Ripple Control Receiver

Enermet RO

Product Description
## Revision history

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>26.08.09</td>
<td>First L+G version</td>
</tr>
<tr>
<td>a_za</td>
<td>06.07.10</td>
<td>Version for South Africa with RO3 Pictures</td>
</tr>
</tbody>
</table>
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1 Introduction

1.1 Ripple Control Receiver Enermet RO

Enermet RO is the universal Ripple Control receiver family of Landis+Gyr. With its identical housing for both the 3 and 5 switches version, a wide range of applications is covered by one product family.

Programming is performed via the optical interface either by means of the user-friendly PC program Enermet ROP or via the robust handheld Enermet ROH programming device.

The Enermet ROS receiver version offers an advanced plug-in PROM which is another convenient way of programming receivers, especially for field applications.

1.2 Documentation

As a completion of the present product description for the Enermet RO Product family, the following documents are also available:

- Descriptive Brochure Enermet RO
- Technical Data Sheet Enermet RO
- Operating instructions Enermet ROP
- Operating instructions Enermet ROPmobile

1.3 Terminology of the Enermet RO Product family

The Enermet RO Product family consists of a comprehensive set of products which are listed in the following table with their corresponding description.

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RO3</td>
<td>RO for up to three 25A/40A switches</td>
</tr>
<tr>
<td>RO5</td>
<td>RO for up to five 16A switches</td>
</tr>
<tr>
<td>RO3S</td>
<td>RO3 with plug-in PROM ROE</td>
</tr>
<tr>
<td>RO5S</td>
<td>RO5 with plug-in PROM ROE</td>
</tr>
<tr>
<td>ROA3</td>
<td>RO3 in housing according to UL standard for outdoor mounting</td>
</tr>
<tr>
<td>ROA5</td>
<td>RO5 in housing according to UL standard for outdoor mounting</td>
</tr>
<tr>
<td>ROA3S</td>
<td>RO3S in housing according to UL standard for outdoor mounting</td>
</tr>
<tr>
<td>ROA5S</td>
<td>RO5S in housing according to UL standard for outdoor mounting</td>
</tr>
<tr>
<td>ROP</td>
<td>PC software tool for programming</td>
</tr>
<tr>
<td>ROPmobile</td>
<td>Field programming application (run on Windows Mobile based PDAs)</td>
</tr>
<tr>
<td>ROH</td>
<td>Handy (portable programming device)</td>
</tr>
<tr>
<td>ROT</td>
<td>Tele-echo PC software (on-line logging of received transmissions)</td>
</tr>
<tr>
<td>ROE</td>
<td>Plug-in PROM (for ROS)</td>
</tr>
<tr>
<td>ROE-M</td>
<td>ROE with write-protection</td>
</tr>
<tr>
<td>ROG</td>
<td>Programming device for ROE (simultaneous programming of up to eight PROMs)</td>
</tr>
<tr>
<td>RON</td>
<td>Mains adapter for RO receiver (power supply for programming in the workshop)</td>
</tr>
<tr>
<td>ROL3</td>
<td>Strap connector for RO3 (25A switch)</td>
</tr>
<tr>
<td>ROL5</td>
<td>Strap connector for RO5</td>
</tr>
</tbody>
</table>
2 Types

2.1 Enermet RO types
The following RO types are available:

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Switch (plug in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RO3</td>
<td>RO with soldered data storage device</td>
<td>3 x 25 A change over contact or 3 x 40 A ON/OFF contact or any combination of 25A/40A switches</td>
</tr>
<tr>
<td>RO3S</td>
<td>RO with plug in PROM (ROE)</td>
<td></td>
</tr>
<tr>
<td>RO5</td>
<td>RO with soldered data storage device</td>
<td>5 x 16 A change-over contact</td>
</tr>
<tr>
<td>RO5S</td>
<td>RO with plug-in PROM (ROE)</td>
<td></td>
</tr>
<tr>
<td>ROA3</td>
<td>RO with soldered data storage device in housing according to UL standard</td>
<td>3 x 25 A change over contact or 3 x 40 A ON/OFF contact or any combination of 25A/40A switches</td>
</tr>
<tr>
<td>ROA3S</td>
<td>RO with plug in PROM (ROE) in housing according to UL standard</td>
<td></td>
</tr>
<tr>
<td>ROA5</td>
<td>RO with soldered data storage device in housing according to UL standard</td>
<td>5 x 16 A change over contact</td>
</tr>
<tr>
<td>ROA5S</td>
<td>RO with plug in PROM (ROE) in housing according to UL standard</td>
<td></td>
</tr>
</tbody>
</table>

2.2 Type code
The following type code contains relevant data for product identification purposes. The code is printed on the type label and is also stored in the receiver. In addition, the type code appears in the Enermet ROP programming software.

