

MEASUREMENT AND CONTROL

LINE Integral Energy Management System





EMSi Integral Energy Management System

It has never been easier:

Continuous management, maintenance and integrated control

The **Line** system devices are designed to monitor and control different types of installations, both those where the energy consumption has to be managed and those where the devices installed in the network have to be controlled.

Its modular architecture offers a solution that can be fully adapted to any type of need by connecting different modules through its internal **Bus-Line** communications system.

The result is the ability to create a compact and custom device that can adapt to any requirement, present or future.

The new **Line** system lets you monitor and record any value you wish to manage (electricity, water, gas consumption, temperatures, flow rates, pressures, etc.) and control any system integrated into the installation (lighting, HVAC, pumps, etc.).





Line Series

Complete modular system for energy management



Line-EDS Datalogger with built-in webserver

Line-EDS-Cloud Line-EDS-PS Line-EDS-PSS Line-EDS-PSS-PRO



Line-M-3G Modem for 3G communications



Line-CVM Power analyzer

Line-TCPRS1

RS-232/RS-485 to

Ethernet and Wi-Fi

converter

Line-CVM-D32



Line-M-4I0 Input/output modules

Line-M-4I0-T Line-M-4IO-R Line-M-4IO-RV Line-M-4IO-A

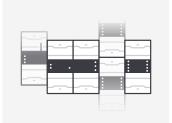


Line-M-EXT-PS



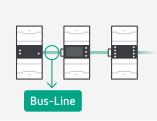
Line-M-20I Module with 20 digital inputs

Line-M-20I



Total flexibility for any installation The Line devices which are part of

the integral Energy Management System (EMSi) offers multiple combinations, allowing you to create a solution custom-made for each installation.



It has never been easier.

The modular design of the system allows any associated Line device to be installed quickly, securely and automatically thanks to its integrated **Bus-Line** communications.



Power supply



Two models, four types of management. Designed for complete control of installations.

With the Line system devices, you decide how to manage any installation. Manage them using IoT cloud platforms or with our integral Energy Management System, working locally or remotely.

TWO MODELS



Line-EDS-Cloud

Cloud data monitoring

Can be used to send data directly to the cloud, registering and integrating them into the major Big Data platforms, so you can easily manage them using simple Dashboards, directly from the internet.



Line-EDS-PS LINE-EDS-PS / -PSS / -PSS-PRO

Data monitoring Integrated control of installations Maintenance

It allows to manage and register the information of a installation on a single device using an integrated web server, without the need to install a PC, as it incorporates the powerful energy management tool **PowerStudio**, by CIRCUTOR.

FOUR TYPES OF MANAGEMENT

	1 Monitoring system using Line-EDS-Cloud	2 Monitoring and control system using Line-EDS-PS
)	3 Monitoring and control system using Line-EDS + PowerStudio	4 Monitoring and control system using PowerStudio

Monitoring system using Line-EDS-Cloud

Line-EDS-Cloud

Remotely monitor your installation using IoT platforms



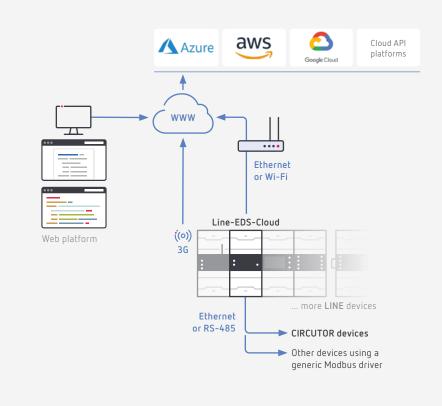
Data tables



<u>A</u>larms

Generic Modb

Generic Modbus driver

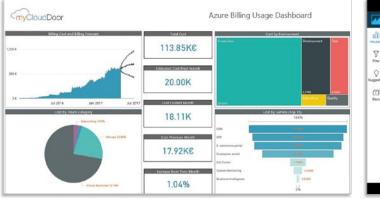


∖ System features:

- > Compatible with the major IoT platforms for Big Data analysis.
- Distributed system, allowing data from multiple installations to be centralized in the same system.
- > Connect from anywhere with internet access.
- > Does not require installing and maintaining a local server.
- > No programming specialists required.

