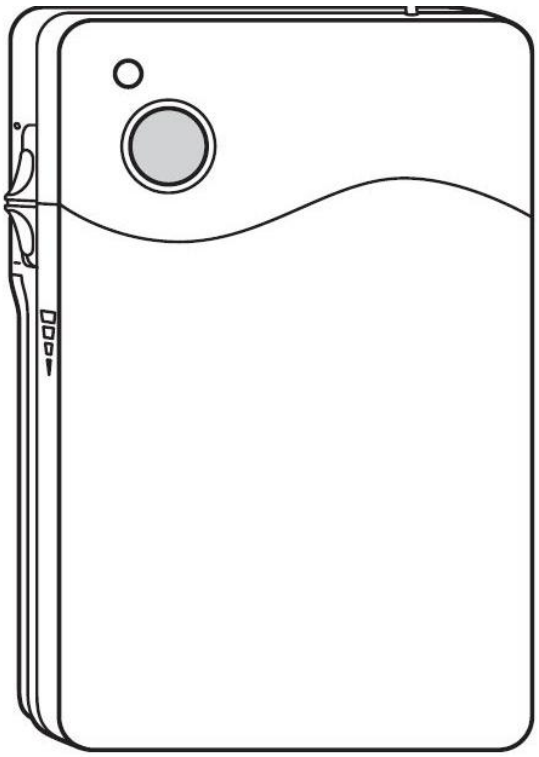
CareTech
A Doro Company

mBox | Motion



Service manual | Technical handbook

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1 REVISIONS

All CareTech'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. 9200 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	Comments
1.2	2014-11-27	Basic version
1.3	2014-12-18	Updated version to Phoniro

The information contained here is subject to change without notice. The only warranties for CareTech 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. CareTech shall not be in liable for technical or editorial errors or omissions contained herein.

The information contained in this publication in relation to applications is intended to be used as a suggestion. It is the installation engineer's duty to ensure that applications comply with set requirements. The information contained in this publication may be updated without prior notice.

CareTech AB accepts no responsibility for the use of the contents of this handbook.

2 TERMS AND ABBREVIATIONS

Abbreviation	Meaning
GSM	Global System for Mobile
DECT	Digital Enhanced Cordless Telecommunications
IR	Infrared
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 CareTech 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 CARETECH 9200

Motion can be used for the following applications:

- Freestanding motion 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 motion detector can be programmed so that in case of motion detection it activates an optional alarm type from CareTech's or Phoniro's alarm system.

Additional features:

- Low power consumption. Can be powered with batteries, or via an external power source (9 - 30 VDC).

- Can be temporarily disconnected using Phoniro's IR remote in Phoniro's radio mode. This can be used e.g. by staff that temporarily needs to be in the area being monitored.

- Integrated reset button.

- Automatic battery monitoring.

- Periodic test alarm.

mBox can be used in the following applications:

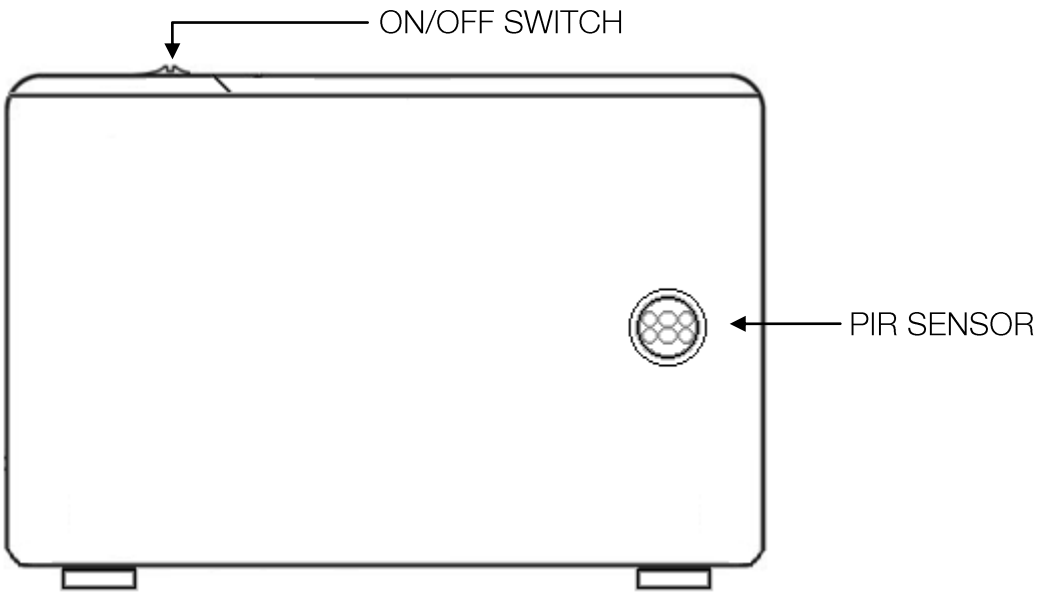
- Stand alone radio receiver.
- Repeater to increase radio coverage. Compatible with CareTech's radio protocol (869 MHz).
- Radio transmitter to interconnect wired alarms to a wireless system.

Additional features:

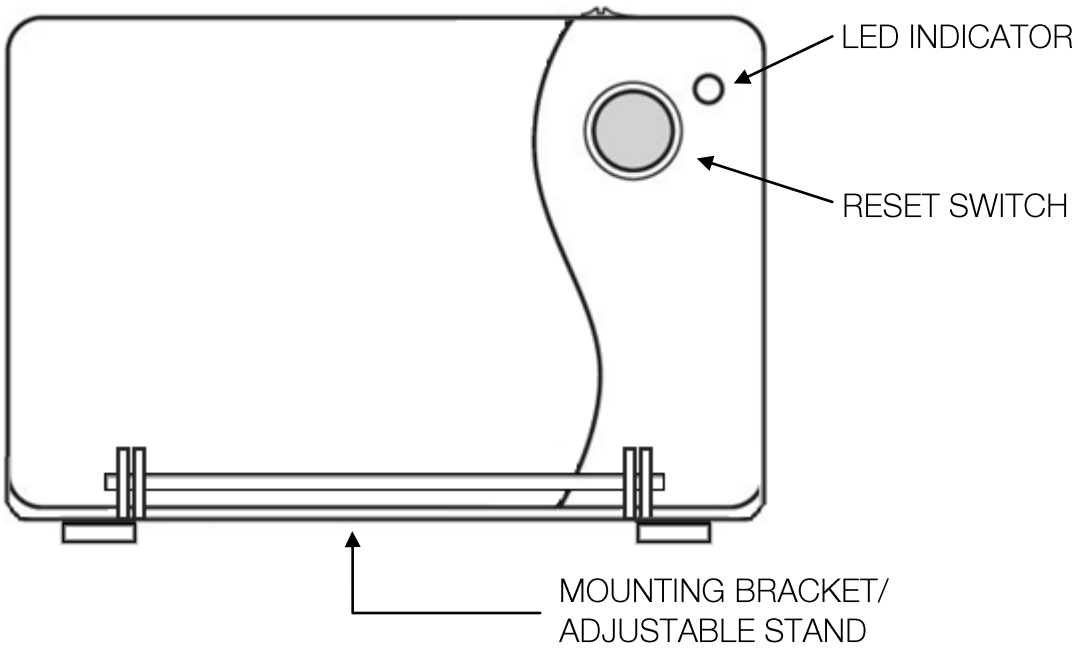
- Low power consumption. Can be powered with batteries, or via an external power source (9 - 30 VDC).
- One relay output. The output is momentarily activated for a programmable period. Alternative a following function where it follows the state of an input.
- 10 radio transmitters can be programmed to 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.

