



ENERGY MANAGEMENT

ENERGY EFFICIENCY DEVICES
AND SOLUTIONS



MONITORING AND ENERGY SAVING

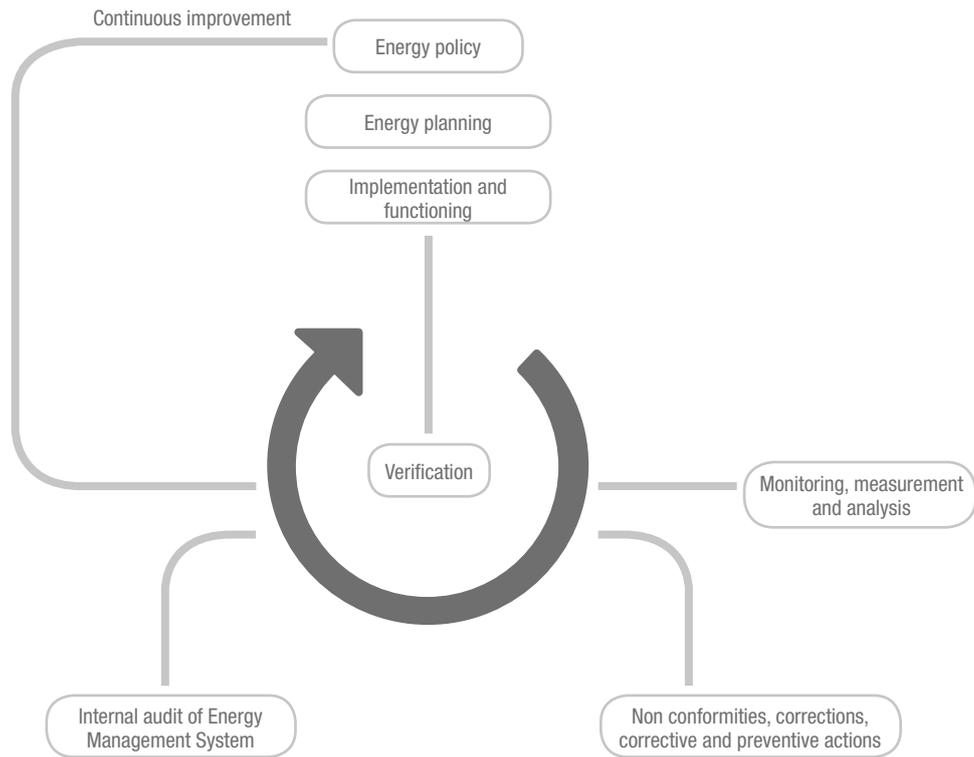
In the manufacturing and service industries, **Energy Management** is an issue of strategic importance.

For a modern company, managing energy resources intelligently yields major competitive advantages, thanks to reduced running costs, in addition to its environmental and social benefits.

Effective energy management is based on thorough analysis of consumption to define measures and investments capable of significantly reducing costs.

This requires a systematic approach involving all levels of the organisation. The standard that provides the necessary framework is **EN ISO 50001: 2018** "Energy management systems - requirements with guidance for use". This standard also integrates effectively with the ISO 9001 quality and ISO 14001 environmental management systems.

Model of the energy management system according to EN ISO 50001: 2018



Continuous consumption monitoring and data analysis are key features of an energy management system pursuant to ISO 50001.



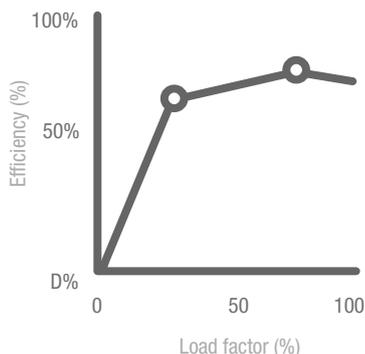
The use of an energy consumption monitoring and analysis system is the prerequisite for satisfying the legal requirement (Italian Decree Law 102/2014) for **Energy Audits** for large and energy intensive enterprises; it is the essential condition for acquiring the data required by the Energy Services Operator (ESO) to issue **White Certificates**.

The outcome of the monitoring and analysis is summarised in an **Energy Audit** which sets out the energy health of the company and identifies measures for improvement. To ensure that the improvement is continuous, the Energy Audits have a periodicity of at least four years, thus verifying the results achieved and the new objectives to be set.

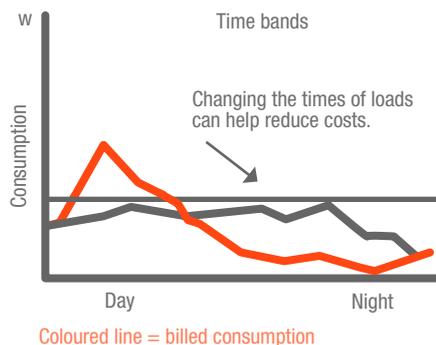
An adequate energy consumption monitoring and analysis system is the principle ally of the company's **Energy Manager** in the difficult task of planning the efficient use of energy resources.

We indicate below the principal factors considered in an effective energy analysis:

