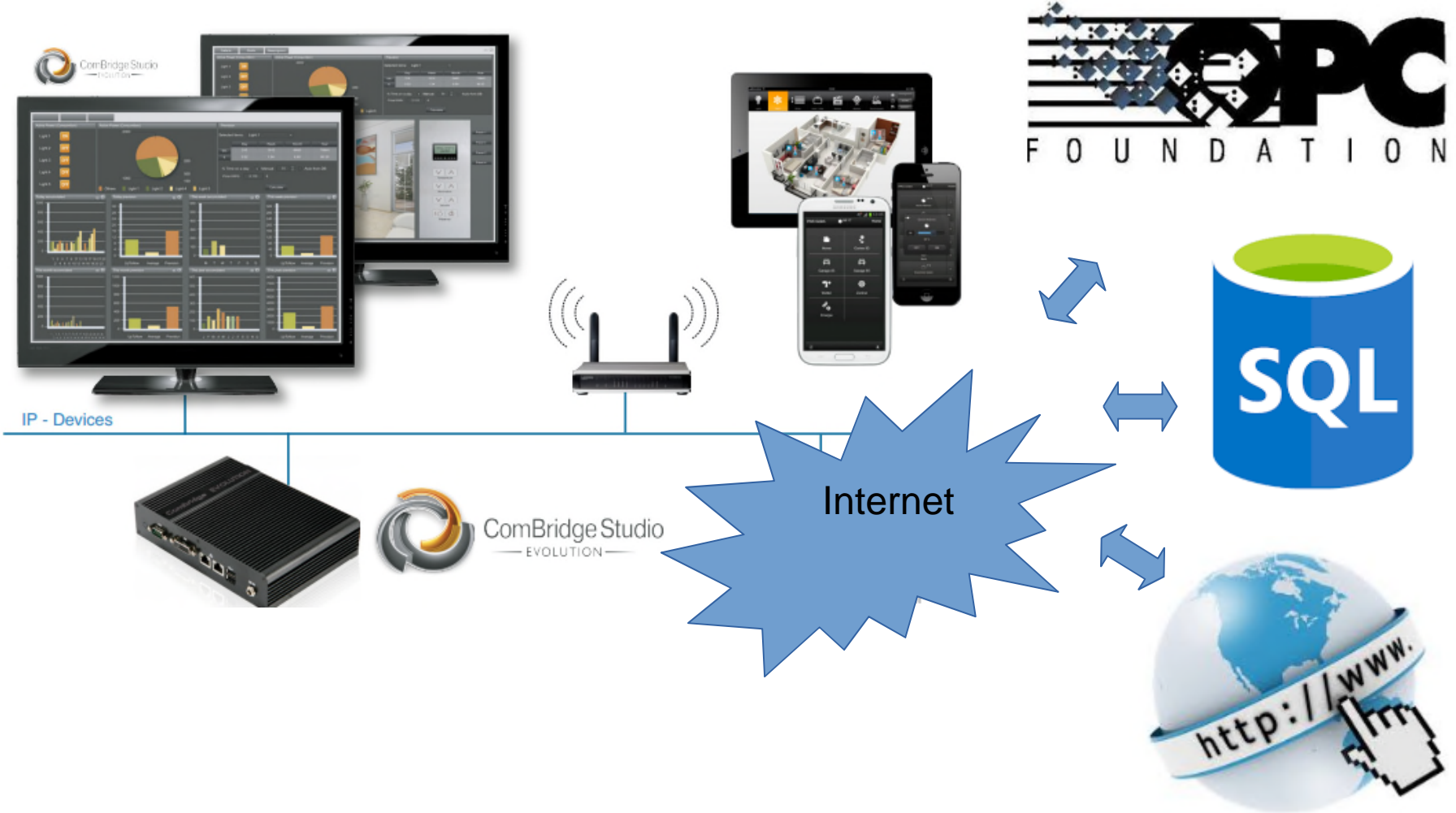


Via Gateway

Via Gateway:
Other systems



BMS OUTPUTS: WEBSERVER, SQL SERVER AND OPC SERVER





BMS INPUT: WEBSERVER CO2 PROBE

Enginency: U.Vigo

Mon, 11:42:59 2017-04-03



Monitorización

Dispositivos

ZigBee CO2 meter:

