

ECOLOG-NET LR8

Operation Manual



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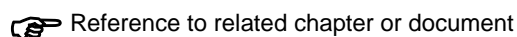
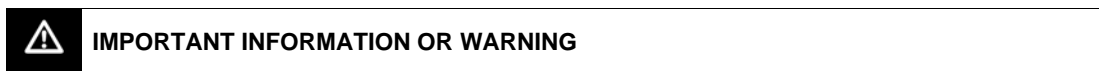
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 In the interest of our customers, we reserve the right to make changes due to ongoing technical development. As a result, images, descriptions and scope of delivery are not binding!
This manual is valid for firmware version 1.02 elproLOG ANALYZE 3.63

Symbols & description codes used

Symbols



Software

elproLOG ANALYZE
elproLOG ANALYZE QLS

For a detailed description, see elproLOG ANALYZE the operation manual (SE3003E) or the software's online help files

elproLOG MONITOR




For a detailed description, see elproLOG MONITOR operation manual (SM3002E) or the software's online help files

elproLOG CONFIG

For a detailed description, see elproLOG CONFIG the operation manual (SC3001E) or the software's online help files

Technical modifications - CE - WEEE


In the interest of our customers, we reserve the right to make changes due to ongoing technical development. As a result, images, descriptions and scope of delivery are not binding!

-  - This product is subject to CE marking.
-  - The manufacturer guarantees that this product complies with the relevant guidelines: EN 61000-6-2 : 2001 and EN 61000-6-4 : 2001
-  - This product must be disposed of in accordance with WEEE (Waste electrical and electronic equipment, 2002/96/EC)!

1. Product description


The radio datalogger system from ELPRO-BUCHS AG consists of a network-capable (LAN) radio datalogger ECOLOG-NET LR8 as receiving terminal and various radio sensors for detecting temperature and humidity values.

Up to 8 radio
sensors
64000 measured
values
Alarms



1.1 Radio datalogger

The ECOLOG-NET LR8 is a datalogger for recording up to 8 radio sensors and a maximum of 64,000 measured values. The measured values are transmitted via radio to the datalogger and from there, via the local network to the PC. In the event of a power outage, all data is retained and the internal clock continues to run.

The radio datalogger ECOLOG-NET LR8 is equipped with a 10/100 BaseT network connection. All logger functions and network configurations can be performed via this connection  3.7.1 Assign network address.

USB connection
LAN connection

In addition, the datalogger is equipped with a USB connection. This connection can be used for the parameterization of the datalogger in the event that no network connection is available. No network parameters can be defined, however. In the event that both connections are busy, no data exchange is possible via the LAN.

The datalogger requires an external power supply for the operation of the LAN interface. After connection to the power supply, it takes approximately 1 minute until the datalogger responds via the LAN.

In order to obtain a flawless USB connection, the following operational sequence should be followed:

1. Connect the power supply to the datalogger and turn on the PC
2. Once both devices are ready for use, connect the USB cable
3. The Windows driver for the utilized USB connection must be installed. If the appropriate driver is missing, it can be installed using the elproLOG ANALYZE software CD.
4. elproLOG ANALYZE: Options - connection options - RS232 & 57600 (Hoseries 4) & select appropriate COM port.

There are multiple possibilities for local alerting:

Alarm

- Alarm indicator on the display
- Alarm buzzer
- Alarm contacts

With the elproLOG MONITOR software, alarms can be registered and relayed over the network.

Casing

The ECOLOG-NET LR8 has a screwed connection(SMA) for the antenna on the upper side of its casing. The ECOLOG-NET LR8 has a number of electrical connections on the left side of its casing. The front side of the casing has a large LCD display and the membrane keypad.

Battery discharge protection

The removal of the battery discharge protection creates the first "system reset" entry in the datalogger status!

After removal, it is necessary to wait about 10 sec. until the datalogger is operational.

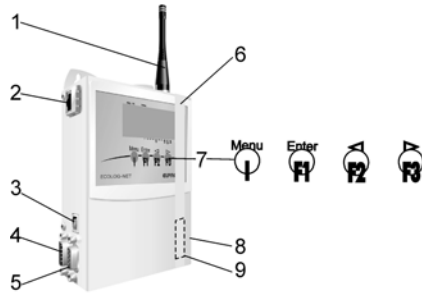


Figure 1

- 1. Antenna
- 2. Network connection
- 3. USB connection
- 4. Power supply, digital inputs & alarm output
- 5. Alarm output
- 6. Battery discharge protection
- 7. Membrane keypad with 4 buttons
- 8. Type label with ID number and IP address
- 9. Battery (inside the logger)

1.2 Radio sensors

Using the available radio sensors, temperature and humidity values can be detected and transmitted via radio to the base station (ECOLOG-NET LR8). The radio sensors work autonomously and are supplied with power via internal batteries.

On the front side there is a status display (green/red LED) and a type label which documents the radio sensor designation and the ID number of the sensor.

A radio sensor can be connected with up to 2 sensing devices.
 A humidity/ temperature sensor corresponds to 2 sensors in the elproLOG ANALYZE and elproLOG MONITOR software if both measured values are recorded.

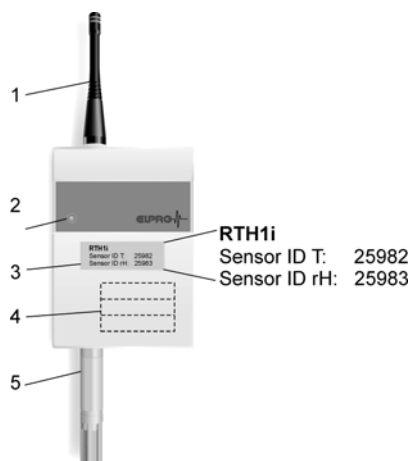


Figure 2

- 1. Antenna
- 2. Status display 4.1 Initial startup and 4.2 Operation
- 3. Type label with ID numbers
- 4.3 batteries (inside the radio sensor)
- 5. Sensor, i.e. humidity or temperature sensor

Types of radio sensors 7.3 Radio sensors

2. General instructions and safety guidelines

2.1 Antenna position

The 433/886/915MHz range (always dependent upon the structural conditions of the building such as cement ceilings, water pipes etc.) is approx. 100m in a typical office environment 7.1 Radio settings.

Range approx.
1000m

With this type of antenna, the signal is emitted at right angles from the antenna. The direction can be visualized as being like a CD that is skewered on the antenna. This makes it clear that it is best for the antenna to be placed vertically, pointing upward, so that it transmits to all rooms on the same floor. If the antenna is placed horizontally, reception is best on the floors above and below. The worst reception is when the radio sensor antenna is pointed directly at the radio datalogger. For optimal reception, the radio sensor should be in the line of sight of the radio datalogger.

In which direction
should
the antenna
point?

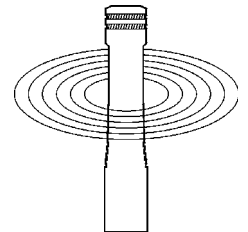
Metal objects such as shelves, reinforced concrete walls, ventilation and energy shafts, but also the opening of a refrigerator door can lead to the weakening of the signal. This kind of effect is usually very much limited to the location.

Moving the radio sensor within an area of 2.5 meters (sometimes just a few centimeters) is usually adequate to completely change the reception (4.1.2 Transmitted frequency & radio channel). Move the radio sensor forward, backward, up and down within this area. The radio datalogger / radio sensor should always be mounted at least 1.5m above the ground.

If no direct line of sight to the radio datalogger is available, the angular position (angle in relation to the horizontal axis and rotation of direction) can improve reception.

Placing the datalogger / radio sensors in an open stairwell is an additional possibility to avoid one or more reinforced steel ceilings that are an obstacle.

For additional details regarding the antennas 7.1 Radio settings



2.2 Temperature influence

Outside of the set limits (7.2.1 Use) the functions are no longer guaranteed. Experience shows that at storage temperatures below -50°C, the battery freezes, measurements are no longer taken and setpoint tracking may be temporarily interrupted. Once it has been returned to room temperature, this logger must be reprogrammed before it can be used again.