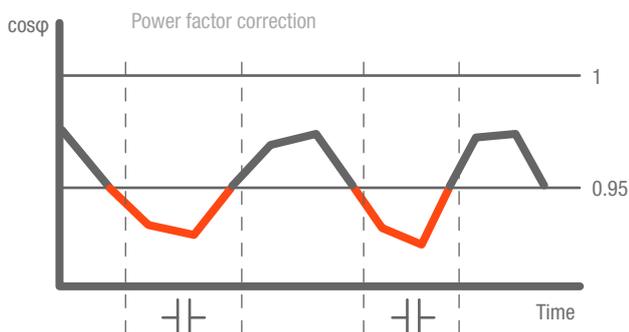
Using no more energy than necessary



Flattening off demand



Avoiding penalties



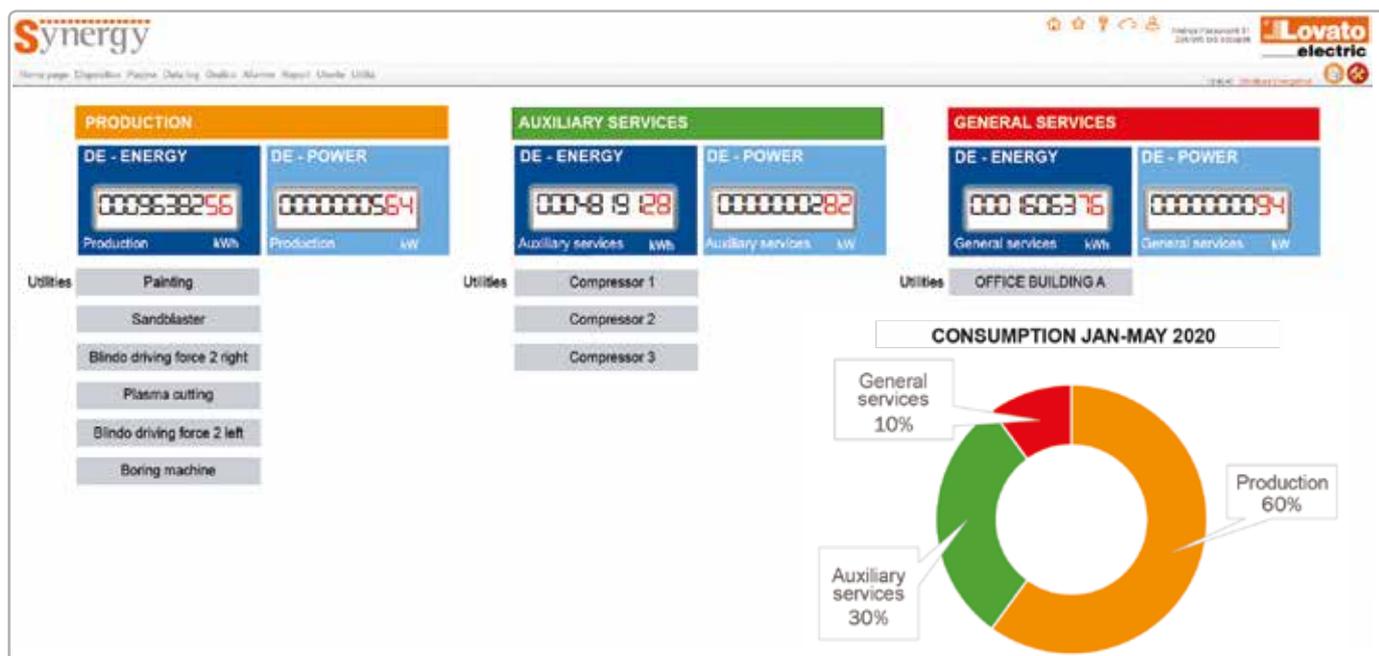
Identifying mains supply disturbances

ENERGY QUALITY COUNTERS

DIPS	5
SWELLS	1
INTERRUPTIONS	8
INTERRUPTIONS > 180S	6
VOLTAGE OUT OF RANGE	1
FREQUENCY OUT OF RANGE	0

OFFICES LOG FOR WEEK 4 - 2019

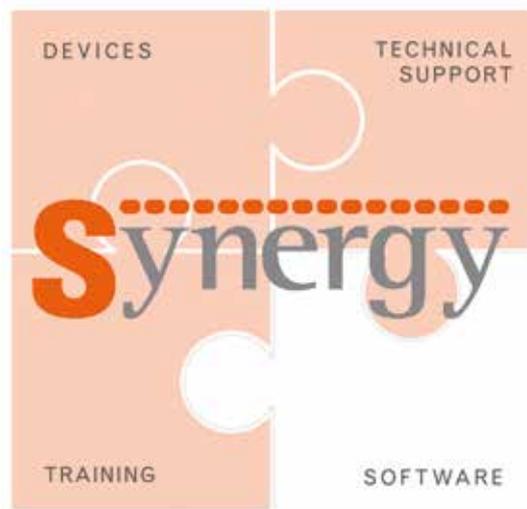
Division of energy



THE LOVATO ELECTRIC SOLUTION

For energy monitoring and energy saving, LOVATO Electric offers an integrated global solution for the main factors in the **Energy Management** industry, composed of:

- **hardware** for energy consumption measurement and control (multimeters, energy meters, drives, power factor controllers, etc.);
- **software** web servers for monitoring energy vectors continuously and online;
- **qualified Technical Support** for pre- and after-sales, with the aim of providing the user with an adequate, complete monitoring system;
- **continuous training** with courses in Energy Management and industrial automation, developed by LOVATO Academy.



The **Synergy** solution is thus an energy monitoring and analysis solution born out of LOVATO Electric's experience in four different, synergistic areas. This guarantees availability of all prerequisites required for professional, flexible energy monitoring, with a view to Industry 4.0.

Software

Synergy is a web-based energy monitoring software for supervising and controlling systems from any computer or mobile device using the most common web browsers.

It is a valid support for the activities envisaged in UNI CEI EN ISO 50001: 2018 "Energy management systems – Requisites and guidelines for use" and the energy monitoring activities demanded of **energy audits**.

In addition to electrical parameters, it allows to check all environmental and process information (operating status, alarms, etc.), acquired from LOVATO Electric devices equipped with communications ports, as well as from compatible third party equipment.

MAXIMUM AVAILABILITY

Synergy can integrate measurements provided by third party equipment, thanks to its Modbus driver creation tool.

Synergy makes the data collected in its MS SQL available to third party software via a WEB API (rest mode).

CONFIGURATION

Programming **Synergy** is guided and user-friendly, and the system is largely self-configuring.

Networks of devices, graphic pages, historic databases, graphs and reports can always be customised by the user without special IT skills, or can be done by LOVATO Electric Technical Support.

LANGUAGES

Synergy is available in a variety of languages: English, Italian, Spanish, French, Polish and Russian. Other languages can be added to meet special needs. Each user can be assigned his preferred language.

HOME PAGE

The home page is the starting point for using **Synergy**, and gather together all the main information in a single screen: device network status, alarms, banner with links to the user's favourite pages and graphs.

The screenshot shows the Synergy home page with the following components and annotations:

- Alarms:** A table listing the last 10 alarms. The table has columns for Alarm starting date, Device, Measure, Starting value, Ending value, Min, and Max.

Alarm starting date	Device	Measure	Starting value	Ending value	Min	Max
10/20/2016 10:00:00 AM	LV Generator - DM2003	gWh	6374.54		0	90
09/20/2017 12:00 AM	Photovoltaic - ST	V/L1	237.52		100	150
09/20/2017 01:00 AM	Photovoltaic - ST	V/L2	1		100	1000
- Information:** A summary table showing device status:

	With communication error	Disabled	Configured
Devices	2	0	54
- Pages:** A row of buttons for navigation: Electric diagram overview, Production department, Plant overview, Power factor correction, Generators (ATS), Air compressors, Photovoltaic, Pumps, Air conditioning, UPS.
- Charts:** A row of buttons for trend charts: Cost allocation - Various (Daily), General consumption, Photovoltaic - ST.

Annotations on the right side of the screenshot:

- Line from "List of last 10 alarms" points to the Alarms table.
- Line from "Links to favourite graphic pages" points to the Pages row.
- Line from "Links to favourite trend charts" points to the Charts row.
- Line from "Software and driver versions" points to the bottom right area of the interface.
- Line from "Summary status of communications channels and devices" points to the Information table.

ACCESS LEVELS

Synergy provides **3 levels** of access, each with different privileges:



Administrator

complete access to all functionalities



Super users

viewing of field devices defined by the administrator, the creation/modification of graphic pages and reports, and the export and editing of device parameters



Users

viewing of field devices and device pages defined by the administrator or super user

COMMUNICATIONS NETWORKS AND CHANNELS

Synergy can interface with field devices in two ways:

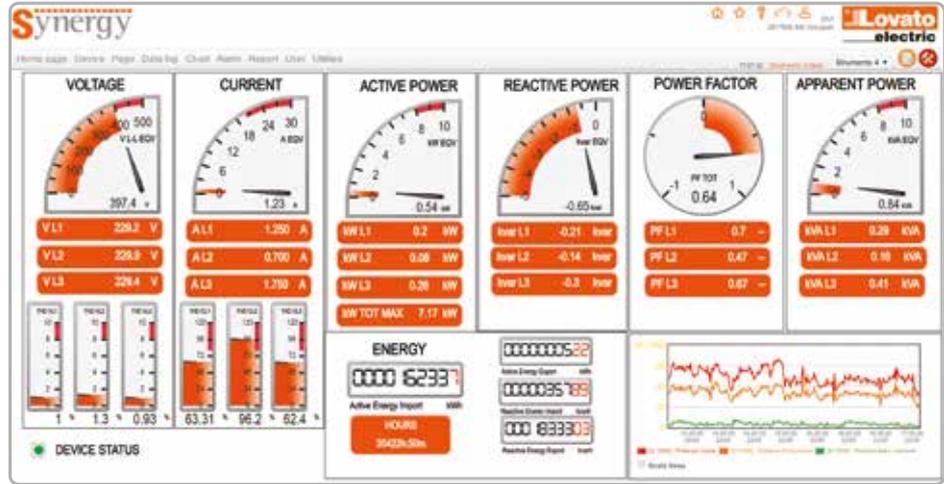
- by connecting to individual devices via the intranet or GPRS. Communications employ the Modbus protocol;
- by connecting to one or more gate loggers which use the **Modbus protocol** to acquire the data from the local devices. The connection between the gate loggers and **Synergy** is via the encrypted HTTPS data protocol over the local network or internet (cabled or mobile).

In both cases, **Synergy** can handle **several comms channels at a time**, hence multiple measurement islands, whether over a local network or internet, with independent configurations.

Synergy has 5 main components

PAGES

Monitoring pages contain the Synergy dynamic objects (indicators, counters, control buttons, etc.) and personalisable images, for creating overviews of systems, synoptic and topographic panels and providing input directly to the field devices. All energy measurements and control are thus directly at your fingertips.



