IOR Family

Technical Handbook

Contents

1 Introduction

1.1 About This Manual

This manual is an installation and programming manual for the home care phone accessories in the IOR Family. In all sections where configurable functions are described, there is an instruction of how to make the programming.

Configuration can be done in two ways:
1. Mounting or removing jumpers on the PCB inside the unit
2. Programming from a computer with *NEAT Programming Unit* (NPU).

A programming instruction for the NPU can have an appearance as below:

INKA IOR REPO	Send mains failure alarm	Choose "Yes/function on" in list box 303

1.2 Overview

1.2.1 INKA – Radio Transmitter for Wired Inputs

Radio transmitter INKA is intended to monitor wired inputs. When one of the inputs is activated a radio signal will be sent to the receiving unit, which is normally either a home care phone (NEO) or a portable transceiver (TREX or HOME). The unit can handle up to five inputs, three of which are digital and two that can be configured as digital or analog. The analog inputs can either continuously monitor a level or just take a sample value when one of the other inputs is activated.

INKA has the appearance as in the picture below. The size of the plastic cover is 65 x 65 x 23 mm, not including the mounting flanges. The width with the mounting flanges is 89 mm and the distance between the mounting holes is 76 mm.

Under the lid there are two batteries, size AAA (LR03). There is also a LED, a button and 6 jumpers for basic configuration of the unit.

INKA front view   *INKA inside view*
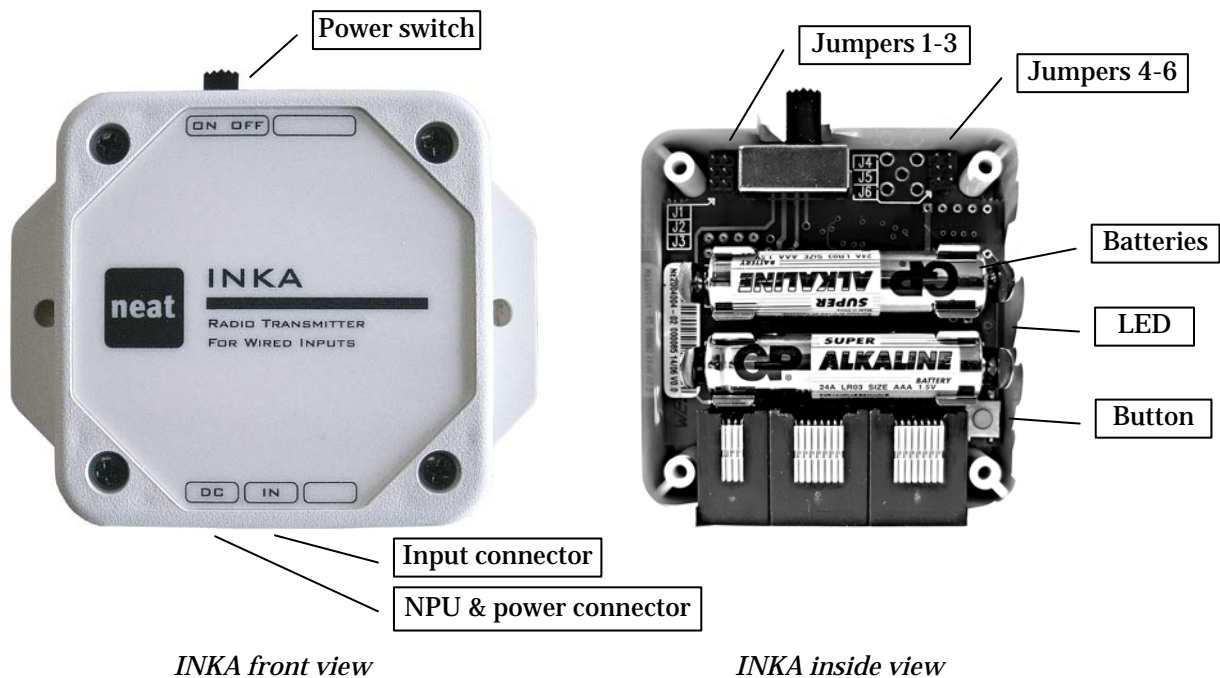
1.2.2 IOR – Radio Transceiver for Wired I/O

Radio transceiver IOR is intended to monitor wired in- and outputs. When one of the inputs is activated a radio signal will be sent to the receiving unit, which is normally either a home care phone (NEO) or a portable transceiver (TREX or HOME). When IOR itself has received a pre-programmed radio code, usually from an ATOM or an INKA, the output will be activated. The unit can handle up to five digital inputs and one output. The output can be configured to have a pulse, toggle or static function.

IOR has the appearance as in the picture below. The size of the plastic cover is 65 x 65 x 23 mm, not including the mounting flanges. The width with the mounting flanges is 89 mm and the distance between the mounting holes is 76 mm.

Under the lid there is a rechargeable 3.6V NiMH-battery. There is also a LED, a button and 6 jumpers for basic configuration of the unit.

IOR front view   *IOR inside view*
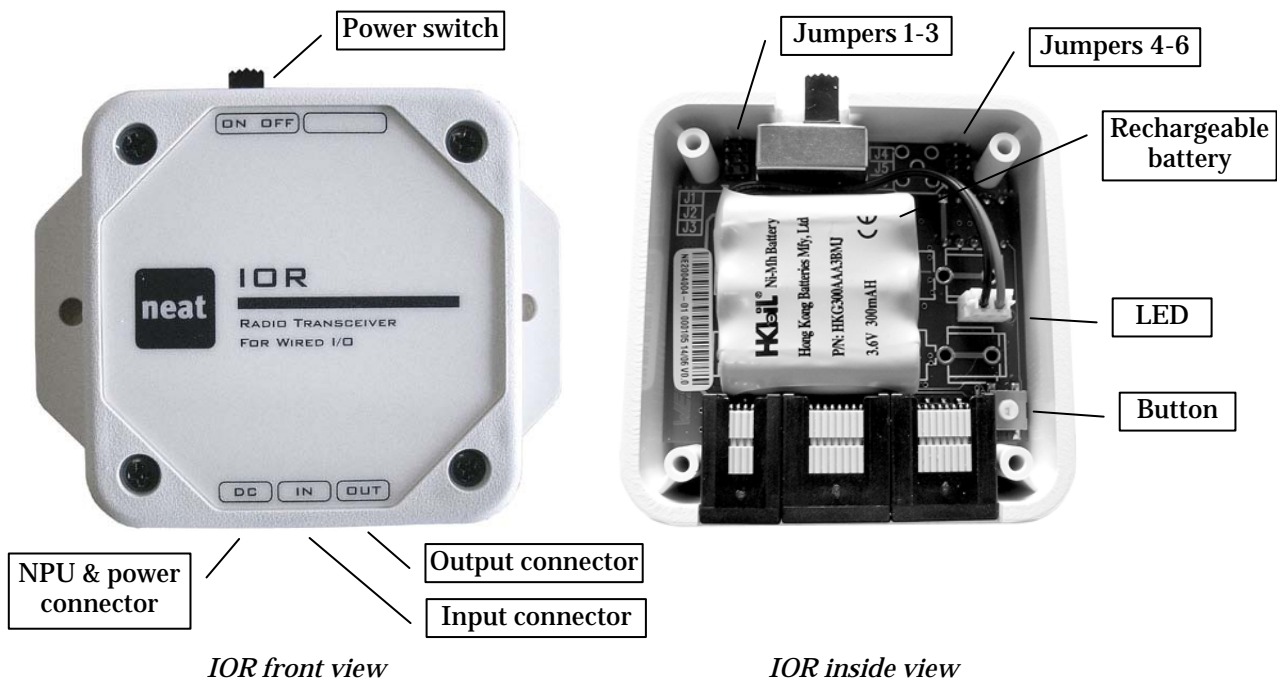
1.2.3 REPO – Radio Repeater

Radio repeater REPO is intended to extend the radio coverage area for home care phones and its auxiliary equipment. When a signal from an ATOM or INKA is received, the signal will be forwarded by REPO with a higher output power level. The unit may be configured to retransmit either all radio signals or just a number of signals with pre-programmed codes. Up to eight radio codes can be pre-programmed.

REPO has the appearance as in the picture below. The size of the plastic cover is 65 x 65 x 23 mm, not including the mounting flanges or the external antenna. The width with the mounting flanges is 89 mm and the distance between the mounting holes is 76 mm. The length of the antenna is 52 mm.

Under the lid there is a rechargeable 3.6V NiMH-battery. There is also a LED, a button and 6 jumpers for basic configuration of the unit.

Antenna

Power switch

Jumpers 1-3

Antenna connector

Jumpers 4-6

Rechargeable battery

LED

Button

NPU & power connector

REPO front view   *REPO inside view*

1.2.4 REPO+ Radio Repeater with Extended Range

Radio repeater REPO+ is used to extend the radio coverage area between a transmitter and a receiver from NEAT Electronics. REPO+ has higher output power than the regular REPO, which gives a transmission range of up to 600 m at social alarm frequency 869.2125 MHz and up to 2.5 km at general alarm frequency 869.4125 MHz.

The unit may be configured to listen for alarms at either 869.2125 MHz or 869.4126 MHz or both, and to transmit at either 869.2125 MHz or 869.4125 MHz. All configurations are done with a computer with the software IOR Programmer and the NEAT Programming Unit (NPU).

REPO+ has the appearance as in the picture below. The size of the plastic cover is 85 x 63 x 28 mm, not including the mounting flanges or the external antenna. The width with the mounting flanges is 111 mm and the distance between the mounting holes is 98 mm. The length of the antenna is 41 mm.

Under the lid there is a rechargeable 3.6V NiMH-battery. There is also a push-button which can be used to transmit the radio code used for technical alarms.