5 OVERVIEW

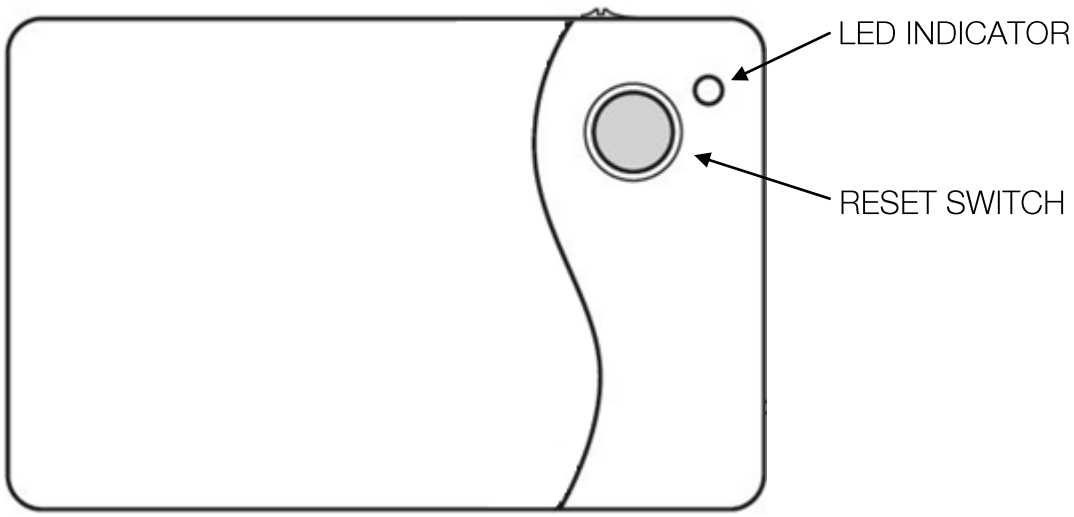
5.1 Motion, front side



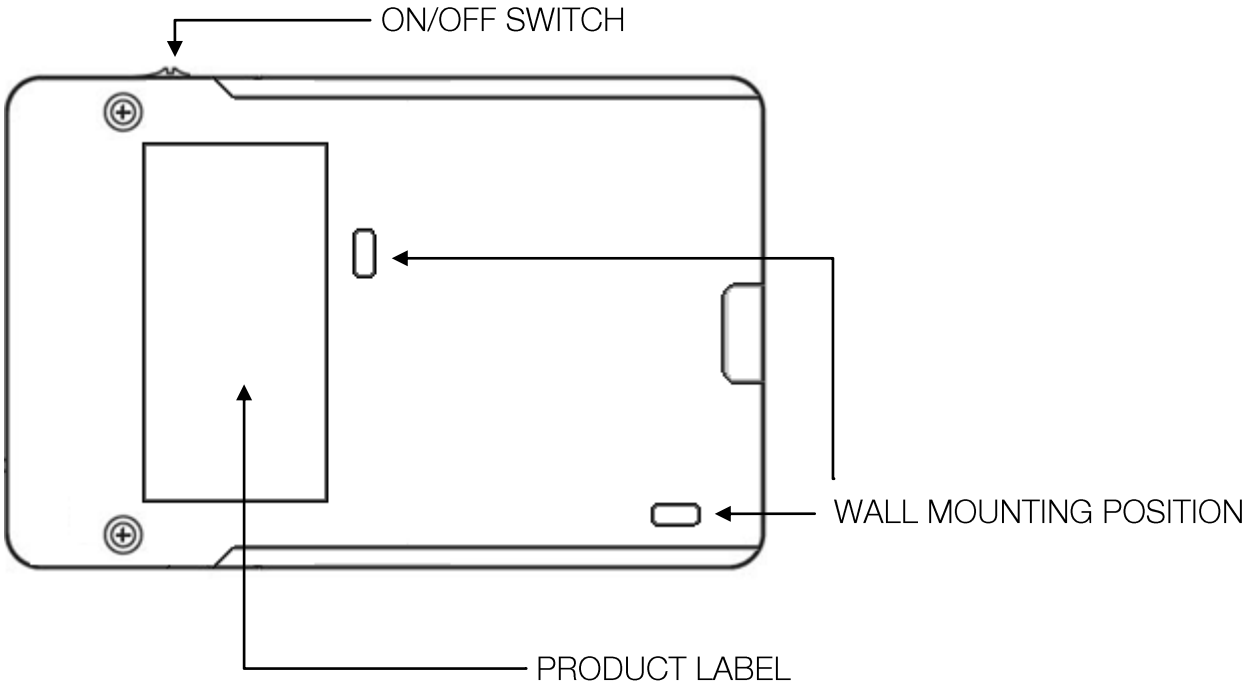
5.2 Motion, back side



5.3 mBox, front side



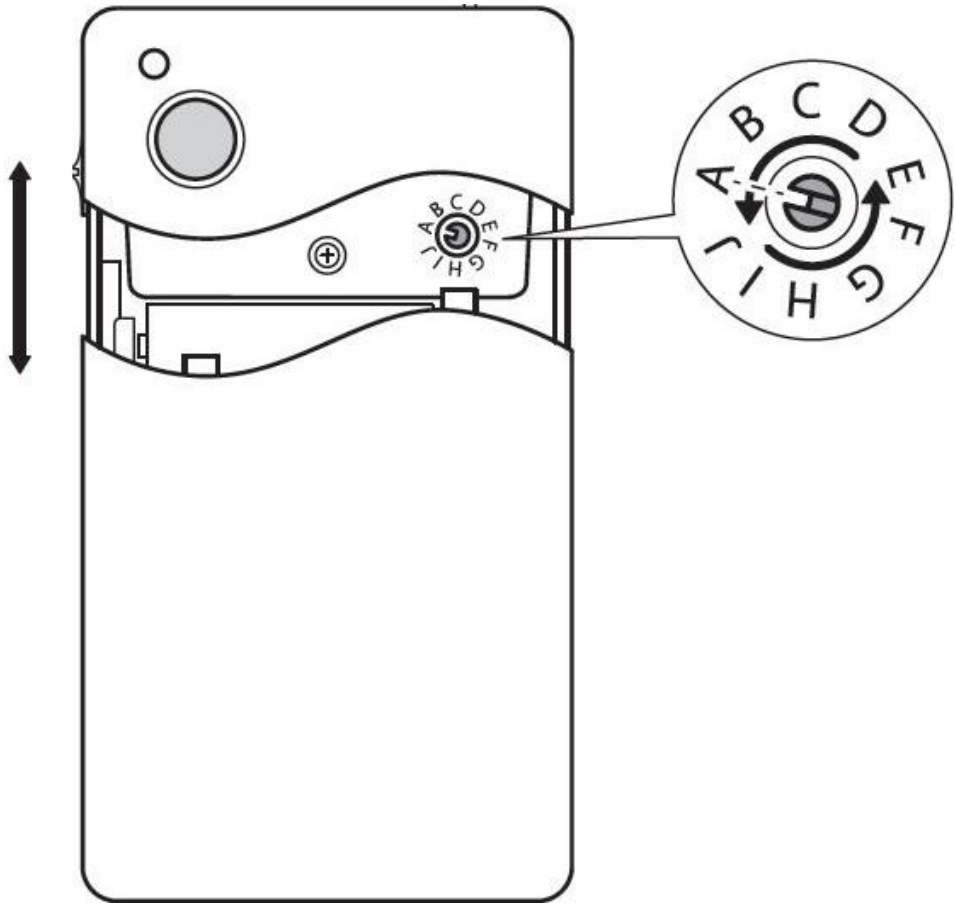
5.4 mBox, back side



5.5 Components

5.5.1 Function selector

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



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 a Motion or mBox unit. The function selector modes are described in section 5.8.

5.5.2 RJ45

Pin 1: No function

Pin 2: No function

Pin 3: IN 1

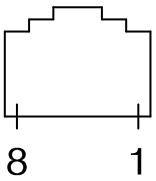
Pin 4: IN 2

Pin 5: OUT -

Pin 6: OUT +

Pin 7: VCC

Pin 8: GND

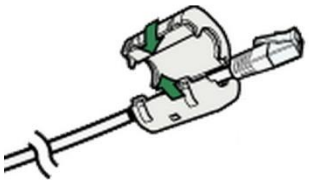


5.5.2.1 Inputs

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, see section 7 for a detailed description.

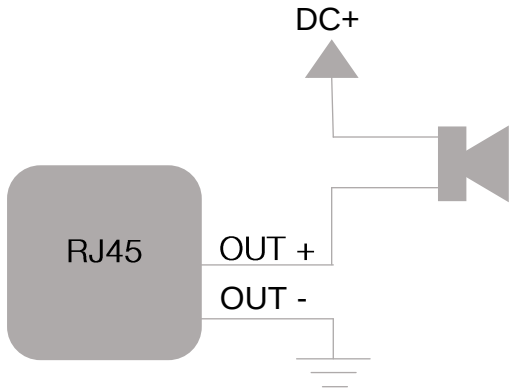
Maximum length on the cabling is two meters.

For CE compliance when using custom I/O cable; Apply a ferrite from Würth (Part no. 742 711 42) at the 9200 side.



5.5.2.2 Outputs

The unit has a solid state relay output that is polarity depending, pin 5 (-) and pin 6 (+) in the RJ45 connector. If the output is activated a current is allowed to flow from + to -. The output can be used to activate external units e.g. a siren or a LED lamp.