DATA LOG

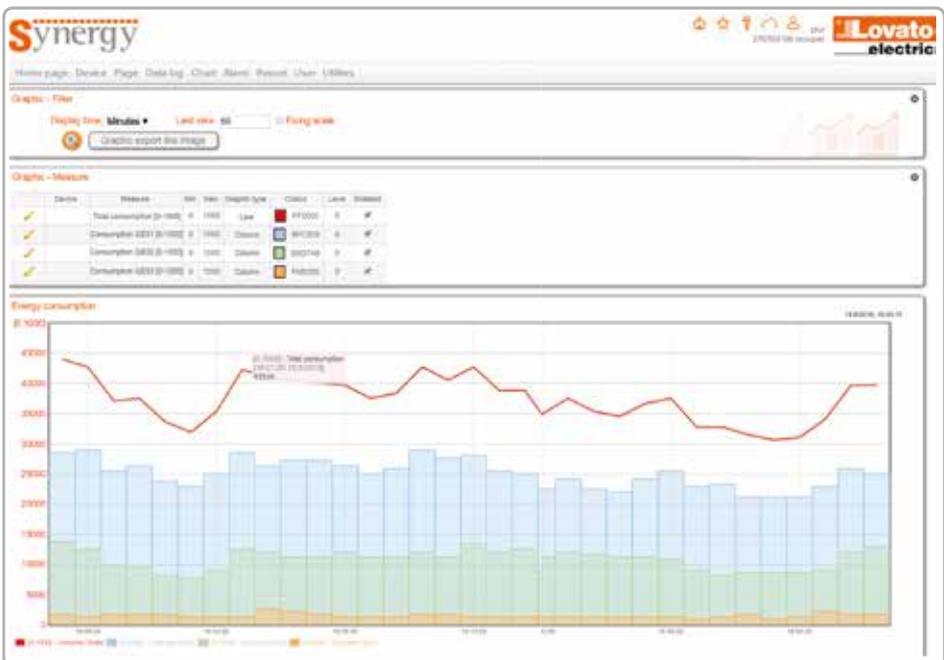
The data read by the field devices or gate loggers are registered in Data Logs which can be freely configured by the user. The Data Logs can aggregate information by line, department/area or sampling period. You can export the Data Logs at any time to Excel or text, even automatically at fixed intervals (day/week/year).

The screenshot shows a 'Data Log' interface with a table of consumption data. The table has the following columns: Date, Device 5 Partial consumption, Device 4 Partial consumption, Device 3 Partial consumption, Device 2 Partial consumption, Device 1 Partial consumption, and Delta partial consumption.

Date	Device 5 Partial consumption	Device 4 Partial consumption	Device 3 Partial consumption	Device 2 Partial consumption	Device 1 Partial consumption	Delta partial consumption
06/05/2019 11:42:59	23981.53	16801.93	170625.76	442434.25	345426.37	0.64
06/05/2019 11:42:59	23981.53	16801.91	170625.7	442434.11	345426.35	0.64
06/05/2019 11:42:59	23981.57	16800.99	170625.84	442433.93	345426.32	0.63
06/05/2019 11:39:56	23981.54	16800.97	170625.56	442433.76	345426.27	0.64
06/05/2019 11:36:56	23981	16800.96	170625.42	442433.58	345427.83	0.64
06/05/2019 11:33:56	23980.99	16800.94	170625.46	442433.29	345427.74	0.63
06/05/2019 11:30:56	23980.93	16800.92	170625.34	442433.22	345426.69	0.64
06/05/2019 11:27:56	23980.99	16800.9	170625.34	442433.16	345426.71	0.64
06/05/2019 11:24:56	23980.85	16800.87	170625.21	442432.8	345425.13	0.63
06/05/2019	16800.85	16800.86	170625.18	442432.76	345425.09	0.63

GRAPHS

Data saved to the Data Logs can also be displayed in graphic form. The period, chart type (lines, bars, dots, candle sticks), colours and scale can be changed quickly and easily. Attractive charts can be created to suit specific analysis requirements. It is also possible to create graphic comparisons of a given set of parameters over different periods (e.g. the previous week compared to the current one, etc.).



ALARMS

For each parameter you can assign **one or more alarms**, with the following options: An upper and lower limit, calendar (for enabling/disabling the alarm), display in trend charts and automatic e-mail notification options with personalised text can be set for each alarm. When the **limits** defined by the user for the parameters are exceeded, **Synergy** records the fault and **reports** it in the software's header. The **home page** always displays the **last 10 alarms**, while the alarms menu displays their details and allows you to acknowledge them.



REPORT

Reports let you process data collected from Data Logs and highlight significant values for all measured quantities (minimum, mean, maximum and differential values) using pre-set time bands (hours, days and months). Reports can be **displayed graphically** (pie chart or histogram), with **manual/automatic export** by day, month or year in Excel or text format. The exported data can be saved to hard disk or transmitted by e-mail or FTP.

The user can also export the data from **Synergy** using his preference of Excel template for analysis.



Synergy On Premises

In this solution (On Site), **Synergy** is purchased by the client and installed on his dedicated server, whether physical, virtual or cloud-based (On Custom Cloud). The user acquires permanent licenses for the number of devices he wishes to monitor and pays an annual maintenance fee. Additional licences can be added as needed at a later date. In this way the monitored system can be expanded over time, satisfying both present and future needs.

Synergy On Premises requires:

Operating system:

- Windows Server or (this must be verified by LOVATO Electric Technical Support) Windows 7, Windows 8.1 Pro, Windows 10 Pro.

Hardware with the following minimum characteristics:

- Dual core CPU, 2 GHz
- 4 GB RAM
- 60 GB hard disk (disk size depends on the volume of data to be stored).

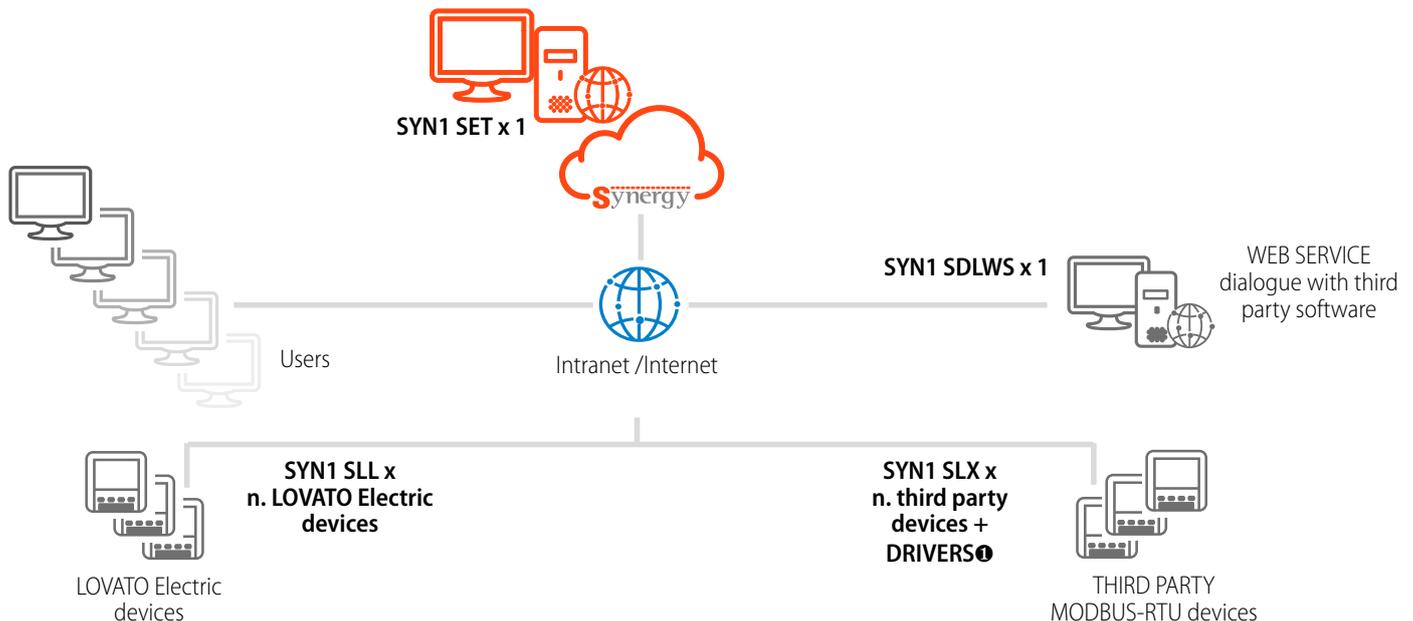
Server network connections:

- Ethernet RJ45 LAN
- For use on an intranet: comms ports of the type and number required for the application, whether Ethernet, RS485 serial, or modem
- For use on the internet: installation on a static public IP to which the data gathered from the field by the **EXC GL A01** gateway data logger is addressed.