RO3S.031.06T

Backup-Clock T: with empty: without
Hardware version
Software version
Type

<table>
<thead>
<tr>
<th>Type</th>
<th>See chapter &quot;2.1 Enermet RO types&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software version</td>
<td>Version of the micro controller software</td>
</tr>
<tr>
<td>Hardware version</td>
<td>Version of the Enermet RO hardware</td>
</tr>
<tr>
<td>Backup clock</td>
<td>See chapter &quot;8 Optional Backup Clock&quot;</td>
</tr>
</tbody>
</table>

This example therefore describes a RO3S with software version 3.1, hardware version 06 and built-in backup clock.
3 Construction

All switches of the Enermet RO are of the plug-in type. Therefore, the receiver can easily be configured according to the corresponding application.

The following explosion drawings show the modular construction of the Enermet RO.

RO3S with printed circuit board, cover and plug-in PROM ROE, without switch and dummy

RO5 with 4 plug-in 16A switches and 1 dummy
4 Installation

4.1 Safety

This product is under electrical voltage and is permitted to be used only by instructed and qualified personnel.

4.2 Ways of installing

There are two different ways of installing the Enermet RO receiver.

4.2.1 Free installation

The Enermet RO is installed on a wall or separate terminal board. The mounting position is free. The two lower fixing holes are compatible with the predecessor products RE2 and RM3.

4.2.2 Piggyback installation

The Enermet RO is mounted on the terminal cover of an electricity meter (piggyback). In such a case, the meter terminal cover has to be according to the standard DIN 43861.
4.3 Connection diagram

Connection diagram for RO3 (25A/40A-Relais):

![Connection diagram for RO3](image)

Connection diagram for RO5 (16A-Relais):

![Connection diagram for RO5](image)

**Note**
- In case a strap connector is used, special attention has to be paid to the correct connection of phase and neutral leads
- Before connecting the receiver it has to be checked that the receiver’s nominal voltage complies with the mains voltage (see chapter "9 Technical Data”)

4.4 Terminals

The terminals are equipped with combined screws, which can be operated either with slit or cross type screw drivers. The permissible diameters of the leads as well as the sizes of the screw drivers are shown in the following table.

<table>
<thead>
<tr>
<th>RO type</th>
<th>Terminals</th>
<th>Lead diameter (stiff or flexible)</th>
<th>Type of screw driver</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>min. 1 x ...</td>
<td>max. 2 x ...</td>
</tr>
<tr>
<td>RO3 / RO3S</td>
<td>Mains</td>
<td>1.5 mm²</td>
<td>4 mm²</td>
</tr>
<tr>
<td></td>
<td>Switch 25 A</td>
<td>1 mm²</td>
<td>2.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Switch 40 A</td>
<td>1.5 mm²</td>
<td>4 mm²</td>
</tr>
<tr>
<td>RO5 / RO5S</td>
<td>Mains</td>
<td>1 mm²</td>
<td>2.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Switch 16 A</td>
<td>1 mm²</td>
<td>2.5 mm²</td>
</tr>
</tbody>
</table>

Dimensions of terminals:

![Dimensions of terminals](image)

4.5 Sealing

For proper sealing the screws of both the cover and terminal cover have to be equipped with a seal. Sealing is performed either with sealing wire or thread.

