

FaunaScan MR2 Radar Platform Integration Manual

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1 Disclaimer

These instructions enable the safe and efficient integration and use of the FaunaScan MR2 Radar Platform(hereinafter referred to as "device" or "system"). The manual is an integral part of the system and must be kept in the immediate vicinity of the system, accessible to personnel at all times.

All personnel must thoroughly read and comprehend these instructions before commencing any work. The fundamental requirement for ensuring safety is to adhere to all safety notes and action instructions provided in this document.

Furthermore, it is essential to adhere to local occupational health and safety regulations as well as the general safety regulations applicable to the system's area of operation. Please note that the illustrations provided in these instructions are for basic understanding purposes and may not accurately represent the actual design.

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2 Regulatory Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment must be installed and operated with minimum distance of 2.85 m between the radiator and any body parts of nearby persons.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

3 General Information

1.1 Scope of delivery

The scope of delivery includes the following components:

Quantity	Component	Description
1	CenterUnit	Signal Processing Unit
1	RXUnit	Receiver
1	TXUnit	Transmitter
2	Power Supply Cable	Power Supply Cable to connect Transmitter/Receiver to Center Unit
2	CAT6 0.5 m Cable	Data connection between Transmitter/Receiver and Center Unit
2	SMA HF Cable	HF Connection between Transmitter/Receiver
2	Radom	Radom for integration of Modules into a outdoor housing

4 Overview

The FaunaScan Radar Platform is radar device that can be integrated into a outdoor housing to monitor birds, bats and insects.

It consists of the three modules CenterUnit, TXUnit and RXUnit, that form together the FaunaScan Radar Platform. Figure 1 shows the three modules connected internally and the interfaces exposed to external components. It is supplied by a single 24 V Port and offers various communication interfaces like USB, Ethernet and HDMI. Additionally GPIOs can be connected to control external LEDs.

The CenterUnit contains the main processing unit including a Linux operating system, that controls all radar operation and processes the radar data. The TX Unit contains the power amplifiers and antenna that transmits the radar signal with a beam width of approx. 22° and a maximum EIRP power of 60 dBm. The RXUnit contains an antenna, low signal amplifiers and an analog to digital converter that digitizes the received radar signals.

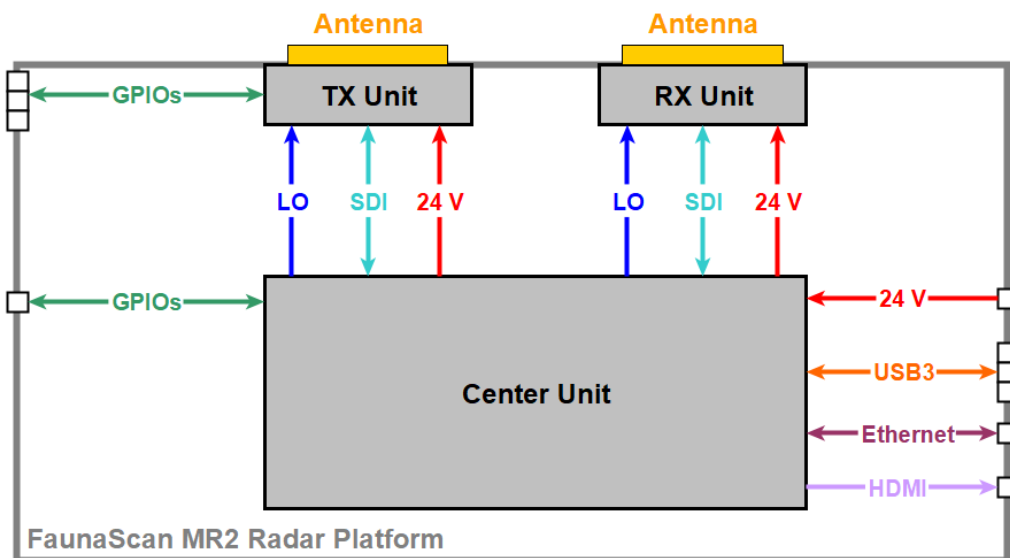


Figure 1: FaunaScan MR2 Radar Platform

4.1 Warnings



The radar modules must be integrated by a instructed professional.



