Supervision and energy management software

Synergy

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ENERGY AND AUTOMATION
Applications

Supervision for industry, shopping malls
- Quality control of power grid supply
- Consumption accounting for cost centres
- Monitoring of machinery/production lines
- Operation monitoring of motors
- Operation monitoring of generating sets
- Monitoring of power factor correction installations
- Monitoring of process/environmental data (values of pressure, flow rate, temperature, …).

Supervision for chains of stores
- Monitoring of energy consumption
- Installation diagnostics
- Consumption report for cost centres.

Supervision of photovoltaic installations
- Energy monitoring
  - Generated
  - Consumed
  - In-Out.

Supervision of waterworks and wells
- Quality control of power grid supply
- Energy accounting
- Operation monitoring of pumps
- Operation monitoring of generating sets
- Monitoring of process/environmental data (values of pressure, flow rate, temperature, …)
- Monitoring of remote wells.
Synergy is a valid software to sustain the activities indicated by the standard EN ISO 50001 “Energy management systems. Requirements with guidance for use”.

Increasing energy efficiency means using only the power required (reducing consumption), using energy when it costs less (optimise consumption in tariff time slots, increase renewable energy consumption and so on) and improving energy quality (reduction of harmonics, power surges, ...).

Therefore, the first step to take is the monitoring and analysis of your power consumption. How much energy do you consume? When and how do you consume it? What is the state of your machinery and equipment? Are you promptly informed about malfunctions?

Synergy is a supervision and energy management web-based software that provides for the monitoring and control of the electrical installation, in a simple and efficient way. In addition to electrical quantities, it allows to check all environmental and process information (operating status, alarms, etc.), acquired from LOVATO Electric products, equipped with communication port, and thereby to carry out commands and parameterising.

Synergy structure and applications are based on MS (Microsoft) SQL Relational Database management system (RDBMS).

Synergy consulting (Client) is made through popular programs for Internet browsing that are available across different platforms and operating systems. These features allow Synergy to be a highly versatile system, simultaneously accessible to a large number of users/workstations, via intranets, VPN or Internet.

Functionality

- Serial communication via Ethernet or modem with all devices in the field
- Database of instantaneous values
- Graphic pages
- Datalog files
- Energy consumption reports
- Charts
- Alarms
- Energy quality analysis
- Field equipment parameterising
- Access level management.

Server-multiclient system

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Interfacing products

- Genset controllers: RGK...
- Power factor controllers: DCRJ..., DCRG...
- Energy meters: DMED3...
- Data concentrator: DME CD
- Multimeters: DMG/DMK...
- Interface protection systems: PMVF...
- Micro PLCs: LRD...
- Automatic transfer switch controllers: ATL...
- AC motor drives: VE1..., VFNC3..., VFS...
- Soft starters: ADX...

The up-to-date list of LOVATO Electric devices interfaceable with Synergy software is available at the following address: www.lovatoelectric.com/Synergy_gb.htm.

System requirements

Supported operating system
- MS Windows XP SP3
- Windows Vista
- Windows 7 32/64-bit
- Windows server 2003

Supported browser
- MS IExplorer 9 64-bit
- MS IExplorer 10
- Google Chrome
- Apple Safari
- Mozilla FireFox
- Opera.

PC/Server hardware requirements
- Dual core CPU, 2GHz
- 2GHz of RAM
- 60GB hard disk (hard disk partition or volume depends on how much data you intend to record)
- SVGA 1024x768 16-bit pixels
- Type and number of communication ports based on use, be they Ethernet, RS485 serial, RS232 serial or modem.

Configuration

Synergy programming does not require any particular computer knowledge since specific configuring instruments have been developed to guide through the configuration of product networks, graphic pages, datalog reports and charts, in a simple and intuitive way.

Languages

Synergy is available in the following languages: English, Italian, Spanish, French, Polish and Russian. The up-to-date list of available languages can be consulted at this address: www.LovatoElectric.com/Synergy_gb.htm
Synergy allows access to a large number of users with different access levels and authorisations.

Three access levels are available:

- **Administrator**: Complete access to all functions.
- **Power users**: Viewing of a limited number of field devices, predefined by the administrator, with possible creating or changing of graphic pages, datalog reports and relative export and change of device setup.
- **Users**: Viewing of a limited number of devices, predefined by the administrator, and the relative pages.