REPO+ front view

REPO+ inside view
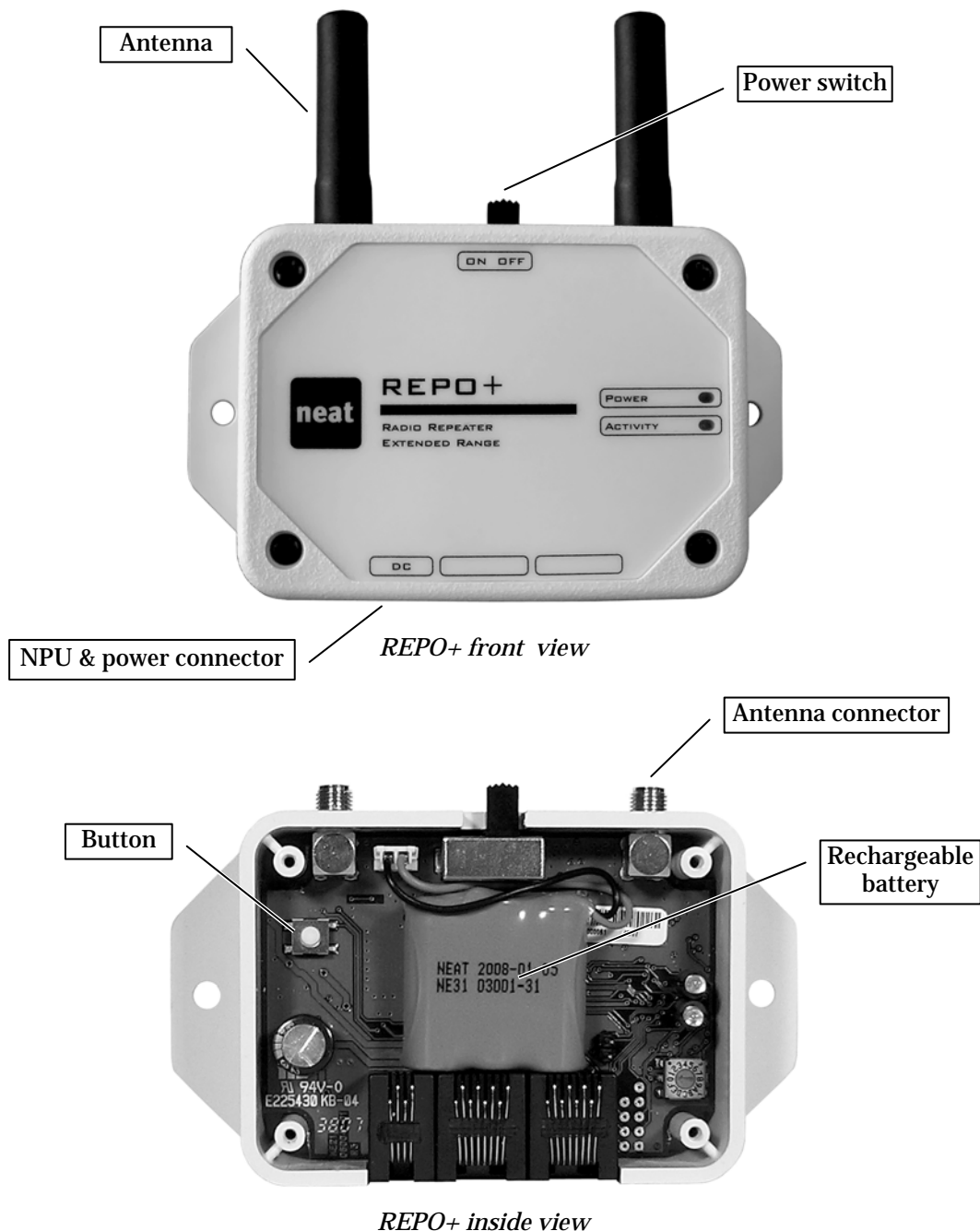
1.2.5 LINK – Radio Receiver

Radio Receiver LINK is intended to be used together with ATOM or INKA as a stand-alone solution. When a radio signal with a pre-programmed radio code is received the output of the LINK will be activated. The unit can handle up to eight pre-programmed ATOM or INKA. The output can be configured to have a pulse, toggle or static function.

LINK has the appearance as in the picture below. The size of the plastic cover is 65 x 65 x 23 mm, not including the mounting flanges. The width with the mounting flanges is 89 mm and the distance between the mounting holes is 76 mm.

Under the lid there is a rechargeable 3.6V NiMH-battery. There is also a LED, a button and 6 jumpers for basic configuration of the unit.
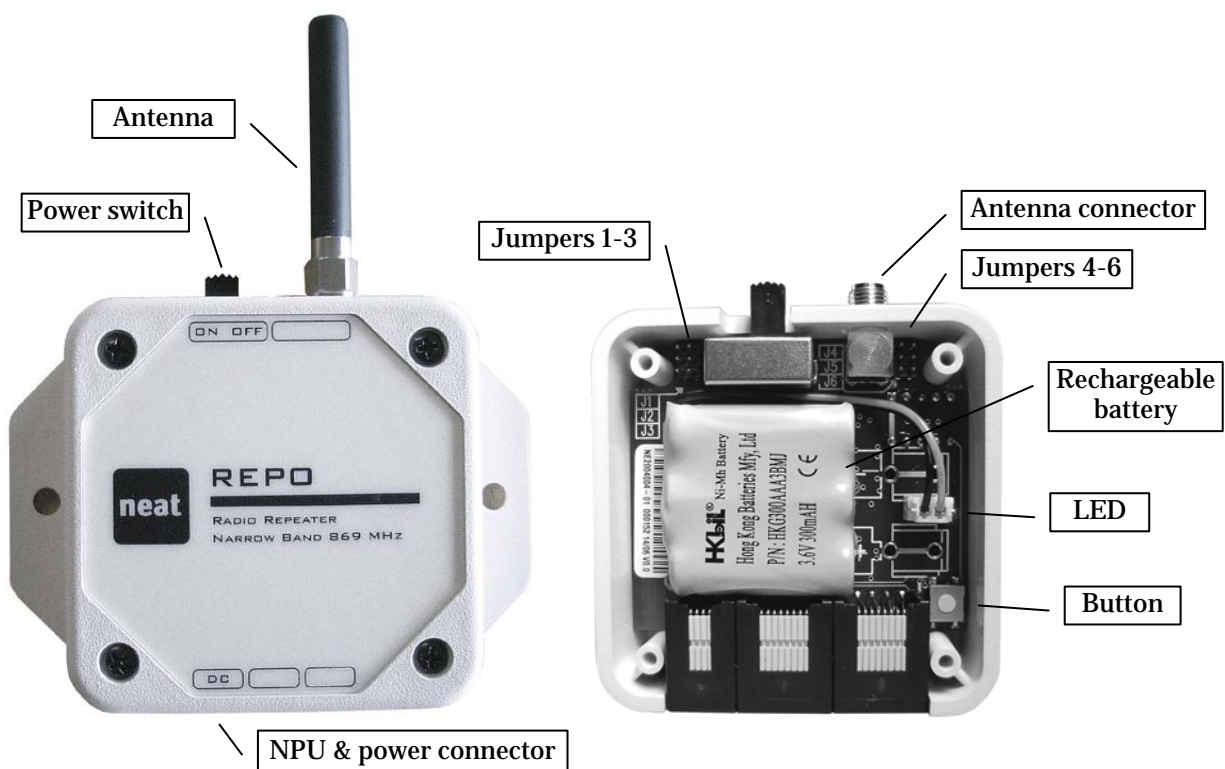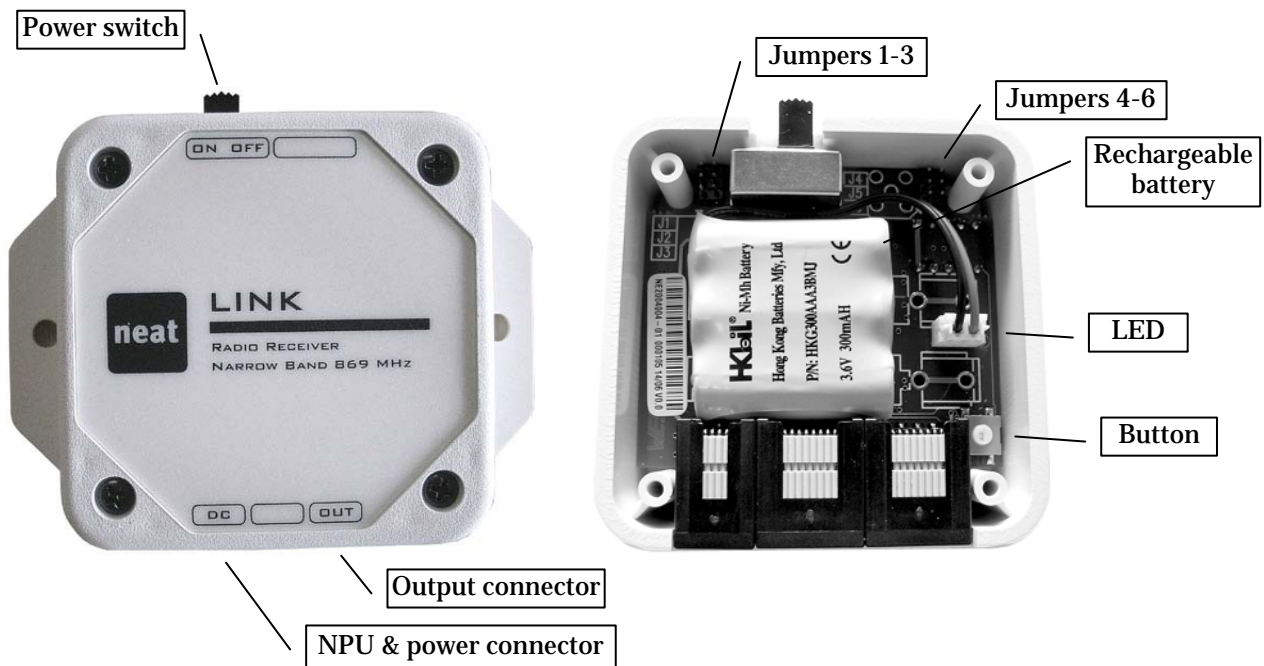

*LINK front view*   *LINK inside view*

1.3 Connectors

The connectors are located at the bottom side of the unit. All connectors are of modular (western) type.

1.3.1 INKA

Connector	Type	Marking	Function
Power	4/4	DC	Connector for the AC/DC adapter. Also used for programming with NPU.
Input	8/8	IN	Connector for wired sensor inputs

1.3.2 IOR

Connector	Type	Marking	Function
Power	4/4	DC	Connector for the AC/DC adapter. Also used for programming with NPU.
Input	8/8	IN	Connector for wired sensor inputs
Output	8/8	OUT	Connector for wired equipment controlled by the IOR.

1.3.3 REPO & REPO+

Connector	Type	Marking	Function
Power	4/4	DC	Connector for the AC/DC adapter. Also used for programming with NPU.

1.3.4 LINK

Connector	Type	Marking	Function
Power	4/4	DC	Connector for the AC/DC adapter. Also used for programming with NPU.
Output	8/8	OUT	Connector for wired equipment controlled by the LINK.

1.4 Power Switch

By putting the switch at the top of the unit in the left position, the unit is turned ON. Please note that it is not enough to take the AC plug out to shut the unit off. The unit will then use the batteries as power source.

1.5 Mounting holes

There is one hole in each of the mounting flanges for wall mounting of the unit. The distance between the mounting holes is 76 mm and the holes are designed for use with Ø 4 mm screws.