The complete assembly must be checked by a four-eyes principle before the first start-up of the integrated radar platform.



Pay attention to the safety warnings in chapter 9.



The radar modules must not be accessible by an ordinary person

5 Specifications

General Operating Conditions	
Operating Temperature	10° C to 35° C
Storage temperature	0° C to 50° C
IP Protection	IP 10
Center frequency	8.8, 8.905, 9.25, 9.4 GHz
Bandwidth	85 MHz
Useful life	24x7, 10 years
Center Unit	
Supply Voltage	24 V DC, +/- 0.5 V
Supply Current	6 A
Dimension	242 mm x 132.5 mm
TX Unit	
Output power	60 dBm EIRP
Beam Width	22°
Polarisation	Vertical & Horizontal
Dimension	210 mm x 160 mm
RX Unit	
Beam Width	22°
Polarisation	Vertical & Horizontal
Dimension	210 mm x 160 mm

5.1 Modules overview

The following figures show all 3 modules and the name and position of each connector.

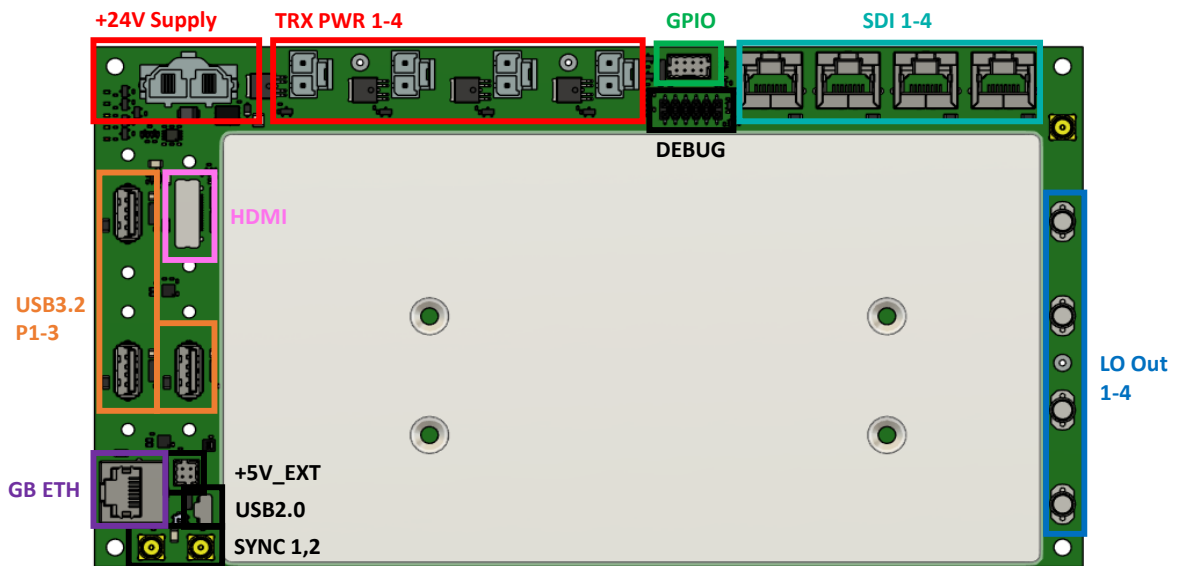


Figure 2: CenterUnit Interfaces



Figure 3: TXUnit Interfaces

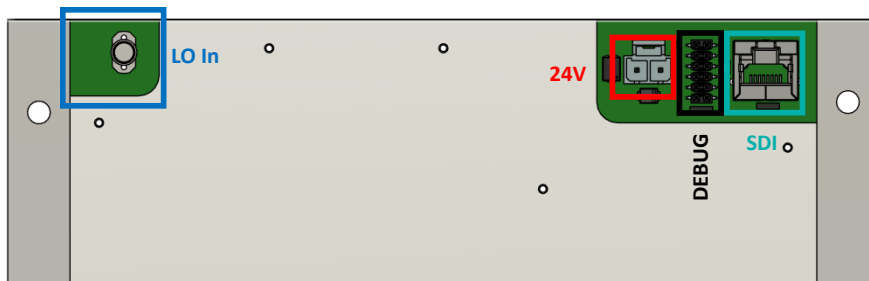


Figure 4: RXUnit Interfaces

6 Integration requirements



All requirements and instructions of this manual must be strictly followed

6.1 Personnel requirements

Design of integration:

- The design of the cabinet and external components must be performed by a professional engineer with background in electronics and radar design.