Main diagnostic data is concentrated in a single page to allow quick spotting of abnormal conditions of the entire system under control.

- List of last 10 alarms
- Status summary of communication channels and of devices
- Link to main graphic pages and preferred charts.
Example of local system architecture

SERVER Client 1

GSM-GPRS NETWORK
(Modbus-ASCII)
Multimeters DMG900
Genset controllers
RGK800, RGK900
Power factor controllers
DCRG8

Telephone modem

Automatic transfer
switch controllers
ATL...

ETH-RS485

Multimeters/analyzers
DMG300, DMG800,
DMG900
- Energy meters DMED3...
- Data concentrator
DME CD

Genset controllers
RGK800, RGK900

Power factor
controllers
DCRG8

Multimeters
DMG...

Micro PLCs
LRD...

AC motor
drives
VE1...
VFNC3...
VFS...

Soft starters
ADX...

Field signals
Digital / Analog

Energy meters DME
with pulse output

Process and environmental data

Field bus RS485
Modbus-RTU

Genset controllers
RGK...

Power factor
controllers
DCRJ...
DCRG8

- Energy meters DMED3...
- Data concentrator
DME CD

Multimeters
DMK...

Multimeters
DMG...

Multimeters
DCRG8

Telephone modem

GSM-GPRS NETWORK
(Modbus-ASCII)
Multimeters DMG900
Genset controllers
RGK800, RGK900
Power factor controllers
DCRG8

Software

Ethernet
Modbus-RTU, Modbus-TCP/IP

Field bus RS485
Modbus-RTU
Example of system architecture for many remote installations

Server + clients
The main system (server installed at the office of the plant or maintenance engineer or energy consultant) monitors all the controlled installations (clients) making queries to all the consumers’ devices.

Single clients
Each consumer can consult data of their own installation, using popular browsers.

Photovoltaic installations

Chain of stores

Companies
**Communication networks/channels**

Synergy allows to interface LOVATO Electric devices only. It simultaneously manages different communication channels with independent configuration for protocol, speed rate, etc. Channels are to be intended as one for each different TCP/IP address and every other communication port RS232, RS485, etc. In addition to wired connections of devices through wired networks (RS232, RS485 and Ethernet), Synergy also permits the management of analog and GSM/GPRS modems. Available communication protocols are Modbus-RTU, Modbus-ASCII and Modbus-TCP/IP.

LOVATO Electric devices, directly connected to an Ethernet network, can be predisposed to also handle dynamic TCP/IP addresses.

**Management of interfaced devices**

Each device can also be identified by a customised description of the electrical utility/application to which it makes reference to. Using the specific control menu, it is possible to verify if it is correctly communicating and when the last measurement was done. Synergy can query about exclusive data required by datalog files on a regular basis to optimise network data traffic as well as for other eventual information contained in the graphic page viewed in that moment. With Synergy, internal device parameters can be possibly changed or saved on hard disk and retrieved later on for quick configuration duplication in other devices.
Synergy allows to create an unlimited number of pages, to include static images and dynamic indicators of various types and easily configure them. Therefore, the user can create pages with installation overall view, synoptic and/or topographic representations of the electrical network and pages of the single electrical lines and/or applications with all detailed information. By using pushbuttons, commands can be sent to the installations, if obviously foreseen in the field devices. Page configuration permits to also interactively browse among these same pages.

The dynamic objects available are:
- Analog instruments at 90° and 270°
- Digital instrumentation
- Digital instrumentation with vertical or horizontal bar graphs
- 10-digit hour counter
- Simple label or with dynamic image
- Multi-measurement panel
- Chart of single measurements
- Harmonic status bar graph.
Synergy allows to record data read on field devices in different datalog files (unlimited number), each with freely user-customisable configuration. Therefore, it is possible to gather different information per time sampling (e.g. electric power or gas consumption counts every hour; average active power and current values every 15 minutes and active power and current values every 10 seconds, ...), per each single electric line or grouped together per department or production bay. The recorded measurements by devices can be used as parameters for mathematical functions to permit additional calculations or information elaborations not readily or not even available of the installation, for instance the sum of consumption for a certain area so the cost of electricity can be calculated. Automatic export with customisable rate (daily, weekly or monthly) and standard Excel or text format can be defined for each file. The generated files are saved on hard disk and sent by email / FTP wherever required. In the case of data networks with potential reliability problems, separate data storage modules are available for data logging, to fit exclusively on devices that are expandable with the EXM1030 or EXP1030 unit. Synergy will provide for automatic recovery of stored data when network connection is restored.

