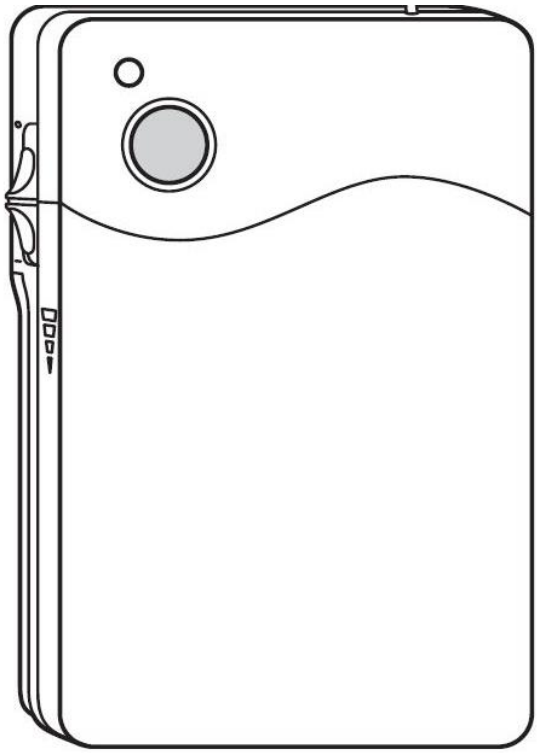
mBox | Motion



Technical Handbook

Table of Contents

1. Revision

All Doro's products are continuously being developed and adapted to suit the needs of our customers. This means that new versions of software and hardware are released regularly. mBox/Motion can be updated to the latest software version by reprogramming the processor. The processor contains a flash memory, which means that it can be erased and reprogrammed.

Version	Date	Comment
A	2014-11-27	Draft version
B	2014-12-18	Updated version to Phoniro, corresponding to f/w version 1.3
C	2018-02-16	Doro version. 868 MHz introduced as an option for certain applications. Corresponding to mBox v.2.5 and Motion v.2.7
D	2018-04-10	New solid state relay. The output is no longer dependent on polarity.
E	2018-10-25	Improved power consumption in 868 MHz Motion. mBox v2.8 and Motion v2.8
F	2018-10-29	mBox v.3.1 and Motion v.3.1 New hardware. New PIR ~90° horizontal and vertical detection.
G	2018-12-03	Motion: no external power supply

The information contained here is subject to change without notice. The only warranties for Doro product and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. Doro shall not be in liable for technical or editorial errors or omissions contained herein.

2. Terms and abbreviations

Abbreviation	Meaning
GSM	Global System for Mobile
PIR	Passive Infrared
LED	Light-emitting diode
VCC	Positive supply line voltage
DC	Direct current
NC	Normally closed
NO	Normally open

3. Important information

All systems using radio and telecommunication are subject to interference beyond the user's control. Products from Doro are designed to minimize the impact of such interference. Nevertheless, the user must be aware that system components can be subjected to interference or other influences that may cause malfunction. It is therefore important to regularly check that every part of the system works in all areas, especially radio communications.

Contact your supplier immediately in case of any suspected malfunction. Keep the product away from interfering devices such as radio transmitters, GSM-telephones, DECT-telephones or wireless headphones.

Users should pay particular attention to the potential for interference from other systems operating in the same or adjacent bands.

The compartment covers on the reverse may be opened only by authorized person. Only use recommended battery type as stated under technical data. CAUTION – risk of explosion if batteries are replaced by incorrect type. Dispose of used batteries shall be done in an environmental friendly way. See environmental information. Only use power supply recommended in technical data.

When connection/disconnection of external devices, the unit shall be turned off and the power supply shall be disconnected from the unit. For further information, please contact your supplier.

4. About mBox/Motion

mBox can be used in the following applications using the Doro radio protocol(s):

- Door alarm and bed alarm (868 MHz, 869 MHz).
- Stand alone radio receiver (868 MHz, 869 MHz).
- Repeater to increase radio coverage (868 MHz, 869 MHz).
- Radio transmitter to interconnect wired alarms to a wireless system.

Additional features:

- Low power consumption. Can be powered with batteries, or via an external power source (9 - 30 VDC).
- One solid state relay output, the output is momentarily activated for a programmable period. Alternative a following function where it follows the state of an input.
- 10 radio transmitters can be programmed to the output.
- Two inputs can be programmed to trigger alarms of selectable alarm types on close/open (Alarm types are programmed in the radio receiver/receiving system).
- Automatic battery monitoring.
- Periodic test alarm (only 869 MHz).

Motion can be used for the following applications using the Doro radio protocol(s):

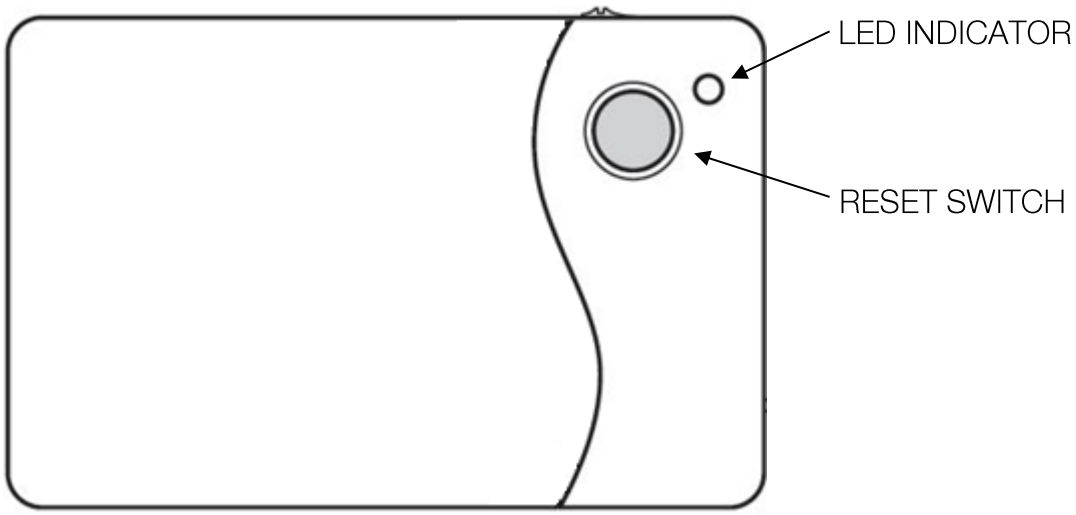
- Freestanding motion/temperature difference detector for bed alarm application. Normally positioned on the floor lengthwise to the bed, to detect and transmit a signal if the person leaves or falls out of the bed.
- Inactivity monitoring in conjunction with passive alarm function in radio receiver or alarm system. Positioned so that it is activated at least once a day, e.g. in the kitchen. The alarm system transmits an alarm if this does not happen within the programmed time interval.
- The detector can be programmed so that in case of detection of motion the unit activates an optional alarm type from Doro's alarm system.

