MEASUREMENT AND CONTROL

LINE

Integral Energy Management System

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Circutor

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-CVM
Power analyzer
–
Line-CVM-D32

Line-M-4IO
Input/output modules
–
Line-M-4IO-T
Line-M-4IO-R
Line-M-4IO-RV
Line-M-4IO-A

Line-M-20I
Module with 20 digital inputs
–
Line-M-20I

Line-M-3G
Modem for 3G communications
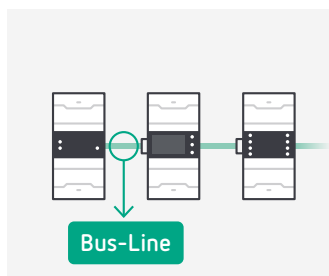
Line-TCPRS1
RS-485 to Ethernet and Wi-Fi converter

Line-M-EXT-PS
Power supply

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.

Bus-Line

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.

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
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**
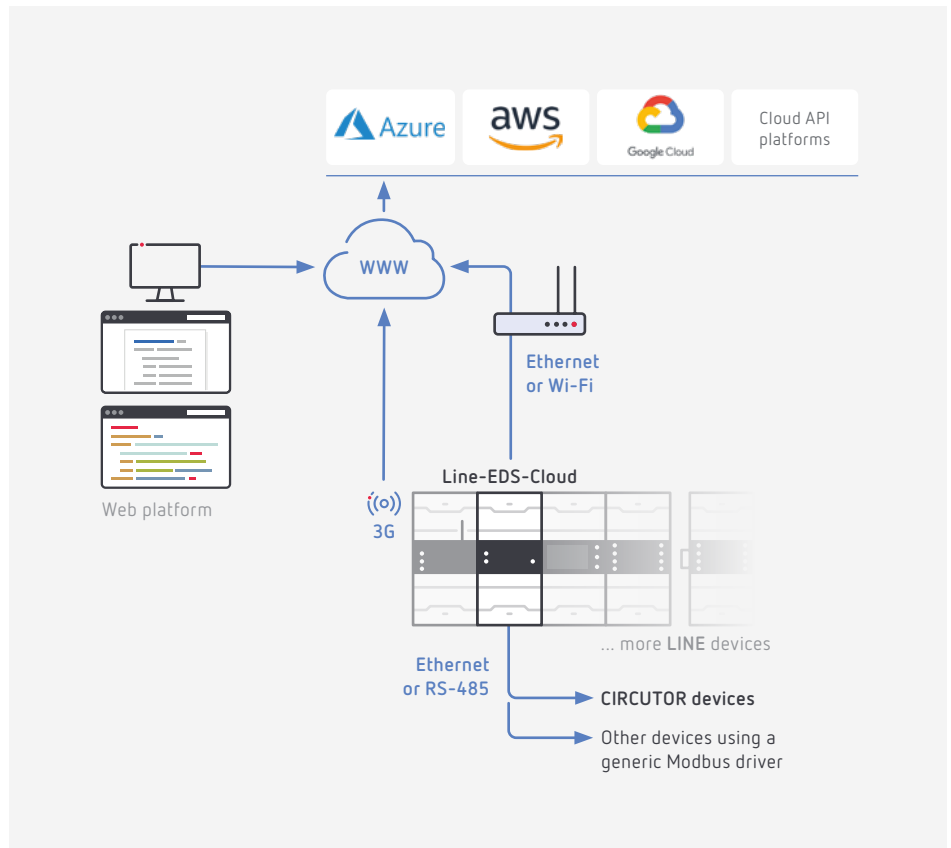
3
Monitoring and control system using **Line-EDS + PowerStudio**

4
Monitoring and control system using **PowerStudio**

Monitoring system using
Line-EDS-Cloud

Line-EDS-Cloud

Remotely monitor your installation using IoT platforms

On-line monitoring

Data tables

Graphs

Alarms

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.