Data recorded in datalog files can also be viewed in charts.

Data stored in datalog files can be used even to elaborate controls with regards to the correct operation of the installations. Eventual conditions to keep monitored can be linked with alarms, that are recorded in a specific alarm list, highlighted in the Synergy headline and conveniently described in the homepage. The same alarms can be transformed into commands and transmitted to the devices for an automatic control of the installation.
How to order

**Setup software**

- **Order code SYN 1 SW 00**  
  The setup software is the same for all LOVATO Electric products. It is used for parameter setting and data logger configuration and includes a 60-day demo version of the remote control supervision function (measurements, monitoring, control and web server). Download at www.lovatoelectric.com/Synergy_gb.htm

**Enable licence for remote control supervision function of one device**

- **Order code SYN 1 SW 10**  
  Enable licence of the supervision function (measurements, monitoring, control and web server) including enabling for one device (RG series generator controllers excluded).

- **Order code SYN 1 SW 11**  
  Enable licence of the supervision function (measurements, monitoring, control and web server) including enabling for one RG series generator controller.

**Enable licence for remote control supervision function of additional devices**

- **Order code SYN 1 SW 20**  
  Enable licence of supervision function for five additional devices (RG series generator controllers excluded).

- **Order code SYN 1 SW 21**  
  Enable licence of supervision function for one additional RG series generator controller.

**Complementary licence**

- **Order code SYN 1 SW X00**  
  Enable licence for sending emails and FTP for all LOVATO Electric devices.

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**Note:** For the number of licences, only devices equipped with communication port can be considered.
**Example 1**

RS485 network, Modbus-RTU protocol

Network of multimeters/power analyzers, three-phase energy meters and a data concentrator that receives electric pulses from single/three-phase energy meters. Total of 6 network nodes monitored.

<table>
<thead>
<tr>
<th>Devices installed</th>
<th>LOVATO ord. code</th>
<th>Q.ty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel 1</td>
<td>DMG 300</td>
<td>1</td>
<td>Modular digital multimeter</td>
</tr>
<tr>
<td></td>
<td>EXM 1012</td>
<td>1</td>
<td>RS485 opto-isolated expansion module</td>
</tr>
<tr>
<td>Panel 2</td>
<td>DMG 210</td>
<td>3</td>
<td>Modular digital multimeter with RS485</td>
</tr>
<tr>
<td></td>
<td>DMED 310 T2</td>
<td>1</td>
<td>3-phase digital energy meter 5A with 2 prog. outputs</td>
</tr>
<tr>
<td></td>
<td>EXM 1012</td>
<td>1</td>
<td>RS485 opto-isolated expansion module</td>
</tr>
<tr>
<td>Panel 3</td>
<td>DME CD</td>
<td>1</td>
<td>Data concentrator for DME...</td>
</tr>
<tr>
<td></td>
<td>DMED 310 T2</td>
<td>3</td>
<td>3-phase digital energy meter 5A with 2 prog. outputs</td>
</tr>
<tr>
<td></td>
<td>DMED 120 T1</td>
<td>1</td>
<td>1-phase digital energy meter 63A with 2 prog. outputs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Software/licences to purchase</th>
<th>LOVATO ord. code</th>
<th>Q.ty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of monitored nodes is 6.</td>
<td>SYN1 SW 00</td>
<td>1</td>
<td>Setup software</td>
</tr>
<tr>
<td></td>
<td>SYN1 SW 10</td>
<td>1</td>
<td>Supervision licence + enable for n°1 device</td>
</tr>
<tr>
<td></td>
<td>SYN1 SW 20</td>
<td>1</td>
<td>Supervision licence + enable for n°5 extra devices</td>
</tr>
</tbody>
</table>
Example 2  Mixed Ethernet/RS485 and modem network Modbus-RTU and ASCII protocols

Network of multimeters/power analyzers and a data concentrator that receives electric pulses from single-phase energy meters. Total of 6 network nodes monitored with load control (statusi/commands).