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Examples of IoT platforms

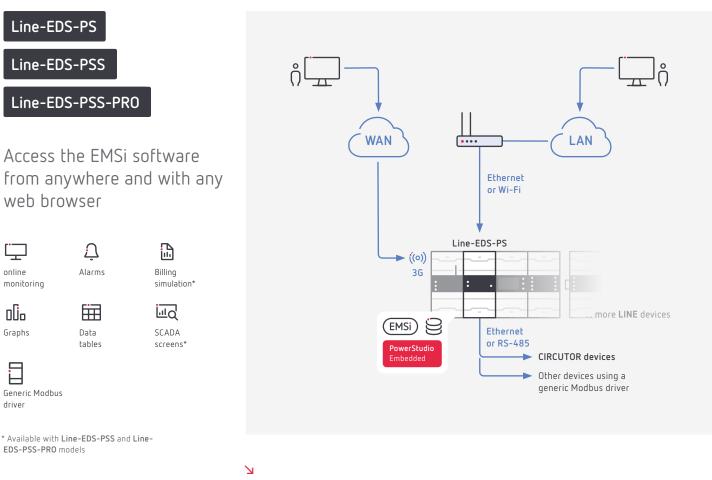




Azure platform

AWS platform

Monitoring and control system using **Line-EDS-PS**



EMSi (Integral Energy Management System) Manage consumption Installation control I Maintenance

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System features:

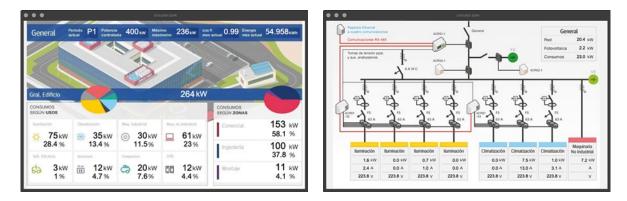
- > Line-EDS-PS incorporates EMSi software for the integral management of installations.
- > Access EMSi from any web browser, whether in local or remote mode.
- > Does not require installing and maintaining a local server.
- > Generic Modbus driver to add any device on the market.
- > Internal memory for data analysis and traceability using graphs and tables.
- > Energy consumption management.
- > Automatic control of installations.
- > Alarms and billing simulation for proper maintenance.

Accessible via Webserver or PowerStudio



All your consumption at a glance

Record and manage the measurements of all your energy and consumption variables with the **Line** devices. Easily add any meter that uses the Modbus protocol. Use the **Line-CVM-D32** power analyzer to record electricity consumption, and the **Line-M** input and output modules to record other consumption using pulses. Group consumption into different hourly rates, manage your installation as per the **ISO 50001** standard and monitor all the information directly on a SCADA display.



Control and automate your installation

Line-EDS-PS can integrate any Modbus RTU and/or Modbus TCP device, enabling both the reading and management of any device with this protocol (HVAC machines, variable speed and frequency drives, compressors, level pumps, etc.).



□ Stay on top of everything that is happening in your installation

With **Line-EDS-PSS** and **Line-EDS-PSS-Pro** it is possible to program the automatic sending, via mail electronic, of invoice simulations, reports or alarms to be at all times informed of the behaviour of the facility.