5.5.2.3 External Power Supply

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.

5.5.3 Magnetic reed switch

The magnetic reed switch in conjunction with a door magnet is used in mode A and G to detect open and closed doors.

5.5.4 Motion sensor

The motion sensor is used for motion detection in the Motion product. The sensor is a PIR model and is described in section 8.1.

5.5.5 IR receiver

Can be used together with Phoniro's remote control to pause, turn off or on the motion unit when Phoniro's radio protocol is chosen.

5.5.6 USB connection

The micro-USB connector is used in conjunction with a USB cable and a power supply (5VDC) to externally power the unit. It is also used for programming the unit with a PC and the configuration software CS9200.

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

5.5.7 Reset button

Has different function depending on product and function selection.

5.5.8 On/Off switch

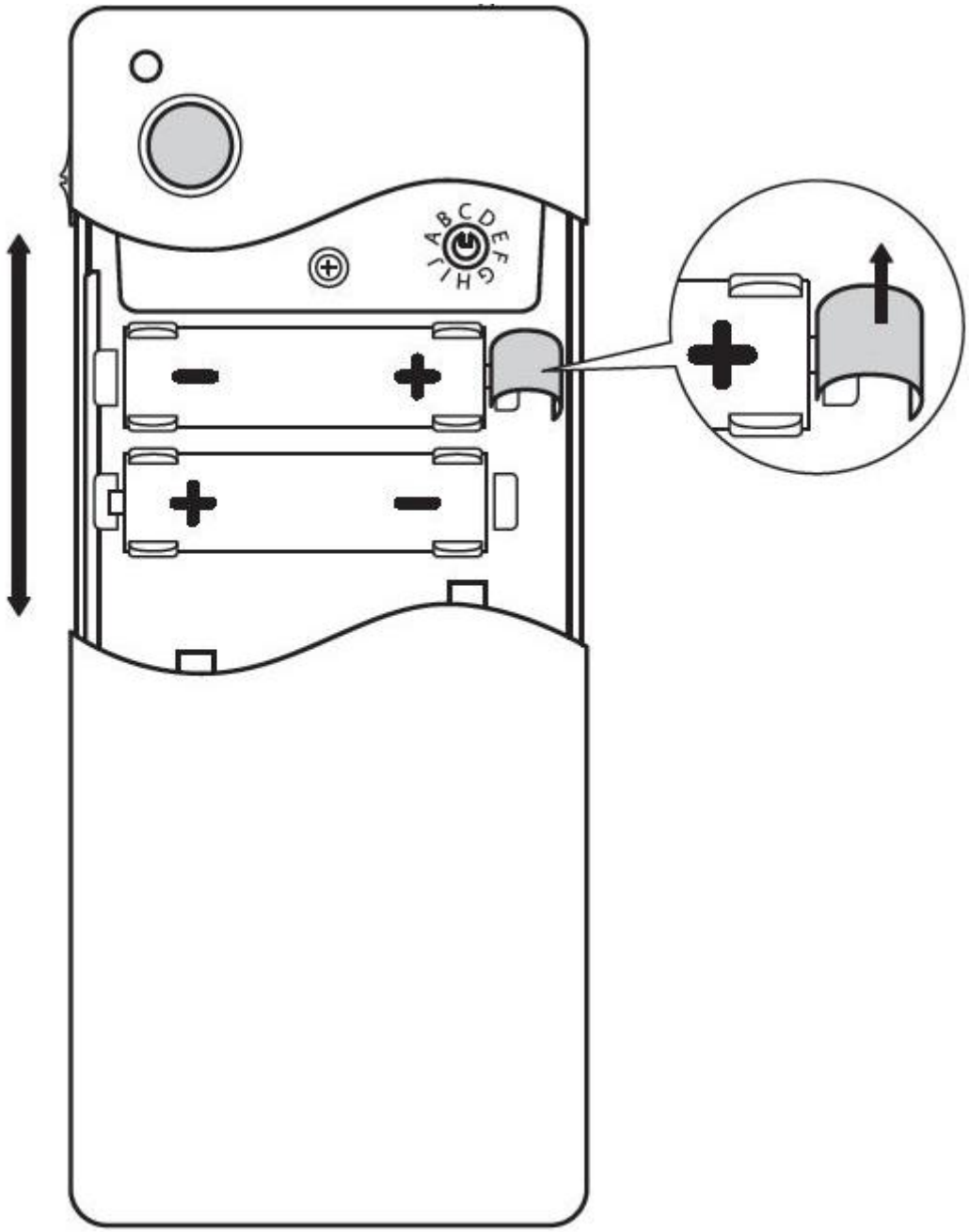
The unit is turned on and off with the On/Off switch.