1.6 Batteries

1.6.1 INKA

INKA is powered by 2 alkaline batteries size AAA (LR03). Depending on the quality of the battery, and assuming that no jumpers are mounted on the circuit board inside INKA, the battery lifetime is up to 10 years when INKA is in power save mode and up to 20 months when INKA is in normal power mode. If an AC/DC adapter is used, the batteries are used as a backup in case of power failure.

1.6.2 IOR, REPO, REPO+ & LINK

IOR, REPO, REPO+ and LINK are powered by an external AC/DC adapter. A rechargeable NiMH battery inside the units works as a backup during mains power failure. The unit can run 4 days on the backup battery when it is fully charged.

1.7 AC/DC Adapter

The AC/DC adapter shall be installed in an ordinary AC mains outlet, European type. The voltage in the outlet shall be between 100 V_{AC} and 240 V_{AC}. Please use only the specified adapter marked "NEAT Electronics" and "PS49/1880", part number NE31 03001-01.

Connect the adapter to the connector marked DC at the bottom side of the unit, see section 1.2.1-1.2.3.

1.8 Inputs: INKA and IOR

Connect wired sensors to the connector marked IN on the bottom side of the unit, see section 1.2.1-1.2.2.

Up to 5 alarm sensors can be connected to the same INKA or IOR unit. The first sensor is connected between pin 3 and 8 in the input connector, the second sensor is connected between pin 4 and 8, the third between pin 5 and 8, the fourth between pin 6 and 8 and the fifth sensor is connected between pin 7 and 8 in the input connector. See image below.
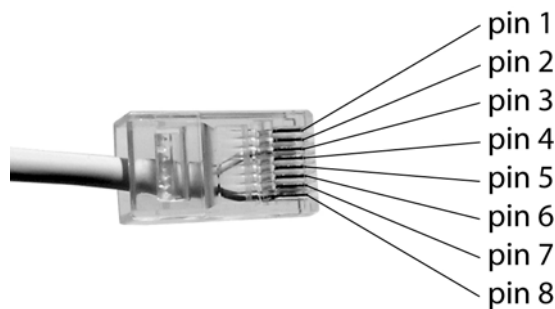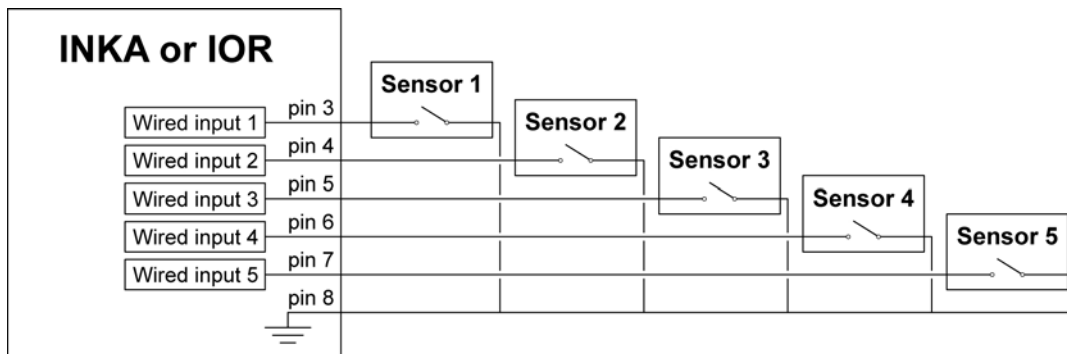
Note that inputs 4 and 5 are not available when running INKA or IOR on batteries in *power save mode*, see section 3.4.7.

The connected alarm sensors may be powered from INKA and IOR. The unregulated voltage from the AC/DC-adapter is supplied between pin 1 and pin 8 in the input connector. With the standard AC/DC-adapter from NEAT, this voltage is 5-9V_{DC}. A total of 250 mA may be drawn from pin 1 and 8. A regulated voltage of 3 V_{DC} is supplied between pin 2 and pin 8 in the input connector. A total of 50 mA may be drawn from pin 2 and 8.
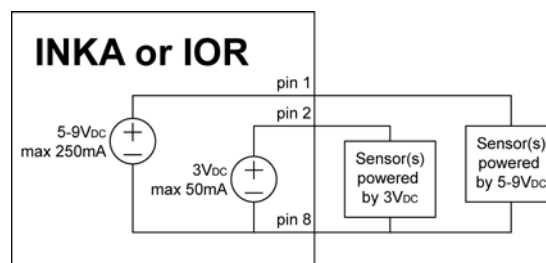
1.9 Outputs: IOR, REPO and LINK

Connect the wired equipment to be controlled by the unit to the connector marked OUT on the bottom side of the unit. See images in section 1.2.2-1.2.3.

The wired output consists of a relay with two positions. In one position, the *ON* position, the relay connects pin 3 and 4 in the output connector. In the other position, the *OFF* position, the relay connects pin 3 and 5 in the output connector. When the power to the unit is turned on, the relay is always reset to the *OFF* position.
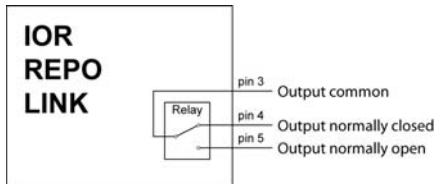
Output relay in *OFF* position   Output relay in *ON* position
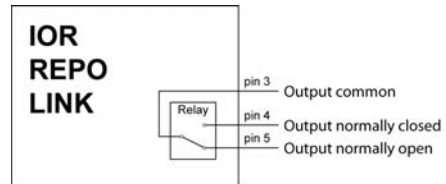
The power supply voltages in the input connector are also present on the same pins in the output connector. The description from section 1.8 is repeated here for your convenience.

The unregulated voltage from the AC/DC-adapter is supplied between pin 1 and pin 8 in the output connector. With the standard AC/DC-adapter from NEAT, this voltage is 5-9V_{DC}. A total of 250 mA may be drawn from pin 1 and 8. A regulated voltage of 3 V_{DC} is supplied between pin 2 and pin 8 in the output connector. A total of 50 mA may be drawn from pin 2 and 8.
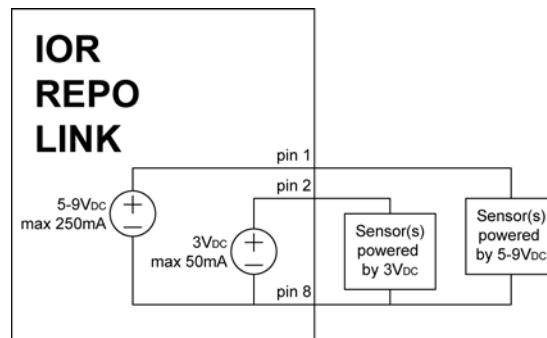
To achieve an output voltage that is 0 V when the relay output is OFF and 3 V when the relay output is ON, use the following connection.

---
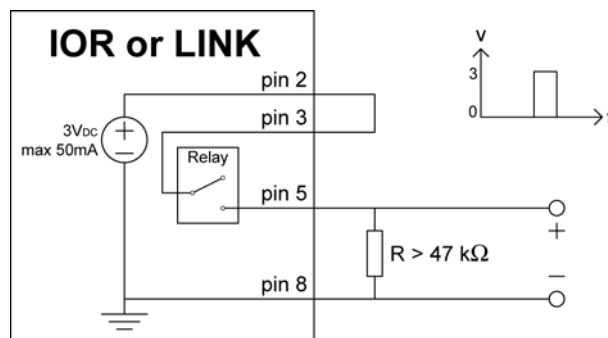
2 Programming / Configuration

Configuration of the units in the IOR family can be done in two ways:
- Programming from a computer with *NEAT Programming Unit* (NPU)
- Mounting or removing jumpers on the PCB inside the unit

PC programming using the NPU is described in section 2.1. Jumper configuration is described in section 2.2.

2.1 PC programming

2.1.1 NPU – NEAT Programming Unit

2.1.1.1 Installation of the program

The NPU is connected between the unit to be configured (INKA, IOR, REPO or LINK) and the USB port of a computer. When you have received your NPU, follow the steps below.
IMPORTANT! Do not connect the NPU until you have finished the installation of the program.

- Download the software and installation manual from www.neatelectronics.com.
- Install the program by using the installation manual before connecting the NPU

2.1.1.2 Using the NPU

To connect the NPU, follow the instructions below:

- Connect the AC adapter to the NPU
- Connect the NPU to the USB port on the computer by the USB cable
- Connect the NPU to DC connector on the bottom side of INKA, IOR, REPO or LINK.
- Switch on the unit to be configured

You are now ready to read and write all parameters that are given in the PC program.

2.1.2 IOR Programmer, Start Screen

In the Windows start-menu, you find the IOR Programmer software under Programs / NEAT. The first thing you see when you start the program is the start screen displayed below. Select the product model that you want to configure – INKA, IOR, REPO, REPO+ or LINK – by clicking the corresponding push button.
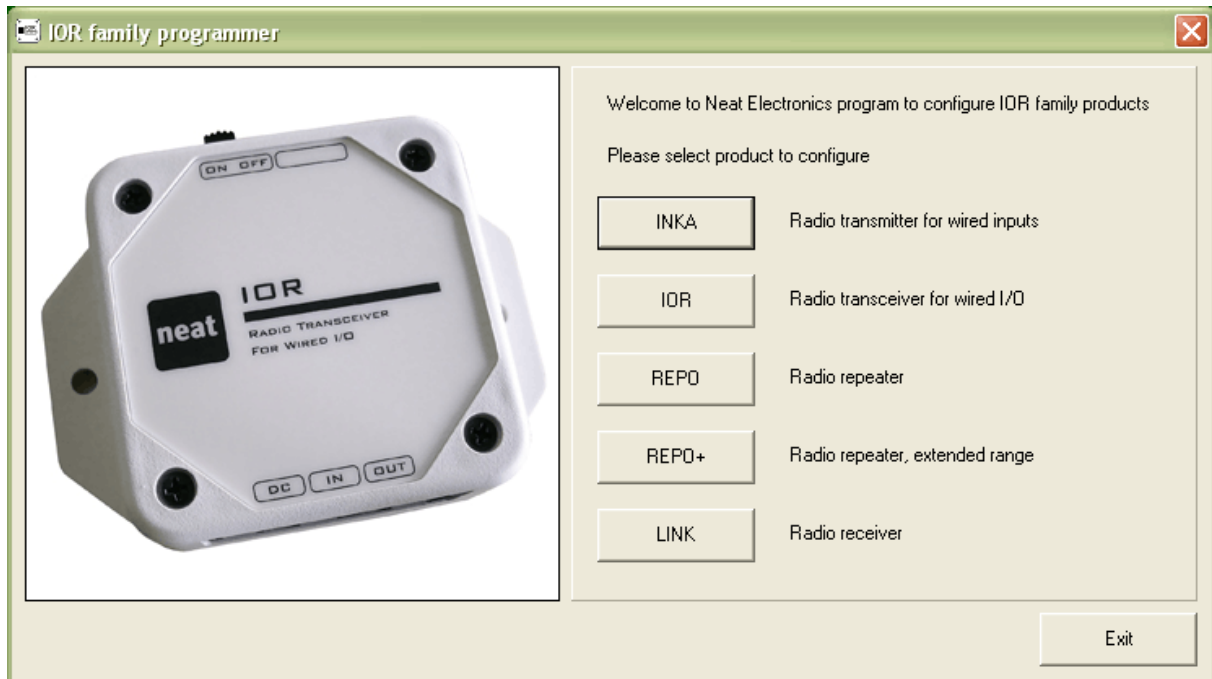
IOR Programmer, Radio Input Tab