Device Type: 59	Command Pass 1: 0	0	Activ. of Command Pass: 0	Alarm bad reading State: 0
Firmware: 2082	Transmission time (seconds): 800	800	ON OFF	OFF
Transmission messages Counter: 554	Command Pass 2: 0	0	High level CO2 Alarm: 0	OFF
SNR of last message from DEV: 52	Command Pass 3: 0	0		
Battery level (mv): 6381	Co2 Alarm Threshold: 1500	1500		
Supply level (mv): 3346				
CO2 Instantaneous value: 865				
CO2 Average value: 822				
CO2 Sensor error code: 0				
Number of device reset: 8				
Type of the last reset: 1025				
ModBus Address: 31				
Last message seconds passed: 3				
Number of received messages: 313				
instant time: 2105				
SNR of last message from GW: 59				
Device network address-17086				

Time (x)	CO2 Instant value (y)	CO2 Average (y)
8	680	500
9	865	720
10	800	800
11	930	830

- GW ZigBee1
- CO2 ZigBee
- Analog. Input / Output ZigBee
- Plug 1 ZigBee
- Plug 2 ZigBee
- Switch 1 meter ZigBee
- Switch 2 meter ZigBee
- Multisensor: Light, humidity, temperature
- Multisensor: Digital IO + NTC °C
- Interfaz 1 Contadores de pulsos / opticos
- Interfaz 2 Contadores de pulsos / opticos



BMS INPUT: WEBSERVER, MULTISENSOR PROBE



Enginency: U.Vigo

Mon, 11:43:59

2017-04-03

Monitorización

Dípositivos

ZigBee Analog Input Output

Device Type: 57	Command Pass 1: 0	0	Activ. of Command Pass: 0	Logical state IN_1:1
Firmware: 2059	Transmission time (seconds): 20	20	ON OFF	ON
Transmission messages Counter: 12214	Command Pass 2: 0	0	Enable 10 Div Mode: 0	(State) 10 Div Mode: 0
SNR of last mesagge from DEV: 64	Command Pass 3: 0	0	ON OFF	OFF
NTC temperature (°C/10): 235	Counter inc. per pulse: 1	1		
0-10v mVdc INtput: 0	Minimun time for valid pulse: 0	0		
IN_1 pulse counter (LSP): 171	0-10Vdc Output Setting (mV): 4000	4000		
IN_1 pulse counter (MSP): 0	Analog. output management: 1	1		
IN_1 Counter in last period: 0	0-10Vdc A. OUTPUT GAIN: 9635	9635		
Sample Interval: 20	0-10Vdc A. OUTPUT OFFset: 0	0		
Last message seconds passed: 18	0-10Vdc A. INPUT GAIN: 24885	24885		
Number of received messages: 12447	0-10Vdc A. INPUT OFFset: 0	0		
instant time: 2105				
SNR of last mesage from GW: 78				
Device network address-8983				
Pulse counter: 171				

GW ZigBee1

CO2 ZigBee

Analog. Input / Output ZigBee

Plug 1 ZigBee

Plug 2 ZigBee

Switch 1 meter ZigBee

Switch 2 meter ZigBee

Multisensor: Light, humidity, temperature

Multisensor: Digital IO + NTC °C

Interfaz 1 Contadores de pulsos / opticos

Interfaz 2 Contadores de pulsos / opticos

Temperatura sonda NTC AIAO

Vdc 0-10Vcc AIAO

Pulse counter AIAO

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BMS INPUT: WEBSERVER, ENERGY METER

Enginency: U.Vigo

Mon, 11:44:59

2017-04-03



- Monitorización
- Dispositivos

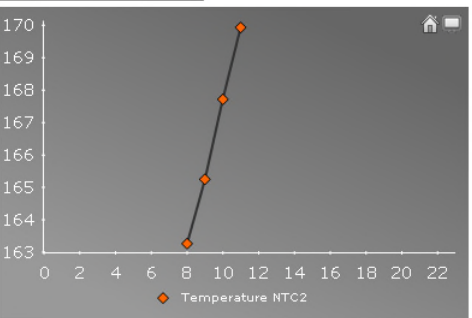
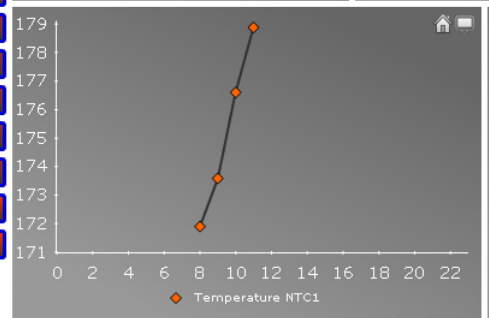
ZigBee, Pulse counter_1 x2 and 2xNTC probes

