

Entwicklung, Design und Herstellung von mechanischen und elektronischen Komponenten im Bereich Industrie, Aviatik und Dienstleistungswesen

## Installation Manual ECW100 Collision Warning Unit



Status

Hardware version 1.1  
(V 1.6 / July 2020)

# 1. Welcome to the ECW100 user community

Thank you for purchasing ECW100, a modern low-cost collision-warning unit for sailplanes and light aircraft. The main task for ECW100 is to support the pilot, while he scans the airspace ahead with his own eyes. ECW100 is simple to use and does not distract the pilot from the main business in hand.

Sport flying is an activity that is associated with considerable risks for crew, passengers, third parties and other objects. **In order to make full and safe use of ECW100, it is absolutely essential to be fully aware of the risks, operating conditions, restrictions and limitations associated with the use of ECW100. This includes familiarity with and observance of the Operating Manual and the Installation Manual.** Additional configuration information can be found in the "Data Port Specifications" document.

We welcome user feedback and reports, suggestions for improvements, and pictures that will help us make further improvements to ECW100. Feedback reports should give a detailed description of the situation, quoting the Hardware and Software versions used, plus the flight data records in IGC format with short time recording intervals.

The latest version of this handbook and other related documents can be found at the Website [www.ediatec.ch](http://www.ediatec.ch). This Website also has answers to Frequently Asked Questions (FAQ). This Website also carries announcements when new software versions or functions become available. If you send back the registry card, you will automatically receive notification of changes as and when they happen by e-mail.

**Software-Versions 7.xx will only remain operational until the end of October 31, 2021. After this date, you must update the device in order to use it in the air.**

On publication the update will have no functional changes and can be downloaded free of charge. Users will be able to load the software with the SD card. Software validity has to be time-limited to ensure that all ECW100 units are mutually compatible and that updates include the latest obstacle data.

The obstacle database is chargeable and can be ordered from FLARM Technology GmbH under the following link: <https://shop.flarm.com/>

When ordering the obstacle database, the internal serial number of the ECW100 must be specified. This number can be found in the flarmdev.csv file on the SD card.

## Hardware version

Immediately after it has been switched on there follows a one-second long beep while a start-up pattern might be shown on the LED, followed by a presentation of the Hardware-Version installed during the system self-test (distance display x.x).

## Software version

This is followed by another one-second beep, followed by a presentation of the Software-Version. The distance display represent the minor version (x.x\_), the collision LEDs clockwise the major version (\_.x).

## 2. How it works

ECW100 receives position and movement information from an internal 16 channel GPS receiver with an external antenna. A pressure sensor further enhances the accuracy of position measurements. The predicted flight path of a first aircraft — in which ECW100 is installed — is calculated by ECW100 and the information transmitted by radio, as a low power digital burst signal at one-second intervals. Provided they are within receiving range these signals are received by further aircraft also equipped with ECW100. The incoming signal is compared with the flight path calculated and predicted for the second aircraft. At the same time, ECW100 compares the predicted flight path with known obstacle data, including electric power lines, radio masts and cable cars.

If ECW100 determines the risk of dangerous proximity to one or more aircraft or obstacles, the unit gives the pilot warning of the greatest danger at that moment. The warning is given by a whistle sound (beep) and bright light emitting diodes (LED). The display also gives indication of the threat level, plus the horizontal and vertical bearing to the threat.

The operating range is very dependent upon the antenna installation in the aircraft. The normal range is about 2 km, but up to 5 km may be achieved in individual cases.

The GPS and collision coordinates of the other aircraft can also be made available for use in other systems (e.g. external display, speech synthesizer, PDA) via a serial data output.

In addition, ECW100 operates as an IGC compatible flight data recorder if this software option has been configured.

## 3. SD card

Use the SD card to update firmware and download flights to your PC.

### **Firmware update:**

To update firmware and obstacle databank put in the SD card before power up ECW100. The new data updates automatically and shows with the collision LEDs and distance display. After an update the unit reboots. Check the current firmware version during start up. The version of the obstacle databank does not display.

### **Logger files:**

Flight recording automatically starts when the aircraft is moving and ends when the unit is switched off. Switching off or rebooting the device during the flight results in separate flight record files. Allow at least 2 minutes (if the interval is 4s, our recommended value) after landing before you switch off the device else you lose the last part of the flight. Allow more time after landing if the interval is higher. When the memory is full, the oldest data is overwritten. Always download you flight data before you update the obstacle databank or the software.