5.5.9 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 5.7.1.

5.6 Battery

5.6.1 Replacing the batteries



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.

5.6.2 Battery monitoring

The battery status in 9200 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.

5.6.3 Battery life time

The battery life time depends on the battery quality, the configuration of the 9200 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.

5.7 Common features

5.7.1 LED indications

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

Green, continuous light
The unit is using an external power supply.
mBox mode G presence marked.

Green flashing light (every 6th second)
The unit is being powered by batteries (default).
mBox mode G not presence marked.

Red light
When starting up the unit, the red LED lits up.
During transmission of the radio message the red LED lits 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
Registration of IR message, one blink.
Change of position with the function selector, one blink.
Change of position with the function selector to programming position, three blinks.

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

Orange flashing (every 6th second)
Motion in visit mode (with Phoniro IR transmitter).

Orange three fast flashes
The unit starts a programming routine to be connected with a radio receiver.
Mode H: indicates that the unit has started up and is ready for use.

Alternating green red, twice per second
The unit has been set in learning mode in radio receiver mode (E).

5.7.2 Radio protocol selector

When the function selector is set to the radio protocol mode, the LED will indicate which protocol that is active. With a short press on the reset button the chosen radio protocol will be changed.

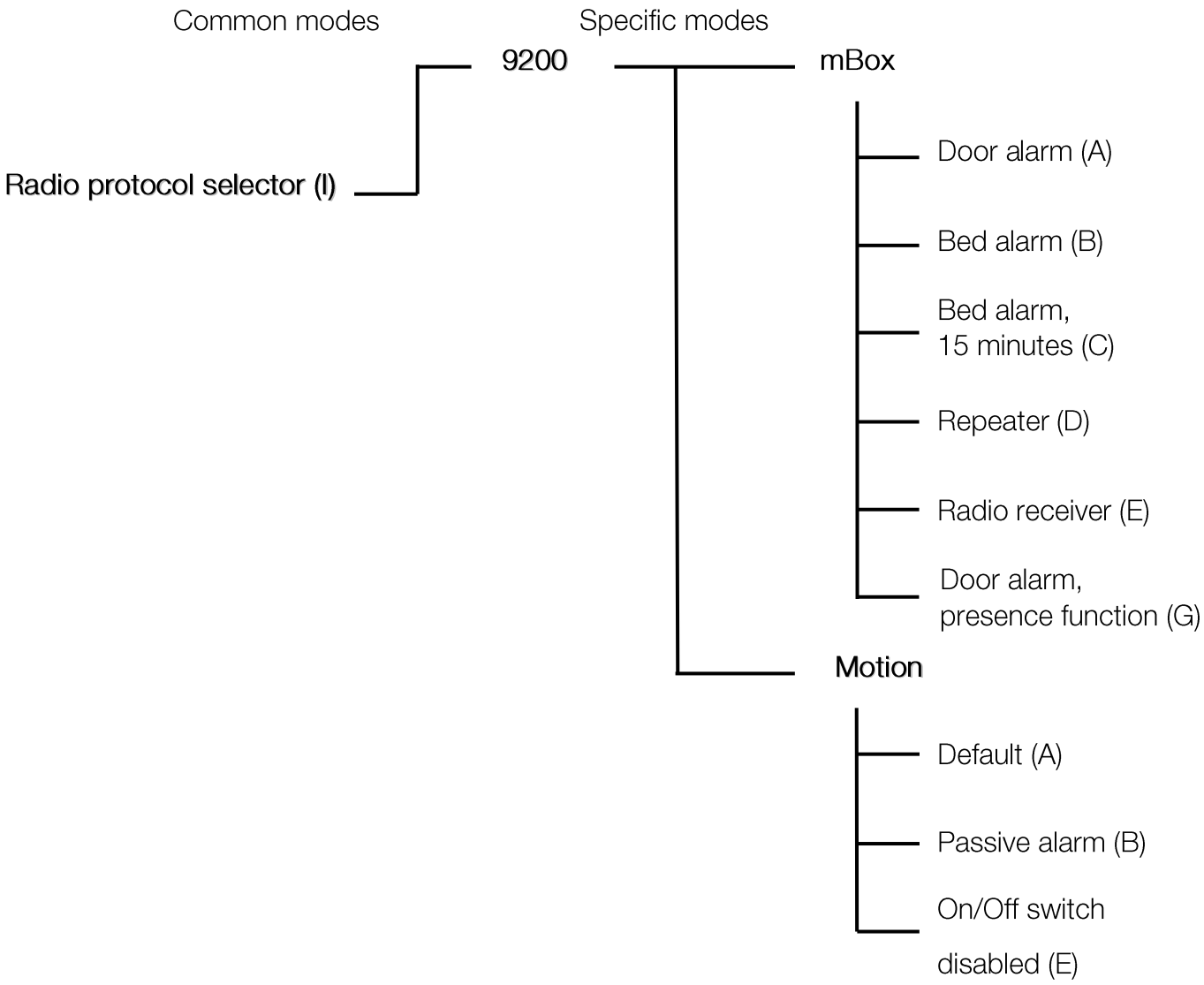
- Red solid light gives the Phoniro radio protocol.
- Green solid light gives the CareTech radio protocol.

5.7.3 Automatic radio protocol selector

Put the radio receiver in learning mode [1] and the function selector in chosen mode and press the reset button until the LED flashes orange three times in fast row. Then the automatic programming will be activated which means that the unit will be searching whether there is a CareTech or Phoniro radio receiver nearby. The unit will be paired with the radio receiver if the receiver is set in learning mode.

NOTE 1: Consult the technical documentation for the radio receiver/alarm system regarding information about radio programming.

5.8 Overview program hierarchy



6 PROGRAMMING

6.1 Software

When programming the 9200-unit, CS9200 is to be used. CS9200 is developed to safely access parameters and rewrite new values to the memory.

6.1.1 Default reset

Default reset can be made by using the configuration software.
Alternatively change the parameter PRGVER = 0 and restart the unit.