Additional features:

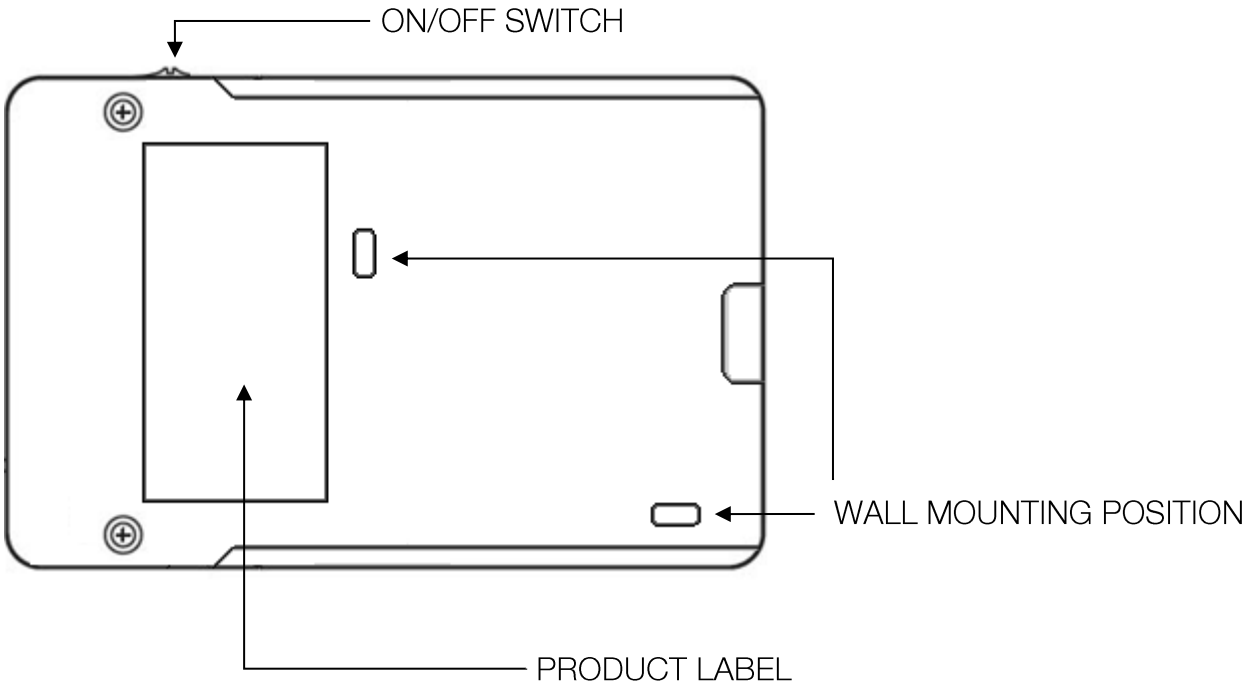
- Low power consumption. Powered with batteries.
- Integrated reset button.
- Automatic battery monitoring.
- Periodic test alarm (only 869 MHz).