- Device Type: 19
- Firmware: 2056
- Transmission messages Counter: 4079
- SNR of last message from DEV: 54
- Battery level: 3338
- NTC1-NTC2 GAP: 9
- NTC1 Temperature: 180
- NTC2 Temperature: 171
- IN_1 Pulse counter LSP: 0
- IN_1 Pulse counter MSP: 0
- IN_2 Pulse counter LSP: 6
- IN_2 Pulse counter MSP: 0
- IN_1 Pulse counter last interval: 0
- IN_1 sample interval: 60
- IN_2 Pulse counter last interval: 0
- IN_2 sample interval: 60
- Last message seconds passed: 46
- Number of received messages: 4127
- Instant time: 2106
- SNR of last message from GW: 59
- Device network address: 15653
- IN_1 counter pulses TOTAL: 0
- IN_2 counter pulses TOTAL: 6

- Command Pass 1: 0
- Transmission time (s): 60
- Command Pass 2: 0
- Command Pass 3: 0
- Counter inc. per pulse: 1
- Minimum time for valid pulse: 0
- Free Parameter: 0

- Activ of Command Pass: 0
- Enable 10 Div Mode: 0

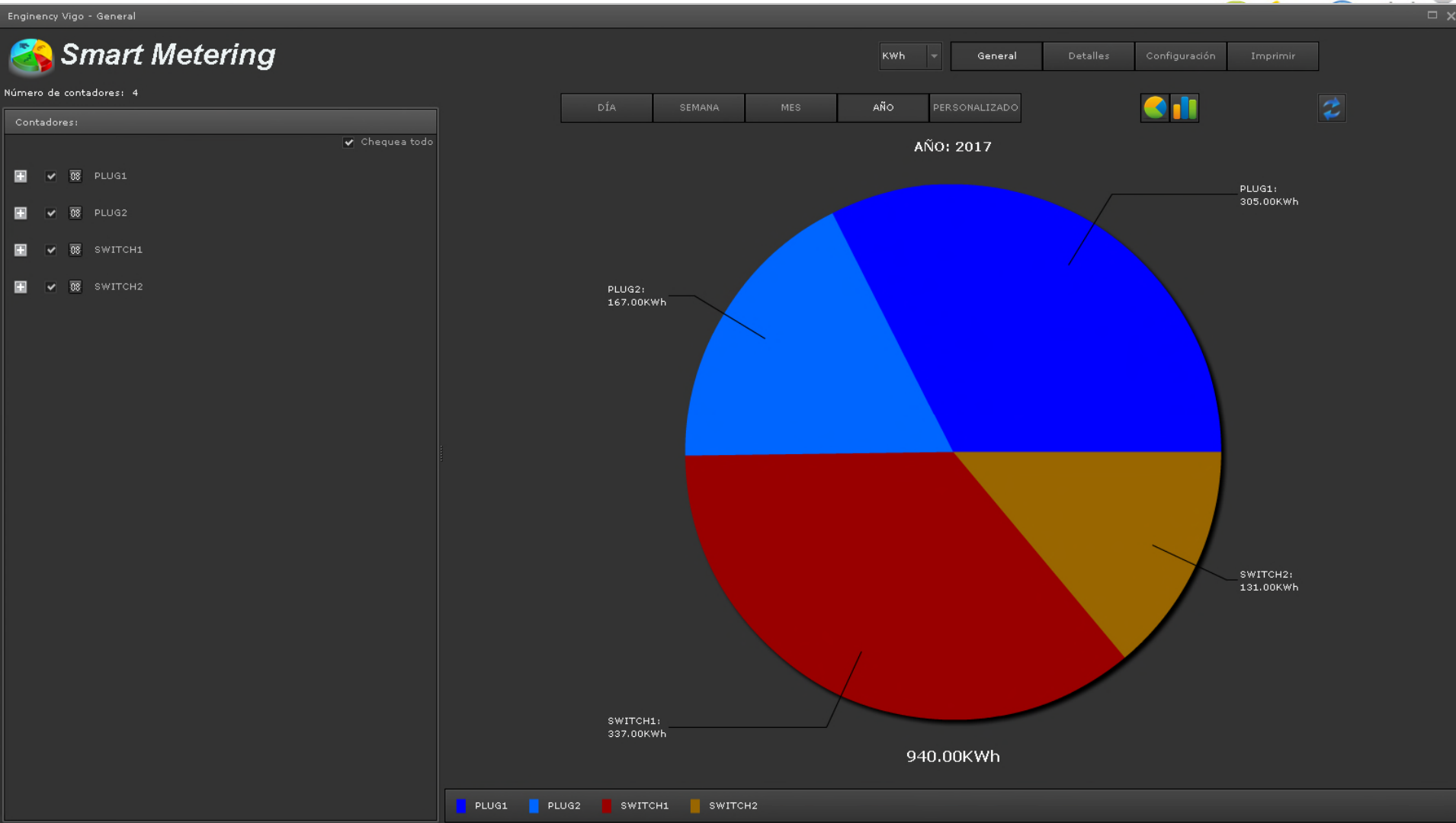
- Logical state 1: 1
- Logical state 2: 1
- Probe fail NTC 1: 0
- Probe fail NTC 2: 0
- Probes fail: 0
- Low battery: 0
- (State) 10 Div Mode: 0



