

INSTALLATION

Manual

RF-100



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1 Safety

1.1 Symbols

Symbol	Explanation
	Indicates a situation which, if not avoided, can result in property damage
	Information that is important for a specific goal, but is not safety-relevant
	Indicates a requirement for meeting a specific goal
	Desired result
	A problem that might occur
	Action to resolve a problem

1.2 Intended Use

The RF-100 is a passive, network-attached sensor for the detection of radio frequencies (RF). It supplements the DroneTracker System with another level of detection. The RF-100 detects targeted radio signals of different drones and remote controllers and sends the data, along with an alert, to the DroneTracker System.

The RF-100 is intended for civil commercial and private use in conjunction with a DroneTracker System.

The RF-100 is suitable for indoor and outdoor use.

Use this product only in accordance with the information provided in the enclosed documentation and with the locally applicable legal standards and directives. Any other application may cause personal injury or property damage.

Any use of the product other than that described in the intended use section does not qualify as appropriate. The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and observe all instructions contained therein.

The type label must remain permanently attached to the product.

Compliance Information Statement FCC and IC

The RF-Sensor RF-100 complies with Industry Canada licence-exempt RSS standard(s) and complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications: Any modifications made to this device that are not approved by Dedrone GmbH may void the authority granted to the user by the FCC to operate this equipment.

**Caution!**

To prevent permanent exposure, the device should be installed and operated with a minimum distance of 20 cm (7.87 in) between the device and your body.

1.3 Safety Information

Read, follow and retain all of the following safety instructions. Heed all warnings on the unit and in the operating instructions before operation.



Warning! Setup should be carried out by trained personnel only, in accordance with the national electric code, ANSI/NSPA, and all local country codes.



Do not attempt to service this device yourself. Refer all servicing to qualified service personnel. This device has no user-serviceable internal parts. Whenever any damage to the device has occurred, unplug the devices from the power source by disconnecting the patch cable and refer servicing to qualified service personnel. Such damages can be:

- the patch cable is damaged
- an object has fallen on the device
- the device has been dropped, or its enclosure has been damaged
- the device does not operate normally when the user follows the operating instructions correctly



Adjust only those controls specified in the operating instructions. Improper adjustment of other controls may cause damage to the unit.



Despite careful construction, electrical devices can cause fires. Do not mount the RF-100 in areas containing highly flammable materials or gases. Do not mount the RF-100 in a potentially explosive atmosphere.



Do not install product near any heat sources such as radiators, heaters, exhaust air systems or other equipment (including amplifiers) that produce heat.

2 The RF-100

The RF-100 is a passive, network-attached sensor for the detection of radio frequencies (RF). The RF-100 detects targeted radio signals of different drones and remote controllers and sends the data, along with an alert, to the DroneTracker System.



Parts of the RF-100

A	Power button	D	RF Mounting Plate
B	RF-100	E	Network socket (covered)
C	Antenna		

It scans a wide frequency band for radio frequencies and classifies them. The data is recorded and available on the DroneTracker user interface.

3 Unpacking

This equipment should be unpacked and handled with care. Check the exterior of the packaging for visible damage. If an item appears to have been damaged in shipment, notify the shipper immediately.

4 Scope of Delivery

Verify that all the parts listed in the scope of delivery are included. If any items are missing, notify your Dedrone Partner.

Do not use this product if any component appears to be damaged. Please contact Dedrone in the event of damaged goods.

- 1 x** RF-100
- 4 x** Antenna (2x short, 2x long)
- 1 x** RF Mounting Plate
- 1 x** Pole Mount
- 2 x** Strap
- 1 x** Bag with 4x screws Torx M5, 8x flat washer, 4x nuts
- 1 x** Bag with 1x environmentally sealed Ethernet crimp connector, 1x RJ45 plug
- 1 x** Installation manual
- 1 x** Safety information
- 1 x** Product registration document (this information is only needed for a cloud based sensor operation and is provided by an enclosed document or online by the Dedrone Service)

The original packing carton is the safest container in which to transport the unit and must be used if returning the unit for service. Save it for possible future use.

5 Installation

5.1 Select the Mounting Place

5.1.1 Mounting Location

The position of the RF-100 has strong impacts to the detection range. The RF-100 is designed for a pole mount. Make sure that a suitable pole is available (diameter between 1.2 in to 3.5 in (40 mm to 90 mm)).