Assembly personnel:

- The assembly of the radar device must be performed by an electrician or similar professional with knowledge of this manual.

7 Interfaces and connections

Figure 5 shows the 3 modules with all interfaces, the internal connection and the ports that act as external ports of the FaunaScan Radar Platform, that can be used by the OEM integrator. The internal ports must be connected as described, using the supplied cables. All not connected (n.c.) ports must not be used by the OEM integrator.



The setup of internal and external connections must be checked by a four-eyes principle before the first start-up of the integrated radar device.



All interfaces (internal and external) must not be accessible by an ordinary person.

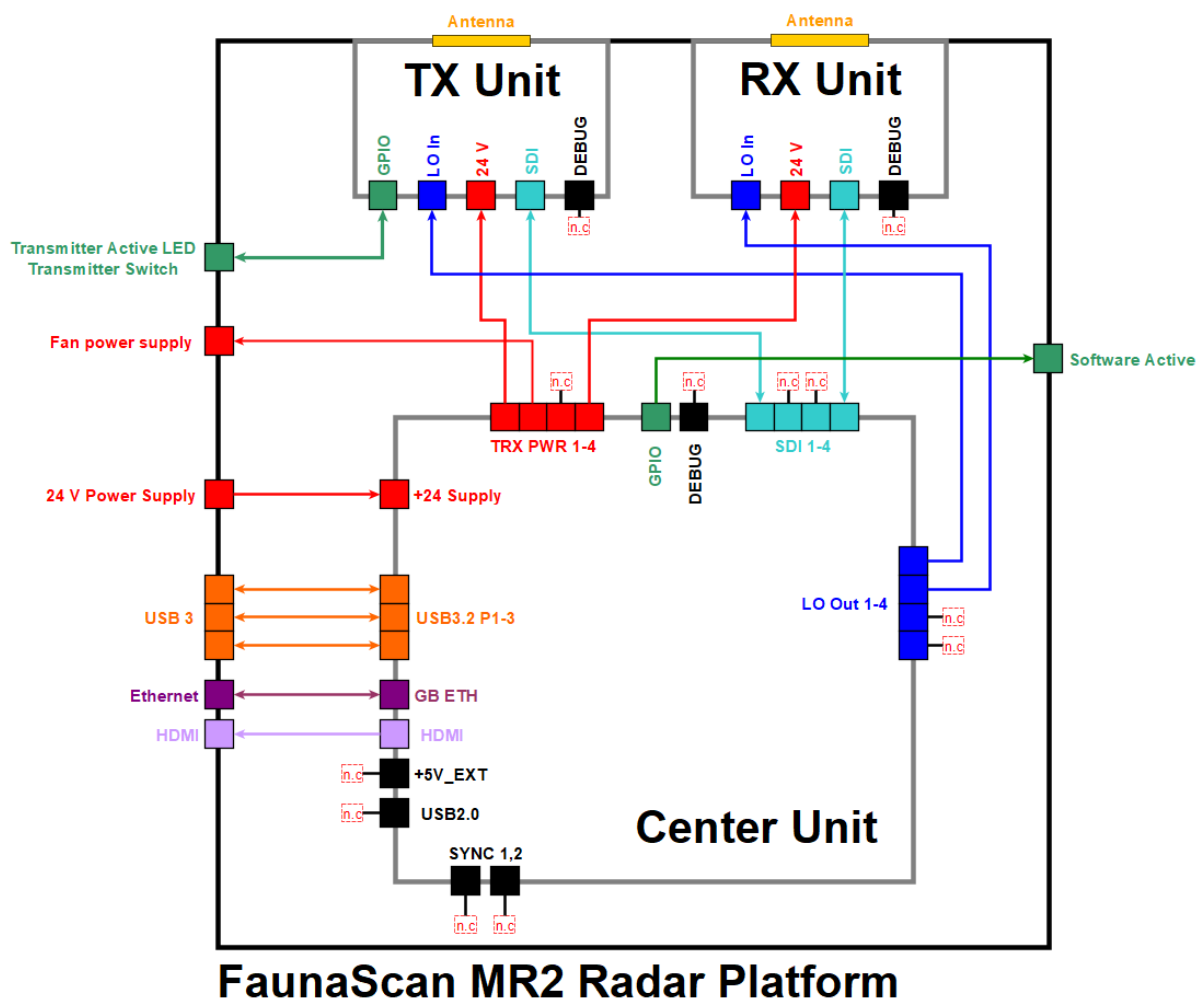
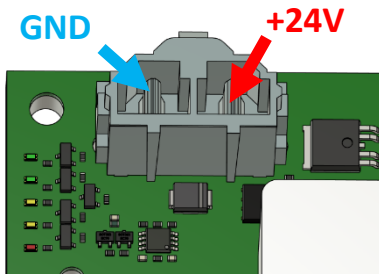


