

TM350

Traffic Monitor



P/N TM350-(HWxxx)

Operation and Installation

Document No. 03.314.010.71e

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Change History

Revision	Date	Description of Change
1.00	22.04.2022	First release
1.01	04.11.2022	Test version for beta testers
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1.03	16.12.2022	Display of configuration data on FLARM displays
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2.01	29.04.2026	Update in ARINC 429 and RS232 TIS Protocols
2.02	14.07.2026	Update FLARM firmware Added ARINC 429 Standby and Demo/Test Mode Improvement in wording

List of Service Bulletins (SB)

Service-Bulletins are to be inserted in the manual and to be recorded in this table				
SB Number	Rev. No.	Date of Issue	Entry Date	Name

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1 GENERAL

This manual contains information about operation and installation of the Traffic Monitor **TM350**, as well as information about its physical, mechanical and electrical characteristics.

It also describes the configuration of user settings and installation settings.

Please read this manual carefully before installing the device and observe the limitations and safety instructions.

1.1 Symbols

	Warning
Warning texts indicate a possibly dangerous situation and include advices whose non-observance may harm the user or cause severe damage to the device or other equipment.	

	Caution
Caution texts indicate the possibility of incorrect operation, malfunction or fail of the equipment, if the instructions are not followed.	

	Information
Information texts give advice or hints that facilitate the use of the equipment.	

	Note
Note texts give additional information related to the use of the equipment	

1.2 Safety Notes

Before operating the **TM350**, please take note of the following safety related information:

1.2.1 Intended Use

The **TM350** is intended for the use onboard air vehicles in VFR flight only. It has to be mounted in a suitable location onboard your air vehicle. The technical and certification limitations of your air vehicle have to be obeyed for installation and for operation.

The principle function of the **TM350** is to provide data to a display connected to one of its interfaces. This data contains information on other aircraft in the vicinity, derived from radio signals transmitted by these aircraft and your own position information derived from satellite navigation signals. Its purpose is to support the pilot by increasing his situational awareness. Further essential information on the unit's functionality and operational use can be found in section 2 *Equipment Description* of this document.

1.2.2 Safe Installation

The **TM350** unit as well as the antennas and cables must be installed in a suitable location, following the instructions in section 8 *Installation* of this document. Installation and checkout shall be performed exclusively by suitably trained and qualified personnel.

1.2.3 Electrical Safety

Electrical safety requires installation as described in section 8 *Installation* of this document.

1.2.4 Operational Safety and Limitations

The Traffic Monitor **TM350** is a non-essential device to improve the situational awareness of the pilot. It does not provide any conflict resolution advisories itself and is not designed and certified to provide data to any third party device providing such advisories. The pilot remains fully responsible for safe conduction of his flight and is required to follow all applicable rules for a safe VFR flight.



Warning

The **TM350** shall not be used for navigation and for flights under IFR conditions.

Under no circumstances should a pilot adopt different tactics or deviate from the normal principles of safe airmanship. Even with **TM350** installed, the pilot remains responsible for flying the aircraft and ensuring the safety of passengers and other traffic. The use of **TM350** is solely at the discretion of the pilot.

Operation must be preceded by thorough familiarisation by the pilot with the operating information in this manual.

TM350 can only warn the pilot of the presence of other aircraft that are also fitted with ADS-B, FLARM or compatible electronic conspicuity equipment. **TM350** cannot warn of aircraft that do not carry such equipment. Therefore, the traffic situation detected by **TM350** cannot be considered to be complete. This re-emphasises the need for the pilot to maintain a complete visual scan.



Warning

This device is not a certified anti-collision warning system and may only be used as supportive means for airspace observation.

The pilot is still obliged to observe the surrounding airspace and to comply with all applicable rules and regulations for safe flight operations.

1.2.5 Service and Maintenance

The unit does not contain any user serviceable parts and shall be opened only by suitably trained personnel. Further information can be found in section *8.12 Troubleshooting* of this document.

1.3 Abbreviations

Abb.	Definition
ADS-B	Automatic Dependent Surveillance — Broadcast
GNSS	Global Navigation Satellite System
GPS	Global Positioning System (NAVSTAR)
HMI	Human-Machine Interface
IFR	Instrument Flight Rules
OEM	Original Equipment Manufacturer
RMA	Return Merchandise Authorization
RF	Radio Frequency
SoC	System on Chip
SRD860	SRD860 radio band ($\approx$ 868 MHz)
SSID	Service Set Identifier, (Wi-Fi network name)
SSR	Secondary Surveillance Radar
TCAS	Traffic Alert and Collision Avoidance System
UAV	Unmanned Aerial Vehicle
VFR	Visual Flight Rules

1.4 Customer Support

In order to facilitate a rapid turnaround in case of repairs, please follow the RMA instructions found at

<https://www.funkeavionics.de/en/service/repairs-upgrades/>

	Information
Information on software updates is available at the company's webpage https://www.funkeavionics.de/en/service/info-download/ Should any unusual problem arise or further information be desired, please feel free to contact us by phone or e-mail.	

	Documentation
The information in this manual does not necessarily cover all the possible contingencies which may arise during operation or maintenance. We appreciate any comments concerning this manual. When reporting a specific problem, please describe it briefly and include the related paragraph or figure number and the page number. Please send your comments via e-mail to: service@funkeavionics.de	

1.5 Warranty

f.u.n.k.e. AVIONICS GmbH warrants to the purchaser of new equipment that such equipment shall be free from defects in material and workmanship.

This warranty does not cover equipment which has been

1. damaged or not maintained as reasonable and necessary,
2. modified by the purchaser in any way,
3. improperly installed,
4. repaired or modified by someone other than by f.u.n.k.e. AVIONICS or an authorized avionics workshop, or
5. used in a manner or purpose for which the equipment was not intended.

This warranty shall not extend to incidental or consequential damages arising from operation of the equipment or from any claimed breach of this warranty.

2 EQUIPMENT DESCRIPTION

2.1 Traffic Monitoring Functionality

The Traffic Monitor **TM350** is a device to improve the situational awareness of the pilot by providing position and speed of compatible near-by air traffic. Aircraft in the vicinity are identified by receiving signals from ADS-B, Mode S and Mode C transponders as well as transmissions from FLARM® and other compatible electronic conspicuity devices.

The received signals are processed in near real-time for display on various mobile devices, electronic flight bags and multi-function displays.

Detected targets within a defined range are evaluated concerning the risk of a dangerous approach and related warnings are issued in the data stream and as audio signal.

The **TM350** supports common interface protocols and is compatible with a variety of navigations apps and glass cockpit displays.

2.2 ADS-B and Mode C/S Reception

ADS-B (Automatic Dependent Surveillance – Broadcast) means that airplanes whose Mode S transponder is coupled with a position source transmit their position data on the frequency 1090 MHz. These data can be received by all airspace users.

These ADS-B transmissions from other airplanes are decoded by the built-in 1090 MHz receiver. Received data are decoded and transmitted via the **TM350** data interfaces to external equipment.

Today, the majority of Air Transport airplanes are equipped with ADS-B capable systems. However, General Aviation still has a relatively low degree of ADS-B equipage and many aircraft have transponders which do not transmit ADS-B signals. By means of evaluation of the field strength of Mode C/S signals of such transponders, the proximity of these aircraft is identified as non-bearing target. A representation of direction or position of these airplanes is not possible.

2.3 FLARM Signal Processing

Nowadays, numerous glider aircraft are equipped with FLARM systems for collision avoidance. FLARM operates with a proprietary protocol which can only be decoded by an OEM FLARM module. Decoding of the FLARM messages to extract position, altitude and alarm status of nearby aircraft requires the installation of a valid license key.

The **TM350** incorporates the FLARM functionality in a System on Chip (SoC).

Without a valid license, the **TM350** can only detect the presence and approximate number of nearby FLARM transmitters; direction, distance, altitude and position are not available.

The license policy of FLARM allows the FLARM SoC to transmit FLARM messages without a dedicated license key. Therefore, the **TM350** can always be operated as a FLARM beacon.

If the aircraft has already a FLARM system installed, this can be connected to the **TM350** via the serial interface, which then allows the indication of position and movement direction of these airplanes on external displays. This configuration deactivates the internal FLARM system.



Caution

If an external FLARM is connected to the **TM350** its settings must be adapted for a combined operation, see section 5.4

With an integrated licensed or attached FLARM device, FLARM targets are treated by the **TM350** in the same manner as ADS-B targets.



Information

For further information on FLARM operations please refer to the official FLARM documentation.

2.4 GNSS Receiver

The **TM350** incorporates a 72 channel GNSS receiver utilizing concurrent reception of up to three GNSS systems (GPS/Galileo together with BeiDou or GLONASS). It recognizes multiple constellations simultaneously and provides high positioning accuracy even in scenarios where multipath or weak signals are involved.

The GNSS Receiver supports various augmentation systems, like WAAS or EGNOS for a better and faster positioning improvement. It also supports message integrity protection, geofencing, and spoofing detection.

2.5 Barometric Altimeter

For operation without transponder the **TM350** has its own absolute pressure sensor to provide barometric altitude data. The piezo resistive sensor is temperature compensated utilizing an on-chip temperature sensor. The measurement range is up to 35.000 ft at 0,33 ft resolution.

TM350 provides a nozzle for direct attachment to a pressure tube.



Caution

The **TM350** must be connected to a static pressure tube to provide correct altitude information; otherwise altitude information may be inaccurate.

2.6 Output of Traffic Information

The **TM350** provides several interfaces for traffic information distribution: four RS232 serial ports, one ARINC 429 output port and a WiFi interface for two parallel connections.

Predefined protocols for the most known navigation applications and electronic flight bags can be directly selected for each interface port. Specific adaptation of protocol details is feasible.

The **TM350** traffic data stream can be configured to be issued as NMEA protocol or GDL90 protocol. ARINC 429 send ARINC735A (STIF) data. All protocols will contain position (GNSS) and traffic data (ADS-B, transponder or FLARM).

2.7 Acoustic Warnings

An acoustic warning is generated immediately when an aircraft enters the predefined defined caution and alert zones (see §5.1) or an impending collision is calculated from relative direction and speed. An infringement of the caution zone generates a singular beep at 1,5 kHz, an infringement of the alarm zone generates a double beep at 2 kHz. It can be selected if the warning is issued once or repeated continuously. The default repetition rate in the caution zone is two seconds, in the alarm zone every second.

2.8 Operation with Transponder

2.8.1 Operation with third party transponders

TM350 configuration for operation with third party transponders has to be done manually on the Configuration page see §4.3.1 and §4.3.2 for detail. These settings allow the **TM350** to identify the transponder and to use it as barometric altitude source. An incorrect ID will trigger false alarms.

2.8.2 Operation with f.u.n.k.e. AVIONICS TRT800H/A

If the **TM350** is installed in combination with a TRT800H/A transponder, it should be connected to it as described in §8.2.

When the appropriate protocol is set in TRT800, the transponder will be automatically detected by the **TM350** on start-up. The data port of the TRT800H/A must be configured as below:

Dataport: Select Port A

Protocol: Select **TM350** or **TM350 + NMEA**

A previous setting of this port will be overwritten. The **TM350** automatically receives once on start-up the ICAO address and the aircraft category. Barometric altitude is continuously received during operation. This feature is supported with TRT800 software version 6.4 or later.

2.9 Accessories

Following accessories are available:

Part No.	Description
BSKS350F	Connector cable with TRT, audio and AMP connector
BSKS350R	Connector cable with RJ12 plug and 2x connectors LED
PNETAN80	internal FLARM Antenna cable 2m, SMA connector
PNETAN35	internal 1090MHz antenna, cable 2m, rpSMA connector
PNETAA80	external FLARM Antenna cable 2,5m, SMA connector
DA-1A03SMC	GPS antenna, cable 2,5m, SMC connector *
ST2000A	Button for software-defined function, connection to BSKS350F
LD2000A	Built-in Warning LED, cable 2,5m, Faston connector
AV-22	"Shark Fin" 1090MHz antenna, cable 2,5m, BNC
AV-74	"Stick" 1090MHz antenna, cable 2,5m, BNC
TMKABEL 1/2/3	extension cable rpSMA/BNC to external antenna

Operation of the **TM350** requires at least the power connector cable BSKS350F and connection to a GPS and ADS-B antenna. A FLARM antenna is required for internal FLARM functionality.

2.10 Equipment Label (Sample)

TM350 Traffic Monitor

1090MHz In , 868/915MHz In/Out
11 – 30VDC / Weight 0,55lb (0,25kg)



PN. **TM350-(HW100)**

SN. 90001222

DO160G Env.Cat.