- At temperatures below - 20°C, the display is longer easily readable. Long term use is not affected, however.
- For long term use above 40°C, lithium battery passivation can lead to temporary reading problems (self-discharge protection), which can be resolved with repeated utilization.
- At temperatures above 45°C, battery self-discharging is increased and with long term use above 45°C, the battery lifetime can be reduced by about 1/3.
- Exposure to temperatures above 55°C can result in permanent discoloration of the display.

2.3 Exceptional environmental conditions

Pay attention to the following when using the datalogger in exceptional environmental conditions:

- IR radiation (heat) and superheated steam can damage the surface coating of the casing
- There is a risk that the battery may explode if the logger is used under microwave irradiation

Initial startup

THE RADIO DATALOGGER MUST BE AT ROOM TEMPERATURE BEFORE INITIAL STARTUP!

2.4 Precautionary measures when handling devices containing lithium batteries

*Lithium
batteries*




- Do not short-circuit and charge batteries: Explosion hazard
- Do not throw units which contain batteries into fire: Explosion hazard
- Do not subject batteries to mechanical stress and do not dismantle them as leaking battery fluid is highly corrosive and lithium can generate severe heat when it comes into contact with moisture or can ignite a fire.
- Do not heat battery operated units to temperatures exceeding 100°C: Explosion hazard
- Avoid violent blows
- Follow the manufacturer specifications for storing batteries
- Return batteries to the supplier for correct waste disposal


3. Radio datalogger

3.1 Transmitted frequency, radio channel & antenna


The transmitted frequency and the channel used are defined using the software elproLOG ANALYZE . Three frequency bands, 433MHz and 868MHz for Europe and 915MHz for the USA can be selected. Antennas will be delivered with appropriate color coding depending upon the country .

Antennas 

The default setting is channel A / 868MHz for Europe and channel A / 915MHz for the USA.

Default settings 

Transmission disturbances can be resolved by selecting a different channel. There are up to 16 channels available depending upon the transmitted frequency. When using multiple LR8 dataloggers, it is recommended that each datalogger be operated on a separate channel.


Transmission disturbances 

 7.1 Radio settings

3.2 LAN & USB Connection

The ECOLOG-NET LR8 is equipped with a 10/100 Base T network connection. All logger functions and network configurations can be carried out via this connection.

In addition, the datalogger is equipped with a USB connection. This connection can be used for parameterization and for data readout if no network connection is available. No network parameters can be defined, however. In the event that both connections are busy, no data exchange is possible via the LAN.

The radio datalogger requires an external power supply for operation. After connection to the power supply it takes approximately 1 minute until the radio datalogger is responsive via the LAN connection. For additional network information see  ECOLOG-NET Service manual IT6001A This manual can be found on the ELPRO homepage at [www.elpro.com/Download/Data Sheets/ ECOLOG-NET networkable datalogger](http://www.elpro.com/Download/Data%20Sheets/ECOLOG-NET%20networkable%20datalogger).

LAN

in order to obtain a flawless USB connection, the following operational sequence should be followed:

USB

1. Connect the power supply to the datalogger and turn on the PC
2. Once both devices are ready for use, connect the USB cable
3. The Windows driver for the utilized USB connection must be installed. If the appropriate driver is missing, it can be installed using the elproLOG ANALYZE software CD.
4. elproLOG ANALYZE: Options - connection options - RS232 & 57600 (Hoseries 4) & select appropriate COM port.

The ECOLOG-NET LR8 datalogger can be equipped with a PoE option. This option makes it possible to operate the datalogger without any additional external power supply. For operation using a switch that supports PoE, the following points are to be taken into consideration:

PoE

- The datalogger supports the standard IEEE 802.3 af, however without the phantom power supply
- PoE does not work on a Gigabit Ethernet.

This diagram shows the pin assignment in accordance with IEEE 802.3 af with spare pairs and color coding in accordance with T568B:

Part no. 2370
The functioning of the PoE module is indicated by a green LED on the PoE module (inside of the back panel)

- 1 orange / white RX+
- 2 orange RX-
- 3 green / white TX+
- 4 blue V+
- 5 blue / white V+
- 6 green TX-
- 7 brown / white V-
- 8 brown V-

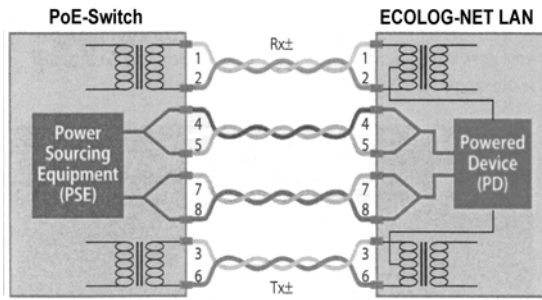


Figure 3

3.3 Display

Large LCD display for measured values, units and conditions

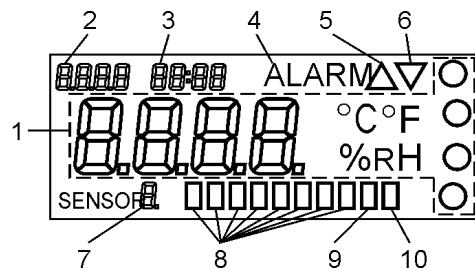


Figure 4




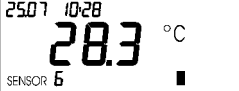




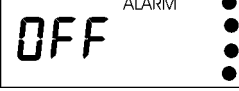












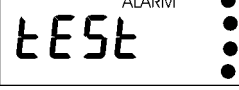



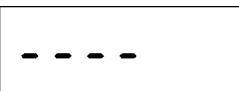
- 1. Measured value with unit
- 2. Date or communication via USB or LAN connection
- 3. Time
- 4. Alarm
- 5. Measured value is above upper threshold value
- 6. Measured value is below lower threshold value
- 7. Sensor number
- 8. Flag alarm from sensor 1...8
- 9. Data logging running
- 10. Battery low
Activated when the capacity limit of the battery has been reached. The battery must be changed at the next opportunity (see 3.8 Maintenance).

Battery low

Display on/off


In the event that no measured values are to be displayed, the radio datalogger display can be switched off. The display is switched on and off using the elproLOG ANALYZE software - Additional settings - Configure logger display... - Logger display off. Correct data logging is indicated by 4 small circles in the measured values display. For testing purposes, the measured values display may temporarily be switched on using the keypad.

3.4 Menu

| | |
|---|--|
| <p>1 Power saving mode</p>  | <p>4  only appears if the logger is in power saving mode and is recording data. The measured value display can be activated for a few seconds by pressing the menu button.</p> <p> Temporary jump to menu item 2</p> |
| <p>2 Measuring mode</p>  | <p> Jump to menu item 3 or 4 or 5; depending upon the situation</p> |
| <p>3 Start</p>  | <p>Only appears when the datalogger is in start/stop mode and is waiting for the start time. StoP, ALA, dISP  6.1.1 <i>Display & elproLOG ANALYZE</i></p> <p> Jump to menu item 5</p> |
| <p>4 Acknowledgment</p>  | <p>Appears when there is an alarm or when the "self-sustaining" function is selected and an alarm is registered.  3.7.4.1 <i>Window: Alarm parameters setup</i></p> <p> Jump to menu item 5</p> <p> Reset alarm display and alarm contacts as well as entry of the reset time in the alarm log and exit menu, jump to menu item 8</p> <p> Exit menu, jump to menu item 8</p> |
| <p>5 Functions</p>  | <p> Jump to menu item 6</p> <p> Timestamp indicated as D2 and exit menu, jump to menu item 8  3.6 <i>Digital inputs D1 and D2</i></p> <p> Exit menu, jump to menu item 8</p> |
| <p>6 LCD display test</p>  | <p> Jump to menu item 7</p> <p> Exit menu, jump to menu item 8</p> |
| <p>7 Alarm output test</p>  | <p> Jump back to menu item 4 or 5</p> <p> OFF - ON - OFF</p> <p> Exit menu, jump to menu item 8</p> |
| <p>8 Exit menu</p>  | <p>Automatic jump back to menu item 1 or 2 or 3</p> |

 **ERROR 5: MODULE DOES NOT RESPOND DURING DATA READ-OUT**
 - THE RADIO DATA LOGGER IS NOT IN MEASURING MODE
 - PRESS F1/F3 TO EXIT THE MENU



3.5 Threshold value function / alarm parameters

The ECOLOG-NET LR8 has a feature for monitoring threshold values. The threshold values are defined separately for each individual sensor  3.7.4 *Definition of threshold values and alarm parameters*.