Figure 5: Radar Platform Interfaces & internal connections

7.1 External interfaces

+24 Supply (Center Unit)



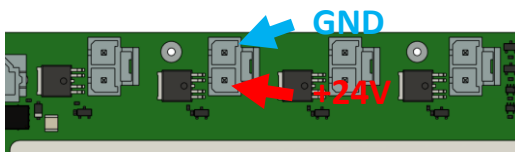
Supply input voltage: 24 V, +/- 0.5 V

Supply current: 6 A **(must be limited!)**

Supply Wires: min 2.5 mm², max. 50 cm length

Supply connector (PCB): Molex 428192214

Fan Power Connector (Center Unit)



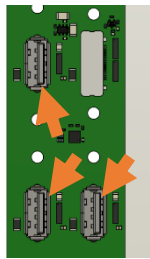
Output voltage: 24V

Max Load current: 1 A

Wires: min 1 mm²

This connector can be used to power an external fan that is active when the radar is operating

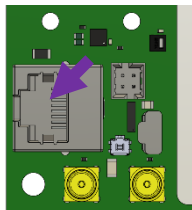
USB 3.2 P1-P3 (Center Unit)



3x standard USB3.2 connection

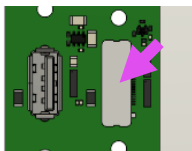
Current limit per connector: 1 A

Ethernet (Center Unit)



Gigabit Ethernet connector

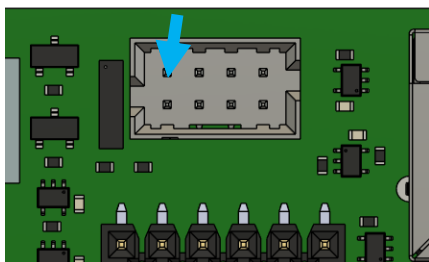
HDMI



HDMI Version: 1.4/2.0

GPIO (Center Unit)

Software Active



Software Active (Pin 2)

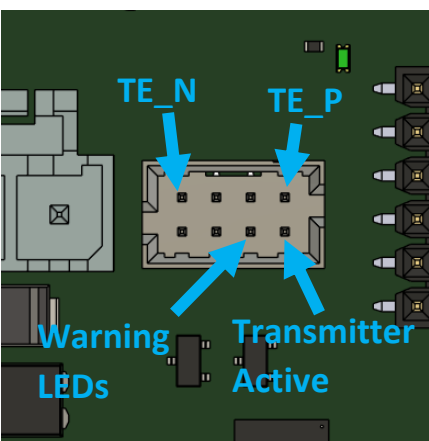
Function: Open-Drain output

Max Voltage: 24 V

Max Load Current: 100 mA

All other pins of the GPIO Connector must not be used!

GPIO (TX Unit)



TE_P (Pin 1) & TE_N (Pin 7)

Function: Input

Connect this two pins by a switch, to enable/disable the transmitter.

Transmitter Active (Pin 2)

Function: Open-Drain output

Max Voltage: 24 V

Max Load Current: 100 mA

Transmitter Active (Pin 2)

Function: Open-Drain output

Max Voltage: 24 V

Max Load Current: 100 mA

All other pins of the GPIO Connector must not be used!