## 4. General Advice on Installation

**Installation and operation must be on the basis of non-interference with and no hazard to the existing suite of other certified equipment necessary for safe flying operation, or installed to comply with official requirements. Installation and operation must comply with official regulations and requirements.** When ECW100 is permanently installed in an aircraft in Switzerland, the installation must comply with the "FLARM and TR-DVS Installation Policy" published by the Swiss Civil Aviation Authority (FOCA). In Germany, an installation as portable device is possible in gliders and motor-gliders; if an installation in powered aircraft is considered, European Commission Regulation (EC) No 1702/2003 must be respected.

ECW100 must be secured in such a position that the pilot has the display LEDs in direct view, and can hear the acoustic warning tone and operate the control buttons. ECW100 must not obstruct the piloting operation and in particular it must not hinder his field of view. These requirements must be maintained at all times during conditions of strong turbulence and acceleration. ECW100 is not suited for use in conjunction with night vision systems, night flying (no dimmers) or in pressurized cabins.

Ideally, ECW100 will be installed in a 57 mm hole in the instrument panel. If possible, ECW100 should be so installed that the pilot does not inadvertently touch the push-buttons during cockpit ingress and egress. Cables must not be folded or under tension. The installation must allow adequate space for cable connectors and the internal antenna.

ECW100, the radio antenna and the GPS antenna should each be installed at least 25 cm away from the magnetic compass, more if possible.

**After installation, an appropriate entry should be made in the aircraft technical logs and a check made that the installation is in no way detrimental to the performance of mechanical, electrical or magnetic (e.g. compass) performance of other aircraft systems (e.g. radio).**

The unit serial number and software version should be recorded in the aircraft technical log. In the case of a permanent installation, the "Means of Compliance" should be confirmed in the aircraft technical log, and an "AFM Supplement" carried in the aircraft.

**The following remark is to place at the instrument panel by the ECW100:**

**For Situation Awareness only**

## 5. Housing

The front of the housing has fore threads, so that ECW100 can easily be secured by fore M4 screws (no more than 10 mm long).

On the rear side there are two distance holders on the D-Sub-15 Connector. Do not remove these distance holders.

**By opening the housing, all guarantees relating to the equipment become null and void.**

ECW100 is not sealed and care should be taken not to allow ingress of solid particles or liquids. Should the unit become wet, it must be thoroughly dried prior to use. Condensation may occur if the unit is subjected to sudden massive cooling. The housing should only be cleaned with a slightly moist nonabrasive cloth without any cleaning agents. The housing can be damaged by scratches and abrasion.

The front housing is black to minimize glare and has been tested at temperatures from -10°C to +60°C and should be protected from excessive direct or indirect solar heating. The unit should not be exposed to strong locally focused solar radiation. Care should be taken when the cockpit canopy is open (lens effect fire hazard).

## 6. Connectors

The rear face has an SMA socket for a  $\lambda/2$  dipole radio antenna [RF], a D-Sub connector [D-SUB 15] for power and data and a MCX socket for an active GPS antenna [GPS].



## 7. Power/Data

The cable kit with a D-Sub-15 connector "power/data" is to lock in place. The key to the connections is defined by the numbers on the connector:

Pin	Color	Power/Data	Remarks
1	red	+8 .. +26 V DC	Power line (Pin 1 and 2, Pin 4 and 5 are wired together inside)
2		+8 .. +26 V DC	
3		GPS test	
4		Ground	
5	black	Ground	
6		GPS test	
7		GPS test	
8		GPS test	
9		+3 V DC	
10		nc	Power to the external display
11		RX	Serial data RS-232 available for use in other systems e.g. external display, PDA, TR-DVS... (NMEA data: GPS, warnings)
12		TX	
13		Ground	
14		Aux Line Intercom	Driver for intercom or head set
15		Ground	

The cable kit contains at minimum two cables for power (Pin 1 and 5).

In spite of reverse polarity protection, it is important to check for correct polarity during installation; in particular the power supply and data wires must not be interchanged.



