UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

September 9, 2019

Georgia Anastasiou
Agent for Rentokil Initial, PLC
c/o Lewis & Harrison
2461 S. Clark St., Ste. 710
Arlington, VA 22202

Subject: Label Amendment – Revision of Manufacturing and Importing Addresses, addition of "Indoor Use Only" restriction, and clarification on net weight
Product Name: Radar
EPA Registration Number: 87942-1
Application Date: 09/07/2018
Decision Number: 545584

Dear Ms. Anastasiou:

The amended label referred to above, submitted in connection with registration under the Federal Insecticide, Fungicide and Rodenticide Act, as amended, is acceptable. This approval does not affect any conditions that were previously imposed on this registration. You continue to be subject to existing conditions on your registration and any deadlines connected with them.

A stamped copy of your labeling is enclosed for your records. This labeling supersedes all previously accepted labeling. You must submit one copy of the final printed labeling before you release the product for shipment with the new labeling. In accordance with 40 CFR 152.130(c), you may distribute or sell this product under the previously approved labeling for 18 months from the date of this letter. After 18 months, you may only distribute or sell this product if it bears this new revised labeling or subsequently approved labeling. "To distribute or sell" is defined under FIFRA section 2(gg) and its implementing regulation at 40 CFR 152.3.

Should you wish to add/retain a reference to the company's website on your label, then please be aware that the website becomes labeling under the Federal Insecticide Fungicide and Rodenticide Act and is subject to review by the Agency. If the website is false or misleading, the product would be misbranded and unlawful to sell or distribute under FIFRA section 12(a)(1)(E). 40 CFR 156.10(a)(5) list examples of statements EPA may consider false or misleading. In addition, regardless of whether a website is referenced on your product's label, claims made on the website may not substantially differ from those claims approved through the registration process. Therefore, should the Agency find or if it is brought to our attention that a website contains false or misleading statements or claims substantially differing from the EPA approved registration, the website will be referred to the EPA's Office of Enforcement and Compliance.

Your release for shipment of the product constitutes acceptance of these conditions. If these conditions are not complied with, the registration will be subject to cancellation in accordance

with FIFRA section 6. If you have any questions, please contact Paul Di Salvo by phone at 703-347-0322, or via email at disalvo.paul@epa.gov.

Sincerely,

Gene Benbow, Product Manager 7
Invertebrate & Vertebrate Branch 3
Registration Division (7505P)
Office of Pesticide Programs

ACCEPTED
09/09/2019
Under the Federal Insecticide, Fungicide and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 87942-1

Rentokil
The Experts in Pest Control

EPA Est. No: 087942-GBR-001
EPA Reg No: 87942-1
MADE IN THE UNITED KINGDOM
Manufactured for:
Rentokil North America, Inc.
1125 Berkshire Blvd. Suite 150
Wyomissing, PA 19610

RADAR

Active ingredient: Carbon dioxide……100.00%
Total……100.00%

KEEP OUT OF REACH OF CHILDREN

WARNING

FIRST AID	
If inhaled	Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for treatment advice.
Have the product container or label with you when calling a poison center, doctor or when seeking medical treatment. For emergency information concerning this product, call the National Pesticide Information Center at 800-858-7378	

PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS AND DOMESTIC ANIMALS

WARNING: May be fatal if inhaled. Do not breathe vapour. Concentrations of >10% carbon dioxide can produce unconsciousness or death. High concentrations may cause asphyxiation; symptoms include loss of mobility and/or unconsciousness. Wear waterproof gloves when cleaning the unit and handling rodent bodies

DIRECTIONS FOR USE: It is a violation of Federal Law to use this product in a manner inconsistent with its labelling. Read all directions for use carefully before applying. For indoor use only. This canister is for use only in the RADAR unit, or as part of PestConnect. Canister is designed to drop inside the unit – do not use force. Before use, refer to the RADAR booklet for information on how to use the RADAR trap, and if necessary, how to use it as part of PestConnect.
This product is suitable for use in food handling and food preparation areas.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage and disposal.

Pesticide Storage: Store in a cool, dry area in original container away from food.
Container Handling: Do Not Puncture or Incinerate! If empty: Place in trash or offer for recycling, if available. **If partly filled:** Call your local solid waste agency for disposal instructions.

MANUFACTURED BY: Rentokil Initial PLC, Liverpool L33 7SR, UK
IMPORTED BY: Target Specialty products, 710 Corporate Center Drive, Berks Corporate Center Building 7, Reading, PA 19605, United States, 888-225-6080

For Batch No and Use by date: see base of can. Net weight: 0.1oz (2.8 g)
Label No. CLP19-138 Carbon Dioxide

Version 1.0

SUB-LABEL A

ACCEPTED
09/09/2019
Under the Federal Insecticide, Fungicide and Rodenticide Act as amended, for the pesticide registered under
EPA Reg. No. 87942-1