7.2 Internal connections

From	To	Requirements
LO Out 1 Center Unit	LO In TX Unit	SMA HF Cable 18GHz, max length 50 cm (only use original cable)
LO Out 2 Center Unit	LO In RX Unit	SMA HF Cable 18GHz, max length 50 cm (only use original cable)
SDI 1 Center Unit	SDI TX Unit	CAT6 Ethernet cable, max length 50 cm (only use original cable)
SDI 4 Center Unit	SDI RX Unit	CAT6 Ethernet cable, max length 50 cm (only use original cable)
TRX PWR 1 Center Unit	24 V TX Unit	Wire min. 2.5 mm ² , max length 50 cm (only use original cable)
TRX PWR 4 Center Unit	24 V RX Unit	Wire min. 2.5 mm ² , max length 50 cm (only use original cable)

8 Installation instructions



Follow this instructions for the installation

Always wear safety gloves and ESD protection

The TXUnit and RXUnit must be installed on the same plane and be oriented identically. Appropriate openings in the cabinet for the antennas must be provided and the supplied radoms must be used.

Side View



← Separation: min 35 cm →

Top View

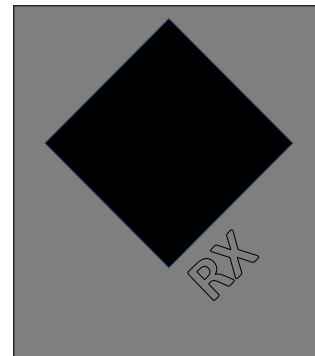
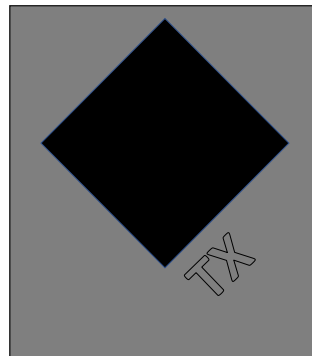


Figure 6: Installation drawing RXUnit and TXUnit

The CenterUnit must be placed close, according to max. length of the connections between the modules (see 3.3).

Figure 7 shows a typical installation of all 3 modules.

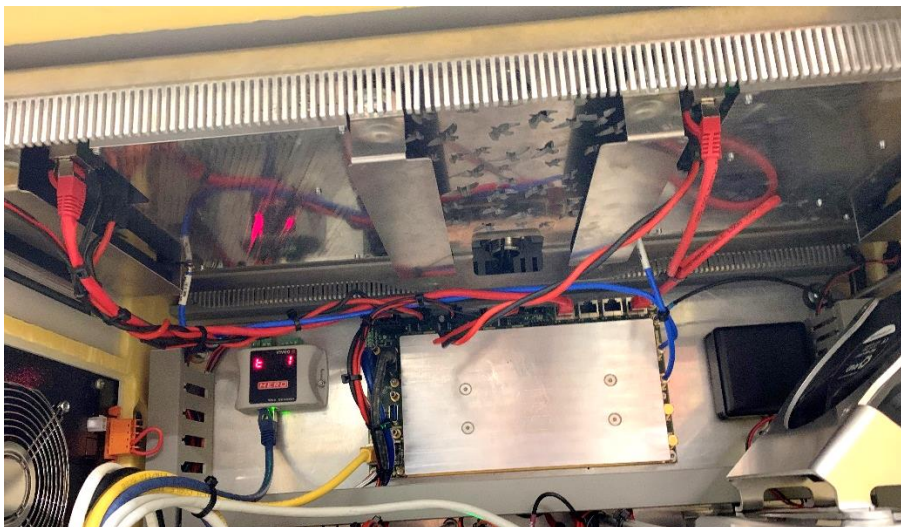


Figure 7: Typical installation

8.1 Cooling

The CenterUnit must be placed on a metallic base plate, allowing to transfer the heat from the CenterUnit. Max. Ambient temperature in the cabinet must be 35°C.

The TXUnit and RXUnit must be placed on a metallic carrier and actively cooled by a fan. Max. Ambient temperature in the cabinet must be 35°C.