- GW ZigBee1
- CO2 ZigBee
- Analog. Input / Output ZigBee
- Plug 1 ZigBee
- Plug 2 ZigBee
- Switch 1 meter ZigBee
- Switch 2 meter ZigBee
- Multisensor: Light, humidity, temperature
- Multisensor: Digital IO + NTC °C
- Interfaz 1 Contadores de pulsos / opticos
- Interfaz 2 Contadores de pulsos / opticos

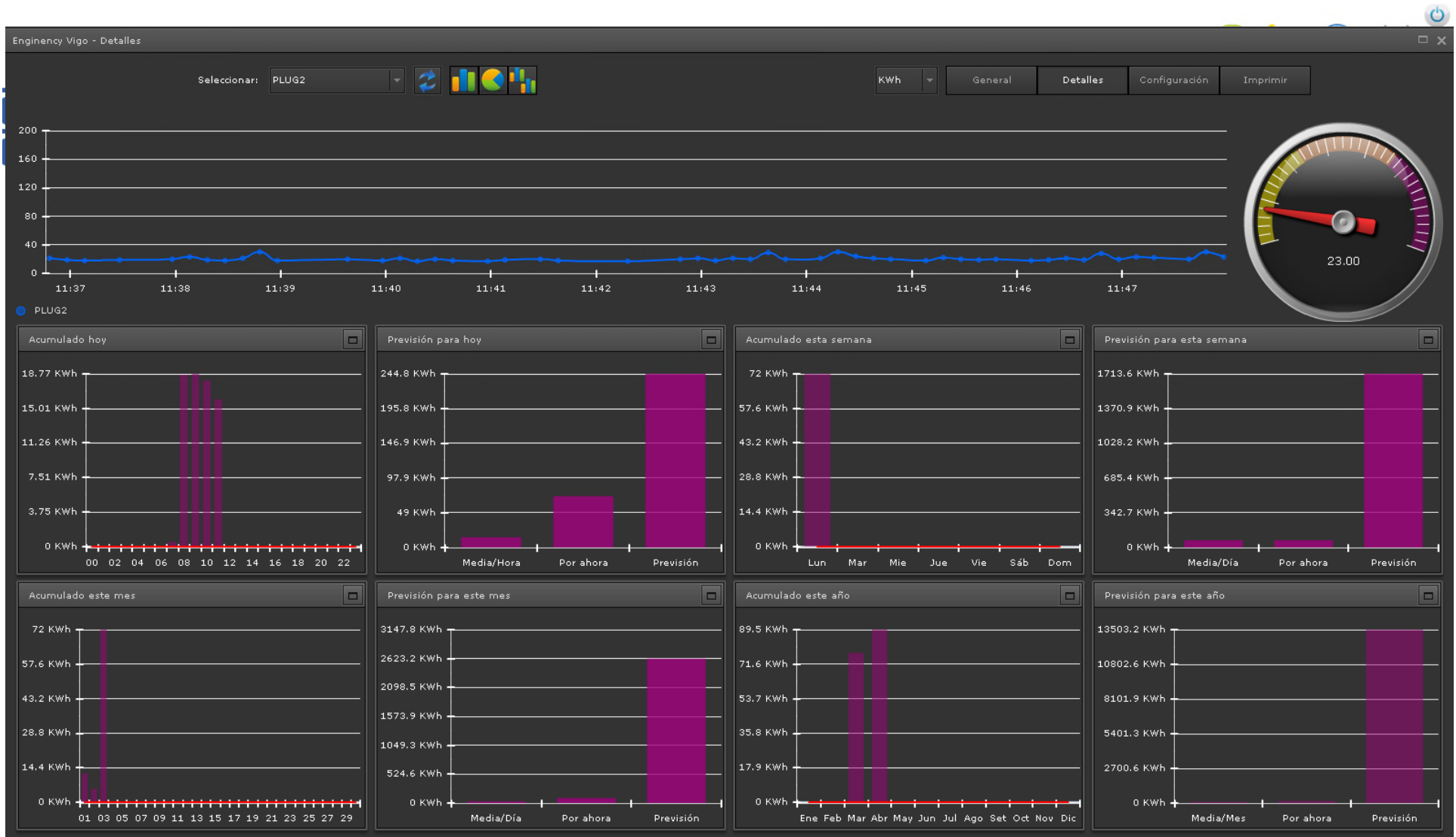


BMS OUTPUT: SMARTMETERING COMPARATIONS



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BMS OUTPUT: WEBSERVER, SMARTMETERING DETAILS



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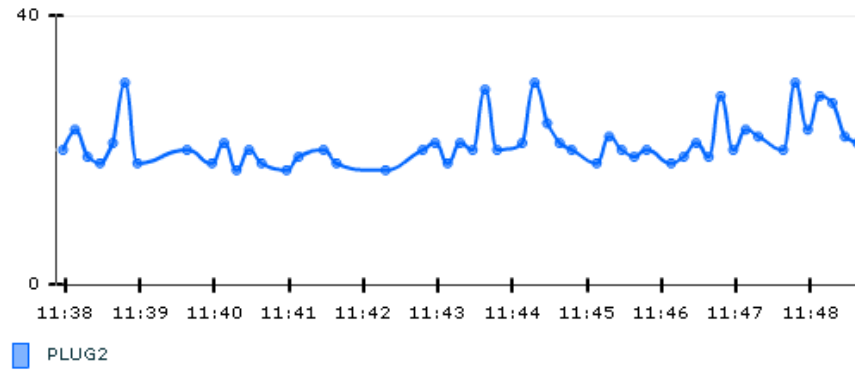
BMS OUTPUT: SMARTMETERING REPORTS