RADAR – OPERATOR'S MANUAL

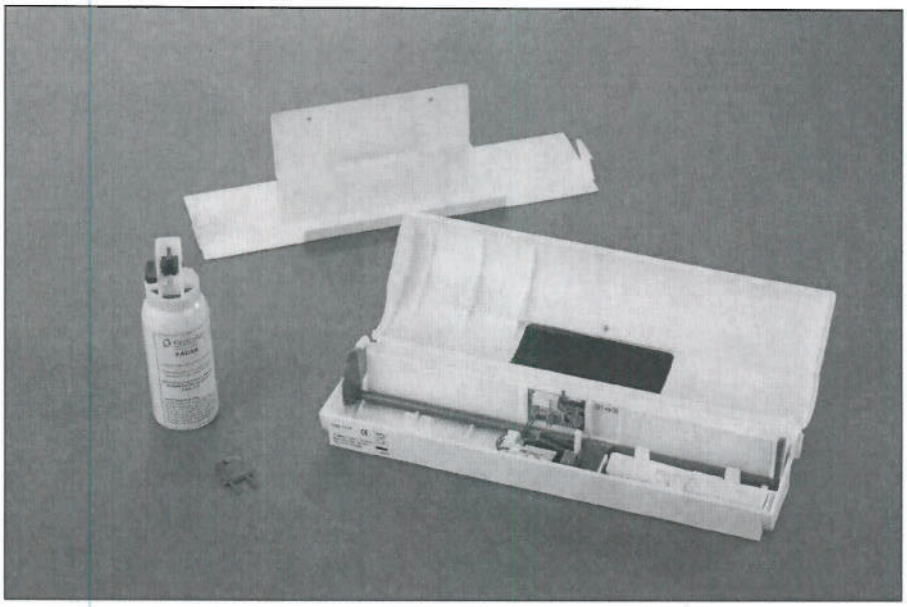
Rentokil
The Experts in Pest Control

OPERATING RADAR

Contents

1. Receipt of Unit

Please check that the box contents are present and undamaged:



- FR80 Radar
- FR90 Radar CO_2 Canisters (Tin Plate)
- FR18 Radar Battery Pack
- FR55 Radar Fixing Brackets
- The battery packs and CO_2 canisters should be free from corrosion, dents and within the expiry date.

2. Location / Installation

Radar units should be sited along wall / floor junctions, behind machinery and equipment, i.e. anywhere that bait boxes and mouse monitor units (MMU's) would normally be placed. Units should be secured with fixing brackets if possible to prevent the unit being accidentally moved, knocked or removed by unauthorised persons. The unit must be sited where the LED is clearly visible to signal activation.

2.1 Location Parameters

This table is a reference point for suitable operating environments for the Radar:

Environmental Restrictions	Details
Outdoor use	Radar has been specifically designed for indoor applications only. The product is not suitable for outdoor use.
High levels of surface water	The system electronics can be damaged by water. Take care to locate units away from areas where local high pressure washing or hosing down operations are carried out.
High levels of dust / grease	It is important that units are kept clean, especially if installed in areas where high levels of dust or grease are present. Cleaning guidelines must be followed to prevent damage to the units.
Knocking / kicking	Care must be taken to locate units away from pedestrian traffic to avoid false activation. This can be prevented by mounting units on fixing brackets.
Extreme temperature (<0°C)	Extremely low temperatures (i.e. unheated warehouses) could affect Radar's performance and may result in the unit entering low battery status mode.
High humidity (> 80%) or condensation	High humidity and / or condensation could result in damage to the unit's control electronics and result in false activations.
High levels of vibration	High vibration due to localised machinery / fridge compressors etc could affect the performance of the unit and result in false activations.

3. Operating Mouse Radar

3.1 Set up

- Open the Radar unit using the supplied key. *(Figure 1)*
- The unit is supplied with the battery fitted.
- Slide circuit board switch to 'ON' – the LED will flash once and then remain illuminated permanently. *(Figure 2)*
- Pass your finger across the first beam and the LED will flicker repeatedly. *(Figure 3)*
- Move your finger to the second beam within four seconds – the solenoid will self test to complete check and the unit doors will close.
- 5 seconds after the self test has completed, the LED will flash 5 times to indicate that it is fully armed and that unit is ready for installation.
- Set the trigger by pressing the red door lever down until it is locked under the blue catch. *(Figure 4 & 5)*
- Remove the blue safety pin from the CO_2 canister and ensure the canister is within its expiry date before installing into the unit. *(Figure 6 & 7)*
- Locate the canister in position – it should not need forcing. *(Figure 8)*
- Close the unit securely. *(Figure 9)*

Note: If the canister resists the fittings, it is likely to be used and in need of disposal


Figure 1

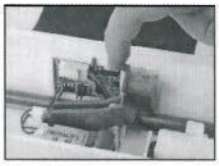


Figure 2

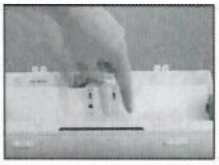


Figure 3


Figure 4

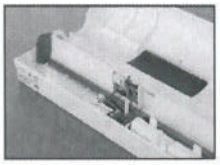


Figure 5


Figure 6


Figure 7


Figure 8


Figure 9

3.2 Routine Servicing – Inactivated Units

- Switch the unit 'OFF' before servicing.
- Remove the CO_2 canister – check the best before date on canister. If within expiry date it maybe reused.
- Remove any external dirt, paying particular attention to any accumulated dirt on the underside of the unit.
- Clean the unit inside out, following the cleaning guidelines. (See Section 7.1)
- Check the operation of the unit, following set up guidelines. (See Section 6.1)

3.3 Activated Units

- Put on protective gloves.
- Open the unit and slide the circuit board switch to 'OFF'.
- Dispose of dead mouse according to your local waste regulations.
- Remove the used CO_2 canister.
- Canisters can only be used once and must not be reused.
- Do not mix the canister with new stock – mark it as used by pressing a dent into the metal and separate for disposal. *(Figure 10)*
- Clean the inside of the unit following the cleaning guidelines (See Section 7.1)
- Reset the unit, referring to the setup guidelines (See Section 6.1)

3.4 False Activations

See Troubleshooting Section (Section 6)

3.5 LED Sequences

Radar signals its status via the red light emitting diode (LED) on top of the unit. Once setup the LED will only flash when the unit is activated. The light sequences are as follows:

LED status	Unit status
Continuous indicator ●	Switch on / reset
Flickering indicator ●	Infrared detector functional – during setup / test mode
5 red flashes ●●●●●	End of test period - unit fully armed
No flashes ○	Armed mode (Please note that the Mk I flashes once every 5 seconds when in armed mode)
1 red flash every 4 seconds ● / 4 seconds	Unit activated
2 red flashes every 4 seconds ●● / 4 seconds	Low battery or unit fault (Please note that doors will also close)

4. Maintenance

Radar requires no maintenance other than cleaning and management of the batteries and CO_2 canisters.