For ideal results the location should fulfill the following conditions:

- clear view over the area**
- elevated position, minimum 3 m**

Select a secure installation location and mounting position for the device. Ideally, this is a location where the device cannot be interfered with, either intentionally or accidentally.

Do not install the device near the following objects:

- Walls because these shade the detection area and prevent classification of signals behind the wall
- Any excessive heat sources
- Any overhead power lines, power circuits, or electrical lights, or where there is a chance of electrical discharge
- Behind metal surfaces or vaporized glass because this could reduce the detection range



Note the properties of each RF-100. This is needed for correct configuration an service.

We recommend the table below. The following information is important:

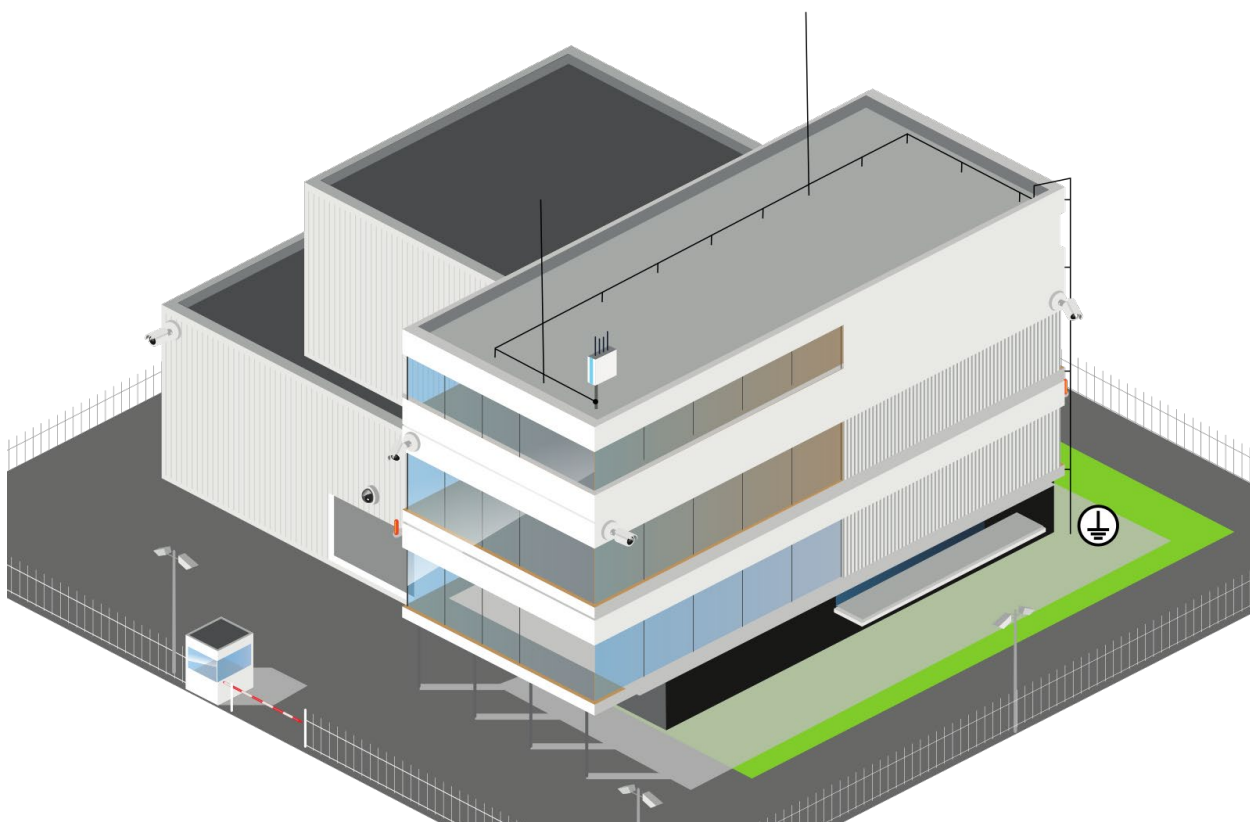
- Serial number (see product plate)
- GPS-position (in degree)

Serial Number (see product plate)	GPS-Position in degree, e.g. 52.516295, 13.377653
	Longitude: Latitude:
	Longitude: Latitude:
	Longitude: Latitude:

Overvoltage Protection

For safe mounting in an exposed position overvoltage protection must be observed.