↘
Examples of IoT platforms
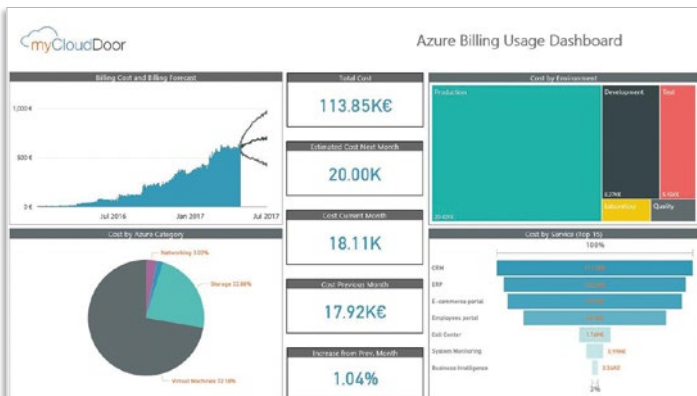
Azure platform

AWS platform

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

2
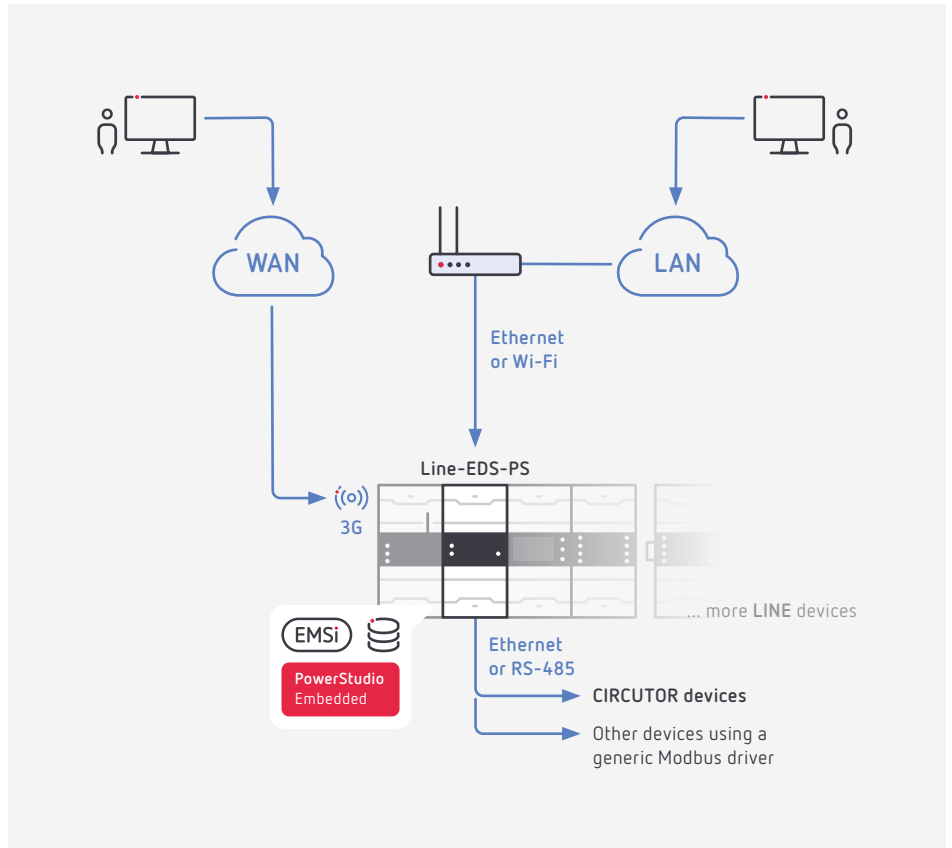
Line-EDS-PS

Line-EDS-PSS

Line-EDS-PSS-PRO

Access the EMSi software from anywhere and with any web browser

online monitoring

Alarms

Billing simulation*

Graphs

Data tables

SCADA screens*

Generic Modbus driver

* Available with **Line-EDS-PSS** and **Line-EDS-PSS-PRO** models

WAN

LAN

Ethernet or Wi-Fi

Line-EDS-PS

((o))
3G

EMSi

PowerStudio
Embedded

... more **LINE** devices

Ethernet or RS-485

CIRCUTOR devices

Other devices using a generic Modbus driver

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

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.
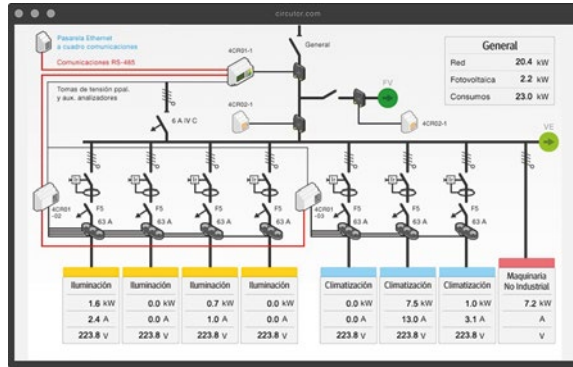
Control and automate your installation