4.1 Cleaning

The recommended cleaning product for Radar is the *Universal Hard Surface Wipes (PSU01)*.These wipes are readily available from Rentokil Initial Supplies.

- Put on some protective gloves.
- Remove the dead mouse and dispose of it in accordance to standard protocol. Remove any external dirt, paying particular attention to any accumulated dirt on the underside of the unit.
- Clean the inside of the unit, cleaning any fur, urine, droppings, etc. *(Figure 11)*

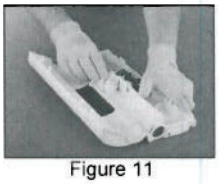


Figure 11

4.2 Batteries

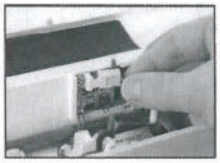
Alkaline batteries can currently be disposed of in accordance with local, national or state regulations, or recycled where such facilities exist. It is recommended that battery packs are replaced every 12 months, irrespective of use, to ensure that they are fit for purpose.

4.3 CO_2 Canisters

A new canister *(figure 12)* will need to be inserted every time the Radar unit is activated (please ensure a new canister is within the expiry date). After firing, the red wedge at the neck of the CO_2 canister it is held inside by a ratchet that empties it completely. This ensures that empty canisters cannot be reused by mistake. Empty canisters are not classified as hazardous waste and can therefore be disposed of in accordance with local, national or state regulations, or recycled where such facilities exist. However, full canisters are classified as "Hazardous Pesticide Waste" and therefore MUST be discharged prior to disposal. The canisters should be discharged by holding the canister horizontally away from the body and pushing the trigger, thus dispensing the contents. It is recommended that CO_2 canisters are replaced every 12 months, irrespective of use, to ensure that they are fit for purpose.

Figure 12

5. Troubleshooting

Issue	Cause	Solution
The LED does not illuminate when unit switched on	Insufficient power	Change battery
		Check battery connection – please ensure that wires are fed between the door beam and lever to prevent them becoming damaged 
Doors do not close	Faulty components	Report back to RIS Kirkby UK
	Insufficient tension in the springs	Check the springs are fitted into the grooves at each end of the door arm 
Mouse alive in unit	Empty / faulty CO_2 canister	Replace the unit if damaged by the mouse or reset the unit with a new CO_2 canister
Unit is immediately activating when the unit is turned on	Infrared detectors are detecting foreign material	Wipe Infrared emitters and detectors clean with a recommended cleaning wipe
LED flashing once every 4 seconds	Unit activated	Follow servicing guidelines
LED flashing twice every 4 seconds	Low battery	Change the battery
	Unit fault	If battery change does not rectify the issue, return to RIS

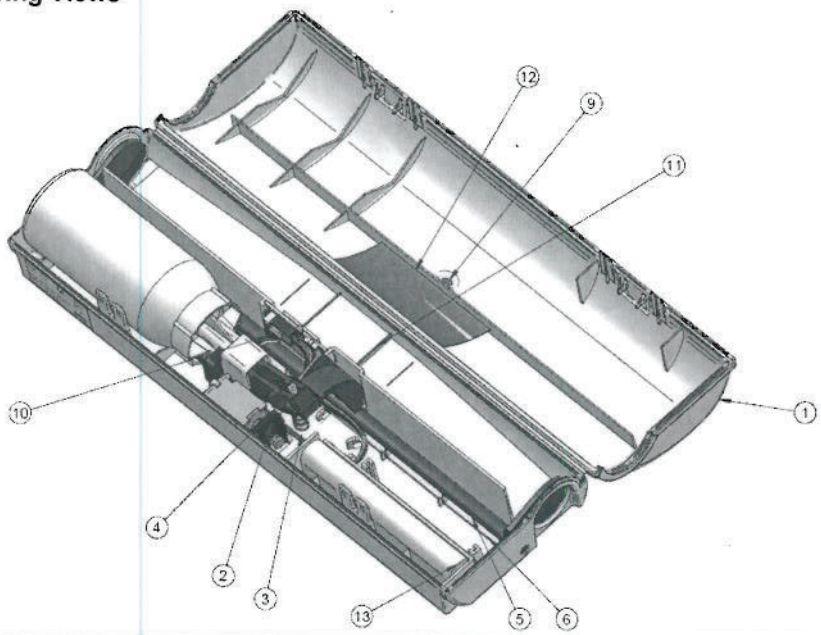
Any other faults:

- If in any doubt, DO NOT USE the unit – return to RIS for fault evaluation.

6. Technical Specifications

Technical Specifications	
Dimensions (L * D * H)	308mm x 196mm x 60mm
Weight (kg)	415g (including full gas canister)
Material	White Polypropylene casing
Detection system	Pulsed, reflective dual Infrared beam sensors
Rodenticide	0.1 ounces (2.8 grams) CO_2, gas purity >99.9%, canister is a tin plate construction
Consumables	Battery pack, CO_2 canister (please ensure these are within the expiry date)
Power supply	6V – 4 x AA cell Alkaline battery pack
Degree of protection (IP)	IP 21 (drip proof)
Set up time	5 seconds
Guarantee	2 years, return to RIS

7. Drawing Views



Item Number	Component Name
1	Main case moulding
2	Trigger
3	Level spring
4	Lever
5	Door beam
6	Door beam spring
9	Lens
10	Printed circuit board assembly
11	Pressure pad recess blanking plate
12	Sensor label – DO NOT REMOVE
13	6V – 4 x AA cell Alkaline battery pack