4.6 Operating state indication

The Enermet RO’s operating state is indicated by a green LED with different flashing modes (see chapter "9 Technical Data”)

D000030226a_z – Enermet RO – Product Description © Landis+Gyr AG
5 Electronic design

The electronic design is shown in the following block diagram:

<table>
<thead>
<tr>
<th>Component</th>
<th>Function Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC-Filter</td>
<td>Digital SC filter for the detection of the Ripple Control signal</td>
</tr>
<tr>
<td>Power supply, rectifier, watch dog</td>
<td>Supply and supervision of the electronic circuits</td>
</tr>
<tr>
<td>Micro processor</td>
<td>Processor for decoding of the telegrams and execution of switching actions</td>
</tr>
<tr>
<td>EEPROM</td>
<td>Memory for receiver specific data (parameters). With the receiver version ROS a part of this information is stored in the plug-in PROM ROE.</td>
</tr>
<tr>
<td>Relay driver</td>
<td>Control of the energy which is necessary for switching the receiver relays.</td>
</tr>
<tr>
<td>Switches</td>
<td>Max. 5 plug-in switches</td>
</tr>
<tr>
<td>LED</td>
<td>Light Emitting Diode for operating state indication</td>
</tr>
<tr>
<td>Optical interface</td>
<td>Infrared interface with protocol according to IEC 1107</td>
</tr>
<tr>
<td>Push button</td>
<td>Push button for function test (only for version ROS) With pressed push button all relays switch together with a rhythm of one second.</td>
</tr>
<tr>
<td>Option backup clock</td>
<td>Backup clock for bridging power failures (see chapter &quot;8 Optional Backup Clock&quot;)</td>
</tr>
</tbody>
</table>
6 Programming

The different possibilities of programming Enermet RO and RM receivers are shown in the following overview:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
</table>
| ROP       | Programming software with following interfaces:  
             • RS232/Infrared for RO3/RO5, RO3S/RO5S and ROG  
             • RS232 for ROH |
| ROH       | Handy with following interfaces:  
             • RS232 for ROP  
             • Infrared for RO3/RO5 and RO3S/RO5S |
| ROPmobile | Field programming application (run on Windows Mobile based PDAs)  
             Bluetooth interface with optical head |
| ROE       | Plug-in PROM for RO |
| ROG       | Programming device for ROE |
| RO3/RO5   | RO with soldered data storage device |
| RO3S/RO5S | RO with plug-in PROM |

7 Functions

For a full description of the functions of the Enermet RO please refer to the „Enermet ROP Operating instructions“
8 Optional Backup Clock

As a standard, the Enermet RO Ripple Control receiver operates on the basis of an internal clock which is used for the time programs, the learning function and the telegram memory. The clock goes by the mains frequency and can be synchronized by means of Ripple Control signals.

If a power down occurs, the current time is stored. When the power is restored, the saved time is loaded and the Enermet RO continues to operate with this time. Therefore, the interval of the power down will be lost. The time is not adjusted until the next synchronization process takes place via Ripple Control.

The backup clock is available as an option for backup during power down times. The main components of the backup clock are a real-time clock and a buffer capacitor for power failures. The optional backup clock is mounted on a separate circuit board which is soldered onto the standard circuit board in the manufacturing process.

8.1 Function with integrated Backup Clock

If a backup clock is installed, the Enermet RO still works with an internal time which goes by the mains frequency. If a power down occurs, the current time is loaded into the backup clock. During the power down the backup clock is powered by the buffer capacitor and continues to work. When the power is restored, the RO time is adjusted by the backup clock. In this way, the Enermet RO will still have the correct time even after a power down has occurred.

If the Enermet RO contains a backup clock, the internal RO time is also adjusted by means of the Ripple Control signal. Since, in the case of a power down, the current time is written into the backup clock, the backup clock can also be synchronized with Ripple Control.

8.2 Technical Data of the Backup Clock

<table>
<thead>
<tr>
<th>Power reserve with buffer capacitor:</th>
<th>&gt; 36h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charging time for buffer capacitor:</td>
<td>3h (for 36h power reserve)</td>
</tr>
<tr>
<td>Accuracy:</td>
<td>&lt; 3s after 36h power reserve at 25°C</td>
</tr>
<tr>
<td>Temperature stability:</td>
<td>&lt; 0.15s / °C / 24h during power reserve</td>
</tr>
<tr>
<td>Temperature range:</td>
<td>-25°C...+70°C</td>
</tr>
</tbody>
</table>
9 Technical Data