6.2 List of parameters

Parameter Category	Parameter	Description
Common	"CARETECH DEVICE SERIAL NUMBER"	Programmed serial number of the device, used when transmitting the CareTech radio protocol.
Common	"PHONIRO DEVICE SERIAL NUMBER"	Programmed serial number of the device, used when transmitting the Phoniro radio protocol.
mBox	"AUTOMATIC PRESENCE RESET"	Determines the time after which the presence state is reset. Default 12 hour.
Common	"BATTTERY LOW"	Indicates that the device has identified a low battery voltage.
mBox	"BED ALARM TIME STATE B"	Determine how long the bed alarm has to be activated to trigger an alarm in state B. Default 10 seconds.
mBox	"BED ALARM TIME STATE C"	Determine how long the bed alarm has to be activated to trigger an alarm in state C. Default 15 minutes.
mBox	"DOOR ALARM BLOCK TIME"	Determine how long time the 9200 is prevented from sending a new door alarm. Default 10 second.
Common	"FREQUENCY DRIFT"	Indicates that the device has identified a drift in radio frequency compared to the receiver.
mBox	"INPUT 1 ARMING TIME"	Determine how long time a device has to be attached to input 1 for the device to be considered valid. Default 30 seconds.

Common	"IR REMOTE CONTROL"	Determine whether to use an IR control or not in Phoniro mode. Default On.
Common	"LED FLASH INTERVAL"	Determine interval with which the LED is lit in standby mode. Default six seconds.
Motion	"MOTION SENSE BLOCK TIME"	Determine how long time the 9200 is prevented from sending a new motion alarm. Default one second.
Motion	"MOTION SENSE STABLE TIME"	Determine the time from start until the PIR sensor assumes to be stable. Default one second.
Common	"OUTPUT NUMBER OF PULSES"	Number of pulses to be transmitted on the output when an alarm is raised. Default two pulses.
Common	"OUTPUT PULSES TIME"	Determine the length of the pulses when an alarm is raised. Default two seconds.
Common	"PERIODIC TEST ALARM"	Indicates if test alarm is activated or not.
Common	"PROGRAM VERSION"	Program version of the firmware.
Common	"RADIO PROTOCOL"	Determines whether the CareTech or Phoniro radio protocol should be used during radio transmissions. Default CareTech.
mBox	"RECEIVER PARAMETER ACKNOWLEDGE"	Determine whether the receiver function should send an acknowledgment when receiving a transmission. Default On.

7 MBOX

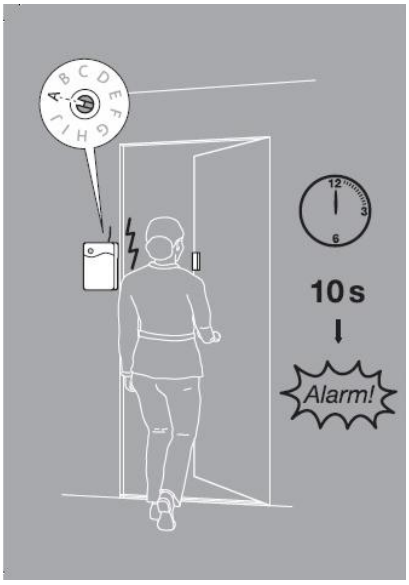
7.1 Program selection

The different program modes with mBox:

A	Door alarm
B	Bed alarm
C	Bed alarm, 15 minutes
D	Repeater
E	Radio receiver
G	Door alarm, presence function

7.1.1 Mode A – Door alarm

7.1.1.1 Installation



7.1.1.2 Function description

	Explanation
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)	Doormat.
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).

To program the unit to a radio receiver, press the reset button until the orange LED flashes fast three times.

7.1.1.3 Parameters

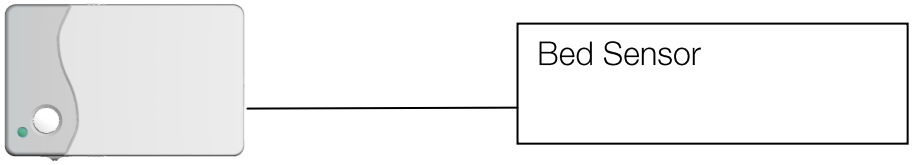
The following parameters can be programmed if needed.

DOOR ALARM BLOCK TIME
OUTPUT 2 NUMBER OF PULSES
OUTPUT 2 PULSES TIME

Parameters are described in section 6.2.

7.1.2 Mode B – Bed alarm

7.1.2.1 Installation



7.1.2.2 Function description

	Explanation
Reset button	Transmit reset alarm and inactivates door alarm (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 step 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.

To program the unit to a radio receiver, press the reset button until the LED flashes orange fast three times.

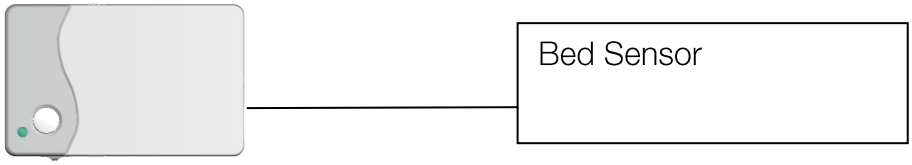
7.1.2.3 Parameters

BED ALARM TIME STATE B
INPUT1 ARMING TIME

Parameters are described in section 6.2.

7.1.3 Mode C – Bed alarm, 15 minutes

7.1.3.1 Installation



7.1.3.2 Function description

	Explanation
Reset button	Transmit reset alarm and inactivates door alarm (default 15 minutes).
Input 1 (NC)	Bed mat.
Output	Follows input 1 (inverted), X 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.

To program the unit to a radio receiver, press the reset button until the LED flashes orange fast three times.

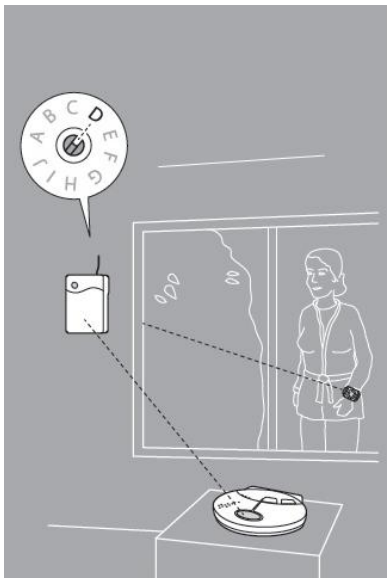
7.1.3.3 Parameters

BED ALARM TIME STATE C

Parameters are described in section 6.2.

7.1.4 Mode D – Repeater

7.1.4.1 Installation



7.1.4.2 Function description

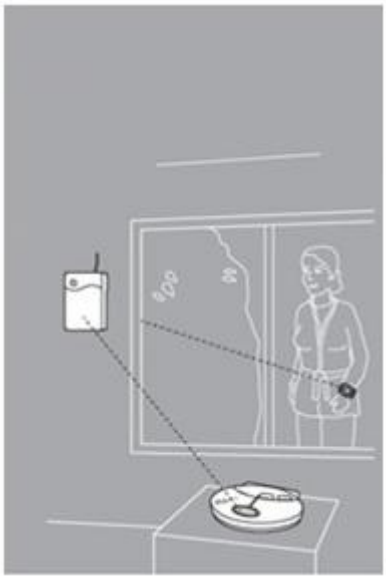
When the unit is switched to repeater, all radio messages that the unit receives will be acknowledged and repeated. It is only the radio messages that are supported by the chosen radio protocol that will be repeated. The messages will be repeated with higher output power to expand the transmission area. To avoid concentricity in the case where several units would be placed within range of each other, there is a block time that prevent that the same message does not repeat within 20 seconds.