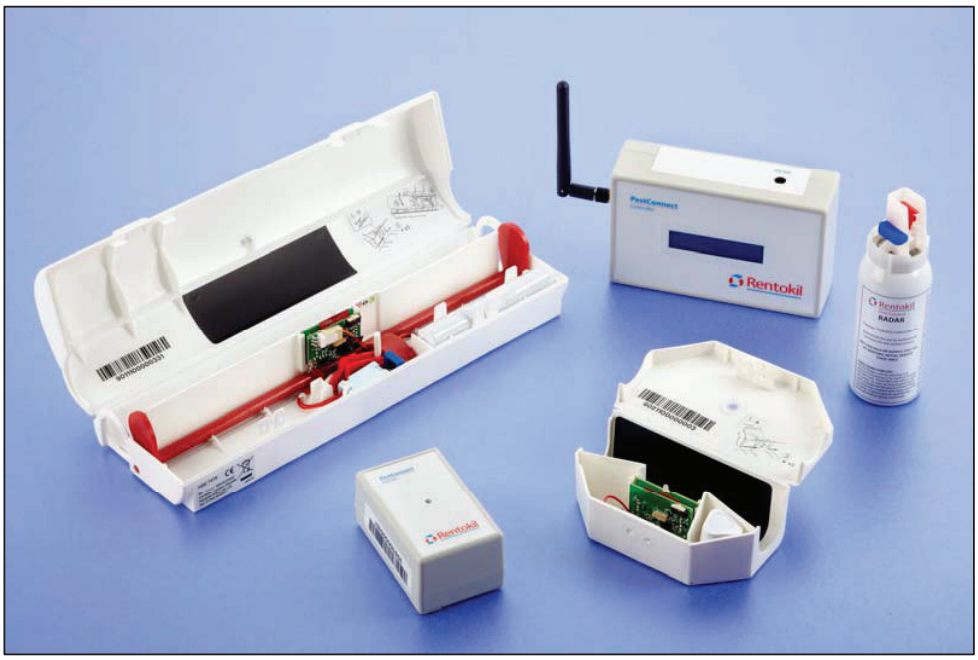
SUB-LABEL B

ACCEPTED
09/09/2019
Under the Federal Insecticide, Fungicide and Rodenticide Act as amended, for the pesticide registered under
EPA Reg. No. 87942-1

Rentokil

PestConnect

INSTRUCTION MANUAL



NOT FOR EXTERNAL CIRCULATION

V 1.0 – June 2012 for USA

Contents

1. Introduction

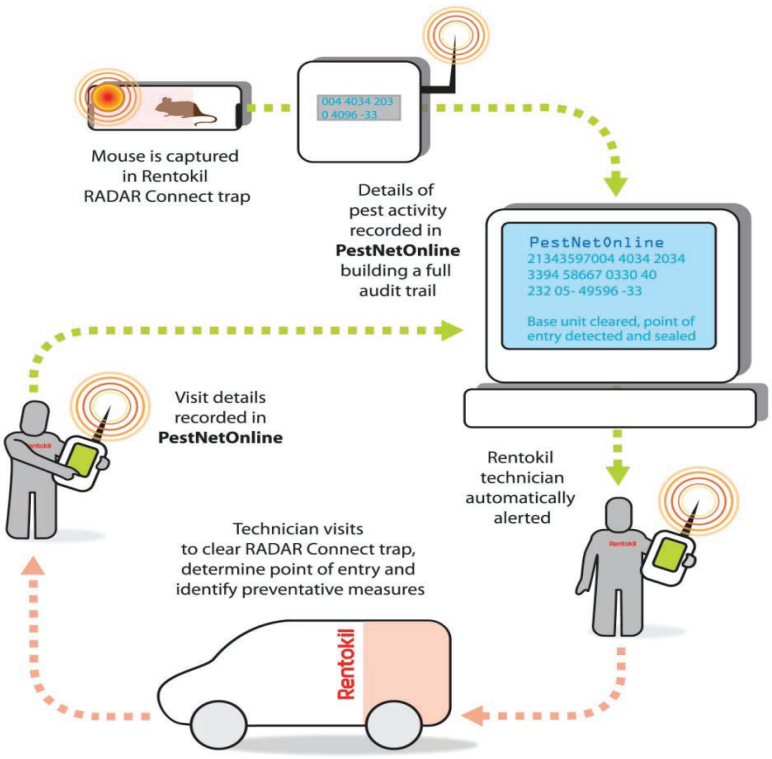
PestConnect is an innovative system providing remote monitoring and continuous protection against mice 24/7, 365 days a year. The system has been designed for use in high risk areas, such as food processing plants and pharmaceutical manufacturing where there is zero pest tolerance or conventional baiting is not allowed.

Using Rentokil's Innovative Radar unit, intruding mice are captured as soon as they are detected, immediately reducing the risk to the customer. They are then killed by concentrated release of carbon dioxide (CO_2) into the air tight unit. CO_2 is capable of killing mice extremely rapidly and is widely recognised as a humane method of control. The mouse is unconscious within 15-20 seconds and fatal levels are reached within 45 seconds of the unit's activation.

Pest Connect can also be used with Rentokil's Mouse Monitor Unit, which provides early detection of mice activity. The unit will identify the time in days or weeks since the unit was last activated through a series of audible bleeps.

Through, PestNetOnline (PNOL), details of pest activity is recorded, building a full audit trial. Rentokil's PNOL is a unique on-line pest control reporting system designed and built by Rentokil and provides 24/7 access. The system send an automatic alert to the customer and local Rentokil Technician should there be any pest activity reported. The Rentokil Technician visits the customer premise's to clear the RADAR Connect trap and determines any point of entry to identify future preventative measures. All visit details are recorded on PestNetOnline.

2. How Pest Connect Works



3. Benefits of PestConnect

- Continuous protection – 24/7 protection against mice intrusions, minimising risk with instant alert.
- Effective & immediate treatment – Captures, humanely kills and contains mice reducing any risk of contamination.
- Real-time reporting – Easy-to-access, real-time data provides immediate status of incident online or via SMS or email.
- Highly reliable – Self monitoring; gives advance warning of any issues such as low battery that could cause any potential data loss.
- Improved audit compliance – Viewed in conjunction with other pest control information on PNOL, provides additional assurance to third party auditors.
- Complete records – Data transmitted from site sent on PNOL recording all activity including historical data.
- Universal Power Supply – Uses 2.4 GHz radio modules allowing for a global solution.
- Self configuring radio system – optimises radio routes and self heals, providing good reliability. Stock movements on site do not break the systems communication capability with the control panel.
- Expandable system – additional units or new products can be easily added.
- Control Pane Display – Shows information on number of devices connected on site and details all data queued and sent to the Rentokil server.