5. Overview

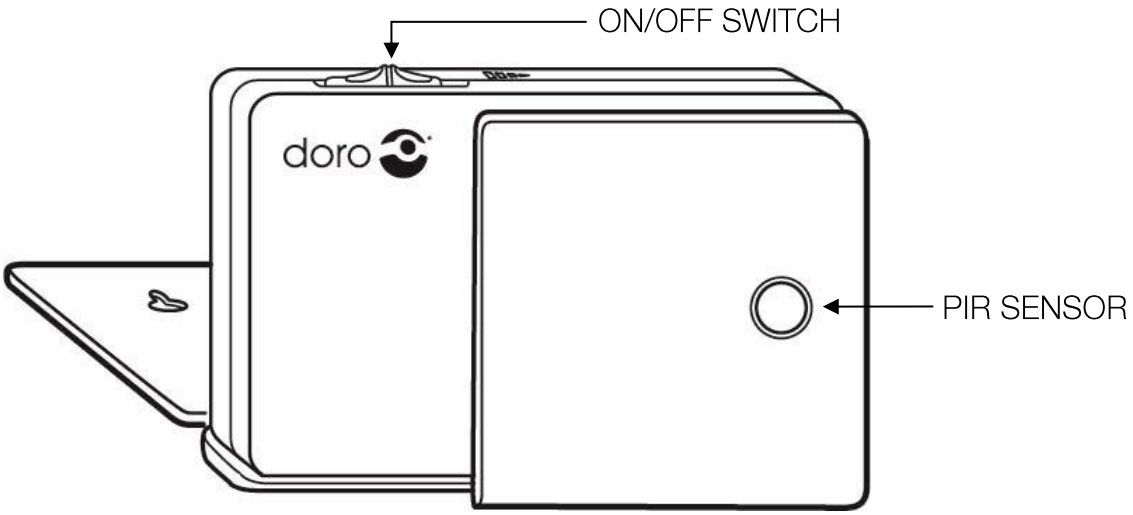
5.1. mBox, front side



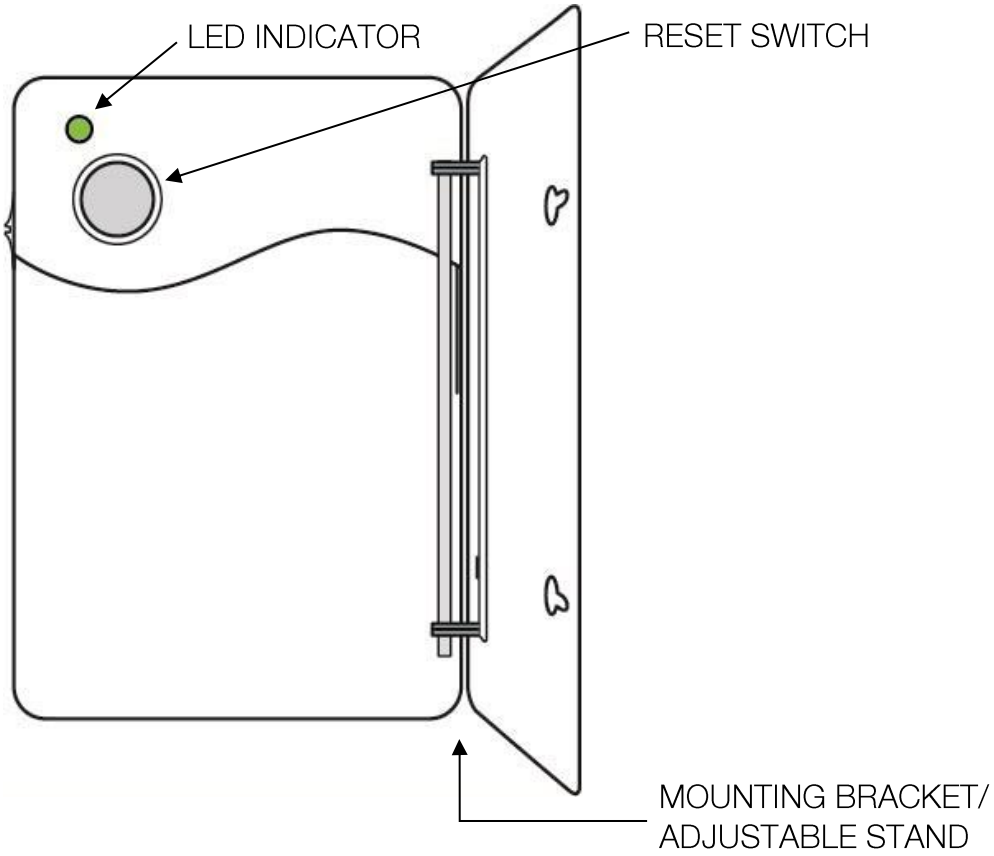
5.2. mBox, back side



5.3. Motion, front side



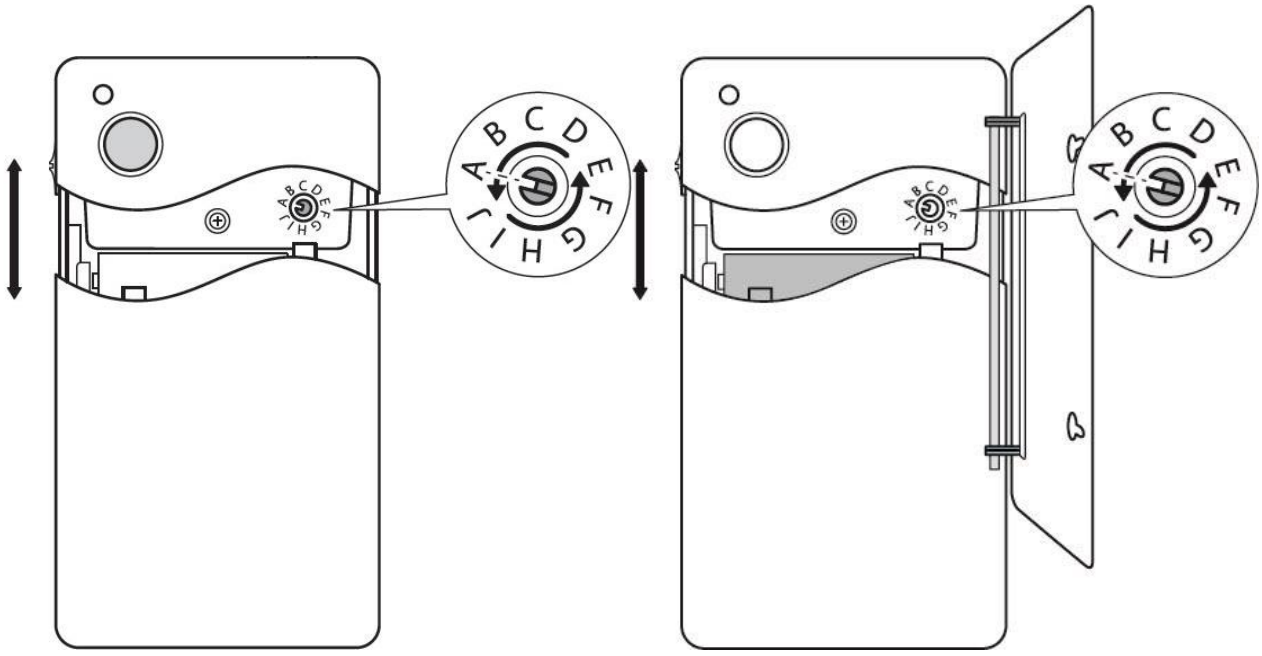
5.4. Motion, back side



6. Components

6.1. Function selector

When the sliding cover is opened to the first position, the function selector can be accessed.



mBox Motion

The default settings are made with the function selector. Turn it to the desired position using a screwdriver or other suitable tool. The function selector has 10 possible position but not all are active. Which positions that are active are determined based on whether it is an mBox or Motion unit.

6.2. RJ45

Pin 1: No function

Pin 2: No function

Pin 3: IN 1

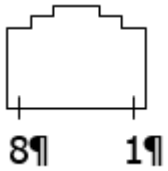
Pin 4: IN 2

Pin 5: OUT1

Pin 6: OUT2

Pin 7: VCC

Pin 8: GND

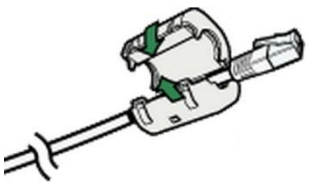


6.3. Inputs

The unit have two inputs that are located in the RJ45 connector, on pin 3 (IN1) and pin 4 (IN2). Both inputs can generate an event/alarm by either a close or an open, it is the selected mode that determines the behavior of the input.

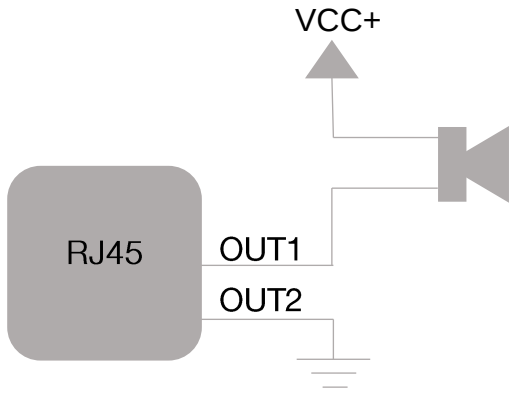
Maximum length on the cabling is two meters.

For CE compliance when using custom I/O cable; Apply a ferrite from Würth (Part no. 742 711 42) at the mBox side.



6.4. Outputs

The unit has a solid state relay output, OUT1 and OUT2 in the RJ45 connector. If the output is activated a current are able to flow between the two outputs. The output can be used to activate external units e.g. a siren or a LED lamp. The solid state relay output is not depending on polarization.



6.5. External Power Supply

mBox only

External power supply can be connected to the RJ45 connector, pin 7 (VCC) and 8 (GND) to supply the unit. Valid input voltage 9 – 30 VDC.

6.6. Magnetic reed switch

The magnetic reed switch in conjunction with a door magnet is used in mode A to detect opened doors.

6.7. Sensor for motion

The motion sensor is used for detecting motion. The sensor is a PIR model and is described in section 12.

6.8. USB connection

The micro-USB connector is used in conjunction with a USB cable and a power supply (5VDC) to externally power the unit.

Maximum allowed length of the USB-cable is three meters.

6.9. Reset button

Has different function depending on product and function selection.