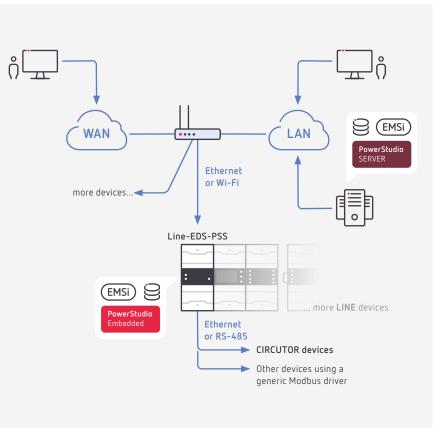
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Monitoring and control system using Line-EDS + PowerStudio

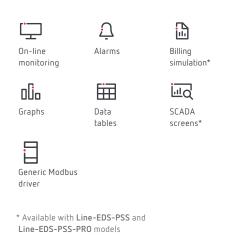


Line-EDS-PS

Line-EDS-PSS

Line-EDS-PSS-PRO

Access **PowerStudio** from anywhere, through your own server or using any web browser.



System features:

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- > Manage your installation from your own server (PowerStudio Server).
- > Add as many devices as you want with PowerStudio Server.
- > Access EMSi from any web browser, whether in local or remote mode.
- > Redundant database through the installation of Line-EDS-PS devices.
- > No limit on memory for data analysis and traceability using graphs and tables.

• Features of the monitoring and control system using Line-EDS-PS

Efficiency combined with energy control. Three versions of the PowerStudio

energy management software .

PowerStudio

- > Monitor variables in real time
- > Data base creation
- > Display the recorded data graphically and in tables
- > XML Server
- > Export data to .txt and .csv files

System monitoring and control using **PowerStudio**

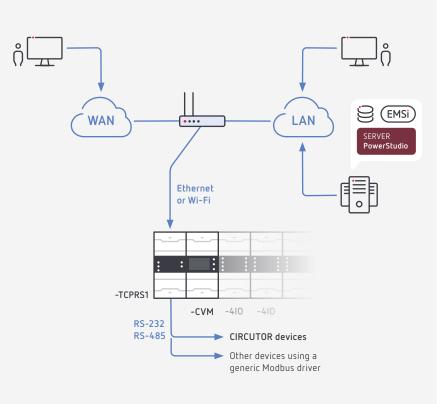
Line-CVM + Line-M

Create a custom solution with Line devices and manage it with PowerStudio Server.





*Depending on version of PowerStudio



System features:

- Create your Line solution using as many devices as you need, and expand it at any time.
- > Manage your installation from your own server (PowerStudio software).
- > Access EMSi from any web browser, whether in local or remote mode.
- > Add as many devices to your communications network as you want with PowerStudio.
- > No limit on memory for data analysis and traceability using graphs and tables.

Ind PowerStudio SCADA

PowerStudio 🕂

- > SCADA screens
- > Reports, billing simulations and configurable alarms

Ind PowerStudio SCADA Deluxe

PowerStudio SCADA 🕂

- > Generic Modbus driver
- > OPC Client



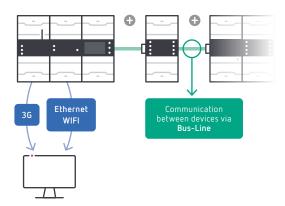
Line system devices. It has never been easier.

BUS-LINE, WITHOUT CABLES

The modular design of the **Line** solution allows any **Line** device to be installed quickly, securely and automatically thanks to its integrated **Bus-Line** communications. No additional set-up is required.

The system is fully expandable, allowing for **Plug & Play** connections of the various modules;digital or analogue inputs/ outputs, power analyzers, datalogger with web server and Ethernet/Wi-Fi or 3G communications.

Add new devices whenever you need more features

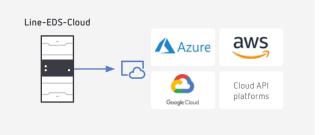




Line-EDS Datalogger with integrated webserver

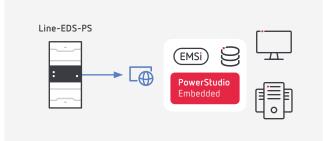
Line-EDS-Cloud has been designed to read any type of data and automatically upload it to the major Big Data platforms.