4. System Overview:

The on-site PestConnect has three principal components

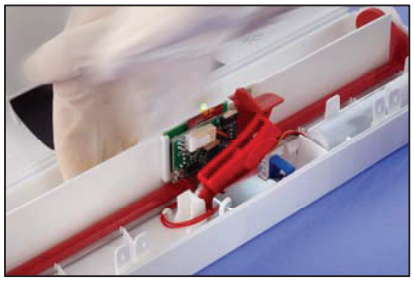
- Sensors (Radar Connect and MMU Connect)
- Repeaters
- Control Panel

4.1 Sensors

The Radar and Mouse Monitor Unit (MMU) sensors are enabled to work with PestConnect. The overall exterior design and concept of the unit is the same except a logo to indicate that they are PestConnect units. The sensors monitor for mice and depending on the device either report activity levels (MMU) or report a catch and kill activation (Radar).

When activity has been detected a report is immediately sent through to the Control Panel. When there is no activity the Sensors communicate hourly to the local Control Panel to indicate current status and verify they are still active. This allows monitoring of other parameters, such as battery levels and communication signal strengths. All Sensors are uniquely identifiable world-wide





4.2 Repeater

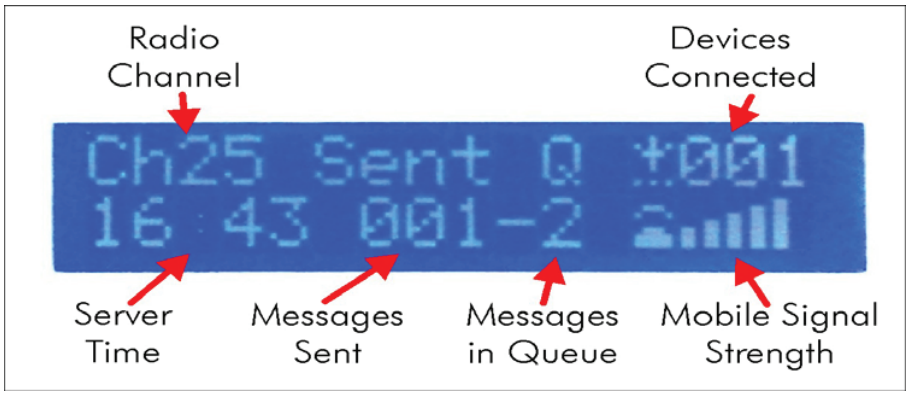
The Repeaters extend the range of the system so that radio data from Sensors located over a wide area can still get to the Control Panel *(see below for information on the Control Panel)*. Multiple Repeaters can be used to route the data through to the Panel, allowing a very large area to be covered by a single Control Panel.

The Repeaters are AC powered, via a low voltage adaptor, and therefore require an AC power outlet to be available in the desired location.

4.3 Control Panel

The control panel is the hub of the on-site installed system as all the data from the sensors (including those sent via the repeaters) is collected here. The Control Panel passes the information onto Rentokil's system servers using mobile data technology. Every significant event is communicated to the servers, together with hourly 'health check' reports, and daily sensor reports. The Control Panel also monitors for devices which fail to make contact for a significant time and reports these to the Rentokil servers to enable further action to be taken.

The Control Panel display shows a number of useful areas of information that show the current status of the system. These are useful for providing confidence that all devices are connected and can aid limited diagnostics onsite. The parameters displayed are shown below:



5. Installation

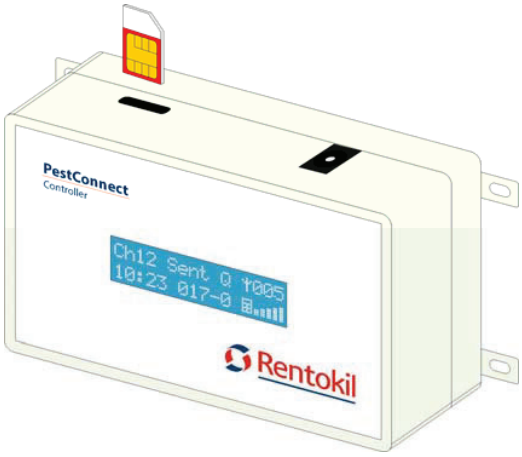
PestConnect has been designed to make installation simple and efficient. The initial site survey should be detailed to ensure the effectives and speed of the final installation.

5.1 Step 1: - Setting up the Control Panel

It is important that the Control Panel is set up in a location that is close to the sensors, but should also allow good mobile signal strength as shown on the display. Good locations are normally on a wall, above head height and at least 1m away from other radio equipment (eg Wi-Fi routers). It is imperative that the Control Panel is positioned horizontally, with the writing the correct way up; failure to do so will result in reduced performance.

Having chosen a suitable location, the Control Panel should be unpacked and the following steps taken.

1. Insert your SIM card into the slot provided on the top of the Control Panel (on the side for the North American Version). The SIM card should be inserted with the gold contacts facing the front of the Control Panel, and with the cut-off corner outermost, see diagram below.



Once you have inserted the SIM you should fit the label provided along the top of the case. The hole in the sticker should line up with the DC power inlet. The sticker will also cover the SIM slot to deter unauthorised removal.

2. Screw the short antenna onto the threaded connector on the side of the Control Panel. The antenna should then be bent at the joint and rotated so that it points upwards. (Note: for the North American version of the Control Panel, the antenna connector is located on the top and the antenna should be kept straight, so that it points up.)

3. The power adaptor supplied comes with a range of options for different country specific power supply outlets. Select the connector style that suits your outlets and then slide back the sprung retaining clip on the adaptor, remove the plastic protection piece and then insert your connector.