The ECOLOG-NET LR8 can signal a threshold violation / an alarm in several ways:

Threshold violation



1. A threshold violation is shown on the display with an alarm flag and two arrows; signaling is always sensor-specific  3.3 *Display*. They are only visible for the duration of the threshold violation. This status is not logged
2. The text: ALARM is displayed when the conditions for an alarm are fulfilled and depending upon the selected alarm output (self-sustaining).
3. If an alarm is triggered, the ECOLOG-NET LR8 has a collective alarm function. This function is simultaneously activated with the text: ALARM activated  3.5.1 *Functioning of the collective alarm contact* and 7.2.3 *Alarm - connection diagram*.
4. After the alarm delay time is up, an alarm is not registered in the memory until the subsequent log interval has elapsed.. All threshold violations / alarms are registered in the alarm protocol, even when they are shorter than the defined log interval!

Acknowledging alarm messages



Alarm messages can be acknowledged manually by using the PC software or the keypad.

Monitoring threshold values



**THRESHOLD VALUES ARE CHECKED IN ONE MINUTE CYCLES. IF THE DISPLAY IS SWITCHED OFF, THE TEXT : ALARM AND ALA WILL BE DISPLAYED WHEN THE APPROPRIATE CONDITIONS ARE MET.
IF THE RADIO DATALOGGER IS IN STOP MODE, THRESHOLD VALUES WILL NO LONGER BE MONITORED.**

3.5.1 Functioning of the collective alarm contact

The ECOLOG-NET LR8 has 4 possibilities for alarm signaling:

- Relay contact S
This is a potential-free switch-over contact. The contact switches when an alarm is triggered or when the external power supply fails.
- Semiconductor contact alarm 1
Only reacts when there is an alarm
This is a semiconductor break contact at the datalogger GND
- Semiconductor contact alarm 2
Only reacts when there is an alarm
This is a semiconductor switch at the datalogger GND
- Integrated buzzer
Serves as an acoustic alarm

Alarm signaling:

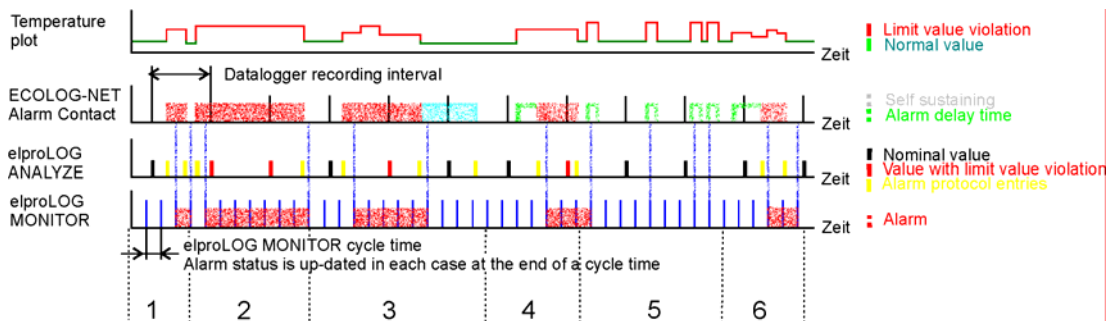
- Relay contact
- Alarm 1
- Alarm 2
- Buzzer



☞ 3.7.4 Definition of threshold values and alarm parameters

☞ Wiring: 7.2.2 Connections

3.5.2 Time response collective alarm



1 Alarm is shorter than the radio datalogger's log interval

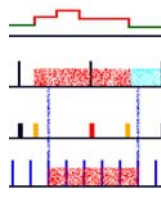
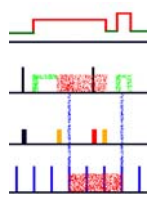
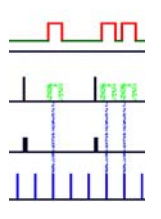
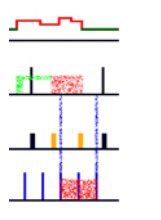


- | | |
|---------|---|
| LR8 | Alarm contact responds immediately. |
| ANALYZE | No alarm measurement, because the alarm is shorter than the log interval, alarm protocol with 2 entries - alarm on/off. |
| MONITOR | Represents an alarm for 1 cycle time. Alarm status is updated at the end of a cycle time. |

2 Alarm is logged



- | | |
|---------|---|
| LR8 | Alarm contact responds immediately. |
| ANALYZE | 2 alarm measurements, alarm protocol with 2 entries - alarm on/off. |
| MONITOR | Represents an alarm over 7 cycle times. |

- 3 Alarm with self-retention; logged**
- 
- LR8 Alarm contact responds immediately.
- ANALYZE 1 alarm measurement, alarm protocol with 2 or 3 entries - Alarm on/off/acknowledged.
- MONITOR Represents an alarm till the end of the limit value violation (5 cycle times). The duration of the self-retention period is not represented as an alarm.
- 4 Alarm with delay time; logged**
- 
- LR8 Alarm contact reacts after the delay time has elapsed
- ANALYZE 1 alarm measurement, alarm protocol with 2 entries - alarm on/off. "Alarm on" is logged after delay time has elapsed.
- MONITOR Represents an alarm over 3 cycle times. The end of the third cycle already falls in a new, delayed alarm and therefore it is not recognized as an alarm.
- 5 Reset of delay time by short threshold value violations**
- 
- LR8 Alarm contact does not react. Even in the case of repeated, short threshold value violations, no alarm is logged since the time delay starts from the beginning each time.
- ANALYZE No alarm measurement, no entries in the alarm protocol.
- MONITOR Represents no alarm.
- 6 Alarm with time delay not logged**
- 
- LR8 Alarm contact reacts after the delay time has elapsed
- ANALYZE No alarm measurement, alarm protocol with 2 entries - alarm on/off.
- MONITOR Represents an alarm over 3 cycle times.

3.6 Digital inputs D1 and D2

**Both inputs are busy with dual functions!
In each case, only one function should be used!**

| Function | Possible configurations | | | |
|------------------|-------------------------|-------------|--------------|---------------------------|
| Assign | D2 key | D2 key | Assign | D2 key |
| Defrost input | D1 external | | D1 external | |
| Alarm forwarding | | D1 external | D2 external# | D1 external & D2 external |

D2 key See function F2, timestamp designated as D2 3.4 Menu
This function can be used to register incidents such as a watchman's patrol on the logger.

D1 external As defroster input(3.7.4 Definition of threshold values and alarm parameters) or for alarm forwarding.

Wiring external power supply digital inputs & alarm

For alarm forwarding.

Wiring external power supply digital inputs & alarm

- The status of D1 and D2 is not recorded in the alarm protocol and has no influence on the alarm contacts. They are first logged to memory on the radio datalogger at the end of the following recording interval in memory. In the elproLOG ANALYZE measurement table, both contacts are represented as D1, D2 or MarkPos.
- Alarm forwarding is used in combination with the software: elproLOG MONITOR elproLOG MONITOR. The status (alarm / no alarm) of the contacts is checked during the update of the monitor data. Status changes between two updates are not detected.

Alarm forwarding

3.7 Configuring the radio datalogger

In preparation for installation, the assignment of the radio sensors to the radio dataloggers and the network addresses being used should be defined.