The device features Wi-Fi communications for simple set-up and start-up. It has Ethernet and RS-485 ports for reading and setting up any device connected to it.

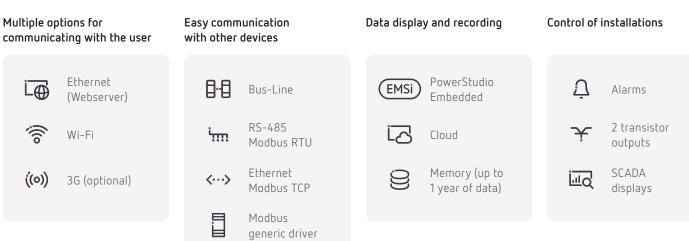


Line-EDS-PS/-PSS/-PSS-PRO incorporates all the features of a powerful data monitoring, control and data acquisition software (SCADA) into a single device.

Monitor your installation using Wi-Fi, Ethernet or 3G communications locally or remotely. Every model has a generic Modbus driver for integration with any product on the market.



KEY FEATURES



Comparison between Line-EDS-PS devices

Features	Line-EDS-PS	Line-EDS-PSS	Line-EDS-PSS-PRO
Customized SCADA screens	-	2	5
Customized reports/billing simulation	-	2	5
Event scheduling	10	20	40
Programming of calculated variables	10	20	40
CIRCUTOR or Generic Modbus RTU and TCP slave devices	5	10	20

Table of references

Туре	Code	Integrated software	TR out- puts	Generic Modbus	Communications	Protocol
Line-EDS-Cloud	[*] M61055.	APIs from Azure, AWS, GOOGLE, Cloud API platforms	2	•	Ethernet / Wi-Fi / RS-485 / Bus-Line	Web platform Modbus/APIs
Line-EDS-PS	[*] M61095.	PowerStudio	2	•	Ethernet/Wi-Fi/RS-485/Bus-Line	CIRCUTOR + Generic/XML Modbus
Line-EDS-PSS	[*] M61085.	PowerStudio SCADA	2	•	Ethernet/Wi-Fi/RS-485/Bus-Line	CIRCUTOR + Generic/XML Modbus
Line-EDS-PSS-PRO	[*] M61065.	PowerStudio SCADA PRO	2	•	Ethernet / Wi-Fi / RS-485 / Bus-Line	CIRCUTOR + Generic/XML Modbus

Bus-Line: RS-485 communications system, with side connector between modules



Line-CVM Three-phase, indirect power analyzer

Line-CVM-D32 Power analyzer to monitor and measure more than 250 electric variables in both medium- and lowvoltage networks. Designed to properly manage the quality of consumption and supply, by reading harmonics and recording the number of power quality events counter (swells, dips and interruptions) that occur in the installation.

Key features:

	Measurement of electrical variables
!	Power quality events counter (swells, dips and interruptions)
٥Ci	Measures up to the 40th harmonic
€	Energy cost measurement
	Consumption and generation measurement (4 quadrants)
ŀ	Sealable
ι	RS-485 port (Modbus RTU) for reading and configuration
⊡→	Two digital outputs to generate impulses or alarms
<u>_</u>	Measurement of CO2 emissions
$\overline{\bigcirc}$	Record of operating hours for preventive maintenance
[®] D	Terminals with Plug&ON system



Line-M-4I0

Input/output modules For connecting to line-EDS or Line-CVM-D32 devices.

4 digital inputs and outputs

Line-M-4I0-T

Module with 4 inputs and 4 transistor outputs (free of voltage).

Line-M-4IO-R

Module with 4 inputs and 4 relay outputs.

Line-M-4IO-RV

Module with 4 inputs (230 Vac) and 4 relay outputs.