6.10. On/Off switch

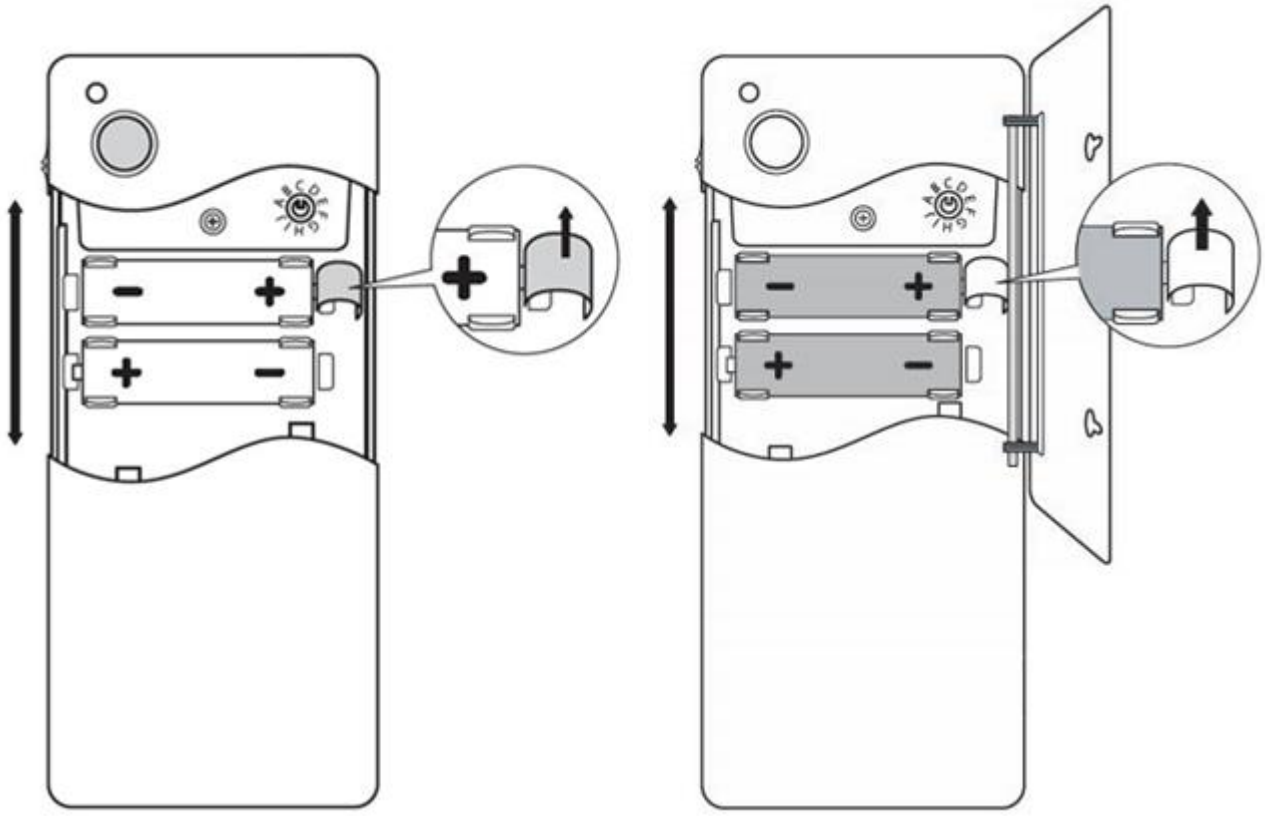
The unit is turned on and off with the On/Off switch.

6.11. LED indicator

Depending on the product and function the LED indicate in different situations. It can have three different colors; green, red and orange. See section 8.

7. Battery

7.1. Replacing the batteries



mBox Motion

Opening the sliding cover allows access to the batteries. Only use good quality Alkaline AA (LR06) batteries. Observe the direction/polarity of the batteries when replacing. On delivery a plastic piece is mounted between the battery and battery holder. Remove the plastic piece in order to start the device.

7.2. Battery monitoring

The battery status in mBox/Motion is constantly being monitored and a low battery level is indicated with a red flashing light every 6th second. An automatically radio alarm is also transmitted to the alarm system.

7.3. Battery life time

The battery life time depends on the battery quality, the configuration of the mBox / Motion and how often the unit triggers an alarm.

Estimated battery life time in Motion (default settings) position A and one alarm/day: approx. six months.

Estimated battery life time in mBox (default settings) position A and one alarm/day: approx. one year.

8. Led indications

Green light
Acknowledge of alarm indicates with a short green light.

Green, continuous light
Unit is using an external power supply.

Green flashing light (every 6th second)
The unit is being powered by batteries (default).

Red light
The red LED lights up when the unit is turned on.
During transmission of the radio message the red LED lights up.

Red flashing light (every 6th second)
The unit is powered by batteries, a low voltage level is detected. Batteries shall be replaced as soon as possible.

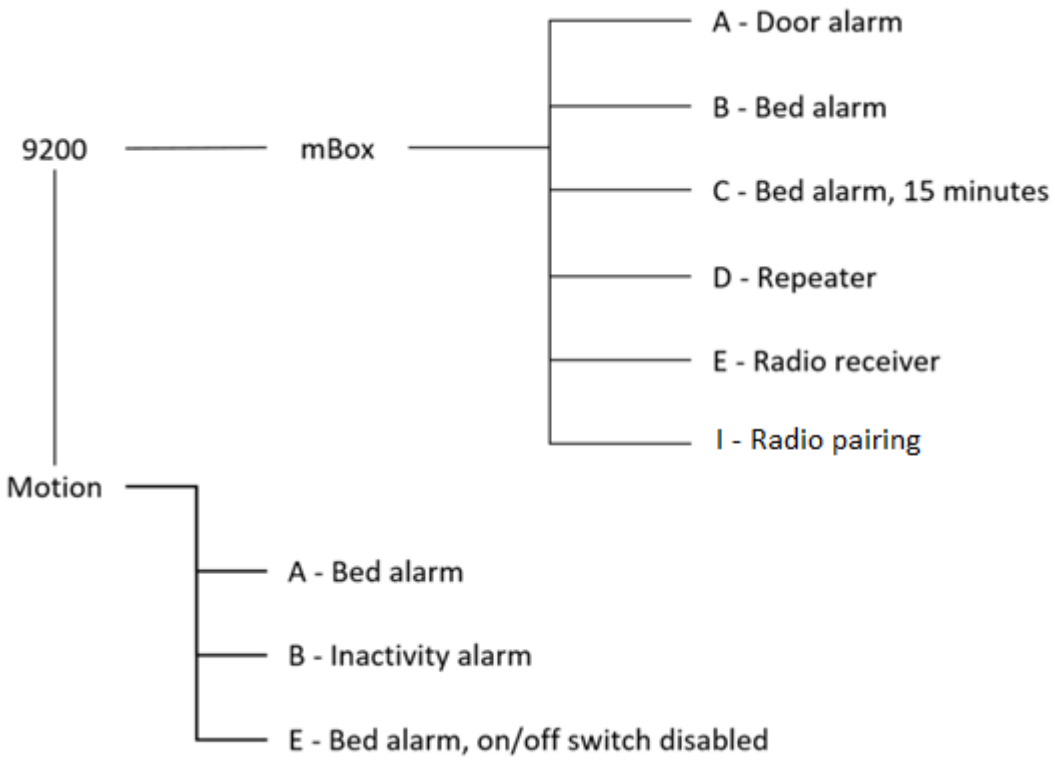
Red fast flashing (every 0,5th second)
Invalid mode, turn the function selector to a valid mode.

Orange fast flashing
Change of position with the function selector, one blink.

Orange flashing every second (for 45 seconds)
The motion sensor is being stabilized.

Alternating green red, twice per second
Unit has been set in pairing mode.

9. Overview program hierarchy



10. Programming

10.1. Software

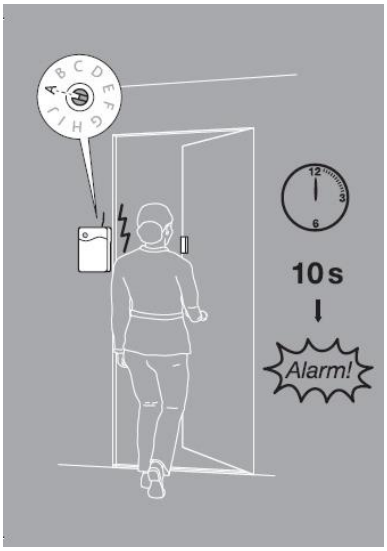
When ordering an mBox/Motion unit, specify the desired programming.

10.2. Default reset

Default reset can only be done by qualified technician.

11. mBox

11.1. Mode A – Door alarm



11.1.1. Function description

	Explanation
Radio protocol	Doro 868 MHz, Doro 869 MHz
Magnetic reed switch (NC)	Transmit an alarm after the delay time has expired (default 10 seconds).
Reset button	Transmit a reset alarm and inactivate door alarm (default 10 seconds).
Input 1 (NC)	Same function as the magnetic reed switch.
Input 2 (NO)	Door mat.
Output	Pulse on output (default two seconds, one pulse).