Ensure that the pole is connected to the lightning conductor of the building. The RF-100 itself must not be grounded directly. The lightning conductor must be installed at least 5 ft (1.5 m) above the RF-100.



Lightning Protection Installation with a RF-100

Ensure that the location has the appropriate clearance from power and lightning conductors, in accordance with NEC725 and NEC800 (CEC Rule 16-224 and CEC Section 60).

5.1.2 Mounting Surface

Make sure the selected mounting surface is capable of supporting the combined weight of the RF-100 (6.8 lb (3.1 kg)) and mounting hardware under all expected conditions of load, vibration, and temperature.

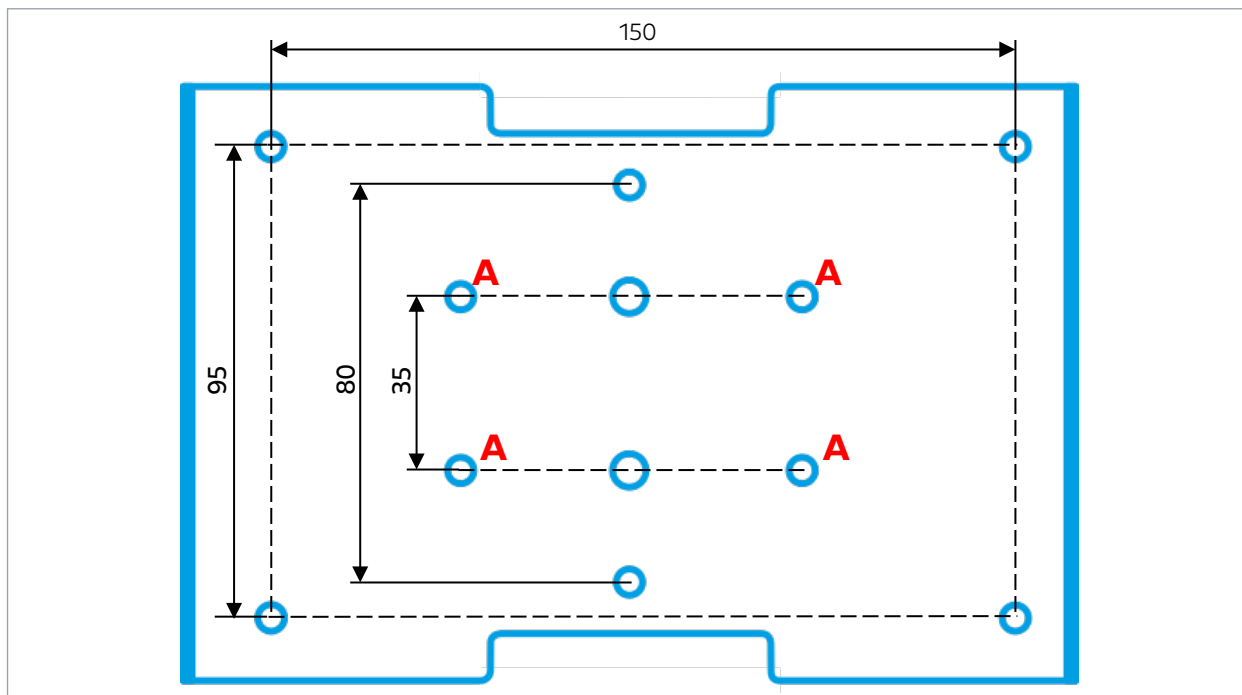
5.1.3 Mounting Orientation

The orientation of the device itself does not have any effect for the performance. Important for a good result is the orientation of the antenna. Both **antennas** have to be orientated **skywards**.

5.1.4 Mounting Device

To mount the RF-100 with a mount other than the one supplied, note the following requirements for the mounting equipment:

- licensed for outdoor use
- safe and stiff load of 8.8 lb (4 kg)
- matching for the holes of the RF Mounting Plate



Dimensioning of the holes of the RF Mounting Plate

A Holes for the Pole Mount

5.2 Power Supply and Required Tools

Power Supply

The RF-100 does not need any additional power supply connection. The power supply is provided by the connected switch with activated active PoE+ (802.3at).

- Make sure, that your network has activated **active PoE+ (802.3at)**.

Note: Data transfer is only possible with a suitable PoE switch.