9 Start-up Instructions



Follow these instructions before the start-up after installation

1. Check the module connections according to the description in chapter 6 using a 4-eyes principle.
2. Ensure that modules are mounted correctly, according to the instructions in chapter 8.
3. Ensure that the modules are properly cooled
4. Ensure that the input current is limited
5. Make sure that no body part is in the radar beam and the safety distance according chapter 10 is respected.
6. Start up the radar by applying the 24V input voltage.

10 Safety and Operation

10.1 Radar Radiation



Health hazard due to non-ionizing radiation!

- Ensure a minimum safety distance of 2.85 m between the radar and body parts of nearby persons during operation
- Implement the transmitter warning LEDs into the cabinet
- Add adequate warning signs to the device
- When carrying out maintenance work on the radar, always switch off power
- Repeat this warnings in the manual

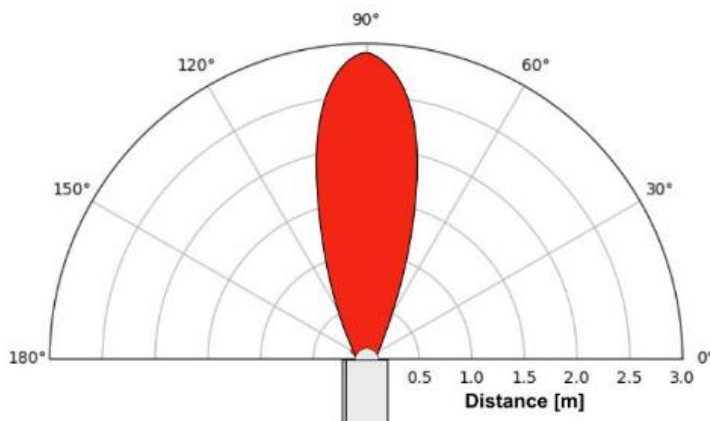


Figure 8: Radar Safety Distance

10.2 Mechanical Safety



The radar modules have sharp edges

- Always wear protective gloves during assembly of the modules
- Integrate sufficient protection to your cabinet, so that the radar modules are not accessible by an ordinary person

10.3 Hot surfaces



The radar modules may have hot surfaces

- Install the modules according to the installation instructions
- Ensure sufficient cooling
- Integrate sufficient protection to your cabinet, so that the radar modules are not accessible by an ordinary person

10.4 Handling of Modules



Ensure proper handling of modules to prevent damage to equipment or risks to health and safety and ensure regulatory compliance:

- Do not remove aluminium cover plates from modules
 - Do not make modifications or repairs to internal circuitry of the modules
-

10.5 Responsibility of the operator

Operator

The operator is the person who operates the system himself or who makes it available to a third party for use/application and who bears the legal product responsibility for the protection of the user, the personnel or third parties during operation.

Operator duties

When used commercially, the operator of the system may be subject to legal obligations for occupational safety.

In addition to the safety instructions in this manual, the safety, occupational health and safety, and environmental protection regulations applicable to the area of use of the system must be observed.

The following applies in particular:

- The operator must inform himself about the applicable occupational health and safety regulations and, in a risk assessment, additionally determine hazards that result from the special working conditions at the system's place of use. He must implement these in the form of operating instructions for the operation of the system.
- During the entire period of use of the system, the operator must check whether the operating instructions correspond to the current status of the regulations and, if necessary, adapt them.
- The operator must clearly regulate and define the responsibilities for operation, troubleshooting, maintenance and cleaning. The operator must ensure that all persons who handle the system have read and understood these instructions.
- In addition, he must train the personnel at regular intervals and inform them about the dangers.
- The operator must inform himself about the local regulations and legislation regarding frequency approval and notification requirements and take the necessary steps before commissioning the system.

11 Maintenance



All Software warnings and errors must be recorded

In case of errors the radar device must not be used until the error is corrected

Report the errors to Swiss Birdradar Solution AG

11.1 Least reparable unit

Each single module (RXUnit, TXUnit, CenterUnit) and the connection cables between the modules may be replaced separately. Only use original components delivered by Swiss Birdradar Solution AG.

Repair or modification of individual modules or software components may only be performed by Swiss Birdradar Solution AG.

12 Disposal

Unless a take-back or disposal agreement has been made, send disassembled components for recycling.