When mBox is used as a door alarm, the reset button is temporarily used to disable the alarm, reset the alarm before it is transmitted or to send a reset message to acknowledge an alarm.

Before opening a door that is monitored by an mBox, it is possible by a press on the reset button to deactivate the door alarm during an adjustable time. If the door is opened during this time, no alarm will be sent. The door alarm is not reactivated until the door is closed or the time for the inactivation has passed.

It is also possible to pass through the door and then deactivate the alarm by pressing the reset button before the delay time has passed. By pressing the reset button one prevent the alarm to be sent.

If the alarm would be sent by mistake, one can send a reset message to the system by pressing the reset button.

The output is activated every time an alarm is activated by input one, two or the magnetic reed switch. The output will then be low after the set value (default two seconds, one pulse).

11.2. Mode B – Bed alarm

11.2.1. Function description

	Explanation
Radio protocol	Doro 868 MHz, Doro 869 MHz
Reset button	Transmit reset alarm and deactivates the output (default 10 seconds).
Input 1 (NC)	Bed mat.
Output	Follows input 1 (inverted), five seconds.

In bed alarm mode, input 1 is used to connect a bed alarm mat. When the bed alarm mat has been connected and the user has lain still on the mat for adjustable time (default 30 seconds), the unit will be activated and it will transmit an alarm when the user gets out of the bed and remain out of bed for more than the adjustable time (default 10 seconds). If the user would lie down again before the adjustable time has passed no alarm will be transmitted.

When the mBox is used in mode B as a bed monitor there will be a reset message when the reset button has been pressed.

The output will follow input 1 inverted which means that the output will be closed when the input has been open for five seconds. The output will then be opened directly when input 1 has been closed again.

The output will be deactivated when the reset button is pressed. It will be activated again once the input is activated and the user gets out of the bed.

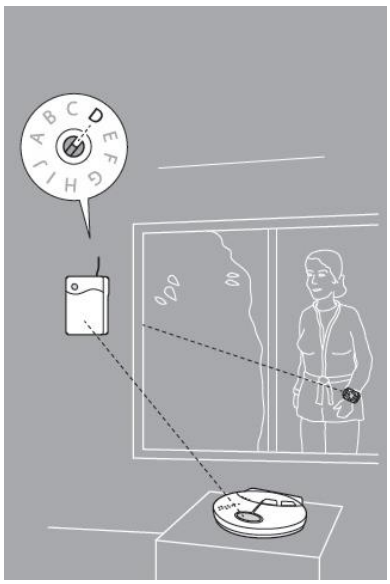
11.3. Mode C – Bed alarm, 15 minutes

11.3.1. Function description

	Explanation
Radio protocol	Doro 868 MHz, Doro 869 MHz
Reset button	Transmit reset alarm and deactivates the output (default 15 minutes).
Input 1 (NC)	Bed mat.
Output	Follows input 1 (inverted), five seconds.

Bed alarm in mode C works in the same way as mode B but has another time (default 15 minutes) for how long the user can stay out of bed before the unit transmits an alarm.

11.4. Mode D – Repeater



11.4.1. Function description

	Explanation
Radio protocol	Doro 868 MHz, Doro 869 MHz

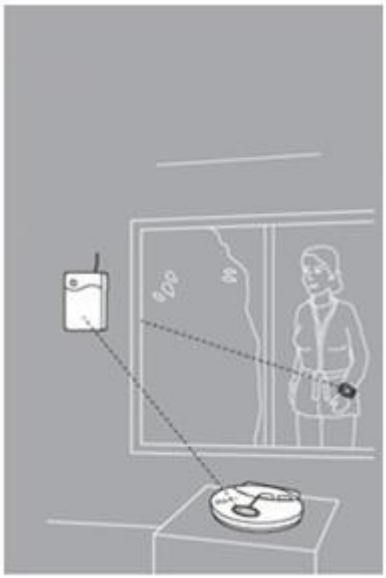
When the unit is switched to repeater, all radio messages that the unit receives will be acknowledged and repeated. It is only the radio messages that are supported by the chosen radio protocol that will be repeated. The messages will be repeated with higher output power to expand the transmission area. To avoid concentricity in the case where several units would be placed within range of each other, there is a delay of 4 seconds on repeated radio messages and a block time of 10 seconds to prevent that the same radio message is repeated twice.

It is also possible to pair the radio transmitter with the mBox in mode I so that only the paired radio transmitters are repeated.

Two or more repeaters shall not be in the same radio transmitter area.

Works only with external power supply in 868 MHz.

11.5. Mode E – Radio receiver



11.5.1. Function description

	Explanation
Radio protocol	Doro 868 MHz, Doro 869 MHz
Output	Pulse on output (default two seconds, one pulse).

In order for the radio units that shall be able to activate the output; the units must be programmed to the mBox's radio receiver. By turning the function selector to mode I and pressing the reset button shortly, the learning mode is activated. When the learning mode is activated it indicates with the LED that alter between red and green twice per second. As soon as a valid radio message has been received by the mBox-unit, the serial number is saved and the learning mode is turned off.

If more radio units shall be programmed to the mBox-unit, press the reset button again and the unit will switch to learning mode. If more than 10 radio units are programmed to the mBox-unit, the first programmed radio unit will be written over. With a short press on the reset button, when the programming mode is activated, the programming mode will be turned off.

To delete all programmed radio units hold the reset button for approx. 10 seconds until red LED flashes once.

Works only with external power supply in 868 MHz.

11.6. Mode I – Radio pairing

11.6.1. Function description

	Explanation
Radio protocol	Doro 868 MHz, Doro 869 MHz
Reset button	Activates/deactivates learning mode

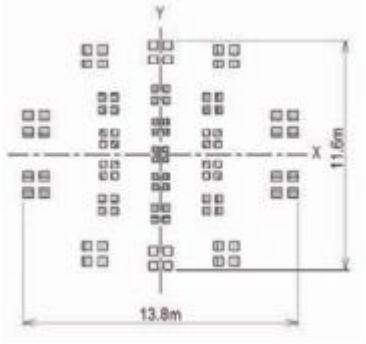
By turning the function selector to mode I and pressing the reset button shortly, the learning mode is activated. When the learning mode is activated it indicates with the LED that alter between red and green twice per second. As soon as a valid radio message has been received by the mBox-unit, the serial number is saved and the learning mode is turned off.

If more radio units shall be programmed to the mBox-unit, press the reset button again and the unit will switch to learning mode. If more than 10 radio units are programmed to the mBox-unit, the first programmed radio unit will be written over. With a short press on the reset button, when the programming mode is activated, the programming mode will be turned off.

To delete all programmed radio units, hold the reset button for approx. 10 seconds until red LED flashes once.