Additional preparatory steps include:

- Definition of the threshold values
- Configuration of the alarm outputs
- Function of the digital inputs

Assignments


3.7.1 Assign network address

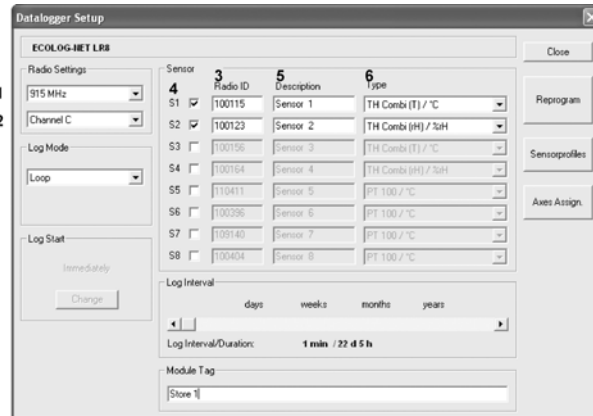
In order to be able to identify each radio datalogger in a network environment, each radio datalogger receives a unique network address. This address is made up of 3 pieces of information: IP address, subnet mask and default gateway. For the elproLOG ANALYZE & elproLOG MONITOR programs, we recommend the use of a fixed IP address.


In order to avoid network conflicts, the network administrator must assign the addresses! These 3 pieces of information must be manually entered into every radio datalogger using the Digi Device Discovery Digi Device Discovery software.

*Digi Device
Discovery
Fixed IP*

3.7.2 elproLOG ANALYZE - Datalogger setup

Of the 8 ECOLOG-NET LR8sensors, 4 user-defined measurement categories can be represented in the elproLOG ANALYZE software  3.7.2.2 Axis assignment.


Radio datalogger
setup 


The window "Datalogger Setup" is used to define the radio and measurement parameters.

Radio parameters


1. Select list for the transmitted frequency
2. Select list for the radio channel being used
3. Radio ID

The assignment of the measuring channels to the ID numbers corresponds to the definitions on the type label.

ID number 

 **THE RADIO SENSORS ARE PROVIDED WITH FIXED ID NUMBERS DURING PRODUCTION THAT CANNOT BE CHANGED BY THE ELPROLOG ANALYZE SOFTWARE. THIS WAY IT CAN BE ASSURED THAT EACH NUMBER IS ONLY ASSIGNED ONCE. DATA CAN ONLY BE CAPTURED IF THE SELECTED TRANSMISSION FREQUENCY AND THE CHANNEL FOR THE RADIO DATALOGGER AND ITS RADIO SENSORS ARE IDENTICAL.**

Sensors

4. S1 ... S8
Check boxes are used to select sensors for recording.
 5. Description
Free text box
 6. Type
One of the predefined measurement ranges can be assigned to the measuring channel.
-  4. Radio sensors

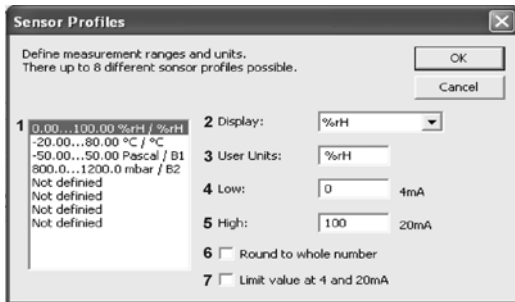
Measurement parameters

The measuring parameters are general guidelines that depend upon the monitoring function being performed.

- Mode
- Log start
- Log interval
- Module description
- Close, program

3.7.2.1 Sensor profile

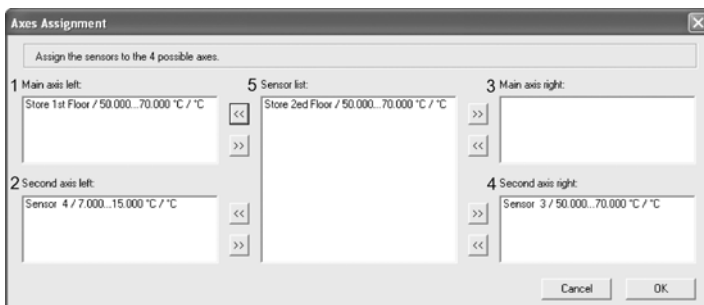
Open the window to parameterize the radio sensors that are appropriate to the connection of 4-20mA transmitters.



1. By selecting a profile, it is possible to define the measurement range and the unit
 ☞ Items 2 to 6.
2. Menu for selecting the measurement units shown on the display.
 The measurement units °C, °F and %rH are represented on the display. For all other units, select one of the 4 items (items 1 to 4). The items are numbered from top (1) to bottom (4) (☞ 3.3 Display).
3. The graphic function of the elproLOG ANALYZE software can represent up to 4 independent y-axes.
 Each of these axes can be assigned its own measurement unit.
 The unit text may not contain a semicolon (;) since this character is used by default as a separating character for communication with the elproLOG MONITOR.
4. Measurement scaling in accordance with sensor settings for the lower limit of the measurement range.
5. Measurement scaling in accordance with sensor settings for the upper limit of the measurement range.
6. Scaled measurements are rounded and represented as whole numbers.
7. Limit function for measurement values outside of the measurement range for the defined range.
 Measurements above the measurement range result in O.F.
 Measurements below the measurement range result in U.F.
 N.C. is not shown
 ☞ 6.1 Radio datalogger

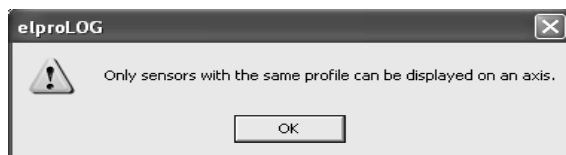
3.7.2.2 Axis assignment

Open the window that enables the assignment of sensors to the 4 representable Y axes in the elproLOG ANALYZE graphic.




1. Main axis left
2. Auxiliary axis left
3. Main axis right
4. Auxiliary axis right
 The difference between the 4 axes may be in range or value. The main axes are the dominant axes in the scaling of the graphic.
5. List of all possible sensors that are not yet assigned to an axis.

Unit &
measurement
range







Only sensors with the same unit and the same measurement range may be assigned to the same axis.

 elproLOG ANALYZE Function: Overlaying
At present, mutual overlaying is not available for the ECOLOG-NET LR8.

3.7.3 elproLOG ANALYZE - Extended setup



| Name | Function |
|--|---|
| Direct calibration through the input of values ... | This function is used to calibrate the sensors. |
| Set calibration date | This function enters the current date as the calibration date into the status of the radio datalogger. |
| Definition of the alarm thresholds... |  3.7.4 <i>Definition of threshold values and alarm parameters</i> The internal buzzer is also switched on/off in this window |
| Reset alarm | This function is used to acknowledge an alarm message. |
| Set date and time... | Used to adjust the internal clock on the radio datalogger. |
| Configure logger display... |  3.3 <i>Display</i> |
| Configure communication settings... | Settings for terminal mode communication  D-HC-6001Ax |
| Set temperature unit... | Selection of temperature units used. A selection can be made between °C and °F. |
| Change password... | Set a password. Delete: Entering a password in the "old password" line alone deletes the password |
| Programming of battery change time... | This function restarts the radio datalogger after a battery replacement ( 2. <i>General instructions and safety guidelines</i>). |

3.7.4 Definition of threshold values and alarm parameters

Threshold values and alarm parameters are defined in the "Alarm parameters setup" window. Threshold monitoring is only performed by sensors that have been specified in the measurement function. An alarm is triggered by the following conditions:

Conditions



- The measured value must be outside the defined tolerance range, i.e. the measured value is higher than the maximum allowable threshold value or lower than the minimum allowable threshold value.
- The threshold violation must exceed the defined alarm delay times.
- The threshold violation remains active until the measured value reaches the defined tolerance range again.

