



TRT800H

P/N 800ATC-H-(0XX)-(0XX)

P/N 800ATC-H-(1XX)-(1XX)

P/N 800ATC-H-(2XX)-(1XX)

ATC Transponder

Mode A, A-C, S



## Installation and Operation

Dokument-Nr.: 03.2121.010.71e

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## 1 GENERAL

### 1.1 Symbols



Instructions whose non-observance can cause radiation damage to the human body or ignition of combustible materials.



Instructions whose non-observance can cause damage to the device or other parts of the equipment.



Supplementary information.

### 1.2 Customer Support

For fastest handling of reshipments please use the reshipment form available from our homepage [www.filser.de](http://www.filser.de).



Any suggestions for improvement of our manuals are welcome. Feel free to contact [service@filser.de](mailto:service@filser.de).

### 1.3 Survey of Variants

Part Number	Description
P/N 800ATC-H-(0XX)-(0XX) prior to SW3.00	display illumination automatically controlled no VFR key no GPS support
P/N 800ATC-H-(0XX)-(0XX) from SW3.00	display illumination automatically controlled no VFR key GPS support
P/N 800ATC-H-(0XX)-(0XX) from SW3.00	display illumination automatically controlled no VFR key 8 entries for AA-/AC-Code, FID, Ground-Switch, GPS-/Interface-setting
P/N 800ATC-H-(1XX)-(1XX) prior to SW3.00	VFR key; two VFR modes: VFRD, VFRW no GPS support
P/N 800ATC-H-(1XX)-(1XX) P/N 800ATC-H-(2XX)-(1XX) from SW3.00	VFR key: one VFR mode GPS support
P/N 800ATC-H-(1XX)-(1XX) P/N 800ATC-H-(2XX)-(1XX) from SW3.10	VFR key; one VFR mode 8 entries for AA-/AC-Code, FID, Ground-Switch, GPS-/Interface-setting

## 1.4 Introduction

This manual contains information about the physical, mechanical and electrical characteristics and about installation and operation of the TRT800H Mode S Transponder.



Please care for the ICAO 24-Bit Aircraft Address before installation. Ask your national aviation authority.

## 1.5 Features

- Level 2es Class 1 Non-Diversity Mode S Transponder, providing downlink of aircraft information
- radio transmitter and receiver for ground radar interrogations on 1030 MHz and transmission of coded reply pulses to ground-based radar on 1090 MHz
- Replies to ATCRBS interrogations using the ICAO 24-bit mode S address, which is unique to the particular aircraft.
  - Mode A replies, consisting of any one of 4,096 codes (squawk), which differ in the position and number of pulses
  - Mode C replies, including encoded flight level
  - Mode S replies, including aircraft address and flight level
  - Acquisition Squitter, including aircraft address and flight level
  - Extended Squitter, additionally including position and velocity
- IDENT capability for activating the Special Position Identification (SPI) pulse for 18 seconds.
- certified to EUROCAE ED-73B and CS-ETSO-2C112a
- maximum flight level 35000 ft, maximum velocity 250 knots
- Display information contains code, reply symbol, mode of operation and pressure altitude.
- temperature compensated high precision piezo-resistive pressure sensor
- RS-232 I/O data port
- 8 entries for AA-/AC-Code, FID, Ground-Switch, GPS-/Interface-setting

## 1.6 Technical Data

Compliance	CS-ETSO-2C112a EUROCAE ED-73B Class 1 Level 2es EASA.21O.045
Applicable Documents	CS-ETSO-2C112a EUROCAE ED-73B Class 1 Level 2es EUROCAE ED-26 RTCA DO-160D RTCA DO-178B Software-Level D
Mounting	Panel cut-out Ø 57 mm
Temperature Ranges Operation Storage	-20 °C to +55 °C; for 30 min +70 °C -55 °C to +85 °C
Altitude Range	≤15,000 ft
Vibration	DO160D, Cat. S, Vibration Curve M
Shock	6 G operation 20 G crash safety
Environmental Categories	RTCA DO-160D Env.Cat.: [C1Z]CAA[SM]XXXXXXZBAAA[TT]M[B3F3]XXA
Power Supply	13.8 VDC (10 VDC .. 16 VDC) <ul style="list-style-type: none"> <li>• 0.40 A (typ.)</li> <li>• 0.70 A (max.)</li> </ul>
Maximum Power Consumption	10 W
Fuse	external fuse required: 2 A, slow blow
Weight	1.3 lbs / 0.6 kg
Receiver Characteristics: Sensitivity	RF input power level resulting in a 90 % reply rate: A. MTL for ATCRBS and ATCRBS/Mode S All-Call interrogations is -74 dBm ±3 dB. B. MTL for Mode S interrogations: -74 dBm ± 3 dB.
Reply Transmission Frequency	1090 ± 1 MHz
RF Peak Power Output	≥ 21 dBW (126 W) peak power at the terminals of the transponder antenna (cable loss max. 1.5 dB)
Squitter	transmitted at random intervals uniformly distributed over the range from 0.8 to 1.2 seconds, full self-verification of data and occurrence