### Mains Voltage
105 V (-15 % ... +15 %)
120 V (-20 % ... +15 %)
230 V (-20 % ... +15 %)
240 V (-20 % ... +10 %)

### Mains Frequency
50 Hz, 60 Hz (-2 % ...+2 %)

### Power Consumption
1.2 W at 230 V, 50 Hz, typical

### Ripple Control Frequency
110 Hz ... 2'000 Hz, adjustable

### Bandwidth
110 Hz ... 2'000 Hz, adjustable

### Operating voltage
0.3 % ... 3.0 %, adjustable

### Ripple Control System
All standard Ripple Control systems

### Switches
Enermet RO3: 25 A change-over, 40 A On/Off
Enermet RO5: 16 A change-over
- all switches of plug-in type
- rated breaking voltage 250 V

### Temperature Range
Operating temperature: -25 °C ... +70 °C
Storage temperature: -30 °C ... +80 °C

### Impulse Voltage Resistance
1.2/50 μs / 10 kV

### Test Voltage and Radio Interference Level
According to IEC 62052-21 Ed. 1.0

### Housing
Insulated, self-extinguishing, sealable, recyclable

### Protection Class
IP 52

### Weight (fully equipped)
Enermet RO3: 575 g
Enermet RO5: 595 g

### Standards
All other data complies with the relevant standards (IEC 62052-21 Ed.1.0, IEC 62054-11 Ed. 1.0 and IEC 62054-21 Ed. 1.0) and recommendations.

### Programming
- via optical port (IEC 62056-21 Ed. 1.0) with programming software ROP or field programming application ROPmobile. Communication protected by password.
- option ROS: plug-in PROM (ROE)

### Operating State Indication
A flashing LED shows the operating state:
- passive, not receiving a signal: flashing rate 1.3 s
- active, receiving a signal: flashing rate 0.3 s
- before the first transmission (after Power ON or programming) or in Failsafe: flashing rate 5.1 s
- error: continuously ON

### Utility number
31 characters can be stored in the receiver

### ON / OFF Delay
0 s ... 9.8 s (0.2 s - steps)
10 s ... 999 min 59 s
plus random delay

### Random Delay
0 s ... 199 min 59 s

### Wiper
Waiting time: 0 s ... 999 min 59 s
plus random delay
Wiper time: 0.2 s ... 9.8 s (0.2 s - steps)
10 s ... 999 min 59 s

### For software version 3.2 only:
Wiper programmable to a or to b

### Standard / Air-conditioning Cycler
Delay time: 0 s ... 999 min 59 s
plus random delay
ON-time: 1 s ... 999 min 59s
OFF-time: 1 s ... 999 min 59s

### Loop
ON-time: 1 min ... 199 h 59 min
OFF-time: 1 min ... 199 h 59 min
**Timer**
Measuring time: 15, 30, 60 min
Reset time: 5, 9, 15 s

**Failsafe Function**
Failsafe time: 1 min ... 199 h 59 min
- Relay position A, B or unchanged
- Activating learning function
- Activating time program

**Learning Function**
24 h recording of switching operations. Initiate switching in failsafe status accordingly.

**Power Down**
Relay position A, B or unchanged

**Power On**
- Relay position A, B or unchanged
- Start time function
- Memory function
- Activating time program

**For software version 3.2 only:**
Programmable delay after power on

**Memory Function**
Delayed repetition of the last received command before Power Down
Memory time: 0 s ... 199 min 59 s
Memory random time: 0 s ... 199 min 59 s

**Relay Repetition**
Repetition of the relay status every 1 min

**Telegramm Memory**
Memory for the last received telegrams:
- 12 telegrams at DECABIT
- 8 telegrams for the other systems

**Telegramm Echo**
Output of the received telegrams via the optical port for logging on a PC/Notebook

**Receiver Setting**
Setting the clock, the relays and the time programs via the optical port.

**Time Synchronisation**
Max. 2 synchronisations per day by ripple control transmissions

**Time Program**
8 time programs with 2 ON/OFF-times
activating / deactivating:
- Ripple control transmission
- Power On
- Failsafe

**Option Backup-Clock**
Real Time Clock with super cap for power interruption up to 36 h

**Functional extensions with software version 3.2**
Full support for daylight saving time

**Accessories**
- Programming software Enermet ROP
- Field programming application Enermet ROPmobile
- Strap connector Enermet ROL
- Programming adaptor Enermet RON
- Meter terminal cover for installation according to DIN 43857 T5

**Dimensions**
(all dimensions in mm)