12. Motion

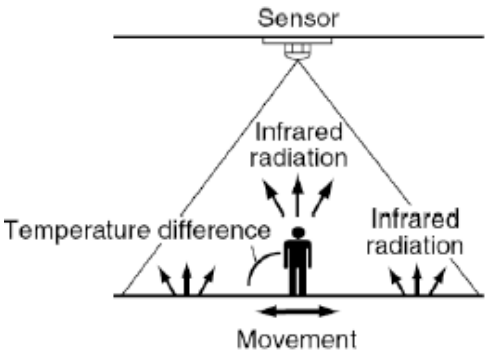
12.1. Detection



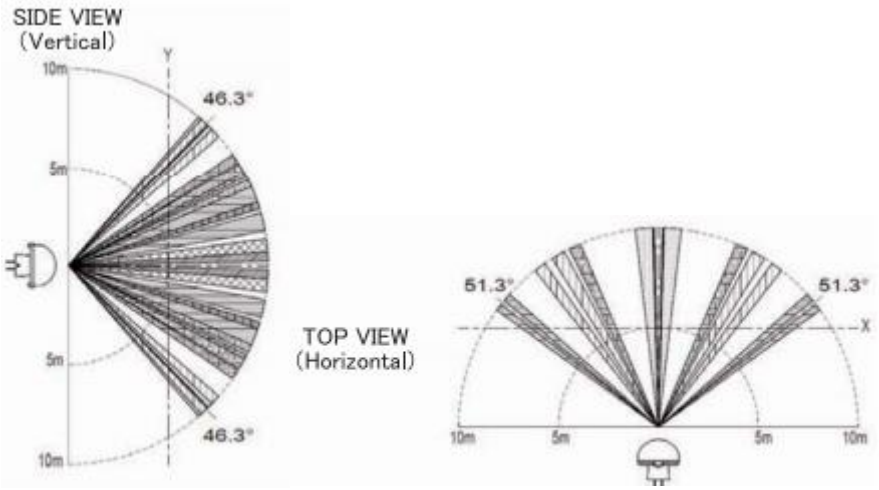
Motion uses an angled spot-type PIR sensor, giving it a very high and wide detection angle.

PIR stands for Passive Infrared Radiation, and measures the differences in infrared radiation when an object with a different temperature to the background temperature moves between the detection zones.

When installing, Motion should be positioned in such a way that the movement occurs sideways/vertically (X/Y) in relation to the PIR sensor as far as possible, so that the movement covers multiple detection zones. A movement directly towards the PIR sensor (Z) shortens the detection distance.



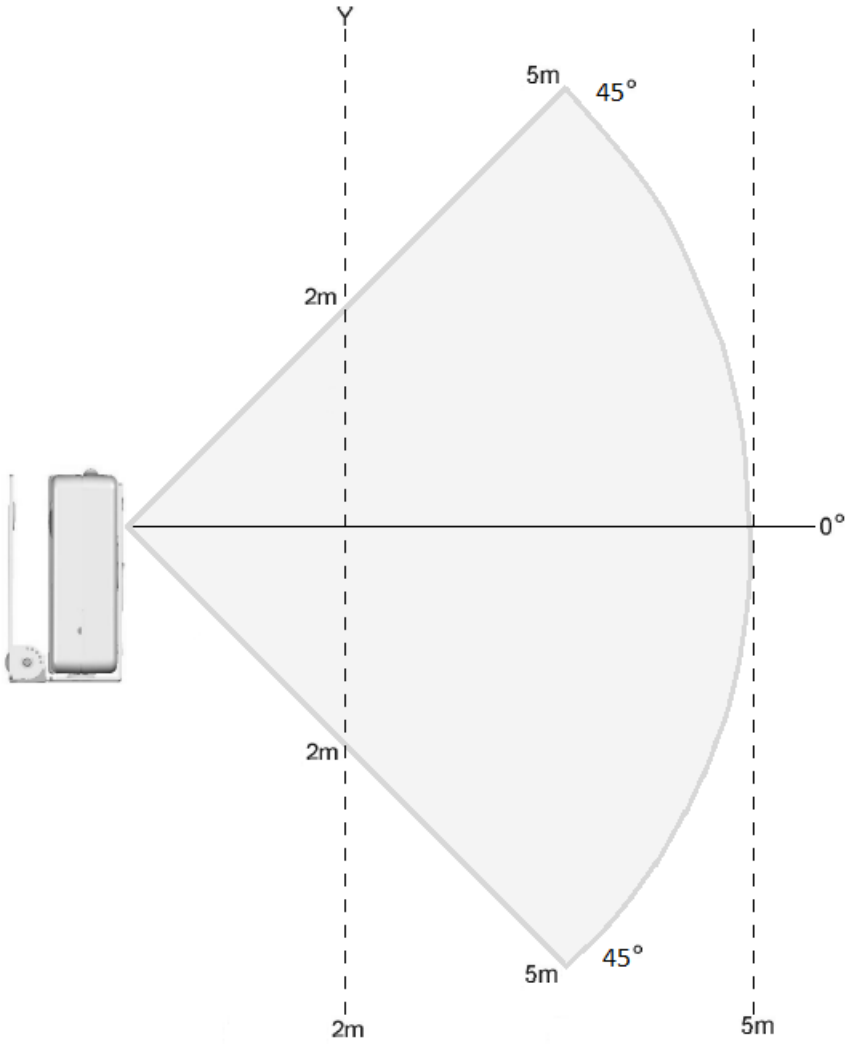
In the horizontal plane, Motion has a slightly larger sensing angle which makes it harder to “sneak” across the detection area.



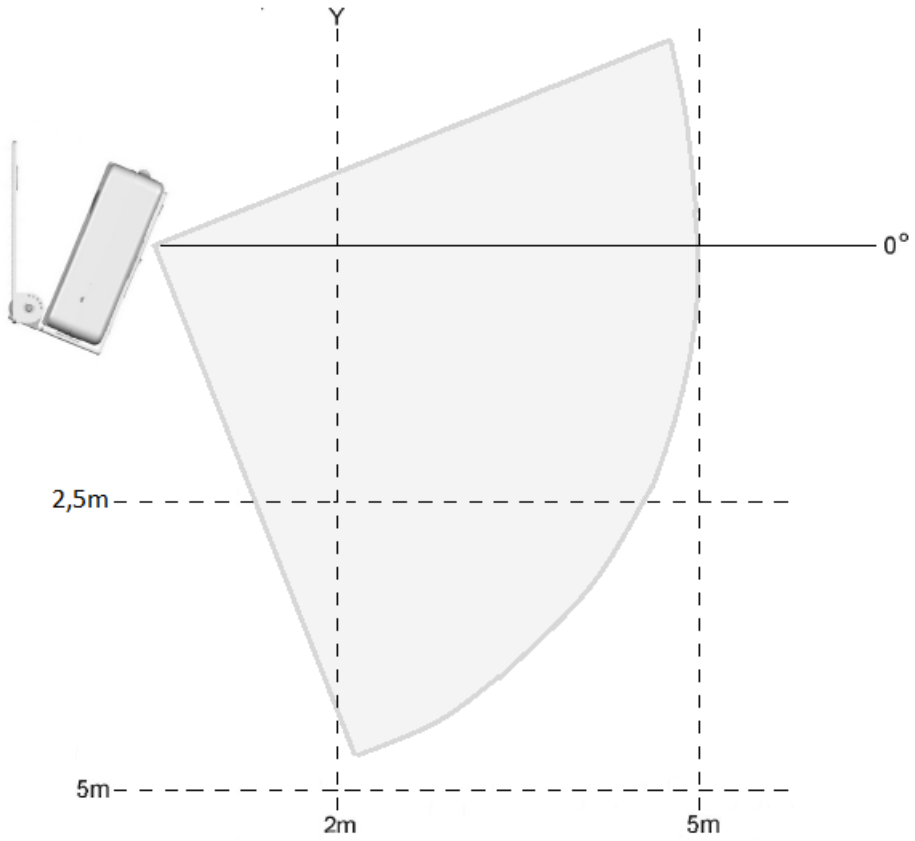
12.2. Mounting

Motion’s stand can be angled in five different positions, making it easy to customize the detection area.