Synergy On Premises must be acquired by ordering the installation software and any additional licenses depending on the number of devices being monitored.

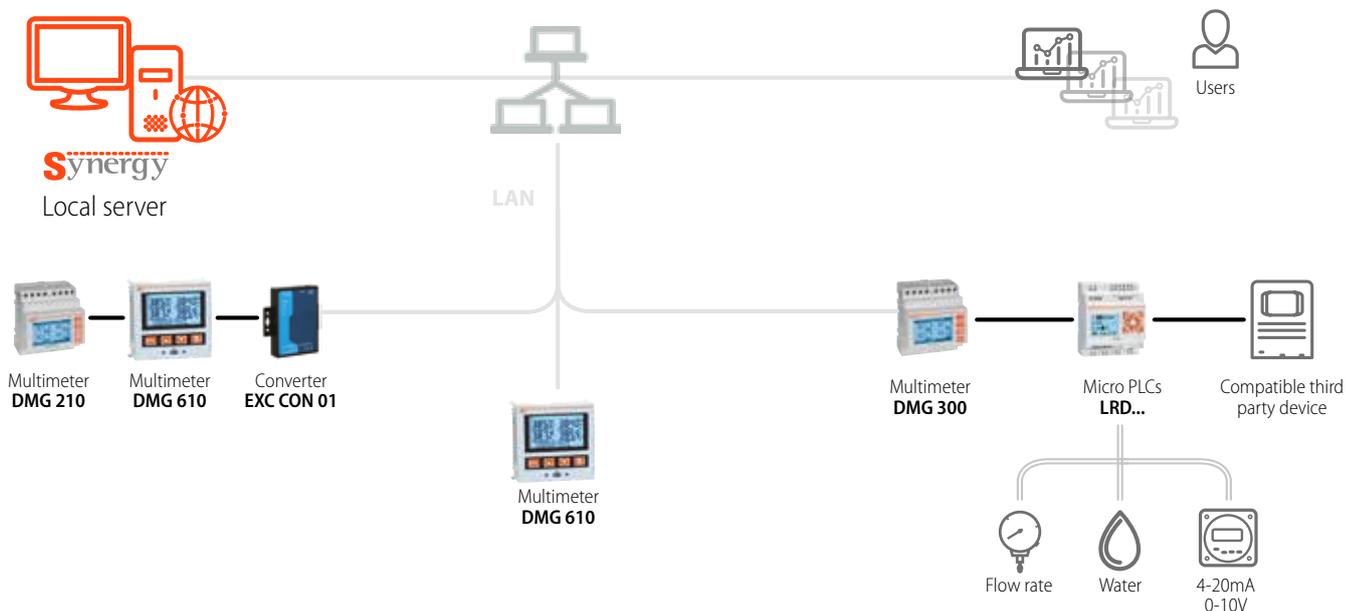
Order code	Description	Packages
SYN1 SET	Software for installation on PC with server function and Windows OS. Parametrisation, measurement, monitoring and control over the internet with email notifications and FTP file delivery.	Permanent license
SYN1 SLL	Enables the supervision function for each LOVATO Electric device equipped with MODBUS-RTU communication port.	Permanent license per device
SNY1 SLX	Enables the supervision function for each third party device equipped with MODBUS-RTU communications port.	Permanent license per device
SYN1 SDLWS	Enables WEB API access to Synergy's MS SQL database by third-party software	Permanent license
SNY1 SLM	Enables updates to Synergy (compatibility with new operating systems and new functions and upgrades) per LOVATO Electric or third party device	Annual subscription license for each device

Note: only devices equipped with a communications port need to be considered when calculating the number of licences needed.

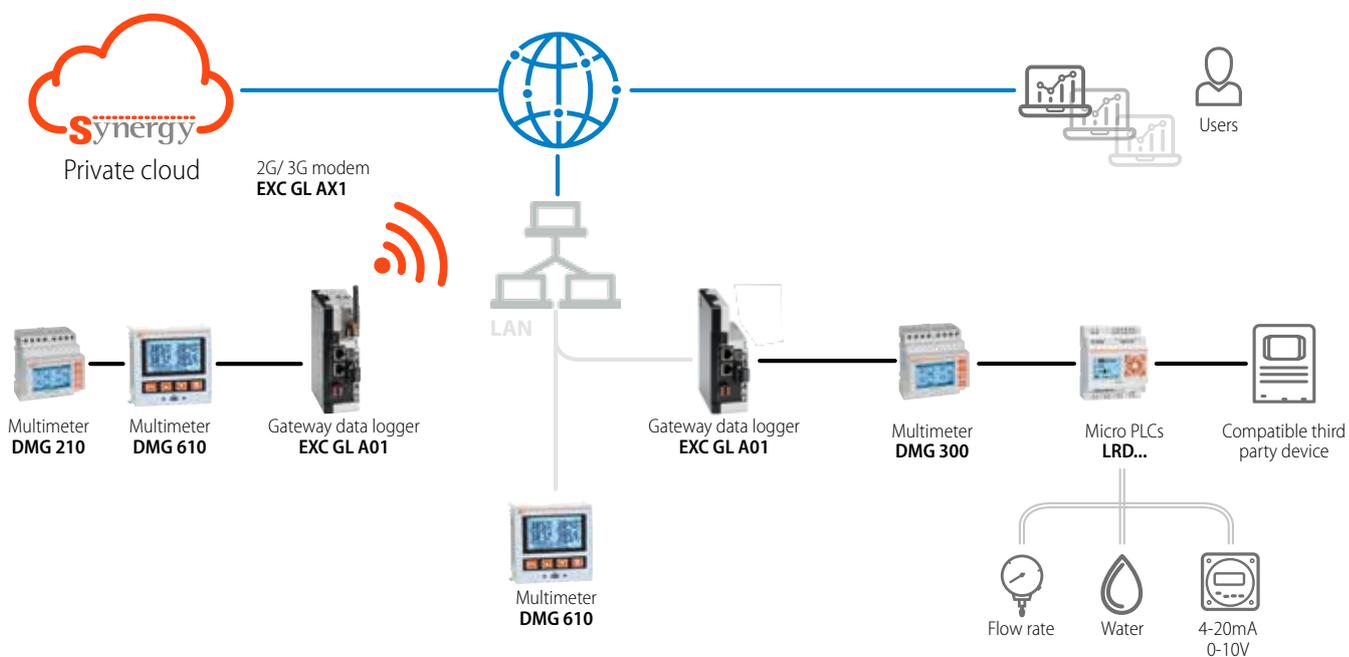


① Contact our Technical Support office (Tel. +39 035 4282422; Email: service@LovatoElectric.com).

Synergy On Premises On Site (physical or virtual server)



Synergy On Premises On Customer Cloud (cloud-based server)



- RS485
- Ethernet
- Internet
- Electrical signal

Synergy Cloud

In this solution, **Synergy** is supplied with a subscription service which provides a LOVATO Electric cloud server running **Synergy**.

Synergy Cloud allows you to check and display the electrical and power parameters of your field devices without having to install any software and without needing a dedicated server at your premises.

