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-CVM
Power analyzer
- Line-CVM-032

Line-M-4I0
Input/output modules
- Line-M-4I0-T
- Line-M-4I0-R
- Line-M-4I0-RV
- Line-M-4I0-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.

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

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

**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

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**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**

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

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
TWO MODELS, FOUR MANAGEMENT TYPES

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

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.
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-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.

Datalogger with integrated webserver

- 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

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

Table of references

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Integrated software</th>
<th>TR outputs</th>
<th>Generic Modbus</th>
<th>Communications</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line-EDS-Cloud</td>
<td>[*] M61055.</td>
<td>APIs from Azure, AWS, GOOGLE, Cloud API platforms</td>
<td>2</td>
<td></td>
<td>Ethernet / Wi-Fi / RS-485 / Bus-Line</td>
<td>Web platform Modbus/ APIs</td>
</tr>
</tbody>
</table>

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 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 CO₂ emissions
- Record of operating hours for preventive maintenance
- Terminals with Plug&ON system

Line-M-410

Input/output modules

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

**4 digital inputs and outputs**

- **Line-M-410-T** Module with 4 inputs and 4 transistor outputs (free of voltage).
- **Line-M-410-R** Module with 4 inputs and 4 relay outputs.
- **Line-M-410-RV** Module with 4 inputs (230 Vac) and 4 relay outputs.

**4 analogue inputs and outputs**

- **Line-M-410-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.).

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 - M-20I

2. TCPRS1 - CVM-32 - M-20I
   - Ethernet
   - Wi-Fi
   - RS-485
   - TCPRS1 - CVM - M-20I

3. EDS-PS - M-20I
   - Ethernet
   - Wi-Fi
   - EDS-PS - M-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.
**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.

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.

**Line-M-EXT-PS**
Power supply 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

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Measurement channels</th>
<th>Input current</th>
<th>TR outputs</th>
<th>Communications</th>
<th>Protocol</th>
<th>Harmonics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line-CVM-D32</td>
<td>M58100</td>
<td>3</td>
<td>.../5A, .../1A or .../0.25 A</td>
<td>2</td>
<td>RS-485/Bus-Line</td>
<td>Modbus/RTU</td>
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</table>

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

#### Inputs/Outputs

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>TR outputs</th>
<th>RL outputs</th>
<th>Digital inputs</th>
<th>Analogue inputs</th>
<th>Analogue outputs</th>
<th>Communications</th>
<th>Protocol</th>
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</thead>
<tbody>
<tr>
<td>Line-M-4IO-T</td>
<td>M58E01</td>
<td>4</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>Bus-Line</td>
<td>Modbus/RTU</td>
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<tr>
<td>Line-M-4IO-R</td>
<td>M58E02</td>
<td>-</td>
<td>4</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>Bus-Line</td>
<td>Modbus/RTU</td>
</tr>
<tr>
<td>Line-M-4IO-A</td>
<td>M58E03</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4 (0/4 … 20mA)</td>
<td>4 (0/4 … 20 mA), (0/2 … 10 Vdc)</td>
<td>Bus-Line</td>
<td>Modbus/RTU</td>
</tr>
<tr>
<td>Line-M-4IO-RV</td>
<td>M58E04</td>
<td>-</td>
<td>4</td>
<td>4 (230 V)</td>
<td>-</td>
<td>-</td>
<td>Bus-Line</td>
<td>Modbus/RTU</td>
</tr>
<tr>
<td>Line-M-20I</td>
<td>M58E06</td>
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<td>-</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>Bus-Line</td>
<td>Modbus/RTU</td>
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</tbody>
</table>

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

#### Communications

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Line-M-3G</td>
<td>M58E05</td>
<td>3G communications modem and Bus-Line to communicate with the Line system’s devices</td>
</tr>
<tr>
<td>Line-TCPRS1</td>
<td>M62411</td>
<td>RS-485 (Modbus RTU) to Ethernet or Wi-Fi (Modbus TCP) converter</td>
</tr>
</tbody>
</table>

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

#### Accessories

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line-M-EXT-PS</td>
<td>M58E0A</td>
<td>110-277 V – (P-N)/110-480 V – (P-P) power supply to drive devices connected to the Bus-Line.</td>
</tr>
</tbody>
</table>

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

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:

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**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.
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 check if energy improvement actions are working correctly. Create your own KPI, depending on your installation and processes.

Typical performance indicators:

<table>
<thead>
<tr>
<th>kWh/unit produced</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>kWh/m²</td>
<td>Water treatment or pumping stations</td>
</tr>
<tr>
<td>kWh/external temp.</td>
<td>HVAC</td>
</tr>
<tr>
<td>kWh/m³</td>
<td>Buildings or Supermarkets</td>
</tr>
<tr>
<td>kWh/occupation</td>
<td>Hotels</td>
</tr>
</tbody>
</table>