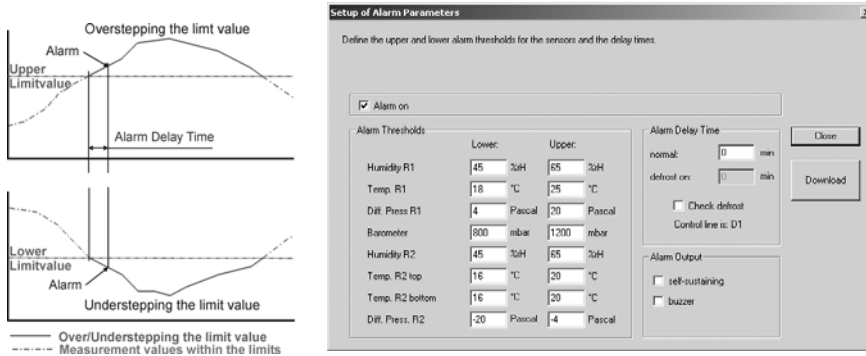


Figure 4



3.7.4.1 Window: Alarm parameters setup

| Name | Function |
|------------------|---|
| Alarm on | Activate this checkbox to switch on the alarm threshold function, 3.5 Threshold value function / alarm parameters. |
| Alarm thresholds | Input fields for the lower and upper threshold values. - normal An alarm is not triggered until the threshold violation has lasted longer than the specified time. |
| Alarm delay time | - defroster on If the "Check defroster" function is active and defrost contact D1 is closed, then an alarm is not triggered until the threshold violation has lasted longer than the time specified at this enter field. |
| Alarm output | This mode is used for all applications where the alarm contact controls an external device such as a flash or a telephone dialing unit. - No selection made The text: ALARM is displayed for the duration of the threshold violation. The alarm contact is closed for the duration of the threshold violation. - self-sustaining This mode is used for all applications where the alarm contact controls an external device such as a flash or a telephone dialing unit. The text: ALARM is displayed until a manual reset is executed. The alarm contact remains closed until a manual reset is executed. - buzzer Switches the buzzer on and off |
| Close / write | These buttons are used to program the datalogger and to close the "Alarm Parameters Setup" window |

3.8 Maintenance

Maintenance schedule


To ensure proper datalogger functioning, the following steps should be part of a periodic maintenance schedule:

- Perform radio datalogger readout and save the data
- Test the alarm function, if implemented
- Check the quality of the radio connection to the radio sensors ( 4.1.2 *Transmitted frequency & radio channel*)
- Change battery ( 7.5 *Dimensional drawings*)
(Part No. 2820, set of 2, can be stored for at least 5 years / lithium 3.6V, 2100mAh, AM3/LR6/AA)

Battery

Monitoring of the battery is based on an energy consumption count. For this reason, only the specific manufacturer recommended battery should be used. Do not remove the battery from the logger when it is not in use. The use of other batteries or removal of batteries will produce incorrect status information at the battery indicator.


Replacing battery

 **AFTER THE BATTERIES ARE CHANGED, THE BATTERY CHANGE TIME MUST BE RESET (ELPROLOG ANALYZE SOFTWARE - EXTENDED SETUP - PROGRAMMING BATTERY CHANGE TIME...) OTHERWISE THE ENERGY COUNTER WILL NOT FUNCTION CORRECTLY!**

3.8.1 Battery

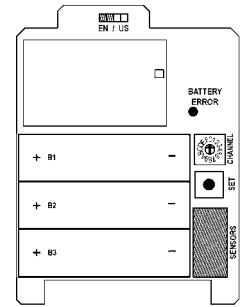
In the current version, battery life in the radio datalogger ECOLOG-NET LR8 is approx. 3 months with a complete loss of power (backup). All of the logged data is retained. This condition is represented by 4 small circles in the measured value display.

Battery life

 No data is logged (<=min).

4. Radio sensors

The radio sensor casing contains various operating equipment, 3 batteries and the sensor connections.



i Technical data and the assignment of terminals in the :SENSORS" field 7.3 Radio sensors.

Radio sensor types

Temperature

- RT1i 1 internal temperature sensor
- RT1e 1 external PT100 temperature sensor
- RT2e 2 external PT100 temperature sensors
The external PT100 sensors can be used with 3- or 4-wire connections.

Temperature & humidity

- RTH1i 1 internal humidity or temperature sensor
- RTH1e 1 external humidity or temperature sensor with 3m cable

After use in high humidity, it can take up to 2 days before the humidity value can again be correctly read. In order to shorten this recovery time, the sensor can be dried in a heating cabinet at 40°C.

High humidity

4.1 Initial startup

4.1.1 Batteries

BATTERY ERROR

This LED lights up red when the battery is inserted incorrectly.



SET key

The battery counter is reset by pressing and holding the SET key (6 seconds).



4.1.2 Transmitted frequency & radio channel

The transmitted frequency and the radio channel used are defined using the positions of the internal switch. Three frequency bands, 433MHz and 868MHz for Europe (EN) and 915MHz for the USA (US) can be used. When using multiple LR8 dataloggers, it is recommended that each datalogger be operated on a separate channel. 7.1 Radio settings



i Appropriate antennas are to be used for every frequency band.

SET key


By quickly pressing the SET key (1 second), the settings are acknowledged and the test of the radio connection is started. The test lasts approx. 2 seconds. The test result is represented by repeated color blinking in the status display at a rate of 1 per second.







Status display - test result

| Quality of the radio connection | | Blinks, number | Color |
|---------------------------------------|------|----------------|-------|
| good radio connection | 100% | 5 | green |
| | 80% | 4 | green |
| | 60% | 3 | green |
| | 40% | 2 | green |
| poor radio connection | 20% | 1 | green |
| No radio connection or wrong settings | | 1 | red |

In the event of a poor test result, shifting the radio sensor can lead to an improvement in the radio connection  [2.1 Antenna position](#).


If no radio connection can be established, the transmitted frequency and the channel settings should be checked. A radio connection is only possible if all of the radio sensors being used and the assigned radio datalogger have the same setting  [Status of the radio datalogger in elproLOG ANALYZE](#).

If the radio channel needs to be changed during operation, it is necessary to briefly press the SET key after selecting the new channel.

Changing the radio channel 

4.2 Operation

Undisrupted operation is indicated by a green, blinking light on the status display at intervals of 15 seconds.


Status display 



Status display - operation

| Quality of the radio connection | Blinks, number | Color |
|---------------------------------------|----------------|-------|
| good radio connection | 1 | green |
| No radio connection or wrong settings | 1 | red |

Battery counter


The condition of the batteries is documented in the radio datalogger status  [elproLOG ANALYZE](#).

4.3 Maintenance

To ensure proper datalogger functioning, the following steps should be part of a periodic maintenance schedule:

*Maintenance
schedule*



- Calibrate radio sensors
- Replace batteries  7.5 *Dimensional drawings*
(Part No.2820-A, set of 3, can be stored for at least 5 years / lithium 3.6V, 2100mAh, AM3/LR6/AA)

Monitoring of the battery is based on an energy consumption count. For this reason, only the specific manufacturer recommended battery should be used. Do not remove the battery from the logger when it is not in use. The use of other batteries or removal of batteries will produce incorrect status information at the battery indicator.

Replacing battery



After the new batteries are installed, the display in the ECOLOG-NET LR8 changes from "n.c." to the measured value display.

*Measured value
display*



AFTER THE BATTERIES ARE CHANGED, THE SET KEY MUST BE PRESSED AND HELD FOR 6 SECONDS, OTHERWISE THE ENERGY COUNTER WILL NOT FUNCTION

5. Installation

The following chapter describes the step by step sequence of actions for the initial startup of the radio datalogger and its radio sensors.


*Connection
test*



1. Mount radio datalogger and radio sensors as per the network planning at the site of operation and connect the sensors.

PING



2.  4.1.2 *Transmitted frequency & radio channel*


3. Communication test LAN
Check communication - PING

Checking the network configuration and function test of the communication with elproLOG ANALYZE and checking the quality of the radio connection to the radio sensors

*elproLOG
CONFIG*



4. elproLOG CONFIG

The purpose of this software is to facilitate the organization of the datalogger in the network environment. The dataloggers can be combined into groups or logical units within the network. Both elproLOG ANALYZE and elproLOG MONITOR work with this information. For more information about the use of this software, see  SC3001D.

*elproLOG
ANALYZE*




5. elproLOG ANALYZE
Parameterizing the datalogger,  3.7 *Configuring the radio datalogger*.

*elproLOG
MONITOR*



6. elproLOG MONITOR

This program is used for the online measured value display. For a detailed description of the functions and application, see  SM3001D.

7. Verification of the installation

Check the installation and ensure that sensor positions, alarm parameters and network addresses are correct. Current calibrators can be used as an aid in simulating defined measured values.