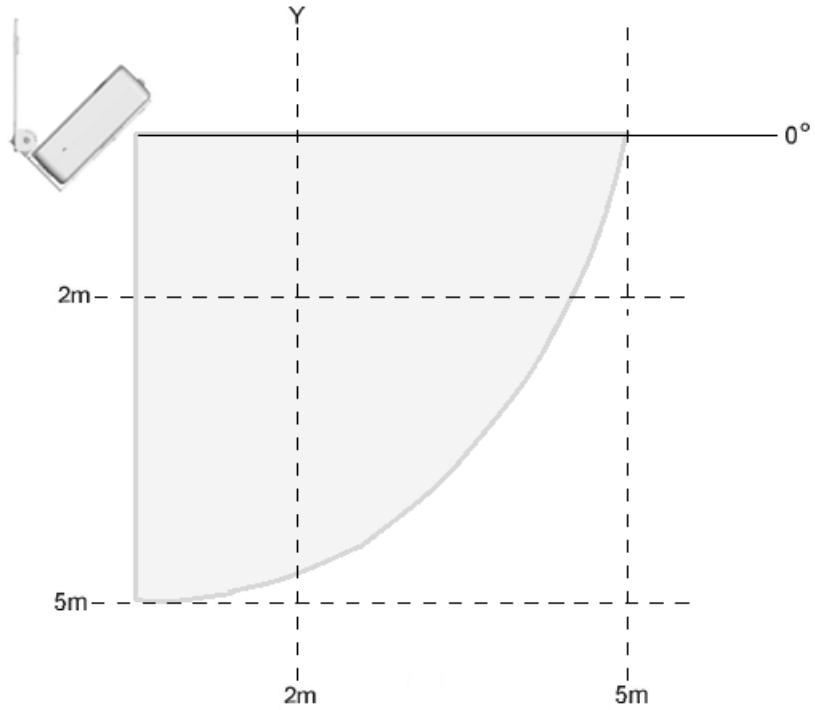
Position 1 – Delivery position



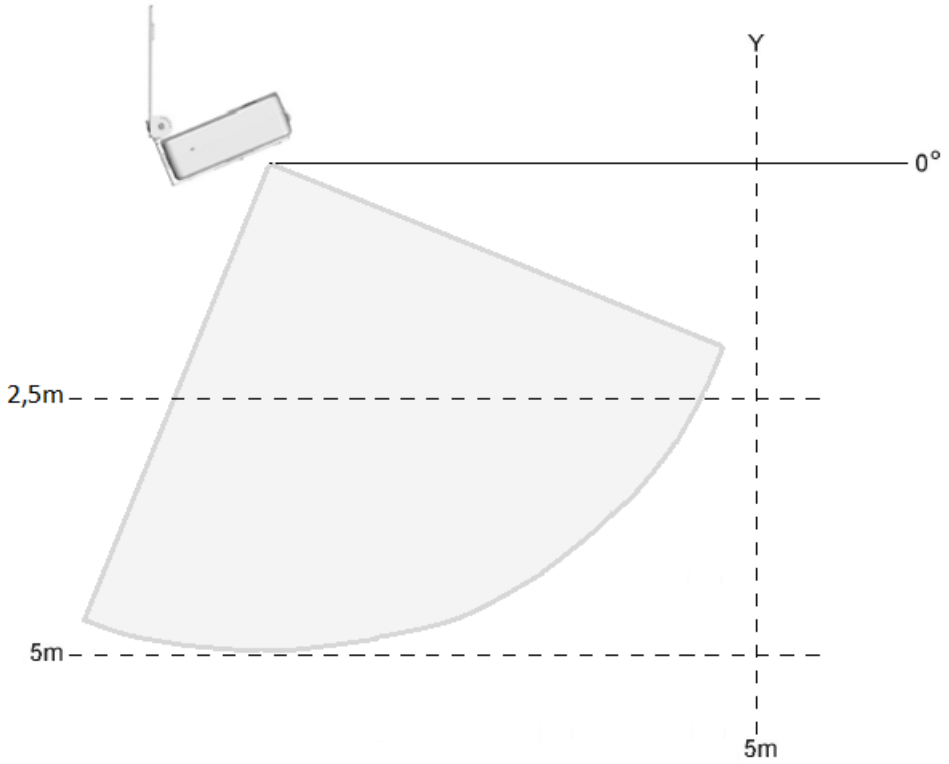
Position 2 (+22.5°)



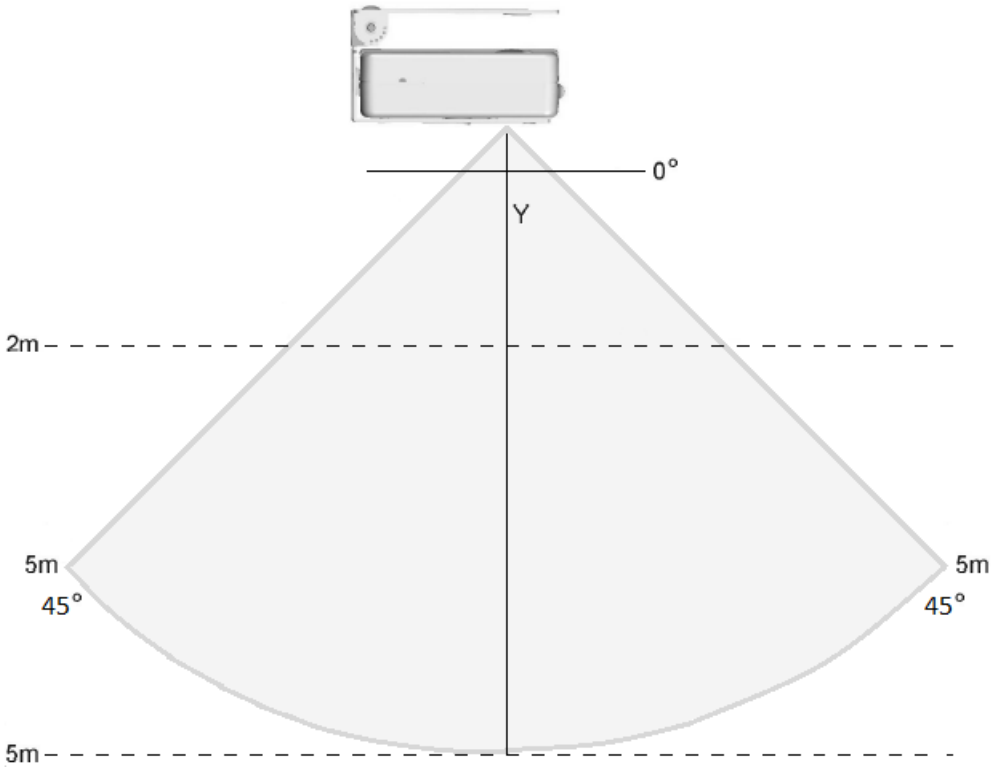
Position 3 (+45°)