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.).
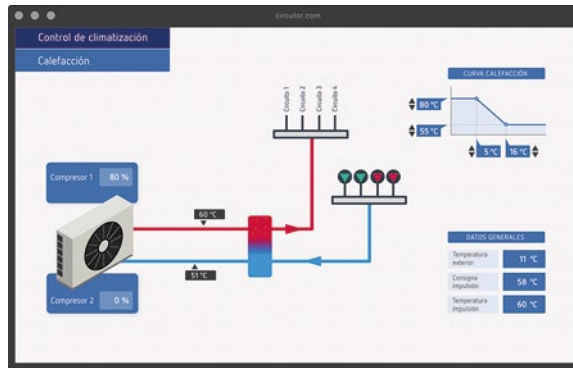
Stay on top of everything that is happening in your installation

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.

Monitoring and control system using
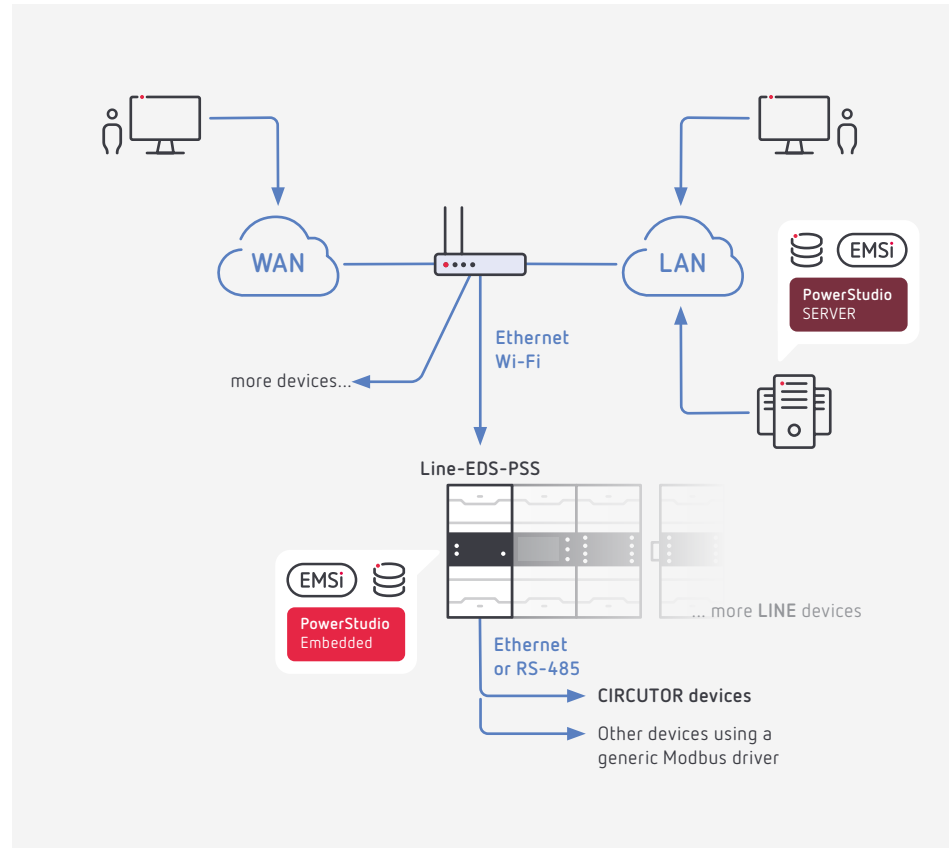# Line-EDS + PowerStudio