8. Documentation

Documentation for the implemented configurations. Log the network parameters on a status printout from the radio datalogger.

IP address



Record IP address on the type label of the radio datalogger. This is the easiest way to identify the radio datalogger at installation!

6. Status and error messages

6.1 Radio datalogger


6.1.1 Display & elproLOG ANALYZE

Display elproLOG ANALYZE


| | | |
|------|----------------|---|
| ALA | -- | Additional alarm text in the power saving mode |
| CON | -- | Radio datalogger is communicating with the software |
| USB | -- | Communication via the USB connection |
| LAN | -- | Communication via the LAN connection |
| dISP | Measured value | The measured value is outside of the range that can be displayed (-999 ... 9999). The measured values are however correctly logged. |
| Strt | -- | Datalogger is waiting for the log start time programmed at menu item: Datalogger setup |
| StOP | -- | Radio is in Start/Stop mode and the memory is full. No further measured values can be logged. In order to resume data logging, the logger must be reprogrammed. This is the condition upon delivery of ECOLOG-NET LR8 |
| U.F. | U.F. | The radio never had a connection to the radio datalogger. |
| C.Fd | C.F. | Faulty radio datalogger |
| N.C. | N.C. | No sensors connected |

6.1.2 Status in elproLOG ANALYZE

This error message appears in the radio datalogger status report in line: Module time. The cause of this error message can, for example, be a battery change if the battery change time was not programmed (👉 3.8 Maintenance).

RAM IMG-BMP destroyed 

This error message can appear in the radio datalogger status report in the line: "Last reprogrammed on". It is the result of the dataloggerreset counter. All entries in the alarm protocol will be erased!


System resets since last reprogramming 

The condition of the batteries (radio datalogger & radio sensors) is presented in the status information (elproLOG ANALYZE) of the radio datalogger.

Battery change: 👉 maintenance, see: 3.8 Maintenance

Battery 

The version of the firmware is documented in the status.

Firmware 


6.1.3 Messages in elproLOG MONITOR

Text

| | |
|-------|---|
| UNDEF | Undefined |
| G.F. | General Error |
| S.C. | Short Circuit |
| N.C. | Not Connected, loss of radio connection |
| O.F. | Range Overflow |
| U.F. | Range Underflow - the radio sensor never had a connection to the radio datalogger |
| C.FO | Conversion Failure Overflow, no sensors connected |
| C.FU | Conversion Failure Underflow |
| C.FD | Conversion Failure Data |
| C.FG | Conversion Failure General |
| DISP | Display Range Error |

6.2 Radio sensor

6.2.1 Status display

| | |
|----------------------------------|--|
| Operation | Blinks green at an interval of 10 seconds |
| Failure | The interruption of the radio connection is indicated by a red blinking light at an interval of 10 seconds. Reestablishing the radio connection can take up to 1 minute. |
| Connection test | Blinks green / red  4.1.2 <i>Transmitted frequency & radio channel</i> |
| In the housing: BATTERY ERROR | This LED lights up red when the battery is inserted incorrectly. |

6.2.2 Status in elproLOG ANALYZE

Batteries

The condition of the 3 batteries is displayed in the status information (elproLOG ANALYZE) of the radio dataloggers.

Battery exchange:  maintenance, see: 4.3 *Maintenance*

Assignments

Information regarding the sensor data and the assignment of the radio sensors to the radio datalogger is documented in the status of the radio datalogger.

7. General

Additional product information can be found on the elproLOG ANALYZE CD-ROM.

CD-ROM

7.1 Radio settings

Europe / USA

| Frequency band | Europe | America |
|--------------------|--|--|
| 433 MHz 868 MHz | permitted frequencies | May not be used! These frequency bands are already assigned to satellite flight and mobile communication! |
| 915 MHz | May not be used! This frequency band is reserved for railway radio! | permitted frequency |

| Channel | Europe | | America | |
|---------|------------|-----------------------------|-----------|-----------------------------|
| | ETSI (MHz) | Color coding of the antenna | FCC (MHz) | Color coding of the antenna |
| 0 - 9 | 433 | red | 915 | yellow |
| A - F | 868 | gray | 915 | yellow |

Antenna

- External, omnidirectional
- 1/4 wavelengths
- Synthetic whip
- RP-SMA connection
- The range is approximately 1000m in open areas and with line of sight

| Frequency band (MHz) | Signal weakening at a distance of: | | | |
|----------------------|------------------------------------|--------|------|--------|
| | 10m | | 100m | |
| | dB | Factor | dB | Factor |
| 433 | 45 | 180 | 65 | 1800 |
| 868 | 51 | 360 | 71 | 3600 |
| 915 | 51.5 | 380 | 71.5 | 3800 |

Signal weakening in air

This example makes the dramatic relation between free space damping and transmission frequency very clear.

The damping factor for solid materials is 4 - 6 times higher than the factor for free space damping (air).

7.2 Radio datalogger

7.2.1 Use

| | |
|-----------------------------|--|
| Operating range | -30°C ...55°C |
| Interval | 1min ...3h |
| Protection class | IP30 |
| external power supply U_B | 10 ...30VDC 12VDC; up to 1.6A starting current, 140mA operation 24VDC; up to 1.6A starting current, 70mA operation |

7.2.2 Connections

The DB9 connectors of the ECOLOG-NET LR8 are to be wired as follows:



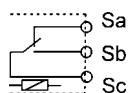
Figure 5

1. RJ45 for network connection
2. USB connection for local analysis and programming
3. Alarm
4. external power supply, digital inputs and alarm

Alarm

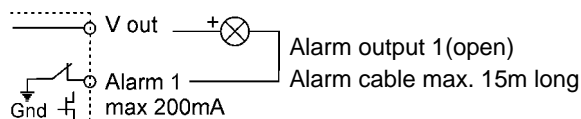
| Pin | Signal | Function |
|-----|---------|---------------------------------------|
| 1 | Sb | Alarm switch (relay contact) |
| 2 | Gnd | Mass |
| 3 | Gnd | Mass |
| 4 | Alarm 1 | Alarm output |
| 5 | V out | Alarm power supply (logger operating) |
| 6 | Sc | Alarm switch (relay contact) |
| 7 | Sa | Alarm switch (relay contact) |
| 8 | Gnd | Mass |
| 9 | Gnd | Mass |

Alarm switch
Alarm output 1



Alarm switch (relay contact)

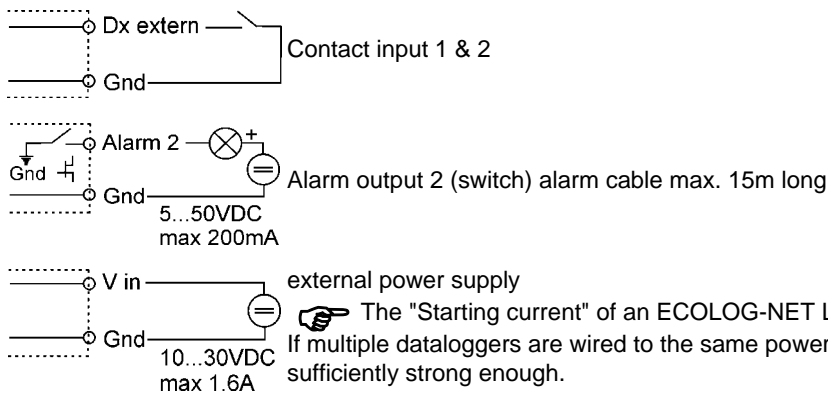
Alarm switch (relay) represented in dead state.
This relay is actuated as soon as the power supply is available.



| Pin | Signal | Function |
|-----|-----------|--|
| 1 | Alarm 2 | Alarm output |
| 2 | D1 ext. 1 | Contact input |
| 3 | D2 ext. 2 | Contact input |
| 4 | Gnd | Mass |
| 5 | V in | external power supply (logger operating voltage) |
| 6 | Gnd | Mass |
| 7 | Gnd | Mass |
| 8 | Gnd | Mass |
| 9 | Gnd | Mass |

**external power supply
digital inputs &
alarm**

⚠ FOLLOW THE SAFETY AND APPLICATION INSTRUCTIONS FOR THE NETWORK DEVICE.