Required Tools

- Screwdriver: Torx TX25
- Hex key: 4 mm
- Socket wrench: 7 mm ($\frac{9}{32}$ ") and 8 mm ($\frac{5}{16}$ ")
- Crimping tool

For an environmentally sealed connection to the RF-100, it's necessary to crimp the supplied connector to the laid patch cable (see 5.3 Cable Requirements and Preparation (Crimp), page 11).

- Ladder or lift truck, depending on the mounting location
- **Recommendation:** GPS device

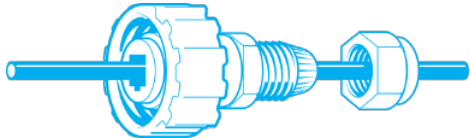

5.3 Cable Requirements and Preparation (Crimp)

Cable Requirements

Type	Cat-6 Patch Cable Recommendation: Cat-7 Patch Cable
Maximum Length	328 ft (100 m) For longer distances a PoE extender is required
External Diameter	3.5 mm – 7.5 mm

Cable Preparation

For a weather resistant connection to the RF-100, it is necessary to crimp the supplied environmentally sealed Ethernet connector to the patch cable.

- 1 Cut the RJ45 plug off the laid cable. Keep the cut off plug to check the wiring standard later.
- 2 Screw the gland off the connector body.
- 3 Thread the gland nut and the connector body onto the cable.
 
- 4 Remove the cable jacket carefully. Therefore take care not to damage the braid and foil.
- 5 Fold back the braid and foil over the cable jacket. Note: 25 mm (1") of free conductors are needed.
- 6 Unravel the conductors, sort the conductors in the required wiring standard (568-A or 568-B), and push the conductors all the way in the plug. The required wiring standard can be checked on the previous cut-off RJ45 plug.
 

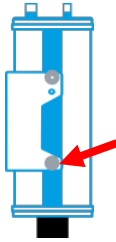
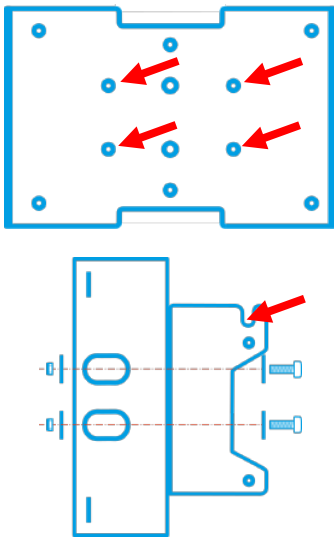
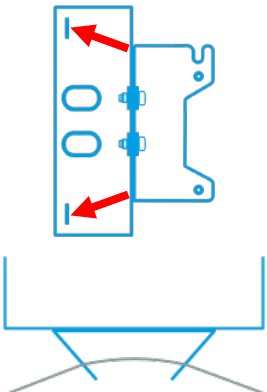
Position	568-A	568-B
1	White/Green	White/Orange
2	Green	Orange
3	White/Orange	White/Green
4	Blue	Blue
5	White/Blue	White/Blue
6	Orange	Green
7	White/Brown	White/Brown
8	Brown	Brown
- 7 Crimp the RJ45 plug with the crimping tool.
- 8 Push down the latching clip of the plug and press the connector body all the way to the stop over the RJ45 plug.
- 9 Put the gland nut over the connector body and screw down the gland nut on the connector body.

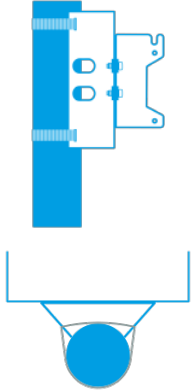
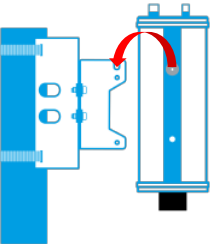
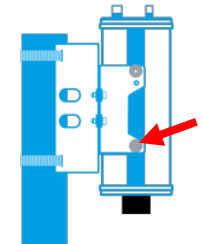
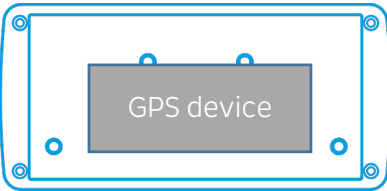
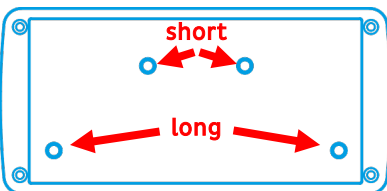
5.4 Installation with Pole Mount