3
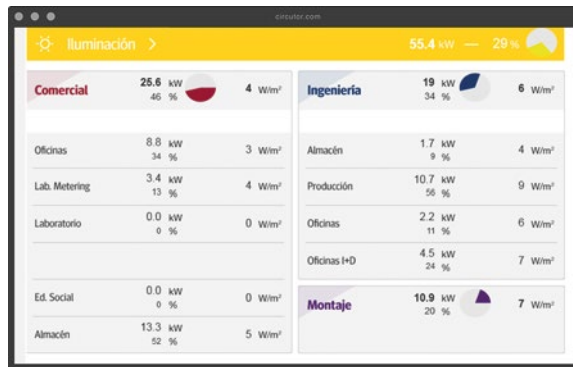
Line-EDS-PS

Line-EDS-PSS

Line-EDS-PSS-PRO

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

On-line monitoring

Alarms

Billing simulation*

Graphs

Data tables

SCADA screens*

Generic Modbus driver

* Available with **Line-EDS-PSS** and **Line-EDS-PSS-PRO** models

System features:

› 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
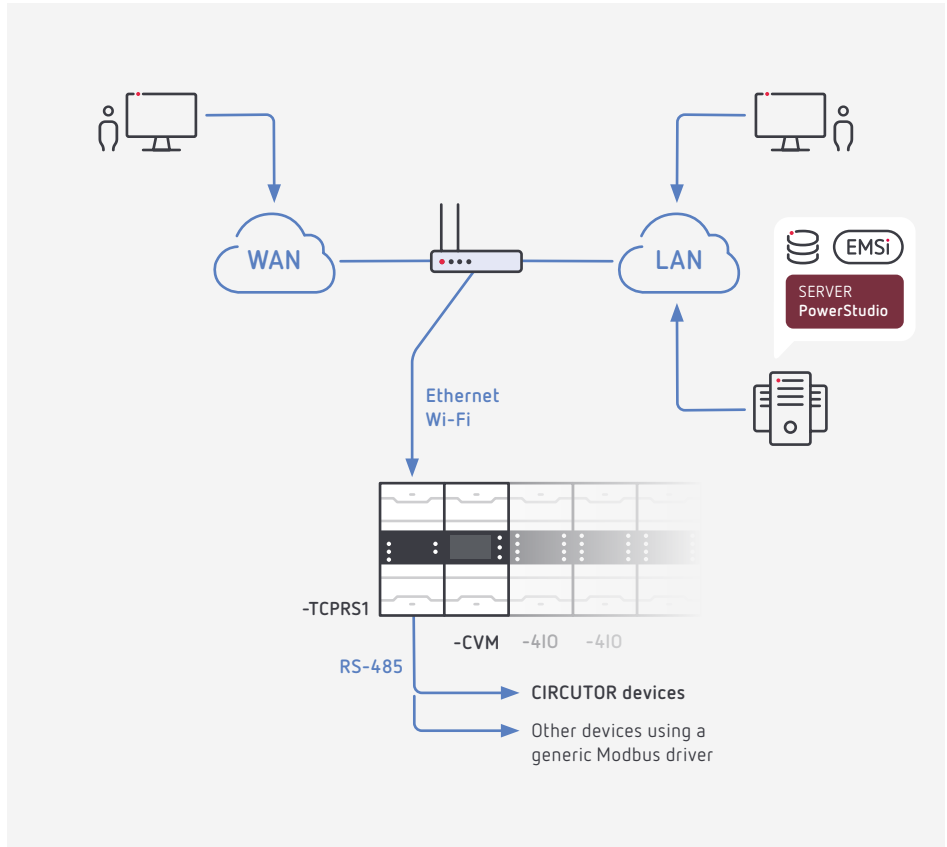› XML Server Export data to .txt and .csv files

System monitoring and control using **PowerStudio**

Line-CVM + Line-M

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

On-line monitoring

Alarms

Billing simulation*

Graphs

Data tables

SCADA screens*

Generic Modbus driver*

*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.

PowerStudio SCADA

PowerStudio ➕

› SCADA screens
› Reports, invoice simulations and configurable alarms

PowerStudio SCADA Deluxe

PowerStudio SCADA ➕

› Generic Modbus driver
› OPC Client

Line system devices.
It has never been easier.