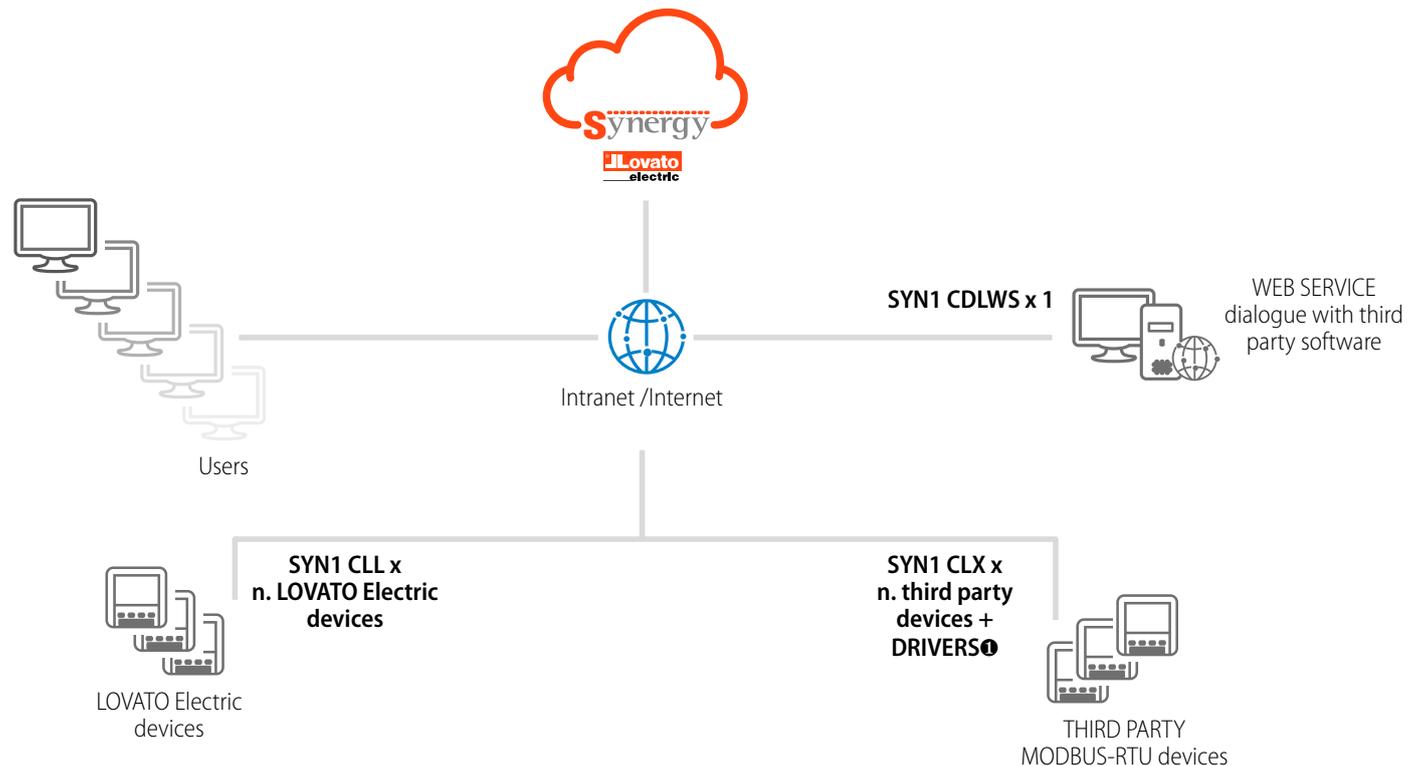
The field devices are configured as Clients which send the monitoring data to the **Synergy Cloud server**, in two possible ways:

- via https using the local **EXC GL A01 gateway data logger (recommended option)**;
- via a specific comms port assigned by the Cloud server (this must be checked by LOVATO Electric Technical Support).

The **EXC GL A01** gateway data logger collects the data from the field devices connected via an Ethernet or RS485 serial port. Supports the Modbus RTU, ASCII and TCP protocols.

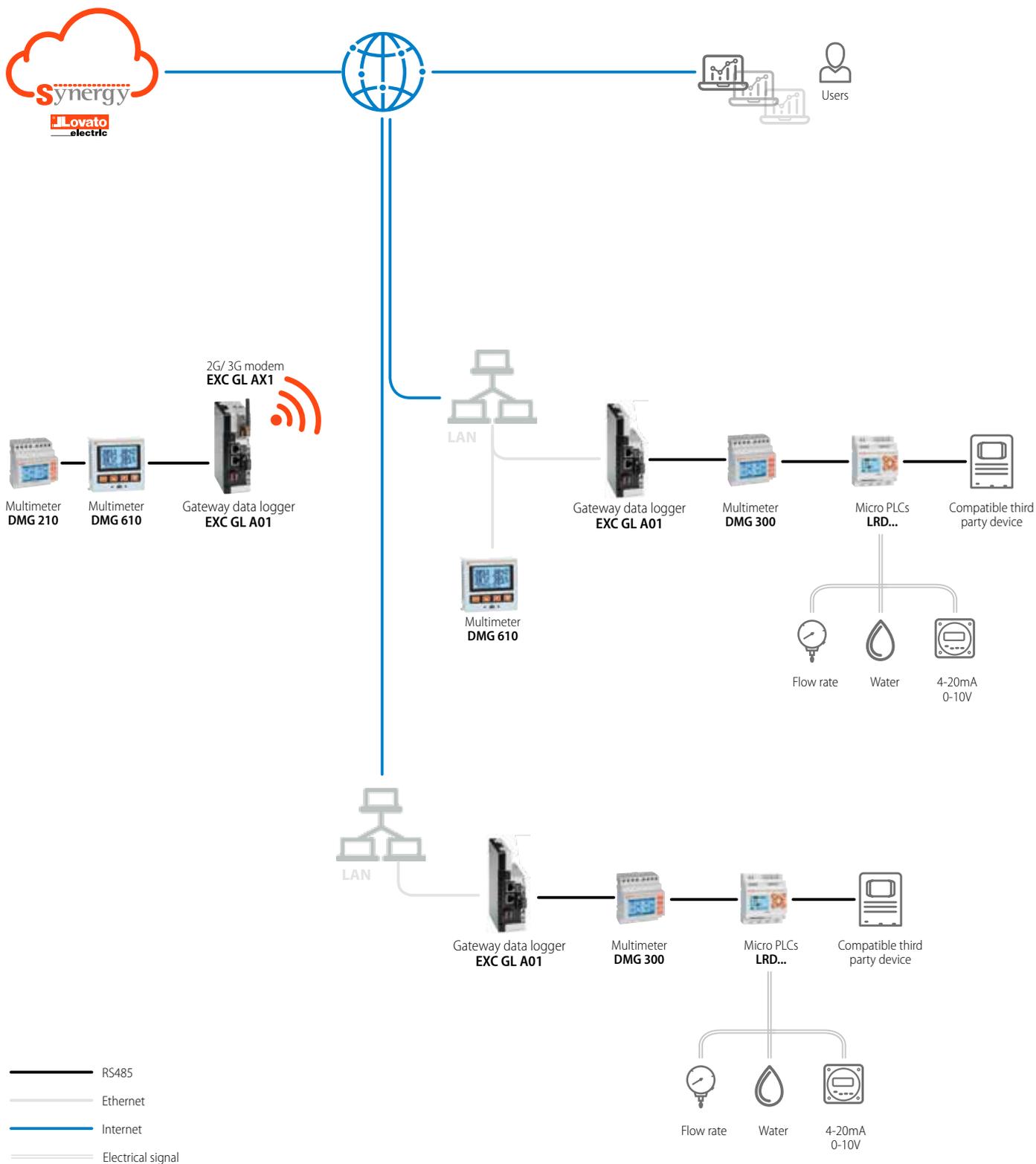
Access to internet for data is provided by an Ethernet port or by adding the accessory **EXC GL AX1 2G/3G** modem.

Order code	Description	Packages
SYN1 CLL	Enables the supervision function for each LOVATO Electric device equipped with MODBUS-RTU communication port.	Annual subscription license (365 days) for each device
SNY1 CLX	Enables the supervision function for each third party device equipped with MODBUS-RTU communications port.	Annual subscription license (365 days) for each device
SYN1 CDLWS	Enables WEB API access to Synergy's MS SQL database by third-party software	Annual subscription license (365 days)