## **7.1. Power (Pin 1, 5)**

**During flight operations at least Pins 1 and 5 must be connected.**

**There must be a direct electrical connection between ECW100 and the aircraft battery. This connection must be via a 1 AT fuse. Essential electrically-operated flight instruments must not draw their power through ECW100 fuse. It must be possible for the pilot to interrupt the power supply to ECW100 during flight by means of a switch or circuit breaker without affecting other essential aircraft systems. This might be necessary if the pilot suspects that ECW100 may be interfering with another on-board system, the suspected presence of smoke, the smell of smoke, or flying in a country where the use of ECW100 is not permitted.**

**In spite of reverse polarity protection, it is important to check for correct polarity during installation; in particular the power supply and data wires must not be interchanged.**

After switching on and the self-test routine, the unit must first capture satellite signals to establish position. Even if the antenna has a clear view of the sky, this process can take a few minutes. For this reason a glider tug pilot should leave ECW100 switched on during brief waiting periods between flights. During night flights ECW100 must be switched off.

## **7.2. GPS Test (Pin 3, 6, 7, 8)**

The GPS test is not for customers use.

## **7.3. Serial Data RS-232 (Pin 11, 12, 13)**

In normal configuration Pin 12 transmits the most important NMEA-0183 Version 2.0 compatible GPWGA and GPRMC codes at a configurable data rate (see document "Data Port Specifications"); also Garmin proprietary PGRMZ codes with barometric altitude information. Further codes are provided for third party applications (e.g. external displays). These are described in a separate document "Data Port Specifications". This document also describes how ECW100 software may be configured.

The power for external displays can be connecting to Pin 9 (+3 V).

## **7.4. Intercom / Head set (Pin 14, 15)**

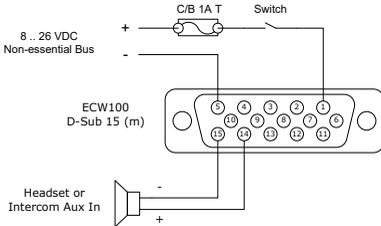
In motor airplane the warning sound can connect to an intercom, radio or head set. It's a standard AC signal with max. 1 V.

## 7.5. Wiring Schematics

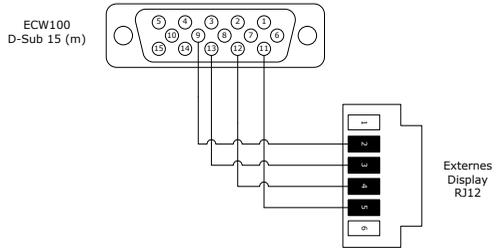
All connectors are shown from rear side (cable side).

The standard cable set includes the two power lines (red, black). Optional cables and connectors can be ordered by your dealer.

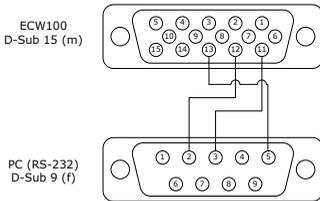
### 7.5.1. Power and Intercom



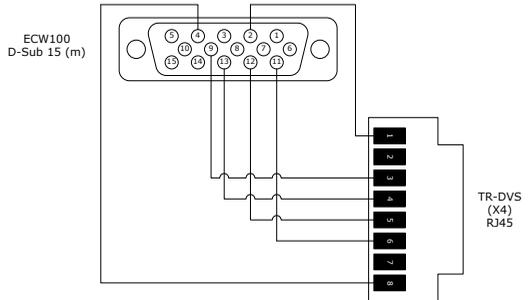
### 7.5.3. External display



### 7.5.2. Computer



### 7.5.4. TR-DVS



## 8. GPS

**The external GPS antenna supplied with the unit must be connected; ECW100 will not operate without an adequate GPS signal.**

The cable length of the 50-Ω-RG-174/U cable with MCX connector is about 5 m. A specialist must undertake any shortening of the cable, which must not be cut to less than 0.5 m. Antenna splitters must not be used. EDIATec rejects any responsibility.

**The antenna should be horizontal in straight flight and have a generally unobstructed view of the sky, including during turns. The antenna should not have any electrically conducting surfaces (e.g. metal, carbon fibre) above or immediately alongside. Ideally, the antenna will be located on top of the instrument panel. Electrically conducting sheet metal under the antenna may enhance its performance.**

The antenna base contains magnets, but nevertheless requires additional attachments. The antenna must under no circumstances interfere with correct compass operation. If the antenna interferes with the compass, the magnets in the antenna base must be removed with a screwdriver and the metallic foil put back.