<b>Mode S Elementary Surveillance</b>	
24-bit Aircraft Address	aircraft address
FID	Flight ID: Flight Plan call sign or aircraft registration marking
Capability Report	Reports the available data and means by which the transponder can report.
Pressure Altitude	up to 35,000 ft in 100 ft increments
Flight Status	in-flight / on-ground
<b>Mode S Enhanced Surveillance</b>	
Level 2es	Comm-A / Comm-B: 56/112-Bit-Messages SI/II code-capability

## 1.7 Telecommunication Data

Depending on your national telecommunications legislation, the following data may be required when applying for the aircraft radio station license:

Manufacturer	Filser Electronic GmbH
Type Designation	TRT800H
EASA Number	EASA.21O.269
Transmitter Power Output	126 W
Frequency	1090 MHz
Emission Designator	12M0M1D

## 1.8 Environmental Conditions

Characteristic DO-160D	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 auxiliary cooling required
Altitude	4.6.1	C1	35,000 ft
Temperature Variation	5.0	C	2 °C change rate minimum per minute
Humidity	6.0	A	
Shock	7.0	A	6 G operational shocks 20 G Crash Safety Test Type R in all 6 directions
Vibration	8.0	S	Vibration Curve M
Explosion Proofness	9.0	X	No test required
Water Proofness	10.0	X	No test required
Fluids Susceptibilities	11.0	X	No test required
Sand and Dust	12.0	X	No test required
Fungus Resistance	13.0	X	No test required
Salt Spray	14.0	X	No test required
Magnetic Effect	15.0	Z	Less than 0.3m
Power Input (DC)	16.0	B	
Voltage Spike Conducted	17.0	A	
Audio Frequency Conducted Susceptibility	18.0	A	
Induced Signal Susceptibility	19.0	A	
Radio Frequency Susceptibility	20.0	TT	
Emission of RF Energy	21.0	M	
Lightning Induced Transient Susceptibility	22.0	B3F 3	
Lightning Direct Effects	23.0	X	No test required
Icing	24.0	X	No test required
Electrostatic Discharge (ESD)	25.0	A	

## 1.9 Scope of Delivery

<b>Filser Part Number</b>	<b>Description</b>
TRT800H	Transponder TRT800H
TRT800EM	AC Address Adapter EM800 with cables
MA8K1101 (4 pieces)	through-hole screw for panels up to 3 mm thickness
03.2121.010.71e	Manual "Installation and Operation"
	EASA Form 1

## 1.10 Accessories

<b>Filser Part Number</b>	<b>Description</b>
ZTRT800EMSS	AC address adaptor EM800 for RS232 with power cable, SUB-D interface connector and mating plug
TRKABEL2	antenna-cable 2.5 m (8.2 ft) TNC → BNC, 0.4 dB loss
TRKABEL3	antenna-cable 4.0 m (13.2 ft) TNC → BNC, 0.62 dB loss
TRKABEL4	antenna-cable 6.5 m (21.3 ft) TNC → BNC, 1.0 dB loss
CI-105	Transponder/DME antenna TSO C66b,C74c CI105 Comant Industries Inc. height 3.25", weight 90 g (0.2 lbs)
MA6K1102 (4 pieces required)	through-hole screw for panels from 3 mm to 5 mm thickness

## 2 INSTALLATION

### 2.1 Note

The following suggestions should be considered before installing.

The installer will supply wiring. For diagrams refer to chapter 4 WIRING.

Transponder, AC address adaptor, all cables and antennas should be installed as per “FAA Advisory Circular AC43.13-2A Methods and Guidelines” and the appropriate manufacturer’s instructions.

### 2.2 Unpacking and Inspecting of the Equipment

Carefully unpack the equipment and inspect for transport damages. If a damage claim has to be filed, save the shipping container and all packing materials to substantiate your claim.



For storage or reshipment the original packaging should be used.

## 2.3 Mounting

- For mounting details/drawing refer to chapter 5 DRAWINGS.
- In cooperation with a maintenance shop, location and kind of the installation are specified. The maintenance shop can supply all cables. Suitable sets of cables are available from Filser Electronic 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 control cables.
- Leave sufficient lead length for inspection or repair of the wiring of the connector (containing the memory), so that when the mounting hardware for the rear connectors is removed, the assembly may be pulled forward several inches.
- Bend the harness at the rear connectors to inhibit water droplets (formed due to condensation) from collecting in the connector.
- Remove rotary knobs before mounting:
  - Lift off faceplate with an appropriate tool.
  - Loosen screw and remove rotary knob.
  - Insert cap correctly orientated!