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

7.1.5 Mode E – Radio receiver

Up to 10 radio units can be programmed to the 9200.

7.1.5.1 Installation



7.1.5.2 Function description

	Explanation
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 9200's radio receiver. By turning the function selector to mode E 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 9200-unit, the serial number is saved and the learning mode is turned off.

If more radio units shall be programmed to the 9200-unit, press the reset button again and the unit will switch to learning mode. If more than 10 radio units are programmed to the 9200-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 programmed radio units, use the configuration software.

7.1.5.3 Parameters

OUTPUT 2 NUMBER OF PULSES
OUTPUT 2 PULSES TIME
RECEIVER PARAMETER ACKNOWLEDGE

And the 10 serial number that are programmed.
Parameters are described in section 6.2.

7.1.6 Mode G – Door alarm, presence function

Door alarm with presence function.

7.1.6.1 Installation

7.1.6.2 Function description

	Explanation
Magnetic reed switch (NC)	Transmit alarm immediately.
Reset button	Transmit on/off presence marking and deactivates the motion sensor.
Input 1 (NC)	Same function as the magnetic reed switch.
Input 2 (NO)	Same function as the magnetic reed switch.
Output	Pulse on output (default two seconds, one pulse).

In this mode the unit can be used as a door alarm with support for presence marking. When entering the room the medical staff can mark their presence with the reset button and when they leave the room they can reset the presence marking with the same button.

If one should forget to reset the presence marking when leaving the room, the unit will automatically reset the presence marking after the adjustable time (default 12 hours).

One may also use input 1 and 2 in the RJ45 contact to connect external magnetic reed switches and then get similar function as the internal magnetic reed switch.

Input 1 – NC, normally closed

Input 2 – NO, normally open

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

To program the unit to a radio receiver, press the reset button until the LED flashes orange fast three times.

7.1.6.3 Parameters

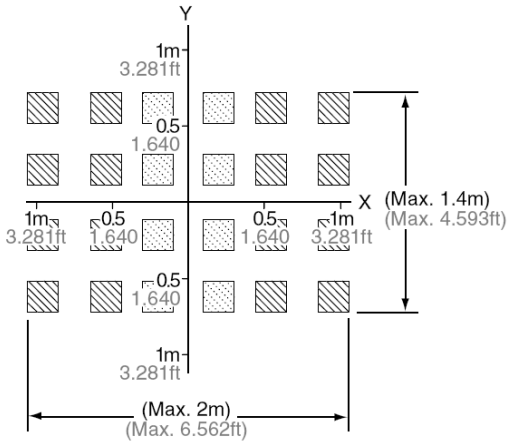
AUTOMATIC PRESENCE RESET
OUTPUT 2 NUMBER OF PULSES
OUTPUT 2 PULSES TIME

Parameters are described in section 6.2.

8 MOTION

8.1 Detection

Cross-section

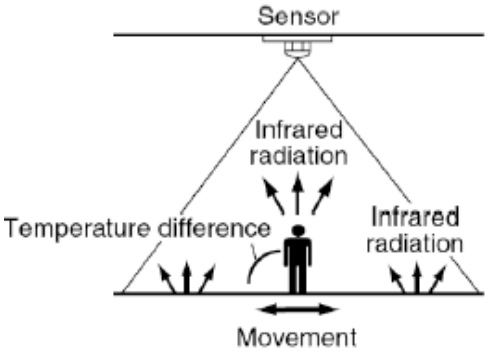


Motion uses an angled spot-type PIR sensor, giving it a very low upward detection angle.

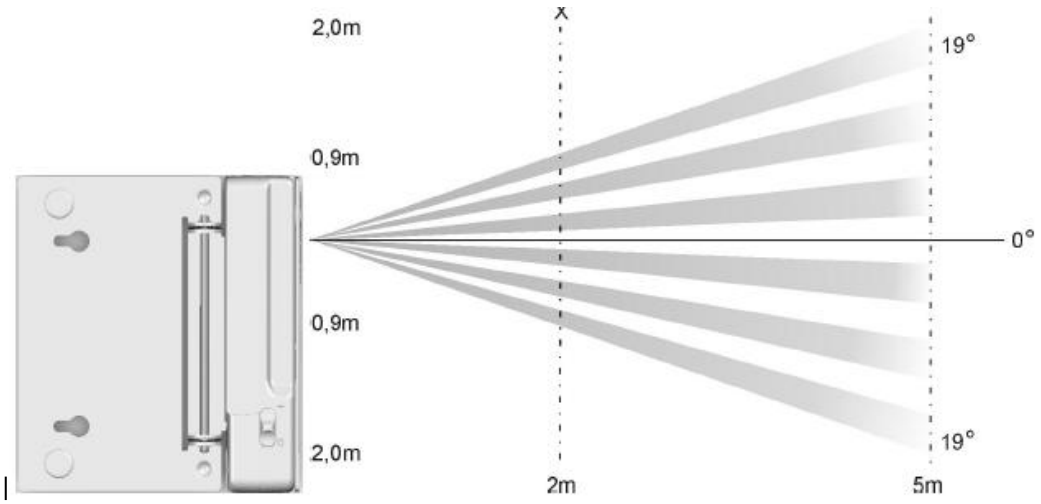
PIR stands for Passive Infrared, and measures the differences in infrared radiation when an object with a different temperature to the background temperature moves between the detection zones.

The PIR sensor has six lenses with individual focal points and two optical axes. The 24 detection zones correspond to an indicative projection of these.

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.



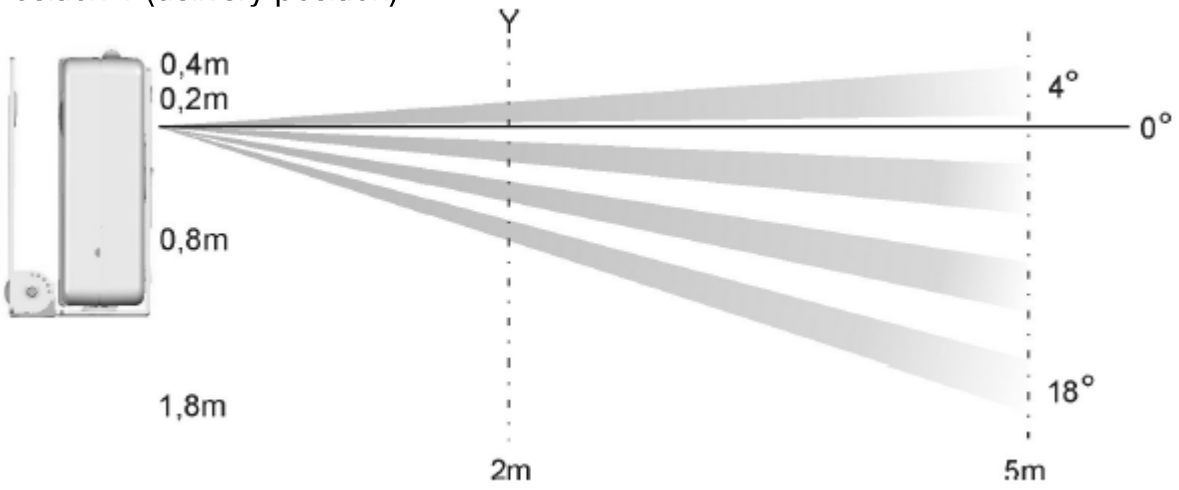
In the horizontal plane, Motion has a slightly larger sensing angle and more detection zones, making it harder to “sneak” across the detection area.