Pagina 1

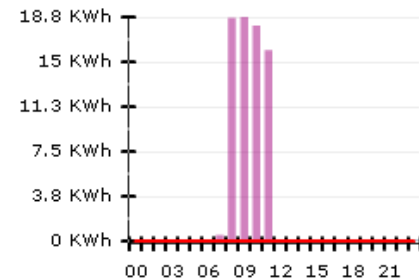
Mon Apr 3 2017

Contador - Resumen

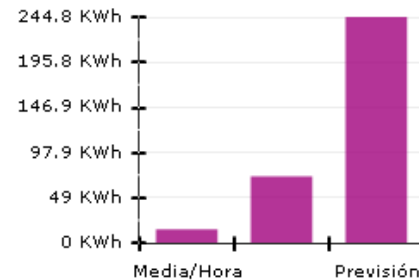
Contador: PLUG2



Acumulado hoy



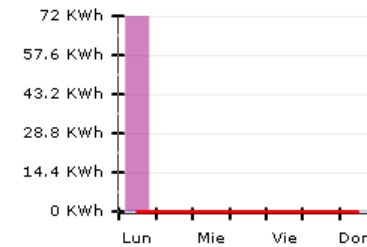
Previsión para hoy



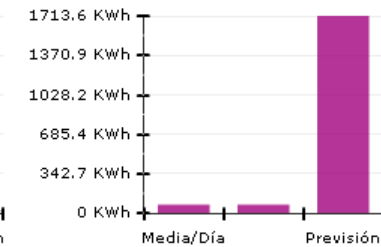
Pagina 2

Mon Apr 3 2017

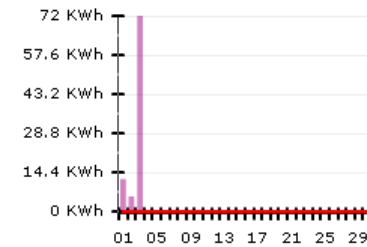
Acumulado esta semana



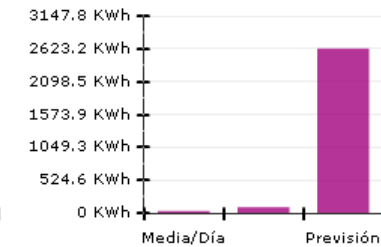
Previsión para esta semana



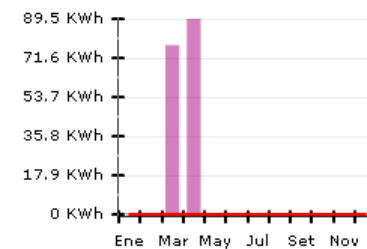
Acumulado este mes



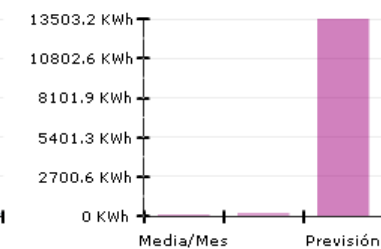
Previsión para este mes



Acumulado este año



Previsión para este año





BMS OUTPUT: ALARMS

Manajador de Alarmas

Estado Historia

FECHA	NOMBRE	NOMBRE PUNTO PROCESO	ESTADO	VALOR	CONDICIÓN	UMBRAL
03/04/2017 08:17:34	PLUG1 OUTPUT STATE	ZB_VIGO.ZRPLUG_1.D_OUTPUT_ST	MANTENIMIENTO	Encender	=	Encender
03/04/2017 08:17:29	PLUG2 OUTPUT STATE	ZB_VIGO.ZRPLUG_2.D_OUTPUT_ST	MANTENIMIENTO	Encender	=	Encender
03/04/2017 08:17:25	SWITCH1 OUTPUT STATE	ZB_VIGO.ZRSWITCH_1.D_OUTPUT	MANTENIMIENTO	Encender	=	Encender
03/04/2017 08:17:17	SWITCH2 OUTPUT STATE	ZB_VIGO.ZRSWITCH_2.D_OUTPUT	MANTENIMIENTO	Encender	=	Encender
03/04/2017 07:50:17	PLUG2 OUTPUT STATE	ZB_VIGO.ZRPLUG_2.D_OUTPUT_ST	ALARMA	Encender	=	Encender
03/04/2017 07:50:16	PLUG1 OUTPUT STATE	ZB_VIGO.ZRPLUG_1.D_OUTPUT_ST	ALARMA	Encender	=	Encender
03/04/2017 07:50:15	SWITCH2 OUTPUT STATE	ZB_VIGO.ZRSWITCH_2.D_OUTPUT	ALARMA	Encender	=	Encender