For assembly in panels of a thickness of 3 mm up to 5 mm, longer screws are needed.  
Filser part number: MA6K1102

## 2.4 Equipment Connections

### 2.4.1 Electrical Connections

The 15 pin D-SUB connector includes all electrical connections, except the antenna line, which is connected by a TNC jack.

Use only an AC Address Adaptor TRT800EM or ZTRT800EMSS for they include an EEPROM with the memorized ICAO Aircraft code.



The TRT800 has to be protected by an external slow-blow fuse of 2 amperes.

### 2.4.2 Static Air Connection

Install an approved soft tubing fitting the 5mm static air port at the back-side of the transponder and secure plumbing with appropriate clamps.

### 2.4.3 Background Illumination

When connecting "LIGHT", note the following for the different equipment variants:

- P/N 800ATC-H-(0XX)-(0XX)
  - To switch off Illumination connect "LIGHT" to "Power GND".
  - If LIGHT is not connected to "Power GND", the illumination is controlled in dependency on the ambience brightness.
  - Do not connect LIGHT to any signal except "Power GND"!
- P/N 800ATC-H-(1XX)-(1XX)/P/N 800ATC-H-(2XX)-(1XX)
  - To switch off Illumination connect "LIGHT" to "Power GND" or leave it unconnected.
  - Illumination can be varied using an input voltage (dimmer or switch) from 0 V .. +UB connected to „LIGHT“.

## 2.4.4 Mutual Suppression

Other equipment on board (e. g. DME or TACAN) may transmit in the same frequency band as the transponder.

Mutual suppression is a synchronous pulse that is sent to the other equipment to suppress transmission of a competing transmitter for the duration of the pulse train transmission. The transponder transmission may be suppressed by an external source and vice versa.

To activate mutual suppression connect the SUPP\_I/O signal to the according signals of the other equipment.

## 2.5 Antenna

### 2.5.1 Antenna Selection

- For applicable antennas refer to 1.10 Accessories
- Choose an antenna type compatible with the vehicle and the mounting location.
- Specified features depend on proper installation of the antenna.
- The radiation pattern needs to be verified per aircraft type. Credit can be taken from the approval of a similar type.
- The electrical interference between the antenna and any other equipment must be taken into account in such a way that no reduction of the performance of any other system will occur.

### 2.5.2 Installation Recommendations



In order to avoid the possibility of human body damage (e. g. to eyes) and/or ignition of combustible materials by radiated energy, a safe distance to the installed antenna must be ensured by adequate installation provisions!

- Take note of the antenna manufacturer's instructions.
- Blade antennas are ground plane antennas. They can be installed in metal aircrafts or where a ground plane can be installed. For installation in composite aircrafts, ground planes are to be added. The ground plane should be as large as possible but not less than 30 cm x 30 cm. If in doubt, please contact the aircraft manufacturer.

- Keep away three feet from the ADF sense antenna or any other communication antenna and six feet from the DME antenna.
- Pursue mounting in vertical position under the belly

### 2.5.3 Antenna Wiring

- Refer to 1.10 Accessories for suitable antenna cables.
- Keep wiring as short as possible.
- Avoid sharp bends.
- Avoid cable running near RF generating sources (generators, trim motors, ignition coil or battery charger).
- Keep away from an ADF antenna cable at least 12 inches.
- Electrical connections to the antenna shall be protected against moisture to avoid loss of efficiency.
- A special cable type (CELLFOIL or AIRCELL) has low attenuation at 1090 MHz but is not very resistant against mechanical stress.



Attenuation from antenna to transponder at 1090 MHz must not exceed 1.5 dB!

## 2.6 POST INSTALLATION CHECK



A certified maintenance shop must verify proper operation of the transponder by testing in accordance with Appendix F of “14 CFR Part 43 – ATC Transponder Tests and Inspections”.

All steering and control functions of the aircraft are to be examined, in order to exclude disturbances by the wiring.

The most important factor in the transponder configuration is the setting of the ICAO address.

Verify proper operation of the transponder during an in-flight test under VFR conditions.



## 3 SETTINGS

### 3.1 Overview

The TRT800 has the contingency of storing the following information **(For model differences refer to 1.3 Survey of Variants.):**

- error logging
- one entry/eight entries for
  - ICAO 24-Bit Aircraft Address (AA)
  - Aircraft Category identification code (AC)
  - Flight Identification (FID)
  - ground switch availability
  - interface configuration

AA, AC and FID are stored in a memory device inside the housing of the D-SUB connector (included in delivery).

The cable with this connector shall remain in the aircraft even if the unit is removed, to ensure that the ICAO aircraft address is fixed to the aircraft.