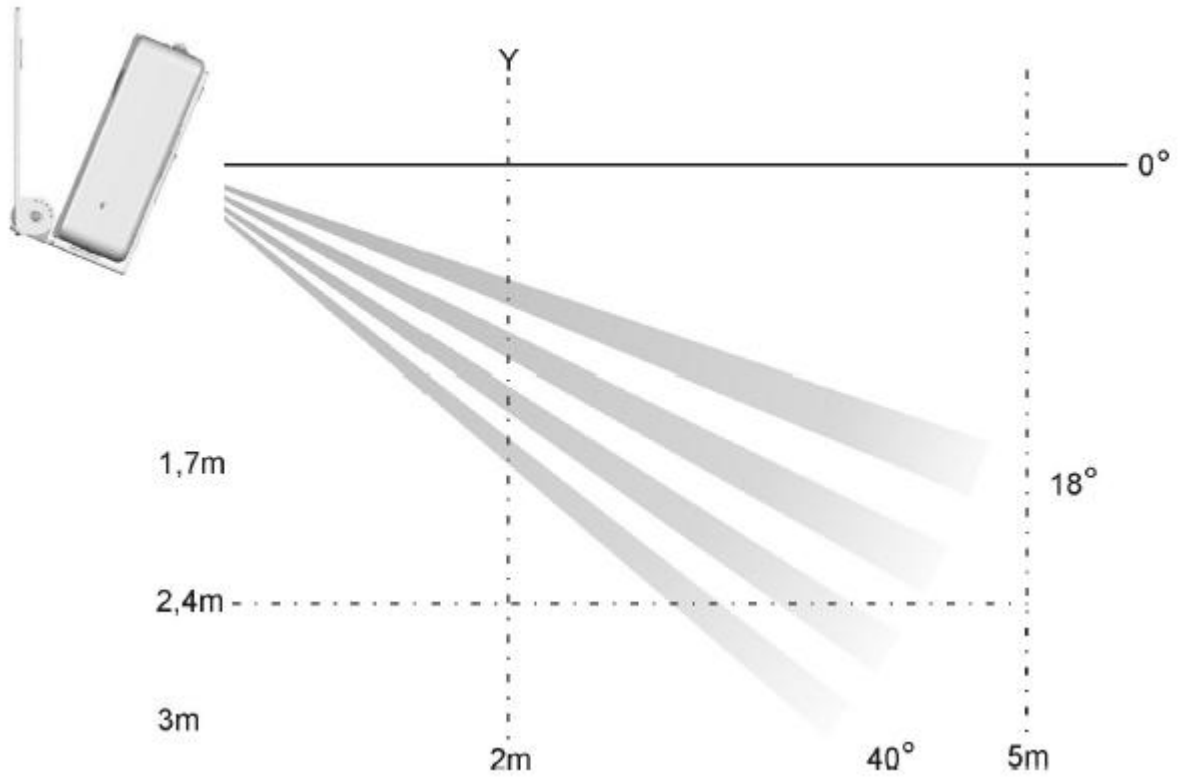
8.2 Mounting

Motion's stand can be angled in five different positions, making it easy to customize the detection area. In position 1 – which also applies to positioning on the floor (stand folded out) – the detection height is only a foot or so, making it ideal as a bed monitor.

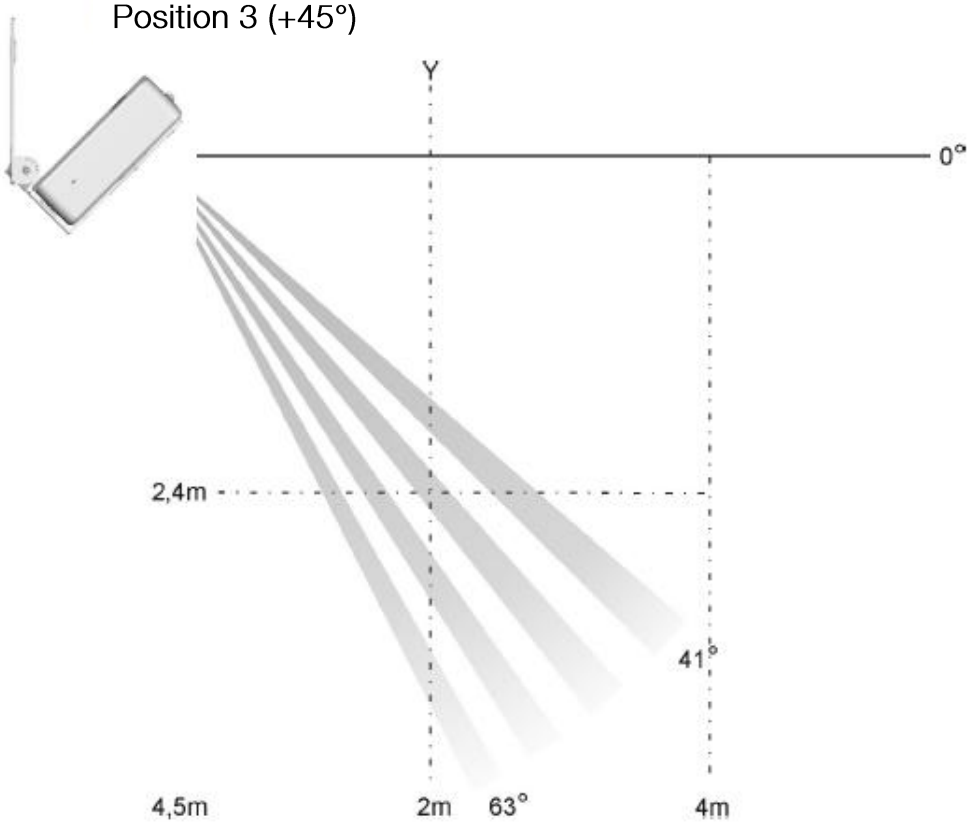
Position 1 (delivery position)