INPU	JTS	OUTP	PUTS
. лл.	Water, energy, gas, thermal energy and other meters.	Ţ	Alarms (instantaneous values)
ŏ	Monitor status of sensors and protection devices (On/Off)	.	Pulses from incremental variables (energies, costs, CO2 emissions or working time).*
	Tariff change	*Only fo	r the Line-M-4IO-T model

4 analogue inputs and outputs -

Line-M-4I0-A

Module with 4 analogue inputs and 4 analogue outputs. Inputs for integrating 0/4... 20 mA signals from external sensors or devices. Programmable outputs from 0/4... 20 mA or 0/2... 10 V, replicating measured signals through their inputs or instantaneous variables measured by devices connected to the **Line** system.



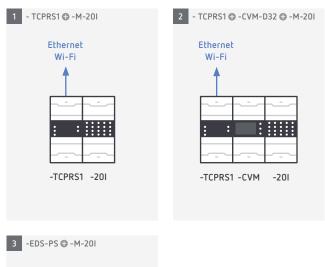


Line-M-20I Module with 20 digital inputs

Module with 20 digital inputs to read consumption using pulses from any type of meter (electricity, water, gas, etc.) or to detect the status (ON/OFF) of any device or sensor associated with a control system (people, units, protection, actuation, alarms, etc.).

Communication options

Line-M-20I features versatile communications, and can be connected directly via the Line-TCPRS1 or Line-EDS module.

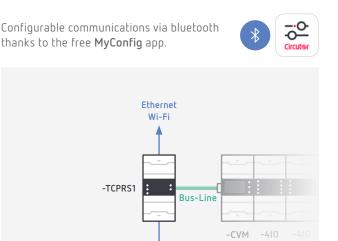






Line-TCPRS1 RS-232/RS-485 to Ethernet/Wi-Fi converter

Communications gateway designed to convert an RS-232/RS-485 physical environment to Ethernet and/or Wi-Fi in order to connect to **Line-CVM** and **Line-M** expansion modules. Allows using a single IP to connect to and configure all the devices connected to the RS-485 or Bus-Line communications bus.



RS-232/RS-485

Circutor. The Future is Efficiency | 13

Line System devices. It has never been easier.



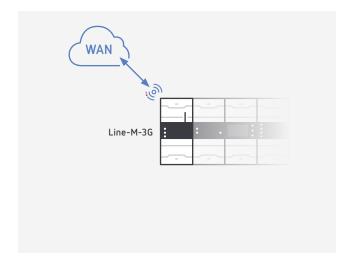
Line-M-3G Modem for 3G communications

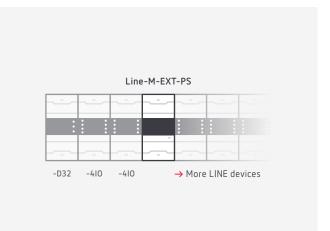
Module to provide 3G communications to the **line-EDS** unit and to the devices connected to it. Allows remote access from anywhere without the need for communications wiring.



Line-M-EXT-PS Power supply up to 480V

This module allows the system to be expanded by connecting more devices on the **Bus-Line**, without the need for external power in the remaining modules. The system can thus be extended as the needs of the installation grow. It also makes it possible to install **Line** devices on networks of up to 480V.





Install one Line-M-PS device every 3 modules of the Line series, or check with CIRCUTOR for your specific installation.

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TABLE OF REFERENCES

Power analyzer

Line-CVM-D32 M58100. 3/5A,/1A or/0.250 A 2 RS-485/Bus-Line Modbus/RTU 40	Туре	Code	Measurement channels	Input current	TR outputs	Communications	Protocol	Harmonics
	Line-CVM-D32	M58100.	3	/5A,/1A or/0.250 A	2	RS-485/Bus-Line	Modbus/RTU	40