**If the aircraft is fitted with two or more GPS antennae, they should be separated if possible by at least 25 cm; the same holds good for ECW100 radio antennae.**



## 9. Radio Antenna

The radio antenna is required for operation of ECW100. It's an external  $\lambda/2$  dipole antenna with 3 m cable (50 RG-174U on conventional SMA), for internal or external installation.

The correct installation has a considerable effect upon range for transmitter/receiver range, so the installation must be carefully considered. The antenna must be vertical, allowing generally unobstructed radiation to the front and sides. Horizontal or inclined installation is not acceptable. In particular, there should be no electrically conducting surfaces (metal, carbon fibre) above or immediately alongside the antenna.

**This antenna doesn't need a ground plane.**

Installation may only be in a Zone 2A or 3 as described in DO-160E Section 23.



## 10. Sound Signal

The housing upper face has a number of holes to improve the transmission of sound from the internal emitter to the cockpit. **These holes must remain unobstructed.** ECW100 has an output to connect to an intercom or head set.

## 11. Limitations

ECW100 is designed and built as a non-essential "situation awareness only" unit to support the pilot, and cannot always provide reliable warnings. In particular, ECW100 does **not** give any guidance on avoiding action. Under no circumstances should a pilot or crewmember adopt different tactics or deviate from the normal principles of safe airmanship. The use of ECW100 is solely at the discretion of the commander and his crew. Operation must be preceded by thorough familiarization by the commander or his delegated crewmember with the Operating Manual.

ECW100 can only warn the pilot of the presence of other aircraft that are also fitted with ECW100, FLARM or compatible equipment, or warn of obstacles that are stored in the internal data bank. ECW100 does not communicate with Mode A/C/S transponders, and remains undetected by ACAS/TCAS/TPAS or Air Traffic Control systems. Likewise, ECW100 does not communicate with TIS-B, FIS-B or ADS-B.

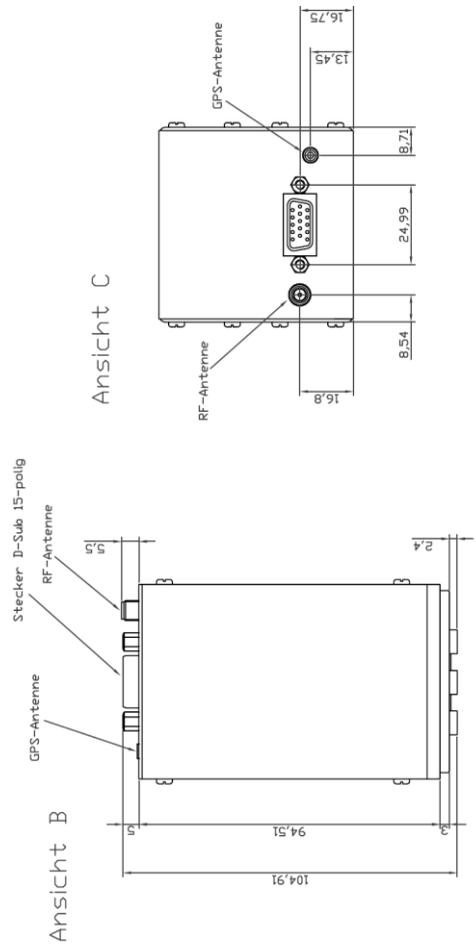
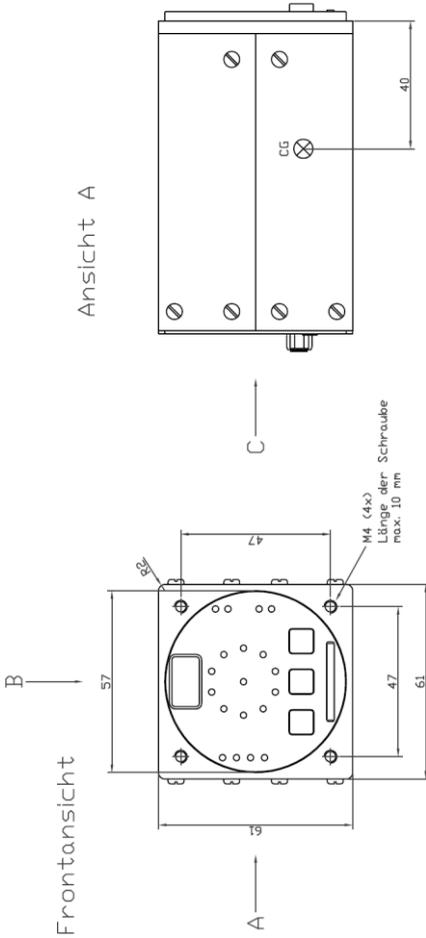
At present ECW100 is not certified by the Civil Aviation Authorities and has not been tested in accordance with the normal aviation requirements (e.g. DO-160E), therefore no EASA Form1 can be handed out. ECW100 software development is commensurate with "Level E" of DO-178B; in other words a failure of the unit will have no effect upon aircraft operation and does not increase crew workload. The ECW100 obstacle data bank is not certified.