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
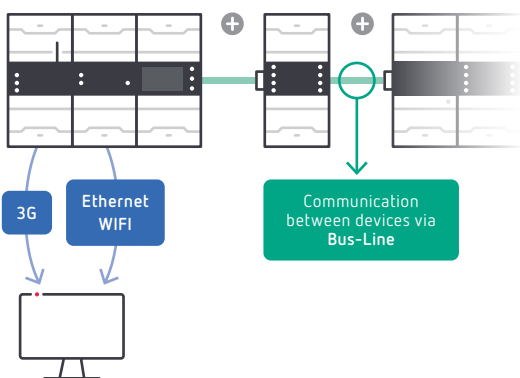
Line-EDS
Datalogger with integrated webserver

–

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.

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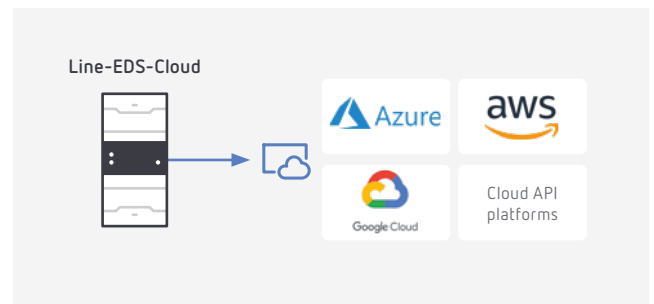
Line-EDS-PS/-PSS/-PSS-PRO incorporates all the features of a powerful data monitoring, control and data acquisition software (SCADA) into a single device.

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.
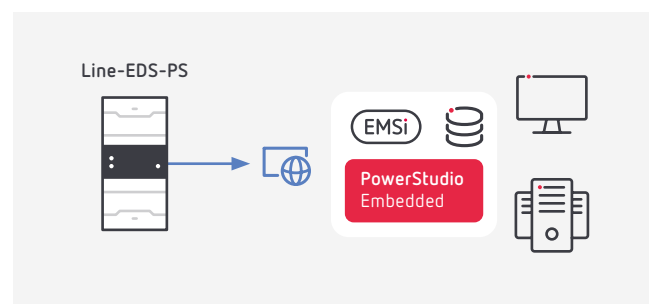
KEY FEATURES

Multiple options for communicating with the user

 Ethernet (Webserver)

 Wi-Fi

 3G (optional)

Easy communication with other devices

 Bus-Line

 RS-485 Modbus RTU

 Ethernet Modbus TCP

 Modbus generic driver

Data display and recording

 PowerStudio Embedded

 Cloud

 Memory (up to 1 year of data)

Control of installations

 Alarms

 2 transistor outputs

 SCADA displays

Comparison between Line-EDS-PS devices

Features	Line-EDS-PS	Line-EDS-PSS	Line-EDS-PSS-PRO
Customized SCADA screens	-	2	5
Customized reports/billling 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

Type	Code	Integrated software	TR outputs	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 System devices.
It has never been easier.

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 low-voltage 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)
- Measures up to the 40th harmonic
- Energy cost measurement
- Consumption and generation measurement (4 quadrants)
- Sealable
- RS-485 port (Modbus RTU) for reading and configuration
- Two digital outputs to generate impulses or alarms
- Measurement of CO_2 emissions
- Record of operating hours for preventive maintenance
- Terminals with Plug&ON system

Line-M-4IO

Input/output modules

For connecting to **line-EDS** or **Line-CVM-D32** devices.

4 digital inputs and outputs

–

Line-M-4IO-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.

INPUTS	OUTPUTS
Water, energy, gas, thermal energy and other meters.	Alarms (instantaneous values)
Monitor status of sensors and protection devices (On/Off)	Pulses from incremental variables (energies, costs, CO_2 emissions or working time).*
Tariff change	*Only for the **Line-M-4IO-T** model

4 analogue inputs and outputs

–

Line-M-4IO-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.