03/04/2017 07:50:15	SWITCH1 OUTPUT STATE	ZB_VIGO.ZRSWITCH_1.D_OUTPUT	ALARMA	Encender	=	Encender
03/04/2017 07:50:14	TIDCI2 ALARM LOW BATTERY	ZB_VIGO.ZEDTIDCI_2.D_LOW_SUPI	SIN ALARMA	Apagar	=	Encender
03/04/2017 07:50:14	TIDCI2 ALARM PROBES FAIL	ZB_VIGO.ZEDTIDCI_2.D_PROBES_F	SIN ALARMA	Apagar	=	Encender
03/04/2017 07:50:14	TIDCI2 ALARM NTC2 FAIL	ZB_VIGO.ZEDTIDCI_2.D_PROBE_NT	SIN ALARMA	Apagar	=	Encender
03/04/2017 07:50:14	TIDCI2 ALARM PROBE NTC1 FAIL	ZB_VIGO.ZEDTIDCI_2.D_PROBE_NT	SIN ALARMA	Apagar	=	Encender
03/04/2017 07:50:12	TIDCI1 ALARM LOW BATTERY	ZB_VIGO.ZEDTIDCI_1.D_LOW_SUPI	SIN ALARMA	Apagar	=	Encender
03/04/2017 07:50:12	TIDCI1 ALARM PROBES FAIL	ZB_VIGO.ZEDTIDCI_1.D_PROBES_F	SIN ALARMA	Apagar	=	Encender
03/04/2017 07:50:12	TIDCI1 ALARM PROBE FAIL NTC2	ZB_VIGO.ZEDTIDCI_1.D_PROBE_NT	SIN ALARMA	Apagar	=	Encender
03/04/2017 07:50:12	TIDCI1 ALARM PROBE FAIL NTC1	ZB_VIGO.ZEDTIDCI_1.D_PROBE_NT	SIN ALARMA	Apagar	=	Encender
03/04/2017 07:50:09	ZB_CO2 OVER THRESHOLD STATE	ZB_VIGO.ZEDCO2.D_CO2_ALARM	SIN ALARMA	Apagar	=	Encender
03/04/2017 07:50:09	ZB_CO2 BAD READING STATE	ZB_VIGO.ZEDCO2.D_STATE_OF_CO	SIN ALARMA	Apagar	=	Encender
03/04/2017 07:50:06	GW ZIGBEE OPEN/CLOSE NETWORK	ZB_VIGO.ZRIGW.D_GW_NETWORK_K	SIN ALARMA	Apagar	=	Encender
03/04/2017 07:50:06	GW ZIGBEE NETWORK STATUS	ZB_VIGO.ZRIGW.D_GW_NETWORK_S	SIN ALARMA	Apagar	=	Encender