[C1Z]BAB[RY]XXXXXXZBBB[XX][XX]M[X]XXAX

f.u.n.k.e. Avionics GmbH
86807 Buchloe – Germany



3 OPERATION

3.1 Overview

The **TM350** provides information to General Aviation pilots on aircraft in their vicinity. Traffic is detected by two distinct radio systems:

- Secondary radar signals, i.e. ADS-B and Mode C/S messages
- FLARM signals

Secondary Radar signals are the world-wide standard for air traffic management. While Mode C/S requires interrogation of aircraft transponders by a ground Radar, ADS-B transmissions are broadcast by aircraft transponders in regular intervals even in areas outside of any radar coverage. All these signals are broadcast in protected, reserved aviation frequency bands, and any equipment operating in these bands has to be certified in accordance with aviation standards.

FLARM is a system designed to increase traffic awareness and collision avoidance for General Aviation, especially gliders, light aircraft and UAVs. It has found wide acceptance especially by glider pilots. It is proprietary and requires licensed equipment and software offered by FLARM Technology Ltd. or its licensees. The system operates in frequency bands open for a wide range of applications. For more information on FLARM please consult the webpage of FLARM: www.flarm.com

TM350 is combining the two distinct technologies in one compact unit.

The **TM350** unit itself does not have any switches or other hardware means to set up its proper configuration which depends on the installation environment and the display unit to which it is connected. The entire setup is achieved via software settings. All settings are stored in non-volatile memory in the **TM350**.

The **TM350** may be configured via its WiFi interface using a common web browser. The function was tested with Firefox, Chrome, Safari and Edge. Any suitable mobile device offering WiFi and browser technology such as smartphone or tablet PC but also fixed or portable computer based on Windows, iOS or Linux operating systems may be used.

The web interface always allows configuration of all **TM350** operational parameters.



Caution

While there is no risk of causing damage to the **TM350** hardware by incorrect parameter settings, it is possible to make configuration settings which may stall the unit or the connected display or create unexpected behaviour. It is even possible to lock/disable the interface which is currently in use for configuration of the **TM350**. This may lead to the need for a different interface to continue the configuration process.

3.2 Connecting to the TM350 web interface via WiFi

The user has to connect to the **TM350** via its WiFi interface to make changes to the configuration. **TM350** creates its own Access Point with a particular name (SSID) to which your device need to be connected to. The access is protected by a WiFi Password.

Follow the standard procedures of your computer to connect to the unit. When connected, open your internet browser and open the following web location: <http://192.168.1.1/> (type this URL into the address line of your browser).

The **TM350** entry page will be opened and displayed in the browser.

The default SSID and the initial password can be derived from the **TM350** label. The SSID consists of the device name “**TM350**” and the serial number connected by a hyphen. The password consists of “SN” directly followed by the serial number. Example:

TM350 Serial-No:	90123421
WLAN SSID:	TM350-90123421
WIFI Password:	SN90123421

SSID and password may be changed via the web interface.



Information

The **TM350** WiFi access point does not establish an internet connection It is exclusive for a wireless connection to the **TM350**. An internet connection is not necessary or required.

3.3 TM350 Connectivity

3.3.1 Supported Flight Apps (WiFi)

The **TM350** can be used with a variety of flight and navigation apps on mobile devices which understand the extended NMEA or GDL90 protocol. The **TM350** was extensively tested with SkyDemon and Garmin Foreflight Mobile.

Most flight apps use the same data protocols and can be connected via the WiFi Interface using TCP on port 2000 and UDP on port 4000. Standard configuration is normally **TCP, IP 192.168.1.1:2000** for the extended NMEA protocol. GDL90 is transmitted via UDP and port 4000 by default, so the configuration is as follows: **UDP, IP 192.168.1.1:4000**.

	Information
The data messages provided by TM350 may be interpreted differently by navigation apps and may cause different indications and announcements.	

3.3.2 Serial Interfaces

The **TM350** issues the traffic messages also on the serial ports. The **TM350** has two ports on the front connector and two on the rear connector. All serial ports can be configured individually to support FLARM compatible displays, portable navigation devices and various cockpit displays.

The f.u.n.k.e. AVIONICS transponder TRT800H or TRT800A can be connected directly via serial interface to the **TM350**. After selection of the TRT protocol, the **TM350** configures automatically the internal settings for the ICAO aircraft address, aircraft category and the barometric altitude source.

For details see §2.8.2 and §4.5.2.

3.3.3 ARINC 429 Interface

The **TM350** can send the traffic information on an ARINC 429 port via the ARINC 735A protocol.

Only Display compatible with ARINC 735A standard can be connected.

The ARINC port can be configured to select the traffic type and additional functions implemented via the Digital Inputs, namely the standby and the demo/test.

A list of the additional display that can be connected is included in §8.7.

For details see §4.5.3 for ARINC 429 port and §4.5.4 for the additional functions.

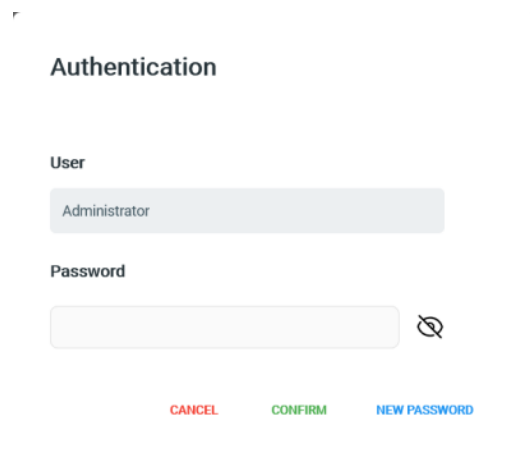
4 TM350 CONFIGURATION PAGE

Once connected via WiFi and your internet browser to your smartphone, tablet or notebook (URL 192.168.1.1), the TM350 will respond with a configuration page on your internet browser where you can adjust any given configuration to your needs. The home page of the TM350 offers a menu in the upper most line in your browser where you may choose from different configuration topics: “user settings”, “device settings”, “configuration”, “audio”, interfaces, “warnings”.

4.1 User Settings / Installation Settings

The **TM350** configuration distinguishes between “User settings” and “Installation settings”: “User settings” allow easy selection of predefined configurations for a device on a data port as well as individual audio settings. When “User settings” is selected “Installation items” are either hidden or locked.

“Installation settings” give access to parameters which are normally set only once as part of the installation process, e.g. change of warning behaviour which requires specific knowledge of the effects. Therefore, access to Installation settings is protected by a password to avoid inadvertently entered changes. The default password for “Installation Settings” is “**advanced**”. The password can be changed by clicking on the gearwheel.



A click on the question mark  gives access to download the user manual and further relevant documentation.

4.2 Device Status Page

As soon as the **TM350** is connected via the WiFi interface the “Device status” page is shown. This page contains information about configuration, operation and failure state of the unit.

f.u.n.k.e. TM350			
Device Status Auto Configuration Interface Warning Installation settings			
Active Settings		Position Information	
Flight App	SkyDemon/MEA	Fix Status	
Port 1		Pcs Latitude	N 48° 23.59761'
Port 2		Pcs Longitude	E 009° 57.92860'
Port 3		GPS Height [m]	496.5
Port 4		Baro Altitude [ft, 1013hPa]	1676
Digital In 1	No functionality	Satellites in view	7
Digital In 2	No functionality	HDCP/IDCP	2.46/2.22
Aircraft id	AABBCD	Date	20/11/25
Aircraft type	No category	Time UTC	08:10:38
Baro source	Internal		
Device Configuration		Flarm Information	
Part number	102	Hardware version	Atom
Serial number	90000124	Serial number	1
Firmware	1.05	Configuration	Full flarm
Software	1.60	Flarm License	Installed
HWID	41415M	Software version	7.40
Webserver	41416	Software expiry date	01.01.2099
WiFi SSID	TM350-90000124	Obstacle Database	0
IP Address	192.168.1.1	ODR expiry date	0
Password	SN90000124		
Number of devices connected	1		

4.2.1 Active Settings

The tile “Active Settings” shows the actual configuration of the **TM350**. The settings for WLAN, serial ports, hex address aircraft category and the source for the barometric altitude are displayed.

4.2.2 Position Information

In this tile the actual the position information from the GNSS receiver and the barometric altitude is displayed.

4.2.3 Health Status

The health status of the 1090 MHz receiver, the FLARM transmitter and receiver are continuously monitored and a failure of a component is indicated by a red light.

4.2.4 Device Configuration

Note: This tile is visible under “Installation settings” only.

The hardware and software configuration of the unit is displayed in this tile. It shows also information about the WiFi access point.

Following information is provided:

Hardware: Part number, Serial number,

Software: FPGA Firmware, μ P Software, HMI, FLARM software,

Access Point: SSID, IP Address, Password, Device Connected

Device Configuration

Part number	102
Serial number	90014123
Firmware	1.05
Software	2.00
HMI	42363M
Webserver	42318
WiFi SSID	TM350-90014123
IP Address	192.168.1.1
Password	SN90014123
Number of devices connected	1

4.3 Configuration Page

The screenshot shows the 'Configuration' page of the TM350 device. The page has a dark blue header with the 'f.u.n.k.e.' logo, the device name 'TM350', and navigation tabs: 'Device Status', 'Audio', 'Configuration' (active), 'Interface', and 'Warning'. There is also a 'Installation settings' toggle. The main content area is divided into several sections: 'Aircraft Id' with a dropdown for 'Id types' (currently 'FLARM ID'); 'AC Category' with a dropdown for 'AC Category' (currently 'No category'); 'Demo mode' with a toggle switch (currently 'Demo mode' is selected); '1090 Receiver settings' with a text input for '1090 Rx Attenuation' (currently '0') and a toggle for 'Mode C reception'; 'Flarm Tracking' with a toggle switch (currently 'No track'); 'Barometer' with a toggle for 'Automatic Barometer Source Selection' (selected), a dropdown for 'Baro Altitude Source' (currently 'Internal'), and a dropdown for 'Altitude adjustment [ft]' (currently '0'); 'WiFi Settings' with a toggle for 'Wifi active time', a text input for 'SSID' (currently 'TM350-90014123'), and a password field; 'Units' with a dropdown for 'Units' (currently 'imperial'); and 'Factory Reset' with a blue 'RESET' button. A footer bar at the bottom contains the copyright notice: '© 2026 f.u.n.k.e. AVIONICS. All Rights Reserved.'

4.3.1 ID - Identification

This tile supports the entry of the Aircraft identification address. The Aircraft ID is required for two functions:

The first function is to suppress warnings caused by your own transponder. The **TM350** needs to know the aircraft proprietary six digit hexadecimal address of your aircraft, also known as ICAO 24bit address. Otherwise it would detect your aircraft as near-by traffic and as a collision threat. When entered, this address (your own aircraft) will be subtracted from the list of near-by traffic.

The second function of the Aircraft ID is that it is used as identifier for the FLARM beacon so that your aircraft is identifiable by other FLARM receivers.

If known, the transponder address can be entered either manually or you can choose an automatic search which is launched by clicking on



For the automatic search your transponder has to be switched on first. The **TM350** looks for the strongest transponder signals at the same

altitude. The detected hexadecimal addresses are then shown in a field “ID selection” and can be taken over from there.

If no transponder is installed, one of the following options can be selected to choose the ID for the integrated FLARM module:

- FLARM ID: This setting generates a constant and unique FLARM ID
- Random ID (FLARM): Generates a randomly selected ID after each start-up and in regular intervals while transmitting.



Caution

The Aircraft ID shall not be different to the ICAO address to avoid self-warning and an ambiguity with the FLARM beacon.



Information

The Aircraft ID cannot be changed when the **TM350** is in flight state.

4.3.2 Aircraft Category

Note: This tile is visible under “Installation settings” only.

The aircraft category can be entered manually or is already set, when an automatic ICAO Address search has been performed. Following categories are selectable:

AC Category

AC Category

No category

No category

Light AC (<15.5 klbs)

Small AC (15.5 - 75 klbs)

Rotorcraft

Glider / Sailplane

Balloon / Lighter than air

Ultralight / Hangglider / Paraglider

UAV



Information

The selected aircraft category in the **TM350** should not be different to the category set in the own transponder.

4.3.3 Demonstration Mode

TM350 offers two demonstration modes which simulate various encounters: one on Serial Port/WiFi and one specific for ARINC 429. The ARINC 429 Demo/Test Mode can be triggered directly from compatible controller on display.

When running the demonstration the effect of different settings can be checked on ground.

4.3.3.1 Serial Port Demonstration Mode

The serial port demonstration is selected from the mail menu. This mode runs in an endless loop. The collision scenarios are repeated after approximately 5 minutes. The demonstration is terminated by switching it off in the configuration settings.