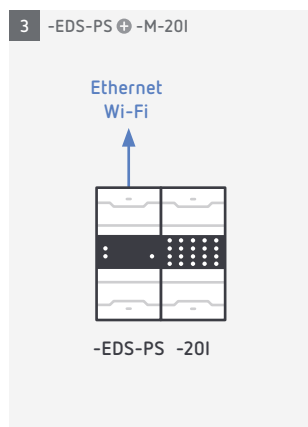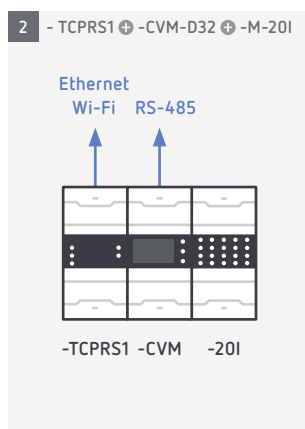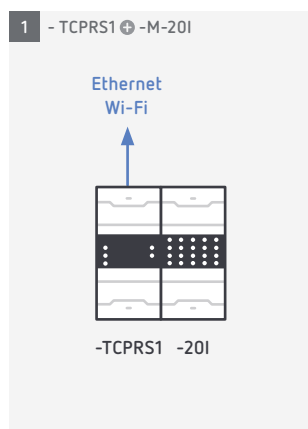| INPUTS	OUTPUTS
Temperature (°C), Flow rate (m³), Pressure (kPa), Level (l)	Values of analogue inputs
	Instantaneous electrical variables: Voltage, Current, Power, etc.

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.).

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

1 – TCPRS1 ⊕ –M-20I

Ethernet
Wi-Fi

-TCPRS1 -20I

2 – TCPRS1 ⊕ –CVM-D32 ⊕ –M-20I

Ethernet
Wi-Fi   RS-485

-TCPRS1 -CVM -20I

3 –EDS-PS ⊕ –M-20I

Ethernet
Wi-Fi

-EDS-PS -20I

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

Communications gateway designed to convert an RS-485 physical environment to Ethernet and/or Wi-Fi in order to connect to **Line-CVM** or **Line-M-20I**. Allows using a single IP to connect to and configure all the devices connected to the RS-485 or Bus-Line communications bus.

Ethernet
Wi-Fi

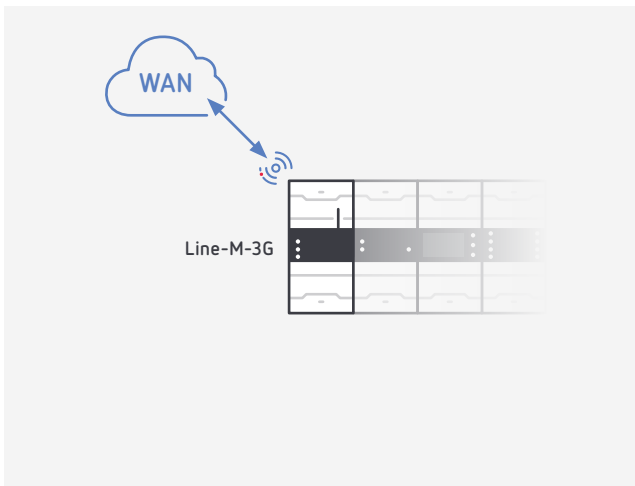-TCPRS1   Bus-Line

-CVM   -4IO   -4IO

RS-485
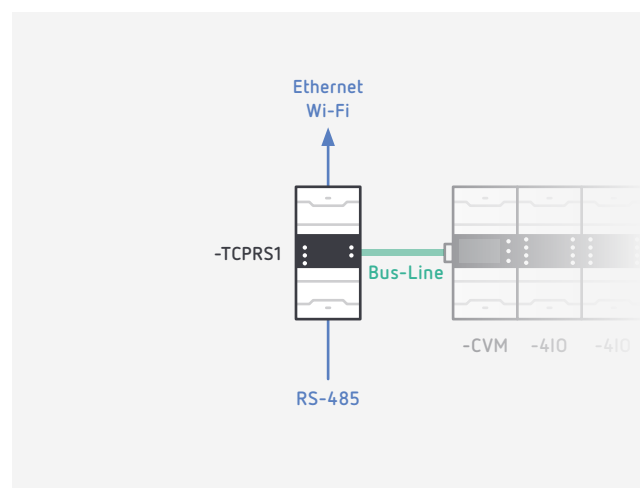
Line System devices.
It has never been easier.