1 / 5

Más info Exportar Cerrar

Nombre alarma: PLUG2 OUTPUT STATE Fecha: 2017-04-03 08:17:29.0

Estado de la alarma: 3

Umbral de la alarma: (ZB_VIGO.ZRPLUG_2.D_OUTPUT_STATE EQUAL 1) y el valor era:1

Deshabilitado por: icm

kike, comprobado, la salida a ON

E-mail enviado a: enrique@icmingeneria.com, roberto@icmingeneria.com, chema@icmingeneria.com Sms enviado a: +34606332513

Cerrar



BMS OUTPUT: SQL SERVER

The screenshot shows the pgAdmin 4 interface. On the left is a tree view of the database structure. The main window displays a SQL query and its results.

SQL Query:

```
1 SELECT * FROM logs_1624.logpp
2 ORDER BY date DESC LIMIT 100
3
```

Data Output:

date [PK] timestamp without time zone	source character varying	destination integer	telegramtype character varying	state character varying	increment character varying
2017-04-03 08:17:40.101	REPLACED	1313	r	8	0
2017-03-31 15:41:31.926		1313	w	8	1
2017-03-31 15:41:25.189		1313	w	7	-1
2017-03-31 15:13:14.866		1313	w	8	1
2017-03-31 14:45:46.6		1313	w	7	-1
2017-03-31 14:35:40.913	REPLACED	1313	r	8	0
2017-03-31 14:16:38.09		1313	w	8	1
2017-03-31 14:12:33.696		1313	w	7	-1
2017-03-31 14:11:01.479		1313	w	8	1
2017-03-31 13:03:10.875		1313	w	7	-1
2017-03-31 12:36:49.919		1313	w	8	1
2017-03-31 12:26:32.882		1313	w	7	1
2017-03-31 12:23:45.244		1313	r	6	0
2017-03-31 11:36:30.498		1313	w	6	0
2017-03-31 11:36:30.491		1313	w	6	-1
2017-03-31 10:34:20.777		1313	r	7	0
2017-03-31 10:34:20.772	REPLACED	1313	r	7	0
2017-03-31 09:51:59.805	REPLACED	1313	r	4	0

COLOPHON

4/4/2017

Consortium meeting, Vigo
Enrique Martínez González,
ICM

Version 1



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PROGRAMME FOR RESEARCH AND INNOVATION COOPERATION



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