Caution

Do not use the demonstration mode during flight as no real information is fed to attached displays or equipment.

4.3.3.2 ARINC 429 Demo/Test Mode

The ARINC 429 Demo/Test mode runs for about 8s without repetitions, unless the Demo/Test is activated again by the display switch.

For details see §4.5.4.2.

4.3.4 FLARM Tracking

FLARM messages are tracked by numerous ground stations which feed the data into the internet for display on live tracking pages. If this is not desired you may deactivate the tracking function. Deactivation of tracking sets FLARM into private mode, which suppresses distribution of received FLARM data to third parties. Collision warning is not affected by this setting.

	Information
FLARM recommends that the tracking function should not be deactivated.	

4.3.5 Units for settings and display

The **TM350** can be configured for entry and display of values in metric or imperial units.

Metric: Range in km, Altitude in m, Speed in km/h, Vertical Rate in m/s

Imperial: Range in nm, Altitude in ft, Speed in kts, Vertical Rate in ft/min

	Information
With change of units, values set in the TM350 will be rounded to the next higher interval step. This may lead to slight different values when reverting back.	

4.3.6 Factory Reset

By clicking on “RESET” the **TM350** will shut down and restart with factory default settings.

	Caution
With a Factory Reset all individual settings will be erased including passwords. All installation dependent settings will have to be repeated.	

4.3.7 1090MHz Receiver settings

Note: This tile is visible under “Installation settings” only.

The receiver attenuation parameter adjusts the received signal strength to the sensitivity of the receiver, antenna gain and cable loss.

An appropriate adjustment allows a fairly good estimation of the distance to other aircraft, which transmit Mode C/S messages only.

The processing of aircraft that are received exclusively via Mode C can be activated using the “Mode C reception” switch.



Caution

Do not change this value without performing a reference measurement.



Information

It is strongly recommended to deactivate Mode C detection unless the flights are conducted into airspaces with a very high rate of Mode C only aircraft.

False alarms may be generated due to the interaction of own transponder, Mode S of the target aircraft and Mode C of the target aircraft.

The diffusion of Mode S transponder suggest not to use the Mode C detection not required in European Airspace.



Caution

Enabling Mode C processing may result in false alarms.

4.3.8 Barometer

Note: This tile is visible under “Installation settings” only.

Following options can be selected as data source for barometric altitude:

1. Internal

The **TM350** uses the own integrated barometric pressure sensor.

2. Mode S (XPDR)

TM350 uses the barometric altitude of a transponder transmission which was recognized as own transponder.

The selection can be determined automatically by the TM350 based on the aircraft identification settings. It is strongly recommended that the automatic selection of the barometric data source be managed via the TM350 in order to avoid misconfigurations.

If a TRT800 transponder is connected via a serial port to the **TM350**, the altitude information from the transponder is used by the **TM350** and overrides the above mentioned settings.

4.3.9 WiFi Settings

Note: This tile is visible under “Installation settings” only.

In this menu point the WiFi network parameters can be set:

- Active Time: When activated, the value defines the time in minutes how long the network is active after power up.
- SSID: Defines the name of the **TM350** WiFi network.
The default **TM350** SSID is composed of the device name and the serial number e.g. **TM350-90123421**.
- Password: Sets the WiFi password. The default password is composed of “SN” with directly attached serial number, e.g. **SN90123421**. The password can be hidden and unhidden with click on the eye icon.

WiFi Settings

☒ Wifi active time

Wifi active time [min]

10

SSID

TM350-90000321

Password

●●●●●●●●





Information

Change of SSID and password become valid after a restart. Record the password before change. Loss of the password requires a reset to default values, which requires reprogramming of the unit in standard configuration.

4.4 Audio Page

Under **Audio** various parameters for the audio output can be selected.



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4.4.1 Volume

Here the initial volume level is defined when the unit is turned on.
The initial value can be set from 0 to 100, where 50 is the default setting.

4.4.2 Analog Volume Input

Note: This tile is visible under “Installation settings” only.

The Analog Volume Input adjusts the control range of an external resistive volume control knob.

The slider enables/disables the use of the analog input pin No. 4.

Disable this setting, if the pin is not used. Risk of unpredictable behavior of the audio output.

When enabled enter the maximum Voltage that will be applied to the Analog Input Pin No. 4. E.g.: If you adjust the input between 12V and 0V, enter 12V. If you use a 24V source, then enter 24V.

4.4.3 Warning Mode

Following Modes are selectable

- **Off** - switches the audio warning permanently off
- **Once** - generates a singular warning signal without repetition
- **Continuous** - generates a warning with repetition
- **Specific Selection** – only accessible under Installation

This setting allows customized audio warnings for directed undirected and FLARM targets. Selection opens a separate settings box for ADS-B, FLARM and Mode C/S.

4.5 Interfaces

The Interfaces page allows the configuration of the **TM350** interfaces:

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4.5.1 Flight App

In this menu the message protocol for the WiFi interface is selected. If there is an adaptation to a specific Flight App an appropriate selection is shown. The initial software version supports NMEA protocol and GDL90 protocol.

Pretested configurations for SkyDemon, ForeFlight and SkyMap are available. These protocols should also work with many other common apps, such as VFRnav.

If “Installation Settings” are ON, the content of the data in the protocol can be customized by definition of traffic output and the protocol type.

The screenshot displays the 'Flight App' configuration window. It features three main sections: 'GDL90 , ADS-B + Flarm' with a 'Custom' dropdown, 'Traffic Output' with an 'ADS-B + Flarm' dropdown, and 'Protocol' with a 'GDL90' dropdown. Below the 'Protocol' dropdown is a list of checkboxes: 'GNSS (NMEA)', 'Baro (NMEA)', 'FLARM (NMEA)', and 'GDL90'. The 'GDL90' checkbox is checked, while the others are unchecked.

Flight App

GDL90 , ADS-B + Flarm

Custom

Traffic Output

ADS-B + Flarm

Protocol

GDL90

- ☐ GNSS (NMEA)
- ☐ Baro (NMEA)
- ☐ FLARM (NMEA)
- ☒ GDL90

4.5.2 RS232 Port 1 – 4

Protocol and baud rates can be configured individually for each serial port. The **TM350** provides four serial interfaces, two on the front connector and two on the rear connector.

Connector	Port	Pin
Rear (D-SUB HD9 Female)	1 Tx	5
Rear (D-SUB HD9 Female)	1 Rx	6
Rear (D-SUB HD9 Female)	2 Tx	7
Rear (D-SUB HD9 Female)	2 Rx	3
Front (D-SUB HD15 Male)	3 Tx	2
Front (D-SUB HD15 Male)	3 Rx	7
Front (D-SUB HD15 Male)	4 Tx	3
Front (D-SUB HD15 Male)	4 Rx	8

TM350 is principally capable of a two way communication on the RS232 ports, which may be supported by certain devices. Following predefined settings can be selected for each port:

RS232 Port 1

GNSS Baro FLARM , ADS-B + Flarm, 115200

Flarm Display 

Traffic Output

ADS-B + Flarm 

Baud rate

115200 

1. None → deactivates the interface

2. External GNSS Receiver → reads NMEA position data
3. External FLARM → for attachment of an external FLARM device
4. FLARM Display → activates traffic data output in FLARM NMEA protocol
5. TRT800X → activates a specific protocol for TRT800 communication
6. TIS (Traffic) → for connection to Garmin instruments
7. Custom → allows customized protocol settings.

4.5.2.1 Customized Protocol

Note: this item is only accessible in Installation Mode

Selection of “Customized Protocol” allows an individual setting of the messages to be sent.

RS232 Port 1

TIS (Traffic), ADS-B + Flarm, 9600

Custom

▼

Traffic Output

ADS-B + Flarm

▼

Protocol

TIS (Traffic)

▼

Baud rate

9600

▼

A customized protocol shall always be checked for proper functionality. FLARM displays require a baud rate of 19200 or higher to transmit PFLAA messages.

4.5.2.2 Traffic Output

Traffic Output configures the messages on the selected port. It can be defined if only targets detected by transponder signals (ADS-B) or only by FLARM or both are issued. If a detected target becomes evaluated as a threat, it is always issued regardless of the detection type.

4.5.2.3 Protocol

Different message content can be assigned in a protocol to the selected port. Following options can be selected and combined:

1. GNSS (NMEA)
2. Baro (NMEA)
3. FLARM (NMEA)
4. GDL90
5. TIS (Traffic)

Selection of GNSS (NMEA) transmits following data sentences:

- \$GPRMC GPS Information
- \$GPGGA GPS Dataset
- \$GPGSA GPS Dataset

Selection of Baro NMEA0183 transmits following data sentences:

- \$PGRMZ Pressure Altitude

Selection of FLARM NMEA transmits following data sentences:

- \$PFLAU FLARM Warning
FLARM Traffic (only if baudrate
≥19.200)
- \$PFLAA
- \$PFLAE FLARM Failure Annunciation

GDL90 is a binary protocol which reports traffic with an alert state in relation to the own position.

TIS (Traffic) is a binary protocol to transmit relative position information of surrounding aircraft to Garmin or Garmin compatible instruments.

4.5.2.4 Baud Rate

The baud rate can be adjusted for each serial port individually in seven steps from 4.800 baud to 115.200 baud. Following values are selectable:

4800 / 9600 / 19200 / 28800 / 38400 / 57600 / 115200 baud.



Information

For proper display of multiple targets on an external display the selected baud rate should not be less than 19.200 baud. Otherwise targets may not be updated within appropriate time.

4.5.3 ARINC 429

The **TM350** provides an ARINC 429 output on:

Connector	Port	Pin
Front (D-SUB HD15 Male)	TX 1A	13
Front (D-SUB HD15 Male)	TX 1B	14

TM350 is principally capable of a one way communication (transmission only) on the ARINC 429 ports using the ARINC735A STIF protocol, which may be supported by certain displays.



Caution

When the ARINC interface is operated together with one of the following interfaces, the ARINC data output can fail intermittently or permanently.

The connected display then shows “NO DATA”:

- FLARM Display output configured for FLARM + BARO + GNSS at a baud rate of 9,600 baud or lower
- GDL 90 output configured at 4,800 baud

The same issue may appear also at higher baud rates as soon as the target aircraft number is increasing.

Following predefined settings can be selected for each port:

The screenshot shows a configuration panel titled "Arinc429 Output". It contains several settings:

- Protocol:** A dropdown menu currently showing "A735A - Traffic (STIF)".
- Traffic Output:** A dropdown menu currently showing "ADS-B + Flarm".
- Advanced options:** A toggle switch that is currently turned on (blue).
- Company Id:** A text input field containing "0x1B" and a blue button labeled "DEFAULT".
- Heading:** A dropdown menu currently showing "Don't send magnetic Heading".
- Standby on Power-Up:** A toggle switch that is currently turned off (grey).

- Protocol: allow to select the output protocol:
 - None → deactivates the interface
 - A735A – Traffic (STIF) → transmit the data with ARINC735A STIF protocol
- Traffic Output: allow to select the output to be displayed:
 - FLARM only
 - ADS-B only
 - ADS-B + FLARM
- Advanced options: activates the advanced options

4.5.3.1 Advanced Options

Advanced options are a series of customized configurations that are available:

- Company Id: Allows to define a customized Company Id
- Heading Output: Allows to select the way the heading is transmitted or to deactivate the heading output
- Stand-by on Power-Up: Commands the unit in stand-by mode when powering up.



Caution

Change the “Heading Output” and “Stand-by on Power-Up” only if required by your specific installation. Leave the default values in all the other cases.



Information

Some ARINC 735A compatible display may require a valid heading to be transmitted in order to work properly.

Setting the Heading to “Don’t send magnetic heading” may create issues in the relative position of the traffic presented on the cockpit display.



Information

The function “Stand-by on Power-Up” is available only when one of the Digital In is set to “ARINC 735 Traffic Standby”.

Otherwise the TM350 is always in “OPERATIONAL” mode.

4.5.4 Digital In 1 / 2

Note: this item is only shown in Installation Mode

The **TM350** provides two digital inputs, to which a software defined function can be assigned. Following functions can be assigned to an attached button, or a third party device discrete out:

- No functionality: disables the input
- Mute: disables audio output for all targets for 60 seconds
- On Ground: function for Ground Switch, disables all audio warnings
- Approach: decreases the caution and alarm zone by a third to reduce alarms when approaching an aerodrome for 60 seconds
- Demo/Test mode select: Temporarily activates the ARINC 735 traffic demonstration mode
- ARINC735 traffic standby: Controls the ARINC 735 traffic operating mode

Further details on ARINC 735 Traffic Standby and on Demo/Test Modes are available in the subsections 4.5.4.1 and 4.5.4.2.