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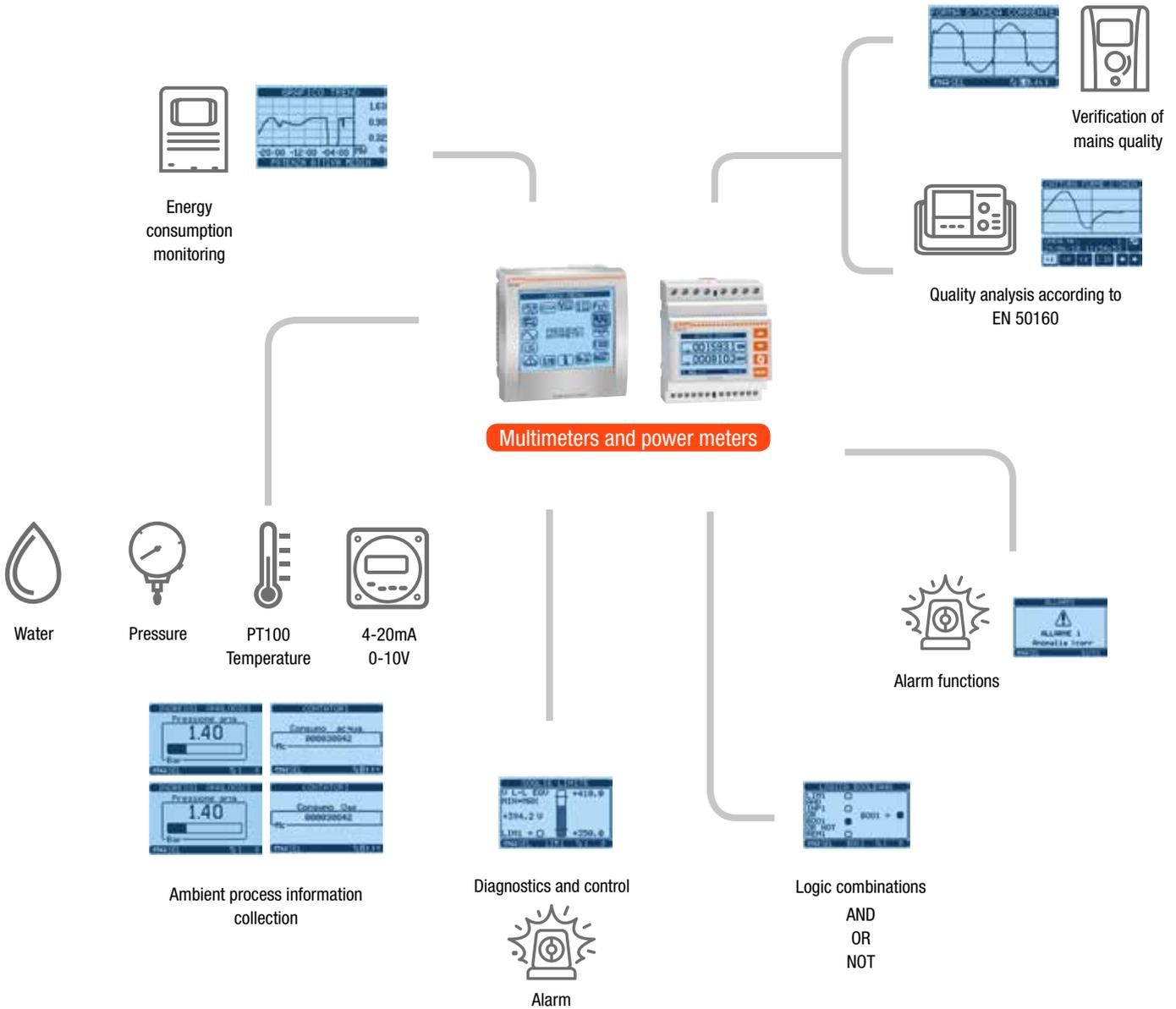
Synergy Cloud



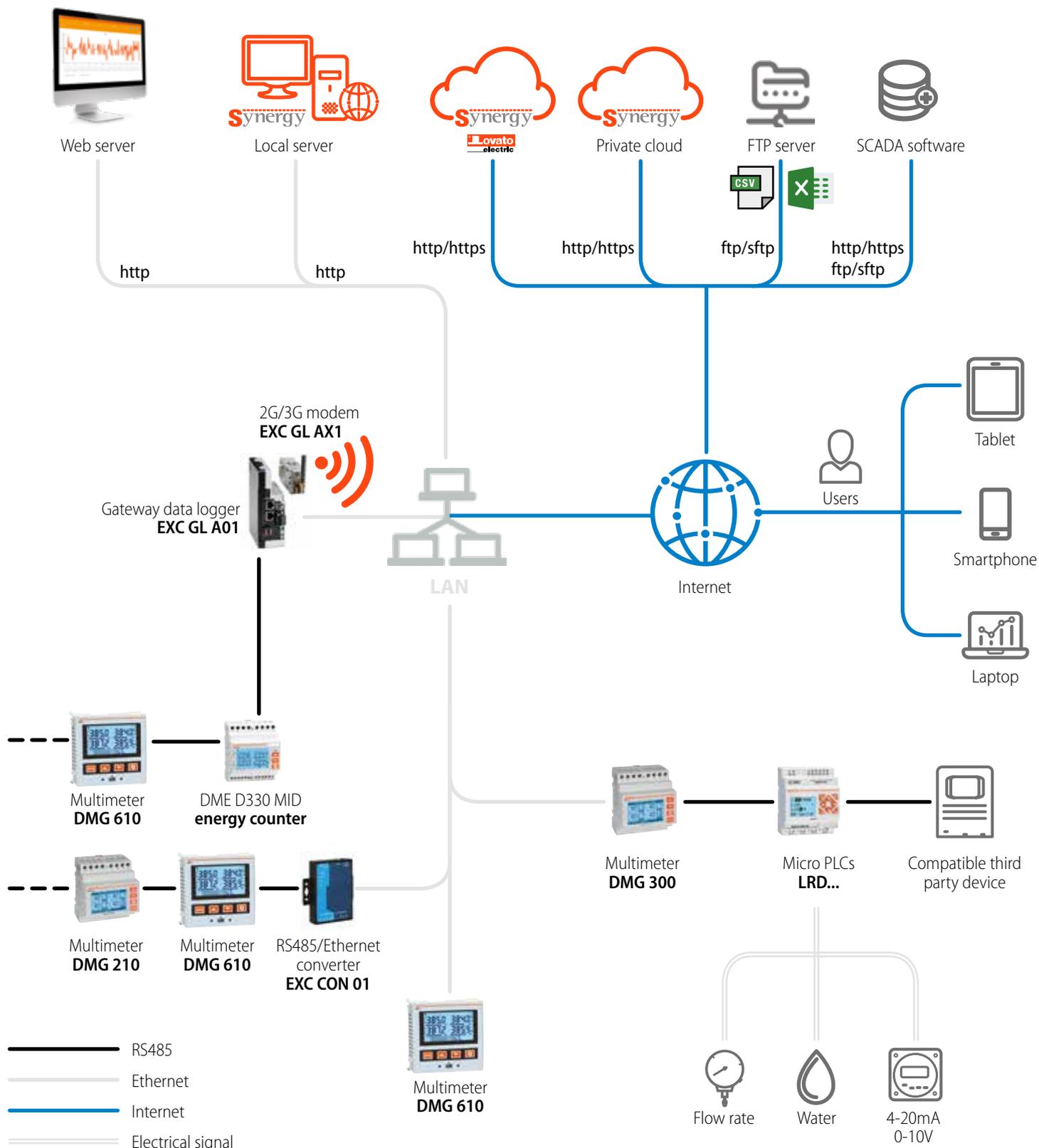
HARDWARE

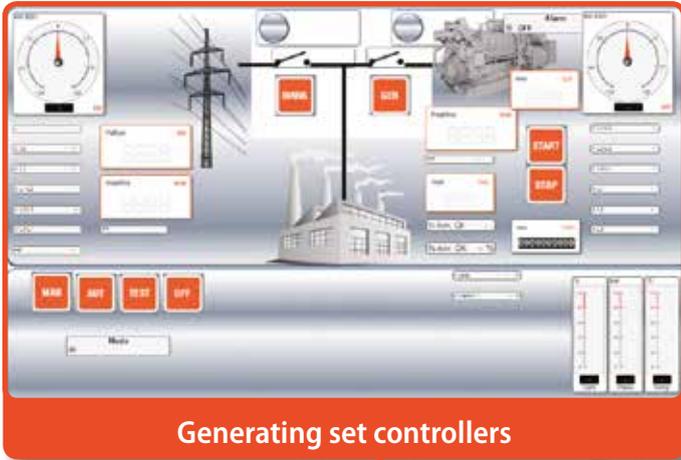
To obtain accurate information for energy saving analysis, LOVATO Electric offers a complete range of **measurement devices** for modular or enclosure installation, for single- and three-phase applications, networked or stand alone, as well as closed and split core **current transformers**, both normal and high precision, or with Rogowski windings. Some devices can be expanded to acquire digital or analogue signals from the field in order to monitor all energy supplies.