4. The power adaptor can now be connected.

5.2 Step 2: - Locating the Control Panel

Before fixing the Control Panel to the wall it is important to verify that the location has suitable mobile network coverage. Power up the unit and then temporarily place (or hold) the Panel in the desired location.

When you first power up the unit you will see that the time in the bottom left of the display is 00:00. Within 5 minutes you should see the time updated to show the correct time (Note: This is the server time, which will not necessarily be the same as local time). This means that the Control Panel has successfully made contact with the Rentokil server. You should also note the reception strength bars on the bottom right of the display; this should show 3 or more bars. If it doesn't update the time or shows less than 3 bars then you should investigate alterative locations for the Panel.

There are a number of error messages that can be displayed when the panel is first connecting to the server, this often occurs when a Control Panel is connecting via a new network, the Panel will continue to try to connect, so these messages may clear after a short while. If they are still showing after 10 minutes then you should restart the Panel. If the messages continue to show for 5 minutes a second time, then you should refer to your PestConnect system contact.

Having successfully selected a location and proved that the signal is good you can now mount it to the wall and then power it up. Once the time has updated you are ready to proceed with the installation.

5.3 Step 3: - Surveying the Site

The next step is to survey the site, which will also involve deploying repeaters as you go. You will also need a PestConnect sensor for the surveying process, a Mouse Radar Connect or MMU Connect is ideal for this.

1. Standing next to the Control Panel, turn on the device. The LED will light Red. Now wait for 10 seconds, after which the LED will turn Yellow. This indicates that the unit is ready to be put into installation mode.

2. Next pass your fingers through the sensor path to set the unit. The LED will now flash alternately Green and Red for a few seconds while it finds the Control Panel. The sensor will then enter a 5 minute scan mode, where it will send out messages and look for responses. For each correct response it receives it will flash Green (up to 5 rapid flashes), if no response is received (ie out of range) then it will flash Red. If the sensor times out, you can restart it as described above.

3. Once this is complete, you can now begin to move around the site to determine the coverage from the Control Panel. Try the sensor (Radar / MMU) in the likely positions, against walls, behind equipment etc. If you have an area where you will need to place sensors, but is out of range (test sensor flashes Red) then you should use a Repeater unit. Locate a suitable AC powered outlet near the edge of the Control Panel range and plug in a Repeater, using the supplied adaptor (fit a suitable connector to the adaptor as you did with the Control Panel supply).

4. Do not fix the repeater to the wall at first. Hold in a position on a wall above head height (a range of 7ft to 12ft up the wall is good). As with the Control Panel, the Repeater should be positioned with the writing the correct way up. When a Repeater is first turned on it will automatically go into test mode for 2 minutes, where it will flash Green or Red to display any connections it can make. If your Repeater is in range of the Control Panel (or another Repeater) then it will flash Green. After 2 minutes it will flash Green 5 times and then the LED will be off. It is best not to fit the Repeater to the wall at the stage it at all possible as you may find further surveying shows gaps in the coverage.

5. Once the Repeater is installed and its 2 minute test period is complete, you can continue with the surveying process. Note that the Repeater will not relay messages until the 2 minute test period is complete. In areas where the test sensor gets responses from both the Control Panel and a Repeater it will double flash green. Check that the coverage is continuous, especially towards the edges of the area.

6. You should continue with the surveying process, deploying more Repeaters as required, until the whole of the desired area is covered. You should then permanently fix all the Repeaters to the walls.

5.4 Step 4: - Deploying the Sensors

In this stage of the installation the sensors are positioned in their desired locations. It is best to do this using the special test mode, as described above, by waiting for 10 seconds and the LED to go Yellow before completing the standard unit test of passing your hand in front of the sensors. The Sensor will automatically arm after the 5 minute test, so you can set and close the Sensor and place it in position, noting that the LED is still flashing Green. By taking the above approach you can be confident that each unit is deployed in a location that has radio coverage. The system will only allow green flash indications if the signal strength between the detector and the repeaters / control panel is above defined thresholds – this ensures continuity of service during stock movements etc.

Continue around the site until all sensors have been set and positioned.

Finally, 5 minutes after you have set the last sensor you should be able to check the Control Panel to see that the number of connected devices in the top right shows the number of units used on the site (including repeaters). You should also see that a number of messages have been sent.

The system is now installed and active.

5.5 Some things to be aware of

- Repeaters need to offer good coverage of the desired area. The system will automatically send data through the best available route on connection, but will try to find alternative routes if the initial route fails. A greater Repeater density helps to support this, but system structure will be very different from site to site.

- It is important to recognise that in a linear chain of repeaters the system is only as good as the weakest link. One badly positioned Repeater can cause the loss of connection of all Sensors and Repeaters beyond it, so it is important to position the repeaters in locations that provide a good radio signal. Square sites tend to naturally provide multiple routes, whereas long, thin sites will require more care to ensure that there are no weak points in the system.

- The loss of connection to the radio system will cause Sensors to retry the connection and attempt to make a new one if it can. If connection continues to be unsuccessful the software automatically increases the time between attempts to conserve battery life. However, it should be noted that a Sensor placed in a location where radio coverage is patchy, or is connected to a chain of Repeaters that has an unreliable link, the battery usage will increase. For normal usage the power consumption of the detector units is comparable to the standard Radar and MMU products – therefore the recommendation is to replace all PestConnect installation detector batteries at 12 monthly intervals (all at the same time) to maximise the installed system performance.

There are some system limitations that should be kept in mind, although typically should only occur in very large systems:

- The maximum number of units that can be connected to a Control Panel is 500 (including repeaters).
- The maximum number of Repeaters than can be used in a single system is 64.
- The maximum number of Repeaters used in a row is 16 (ie the data from a sensor can only pass through 16 Repeaters before it gets to the Control Panel).