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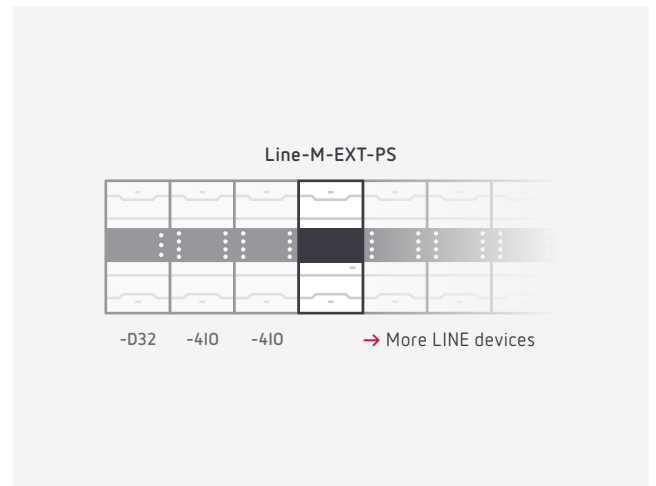
Install one **Line-M-PS** device every 3 modules of the **Line** series, or check with CIRCUTOR for your specific installation.
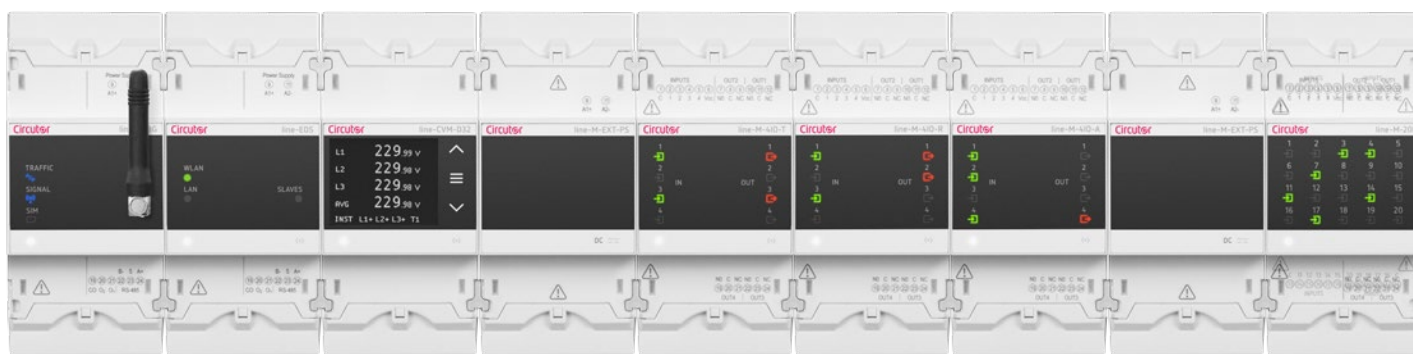
TABLE OF REFERENCES

Power analyzer

Type	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

Type	Code	TR outputs	RL outputs	Digital inputs	Analogue inputs	Analogue outputs	Communications	Protocol
Line-M-4IO-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

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

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

Accessories

Type	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.

ENERGY MANAGEMENT	INSTALLATION CONTROL	MAINTENANCE
Electricity consumption	Lighting control	Alarms and event monitoring
Water consumption	Heating control	Energy and key process indicators
Gas consumption	Air conditioning control	Billing simulations
Thermal consumption	Control of water pumps	SCADA screens
Fuel consumption	Temperature control	Production costs
CO_2 emissions	...	...
...		

↘ 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.

kWh	Active Energy Consumption		
kvarh	Reactive Energy Consumption		
m³	Water Consumption		
kWh	Gas Consumption		
kWh	Thermal Consumption		
l	Fuel consumption		
...	...		