Air band radio frequency allocation and licensing conditions may vary from country to country. The aircraft commander is solely responsible for ensuring that ECW100 is operated in conformity with the respective licensing conditions. No license is required to operate ECW100 in **Switzerland**.

Until further notice ECW100 may not be used in the USA or Canada without written authority of EDIATec GmbH, or in an aircraft that is registered and/or insured in the USA or Canada. Likewise, operation of ECW100 is forbidden in aircraft in which one or more of the occupants resides in or is a citizen of the USA or Canada. Likewise, use of ECW100 is forbidden if the aircraft concerned takes off from, makes an intermediate or final landing in the USA or Canada.

EDIATec GmbH its associates, development team, suppliers, manufacturers and data suppliers accept no responsibility for any damage or claims that may arise from use of ECW100.

# 12. Technical Drawing



## 13. Technical Data

The following data are provided without guarantee and may be altered at any time without notice.

Height:	61 mm
Width:	61 mm (without M2.5 screws on bough sides)
Length:	95 mm housing (behind instrument panel, without connectors), 105 mm total length (incl. button and connector)
Weight:	190 g (without radio antenna, without GPS-Antenna, without cable)
Power supply:	external power supply from 8.0 up to 26.0 V DC (peak voltage up to 28.0 V DC) recommended value 12 V DC, direct galvanic link to aircraft battery via an essential 1 AT circuit breaker; this must be separate from other essential aircraft power systems ECW100 has reverse polarity protection
Power drain:	typically approx. 60 mA at 12 V DC (normal operation without warnings or external display), a collision warning may double these values
Serial data:	bi-directional RS232, compatible with NMEA-0183 Version 2.0, standard message format GPRMC, GPGGA, data rate 4.8 to 57.6 kBaud, additional NMEA proprietary sentences PFLA and PGRMZ (described in a separate document)
GPS:	16-Channel WAAS/EGNOS compatible GPS engine, external 50 $\Omega$ active antenna with 5 m 50- $\Omega$ -RG-174/U cable, MCX connector, 3.3V, dimensions depending upon the antenna used, usually rectangular 45x45 to 50x50 mm, oval or circular of approx. 12 mm thickness.
Radio:	SRD-F-Band 868.0 to 868.6 MHz (Europe), other frequencies depending upon configuration less than 1 % duty cycle, peak pulse power 10 mW (ERP), external radio antenna ( $\lambda/2$ Dipole) (screw-fitted to conventional SMA connector) range approx 2 km, possibly up to 5 km, depending upon antenna and installation
Temperature:	Operation: -10°C to +60°C, storage: -20°C to +70°C, no certification in accordance with DO-160E Sections 4 and 5
Intercom:	signal to intercom, radio or head set, max. 1 V
Vibration:	Use in conditions of strong vibration or turbulence should be avoided or subsequently checked prior to continued operation, no certification in accordance with DO-160E Section 8
Country of Origin:	Switzerland

### DECLARATION OF CONFORMITY

EDIATec GmbH, Im Baumgarten 10, 3600 Thun, Switzerland declares that in typical configuration the "ECW100 Collision Warning Unit" meets the requirements of the CE Mark. The radio conforms to the requirements of EN 300 220-3:2000 (Power Class 9. The EMC conforms with EN 301 489-3:2002-08 for a Class 3 SRD Device (equipment type I). ECW100 is a Class 1 item of radio equipment as defined by R&TTE Directive.

Thun, February 2007