Polarity defines if the active state is either by pulling the pin to high (5V) or to low (ground). Default setting is low active.

	Caution
In case the digital inputs are at 12V, it is recommended to protect the inputs with a diode. Ref. to §8.7.1 for additional information.	

4.5.4.1 ARINC 735 Traffic Standby

The ARINC 735 traffic standby function controls the operating mode of the ARINC 735 traffic output.

When the assigned digital input is activated, the TM350 changes the ARINC 735 traffic mode as follows:

- If the current mode is **OPERATIONAL**, the TM350 changes the mode to **STANDBY**.

- If the current mode is **STANDBY**, the TM350 changes the mode to **OPERATIONAL**.

When no digital input is assigned to the **ARINC735 traffic standby function**, the ARINC 735 interface cannot be controlled through a discrete input and it is always set to **OPERATIONAL**.

When a digital input is assigned to the ARINC735 traffic standby function, the default ARINC 735 traffic mode after power-up is **STANDBY**. The connected display must activate the assigned digital input to set the TM350 to **OPERATIONAL** mode.



Information

The ARINC 429 electrical interface remains active in STANDBY mode. The STANDBY function controls the operational status reported through the ARINC 735 traffic interface.

4.5.4.2 Demo/Test Mode Select

The Demo/Test mode select function temporarily activates the TM350 traffic demonstration mode specifically in compliance with ARINC 753 Test.

Demo/Test mode is active only if Ground Speed < 10 m/s (36 km/h) to avoid activation during flight.

When the assigned digital input is activated:

- The TM350 enters demonstration mode.
- The TM350 remains in demonstration mode for approximately 8 seconds.
- The TM350 automatically returns to OPERATIONAL mode.



Caution

Do not use demonstration mode during normal flight operations.

Demonstration traffic does not represent actual surrounding traffic.

4.5.5 Digital Out 1 / 2

Note: this item is only shown in Installation Mode

The **TM350** provides two output pins, which provide 12V with a maximum load of 20 mA.

These two lines are used to drive additional LED warning lights indicating on which side a potential threat was detected. The output may also be used to trigger other functions planned in future software versions.

4.6 Connection Transponder TRT800H/A

A TRT800H/A transponder can be connected to the TM350. Transponders with software version 6.4 or higher support an automatic configuration for a complete ADS-B IN/Out system. (see also §8.6)

The cable harness BSKS350F provides a DIN socket for connection to the transponder. The preselected port for a TRT800 connection is the RS232 Port 3. Check, that this port is set to TRT800 protocol.

Select data port A in the TRT800 menu and select TM350 or TM350+NMEA protocol.

The TM350 shall now receive the ICAO address and the aircraft category on start-up and periodically the barometric altitude.

5 WARNINGS

5.1 Zone Definition

The **TM350** divides the surrounding airspace in three zones:

- 1) Alarm Zone: This zone is the next vicinity of the own aircraft.
- 2) Caution Zone: Extended zone of interest around the own aircraft.
- 3) Detection Zone: The zone in which detected aircraft are tracked.

5.1.1 Warning Zones

TM350 triggers a warning as soon as a defined warning zone around the aircraft is infringed. Two warning zones are defined as protection cylinders: Alarm Zone and Caution Zone. The range and altitude coverage can be defined in three steps: narrow, medium and wide.

Selection “Customized” allows modification of the predefined values.

The default value “Medium” for the Alarm Zone 1 is 1,15nm with an altitude difference of $\pm 400\text{ft}$. and for the Caution Zone with 2,3nm and $\pm 800\text{ft}$ altitude difference. Selection of Narrow or Wide reduces or expands the zone by approximately 30%. Exact values are shown in the table below:

Alarm Zone		
narrow	medium (default)	wide
0,85nm / $\pm 300\text{ft}$ / 15s	1,15nm / $\pm 400\text{ft}$ / 20s	1,55nm / $\pm 500\text{ft}$ / 27s
1,57km / $\pm 91\text{m}$ / 15s	2,13km / $\pm 122\text{m}$ / 20s	2,87km / $\pm 152\text{m}$ / 27s

Caution Zone		
narrow	medium (default)	wide
1,8nm / $\pm 600\text{ft}$ / 50s	2,3nm / $\pm 800\text{ft}$ / 70s	3,0nm / $\pm 1000\text{ft}$ / 95s
3,3km / $\pm 183\text{m}$ / 50s	4,3km / $\pm 244\text{m}$ / 70s	5,6km / ± 305 / 95s

Specification of the warning zones see §5.1 Threat Classification.

5.1.2 Approach Warning

TM350 calculates the approach speed of aircraft. In addition to the zone dimensions an alarm and caution warning can be assigned according to

the predicted time to an encounter if both aircraft maintain their flightpath vector, i.e. heading and horizontal/vertical speed.

Predefined value for a caution warning is 70 seconds and 20 seconds for an alarm warning.

5.1.3 Detection Zone

The Detection Zone limits the evaluation area of the **TM350**. All aircraft outside the defined limits are suppressed and neither processed for display nor for warnings.

Selection of “Unlimited” means that all detected aircraft are processed by the **TM350**. Following limits can be selected:

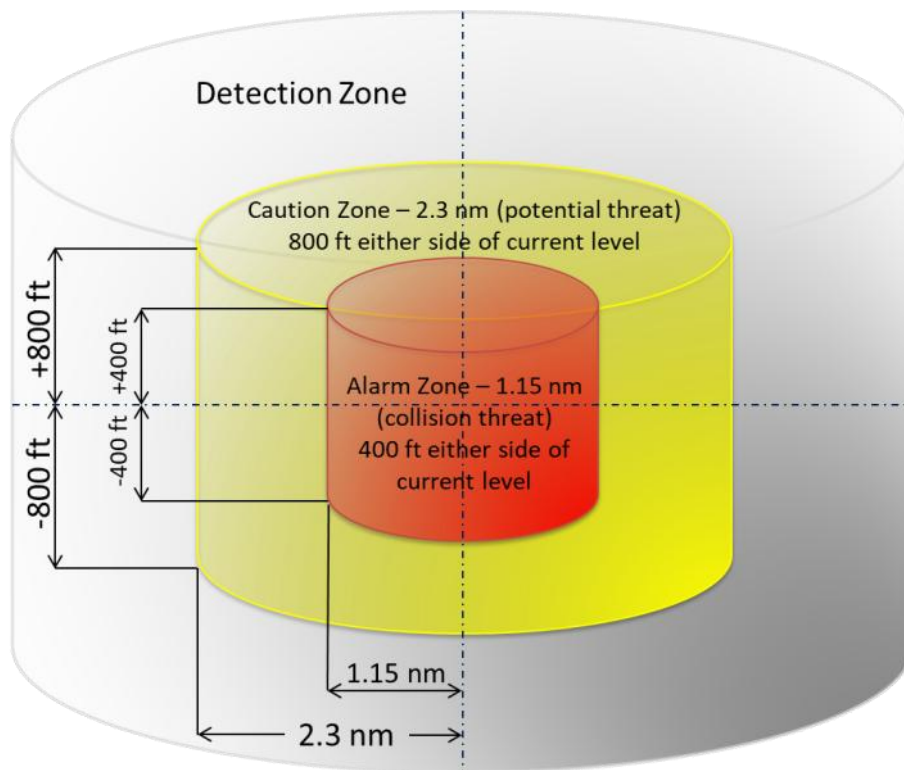
- Narrow = 4 nm / ± 1.000 ft
- Medium = 8 nm / ± 2.000 ft
- Wide = 16 nm / ± 4.000 ft
- Unlimited = default setting
- Customized = allows any range up to 30nm and ± 10.000 ft



Information

The Detection Zone must always be larger than the Caution Zone and the Caution Zone larger than the Alarm Zone. **TM350** rejects parameter input below the inner cylinder.

5.2 Threat Classification



Basically, the collision warning is based on the comparison of the own position with the location of surrounding traffic. With ADS-B traffic, this is done using the respective position reports. For Mode C/S traffic (not ADS-B capable), the field strength is measured and converted into a distance estimate.

The priority of a collision warning is determined on the basis of two predefined warning zones. These are defined in each case by a distance radius as well as by an altitude range above and below the own position.

The **TM350** comes with following default configured zones:

Caution Zone: If a traffic item closes in to less than 2.3 nm with an altitude difference (relative altitude) of less than 800 ft, the caution zone is infringed.

Alarm Zone: If a traffic item is less than 1.15 nm away with an altitude difference (relative altitude) of less than 400 ft, the alarm zone is infringed. A target in the alarm zone is an imminent threat that requires immediate action.



Warning

The dimensions of the Caution and Alarm Zone have been determined and verified in a project called EVA (Electronic Visibility using ADS-B) with UK ATC authority NATS.

The dimension of the zones can be changed in the installation settings and should only be altered with appropriate experience.

Besides the spatial boundaries of these zones, the approach rate is also taken into account for traffic which is inside the alarm altitude band.

An alarm equal to the caution zone violation will be raised if an encounter is forecasted in less than 70 seconds. An alarm equal to the Alarm Zone violation will be raised if an encounter is forecasted in less than 20 seconds. These alerts will be issued regardless of the zone in which the intruder currently is.

For Mode C/S traffic the measured field strength – converted to a distance - will be compared to the pre-defined threshold values. In case that the altitude is also available, this will also be checked against the lower and higher detection zone boundaries. The TM350 issues a warning for undirected targets if the detected object is within the warning or alarm zone. The GDL90 protocol generates as graphical output 8 objects on an arc around the own position. Some apps, such as Skymap recognize this representation as an undirected target and convert it to a continuous circle.

In case of FLARM, the range of reception is approximately 4 to 5 nautical miles. A warning is normally triggered when entering the red zone or when a calculated encounter happens within less than 20 seconds.



Information

Audio alarm and display of FLARM targets is triggered according to the description above and not to the FLARM internal scheme.

5.3 Warning on Ground

The output of warnings can be disabled as long as the aircraft is not airborne.

If enabled, a threshold speed can be set when warnings shall be issued. If this parameter is set to auto, the threshold speed is set according to the aircraft type as defined in the table below:

Aircraft Type	speed km/h	speed m/s	speed kn
Light A/C	36	10	20
Small A/C	36	10	20
Glider / Sailplane	18	5	10
Balloon	0	0	0
Ultralight	18	5	10
Rotorcraft	7	2	4
UAV	7	2	4

By default the “Warning on Ground” is disabled.

5.4 FLARM Settings

5.4.1 FLARM Source

The **TM350** provides two options to include FLARM processing:

First option is to use the internal FLARM System. For a full FLARM reception capability a valid license file has to be installed.

Without a valid license, the **TM350** can only detect the presence and approximate number of nearby FLARM transmitters; direction, distance, altitude and position are not available.

Independent of a valid license file, the **TM350** operates as a FLARM Beacon and transmits FLARM messages.

Second option is to attach an external FLARM device to the serial port of the **TM350**. Any serial port of the **TM350** can be configured accordingly.



Information

The connection of an external FLARM requires a crossover adapter which changes the RX/TX assignment (e.g. LexTec SKU:CB9020X). The selection of an external FLARM deactivates the integrated FLARM including the beacon function.

5.4.2 Parameters

Some FLARM parameters need to comply with the 1090MHz receiver values. The internal FLARM parameters cannot be different and modified. An external FLARM needs to be configured manually.

Following FLARM parameters are defined by the **TM350** settings to avoid ambiguity:

TM350 Label	defines FLARM Label	TM350 Label	defines FLARM Label
ICAO 24bit	➔ ID	A/C Category	➔ ACFT
FLARM NMEA	➔ NMEAOUT	Detection Zone	➔ RANGE ➔ VRANGE
Baud Rate	➔ BAUD	Volume	➔ VOL Buzzer



Caution

The own ICAO address needs to be configured in the external FLARM device as FLARM ID. Otherwise there will be a continuous warning.

6 SOFTWARE / FIRMWARE UPDATE

The **TM350** software and firmware can be updated by the user. The installation of an update package may update all or parts of following software and firmware

- TM350 Firmware
- TM350 Software
- HMI Software
- FLARM Software



Caution

Every FLARM device must be updated with the latest firmware version at least every 12 months to avoid firmware expiration. This will also ensure interoperability with all other FLARM devices. Expiry date can be checked in the browser interface under Device Status.

