



# User Manual

## Logger 4.0

( Release 1.1 )



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## Document History

Date	Version	Reason
27.08.2022	V1	Initial version
30.08.2022	V1.1	Corrections

## 1 Key features



### key features

- Designed for EASA CS-STAN issue4 compatibility using CS-SC104b or CS-SC106b
- 52 mm size to be used as direct replacement for old hops meters
- Mounting accessories for 57mm slots or cockpit on top
- Crew ID detection for pilot and instructor using RFID technology
- Tracking by GPS, GALILEO, GLONASS, BEIDONG in parallel, 2 antenna diversity
- Blind positioning by inertial navigation in deep valley airfields without satellites
- Logging of roll-pitch-yaw angles and accelerations of plane cell
- Hard landing snap shot of accelerations and roll-pitch-yaw angles
- Ongoing bus voltage logging
- Optional RPM logging
- Optional engine temperature logging
- Mobile carrier systems 4G LTE, IOT NB + 2G GPRS
- Display for log time assistance in the cabin



## 2 Installation

### 2.1 Supply items

The hardware items supplied consist of the Logger itself, and mounting accessories to fit it into VDO type 52mm through holes used by Rotax engine instruments, 57mm slots or even cockpit on top mounting.

Further materials, wires, cable binders, fuses and screws are not part of the delivery package but will be needed for an installation.

### 2.2 mechanical and electrical data sheet

mechanical data	value	unit
size	60*60*120	mm
needed throughhole	52	mm
weight	less then 300	gr
interface	9	nr. of male D-SUB pins

electrical data D-SUB 9	function (all pins except 9 are inputs)	max. input voltage	typical current consumption / minimum input impedance
Pin 1	Gnd	0	
Pin 2	Internal use		
Pin 3	Switched signal, plus or Gnd	30V	< 1mA , > 47 K Ohm
Pin 4	Reserved , V24 Receiver	+/-12V: do not connect	
Pin 5	Permanent supply	30V	< 0.1A @ MAIN ON < 3A peak, 200mA mean @ Transmit= MAIN OFF < 150 uA @ Standby
Pin 6	Counter (RPM)	30V	< 3 mA, > 10 K Ohm
Pin 7	Set inverted switch on logic	Open / Gnd	< 0.01mA, > 100 K Ohm
Pin 8	Analog input (temperature)	30V	< 0.1mA, > 100 K Ohm
Pin 9	Reserved , V24 Transmitter	Output : do not connect	



### 2.3 Assured characteristics with respect to continued airworthiness

The design of the Logger was carefully done for almost no influence on the plane and it's manuals at all. Especially CS-STAN was taken into account resulting in the following assured characteristics:

- Mechanically it can easily be fitted into European 52mm or US 57mm standard slots or mounted cockpit on top in a solid safe way using a supplied accessory. The weight is less than 300 grams to ensure its inclusion will only have a minor influence on weight & balance calculation.
- Electrically it is a low power design and it contains an own 1 A internal melting fuse at it's major supply line pin 5. This gives protection against internal shortcuts within the logger but does not protect the additional installation wires. One should take own precautions using fuses at the sourcing points.
- Automatic Flight Mode is implemented. Internal hardware capable of spurious emissions, light emissions as well as RF transmissions runs on an own internal supply bus.

These are a switching regulator, the display illumination, an RFID as well as an LTE / GSM transceiver. Whenever the controlling signal at pin3 switches to ON (plane in use), these hardware functions are at first disabled by software within a few seconds. Additionally after a maximum of 10 seconds the power supply of these components is fully shut down by hardware making it impossible for the components to emit light or radiation. This additional shut off implementation in hardware provides a protection against software malfunctions and this allows for software updates after the released change.

As a prerequisite that Light and RF transmitting hardware functions will be powered, the plane must be switched OFF and the GNSS Receiver must detect zero speed. Under unknown speed conditions, while moving or when the plane is switched on, these components will not be powered.

- With respect to environmental conditions the device is designed to be operated under all temperature and pressure conditions which can be found inside manned air crafts.
- There is no batteries included in the system. There is also no mechanical parts like switches. As a consequence the device itself needs no maintenance. Maintenance and inspection will be limited to the additional installation wires, fuses and materials provided by the installer. We recommend to carry out the change documentation in a way, that maintenance on the installed wires and cables does not differ from the normal maintenance cycle and