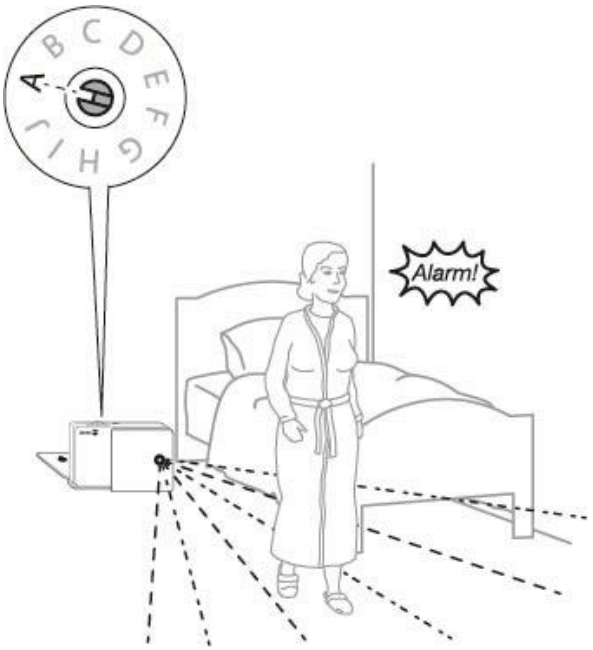
Position 4 (+67.5°)



Position 5 (+90°)



12.3. Mode A – Bed alarm



12.3.1. Function description

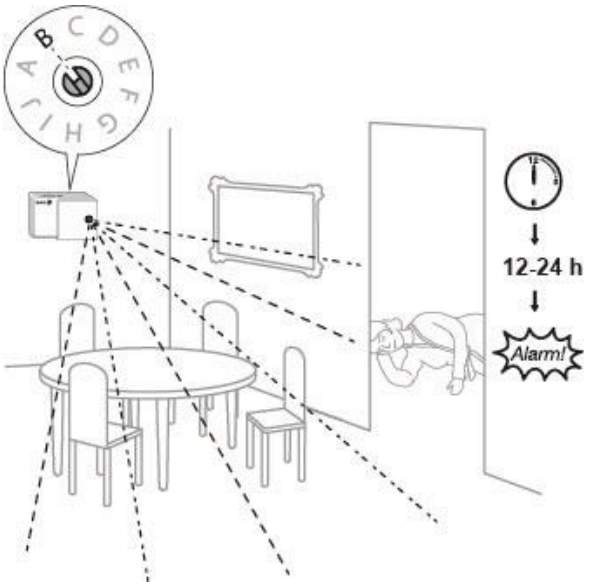
	Explanation
Radio protocol	Doro 868 MHz, Doro 869 MHz
Reset button	Transmit reset alarm.
Motion sensor	Transmit bed alarm after 45 seconds stabilization time.
Output	Pulse on output (default two seconds, one pulse).

When the unit is switched on or set in mode A, the sensor will be activated. The sensor has a stabilization time of 45 seconds, during which the LED will flash orange to show that the sensor is being stabilized. First when the sensor has been stabilized, the unit will be able to transmit alarm at movement or temperature differences in front of the sensor.

The reset button transmits a reset message to the system by pressing the button. It also resets the sensor which activates a new stabilization time.

The output is activated every time an alarm is activated by the sensor. The output will then be low after the set value (default two seconds, one pulse).

12.4. Mode B – Inactivity alarm



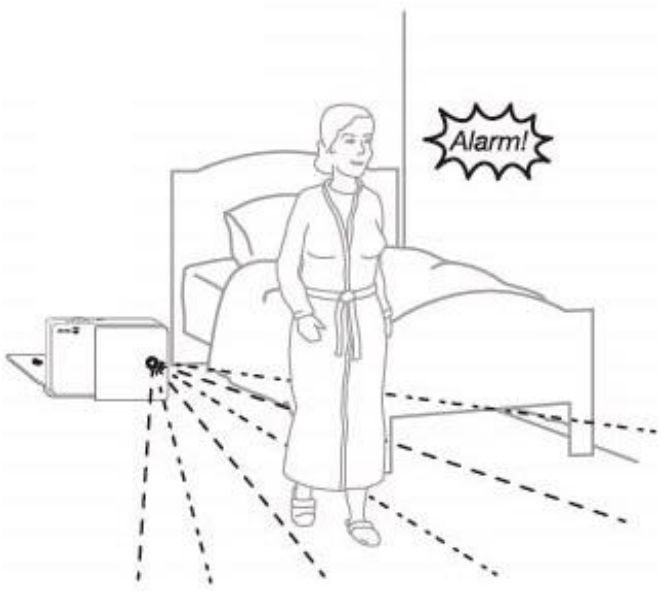
12.4.1. Function description

	Explanation
Radio protocol	Doro 868 MHz, Doro 869 MHz
Reset button	Transmit reset alarm and reset inactivity alarm.
Motion sensor	Transmit reset alarm and reset inactivity alarm.
Output	Pulse on output (default two seconds, one pulse).

When activating, the Motion unit transmits a radio message. Afterwards the Motion unit will be set in a power saving mode for one hour. This will reduce the power consumption during this time. At a longer inactivity there will be no reset messages to the radio receiver. If the radio receiver (e.g Carephone) doesn´t receive activation within a preset time it will transmit an “inactivity alarm” to one or more receivers, e.g. an Alarm Receiving Centre (ARC).

Programming of alarm type in the alarm system is required.

12.5. Mode E – Bed alarm, on/off switch disabled



12.5.1. Function description

	Explanation
Radio protocol	Doro 868 MHz, Doro 869 MHz
Reset button	Transmit reset alarm.
Motion sensor	Transmit bed alarm after 45 seconds stabilization time.
Output	Pulse on output (default two seconds, one pulse).

Same function as mode A, the on/off switch is locked in On-mode to avoid that anybody intentionally or unintentionally turn off the unit.

13. TECHNICAL DATA

Power supply	9 – 30 VDC or 2 pcs 1,5V LR6/AA, Alkaline batteries.	
Power consumption, Battery powered.	40uA 10mA	Standby mode. On detection (three seconds).
Power consumption, External power supply.	30mA	Standby mode.
Radio	868 MHz, 869 MHz	
Output	1 solid state output. Max 60mA / 50VDC.	
Size	110.0 x 70 x 41/100 mm.	
Equipment class	Class 1 radio equipment.	
Environment	Indoor use, normal living environment.	
- Temperature	+5 to +35 °C.	
- Humidity	0 to 75% relative humidity.	
- Environmental class	I	

14. ENVIRONMENTAL INFORMATION

This product complies with the requirements of the EU directive 2006/66/EC (Batteries), 2012/19/EU (WEEE) and 2011/65/EU (RoHS2).

These directives regulate the product liability for battery, electrical and electronic recycling with the purpose of increasing recycling and minimizing waste. The unit is marked with the “crossed out wheeled bin” logo, which indicates that it shall be handed in for recycling.

The product can be returned free of charge to a recycling station that is connected, directly or via a recycling system, to Doro or to your distributor. For detailed instructions, please check with your distributor or visit our website, www.doro.se/care.

Note! The WEEE information and recycling instructions applies to European Union member states only. For other countries please check local legislation or contact your distributor.

15. DECLARATION OF CONFORMITY

CE

Hereby Doro declares that this radio equipment is in compliance with Directive 2014/53/EU (RED). The full text of the EU declaration of conformity is available at the following internet address: www.doro.com/dofc

www.doro.com