When you have selected the product model you will see the following screen. Depending on which product model you have chosen, the text in some of the fields may be gray showing that these fields are disabled, and the corresponding parameter can not be changed for the current product model. Some fields may contain dashes only (---). This means that the parameter in question is not used.
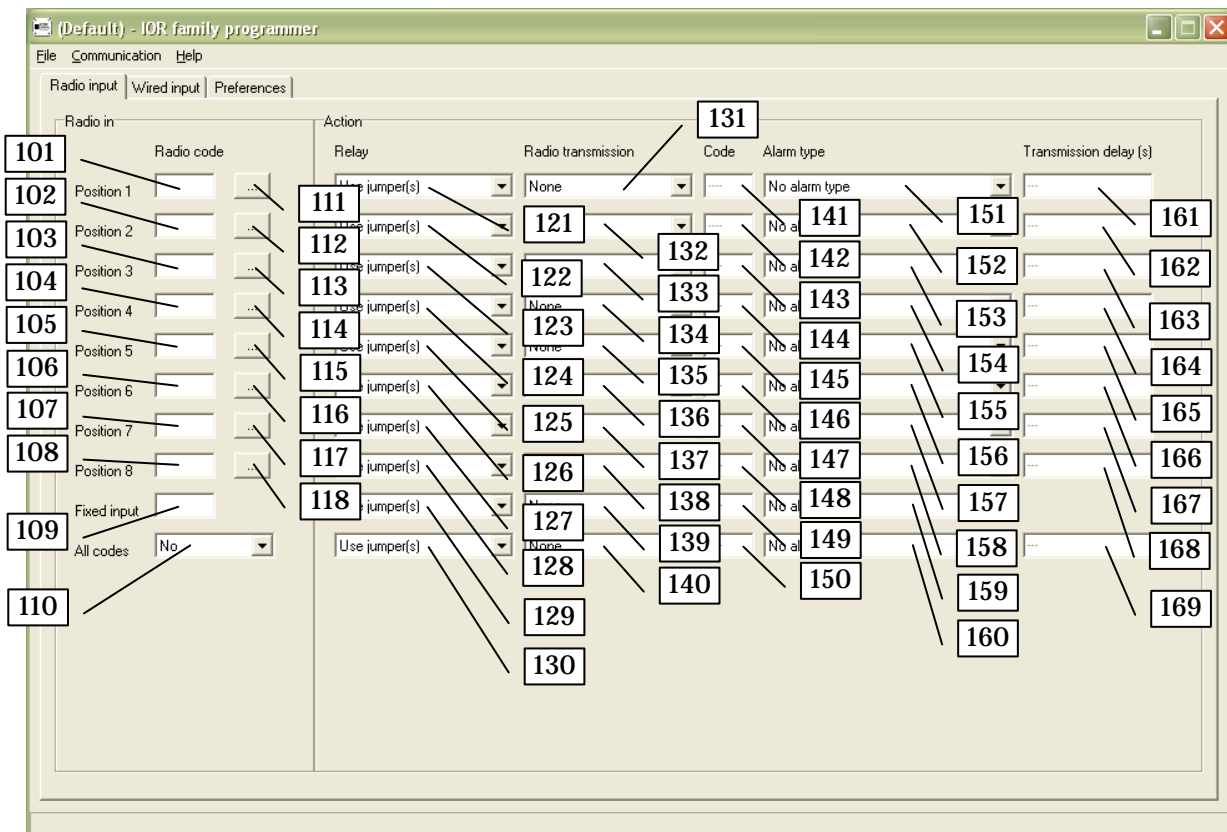
Explanation of controls

101-108	Radio ID codes for external equipment
109	Radio ID code used by equipment sending specifically to this unit
110	Indicates whether all radio codes or only pre-programmed (101-109) shall be received
111-118	Push buttons for receiving radio ID codes
121-130	Activation of relay output
131-140	Radio transmission and choice of radio ID code for outgoing alarm
141-150	Radio ID code used for outgoing alarm
151-160	Alarm type for outgoing alarm
161-169	Transmission delay (REPO+ only)

The fields are arranged in rows. In the text field farthest to the left, the radio code of an alarm transmitter is entered. The rest of the fields in the same row determine what actions will be performed when a message with this radio code is received.
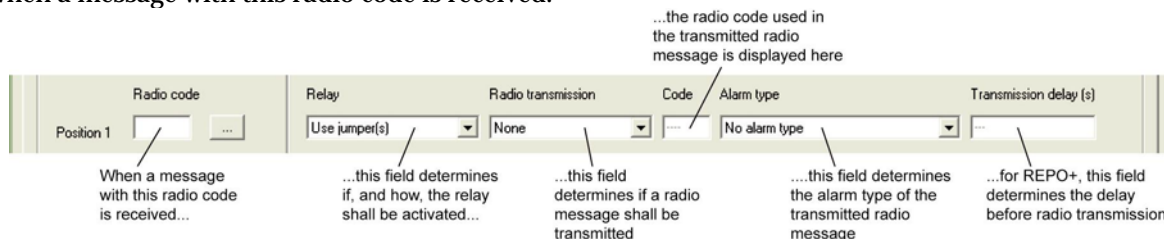
2.1.3 IOR Programmer, Wired Input Tab
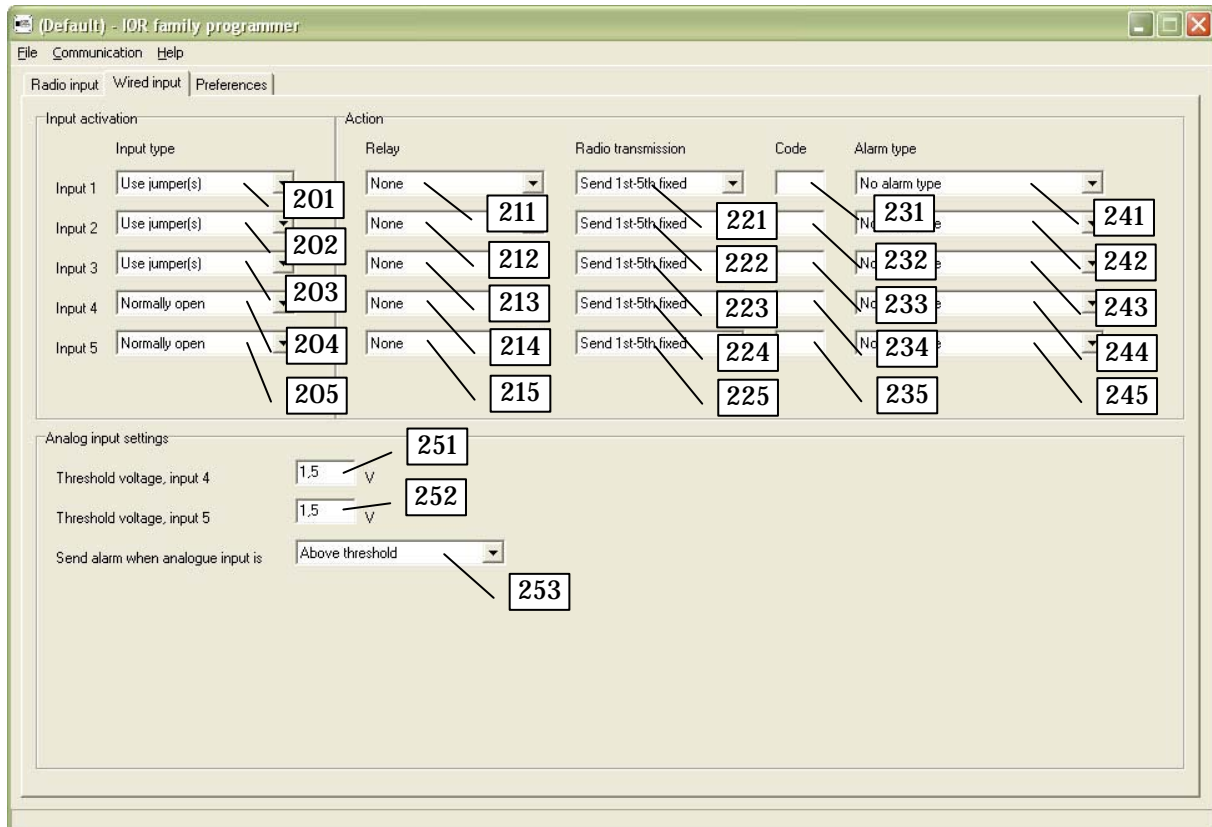
Explanation of controls

201-205	Input type for each wired input
211-215	Activation of relay output
221-225	Radio transmission and choice of radio ID code for outgoing alarm
231-235	Radio ID code used for outgoing alarm
241-245	Alarm type for outgoing alarm
251-252	Threshold voltage for analog input (in analog threshold mode)
253	Indicates whether analog inputs shall trig above or below threshold voltage