Requirements:

- Desired mounting place fulfills the requirements (see 5.1 Select the Mounting Place, page 8)
- Diameter of the pole: between 1.2 in to 3.5 in (40 mm to 90 mm)

Procedure:

1	<p>Loosen the knurled head screws on both sides of the RF-100 and unhook the RF-100 from the RF Mounting Plate.</p>	
2	<p>Screw the RF Mounting Plate onto the Pole Mount. Therefore note the following:</p> <ul style="list-style-type: none"> • Use the shown holes. • The screw guidance of the RF Mounting Plate shows to the top. • Put a flat washer between <ul style="list-style-type: none"> ○ screw head and RF Mounting Plate and ○ nut and Pole Mount. • Screw down the nut. (socket wrench: 7 mm ($\frac{9}{32}$)). 	
3	<p>Run the straps through the slashes of the Pole Mount.</p>	

<p>4</p>	<p>Mount the the Pole Mount to the pole:</p> <ul style="list-style-type: none"> • Hold the Pole Mount with the RF Mounting Plate at the desired height of the pole. • Lay the straps around the pole • Put the strap in the slash under the screw and tighten it appropriately. (socket wrench: 8 mm ($\frac{5}{16}$")) 	
<p>5</p>	<p>Hook the RF-100 in the screw guidance of the RF Mounting Plate.</p>	
<p>6</p>	<p>Screw down the 2 knurled head screws with the sealing washers at both sides in the lower holes.</p> <ul style="list-style-type: none"> • Make sure that the soft side of the sealing washer is faced to the RF Mounting Plate. • Tighten the screws carefully. The RF Mounting Plate should not be bent. 	
<p>7</p>	<p>If a GPS device is available, place it on top of the RF-100 and note the longitude and latitude in the table (see 5.1.1 Mounting Location, page 8).</p>	
<p>8</p>	<p>Screw the antennas on the screw threads at the top of the RF-100. Therefor note the correct positioning of the short and long antenna.</p>	
<p>9</p>	<p>Adjust the antenna of the RF-100 skywards.</p>	
<p>10</p>	<p>Make sure that the pole is grounded (see Requirements Overvoltage Protection, page 9).</p>	

11

Connect the patch cable to the RF-100 and turn the connector gland until it is locked (for a correct cable preparation see 5.3 Cable Requirements and Preparation (Crimp), page 11).

- ✓ If the patch cable is connected to the network, the RF-100 boots automatically and after approximately 1 second the blue button at the RF-100 illuminates, indicating that the hardware is ready.
- ⊗ The patch cable is connected to the network and the RF-100 does not boot automatically after approximately 1 second?
 - 🔧 Push the blue button and wait for it to illuminate.
 - 🔧 Make sure that **active PoE+ (802.3at)** is activated in your network.

6 Integrate the RF-100 in your DroneTracker

The integration procedure of the RF-100 in your DroneTracker depends on the system type:

- On premises installations use your local DroneTracker Server (see 6.1 Integrate the RF-100 in your on prem DroneTracker Server, page 14).
- Dedrone Cloud installations do not require any additional infrastructure and are connected to the Dedrone Cloud (see 6.2 Integrate the RF-100 via Dedrone Cloud, page 16).


6.1 Integrate the RF-100 in your on prem DroneTracker Server

To connect to the RF-100 DHCP-Services are required that automatically assign an IP address to the RF-100. If the RF-100 and the DroneTracker Server are in the same Layer2 network they can be connected directly. If the RF-100 and the DroneTracker Server are in different networks refer to the Dedrone Planning Manual or consult your network administrator.

Requirements:

- RF-100 is installed.
- The power supply is working and the power button at the RF-100 illuminates blue.
- RF-100 is connected to the network.
- The IP address of the DroneTracker Server is known.