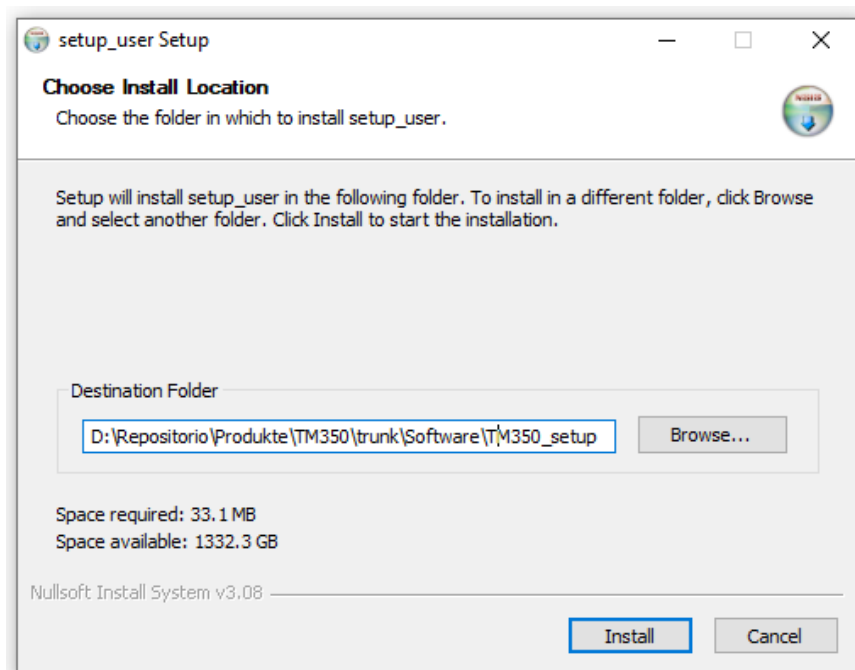
To update the **TM350** following equipment is required:

- Standard Windows PC or Laptop with USB port
- USB cable with USB-C Connector
- Update Installer Package (TM350_setup_Vxx.exe)
- TM350 unit

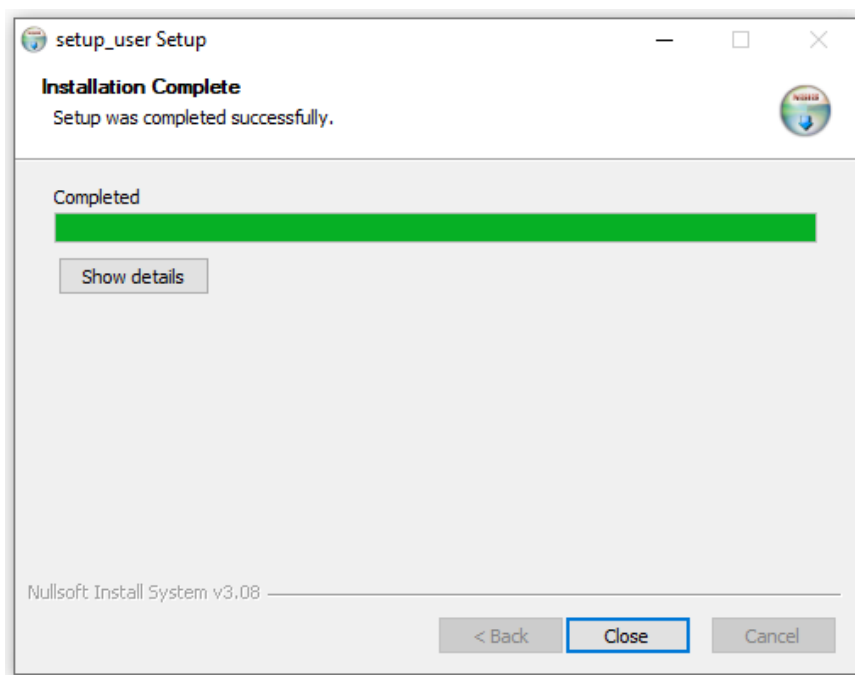
To install an update on the **TM350** execute the following steps:

Download the Installer Package from the service area of f.u.n.k.e. Avionics: <https://www.funkeavionics.de/en/service/info-download/> to the PC and execute it.

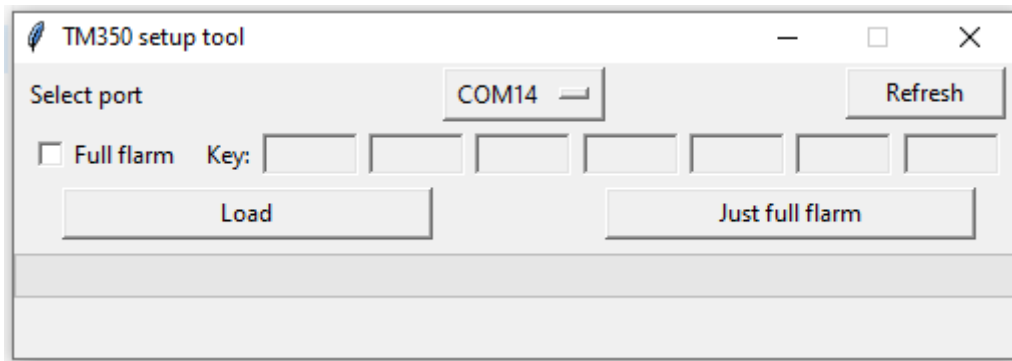
Set the path where the setup tool shall be located.



After this process, a folder structure will be created in the selected path. The executable file “user_setup.exe” to start the update will be in the root folder.



The user setup tool looks as follows:



When the **TM350** is plugged in as a new device, it does not appear automatically. It is necessary to refresh the ports by clicking on **Refresh** and then select the new COM port to connect the **TM350** to the updating device. The user can click “**Load**” and the new version of the software of the **TM350** will be uploaded.



Caution

If there is already a FLARM license installed or if the user does not have a FLARM license, the Full FLARM check box must be left unchecked.

If the user has a new FLARM license the check box must be ticked and the fields next to it have to be filled in with the FLARM license key. Each of the eight fields must contain 4 characters. The setup tool does not check if the content is correct. So, if the user sets a wrong key, the setup tool will not show any error message, the key will be installed but the **TM350** will not work with the full FLARM functionality.



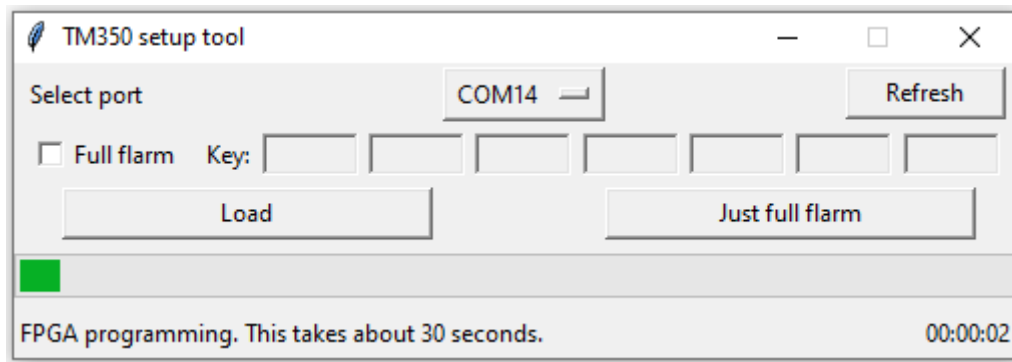
Information

A FLARM license key for the **TM350** can only be obtained from f.u.n.k.e. AVIONICS GmbH. Please contact us by phone or send us an email to service@funkeavionics.de

If the user just needs to install the FLARM license, the check box must be ticked, the fields next to it must be filled in and the button “Just Full FLARM” must be clicked. The advantage of this procedure is that the loading time is shorter.

If the user connects the USB after starting the setup tool, the combo box of the ports must be refreshed. Click **Refresh** and wait until the combo box is loaded.

When the process starts, a log message will appear at the bottom and the load bar will show the progress. A clock will be shown at the bottom right corner. This clock shows the time since the beginning of the process.



If any problem is detected, an error message will be issued. Follow the instructions in that message and if the error persists, contact the support of f.u.n.k.e. AVIONICS.

If the time of processing is significantly longer than what the log message shows, close the tool, disconnect the USB, reconnect it, start the setup tool and try again. If the problem persists, contact the support of f.u.n.k.e. AVIONICS.



Warning

Do not interrupt the update process! This may lead to an incomplete installation, which may prevent further updates. In such case the unit needs to be returned to the manufacturer.



Caution

FLARM releases periodically updates to its firmware. An outdated firmware will prevent proper FLARM functionality. Availability of software updates shall be checked regularly.



Information

The software update requires a personal computer with Windows operating system.

7 STATUS INDICATIONS

There are three color LEDs which show the modes of operation and failure modes. The table below shows the different modes:

Status	LED1 – green	LED2- yellow	LED3- red
ON	GPS fix o.k.	last 1090MHz Rx > 60s	failure
BLINKING	No GPS	last 1090MHz Rx > 10s	warning
OFF	failure	last 1090MHz Rx ≤ 10s	no failure / no warning
Power Up	Blinking	Blinking	On
Critical failure	Off	Off	On

8 INSTALLATION

8.1 Unpacking and Inspecting the Equipment

Carefully unpack the equipment. Damages due to transportation must be reported to the shipping company immediately. Save the shipping container and all packing materials to substantiate your claim.



Information

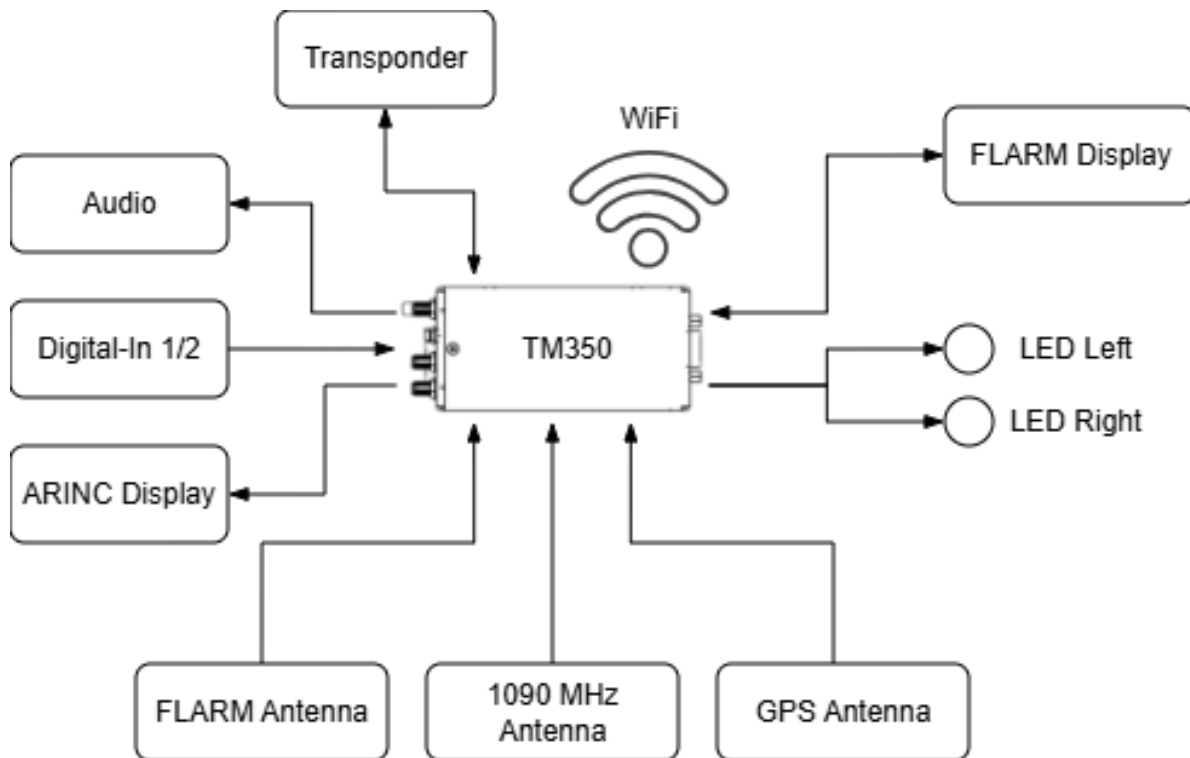
Please use the original packing material for storage and shipping.

8.2 System interconnection overview

The **TM350** unit has to be connected correctly to a power supply and to a number of external devices to create a complete traffic information system:

- A 1090MHz antenna for ADS-B and Mode C/S signal reception, connected using suitable high-quality coaxial cable;
- A GNSS antenna, connected using suitable high-quality coaxial cable;
- An antenna for FLARM reception
Alternatively, the **TM350** may be connected to an external FLARM unit via serial line;
- A display device, connected either via serial line or over WLAN
- Connection to an existing audio distribution panel or a buzzer for audible warnings.
- TRT800H/A transponder, if installed

The figure below shows the connection scheme.