# **CHARTERWARE**

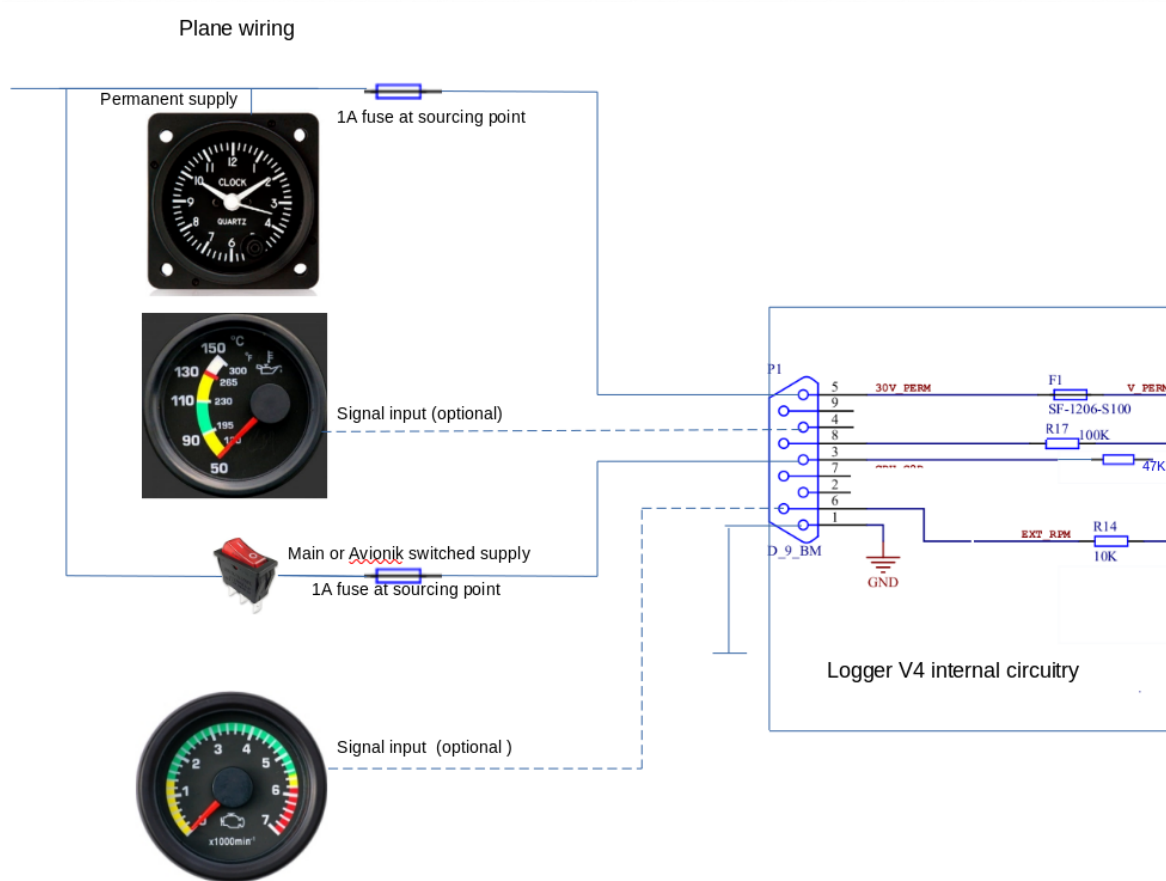
maintenance instructions of the plane and provide an instruction for continuing airworthiness (ICAs) like that.

- The logger does not provide a different flight experience as it does not need any extra crew tasks while the plane is in use that is while flying, taxiing, or even only when main switch is on. Crew identification can only be done when the plane is standing and its main switch is OFF after flight.

Therefore no aircraft flight manual supplement (AFMS) needs to be provided or it should be provided with a statement that no additional tasks are necessary.

## 2.4 A basic installation like for a Cessna 170, Piper 28 etc. or most Microlights

In a basic electrical installation pin1 is connected to Gnd, pin5 is connected to a permanent supply (i.e. in parallel with the clock) and pin 3 is connected to a switched supply like main or avionic supply. The device comes with an own internal fuse and current limiting resistors like shown in the graph. However to protect your extra installed supply wires we strictly recommend to install in line fuses at the sourcing points of your supply lines for pin 3 and 5. 1A is sufficient.



The logger contains own internal sensors for accelerations, turn rates and positions. To use them it is sufficient to provide the 3 supply lines at pins 1,3 and 5.

If one would like to log also frequency counts like RPM or measure an analogue voltage like the signal usually supplied to a temperature instrument, then such signals can optionally be connected to the logger. Both will only be listened to by high impedance inputs if connected.



However it has to be checked whether the legal situation allows for such optional connections.