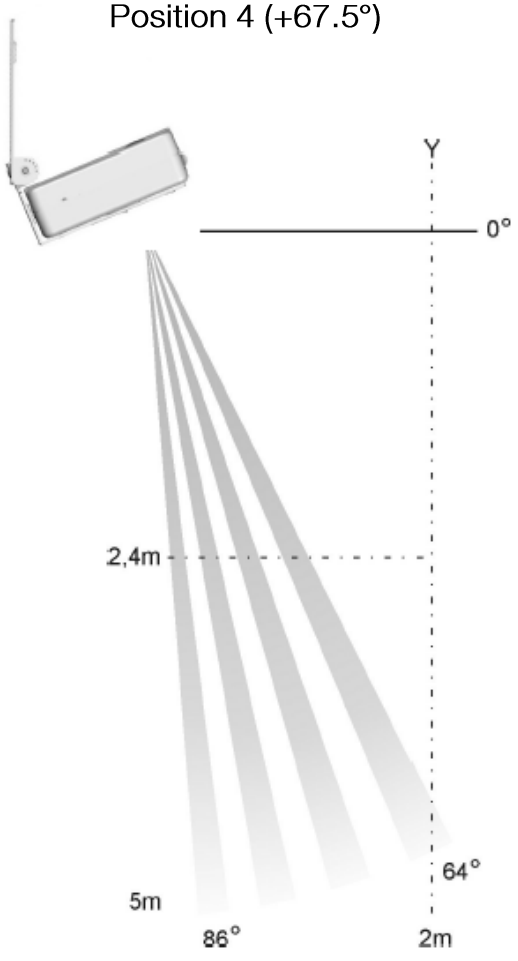
Position 2 (+22.5°)



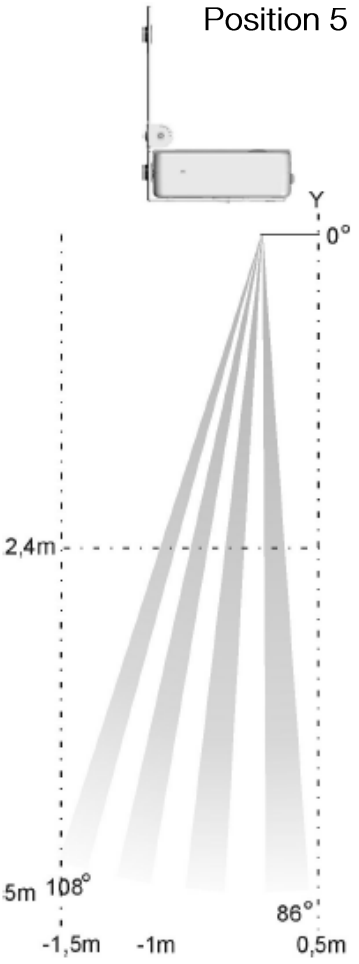
Position 3 (+45°)



Position 4 (+67.5°)



Position 5 (+90°)



8.3 Program selection

The different program functions for Motion:

A	Bed alarm - Default
B	Bed alarm - Passive alarm
E	Bed alarm - On/Off switch disabled

8.3.1 Mode A – Default

8.3.1.1 Function description

	Explanation
Reset button	Transmit reset alarm.
Motion sensor	Transmit bed alarm after 45 seconds stabilization time.

When the unit is switched on or set in mode A, the motion sensor will be activated. The sensor has a stabilization time of 45 seconds, during which the LED will flash in a specific pattern 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 in front of the motion sensor.

If the unit is in Phoniro radio mode and the IR-parameter is active (default on); it is possible to turn on, turn off and activate the visit mode (the sensor is deactivated for 15 minutes) by using the IR-remote.

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

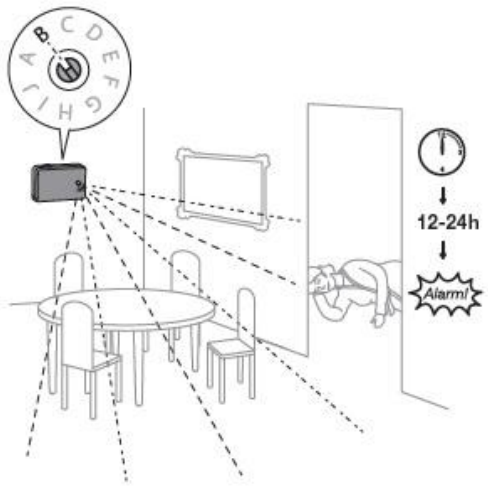
To program the unit to a radio receiver, press and hold the reset button until the LED flashes orange fast, three times.

8.3.1.2 Parameters

IR REMOTE CONTROL

Parameters are described in section 6.2.

8.3.2 Mode B – Passive alarm



8.3.2.1 Function description

	Explanation
Reset button	Transmit reset alarm and reset passive mode.
Motion sensor	Transmit bed alarm after 45 seconds stabilization time.

When activating, the Motion unit transmits a radio message which the radio receiver interpret as “passive alarm”, afterwards the Motion unit will be set in a passive 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. The radio receiver will then transmit a passive alarm [2] to one or more receivers, e.g. an Alarm Receiving Centre (ARC).

To program the unit to a radio receiver, press and hold the reset button until the LED flashes orange fast, three times.

Programming of alarm type in the alarm system is required.

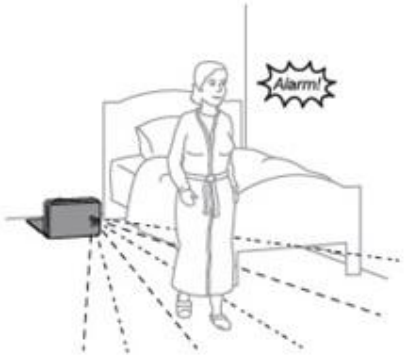
NOTE 2: Otherwise the same function as mode A.

8.3.2.2 Parameters

IR REMOTE CONTROL

Parameters are described in section 6.2.

8.3.3 Mode E – On/Off switch disabled



8.3.3.1 Function description

	Explanation
Reset button	Transmit reset alarm.
Motion sensor	Transmit bed alarm after 45 seconds stabilization time.

Same function as mode A, On/Off switch locked in On-mode to avoid that anybody intentionally or unintentionally turn off Motion.

To program the unit to a radio receiver, press and hold the reset button until the LED flashes orange fast, three times.

8.3.3.2 Parameters

IR REMOTE CONTROL

Parameters are described in section 6.2.

9 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	869.2125 MHz.	
Output	1 solid state output. Max 1A / 30VDC.	
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 ºC.	
- Humidity	0 to 75% relative humidity.	
- Environmental class	I	

10 ENVIRONMENTAL INFORMATION

This product complies with the requirements of the EU directive 2006/66/EC and 2002/96/EC. These directives regulates 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 CareTech or to your distributor. For detailed instructions, please check with your distributor or visit our website, www.caretech.se.

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. Manufactured in accordance with the EU directive, 2002/95/EC (RoHS).

11 DECLARATION OF CONFORMITY

CE

Herby, CareTech AB, Kalix Sweden declare that this radio- and telecommunications terminal equipment is in compliance with the essential requirements and other provisions of R&TTE Directive 1999/5/EC.

The comprehensive declaration of conformity is available at the address: CareTech AB, Box 10030, SE-952 27 Kalix, Sweden.

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