EXAMPLE

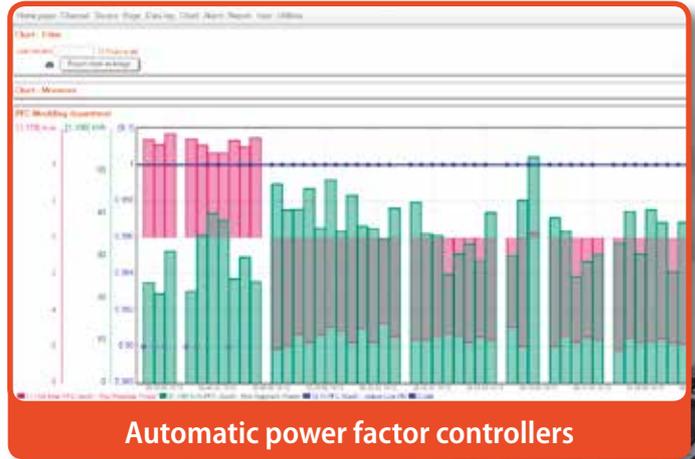


EXAMPLE

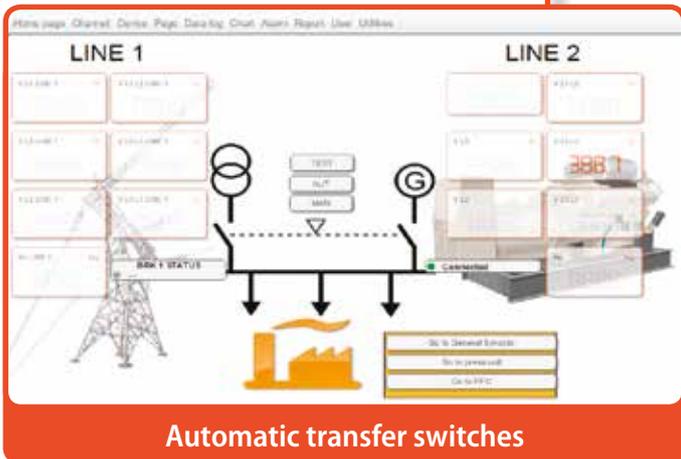
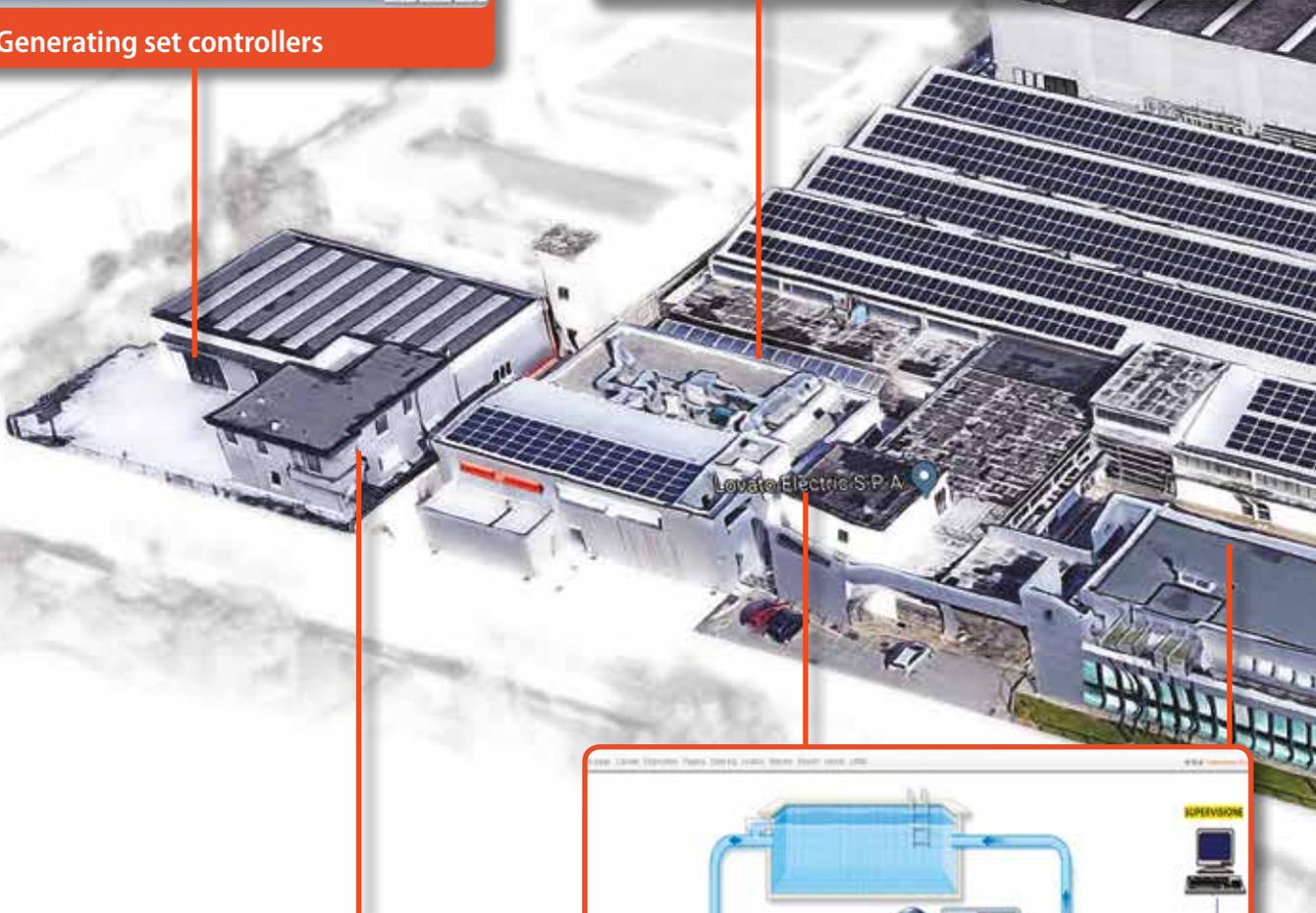




Generating set controllers



Automatic power factor controllers



Automatic transfer switches



Soft starters and variable speed drives



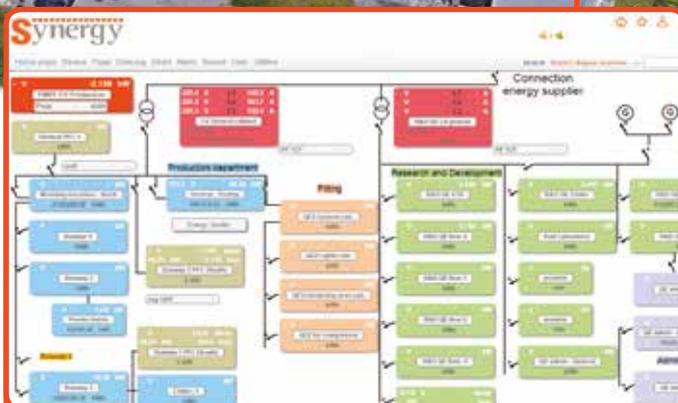
Interface protection system



Micro PLCs



Fire pumps controllers



Supervision and energy management software

Synergy





Generating set controllers

For use with generating sets (alternative energy sources used in the event of a power cut) LOVATO Electric has designed the RGK product range for generator protection and power source/ grid-generator parallel switching control.



