ENERGY EFFICIENCY DEVICES AND SOLUTIONS
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**

![Graph showing Efficiency vs Load factor]

**Avoiding penalties**

![Graph showing Power factor correction vs Time]

**Identifying mains supply disturbances**

<table>
<thead>
<tr>
<th>ENERGY QUALITY COUNTERS</th>
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<tbody>
<tr>
<td>DIPS</td>
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<tr>
<td>SWELLS</td>
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<tr>
<td>INTERRUPTIONS</td>
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<tr>
<td>INTERRUPTIONS &gt; 180S</td>
</tr>
<tr>
<td>VOLTAGE OUT OF RANGE</td>
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<tr>
<td>FREQUENCY OUT OF RANGE</td>
</tr>
</tbody>
</table>

**OFFICES LOG FOR WEEK 4 - 2019**

**Division of energy**

![Graph showing Consumption by Department]

**Flattening off demand**

![Graph showing Coloured line = billed consumption]

Changing the times of loads can help reduce costs.
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.

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).

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.
**SOFTWARE**

**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.

<table>
<thead>
<tr>
<th>Order code</th>
<th>Description</th>
<th>Packages</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYN1 SET</td>
<td>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.</td>
<td>Permanent license</td>
</tr>
<tr>
<td>SYN1 SLL</td>
<td>Enables the supervision function for each LOVATO Electric device equipped with MODBUS-RTU communication port.</td>
<td>Permanent license per device</td>
</tr>
<tr>
<td>SYN1 SLX</td>
<td>Enables the supervision function for each third party device equipped with MODBUS-RTU communications port.</td>
<td>Permanent license per device</td>
</tr>
<tr>
<td>SYN1 SDLWS</td>
<td>Enables WEB API access to Synergy’s MS SQL database by third-party software</td>
<td>Permanent license</td>
</tr>
<tr>
<td>SYN1 SLM</td>
<td>Enables updates to Synergy (compatibility with new operating systems and new functions and upgrades) per LOVATO Electric or third party device</td>
<td>Annual subscription license for each device</td>
</tr>
</tbody>
</table>

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

[Contact our Technical Support office (Tel. +39 035 4282422; Email: service@LovatoElectric.com).](#)
**SOFTWARE**

**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
S NY1 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)

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

**Multimeters and power meters**

- **Energy consumption monitoring**
- **Verification of mains quality**
- **Quality analysis according to EN 50160**
- **Alarm functions**
- **Logic combinations**
  - AND
  - OR
  - NOT

- **Ambient process information collection**
- **Diagnostics and control**
  - Alarm

**Water**

**Pressure**

**PT100 Temperature**

**4-20mA**

**0-10V**
EXAMPLE

Web server

Local server

Private cloud

FTP server

SCADA software

Internet

http

http

http

http/https

http/https

ftp/sftp

http/https

ftp/sftp

Tablet

Smartphone

Laptop

Gateway data logger

EXC GL A01

2G/3G modem

EXC GL AX1

Multimeter

DMG 610

Multimeter

DMG 210

DME D330 MID

energy counter

Multimeter

DMG 610

Multimeter

DMG 610

RS485/Ethernet

converter

EXC CON 01

Multimeter

DMG 300

Micro PLCs

LRD...

Compatible third party device

Flow rate

Water

4-20mA

0-10V

RS485

Ethernet

Internet

Electrical signal
THE LOVATO ELECTRIC SOLUTION

Generating set controllers

Automatic transfer switches

Automatic power factor controllers

Soft starters and variable speed drives
Supervision and energy management software

Interface protection system

Micro PLCs

Fire pumps controllers

Synergy
THE LOVATO ELECTRIC SOLUTION

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.

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.

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.

Automatic transfer switches
Soft starters
Variable speed drives
The device collects and saves data from the RS485 field bus with Ethernet 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 device collects data from the RS485 field bus with Ethernet, via Ethernet, or 3G / 4G modem output.

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.

Medium 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/alarm, pressures, flow rates, temperatures, levels, control of local automation, scheduled service management, control of operating equipment.

Communications interfaces

Energy meters

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.

Gateway data logger

Communications interfaces

Fire pumps controllers
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.

Fire pumps

The device collects and saves data from the RS485 field bus with Ethernet, via Ethernet, or 3G / 4G modem output.

Measuring instruments

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/alarm, pressures, flow rates, temperatures, levels, control of local automation, scheduled service management, control of operating equipment.
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.

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<tr>
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<tbody>
<tr>
<td>SYN1 SC00</td>
<td>Synergy technical support per the clients requirements</td>
<td>Cost per hour</td>
</tr>
<tr>
<td>SYN1 SC11</td>
<td>Synergy support, on site and/or remote, including: • 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.</td>
<td>Cost per intervention</td>
</tr>
<tr>
<td>SYN1 SCDRV</td>
<td>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</td>
<td>Cost per driver</td>
</tr>
<tr>
<td>SYN1 TRAINING</td>
<td>Training courses on: • 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. For more details visit the EVENTS section on academy.LovatoElectric.com.</td>
<td>Cost to be agreed at the offer stage</td>
</tr>
</tbody>
</table>

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](http://academy.LovatoElectric.com).
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