Procedure:

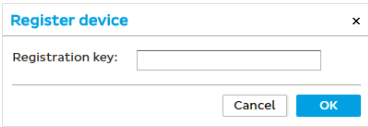

1	Start your web browser and enter the IP address of the DroneTracker Server For an optimal use, Dedrone recommends Chrome or Firefox.
2	Log in the DroneTracker UI as an administrator or configurator. The default login credentials are: User: admin Password: dedrone ✓ The DroneTracker user interface appears.
3	Choose OPTIONS > Site Configuration .
4	Choose [Add] > Dedrone RF Sensor . ✓ The window Discovered Sensors appears.
5	Select the desired RF-100 and choose [OK]. ✓ The RF-100 appears in the Site Explorer.
6	To sort the RF-100 in the Site Explorer, drag and drop the element to the desired position.
7	Choose [Save changes]. ✓ The window Site Configuration disappears.
8	Choose OPTIONS > Map Editor .
9	Choose [Add] > Sensor . Choose the desired RF-100 in the window Select sensor . Choose [OK]. ✓ The RF symbol  appears on the map.
10	Move the RF symbol per drag and drop on the installation position on the map. If the sensor was installed and aligned with a GPS device enter the noted values in the fields Longitude and Longitude .
11	To lock the settings activate the option Lock settings .
12	Choose [Save changes]. ✓ The window Map Editor disappears.

6.2 Integrate the RF-100 via Dedrone Cloud

Requirements:

- RF-100 is installed
- The power supply is working and the power button at the RF-100 illuminates blue
- RF-100 is connected to the Dedrone Cloud
- The address of your Dedrone Cloud access is known (provided by Dedrone)
- The registration key of the sensor is available (provided by Dedrone)

Procedure:

1	Start your web-browser and enter the address of your Dedrone Cloud. For an optimal use, Dedrone recommends Chrome or Firefox.
2	Log in the DroneTracker UI as an administrator or configurator.
3	Choose OPTIONS > Site Configuration .
4	Choose [Add] > Register device . ✓ The window Register device appears.
	
5	Enter the registration key of your sensor and choose [OK] . ✓ The RF-100 appears in the Site Explorer.
6	To sort the RF-100 in the Site Explorer, drag and drop the element to the desired position.
7	Choose [Save changes] . ✓ The window Site Configuration disappears.
8	Choose OPTIONS > Map Editor .
9	Choose [Add] > Sensor . Choose the desired RF-100 in the window Select sensor . Choose [OK] . ✓ The RF symbol  appears on the map.
10	Move the RF symbol per drag and drop on the installation position on the map. If the sensor was installed and aligned with a GPS device enter the noted values in the fields Longitude and Longitude .
11	To lock the settings activate the option Lock settings .

12

Choose [**Save changes**].

- ✓ The window **Map Editor** disappears.

7 Cleaning

NOTICE Some cleaners damages the housing

Some cleaners can damage the housing or antenna of the RF-100. Never use glass cleaner or other solvent cleaner to clean the RF-100.

- Use solvent-free cleaner to clean the RF-100.

8 Decommissioning

8.1 Shut Down the RF-100

NOTICE RF-100 breaks

By disconnecting the cable without shut down the RF-100, the RF-100 could break.

- Always shut down the RF-100 in the DroneTracker UI **before** disconnecting the cable.

Procedure:

1

Log in to the DroneTracker user interface.

2

Choose **OPTIONS > Site Configuration**.

3

Right-click on the desired RF-100.

4

Choose **System > Shutdown hardware**.

8.2 Dismantling



Hot surface during operation

Depending on the environment the surface of the RF-100 could get hot.

- Before dismantling the device **wait 30 min** after shut down the RF-100.

8.3 Disposal



Dispose the RF-100 at the end of its service life in accordance with the disposal regulations for electronic waste which apply at the installation location at that time. Alternatively, send it back to Dedrone GmbH with shipping paid by the sender, and labeled "ZUR ENTSORGUNG" ("FOR DISPOSAL").

9 Technical Data

L x W x H	7.7" x 3.7" x 17.3" (195 mm x 95 mm x 440 mm) Height without antenna: 9.8" (250 mm)
Operating Temperature	-4 °F to +122 °F (-20 °C to +50 °C)
Weight	6.8 lb (3.1 kg)
Ingress Protection Rating	IP65 *
Connectivity	Fast-Ethernet (100 Mbit/s)
Power Supply	Active PoE+ (802.3at)
Power Consumption	15 W (typ.)
Range	0.65 mi (1.0 km) in good conditions up to 1.3 mi (2 km)
Radio Frequency	Omnidirectional passive detecting and classification

* No ingress of dust; complete protection against contact (dust tight). A vacuum must be applied. Water projected by a nozzle (6.3 mm) against enclosure from any direction shall have no harmful effects.



DRONE DETECTION TECHNOLOGY



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