The fields in the upper portion of the screen are arranged in rows. Farthest to the left, the number of a wired input is written. The first text field in the row determines the criteria for when the input will be trigged and the rest of the fields in the same row determine what actions will be performed when this input is trigged.
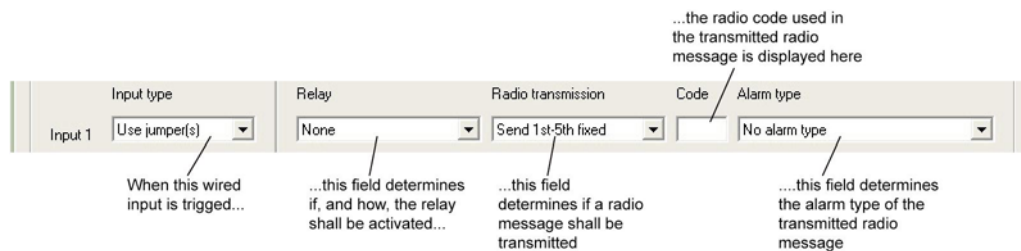
2.1.4 IOR Programmer, Preferences Tab
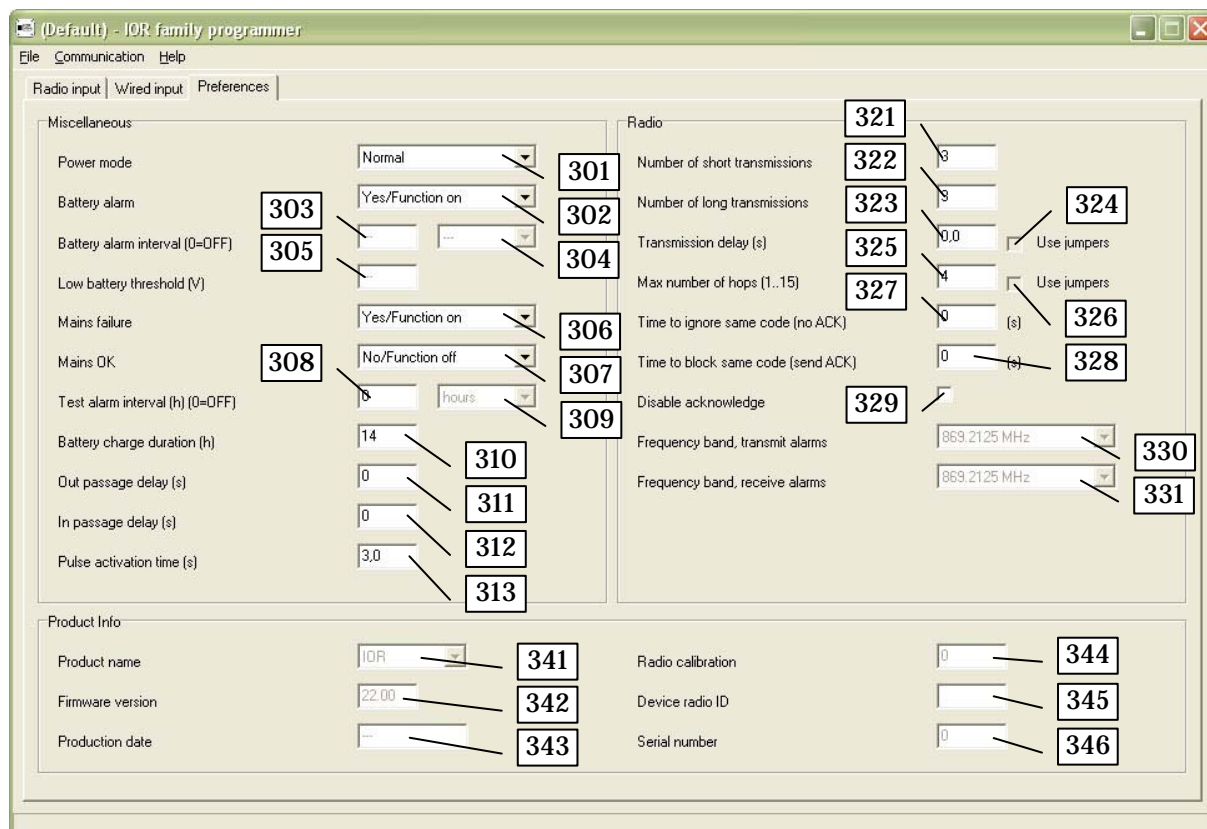
Explanation of controls

301	Power mode
302	Battery alarm when the battery voltage is low, yes or no (does not apply for REPO+)
303	Battery alarm interval when the battery voltage is low (REPO+ only)
304	Unit of time for battery alarm interval, minutes or hours (REPO+ only)
305	Threshold voltage for battery low indication (REPO+ only)
306	Specifies whether a mains failure alarm shall be sent when mains power is lost
307	Specifies whether a mains OK indication shall be sent when mains power returns
308	Test alarm interval
309	Unit of time for test alarm interval, minutes or hours
310	Battery charge duration (hours)
311	Out passage delay (s)
312	In passage delay (s)
313	Pulse activation time for relay (s)
321	Number of short packages in outgoing radio messages
322	Number of long packages in outgoing radio messages
323	Transmission delay (s)
324	Transmission delay according to jumper settings, field 323 is ignored
325	Maximum number of hops
326	Maximum number of hops according to jumper settings, field 325 is ignored
327	Block time for same code (no ACK) (s)
328	Block time for same code (send ACK) (s)
329	Disable acknowledge for incoming messages
330	Frequency band for transmitted alarms
331	Frequency band for received alarms
341	Product type: INKA, IOR, REPO, REPO+ or LINK
342	Firmware version
343	Production date
344	Radio calibration

Explanation of controls (continued)

345	Radio code for technical alarms (REPO+ only)
346	Serial number

2.2 Jumper Configuration

Some of the basic configuration parameters can be changed by mounting or removing jumpers on the circuit board inside the unit. A configuration parameter is only affected by jumper settings if the parameter is configured to "Use jumper(s)" in IOR Programmer.

By default, all parameters that can be configured by setting jumpers have the value "Use jumper(s)" when the unit is delivered, unless something has been specified when the units were ordered.

The only exception is the *power mode*, which by default has the value "No/Function off", in other words *power save mode* is disabled by default.

2.2.1 Jumper Settings – Overview

An overview of the jumper settings is given in the table below.

Jumper	Product Model	Description
J1	INKA IOR	Input mode for wired input 1, see section 2.2.2
	REPO LINK	Receive all radio messages, see section 2.2.4
J2	INKA IOR	Input mode for wired input 2, see section 2.2.2
	REPO	Maximum number of hops, see section 2.2.5
J3	INKA IOR	Input mode for wired input 3, see section 2.2.2
	REPO	Maximum number of hops, see section 2.2.5
J4	INKA	Input mode for wired input 4 and 5, see section 2.2.3
	REPO	Transmission delay, see section 2.2.6
	IOR LINK	Output mode, see section 2.2.7
J5	INKA	Input mode for wired input 4 and 5, see section 2.2.3
	REPO	Transmission delay, see section 2.2.6
	IOR LINK	Output mode, see section 2.2.7
J6	INKA IOR	Power mode, see section 2.2.8

2.2.2 Input Mode for Wired Input 1-3

The input mode for wired input 1-3 can be configured by setting jumpers J1-J3 in INKA and IOR.
See section 3.2.1 for details.

Jumper	ON (mounted)	OFF (not mounted)
J1	Wired input 1 normally closed	Wired input 1 normally open
J2	Wired input 2 normally closed	Wired input 2 normally open
J3	Wired input 3 normally closed	Wired input 3 normally open

2.2.3 Input Mode for Wired Input 4-5

The input mode for wired input 4-5 can be configured by setting jumpers J4-J5 in INKA.
See section 3.2.2 for details.

J4	J5	Input Mode
OFF	OFF	Digital mode (normally open)
OFF	ON	Analog threshold mode
ON	OFF	Analog sample mode

2.2.4 Receive All Codes

Jumper J1 in REPO and LINK can be used to configure whether all radio messages or only those with pre-programmed radio codes shall be received. See section 3.1.3 for details.

Jumper	ON (mounted)	OFF (not mounted)
J1	Receive only pre-programmed	Receive all radio messages

2.2.5 Maximum Number of Hops

The *maximum number of hops* can be configured by setting jumpers J2 and J3 in REPO.
See section 3.4.6 for details.

J4	J5	Maximum Number of Hops
OFF	OFF	1
OFF	ON	2
ON	OFF	3
ON	ON	4

2.2.6 Transmission Delay

The *transmission delay* can be configured by setting jumpers J4 and J5 in REPO.
See section 3.4.5 for details.

J4	J5	Transmission Delay
OFF	OFF	2.5 seconds
OFF	ON	5.0 seconds
ON	OFF	7.5 seconds
ON	ON	10.0 seconds

2.2.7 Output Mode

The *output mode* can be configured by setting jumpers J4 and J5 in IOR and LINK.
See section 3.3 for details.

J4	J5	Output Mode
OFF	OFF	Pulse mode
OFF	ON	Toggle mode
ON	OFF	Static mode

Static mode means that the relay never changes state, unless a special maneuver message is received from, for example, home care phone NEO.

2.2.8 Power Mode

The *power mode* can be configured by setting jumpers J6 in INKA and IOR.
See section 3.4.7 for details.

Jumper	Power Source	ON (mounted)	OFF (not mounted)
J6	AC/DC adapter	Normal power mode	Normal power mode
	Batteries only	Normal power mode	Power save mode

3 Event Handling

3.1 Radio Reception: IOR, REPO, REPO+ and LINK

IOR, REPO, REPO+ and LINK can receive radio messages sent from alarm transmitters such as ATOM or INKA, or from home care phone NEO or portable transceivers TREX and HOME. The radio messages are normally alarms, but can also be of other types.

Note that if IOR is configured to be in *power save mode*, it can not receive any radio messages when running on the backup battery only, see section 3.4.7 of this manual.

3.1.1 Radio Codes

All radio messages contain an *ID code* identifying the transmitter that sent the message. The ID code in a radio message is also referred to as the *radio code* of the radio message. If the radio message is intended for one specific receiver, the *fixed input* ID code of the receiver is sent instead of the ID code of the transmitter.
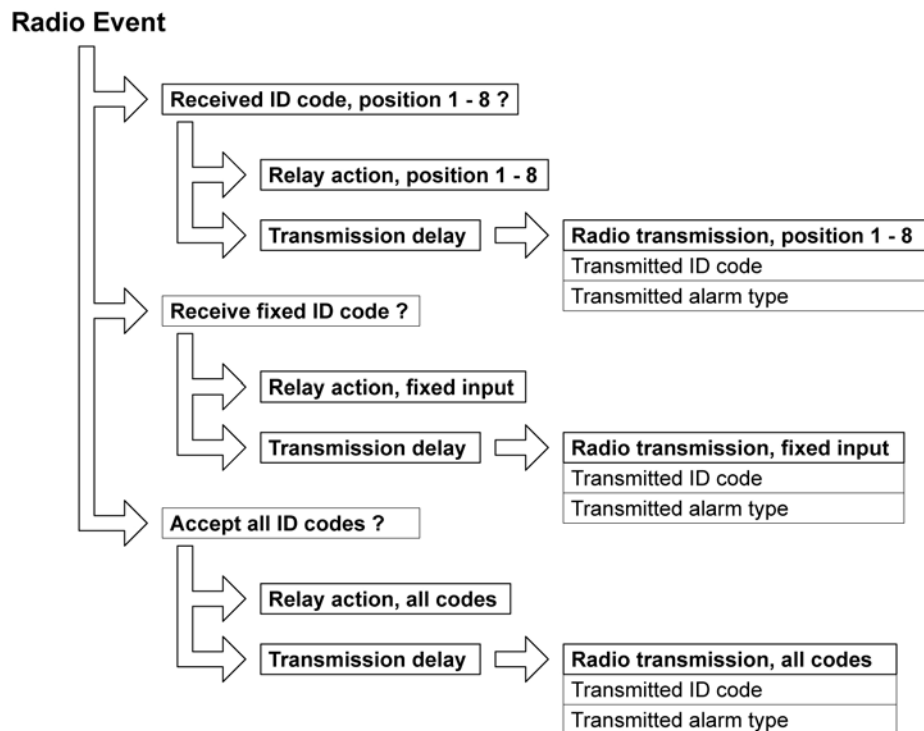
3.1.2 Connecting Alarm Transmitters to IOR, REPO, REPO+ and LINK

There are 8 radio positions in IOR, REPO, REPO+ and LINK. In each position, one transmitter ID code can be programmed. When the ID code of a received radio message matches the ID code of one of the 8 radio positions, then the relay action and radio transmission configured for that position will be performed.