8.3 Preparation of Installation

The following steps should be performed before starting the installation:

- Clarify, which installation options (see above) are applicable;
- Make sure you have all required material and tools for installation readily available;
- Verify that installation material (e.g. antennas) is suitable for installation on the aircraft type;
- Make sure that all required cables are available in required length and quality;
- Mount all connectors (if possible) in the workshop rather than inside the aircraft;
- Follow all safety procedures mandatory for the type of aircraft;
- Verify that adequate power voltage and current is available;

A suitably qualified maintenance company shall perform installation.

8.4 Mounting

In cooperation with a maintenance shop, location and kind of the installation shall be specified. The maintenance shop will be able to

supply all required cables. Pre-assembled **TM350** cable harnesses with appropriate connectors are available from f.u.n.k.e. AVIONICS GmbH.

- Select a position away from heat sources. Care for adequate convection cooling.
- Leave sufficient space for the installation of cables and connectors.
- Avoid sharp bends and wiring close to power or RF cables.
- Leave sufficient lead length for inspection or repair of the wiring of the connector.
- Bend the harness at the rear connectors to inhibit water droplets (formed due to condensation) from collecting in the connector.

8.5 Equipment Connectors

8.5.1 TM350 Connectors

The **TM350** has the following connectors:

Front D-SUB DE-15P Male for:

Power, RS232 serial lines 3 & 4, Audio out, ARINC 429

Rear D-SUB DE-9 Female for:

RS232 serial lines 1 & 2, 12V 100mA power out for external devices



Caution

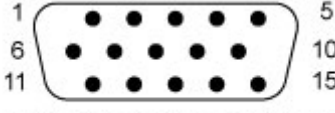
The D-Sub-Connector (plug) has to be fastened with both screws.

8.5.2 Pin Allocation 15 Pin Connector

This connector is used for attachment to the power supply. It provides two serial interfaces, two discrete signal inputs, an analog input, an audio output and two lines for ARINC 429 interface. Over pin 5 "Enable" the device can be connected to a master switch. Pulling Pin 5 to GND turns the device on.

Front Connector Pin-Out			
PIN #	I/O	Term	Function
1	-	PWR (+14 / +28V)	Power Supply
2	O	TX D3	RS232 Transmit Data 3
3	O	TX D4	RS232 Transmit Data 4
4	I	A IN	Analog Input (Volume Control)
5	I	EN	Enable

6	-	PWR-GND	Power Supply Ground
7	I	RX D3	RS232 Receive Data 3
8	I	RX D4	RS232 Receive Data 4
9	O	Audio Analog	Analog Audio out
10	I	D IN -1	Discrete Signal Input 1
11	I	D IN -2	Discrete Signal Input 2
12	I/O	GND	Signal Ground
13	O	A429 TxA	ARINC 429 Tx A
14	O	A429 TxB	ARINC 429 Tx B
15	I/O	GND	Signal Ground

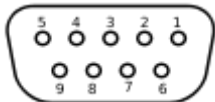


DE-15P (Male Plug Front View)

8.5.3 Pin Allocation 9 Pin Connector

The connector at the rear side provides two serial interfaces and power supply for external devices or displays.

Rear Connector Pin-Out			
PIN #	I/O	Term	Function
1	O	Power Out	12 VDC supply for external displays (100mA)
2	I	Digital Out	(Warning LED Left)
3	I	RX D2	RS232 Receive Data 2
4	-	GND	Ground
5	O	TX D1	RS232 Transmit Data 1
6	I	RX D1	RS232 Receive Data 1
7	O	TX D2	RS232 Transmit Data 2
8	O	Digital Out	(Warning LED Right)
9	-	GND	Ground



Pinout DE 9S Frontview

**Warning**

The power supply wire (PWR – Pin 1) has to be protected by a fuse or circuit breaker with 2 A slow.

**Caution**

Both discrete inputs shall be left open if no function is assigned.

8.6 Connection Transponder TRT800H/A

A TRT800H/A transponder can be connected to the TM350. Transponders with software version 6.4 or higher support an automatic configuration for a complete ADS-B IN/Out system.

The cable harness BSKS350F provides a DIN socket for connection to the transponder. The preselected port for a TRT800 connection is the RS232 Port 3. Check, that this port is set to TRT800 protocol.

Select data port A in the TRT800 menu and select TM350 or TM350+NMEA protocol.

The TM350 shall now receive the ICAO address and the aircraft category on start-up and periodically the barometric altitude.

8.7 Connection with third party systems

		Interfaces							
		TM350			Garmin LRU				
	Equipment	RS-232 (Garmin TIS)	ARINC 429 (ARINC 735A)	Discretes	Track via RS-232 (Aviation Format)	Heading via RS-232 (ASCII Format)	Heading via RS-422 (GDL 90 Protocol)	Audio Alerting	Remarks
Navigators	Portables (Aera 500/550/660/760/GPSMAP)	•						• (limited, see note 1)	May be interfaced by customer.
	GPS 400/500, GNC 420/520, GNS 430/530 & (W) Series		•	•	•				Installation by a qualified maintenance facility/dealer recommended. A429 Heading available when interfaced to AHRS system with magnetometer.
	GNS 480		•	•	•				
	GTN 625/635/650/725/735/750 & GTN Xi Series		•	•	•				
Flightdecks (OEM or Retrofit)	G3X & G3X Touch	•			•	•		• (limited, see note 1)	When installed as an OEM flightdeck, the installation and interconnect may be limited to approved maintenance facilities/dealers through a configuration lockout. G3X/G3X Touch: Heading available when interfaced to AHRS with magnetometer. A429 Heading/Track available when interfaced to GAD29C or GAD29D.
	G500/G600 (GDU620)		•	•	•				
	G500/G600 (GDU1210/1060/700P/700L)		•	•					
Multifunction Displays / Instruments	GI275		•	•					Installation by a qualified maintenance facility/dealer recommended. A429 Heading available on GI275 ADAHS equipped units.
	GMX200 (only -I/O models)		•	•	•				GMX200 cannot display correlated traffic if installed with GTX345 using RS-422 interface.
Flightdecks (OEM)	G900(X)/1000 (GIA63 & GIA63W)		•	•					Compatibility depending on availability of ARINC 429 IN ports and discrete outputs, as well as OEM software limitations and traffic feature unlock capability.
Transponders	GTX345 & GTX345R		•	•			•	• (advanced, see note 2)	Capable of correlated traffic output (see note 3) via HSDB (Ethernet) or RS-232 (Garmin Connex) to selected Garmin LRUs and ARINC 429 to any Navigator/Display System featuring ARINC 735A protocol. A429 Heading available when interfaced to AHRS system with magnetometer.

Note 1 Traffic audio alerting is available from the Garmin LRU if interfaced to an audio panel or headset. The LRU announces the word "TRAFFIC".

Note 2 Advanced audio alerting is available from the Garmin LRU if interfaced to an audio panel. Traffic is output as an audio message with bearing, distance, and relative altitude.

Note 3 The correlated traffic feature combines ADS-B In traffic received by the GTX ADS-B receiver and traffic received through the ARINC 429 input from the TM350 acting as a TAS. If the GTX is installed in a certified aircraft, it is configured to process certified ADS-B traffic. The TM350 can be configured to output both ADS-B and FLARM traffic through ARINC 429 to the GTX. If the GTX is configured to display non-performing ADS-B emitters (NPEs, i.e. ADS-B with SIL-1 or lower), configure the TM350 to output FLARM traffic only.

8.7.1 Digital In 1 / 2 connection to third party devices

Whenever Pin 10 and/or Pin 11 of DSUB DE-15 Socket (front connector) are connected to a third-party device discrete output with pull-up voltage >5V, it is recommended to protect the TM350 inputs by using a 1N4001 rectifier diode or equivalent oriented with the cathode side against the discrete output source.

8.8 Warning LEDs

Pin 2 and Pin 8 of the rear 9-pin connector provide a digital switch to ground. These pins are triggered in the actual software version by a detected target within the alarm zone and can be used to provide a direct visual warning from which side a potential threat is coming. For this purpose warning LEDs can be attached to the **TM350**. This function is coupled with the audio output. If the audio output is suppressed, this output is also disabled.

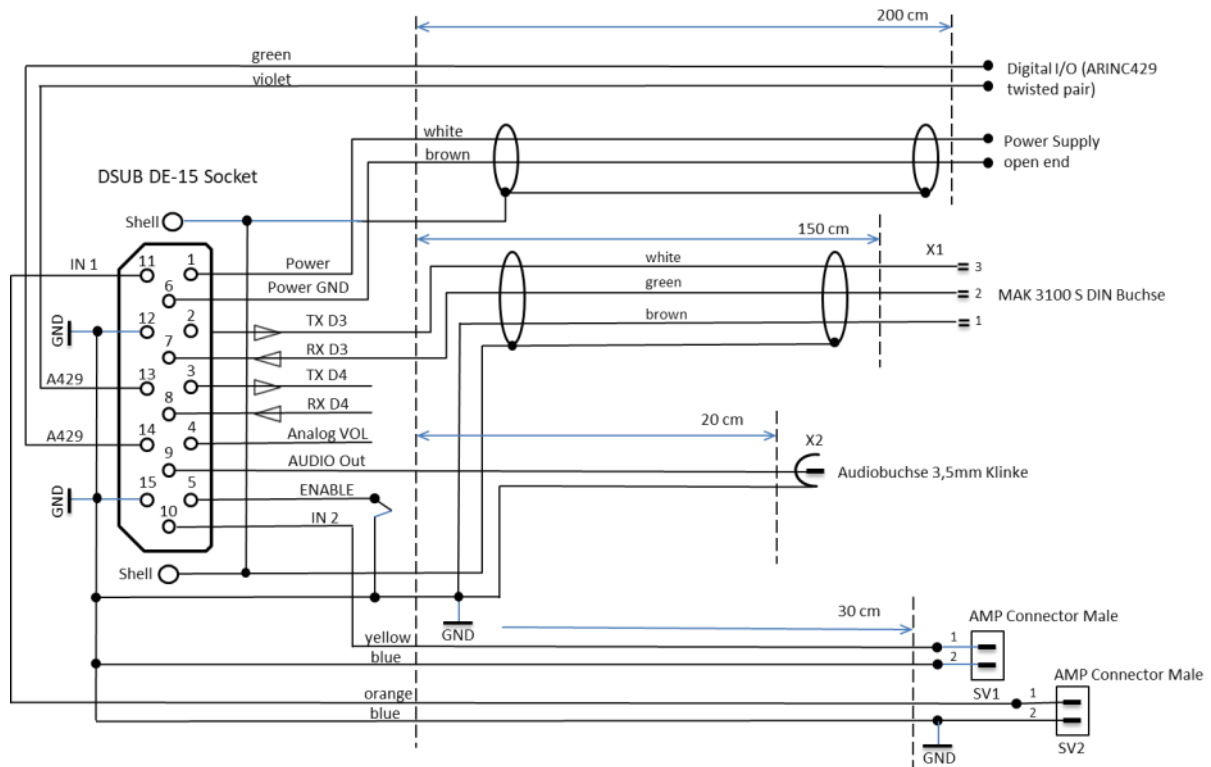
The threshold when the LED starts to blink is defined by the settings of the alarm zone. Pin 2 covers the left area (270° - 360°), pin 8 the right area (0° - 90°). On cable harness BSKS350R LED left Pin 2 is the violet wire, LED right Pin 8 is the green wire. 12V from Pin 1 is provided by the orange wire.

LEDs to be attached shall be chosen to use less than 10 mA. Suitable LED with installation frame are available as accessory LD2000A.