6. Using the System

PestConnect system has been designed to require minimum on site time. Once the system has been installed the Control Panel display gives basic information on the current status.

If a Sensor is triggered it will send information to the Control Panel immediately, which will send that information on to the Rentokil Server within 60 seconds. The server will then trigger necessary actions and back office systems as well as updating PestNetOnline, iCABS and Pestrack reports. Site maintenance activities can be prioritised to direct technicians to areas that require their attention.

For operational speed, the Sensors do not need to be put into the test mode when reset; they can be set in the same way as the non-PestConnect units and keeping day to day operation simple.

The PestNetOnline system allows trigger levels to be set, so that the response can be based on risk. The PestConnect enabled Mouse Monitor Unit thresholds are no longer limited to single Sensor, and can now be implemented across multiple Sensors to achieve Zone level monitoring through PestNetOnline, offering a more holistic approach to Pest Activity Monitoring.

Additionally, the information provided from site to PNOL includes real-time information about battery voltage levels in each detector and the transmission signal strengths between detectors, repeaters and the central control panel.

Low battery conditions on Radar connect detectors can be effectively managed by automatic closure of the unit and Technician alert if required when the battery power is below a low level threshold set in the server.

7. Specifications

Control Panel Technical Specifications	
Dimensions	150mm x 88mm x 47mm
Weight (kg)	265g
Power Supply	5VDC input voltage
Material	Grey Polypropylene Enclosure
Degree of Protection	IP21 (drip proof)
Compliance	Conforms to and tested to CE approvals

Repeater Technical Specifications	
Dimensions	54mm x 88mm x 41mm
Weight (kg)	84g
Power Supply	5VDC input voltage
Material	Grey Polypropylene Enclosure
Degree of Protection	IP21 (drip proof)
Compliance	Conforms to and tested to CE approvals

Radio System Specifications	
Location	All PestConnect Units
Module	IEEE Std. 802.15.4 Compliant RF Transceiver
Module Certification	Radio Regulation Certified for United States (FCC), Canada (IC) and Europe (ETSI)
Frequency	ISM Band 2.405-2.475 GHZ
Output Power	+10dBm

Mobile Data System Specifications	
Location	Control Panel Only
Module	Motorola M2M Quad Band GPRS Module
Module Certification	FCC, IC, R&TTE/CE Approvals
Supported Bands	850/900/1800/1900 MHz
Transmit Power	850/ 900 MHz – Class 4 (2 Watt) 1800/1900 MHz – Class 1 (1Watt)

Power Supply Specifications	
Devices	Used for Control Panel and Repeater
EMI Standards	FCC PART15 CLASS B, EN55022 CLASS B, VCC CLASS II
Safety Approved	UL/CUL, GS, CE & RoHs Compliant
Input Voltage	90-264VAC
Input Voltage Freq.	47 to 63 Hz
Output Voltage	5VDC
Current (Max)	2.6A

Radar Specifications	
Dimensions	308mm x 196mm x 60mm
Weight (kg)	415g (including full gas canister)
Power Supply	6v 4xAA cell Alkaline battery pack
Material	White Polypropylene casing
Degree of Protection	IP21 (drip proof)

MMU Specifications	
Dimensions	125mm x 72mm x 44mm
Weight (kg)	85g (including battery pack)
Power Supply	4.5V 3xAA cell Alkaline battery pack

Material	White Polypropylene casing
Degree of Protection	IP21 (drip proof)

8. Troubleshooting

If you are having trouble with setting up the system some of the following points may help.

8.1 Connection to the server

Normally the Control Panel will connect to the server within 2 minutes, however sometimes it can take longer, especially for a new SIM card. You should wait at least 5 minutes for connection (10 minutes for a new card). If the Control Panel hasn't connected by this time, then it is likely there is a problem.

The Control Panel will try to help identify problems and show error messages to guide you. Here is a list of messages and their meaning and possible cause.

Message	Meaning	Possible Cause
No SIM card	Control Panel cannot identify the SIM	• SIM inserted wrong way round or upside-down – check and re-insert. • SIM contacts dirty – try cleaning with eraser • SIM faulty – try SIN in another communication device to see if it works.
No Signal	The modem cannot detect a signal from the mobile network	• Antenna not fitted, or not screwed on fully. • Control Panel location does not have sufficient mobile network reception – try alternative locations (check other communication devices on the same network to see if they show signal) • Mobile network isn't working – try mobile phone on the same network to check this. • Faulty Antenna – try another antenna if you have one.
GPRS Fail	The modem can detect a network, but cannot connect to it	• Network Problem - The Control Panel will automatically try to connect again. If this is still a problem after 5 minutes then try restarting the Control Panel. • SIM not authorised for data access – verify that the SIM has been enabled by the network provider. – You could try the SIM in another communications device and try connecting to the internet to prove data is enabled.
Modem Fail	The Control Panel software is getting no response from the internal modem	• Modem fault – The Control Panel will automatically restart the modem showing the message Restart Modem, if this fails you can try restarting the Control Panel.

8.2 Connection to the Control Panel

Problems with connection to the Control Panel from Repeaters and Sensors are very rare. Connection issues are typically only related to low signal strength caused by obstructions in the Radio path.

It is useful for the installer to understand the type of obstructions that can cause issues, although radio waves are very complex and sometimes work contrary to initial expectations, so the best method is to try it out.

Example 1- Warehouse fitted with linear racking

In a warehouse with rows of racking it is expected that radio communication will be better along the length of the rows and worse going across the rows (ie through many sets of racking). This is not to say that the signal cannot go across racking, but that the connection distances achieved going across are reduced compared to those along the length.

This is a useful observation to consider when placing repeaters. A system in a 45m x 150m warehouse, with racking consisting of 6 central rows of racking along the full length, showed that signals could pass through the racking with repeater distances of about 70m. However these signals were relatively low and were susceptible to stock movement.

A second arrangement which allowed signals to pass up each side to an end point showed much higher signal levels, but also allowed for redundant paths in the system, increasing overall reliability.