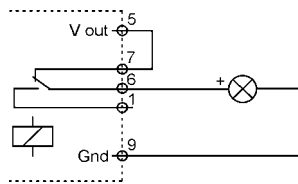
*Contact input
1 & 2
Alarm output 2
external power
supply*

⚡ The "Starting current" of an ECOLOG-NET LR8 is 1.6A
If multiple dataloggers are wired to the same power supply unit, it has to be sufficiently strong enough.

7.2.3 Alarm - connection diagram

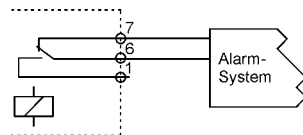
**Connector 3
Plug white**

Alarm = threshold violation



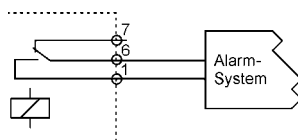
- Alarm: Contact open
- Radio datalogger requires an external power supply for signaling [7.2.2 Connections](#)
- Switching load max. 42VAC or VDC; 500mA

Alarm = threshold violation or failure of external power supply



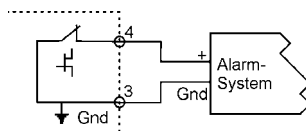
- Alarm: Contact open
- Switching load max. 42VAC or VDC; 500mA

Alarm = threshold violation, failure of external power supply or cable break



- Alarm: Contact open
- Switching load max. 42VAC or VDC; 500mA

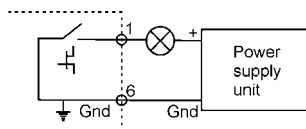
Alarm = threshold violation or cable break



- Alarm: Contact open
- Radio datalogger does not need external power supply
- Switch load max. 24VDC; 200mA

**Connector 4
Plug red**

Alarm = threshold violation



- Alarm: Contact closed
- Behaves like ECOLOG datalogger
- Signalization has its own power supply
- Switch load max. 24VDC; 200mA

7.3 Radio sensors

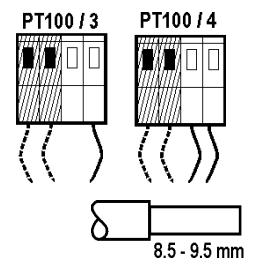
7.3.1 RT1i - 1 internal temperature sensor

| | | |
|-------------------------------|--|------------|
| Operating range | -30°C ...55°C, non-condensing | |
| Protection class | IP54 | |
| Power supply / operating time | 3 internal lithium batteries / 2-3 years | |
| Measurement range / sensors | -30°C ...55°C / PT100 | |
| Precision | 25.1°C ...55.0°C | +/- 0.65°C |
| | -10.0°C ...25.0°C | +/- 0.40°C |
| | -30.0°C ...-10.1°C | +/- 0.65°C |



7.3.2 RT1e - 1 external temperature sensor RT2e - 2 external temperature sensor

| | | |
|-------------------------------|--|------------|
| Operating range | -30°C ...55°C, non-condensing | |
| Protection class | IP54 | |
| Power supply / operating time | 3 internal lithium batteries / 2-3 years | |
| Measurement range / sensors | -200°C ...200°C / PT100 | |
| Precision | 25.1°C ...200.0°C | +/- 0.50°C |
| | -10.0°C ...25.0°C | +/- 0.30°C |
| | -10.0°C ...25.0°C DIN A | +/- 0.40°C |
| | -200.0°C ...-10.1°C | +/- 0.50°C |



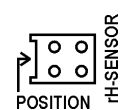
Sensor connection

The terminal assignment for the PT100 sensors is presented in the adjacent figure. PT100 sensors with 3 or 4 leads can be used.

In order to guarantee that the sensor cable has good contact, the lead ends should have between 8.5 - 9.5mm of the insulation stripped

7.3.3 RTH1i - 1 internal temperature & humidity sensor RTH1e - 1 external temperature & humidity sensor

| | | | | |
|-------------------------------|--|-----------|---------------|----------|
| Operating range | -30°C ...55°C, non-condensing | | | |
| Protection class | IP50 | | | |
| Power supply / operating time | 3 internal lithium batteries / 2-3 years | | | |
| Measurement range / sensors | -30°C ...55°C / 0 ...100%rF / combined T/rF measurements | | | |
| Precision | 25.1°C ...70.0°C | +/- 1.0°C | 90.1% ...100% | +/- 3.0% |
| | 0.0°C ...25.0°C | +/- 0.5°C | 10.1% ...90% | +/- 2.0% |
| | -35.0°C ...-0.1°C | +/- 1.0°C | 0% ...10% | +/- 3.0% |




When combining T/rF-sensors, the plug position must taken into account. The plug is used for internal or external sensors

7.4 Part No. System & Accessories

7.4.1 Radio datalogger system

| Part No. | Function |
|----------|---|
| 27153 | ECOLOG-NET LR8 Radio datalogger |
| 3456 | RT1i radio sensor - 1 x internal temperature |
| 3452 | RT1e radio sensor - 1 x external temperature |
| 3454 | RT2e radio sensor - 1 x external temperature |
| 3450 | RTH1i radio sensor - internal temperature & humidity |
| 3448 | RTH1e radio sensor - external temperature & humidity with 3m connection cable |
| 2370 | PoE Option; cannot be retrofitted |

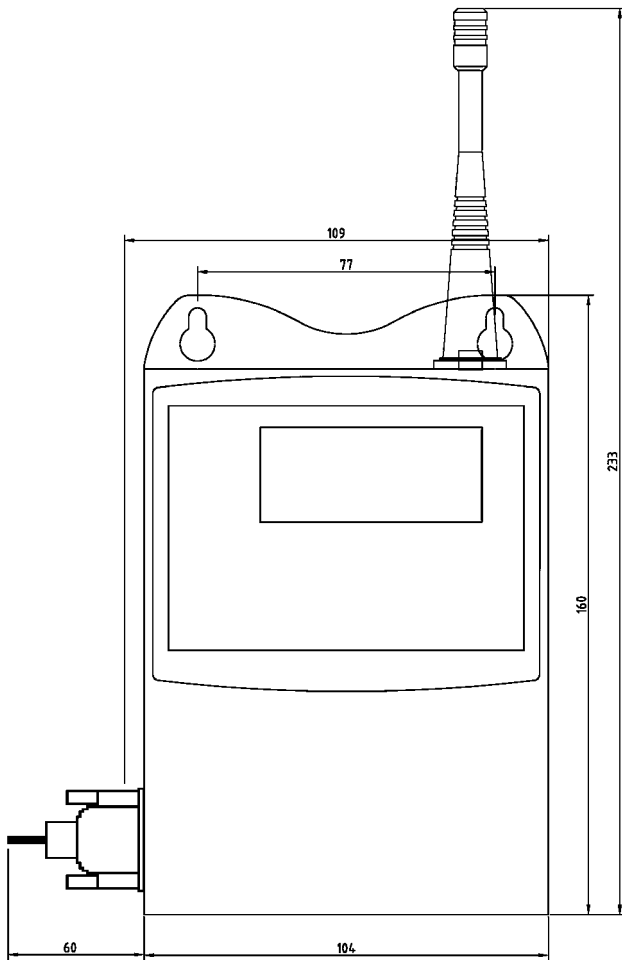
7.4.2 Accessories

Please keep the transmitter power requirements in mind. Where necessary, use a network device with higher performance. 

| Part No. | Name |
|----------|---|
| 2750-V12 | Network device with plug DB9 12V 0.7A [#] |
| 2750-V24 | Network device with plug DB9 24V 0.35A [#] |
| 2751-V24 | Network device with plug DB9 24V 1.6A [#] |
| 2754-WS | Plug DB9, male, alarm, white |
| 2754-RT | Plug DB9, female, power supply, red |
| 2758-SET | Set with 2m patch, crossover and USB cable |
| | Set with 2 antennas: |
| 2760-EU | Antenna, 433 MHz band ETSI, red & antenna, 868 MHz Band ETSI, gray Included in scope of delivery |
| 2760-US | Antenna 915 MHz band FCC, yellow Included in scope of delivery |
| 31xx-xx | Diverse PT100 sensors |
| 3460-A | T/rF replacement sensor |
| 2820 | Replacement battery, set of 2, can be stored for at least 5 years, for radio datalogger |
| 2820-A | Replacement battery, can be stored for at least 5 years, for radio datalogger |
| 2311-xx | Various alarm blinkers |