ID codes for incoming radio messages are programmed in the text boxes for *radio code*, *position 1-8* under the *radio input* tab in IOR Programmer.

IOR REPO LINK	Program a transmitter ID in position 1...8	Click button 111...118 and then activate the transmitter, or enter the ID code in text box 101...108.

Fixed Input

If the ID code of the received radio message matches the *fixed input* ID code, then the corresponding actions configured for the fixed input will be performed. The fixed input ID code of an IOR, REPO or LINK unit is used when a transmitter wants to send specifically to this unit. It is not possible to change the fixed input ID code. The fixed input ID code is shown in text box 109 on the radio input page.

3.1.3 Receive All Codes

IOR, REPO, REPO+ and LINK can also be configured to accept all incoming radio messages, regardless of the ID code. If the unit is configured to accept all received radio messages, and the ID code of a received message does not match any of the ID codes in position 1-8, nor the fixed input ID code, then the actions configured for *all codes* will be performed.

IOR REPO LINK	Configure the unit to receive all radio messages regardless of the ID code	Select "Yes" in list box 110.

IOR REPO LINK	Configure the unit to receive pre-programmed ID codes only.	Select "No" in list box 110.

See section 2.2.4 for jumper configuration of which radio codes to receive.

For each of the 8 radio positions and for the *fixed input* and for *all codes*, the relay output activation and radio transmission can be configured individually.

3.2 Wired Input: INKA and IOR

Sensors without radio interface can be supervised by connecting them to the wired inputs on INKA or IOR. Inputs 1-3 are digital only, while inputs 4-5 can be configured as either digital or analog. Section 1.8 describes how the inputs are connected.

When a sensor connected to a wired input fulfils some predefined criteria for that input, the input is *trigged*. When an input is trigged, the actions associated to that input are performed. The configuration in the unit determines the criteria for each input to be trigged and what actions to perform.
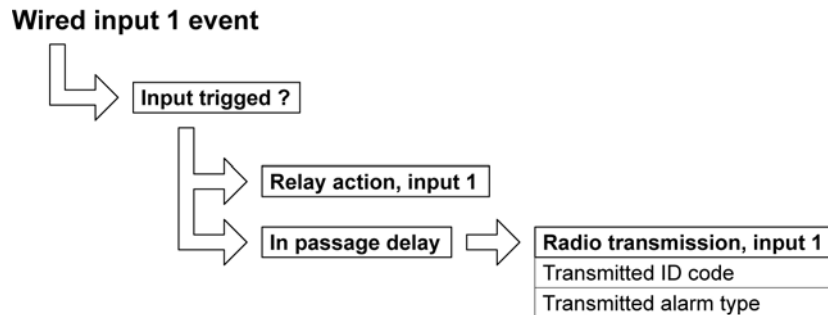
Suppose, for example, that a magnetic contact is mounted on a door and connected to input 1 of an INKA. The INKA can then be configured so that input 1 is trigged each time the door is opened. The action associated to input 1 in this case can be to send a radio alarm.

3.2.1 Digital Input

The equipment connected to a digital input works as a switch between the input and ground, see image below. If the input is configured as *normally open*, the input is trigged each time that the switch is closed. If the input is configured as *normally closed*, the input is trigged each time that the switch is opened.
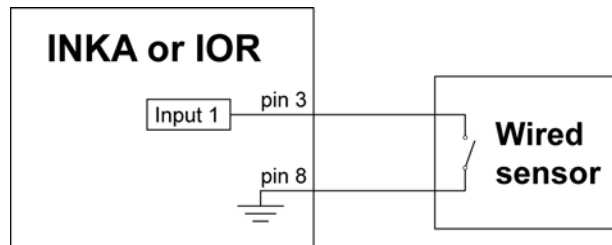
Now we return to the example with an INKA and a magnetic contact. Assume that the magnetic contact is connected so that the switch closes when the door is opened. Then the input in INKA must be configured as *normally open* for the input to trig each time that the door is opened.

The input mode of each wired input is configured by choosing a value from the list boxes *input activation*, *input 1-5* under the *wired input* tab in IOR Programmer.

INKA IOR	Configure input 1, 2 or 3 as *normally open*	Select "Normally open" in list box 201, 202 or 203

INKA IOR	Configure input 4 or 5 as a digital input, *normally open*	Select "Normally open" in list box 204 or 205

INKA IOR	Configure input 1, 2 or 3 as *normally closed*	Select "Normally closed" in list box 201, 202 or 203

INKA IOR	Configure input 4 or 5 as a digital input, *normally closed*	Select "Normally closed" in list box 204 or 205

See section 2.2.2 for jumper configuration of the input mode for wired input 1-3. See section 2.2.3 for jumper configuration of the input mode for wired input 4-5.

3.2.2 Analog Input

The equipment connected to an analog input applies a voltage to the input, which is measured by INKA or IOR. Only voltages between 0 and 3 V can be measured at the analog inputs. For best performance we recommend you to always have the AC/DC adapter connected when using analog inputs. Otherwise the voltage reference for the A/D-conversion changes with the battery voltage. There are two modes for analog inputs: *analog threshold* and *analog sample*.

The input mode of wired input 4 and 5 is configured by choosing a value from the list boxes *input activation, input 4-5* under the *wired input* tab in IOR Programmer.

INKA IOR	Configure input 4 or 5 as an analog input in *analog threshold* mode	Select "analog threshold" in list box 204 or 205

INKA IOR	Configure input 4 or 5 as an analog input in *analog sample* mode	Select "analog sample" in list box 204 or 205

See section 2.2.3 for jumper configuration of the input mode for wired input 4-5.

In *analog threshold* mode, the voltage on the input port is constantly supervised. When the voltage reaches a pre-defined level, the input is trigged. The voltage level at which the input is trigged is called *threshold voltage* and can be configured individually for each analog input. It is also possible to choose whether the input shall trig when the voltage at the input exceeds the threshold voltage or when it falls below the threshold voltage.

The threshold voltages for input 4 and 5 in analog threshold mode are configured in the text field *threshold voltage, input 4* and *threshold voltage, input 5* under the *wired input* tab in IOR Programmer.

INKA IOR	Set the threshold voltage for input 4 or 5	Enter the desired voltage in text box 251 or 252

INKA IOR	Configure the analog inputs to be trigged each time the voltage on the input exceeds the threshold voltage	Select "Above threshold" in list box 253

INKA IOR	Configure the analog inputs to be trigged each time the voltage on the input falls below the threshold voltage	Select "Below threshold" in list box 253

In *analog sample* mode, the input is never trigged. Instead the voltage at the input is sampled every time that a specific digital input is trigged. When input 4 is configured as analog sample, the voltage at input 4 is sampled each time that input 1 is trigged. When input 5 is configured as analog sample, the voltage at input 5 is sampled each time that input 2 is trigged.

The sample value from the analog input is sent with the radio alarm that is trigged by the corresponding digital input. The alarm type *measurement data* should be used for wired input 1 when wired input 4 is configured as *analog sample* and for wired input 2 when wired input 5 is configured as *analog sample*. See section 3.4.2 for configuration of alarm type.

3.2.3 Out Passage Delay

It is possible to configure the unit to wait a certain time before inputs can be trigged when the unit is turned on. This delay is called *out passage delay*. It may be helpful for care personnel when leaving a patient's room where there is a door alarm mounted on the door. For example, if the out passage delay is configured to 10 seconds, then the door can be opened and closed during the first 10 seconds after the unit is turned on without any alarm being transmitted.

INKA IOR	Configure the unit to start supervision of wired inputs at once when it is turned on (*out passage delay* = 0 seconds)	Enter the value 0 in text box 311

INKA IOR	Configure the unit to ignore the wired inputs during the first 10 seconds after it has been turned on (*out passage delay* = 10 seconds)	Enter the value 10 in text box 311

3.2.4 In Passage Delay

To avoid sending unnecessary alarms, it is possible to configure a delay before an alarm is sent when a wired input is trigged. This delay is called *in passage delay*, and may be helpful for care personnel entering through a door with a door alarm. If the unit is turned off before the in passage delay has expired, then an alarm will not be transmitted.

The *in passage delay* parameter is found in the *miscellaneous* section under the *preferences* tab in IOR Programmer.

INKA IOR	Configure the unit to transmit any alarm immediately after a wired input has been trigged (*in passage delay* = 0 seconds)	Enter the value 0 in text box 312

INKA IOR	Configure the unit to wait 10 seconds before transmitting an alarm after a wired input has been trigged (*in passage delay* = 10 seconds)	Enter the value 10 in text box 312

3.3 Wired Output: IOR, REPO and LINK

The wired output consists of a relay with two positions. In one position, the *ON* position, the relay connects pin 3 and 4 in the output connector. In the other position, the *OFF* position, the relay connects pin 3 and 5 in the output connector, see section 1.9.

The behavior of the output relay when a wired input is trigged or when a radio message is received is here referred to as the *relay action*. The table below lists the 5 possible actions that the output relay can perform when an input is trigged.

Relay Action	Description
None	The relay remains in its previous state
Relay on	The relay switches to the *ON* position
Relay off	The relay switches to the *OFF* position
Toggle relay	The relay changes state, from *OFF* to *ON* or from *ON* to *OFF*.
Pulse relay	The relay switches to the *ON* position, waits for a pre-configured time and then switches to the *OFF* position.

3.3.1 Pulse Activation Time

The time that the relay remains in its ON position during the *Pulse relay* action is determined by the *Pulse activation time* parameter under the *preferences* tab in IOR Programmer.

IOR REPO LINK	Configure the output relay to stay in its ON position during 5.5 seconds when the *Pulse relay* action is performed	Enter "5.5" in text box 313

3.3.2 Relay Action when Wired Input is Trigged

The relay action can be configured individually for each wired input.