#### 3.1.1 Error Logging

Errors are counted and ordered in the sequence of their occurrence. The error list can be displayed as described in chapter 3.2 Configuration

#### 3.1.2 ICAO 24-Bit Aircraft Address (AA)

Ask your national aviation authority (e. g. in Germany: LBA, department “Verkehrszulassung”) how to obtain the AA.

The assigned AA must not be modified at any time, because a duplicate address would jeopardize the data surveillance and integrity figures of Mode S.



If no AA is stored, after power on the display shows “CRADLE OFF” and the transponder operates in Mode A/C.

### 3.1.3 Aircraft Category Identification Code (AC)

Code	Description	Code	Description
11	vehicle	1C	ultra light
12	emergency vehicle	1E	drone
19	glider	21	light aircraft, motor glider, < 7031 kg (15.500 lbs)
1A	balloon & airship	27	helicopter
1B	paraglider		

### 3.1.4 Flight Identification (FID)

ICAO Document “8168-OPS/611 Volume I (Procedures for Air Navigation Services)” requires that flight crews of aircraft equipped with Mode S shall set the flight identification (FID) into the transponder to ensure that the correlation between flight plan and radar data will work automatically.

FID setting is required to correspond to the aircraft identification that has been (correctly!) specified at item 7 of the ICAO flight plan:

- seven characters maximum, left-aligned, no additional zeros, dashes or spaces

For an aircraft using a company call sign, the Flight-ID consists of the ICAO three-letter designator for the aircraft operator, followed by an identification code, e.g. KLM511, BAW213, JTR25.

If no company call sign is used or no flight plan is filed, the default FID to be set consists of the registration marking of the aircraft (e.g. GXXXX, DEABC) with no dashes, spaces or additional zeros, even if they are included in the registration marking on the aircraft (tail number).



The ICAO Flight Plan only specifies 7 characters as FID. Filser reserves 8 characters as stated in ED-73B for further expansion of the flight plan.

The user shall only program 7 characters for FID.

### 3.1.5 Ground Switch Connection

If a ground switch is connected (and declared in the configuration!), the transponder is able to acknowledge on-ground and in-flight state. In on-ground state, stand-by mode is activated.

### 3.1.6 RS232 Interface

#### For model differences refer to 1.3 Survey of Variants.

With the additionally available address adaptor ZTRT800EMSS the RS232 interface can be connected to a datalink processor (COMM-A/B) or to a GPS system.

- COMM-A/B-usage:
  - COMM-A e. g. to receive the Traffic Information Service (TIS)
  - COMM-B to transmit a ground- or an air-initiated message or to transmit an addressed air-initiated message to a specified ground station.
- GPS-usage:
  - transmission of the position data from the GPS as ADS-B-data with extended squitter to other aircraft

Options (entering procedure: 3.2 Configuration):


- Comm-A/B-support, 38400 Bd)  
Data format for special purpose. An additional data link processor allows COMM-A/B operation and processing of the position information of a flight management system simultaneously.
- FREEFLIGHT (GPS / WAAS Sensor 1201, 19200 Bd)
  - setting of the GPS receiver: not required
  - Transponder expects data format “Continuous GWSS Navigation Packet”.
- KLN94 (Bendix King, KLN 89B, KLN 94, KMD 150, 9600 Bd)
  - setting of KLN89B/KLN94: “Standard RS232 Sentence”
  - setting of KMD 150: “Type 1 Sentence”
- NMEA-Format (4800 Bd)
  - setting: data format RMC is expected; to minimize the amount of data other formats are to be avoided.



Setting for all described GPS-systems:  
1 .. 2 messages per 2 secs.

Information regarding Comm-A/B support as to usability of other GPS equipment are available from Filser Electronic GmbH.

## 3.2 Configuration

	<p>Programming of the ICAOA 24-bit Aircraft Address and of the Aircraft Category shall be executed by qualified personnel only!</p> <p>A wrong Aircraft Address or Flight ID may cause serious problems with ACAS or ATC systems!</p> <p>Pilot and owner are responsible for correctly set transponder data, which shall be checked prior to every flight.</p>
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- press MOD (repeatedly) until “STBY” is displayed
- press and hold FID while a counter is shown right beside the squawk value:

<p><b>1224 02</b></p> <hr style="width: 20%; margin: 0 auto;"/> <p>12C4E619^EHUPDC</p>
--

The lower line contains AA, AC and FID (“^”: cursor);  
 AA and AC are marked by a line above the numbers:  
 digits 1 to 6: ICAO 24-Bit Aircraft Address (HEX-format)  
 digits 7 to 8: Aircraft Category  
 digit 9 to 15: Flight Identification (FID)

- To select a function listed in the following table, release FID at the corresponding counter value.