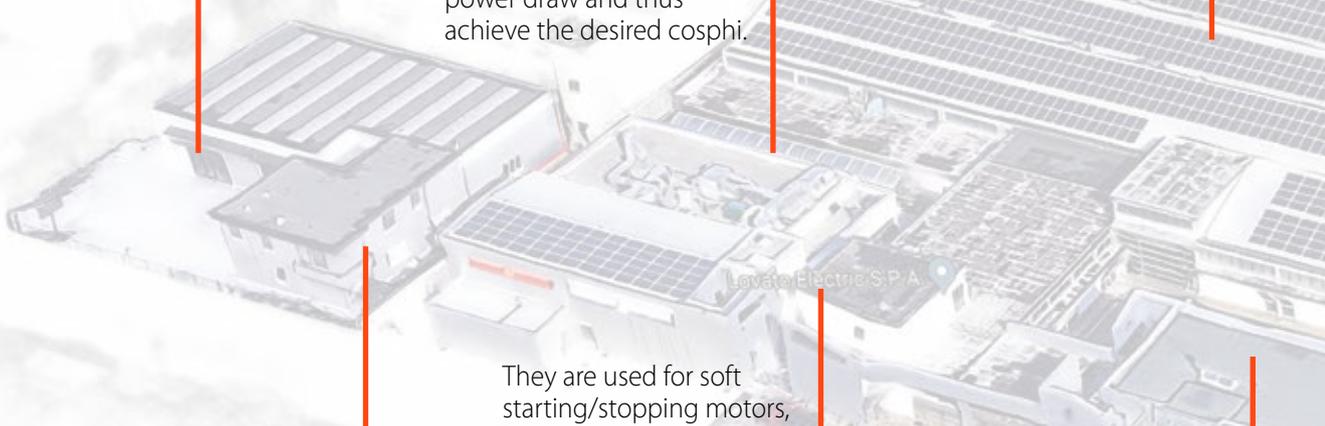
Automatic power factor controllers

These devices monitor the power factor (cosphi) of the installation and, if the value is too low due to excessive reactive power draw by inductive loads such as motors (which implies payment of penalties to the utility company), automatically engage arrays of capacitors to compensate for the reactive power draw and thus achieve the desired cosphi.



Interface protection system

Interface protection systems conforming with CEI 0-21 and CEI 0-16 for the control of voltage and frequency limits for the connection of local generator systems in parallel with medium and low voltage mains power supplies



LOVATO Electric automatic transfer switches permit the remote management and control of even complex systems thanks to a large number of configuration options and excellent flexibility in the setting of thresholds, controls, delays and alarms.



Automatic transfer switches

They are used for soft starting/stopping motors, and thus reduce peak currents, vibrations and mechanical stresses, while improving the motor's electric and mechanical service life. LOVATO Electric soft starters permit the gradual starting and stopping of even large motors (up to 1200A) with two or three controlled phases.



Soft starters

Variable speed drives play a very important role in energy management since not only are they very efficient, but they limit motor starting currents and mechanical stresses as well as regulating motor speed, thus consuming only the power actually demanded by the load.



Variable speed drives



Micro PLCs

These are a valuable complement to the Energy Management system because they are easy to install to machines and enclosures to detect process and environmental data such as: control and operating equipment status/alarms, pressures, flow rates, temperatures, levels, control of local automation, scheduled service management, control of operating equipment.



Energy meters

Single- and three-phase multi-measurement energy meters with direct insertion (up to 80A) and indirect insertion, equipped with pulse output or RS485 port with MODBUS or MBUS protocol, certified MID and UTF.



Measuring instruments

DIN rail and panel mount multimeters with indirect insertion via TA and Rogowski sensors up to 6000A; energy quality and harmonic distortion analysis up to the 63rd harmonic; analogue and digital inputs and outputs with boolean logic programming.

The device collects data from the RS485 field bus with Ethernet or 3G / 4G modem output

The device collects and saves data from the RS485 field bus or via Ethernet; integrated web server for data display and review; CSV format download; data transmission to the Synergy monitoring platform or third party system via ftp/sftp and http/https.

The FFL series fire controllers allow the control and monitoring of electric pumps and motor pumps for sprinkler fire protection systems. They are designed according to the EN 12845 standard and incorporate additional features for the supervision, monitoring and maintenance of fire protection systems. Panels are available for remote alarming of the fire-fighting group in a manned room.



Communications interfaces



Gateway data logger



Fire pumps controllers

TECHNICAL SUPPORT

In order to provide the client with a complete, reliable monitoring system, LOVATO Electric provides qualified Technical Support for commissioning the **Synergy** system.

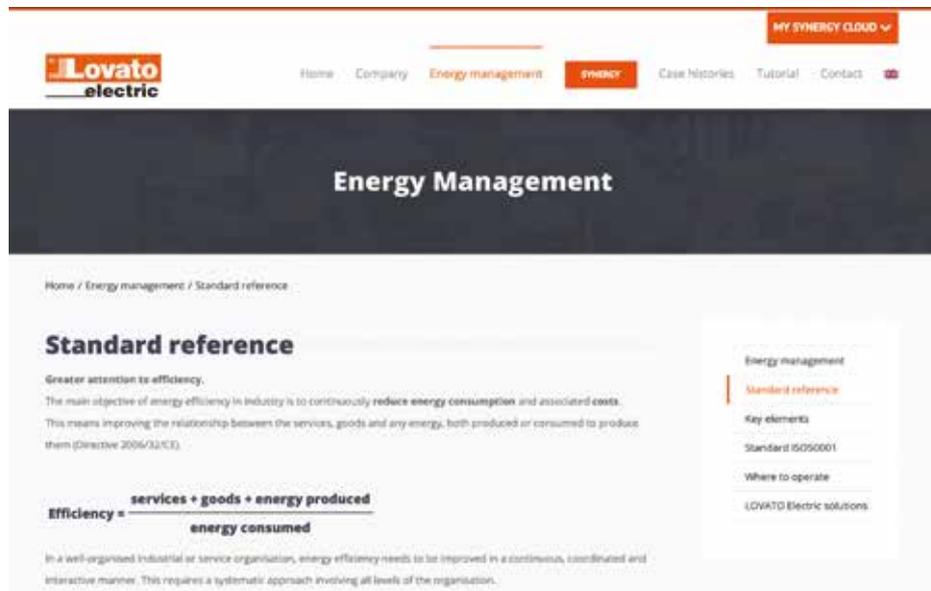
The service can be configured as part of the bid to suit the client's requirements.

Order code	Description	Packages
SYN1 SCS00	Synergy technical support per the clients requirements	Cost per hour
SYN1 SCS11	<p>Synergy support, on site and/or remote, including:</p> <ul style="list-style-type: none"> • verification of device configuration; • verification of communications between Synergy and the devices; • Synergy configuration per the client's requirements; • costs of travel, board and lodging and assessment of the hours of work needed for the activities described above. 	Cost per intervention
SYN1 SCSDRV	Synergy support in developing dialogue drivers for Synergy and third party devices up to a maximum of 5 parameters, consequent on feasibility assessment by LOVATO Electric Technical Support	Cost per driver
SYN1 TRAINING	<p>Training courses on:</p> <ul style="list-style-type: none"> • measuring devices: range and selection criteria with description of practical courses; • introduction to energy management; • Key features of the Synergy monitoring and supervision software: architecture and access, channels, tools, charts, data logs, pages and users; • practical exercises. <p>For more details visit the EVENTS section on academy.LovatoElectric.com.</p>	Cost to be agreed at the offer stage

For a quote and purchase of LOVATO Electric Technical Support, please contact our sales department.

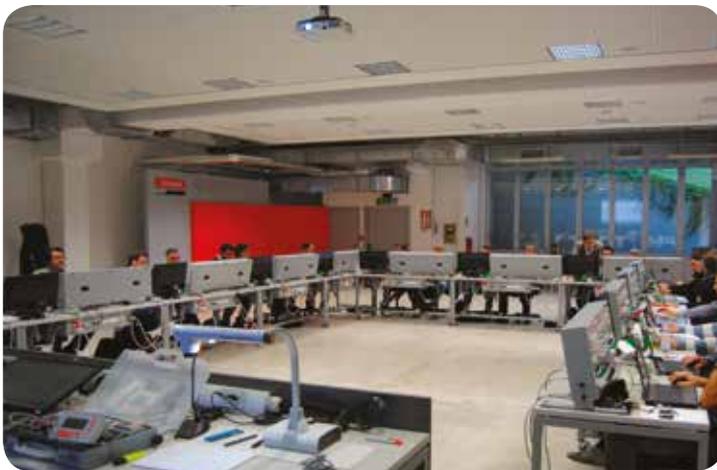


The site em.LovatoElectric.com gives not only all updated information about LOVATO Electric energy efficiency and monitoring solutions, but also case histories, demos, contacts and much more.



To satisfy the growing demand for technical training for **Energy Management** and industrial automation professionals, the LOVATO Electric LOVATO Academy offers a series of courses on **Energy Management**, micro PLCs, overvoltage dischargers and the starting and control of electric motors.

LOVATO Academy courses are detailed on academy.LovatoElectric.com.



ENERGY MANAGEMENT



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