8.9 Cable harness

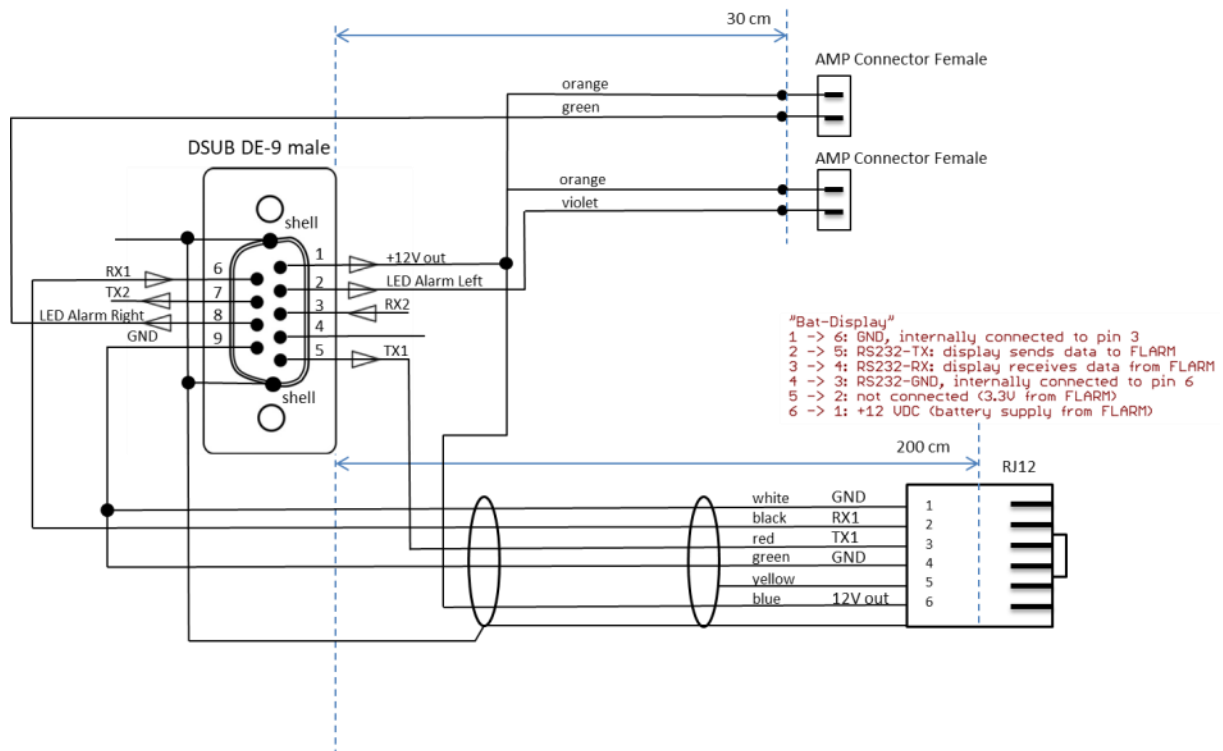
8.9.1 Cable Harness BSKS350F for Front Connector

A preconfigured cable BSKS350F for the 15 pin front connector is available as accessory.



8.9.2 Cable Harness BSKS350R for Rear Connector

A preconfigured cable BSKS350R for the 9 pin rear connector is available as accessory.

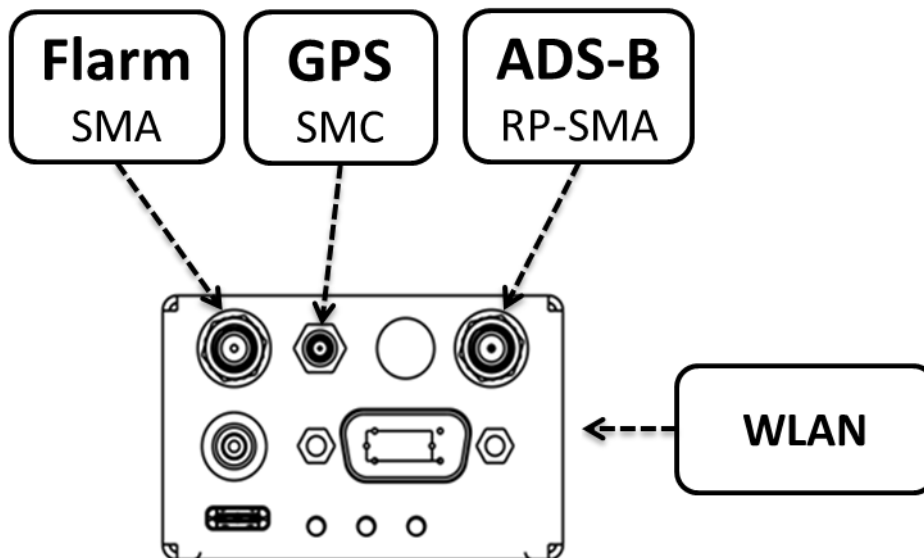


8.10 Antenna Installation

8.10.1 Antenna connectors

The **TM350** is equipped with following antenna connectors:

1. RP-SMA connector for ADS-B antenna
2. SMC connector for GPS antenna
3. SMA connector for FLARM antenna



8.10.2 General Guideline for Antenna Installation

- Take note of the antenna manufacturer's instructions.
- Pay attention that the metallic contact between airplane surface and antenna-GND is very good.
- On non-metallic airplanes a metal foil of appropriate size shall be used as electrical counterweight on the inside of the belly.
- The distance between two antennas should be as large as possible to avoid a mutual interference of equipment.
- Check the standing wave ration (SWR) for transmitting antennas



Caution

Antenna cables must not be included in any other cable sets, for example power supply or microphone. It must also not be placed together with other active antenna lines, for example communication or transponder antennas.

8.10.3 ADS-B Antenna

The ADS-B antenna shall be attached to the rp-SMA connector of the TM350.

- A 1090 MHz antenna with an impedance of 50 Ohm is required.
- Choose an antenna type approved for the aircraft and the mounting location.
- The antenna should be located far away from other transponder and ELT antennas.
- Specified features depend on proper installation of the antenna.

f.u.n.k.e. AVIONICS offers an internal dipole antenna which is optimized for 1090 MHz signal reception. Best reception is achieved, when the antenna is positioned vertically with a horizontal feeding line to the antenna center of about 15 cm length.

Antenna location shall not obstruct the outside view of the pilot.

	Dimensions:	160 mm x 4 mm
	Cable:	3,0 m
	Antenna Pattern:	Dipole
	Connector:	rp-SMA

8.10.4 GPS / GNSS Antenna

Ideally, the GPS / GNSS antenna should be mounted where an unobstructed clear view of the sky is available to enable a connection to visible GNSS satellites, ideally on top of the aircraft. The GPS / GNSS antenna should be distant from any device that can cause signal interference. Recommended is a location away from transmitters and their antennas.

8.10.5 FLARM Antenna

The FLARM antenna shall be located at a position with a good front and side view free of any obstructions. Unlike ADS-B FLARM operates with signals of low energy which limits transmission and reception range.

The FLARM Application Note FTD-041 explains in detail the technical requirements for installing FLARM antennas.

8.10.5.1 Internal FLARM Antenna

f.u.n.k.e. AVIONICS offers an internal dipole antenna which is optimized for FLARM signal reception.

Installation guideline is identical to internal ADS-B antenna.

8.10.5.2 External FLARM Antenna

For best FLARM reception it is recommended to use an external, vertically mounted antenna. The antenna location shall provide good all-around sight and shall be free from any covers. Best location for these antennas depends on the aircraft type.

External antennas should be connected with low-attenuation RF cables. The cable and connector attenuation should be less than 3dB.

8.10.6 WiFi Antenna

The WiFi antenna is mounted directly on the **TM350** body and protected by a plastic cover. Normally, this antenna provides good connectivity for WiFi devices within approximately 5 meters range. However, electrical shielding of the WLAN antenna may reduce the connectivity range significantly.



Caution

The side of the **TM350** with the antenna shall not be covered or shielded by other equipment or metallic structures to allow a stable WiFi connection.

8.11 Post-Installation Check

The demonstration mode can be used to check the proper connection and correct functionality of connected devices, i.e. displays and audio equipment.

The complete wiring should be properly documented. This manual as well as the installation documentation shall be added to the aircraft documentation.

A sticker with the WiFi access data may be attached in a suitable location.

When installation is completed, all steering and control functions of the aircraft are to be examined.

All avionics functions shall be checked on ground with the **TM350** in operation. In particular VHF radio and transponder functionality shall be checked.

A test flight with a technician familiar with the **TM350** and FLARM is recommended to find correct settings, e.g. audio volume and to gather experience with the warning settings.

8.12 Troubleshooting

If the **TM350** shows a malfunction or is not operating as expected, the Status LEDs should be checked first. If no error is indicated, perform the installation checks as described in §8.11 again. The connected equipment should also be checked with the demonstration mode, to check that data is sent and received.

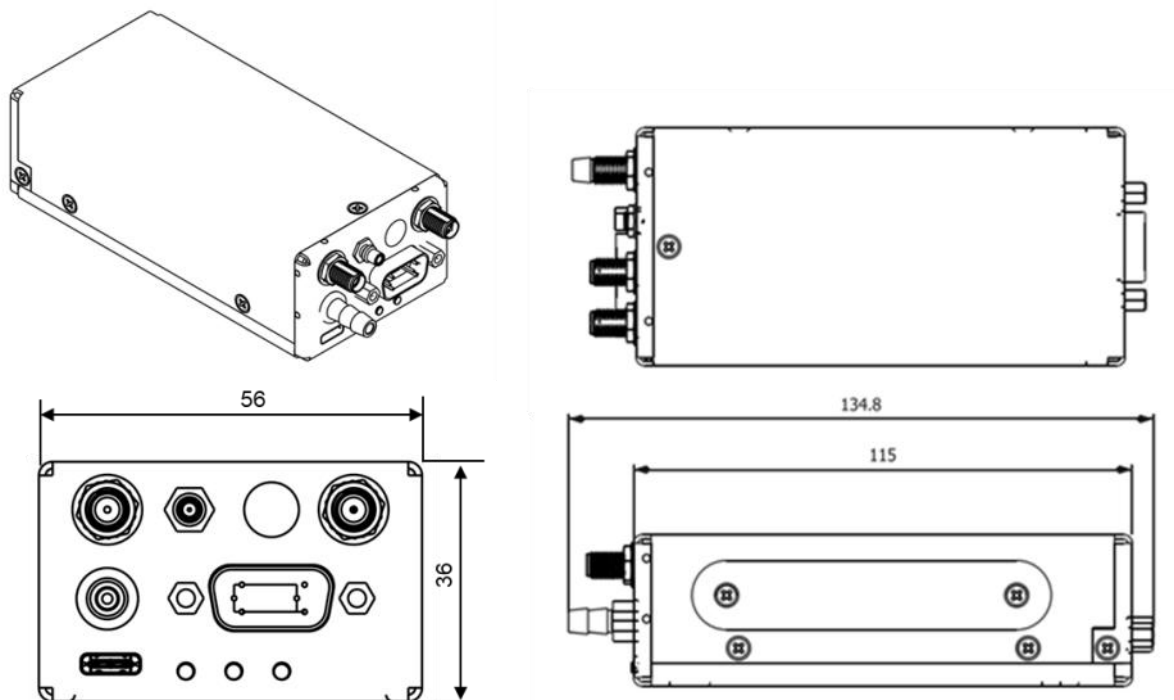
If these checks point to a failure of the **TM350** itself, the unit shall be removed and sent to f.u.n.k.e. AVIONICS for repair.

APPENDIX A - TECHNICAL SPECIFICATION

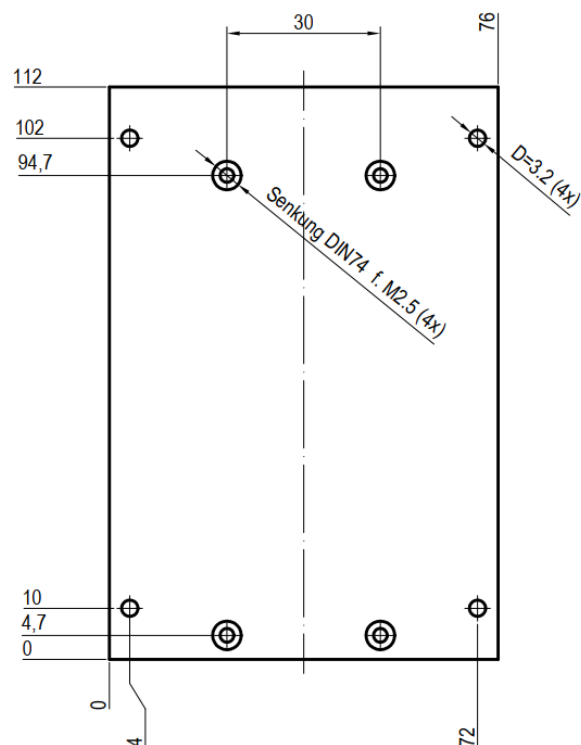
GENERAL	
Compliance	Non TSO / ETSO equipment
Dimensions	Height: 35 mm (1,38 in) Width: 56 mm (2,20 in) Depth without connectors: 115 mm (4,53 in) Depth with D-SUB connectors: 135 mm (5,31 in)
Weight	0,20 kg (0,44 lbs) 0,25 kg (0,55 lbs) with mounting plate
Power Supply	Nominal 13.8 VDC Operational 11.0 – 30.0 VDC Emergency 9.0 VDC
Power Consumption (ADS-B / FLARM)	typ. 200 mA @ 13.8 VDC (300 mA max.) max.1,0 A @ 13.8 VDC
Fuse	external fuse required: 2 A, slow-blow
Interfaces	4x RS232 1x ARINC 429 1x USB 2.0 2x Discrete In
WiFi Connectivity	WIFI 802.11b/g/n (2 parallel connections)
Connectors	Front: D-Sub 15HD Pin Male Rear: D-Sub 9 Pin Female USB Connector Type C ADS-B RP-SMA FLARM SMA GPS SMC
Barometric Sensor	-1000 ft - +35000 ft Resolution ± 1 hPa (± 8 m MSL) Accuracy ± 2 hPa, Stability ± 1 hPa/year
1090 MHz Receiver	Transponder signals on 1090 MHz: ADS-B, Mode C/S Squitter and Replies
1090 MHz Receiver Sensitivity	-84 dBm (+15 dBm max.)
FLARM Frequencies	SRD860 Band: Europe 868,2 – 868,4 MHz
FLARM Receiver Sensitivity	-120 dBm at 2.4 kbps, GFSK (SoC Spec.)