## List of Functions

Counter	Function
1..4	just display AA/AC/FID data <ul style="list-style-type: none"> <li>○ display automatically returns to STBY</li> </ul>
5..19	change FID only (AA/AC input locked) <ul style="list-style-type: none"> <li>○ turn <b>..X.</b> to set cursor (“^”)</li> <li>○ turn <b>.X..</b> to select characters</li> <li>○ press MOD to save and to return to STBY</li> </ul>
20	test mode (refer to chapter 3.3)
40	display error logging <ul style="list-style-type: none"> <li>○ press MOD to return to STBY</li> </ul>
47	change ICAO-Address/Aircraft Category/FID <ul style="list-style-type: none"> <li>○ turn <b>..X.</b> to set cursor (“^”)</li> <li>○ turn <b>.X..</b> to select characters</li> <li>○ press MOD to enter the next menu item</li> </ul> <hr/> ground switch info <ul style="list-style-type: none"> <li>○ turn <b>.X..</b> to select option (Y/N)</li> <li>○ press MOD to enter the next menu item</li> </ul> <hr/> configure RS232 interface (refer to chapter 3.1.6) <b>(For model variants refer to 1.3 Survey of Variants.)</b> <ul style="list-style-type: none"> <li>○ turn <b>.X..</b> to select option</li> <li>○ press MOD to save and to return to STBY</li> <li>○ Transmission of position data is indicated by “p” in the upper line in the test mode. How to enter test mode see above in this table.</li> </ul> <hr/> From SW 3.10: After running through the first entry, another seven entries (Records) for AA, AC, FID, etc. can be saved. At power-on on one of the stored entries can be selected. (Menu-driven handling.) <ul style="list-style-type: none"> <li>○ select: rotary knob <b>.X..</b></li> <li>○ next item: MODE</li> </ul>
	Turn power off and on again to activate new settings of this item (47).

### 3.3 Test Mode

Refer to 3.2 for entering the test mode.

In this mode all transponder functions are still active but more details are shown on the display.

Line	Display			
1	A/C/R	a/p/v	<b>1224</b>	TM
2	·/PLL	TRX/ANT/DC	FPG	BAT/nn
3	IDT	P/A/E/T	mmmm ft/FLerr	
4	ACS		<b>4444</b>	G/F

Value	Description	Comment
A	all call	reply indicator
C	mode A/C	showing with each answer
R	mode S	
indicator	squitter type	shown with each squitter
a	acquisition	AA and altitude
p	position	position data used
v	velocity	only in COMM-A/B operation
1224	active squawk value	
TM	Test Mode	
·	interface indicator	dot shown, if interface is on
PLL	PLL error	internal error
TRX	transmitter error	
ANT	antenna mismatch	
DC	internal voltage failure	internal error
FPG	FPGA error	
BAT	low battery error	main power supply error
nn	number of FPGA error	
IDT	SPI transmission	SPI pressed

P	ADS-B position input	
A	init COM-B	
E	event driven squitter	
T	TRA (BDS 07)	
mmmm ft	flight level	
FLerr	faulty altitude value	out of -1000 .. 35000 ft, C mode deactivated
A-C ACS STBY		operating mode
4444	stand-by squawk value	
F G	in-flight on-ground	state of ground switch (if connected)

Leave test mode:

- press MOD (repeatedly) until “STBY” is displayed
- press FID once

## 4 WIRING

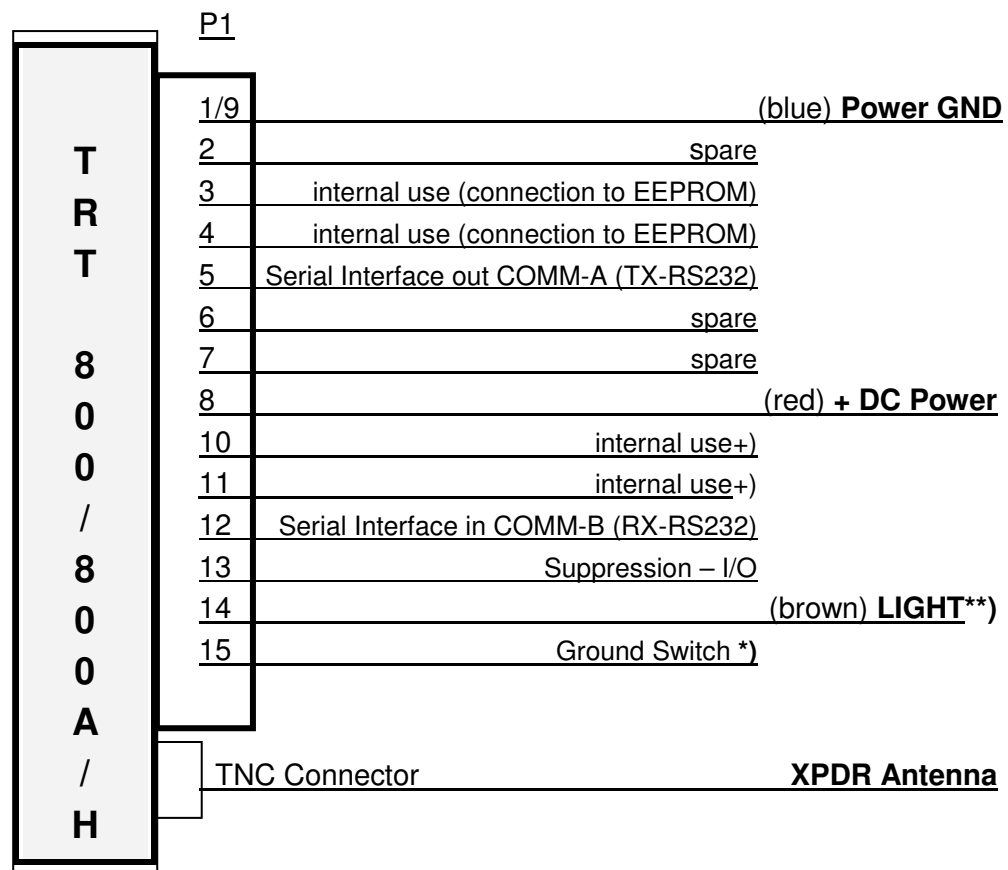
### 4.1 Conductor Cross-Section

Power, GND: AWG20 (0,62 mm<sup>2</sup>)

Signals: AWG22 (0,38 mm<sup>2</sup>)

The conductors must be approved for aircraft use.

### 4.2 TRT800EM – Address Adaptor

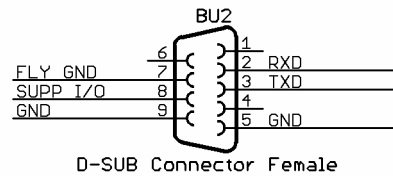
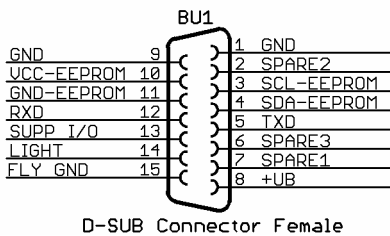
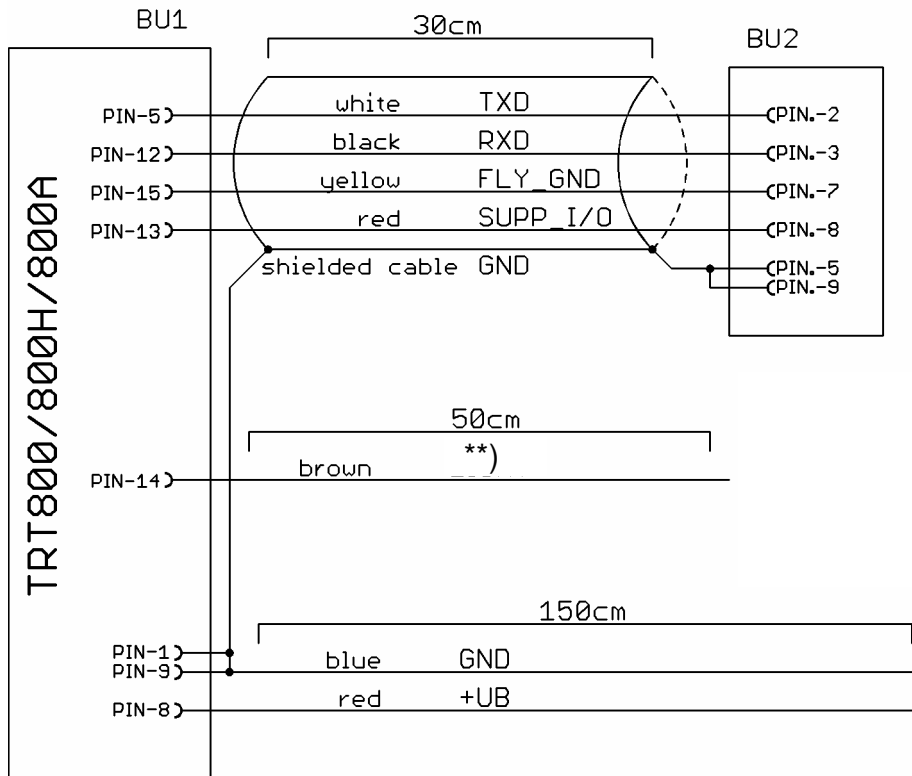


*) Ground Switch/ FLY_GND	If a ground switch is connected, in “on-ground“ state pin 15 must be connected to „Power GND“, otherwise leave Pin 15 open.
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	**) LIGHT Notice chapter 2.4.3 Background Illumination!
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### 4.3 TRT800EMSS – Address Adaptor with RS232