IOR	Configure the output relay to remain unchanged when input 1...5 is trigged	Select "None" in list box 211...215

IOR	Configure the output relay to switch to the *ON* position when input 1...5 is trigged	Select "Relay on" in list box 211...215

IOR	Configure the output relay to switch to the *OFF* position when input 1...5 is trigged	Select "Relay off" in list box 211...215

IOR	Configure the output relay to change state when input 1...5 is trigged	Select "Toggle relay" in list box 211...215

IOR	Configure the output relay to switch *ON*, and then *OFF* when input 1...5 is trigged	Select "Pulse relay" in list box 211...215

3.3.3 Relay Action when Radio Message is Received

The relay action can also be configured individually for each of the radio positions 1-8.

IOR REPO LINK	Configure the output relay to remain unchanged when a radio message is received in position 1...8	Select "None" in list box 121...128

IOR REPO LINK	Configure the output relay to switch to the *ON* position hen a radio message is received in position 1...8	Select "Relay on" in list box 121...128

IOR REPO LINK	Configure the output relay to switch to the *OFF* position hen a radio message is received in position 1...8	Select "Relay off" in list box 121...128

IOR REPO LINK	Configure the output relay to change state hen a radio message is received in position 1...8	Select "Toggle relay" in list box 121...128

IOR REPO LINK	Configure the output relay to switch *ON*, and then *OFF* hen a radio message is received in position 1...8	Select "Pulse relay" in list box 121...128

It is possible to configure the relay action when a radio message with the *fixed input* ID code is received.

IOR REPO LINK	Configure the behavior of the output relay when a radio message is received with the *fixed input* ID code	Select "None", "Relay on", "Relay off", Toggle relay" or "Pulse relay" in list box 129

When the unit is configured to receive all radio ID codes, the relay action is configured separately for received radio messages that have an ID code that is not pre-programmed in the unit.

IOR REPO LINK	Configure the behavior of the output relay when a radio message is received that does not have a pre-programmed ID code	Select "None", "Relay on", "Relay off", Toggle relay" or "Pulse relay" in list box 130

See section 2.2.7 for jumper configuration of the relay action (output mode).

3.4 Radio Transmission: INKA, IOR, REPO and REPO+

INKA, IOR, REPO and REPO+ can send a radio message when an event occurs, i.e. when a wired input is trigged (INKA & IOR) or when a radio message is received (IOR, REPO & REPO+).

For each wired input and for each radio position, the ID code and alarm type of the outgoing radio message can be configured individually.

3.4.1 ID Code in Transmitted Radio message

Each unit has 5 fixed ID codes that can be used in radio messages transmitted by the unit. These ID codes are individual for each unit and can not be change.

3.4.1.1 Radio Transmission when a Wired Input is Trigged

When a wired input is trigged, there are three possible choices for radio transmission:

Radio transmission	Description
Send None	No radio message is transmitted
Send 1st fixed	An alarm is transmitted using the first fixed ID code
Send 1st – 5th fixed	An alarm is transmitted using the first fixed ID code if wired input 1 was trigged, the second fixed ID code if wired input 2 was trigged, etc...

The parameters for radio transmission when a wired input is trigged are configured in the fields of the column *radio transmission* under the *wired input* tab. The resulting radio code that will be transmitted is displayed in the fields of the column *code* under the *wired input* tab.

INKA IOR	Configure the unit to transmit a radio alarm using fixed ID code 1 when wired input 1...5 is trigged	Select "Send 1st fixed" in list box 221...225

INKA IOR	Configure the unit to transmit a radio alarm using fixed ID code 1 when wired input 1 is trigged and using fixed ID code 2 when wired input 2 is trigged, etc...	Select "Send 1st – 5th fixed" in list box 221...225

3.4.1.2 Radio Transmission when a Radio Message is Received

When a radio message is received in position 1-5, the following choices are possible for radio transmission:

Radio transmission	Description
Send none	No radio message is transmitted
Send same	An alarm is transmitted with the same ID code as in the received alarm
Send 1st fixed	An alarm is transmitted using the first fixed ID code
Send 1st – 5th fixed	An alarm is transmitted using the first fixed ID code if a radio message was received in position 1, the second fixed ID code if a radio message was received in position 2, etc...

When a radio message is received in position 6-8, or a message with the *fixed input* ID code or an ID code that is not pre-programmed in the unit, only the first fixed ID code can be used for radio transmission.

The parameters for radio transmission when a radio message is received are configured in the fields of the column *radio transmission* under the *radio input* tab. The resulting radio code that will be transmitted is displayed in the fields of the column *code* under the *radio input* tab.

IOR REPO	Configure the unit to transmit a radio alarm using fixed ID code 1...5 when a radio message is received in position 1...5	"Send 1st – 5th fixed" in list box 131...135

IOR REPO	Configure the unit to transmit a radio alarm using fixed ID code 1 when a radio message is received in position 1...8	Select "Send 1st fixed" in list box 131...138

IOR REPO	Configure the unit to transmit a radio alarm using fixed ID code 1 when a radio message is received with the *fixed input* ID code	Select "Send 1st fixed" in list box 139

IOR REPO	Configure the unit to transmit a radio alarm using fixed ID code 1 when a radio message is received that does not have a pre-programmed ID code	Select "Send 1st fixed" in list box 140

IOR REPO	Configure the unit to transmit a radio message using the ID code of the received message when a radio message is received in position 1...8	Select "Send same" in list box 131...138

IOR REPO	Configure the unit to transmit a radio alarm using the ID code of the received message when a radio message is received with the *fixed input* ID code	Select "Send same" in list box 139

IOR REPO	Configure the unit to transmit a radio alarm using the ID code of the received message when a radio message is received that does not have a pre-programmed ID code	Select "Send same" in list box 140

3.4.2 Alarm Type for Transmitted Alarm

The alarm type in transmitted alarms can be configured individually for each wired input and for each radio position. By default, the special alarm type *No alarm type* is chosen. This means that the home care phone NEO will determine the alarm type depending on radio position used in NEO.

If any other alarm type than *No alarm type* is chosen, then the home care will use the alarm type configured in the INKA, IOR or REPO. Any alarm type in the list can be chosen for transmitted alarms. Each alarm type has its own meaning, but it is up to the user that configures the unit to make sure that the correct alarm type is used.

When input 4 is configured as *analog sample*, choose alarm type *measurement data* for input 1. See section 3.2.2 for a description of *analog sample* mode. Likewise, when input 5 is configured as *analog sample*, choose alarm type *measurement data* for input 2.

When configuring alarm type for transmitted radio alarms trigged by a received radio message, it is also possible to choose the alarm type *transparent*. This means that the alarm type of the transmitted alarm will be the same as the alarm type of the received message.

The alarm type for transmitted alarms when a wired input is trigged is configured in the fields of the column *alarm type* under the *wired input* tab.

INKA IOR	Configure alarm type for transmitted alarm when wired input 1...5 is trigged	Select alarm type from the list in list box 241...245

The alarm type for transmitted alarms when a radio message is received is configured in the fields of the column *alarm type* under the *radio input* tab.

IOR REPO	Configure alarm type for transmitted alarm when a radio message is received in position 1...8	Select alarm type from the list in list box 151...158

IOR REPO	Configure alarm type for transmitted alarm when a radio message is received with the *fixed input* ID code	Select alarm type from the list in list box 159

IOR REPO	Configure alarm type for transmitted alarm when a radio message is received that does not have a pre-programmed ID code	Select alarm type from the list in list box 160

3.4.3 Number of Transmissions – Radio Packages

When a radio message is transmitted, the INKA, IOR or REPO unit that transmits the message waits for an *acknowledge* message from an alarm receiver. If no *acknowledge* is received, the same message is transmitted again and again until an *acknowledge* is received, or until the maximum number of transmissions has been reached.

Each transmission of the same message is called a *radio package*. A radio package can be short or long. The maximum number of short and long radio packages can be configured individually with IOR Programmer. The short packages are always transmitted before the long packages.

Each package in the same message contains the same information, but only long packages can be received by battery powered equipment and portable transceivers TREX or HOME. Each short package takes approximately 60 ms to transmit, and each long package takes approximately 560 ms to transmit. The time between two packages is 75 ms.

The parameters for the number of short and long packages in each radio message are found in the *radio* section under the *preferences* tab in IOR Programmer.

INKA IOR REPO	Configure the maximum number of short packages in a radio message	Enter the number of short packages in text box 321

INKA IOR REPO	Configure the maximum number of long packages in a radio message	Enter the number of long packages in text box 322

In the table below, recommended settings for short and long radio packages are listed for some common system configurations.

Recommended Settings	Short Packages	Long Packages
TREX system, one REPO unit	0	6
TREX system, many REPO units	0	3
NEO system, one REPO unit	6	6
NEO system, many REPO units	3	3

3.4.4 Disable Acknowledge

By default an *acknowledge* radio message is sent as a response to every received radio message.
If an alarm transmitter does not receive any acknowledge, it keeps transmitting a number of short and long packages the same way that the units in the IOR family do. See section 3.4.3 above.

To force alarm transmitters to always send all its short and long packages, it is possible to disable the acknowledge message in IOR, REPO and LINK. This is used to allow many alarm receivers to receive the same radio message.

Note that when acknowledge is disabled in a REPO or IOR, the *transmission delay* must be at least 2.5 seconds, see section 3.4.5.

The *disable acknowledge* parameter is found in the *radio* section under the *preferences* tab in IOR Programmer.

INKA IOR REPO	Disable transmission of acknowledge messages	Check box 329

INKA IOR REPO	Enable transmission of acknowledge messages	Uncheck box 329

3.4.5 Transmission Delay

When a radio message is received, the unit can be configured to wait a certain time before transmitting an alarm. This delay is called *transmission delay*.

This delay is necessary in REPO, REPO+ and IOR when more than one unit can receive the same radio message and retransmit the message. If the transmission delay is not different in each REPO that is in radio range of each other, they will all transmit at the same time. Interference between the radio signals will then make it impossible for any alarm receiver to receive the message.

All units that are within radio range of each other must therefore be configured with different transmission delays. If the standard number of radio transmissions is unchanged, i.e. three short transmissions and three long transmissions, it is recommended that the difference in transmission delay is 2.5 seconds between each unit.

As an example, if four REPO units are configured to receive all radio messages and retransmit them, then the first REPO can have a transmission delay of 0 seconds, the second REPO can have a transmission delay 0f 2.5 seconds, the third 5.0 seconds and the fourth 7.5 seconds.

If acknowledge is disabled, see section 3.4.4, then the transmission delay must be at least 2.5 seconds to make sure that the radio signal from the REPO does not interfere with the received message.

The *transmission delay* parameter is found in the *radio* section under the *preferences* tab in IOR Programmer.

IOR REPO	Configure the unit to transmit a radio message at once when a radio message is received (transmission delay = 0 seconds)	Enter the value 0 in text box 323

IOR REPO	Configure the unit to wait 7.5 seconds before transmitting radio message when a radio message is received (transmission delay = 7.5 seconds)	Enter the value 7.5 in text box 323

In REPO+, the transmission delay is configured on the radio input page. There is one transmission delay parameter for each radio position (text box 161-168), and one transmission delay for all other radio codes (text box 169).