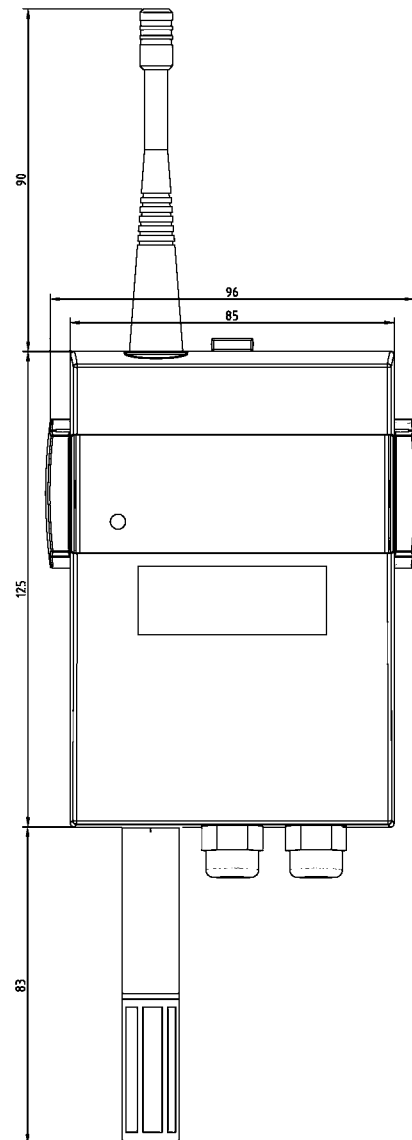
7.5 Dimensional drawings

Radio datalogger



Housing depth 50mm

Radio sensor



Housing depth 50mm

8. Approvals

8.1 Wireless Communication reliability

The communication reliability for the Elpro wireless sensor system, often referred to as Quality of service (QoS) is based on the following principles:

"The used modulation is of the "Gaussian Frequency-Shift Keying (GFSK)" type. This is a type of frequency shift keying modulation that uses a Gaussian filter to smooth positive/negative frequency deviations:

- Multi channel operation - ETSI/FCC compatible
- Address match for detection of incoming package
- Automatic retransmission of data packages
- Automatic CRC and preamble generation
- Build in test function for the radio signal
- Listen before talk (LBT) for the 433 and 868 MHz band
- Use of frequency hopping in the 915MHz band to gain higher output power
- Limited number of sensors and transmitters used
- Installation requirements

Risk assessment for Receivers and Transmitters

The Elpro wireless system is made up of a receiver and a transmitter function in the wireless datalogger and in each wireless sensor. The receivers are divided into three classes, each having its own set of minimum performance criteria. The classification is based upon the impact the equipment has on persons in case of a failure.

The Elpro wireless sensor system complies to a class 2 system:
A failure causes loss of function but not physical risk of a person

8.2 ETSI

The standards used in the evaluation of this product establish the threshold values for use in residential areas, business and commercial areas as well as in small businesses whereby the use of the product is intended for a business environment.

This includes the following, typical sites and spaces:

- Residential buildings/living spaces such as houses, apartments and rooms, etc.;
- Retail areas such as stores, supermarkets, etc.;
- Business premises such as municipal offices, banks, etc.;
- Entertainment businesses such as cinemas, public establishments, etc.;
- Outdoor locations such as gas stations, parking lots, sports facilities, etc.;
- Small business offices such as workshops, service centers, etc.

All areas of application are characterized by the fact that they are connected to the public low-voltage power supply. When using in a location in a severely electromagnetically disrupted environment such as typical industry environments, problems are likely to occur as a result of the product's inadequate interference immunity.

R&TTE Guideline 99/5/EG

EN 300 220-1 V2.1.1 (2006-04) EN 60950-1 (2006-11)

EN 300 220-2 V2.1.2 (2007-06)

EN 301 489-1 V1.8.1 (2008-04)

EN 301 489-3 V1.4.1 (2002-08)

EMV Guideline 2004/108/EG

EN 55022 (2008-05)

EN 50130-4 (2003-09)

EN 50371 (2002-11)

Low Voltage Directive 2006/95/EG

EN 60650-1 (2006-11)

EN 61000-6-1 (2007-10)

EN 61000-6-3 (2007-09)

8.3 FCC

In the USA, the FCC (Federal Communications Commission) regulates the use of frequencies for RF equipment. CFR 47 part 15 (Code of Federal Regulations) covers the unlicensed ISM bands. This is usually referred to as FCC part 15. All equipment must be certified with the FCC with the issuance of a Grant of Authorization by the FCC. When the product is approved, the FCC issues an identification number which the product must be marked with.

The part 15 sections for ISM band radios are:

- 15.35: General rules for certification measurements
- 15.109: Radiated emission limits for unintentional radiators
- 15.205: Restricted bands of operation
- 15.209: Radiation limits for intentional radiators
- 15.247: Frequency Hopping and Spread Spectrum (FHSS), operation within the bands 902 - 928MHz, 2400 - 2483.5 MHz

Spurious emissions and restricted bands

A large part of the FCC Part 15 is about the limit of spurious emissions (harmonic component) and restricted bands. The main concept behind part 15 is that a general set of rules must be followed, but with exceptions for different application and frequency bands.

Emissions are divided into two parts:

- Unintended radiators, like receivers and transmitters in standby or other radiators requirements are given in 15.109
- Intended radiators, like active transmitters requirements are given in 15.209

There is a number of restricted frequencies according to 15.205 which can not be used for active transmissions, but spurious emissions can be produced. The levels are given in EIRP, Electrical Field Strength Power, at a distance of 3 meters

| Frequency | Electrical Field Strength | EIRP |
|------------|---------------------------|----------|
| 216-960MHz | 200V/m | -49.2dBm |

White Paper

915MHz band

Section 15.249 gives the opportunity to use the 902-928MHz band with a output power of 50mV/m at 3 meters or -1.2dBm. The harmonics are limited to 500V/m or -41.2dBm. This band is commonly referred to as the 915MHz band in the USA. There are no restrictions on duty cycle or the application.

Even higher output power can be used according to section 15.247. This implies the use of frequency hopping. The following requirements must be fulfilled for the use of the 902-928MHz band under section 15.247:

- Hopping channels shall be separated by minimum 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater.
- The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies.
- If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.
- If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.
- The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- Maximum peak conducted output power is 1W in the 902-928MHz band if more than 50 hopping channels are used. The limit is 0.125W for 25 to 50 hopping channels.

FCC STATEMENT

This product has been tested and complies with the specifications for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used according to the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which is found by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment or devices
- Connect the equipment to an outlet other than the receiver's
- Consult a dealer or an experienced radio/TV technician for assistance
- FCC Radiation Exposure Statement
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

Further information

More information regarding the FCC rules and requirements are found at:

<http://www.fcc.gov>

ETSI standards are found at:

<http://www.etsi.org>

The CEPT/ERC rec 70-03 are found at:

<http://www.ero.dk>

The ARIB STD-T66 regulation is found at:

<http://www.arib.or.jp/english/index.html>

The Australian/New Zealand Standard AS/NZS 4268:2003 are found at:

<http://www.standards.org.au>

8.4 INDUSTRY CANADA (CANADA)

This Class B digital apparatus complies with Canadian ICES-003, RSS210.

The use of this device in a system operating either partially or completely outdoors may require the user to obtain a license for the system according to the Canadian regulations.

8.5 Conclusion

The data transfer between wireless dataloggers and wireless sensors could be seen as a safe way to exchange data.

This conclusion is valid as long as the wireless datalogger system is secured against any kind of fraud from the inside or outside of the company. This security task has to be fulfilled by the company internal IT department or other related departments.

Revision History

| Author | Date | Version | Description |
|-----------|------------|---------|---------------|
| A. Gubler | 11/02/2010 | -- | First edition |

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