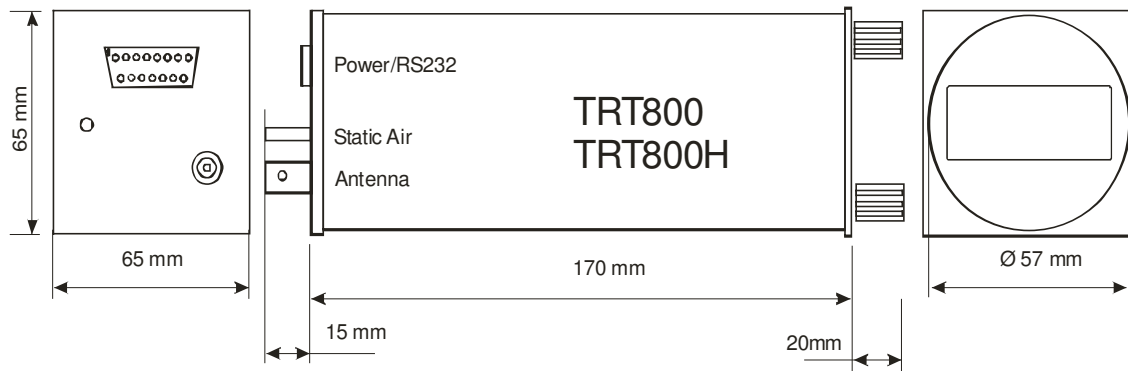


*) Ground Switch/ FLY_GND	If a ground switch is connected, in “on-ground” state pin 15 must be connected to „Power GND“, otherwise leave Pin 15 open.
------------------------------	---

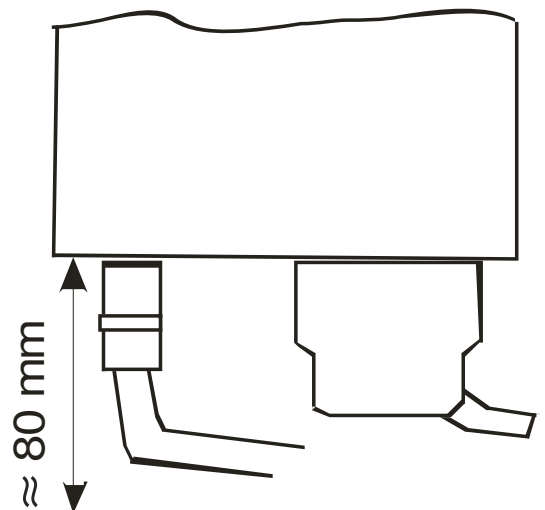
	**) LIGHT Notice chapter 2.4.3 Background Illumination!
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## 5 DRAWINGS

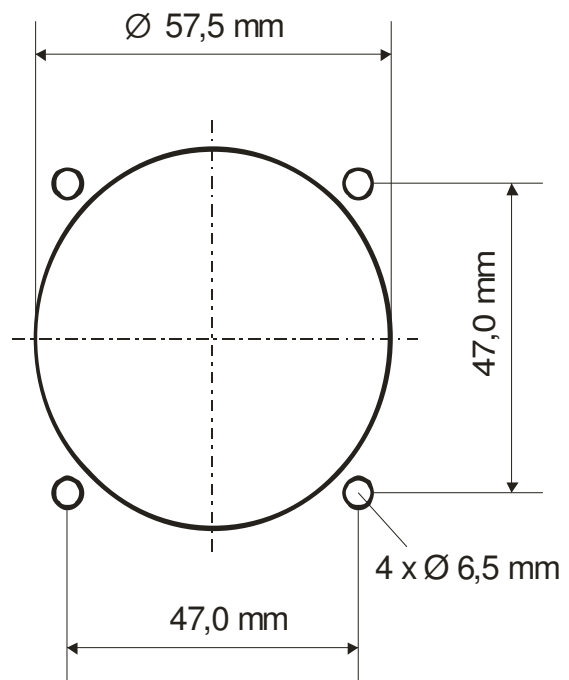
### Equipment Dimensions



### Connector Area



### Panel Cut-out



## 6 OPERATION

### 6.1 ON/OFF

- power on: press approx. 0.5 s
- power off: press approx 3 s

display after power on:

<b>TRT 800H</b> <b>V 2.51</b> <b>FPGA-Vers. 21</b>	Gerätename Software-Version Firmware-Version
--	--

#### From SW 3.10:

If more than one aircraft address/FID exist, select the correct entry with the rotary knob **.X..** and confirm with **MODE**.

### 6.2 FID – Flight ID

- Press **MOD** (repeatedly) to enter “**STBY**” mode.
- Press and hold **FID** while a counter is shown beside the active squawk.