<table>
<thead>
<tr>
<th>Devices installed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOVATO ord. code</strong></td>
</tr>
<tr>
<td>Panel 1</td>
</tr>
<tr>
<td>DMG 900</td>
</tr>
<tr>
<td>EXP 1015</td>
</tr>
<tr>
<td>Panel 2</td>
</tr>
<tr>
<td>DMG 300</td>
</tr>
<tr>
<td>EXM 1012</td>
</tr>
<tr>
<td>EXM 1013</td>
</tr>
<tr>
<td>Panel 3</td>
</tr>
<tr>
<td>DMG 300</td>
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<tr>
<td>EXM 1012</td>
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<tr>
<td>EXM 1001</td>
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<tr>
<td>Panel 4</td>
</tr>
<tr>
<td>DME CD</td>
</tr>
<tr>
<td>DMED 120 T1</td>
</tr>
</tbody>
</table>

<table>
<thead>
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<tbody>
<tr>
<td><strong>LOVATO ord. code</strong></td>
</tr>
<tr>
<td>SYN1 SW 00</td>
</tr>
<tr>
<td>SYN1 SW 10</td>
</tr>
<tr>
<td>SYN1 SW 20</td>
</tr>
</tbody>
</table>

**Number of monitored nodes is 6.**
### Example 3

Mixed Ethernet/RS485 networks, Modbus-TCP and RTU protocols

Network of multimeters/power analyzers, power factor controllers and energy meters. Extra enable licence for sending emails and FTP. Total of 10 network nodes monitored.

#### LOVATO ord. code | Q.ty | Description
--- | --- | ---
Panel 1 | DMED 310 T2 | 1 | 3-phase digital energy meter 5A with 2 prog. outputs
| EXM 1013 | 1 | Ethernet opto-isolated expansion module
Panel 2 | DCRG 8 | 1 | Power factor controller
| EXP 1013 | 1 | Ethernet opto-isolated expansion module
Panel 3 | DMG 300 | 1 | Modular digital multimeter
| EXM 1013 | 1 | Ethernet opto-isolated expansion module
Quadro 4 | DMG 300 | 1 | Modular digital multimeter
| EXM1013 | 1 | Ethernet opto-isolated expansion module
| EXM 1012 | 1 | RS485 opto-isolated expansion module
| DMG 210 | 2 | Modular digital multimeter with RS485
Quadro 5 | DMG 800 | 1 | Flush-mount 96x96mm digital multimeter
| EXP 1013 | 1 | Ethernet opto-isolated expansion module
| EXP 1012 | 1 | RS485 opto-isolated expansion module
| DMG 210 | 3 | Modular digital multimeter with RS485

#### Software/licenses to purchase

Number of monitored nodes is 10. In addition, control of logged data email transmission.

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<th>Description</th>
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</thead>
<tbody>
<tr>
<td>SYN1 SW 00</td>
<td>1</td>
<td>Setup software</td>
</tr>
<tr>
<td>SYN1 SW 10</td>
<td>1</td>
<td>Supervision licence + enable for n°1 device</td>
</tr>
<tr>
<td>SYN1 SW 20</td>
<td>2</td>
<td>Supervision licence + enable for n°5 extra devices</td>
</tr>
<tr>
<td>SYN1 SWX 01</td>
<td>1</td>
<td>Enable licence for sending emails and FTP</td>
</tr>
</tbody>
</table>
Example 4

Mixed Ethernet/RS485 and modem networks, Modbus TCP-RTU-ASCII protocols

Network of generator controllers and multimeters. Total of 7 network nodes monitored.

<table>
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<td>LOVATO ord. code</td>
<td>Q.ty</td>
</tr>
<tr>
<td>Quadro 1</td>
<td></td>
</tr>
<tr>
<td>RGK 800</td>
<td>1</td>
</tr>
<tr>
<td>EXP 1015</td>
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</tr>
<tr>
<td>Quadro 2</td>
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</tr>
<tr>
<td>RGK 800</td>
<td>1</td>
</tr>
<tr>
<td>DMG 210</td>
<td>1</td>
</tr>
<tr>
<td>Quadro 3</td>
<td></td>
</tr>
<tr>
<td>RGK 900</td>
<td>1</td>
</tr>
<tr>
<td>DMG 210</td>
<td>1</td>
</tr>
</tbody>
</table>

| Software/ licences to purchase |

Number of monitored RGK nodes is 4. Number of monitored DMG nodes is 3.