REPO+	Configure the unit to transmit a radio message at once when a radio message is received if the radio code is not programmed in position 1-8 (transmission delay = 0 seconds)	Enter the value 0 in text box 169

REPO+	Configure the unit to wait 10.0 seconds before transmitting radio message when a radio message is received (transmission delay = 10.0 seconds)	Enter the value 10 in text box 169

See section 2.2.6 for jumper configuration of the transmission delay.

3.4.6 Maximum Number of Hops

When using more than one REPO or REPO+ (or IOR) to forward radio messages, the message forwarded by one REPO can be received by another REPO. The message *hops* from one REPO to the next.

REPO, REPO+ and IOR have a configurable upper limit on the number of hops that is allowed for the same message. The purpose of this limit is to avoid that messages hop back and forward between REPO units endlessly.

The maximum number of hops can be given any value between 0 and 15. The value 15 means that the message may be retransmitted an infinite number of times.

As a general rule, the maximum number of hops should be equal to the number of REPO units needed to cover the longest distance between an alarm transmitter (such as ATOM) and an alarm receiver (such as NEO).

The *maximum number of hops* parameter is found in the *radio* section under the *preferences* tab in IOR Programmer.

IOR REPO	Configure the *maximum number of hops* for forwarded radio messages	Enter the desired value (0-14) in text box 325

IOR REPO	Configure an unlimited *maximum number of hops* for forwarded radio messages	Enter the value 15 in text box 325

See section 2.2.5 for jumper configuration of the maximum number of hops.

3.4.7 Ignore Same Code (no ACK)

To further decrease redundant retransmissions of radio messages, it is possible to configure a minimum time that must pass before a message with the same radio code is received again by an IOR, REPO, REPO+ or LINK unit. This parameter is called *ignore same code (no ACK)*. In previous versions of IOR Programmer, this parameter was called *same code inhibit time*.

If a radio message is received by a REPO unit and retransmitted, and then another message with the same radio code is received within a few seconds, it is very likely that it is the same message that has been received by another REPO or IOR and retransmitted. In this case we want to ignore the message, and this can be done efficiently by setting the parameter *ignore same code (no ACK)* to, for example, 10 seconds.

Ignore same code (no ACK) can be set in the interval 0 to 3600 seconds (0-60 minutes). The parameter is found in the *radio* section under the *preferences* tab in IOR Programmer.

When an alarm is discarded because the same radio code was already received within the time specified by parameter *ignore same code (no ACK)*, no ACK message will be sent to the transmitter of the alarm.

IOR REPO LINK	Allow received messages from an alarm transmitter immediately after the last message from the same transmitter	Enter the value 0 in text box 327

IOR REPO LINK	Reject all messages from an alarm transmitter during the following 10 seconds after the last message from the same transmitter	Enter the value 10 in text box 327

3.4.8 Block Same Code (send ACK)

The parameter *block same code (send ACK)*, is used to specify a time within which alarms from the same transmitter are discarded, but ACK is sent to the transmitter.

This parameter does exactly the same as *ignore same code (no ACK)* except that ACK messages are sent to the transmitter of alarms that are discarded.

If the parameter *block same code (send ACK)* is given a lower value than ignore same code (no ACK), no ACK messages are sent to transmitters of alarms that are discarded.

When an alarm from a certain alarm transmitter has been received by a REPO, no ACK is sent when alarms are received from the same transmitter within the time specified by *ignore same code (no ACK)* period. After the *ignore same code (no ACK)* period has expired, ACK is sent as answer to alarms from the same transmitter, but the alarms are still discarded until the *block same code (send ACK)* period has expired.

Block same code (send ACK) can be set in the interval 0 to 3600 seconds (0-60 minutes). The parameter is found in the *radio* section under the *preferences* tab in IOR Programmer.

IOR REPO LINK	Allow received messages from an alarm transmitter immediately after the last message from the same transmitter	Enter the value 0 in text box 328

IOR REPO LINK	Reject all messages from an alarm transmitter during the following 10 seconds after the last message from the same transmitter	Enter the value 10 in text box 328

3.4.9 Frequency Band

REPO+ can be configured to transmit alarms either on 869.2125 MHz or 869.4125 MHz. REPO+ can also be configured to receive alarms on 869.2125 MHz or 869.4125 MHz or on both frequency bands.

IOR, REPO and LINK can be configured to receive alarms on either 869.2125 MHz or 869.4125 MHz.

The difference between the two frequency bands is listed in the table below. When nothing else is stated explicitly, equipment from NEAT Electronics normally transmits alarms at 869.2125 MHz.

The frequency band 869.4125 MHz can be used when a longer radio range is needed than is possible to achieve at 869.2125 MHz, where the allowed output power is limited to 10 mW. Note that the radio transmission range may be much shorter when the radio signal is obstructed by walls or buildings, specifically when these are made of metal or armored concrete.

Frequency Band	**Description**	**Output Power**	**Transmission Range to TREX**
869.2125 MHz	reserved frequency for social alarms	10 mW (e.r.p.)	up to 1 km line-of-sight
869.4125 MHz	open frequency band	100 mW (e.r.p.)	up to 3 km line-of-sight

REPO+	Configure REPO+ to transmit alarms at both 869.4125 MHz with a radio range of up to 3 km line-of-sight	Choose "both bands" in list box 331.

REPO+	Configure REPO+ to receive alarms at both 869.2125 MHz and 869.4125 MHz	Choose "both bands" in list box 331.

IOR REPO LINK	Configure the unit to receive alarms from REPO+ at 869.4125 MHz	Select "869.4125 MHz" in list box 331.

3.5 Power Mode

For longer battery life, INKA and IOR can be configured to go into *power save mode* when the AC/DC adapter is not connected, and when mains power is lost.

Power save mode is only intended for supervision of wired inputs 1-3. Inputs 4 and 5 are not available for use, and no radio messages can be received in power save mode.

Please note that no battery alarms or radio test alarms are sent in power save mode.

When running on mains power with the AC/DC adapter connected, INKA and IOR are always in normal power mode with all functionality enabled. REPO and LINK are always in normal power mode.

The *power mode* parameter is found in the *miscellaneous* section under the *preferences* tab in IOR Programmer.

INKA IOR	Enable *power save mode*	Select "Yes/Function in" in list box 301

INKA IOR	Disable *power save mode*	Select "No/Function off" in list box 301

See section 2.2.8 for jumper configuration of the power mode.

3.6 Battery Charge Duration

IOR, REPO and LINK are equipped with a rechargeable battery for power back-up in case of AC power failure. When one minute has passed after the power to the unit is turned on, the unit starts to charge the back-up battery. The duration of the charging is configurable.

The *battery charge duration* parameter is found in the *miscellaneous* section under the *preferences* tab in IOR Programmer.

IOR REPO LINK	Configure the battery charge duration	Enter the desired time (in hours) in text box 310

3.7 Technical Alarms

3.7.1 Radio Test Alarm

To let the alarm receiver know that the unit is working, INKA, IOR and REPO can send test alarms to the alarm receiver at regular intervals. By default this function is turned off. Selecting an interval between 1 hour and 255 hours turns the function on. Interval time zero (0) hours means that the function is turned off.

The *test alarm interval* parameter is found in the *miscellaneous* section under the *preferences* tab in IOR Programmer.

INKA IOR REPO	Deactivate the test alarm function	Enter the value 0 in text box 308

INKA IOR REPO	Activate the test alarm function and set the test alarm interval.	Enter the desired time (in hours) in text box 308

Please note that no radio test alarms are sent in *power save mode*, see section 3.4.7.

3.7.2 Battery Alarm: INKA, IOR, REPO and REPO+

INKA, IOR, REPO and REPO+ can be configured to send a *battery alarm* when the battery voltage is too low.

The reason for the alarm can be

- The batteries are getting old and must be replaced
- The AC/DC adapter is not connected and the unit has been battery-powered for a long time (IOR, REPO and REPO+)

The battery voltage is continuously supervised. If the battery voltage is too low, a battery alarm is sent every day until the batteries are replaced. The limit for low battery voltage is 2.6 V in INKA and 3.5 V in IOR and REPO. In REPO+ the limit for low battery voltage is configurable between 0.0-6.0V. The default value is 3.5 V.

Please note that no battery alarms are sent in *power save mode*, see section 3.4.7.

The *battery alarm* parameter is found in the *miscellaneous* section under the *preferences* tab in IOR Programmer.

INKA IOR REPO	Activate the *battery alarm* function	Select "Yes/Function on" in list box 302

INKA IOR REPO	Deactivate the *battery alarm* function	Select "No/Function off" in list box 302

In REPO+, it is possible to the interval between battery alarms can be specified. Interval time zero (0) means that the function is turned off.

| **REPO+** | Activate the *battery alarm* function | Enter the desired time (in hours or minutes) in text box 303

Choose "hours" or "minutes" in list box 304 |

| **REPO+** | Deactivate the *battery alarm* function | Enter the value 0 in text box 303 |

| **REPO+** | Configure REPO+ to start sending battery alarms when the battery voltage falls below 3.0 V | Enter the value 3.0 in text box 305 |

3.7.3 Mains Failure

When the unit detects a mains failure, the unit will be powered from the internal backup-battery. INKA, IOR and REPO can be configured to send a *mains failure alarm* when the mains power disappears. Mains failure alarms will only be sent if the AC/DC adapter was connected and AC-power present when the power switch of the unit was turned on.

To avoid radio interference when many units send a mains failure alarm at the same time, the time from mains power loss to when the radio message is sent will be a random time between 0 and 45 seconds in intervals of 3 seconds.

The *mains failure* parameter is found in the *miscellaneous* section under the *preferences* tab in IOR Programmer.

INKA **IOR** **REPO**	Activate the *mains failure alarm* function	Select "Yes/Function on" in list box 306

INKA **IOR** **REPO**	Deactivate the *mains failure alarm* function	Select "No/Function off" in list box 306

3.7.4 Mains return

When the AC power returns after a power failure, and the unit has sent a *mains failure alarm*, INKA, IOR and REPO can be configured to send a *mains OK indication*.

To avoid radio interference when many units send a mains OK indication at the same time, the time from mains power return to when the radio message is sent will be a random time between 0 and 45 seconds in intervals of 3 seconds.

The *mains OK* parameter is found in the *miscellaneous* section under the *preferences* tab in IOR Programmer.

INKA **IOR** **REPO**	Activate the *mains OK indication* function	Select "Yes/Function on" in list box 307

INKA **IOR** **REPO**	Deactivate the *mains OK indication* function	Select "No/Function off" in list box 307