Line-EDS · Line-CVM · Line-M-4IO

Ethernet RS-485

CIRCUTOR devices
Other devices using generic Modbus driver

Electricity meter · Consumption meters with pulse outputs
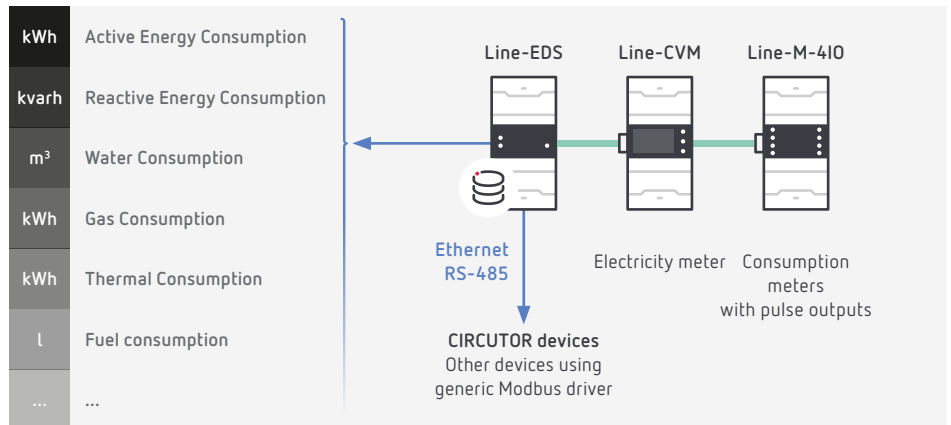
The **EMSi** software integrated into **line-EDS** lets you create SCADA displays to show, in real time, where, how, when and how much energy your installation is consuming. This information lets you save on costs and manage the installation globally based on the **ISO 50001** standard.
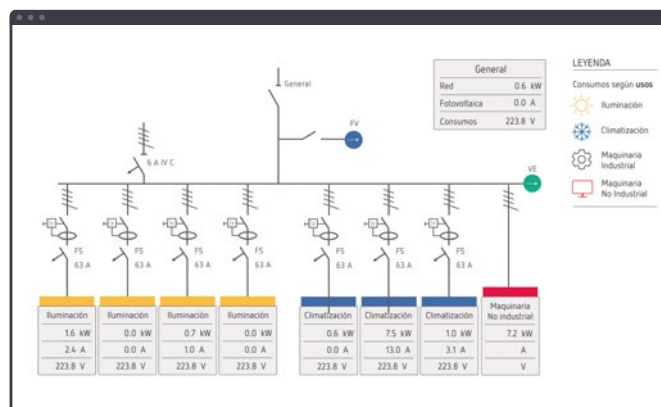
Find out how and where you consume energy.

Monitor every circuit in your installation

Monitor any type of installation
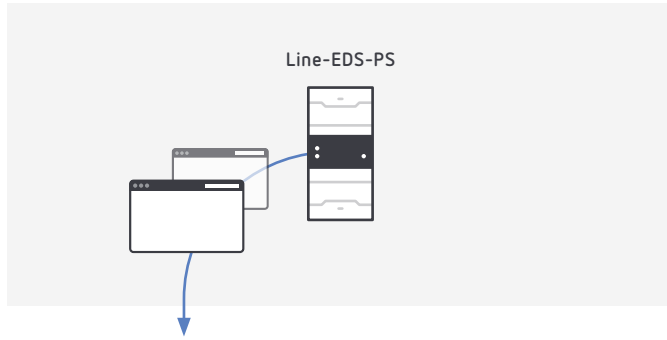
Line-EDS-PS

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:

Example of lighting control

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.
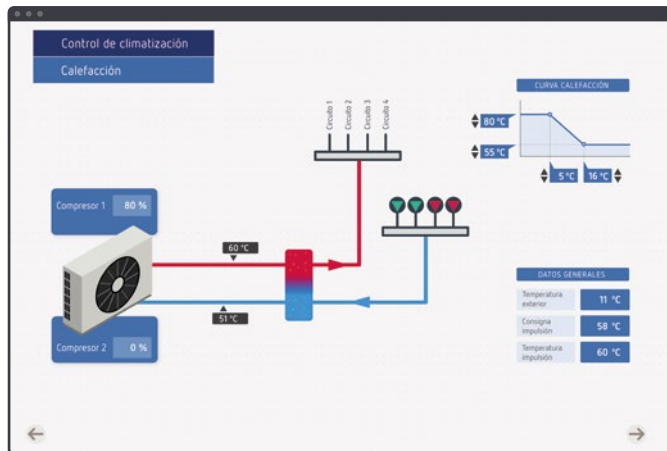
Example of HVAC control

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.

Example of temperature control

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.

↘ Maintenance 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.

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.

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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