Example 2 – Warehouse area with large, closely stocked produce containers

Radio frequencies can easily be absorbed by buildings and stock, so it is worth considering this when installing the system. In particular, large, densely stored containers of produce (especially fine product such as grain or nuts) can reduce signals very quickly if you try to go through them.

In a warehouse with very dense storage, positioning repeaters such that they can communicate along access routes and gangways will often help, because the signals are going around or along the stock rather than through it.

On a site with 2m tall bags of nuts placed 2 or 3m deep it was difficult to get a signal through, directly to the sensors needed in that area. By locating a repeater at the end of the rows, and then another halfway down, it was possible to provide enough coverage to the sensors in that area.

Finally be aware of empty racking when installing the system. What is empty today might not be tomorrow! This is where the technician’s knowledge of the site can be very useful.

Example 3 – Metalwork

Metal reflects radio signals, so often helps bounce the radio waves around. However, radio signal doesn’t easily pass through metal especially if the metal is continuous.

A chilled storage area on one site showed much lower signal levels, because the foil coated insulation reduced the signal significantly, compared to those even just outside the room. The solution here was to put a repeater directly outside the chilled area, where there was good signal, and this boosted the levels

enough to cover the sensors inside. In an extremely bad situation it would be possible to put a repeater both inside and outside the room.

Fixing PestConnect units to metalwork, electrical conduit or cable tray can reduce effectiveness of the system, so should be avoided if possible; ideally units should be at least 20cm clear of such objects.

It is also worth noting that when the radio signal bounces around it causes the signal level to vary, because of the way the various radio waves are combined. This means that there can be a big difference in signal strength even within a few centimetres. If the signal level appears to be bad, it is worth moving the Sensor or Repeater a few centimetres to see if this helps.

Example 4 – Adjacent systems

Multiple Pestconnect systems will work perfectly well next to each other, and it is possible for many systems to be present on a single site. In many instances it can lead to a more robust system. However, the connection route becomes less and less predictable the more Control Panels and Repeaters there are on a site.

It is important to remember that radio waves do not respect building boundaries. Just because a system is all set up in one building won't mean that it will connect that way. An example of this can be where the end sensors of two systems in separate buildings end up very close to one another. This can then provide a link between the units in both building.

Equally the units don't have to be physically close. A Repeater installed at the edge on a warehouse could quite likely find a better signal strength from a Repeater in a building 70m away across an open courtyard or car park than it can get from the Repeater on 40m away the other side of several rows of fully stocked racking.

Fortunately this doesn't matter, because each sensor is uniquely identifiable and registered to its location, so its data will correctly appear in the server, no matter which route or Control Panel it used to do this.

What will be noticeable will be the time it takes to scan for the best route (as it has more options to choose from) and because of this, marginally reduced battery life.

8.3 Points to note

The following are other issues that you might come across once the system is installed.

Situation	Possible Cause
Sudden reports regarding multiple missing sensors	• The loss of many sensors normally indicates a more significant event on site. Typically the loss of one or more repeaters will cause a number of sensors to go missing. • Some sort of loss of power is often to blame for this. Either power outage, site maintenance work, or simply someone unplugging the repeater.
Repeated reports regarding multiple missing sensors	• If no power outage can be confirmed and it happens on more than one occasion it could be due to a weak link between repeaters or between repeater and the Control Panel. • An onsite check can be performed using a sensor in radio test mode to verify the coverage. This might help identify where the signal is going missing. • Analysing a site plan can also help identify patterns of sensors reported missing. • If the problem persists ask the PestConnect support team for assistance.
Control Panel Fault	• If you suspect there is a problem with the Control Panel, please take a picture of the display. If this is not possible note down the exact contents of the display before repowering the Control Panel. • This information should be sent to the PestConnect support Team, together with any further information to help identify any issues.

8.4 Sensor LEDs

The Sensors and Repeaters convey a lot of information with a single LED. The following is a quick guide to what all the flashing means.

LED	Meaning	Notes
Static Red (Sensors only)	Awaiting Technician Test (will start in normally)	• Occurs after first turning on the device • Waiting for the sensors to be tested • Once technician test is complete, sensor will start normally (in sensing mode) • Times out after 10seconds
Static Yellow (Sensors Only)	Awaiting Technician Test, (will start in radio test mode)	• Occurs after 10seconds in Static Red • Waiting for sensors to be tested • Once technician test is complete sensor will start in radio test mode. • Times out after 20seconds (will power down at this point)
Rapid flashing Red (sensors only)	Sensing first sensor in technician test mode	• Occurs when one sensor is obstructed in Technician test mode (obscuring second sensor triggers trap)
Alternate Green and Red	Scanning for Repeaters	• Unit is scanning to find PestConnect Repeaters and Control Panels and comparing signal strengths to select the best route
Flashing Green (2 second interval)	Test Mode: within radio range	• Will flash rapidly 1-5 times at 2 second intervals • Number of flashes indicates the number of valid devices that can receive its signal (displays up to a max of 5 flashes)
Flashing Red (2 second interval)	Test Mode: not in radio range	• Brief flash at 2 second intervals
5 even Green flashes	Making final connection to Control Panel/Repeater	• Occurs either after scanning or after test mode • Indicates it is about to arm, and has connection through to a Control Panel
5 even Red flashes	Unable to make final connection to Control Panel	• Occurs either after scanning or after test mode. • Indicates it has been unable to make a connection. It will retry automatically
Single brief Green flash	Successful Message Transmit	• Indicates confirmation of message receive from Control Panel
Single brief Red flash	Unsuccessful Message Transmit	• Indicates no confirmation of message receive from Control Panel
Single brief Yellow flash	Unsuccessful Message Retry	• Indicates unsuccessful retry with no confirmation from Control Panel
Red flash (5second interval) (Sensors Only)	Remote Deactivation	• Sensor has been remotely deactivated by the server. (eg low Battery, unit fault) • Consult PNOL for further information