Bus-Line: RS-485 communications system, with side connector between modules

Inputs/Outputs

Туре	Code	TR outputs	RL outputs	Digital inputs	Analogue inputs	Analogue outputs	Communications	Protocol
Line-M-4I0-T	M58E01.	4	-	4	-	-	Bus-Line	Modbus/RTU
Line-M-4IO-R	M58E02.	-	4	4	-	-	Bus-Line	Modbus/RTU
Line-M-4IO-A	M58E03.	-	-	-	4: (0/4 20mA)	4: (0/4 20 mA), (0/2 10 Vdc)	Bus-Line	Modbus/RTU
Line-M-4IO-RV	M58E04.	-	4	4 (230 V)	-	-	Bus-Line	Modbus/RTU
Line-M-20I	M58E06.	-	-	20	-	-	Bus-Line	Modbus/RTU

Bus-Line: RS-485 communications system, with side connector between modules

Communications

Туре	Code	Description
Line-M-3G	M58E05.	3G communications modem and Bus-Line to communicate with the Line system's devices
Line-TCPRS1	M62411.	RS-232/RS-485 (Modbus RTU) to Ethernet or Wi-Fi (Modbus TCP) converter

Bus-Line: RS-485 communications system, with side connector between modules

Accessories

Туре	Code	Description
Line-M-EXT-PS	M58E0A.	110-277 V ~ (P-N)/110-480 V ~ (P-P) power supply to drive devices connected to the Bus-Line.

Bus-Line: RS-485 communications system, with side connector between modules



integrated Energy Management System

Control and manage your installation

The devices in the Line system paved the way for the EMSi concept, which combines the management of different types of energy consumption and the management of multiple control and maintenance systems (lighting, HVAC, etc.) into a single solution.

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ENERGY MANAGEMENT
Electricity consumption
Water consumption
Gas consumption
Thermal consumption
Fuel consumption
CO ₂ emissions

INSTALLATION CONTROL

Lighting control

Heating control

Air conditioning control

Control of water pumps

Temperature control

MAINTENANCE

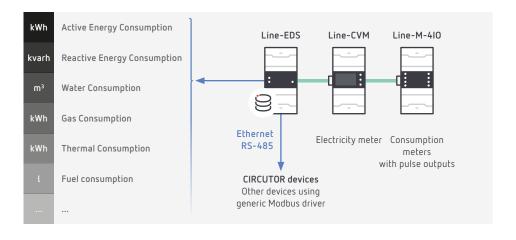
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Alarms and event monitoring Energy and key process indicators Billing simulations SCADA screens Production costs

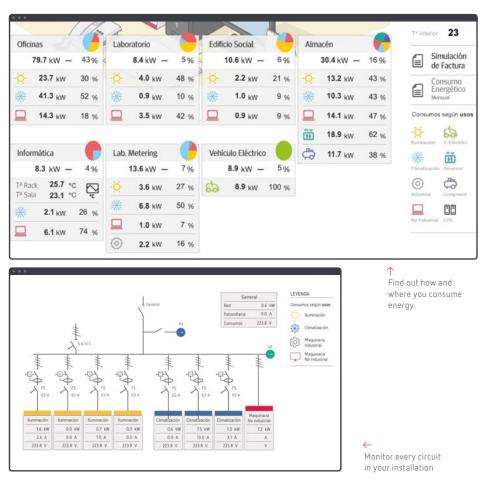
☑ Management of all your consumption

The **EMSi** system records all the information on your installation's energy consumption, which it can monitor in real time, display it on graphs, compare data from different periods or display it in data tables so it can be exported outside the application.

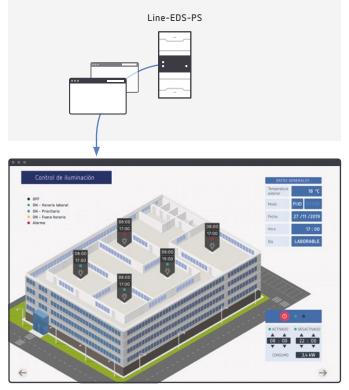
The data acquisition is very simple; using the **line-EDS** device, you can add any meter with Modbus communications to the **EMSi** system; the **Line-M** devices with digital inputs let you record consumption using any meter with a pulse output. The electricity consumption is recorded using the **Line-CVM-D32** analyzer.