For example if the installation is done based on Standard Change CS-SC106b then

**please note it's limitation:**

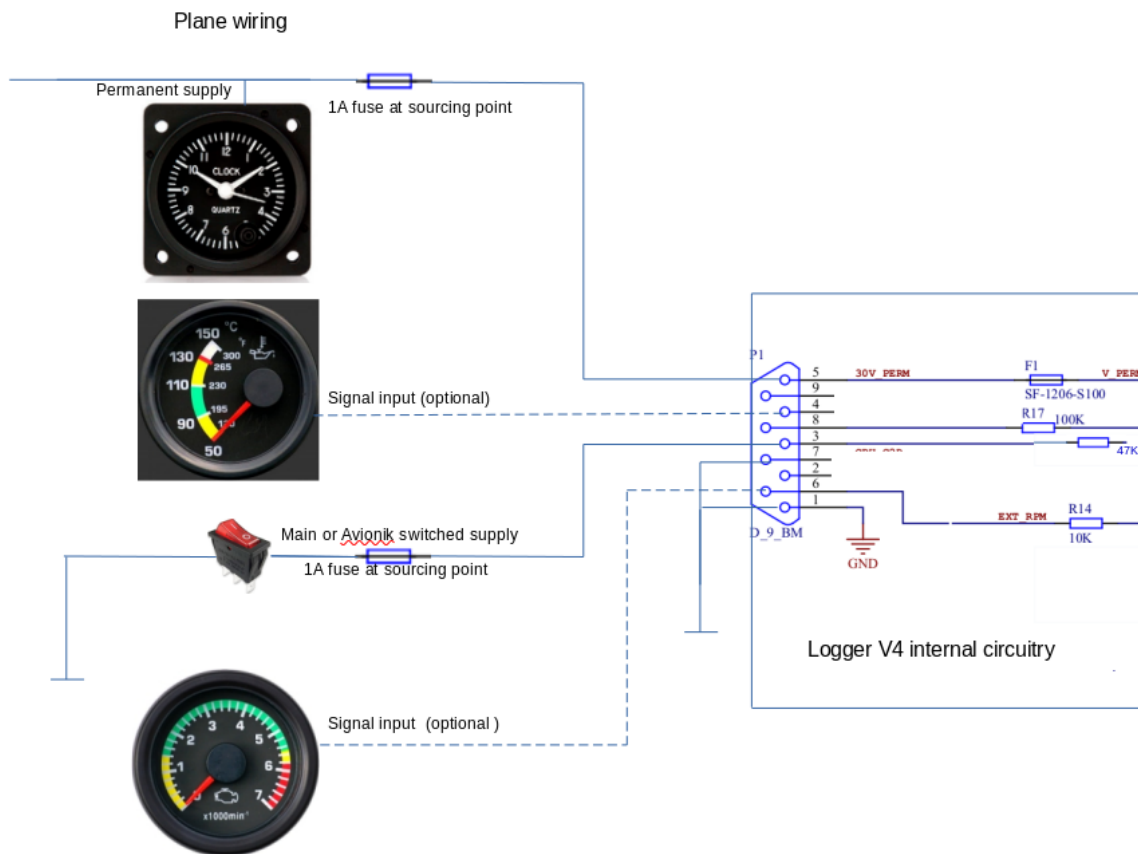
**“Data bus/data connectivity between the flight-time recorder and any other equipment that is ETSO authorised or approved in accordance with point 21.A.305 is not allowed.”**

Whether a 10 K Ohm Input coupling for impulse counting and /or a 100 K Ohm input coupling for an analogue measurement is already considered to be a “Data bus / data connectivity” must be left open for clarification by the releasing person eventually consulting the national FAA administration.



## 2.5 Some inverted switched supply busses

Some planes like Socata and Robin keep their avionic devices permanently connected to positive supply while they are breaking the connection to ground to switch them off. The logger supports such inverted switching logic if you connect pin 7 to Gnd rather than keeping it unconnected. After doing so, the main switched input pin 3 will be activated by a ground signal at pin 3 rather than plus. All the other descriptions of the above paragraph apply unchanged.



## 3 Operation

The Unit works autonomously controlled by main switch with no extra tasks for the crew while the plane is in use.

After GNSS recognition it displays the UTC Time as well as the Sunset Time @ the current place and day. This may change during your flight as the current location changes.

As soon as the plane is switched Off in its parking position, the units expects the wireless entry of up to 2 ID chips. The RFID Antenna is located above the LCD display.

The following order is defined and important to manage:

1. Identification from pilot in charge.
2. Identification will be interpreted as instructor

After the first identification the unit will show either Block times or Flight Times to note into the planes paper book or the personal flight log. Putting the ID chip again in the units reach, those times will be toggled for your convenience.

However after a 2nd different ID was given, the unit immediately starts transmission via a mobile network.

If only one ID was supplied, the unit will start transmission after 1 further minute.

If no Id was provided, then transmission is started after 5 minutes calculated from switch OFF time.

Then it should switch to Standby mode. This behaviour should be used as a test procedure. It is not necessary to fly for a test. Awaiting UTC time in the display and switching then off is sufficient for a test cycle.

## 4 G-Metering and Turn Rate Logging

3 axis angles of the plane are monitored during airborne time. They are provided with every position log. Simulators can later on be feeded with such data to generate a realistic replay of the flight including a rolling and nicking horizon view. Furthermore, when the plane is in landing configuration, which is detected by sinking and a ground speed slightly above stall speed, then upon an vertical acceleration of more than 2.5g a 6 dimensional snap shot is recorded. It covers 3 axis acellerations as well as 3 axis turn rates for 0.5 seconds. This provides information about a hard landing and a further visualization.

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