<b>1224 02</b> <hr style="width: 20%; margin: 0 auto;"/> 12C4E619^EHUPDC
---

The lower line contains AA, AC (marked by a line above the numbers) and FID (“^”: cursor):

digits 1 to 6: ICAO 24-bit Aircraft Address (AA, HEX-format)

digits 7 to 8: Aircraft Category (AC)

digit 9 to 15: Flight Identification (FID)

- Release FID at the corresponding value for following functions:

1..4	just display AA/AC/FID data <ul style="list-style-type: none"> <li>○ display automatically returns to STBY</li> </ul>
5..19	change FID only (AA/AC input locked) <ul style="list-style-type: none"> <li>○ turn <b>..X.</b> to set cursor (“^”)</li> <li>○ turn <b>.X..</b> to select characters</li> <li>○ press MOD to save and to return to STBY</li> </ul>

### 6.3 Transponder Mode Selection

Press MOD (repeatedly) to select from the following modes:

- ACS  
Standard condition; transponder responds to mode A, C and S interrogations.
- A-S  
Altitude is not transmitted (neither on C nor on S requests). Other S data are transmitted.
- STBY  
Transponder only responds to directly addressed Mode S interrogations, squitter remains active.  
If a ground switch is connected, actuation of this switch will cause the transponder switch to STBY.

### 6.4 Squawk Setting

- Turn **X.../.X../..X./...X** to switch the four digits of the stand-by Squawk-Codes (lower line).
- turn  $\updownarrow$  to swap stand-by and active squawk.

## 6.5 VFR – Visual Flight Rules

**For model variants refer to 1.3 Survey of Variants.**

### Equipment from SW3.00

The transponder features a user-defined squawk code for VFR-flight (factory setting: 7000):

- Activate VFR mode and VFR squawk:  
Press VFR in normal mode.
- Return to normal mode:  
Use VFR key or any rotary knob (VFR squawk remains active).
- Save active squawk as VFR squawk:  
Keep VFR pressed until “S” is displayed (3 s);  
after releasing the key, VFR mode is activated.

### Equipment prior to SW3.00

The transponder supports two VFR modes:

- VFRD (“D” = Deutschland), automatic squawk, switching below/above 5000 ft (0021/0022)
- VFRW (“W” = World), squawk value user defined

VFRD/VFRW functions:

- Activate VFRD/VFRW:  
Press VFR once (in normal operation).
- Activate alternative Squawk (VFRW or VFRD):  
Press again.
- Return to normal mode:  
Use any other key or rotary knob
- Store active squawk value as VFRW squawk:  
Press and hold VFR for 3 s in normal operation mode;  
VFRW mode is activated after releasing.

### Note

When VFR is activated, the previously active squawk code is stored as stand-by squawk. However it is not visible as it is hidden by the appearing VFR indication.

After leaving VFR mode, the previously used squawk can be activated again by pressing ↕.

## 6.6 ID – Special Position Identification (SPI)

Press ID to activate transmission of the special position identification pulse with every reply within 18 seconds; “IDT” appears on the display.

## 6.7 Error Codes

For possibly displayed errors refer to 6.8 Display.

## 6.8 Display

Line	Display			
<b>1</b>	R	SE	<b>1224</b>	
<b>2</b>	PLL	TRX/ANT/DC	FPG	BAT
<b>3</b>	IDT		FL0100/FLerr	
<b>4</b>	ACS/ STBY		<b>4444</b>	G/F

Ex.	Meaning	Comment
R	reply indicator	showing with each answer
S	Squitter	showing with each squitter
E	Extended squitter	
1224	active squawk value	
PLL	PLL error	internal error
TRX	transmitter error	
ANT	antenna mismatch	check antenna (connection)
DC	internal voltage failure	internal error
FPG	FPGA dialogue error	internal error
BAT	low battery error	check battery/charger
IDT	SPI transmission	SPI pressed
FL0100	flight level (multiply by 100 ft)	
FLerr	faulty altitude value	If the altitude value exceeds the range of -1000 to 35000 ft, mode C is disabled
ACS	mode STBY, A-S, ACS	
4444	stand-by squawk value	
F	in-flight	status of ground switch
G	on-ground	(if connected)

## 6.9 Controls

For model variants refer to 1.3 Survey of Variants.



ON/OFF	ON press for 0,5 s OFF press for 3 s
VFR	activate VFR (also deactivate; model dependent) (select VFRD/VFRW; model dependent) store active squawk as VFR/VFRW squawk (press for 3 s)
↕	swap active and stand-by squawk
IDENT	activate SPI pulse
MODE	select mode ACS, A-S or stand-by
FID	select FID setting (in stand-by mode; press for 5 s)
X.../.X.../..X./...X	set according squawk digit
..X.	set cursor when entering AA/AC/FID
.X..	change values/select options