FLARM Transmission	25 mW max. (14 dBm)
Alarm Audio Output	2 V _{eff} (0,5 W @ 8 Ohm)
MAIN COMPONENTS	
FPGA	Xilinx XC7S50-2FTGB196I
GPS Receiver	µBlox NEO M8N, 72 channel GNSS Receiver
Barometric Sensor	NXP MPL3115A2
WLAN Module	ESP32 -WROOM-32UE
SRM SoC	EFR32FG12P431F1024GM48

APPENDIX B - DIMENSIONAL DRAWINGS



front and side view, dimensions in mm



Mounting plate, dimensions in mm

APPENDIX C - ENVIRONMENTAL CONDITIONS

The **TM350** was designed and tested to meet following environmental conditions.

CHARACTERISTICS DO-160F	SECTION	CAT	CONDITION
Temperature / Altitude	4.0	C1	
Low Ground Survival Temperature	4.5.1		– 55°C
Low Operating Temperature	4.5.1		– 20°C
High Ground Survival Temperature	4.5.2		+ 85°C
High Short-time Operating Temperature	4.5.2		+ 70°C
High Operating Temperature	4.5.3		+ 55°C
In-flight Loss of Cooling	4.5.4	Z	No cooling required
Altitude	4.6.1	C1	35 000 ft
Temperature Variation	5.0	B	5°C change / minute
Humidity	6.0	A	
Shock	7.0	B	6 g shocks (11 ms) 20 g crash safety Test Type R in all 6 directions (11 ms)
Vibration	8.0	R	Vibration Curve Y
Magnetic Effect	15.0	Z	< 0,3 m Compass Safe Distance
Power Input (DC)	16.0	B	14 / 28VDC Sec. 16.6.1.1b(3) for 5 min. Section 16.6.1.3 for 25 ms
Voltage Spike Conducted	17.0	A	
Audio Frequency Conducted Susceptibility	18.0	B	
Emission of RF Energy	21.0	M	
Electrostatic Discharge (ESD)	25.0	A	15 kV / 10 pulses
Sections 9 / 10 / 11 / 12 / 13 / 14 / 19 / 20 / 22 / 23 / 24 / 26			no tests, (CE tested)

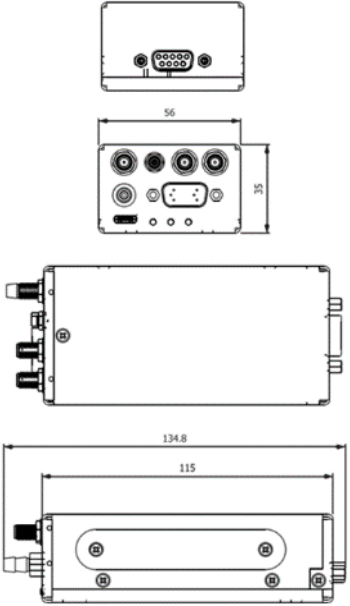
Env Cat: [C1Z]BAB[RY]XXXXXXZBBB[XX][XX]M[X]XXAX

APPENDIX D – EU DECLARATION OF CONFORMITY

EG-Konformitätserklärung zur Richtlinie 2014/53/EU

EC-Declaration of Conformity to Directive 2014/53/EC

CE-Déclaration de conformité à la directive 2014/53/CE

Hersteller: <i>Manufacturer/fabricant:</i>	f.u.n.k.e. AVIONICS GmbH
Anschrift: <i>Adress/adresse:</i>	Heinz-Strachowitz-Str. 4, D-86807 Buchloe, Germany
Produktbezeichnung: <i>Product name:</i> <i>Nom du produit:</i>	Verkehrswarngerät <i>Traffic Monitor</i> <i>Dispositif d'avertissement de trafic aérien</i>
Typen: <i>Types/types:</i>	TM350
Produktbeschreibung: <i>Product description:</i> <i>Description du produit:</i>	Verkehrswarngerät bestehend aus Hardware und Software (Firmware) zur Verbesserung der situativen Aufmerksamkeit <i>Traffic Monitor comprising hardware and software (firmware) for improvement of situational awareness</i> <i>Moniteur de trafic, comprenant le matériel et le logiciel (microprogramme) pour l'amélioration de la conscience de la situation</i>  Technische Daten: - Abmessungen: 115 x 56 x 35 mm (ohne Anschlüsse) - Gewicht: ca. 300 g - Temperaturbereich: -20 bis +55 °C - Frequenzbereich: 868 – 928 MHz, 1090 MHz - Ausgangsleistung FLARM: 100mW (20dBm) max. Technical Data: - Dimensions: 115 x 56 x 35 mm (without antenna) - Weight: approx. 300 g - Operating temperature: -20 to +55 °C - Frequency range: 868 – 928 MHz, 1090 MHz - Output power FLARM: 100mW (20dBm) max. Données techniques: - Dimensions: 115 x 56 x 35 mm (sans antenne) - Poids: env. 300 g - Température de fonctionnement: -20 à +55 °C - Gamme de fréquences: 868 – 928 MHz, 1090 MHz - Puissance de sortie FLARM: 100mW (20dBm) max.

Wir erklären in alleiniger Verantwortung, dass die oben bezeichnete Produkte mit folgenden Europäischen Richtlinien und Verordnungen übereinstimmen: We declare under our sole responsibility that above products are in conformity with the following directives and regulations: Déclarons sous notre seule responsabilité, que les produits repondent aux directives et règlements suivantes:	2014/53/EU Funkanlagen-Richtlinie 2014/53/EU Radio Equipment Directive 2014/53/CE Directive RED 2014/35/EU Niederspannungsrichtlinie 2014/35/EU Low Voltage Directive 2014/35/CE Directive Basse Tension 2014/30/EU Elektromagnetische Verträglichkeit 2014/30/EU Electromagnetic Compatibility 2014/30/CE Compatibilité Électromagnétique
Angewandte harmonisierte Normen und technischen Spezifikationen: Applied harmonised standards and technical specifications: Normes harmonisées et spécifications techniques:	EN 50566:2017 Health Requirements EN 62368-1:2014 Safety Requirements EN 301 489-01 Common EMC Requirements EN 301 489-03 EMC for Short Range Devices (FLARM) EN 301 489-17 EMC for 2.4 GHz WLAN/Bluetooth EN 301 489-19 EMC for GPS Receivers EN 303 413 GPS Receiver Requirements acc. to RED Article 3.2 EN 300 328 WLAN/Bluetooth Requirements acc. to RED Article 3.2 EN 300 220-2 Short Range Devices 25MHz – 1GHz Requirements acc. to RED Article 3.2 EN 300 220-3 EMC and ERM SRD 25MHz – 1GHz Requirements acc. to RED Article 3.2
Verfahren zur Bewertung der Konformität: Conformity assessment procedures: Procédures d'évaluation de la conformité:	2014/53/EG: Verfahren gemäß Anhang III; (EG) 552/2004: Modules B + C 2014/53/EC: procedure laid down in Annex III (EC) 552/2004: Modules B + C 2014/53/CE: procédure prévue à l'annexe III; (CE) 552/2004: Modules B + C 2014/35/EG: NSR - Wesentliche Anforderungen 2014/35/EU: LVD - Essential Requirements 2014/35/CE: DBT - le nécessaire requis 2014/30/EG: EMV - Wesentliche Anforderungen 2014/30/EU: EMC - Essential Requirements 2014/30/CE: CEM -le nécessaire requis
Benannte Stelle gemäß 2014/53/EG und Nummer der EG Baumusterprüfbescheinigung: Notified Body acc. to 2014/53/EC and number of the EC type examination certificate: Organisme agréé à 2014/53/CE et numéro du certificate des test CE:	CTC advanced GmbH Untertuerkheimer Str. 6-10 66117 Saarbruecken, Germany CE 0682 Certificate Registration No.T818972P-01-TEC
Ort, Datum der Ausstellung (Place, date of issue)/ (Lieu, date de l'édition)	Buchloe, 22.04.2022  Dr. Thomas Wittig
Revision:	1.0

APPENDIX E – OVERVIEW SOFTWARE VERSIONS

Version	Date	Changes
1.00	22.04.2022	First release
1.01	04.11.2022	Test version for improvement 1090 MHz recognition and display tests Implementation of corrections and improvements: • The html files are not saved in cache. • Web interface access after configuration or initialization errors to show error code. • Log messages shown in system reports. • Improved 1090MHz receiver signal processing • fixed GDL90 GPS valid in Heartbeat when highest bit in timestamp is set • Added generation of FLARM Heartbeat message even if PPS is not active. • Added FLARM Display support, to show Configuration items. • Added error message for invalid input in WiFi Active time field. • Fixed problem with too fast message sending (faster than 1 times per second) • Improved NMEA parsing for better stability • Improved GNSS data generation for FLARM SoC
1.02	29.11.2022	Release of previous test version with following fixes • Fix of Mode S altitude message detection • Added control of internal FLARM reset pin • Removed NMEA answer, when PFLAC,A is received • Fixed updater tool problem: "Wrong updater"
1.03	16.12.2022	• Fixed AC category "No category" output for FLARM displays • Fixed setting of NOTRACK Flag in FLARM transmissions • Added support for presentation of configuration items on FLARM displays. • Pop up message appears when the FLARM software is close to expire (1 month before) and when it has expired.
1.10	19.01.2023	• Added TIS (Traffic) protocol • Fixed AC category to Emitter category mapping
1.41	25.04.2023	• Update to FLARM Rev.7.09
1.42	17.05.2023	• Update to FLARM Rev.7.21
1.50	21.05.2024	• new framework for browser interface • update to FLARM Rev.7.24 • fix for FLARM Receiver and Transmitter (ref. Service Letter SL2 2024) • fix for FLARM device information
1.51	25.06.2024	• Update to Sw 1.21 (fixes wrong port allocation for TRT communication)
1.60	20.11.2025	• Update to FLARM Rev.7.40 • Fix for FLARM info • Fix for TRT display • Added Mode C deactivation • Added number of connected devices to the device status page • Added some info popups in HMI • Added automatic barometric source selection

Version	Date	Changes
		• Added Updater compatibility with Windows x86 (32bit) • Improved Status LED indication • Removed system reports • Fixed sending same UDP messages multiple times (#7005) • Fixed memory leak (#8608) • Added FTDI driver to Updater tool (#8679)
2.00	13.04.2026	• Update to FLARM Rev.7.43 • Added ARINC 429 Output • Fixed GDL90 Position messages (#9428) • Added FTDI driver to Installation tool (#8679)
2.01	29.04.2026	• Fixed bearing in TIS (Traffic) Protocol • Fixed bearing in ARINC 429 • Improvement FLARM Alarm
2.02	14.07.2026	• Update to FLARM Rev.7.44 • Setup tool Publisher set to f.u.n.k.e. AVIONICS GmbH • Improvement in Compatibility of Setup tool • Included management of Standby and Demo/Test Discretes in ARINC 429 Protocol

APPENDIX F - DISPOSAL



Umweltinformationen für Kunden innerhalb der Europäischen Union
Regulatory and Compliance/WEEE Legislation within the European Union

Gemäß der Europäischen Richtlinie 2012/19/EU über Elektro- und Elektronik-Altgeräte (WEEE) dürfen Produkte, die direkt am Gerät und/oder an der Verpackung mit diesem Symbol versehen sind, nicht zusammen mit gewöhnlichem Abfall entsorgt werden, sondern sind über die für elektrische und elektronische Geräte zuständigen und von der Regierung oder örtlichen Behörden dazu bestimmten Sammelstellen zu entsorgen. Ordnungsgemäßes Entsorgen und Recyceln trägt dazu bei, potentielle negative Folgen für Umwelt und die menschliche Gesundheit zu vermeiden. Wenn Sie weitere Informationen zur Entsorgung Ihrer Altgeräte benötigen, wenden Sie sich bitte an die örtlichen Behörden oder städtischen Entsorgungsdienste oder an den Händler, bei dem Sie das Produkt erworben haben.

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