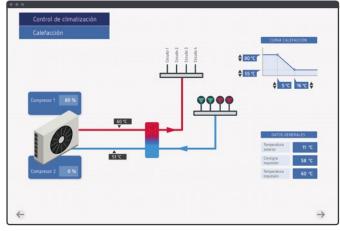
The **EMSi** software integrated into **line-EDS** lets you create SCADA displays to show, in real time, where, how, when and how much energy your installation is consuming. This information lets you save on costs and manage the installation globally based on the **ISO 50001** standard.



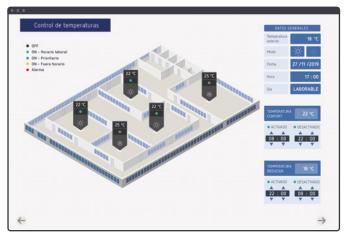
↘ Monitor any type of installation



Example of lighting control



Example of HVAC control



Example of temperature control

Install Line-EDS and integrate any Modbus RTU or Modbus TCP device that is present in your installation (temperature, humidity, pressure, level or other kind of probe).

Create SCADA screens to control all your automation systems from a single device (Line-EDS). You can use any web browser or **PowerStudio** Server to control and display the status of your installation in real time, change any setpoint and receive alarms to improve the management of all your control systems.

Easily and dynamically display any regulation system required, such as:

Lighting control

Configure setpoints to automatically turn lights on and off, on a set schedule or by using the astronomical clock feature. It also offers the option to control lighting systems by creating a work schedule, with or without inputs from motion sensors.

HVAC control

Take external temperature readings, compare them with the setpoint and turn on the HVAC system to drive and monitor the hot water loop. Monitor the condition of the compressors to display the percent load on each and verify they are working correctly.

Temperature control

Check the status of each HVAC unit and adjust the hot/cold setpoints as needed. Create calendars or schedules to program automatic on/ off switching times. Each device can be set based on the schedule or workday, with the option to incorporate motion sensors into the control system.

Note: The sample screens shown are not set up by default on Line-EDS devices. Each user will be able to generate their own screens based on their needs.

Naintenance of any installation

Program any type of alarm to monitor the installation depending on the variables of the connected devices. If any parameter is outside its programmed values, the system will adjust the installation and/or send an e-mail instantly.

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27 12 30 00	CLIBR. Sala DIR02 horario Medio laboral Adivo				< 60 aplicable >	1m 0s
1 27 12 30 00	CLARA Sala DIRO1 horano Media laboral Adivo				< no aplicable >	tm (s
6 27 12 30 00	CLINA Sala CAFE horano Nedio laboral Achie				+ no aplicable +	tm ta
27 12 30 00	CL/MA Sala Admin 2 horario Medio laboral Adivo				- no aplicable -	tm (s
27 12 30 99	CLINA Sala Admin 1 horario Medio laboral Adivo				- no aplicable -	1m (s
\$ 27 15:00:00	CLARA Sala SECRE horario Medio laboral No Adivo				- no aplicable -	1m 0a
\$ 27 15 00 00	CLIMA Sala RECEP horate Medio laboral No Activo				- no aplicable -	1m Da
27 15 00 00	CLIBIA Sala INF2 horano Medio laboral No Adhio				+ no aplicable >	1m 0s
27 15 00 00	CLIMA Sala INF1 horano Medio laboral No Activo				< no aplicable >	tim da
27 15:00:00	CLASH, Sala ICK, horato Medio laboral No Activo				+ no aplicable +	tim da
27 15:00:00	CLINE Sala ICO horato Medio laboral No Activo				+ no aplicable +	tm 0s
27 15:00:00	CLMH-Sala CHR03 horario Media laboral No Activo				+ no aplicable +	1m 0a
27 15:00:00	CLINA Sala DIRO2 Norano Medio laboral No Adivo				r no aplicable v	1m 0a
s 27 15:00:00	CLINA Sala DR01 horario Medio laboral No Adivo				+ the applicable +	5m 0a
27 15:00 00	CLASA Sala CAFE Norato Medio laboral No Adhio				H the applicable in	1m 0s
s 27 15 00 00	CLIMA Sala Admin 2 horario Medio taboral No Activo				rino aglicadia >	tm 0s
27 15.00 00	CLIMA Sala Admin 1 horano Medio laboral No Activo				+ no aplicable +	10118
s 27 15:00:01	CLARK Sala ICA2 horato Medio taboral his Adluo				+ no aplicable +	704
27 15 00 01	CLINA Sala ICM1 horaro Medio laboral No Activo				+ no aplicable +	534
27 19:00:00	CLINA Sala SECRE heraris laboral No Activo				+ no aplicable +	1m (a
27 19:00 00	CLMA.Sala RECEP horaris laboral No Adve				- no aplicable -	ten (h
27 19 00 00	CLINA Sala INF2 horana laboral No Adivo				- no aplicable >	5m 0s
	Co Bills Tartis (NET) Increases Induced hits Arthur				is the anticipation of	100.04

It combines every aspect of energy control into a single tool, providing invoice simulations based on the energy consumption of any meter.

Know what the utility will bill in advance and schedule an automatic notification to compare and improve the efficiency of your consumption.

						-ġ- Iluminad					29 %	
Resumen de la factura		Energia Activa			Comercial	25.6 kW		Ingeniería	19 kW 🥖	6 W/m²		
Fecha Factura 15/11/2019 Periodo facturación de 01/11/2019 a	01/12/2019	\$0.000 - \$40.000 -										Consumo seg
Total factura	9.828.63 €	12 1 2018	2 3 4 5	6 7 8 9 echa	10 11	Oficinas	8.8 kW 34 %	3 W/m ²	Almacén	1.7 kW 9 %	4 w/m²	
Facturación					TÓRICO	Lab. Metering	3.4 kW 13 %	4 W/m ²	Producción	10.7 kW 56 %	9 W/m²	- Ingen
CONCEPTO	C	ALCULO		IM	PORTE	Laboratorio	0.0 kW	0 w/m ²	Oficinas	2.2 kW 11 %	6 W/m ²	
Término de energía variable				4.468	3.87 €		0 %					
Periodo 1	13.773 kV	Vh x 0.099342	E/kWh =	1.368.24 €					Oficinas I+D	4.5 kW 24 %	7 W/m ²	
Periodo 2	21.110 kV	Vh x 0.086493 (E/kWh =	1.825.87 €		-				70		
Periodo 3	20.142 kV	Vh x 0.063289 (E/kWh =	1.274.77 €		Ed. Social	0.0 kW	0 W/m ²		10.9 kW		
Facturación potencia períodos		3.258.		3.86 €		0 % 0 Will		Montaje	20 %	7 W/m ²		
Periodo 1	374.0 kV	V× 59.475288	€/kW = 2	2.243.76 €		Almacén	13.3 kW 5 W/m	5 W/m ²				
Periodo 2	374.0 kV	Vx 36.676813	€/kW = 1	3.717.13 €			52 %					
Periodo 3	374.0 kV	x 8.410411	€/kW =	3.145.49 €								
	39.106.38 €(12 MESES)				C Eficiencia			Otros usos	e 💥 🎯	🗖 🔁	
Energía reactiva				0	.00 €							
France de estensis												

Create Energy Performance Indicators (EnPI) to chack if energy improvement actions are working correctly. Create your own KPI, depending on your installation and processes.

Typical performance indicators:

kWh/unit produced	Industry				
kWh/m³	Water treatment or pumping stations				
kWh/external temp.	HVAC				
kWh/m²	Buildings or Supermarkets				
kWh/occupation	Hotels				



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