Manual

Installation instructions

canopy flash

connectBOX & canopy-power interface

Version	1.3
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1 Important information

Installation and usage of the canopy flash is at your own risk and responsibility. It requires approval by an aircraft inspector authorized for such work and a complete documentation and is only allowed to be operated on board of gliders under VFR-daylight flight rules. Improper installation may lead to failure of the aircraft avionic system. The canopy flash is a system to enhance flight safety. The improved visibility results in a faster detection of aircraft, however the system solely assists airspace observation by the PILOT IN COMMAND and must not replace it at any time. SOTECC will not cover failures due to unauthorized installation, alterations, repairs, abuse, misuse or accidents.

SOTECC GmbH reserves the right to amend its products regarding technical data and functions without previous notice. SOTECC accepts no liability for mistakes in writing, misprints or miscalculations or any other errors and has the right to withdraw at any time.

Caution, high intensity optical radiation!

Handling on ground: do not look directly into the light!

Avoid direct contact with water!

2 Emergency operation

In the event of a malfunction or failure, the system must be switched off immediately and must stay off for the remaining flight time. Never switch on the system again inflight, after or while persisting errors.

3 Operation without connectBOX

After switching on (by switch/fuse) the canopy flash starts flashing with a frequency of 0,6Hz, e.g. a flash every 1,5sec. This frequency is a compromise between visibility and power consumption and cannot be modified or adapted via the SOTECC-configurator. As there is no connection to FLARM®, evaluation of collision data or similar is not possible and it results in a steady flash frequency as long as the system is switched on.

4 Operation with connectBOX

4.1 Automatic mode

Switching on the power supply (and if exist, closing the canopy-power interface), activates systems function test. This test includes flashing for 5sec with the „normal flight flash frequency“ to detect internal errors and to make sure that the system works properly.

Connection between canopy flash and FLARM® is made possible by the connectBOX. As soon as the FLARM® recognizes a takeoff (depending on a preset velocity), it thereupon sends this information via the connectBOX to the canopy flash. The canopy flash then starts flashing with a battery saving frequency of 0,6Hz, e.g. a flash every 1,5sec or set individually via the SOTECC-Configurator. After landing and coming to a complete stop, the canopy flash stops flashing automatically. Information regarding adjustment of the „normal flight flash frequency“ (battery saving frequency), programming and updating of the connectBOX under the item 10 „SOTECC-Configurator“.

4.1.1 Alarm mode

A collision threat detected by FLARM® changes the flash frequency and its flash pattern instantly. The „flashes“ are getting longer with a higher flash frequency and thus even more striking. Triggering alarm mode depends on several parameters:

- Approach angle of conflicting traffic within +- 45 degrees and only oncoming traffic
- Collision warning by FLARM®. The alarm-threshold can be changed with help of the SOTECC-configurator, default setting is „important alarm“. Selectable modes are „low alarm“ (moderate danger with approach time between 19 – 25 s), „important alarm“ (medium danger with approach time between 14 – 18 s) and „urgent alarm“ (immediate danger with approach time between 6 - 8 s). These data is analog to FLARM® „warning level“. *Further information in the handbook of FLARM® or info@sotecc.de.*

After being clear of conflict and passing the oncoming traffic safely, the canopy flash automatically switches back to the „normal flight flash frequency“.

5 Serial number

All components are labeled with serial numbers for clear identification, composed of letters and numbers like:

ACL	3820	501	0001	/	FW	1.4
(a)	(b)	(c)	(d)		(e)	

(a) Component (ACL=canopy flash, FC=connectBOX)

(b) Date of production (example: CW38/2020)

(c) Version (example: 501)

(d) Consecutive number example: 0001)

(e) Firmware (example: FW 1.4)

6 Technical data

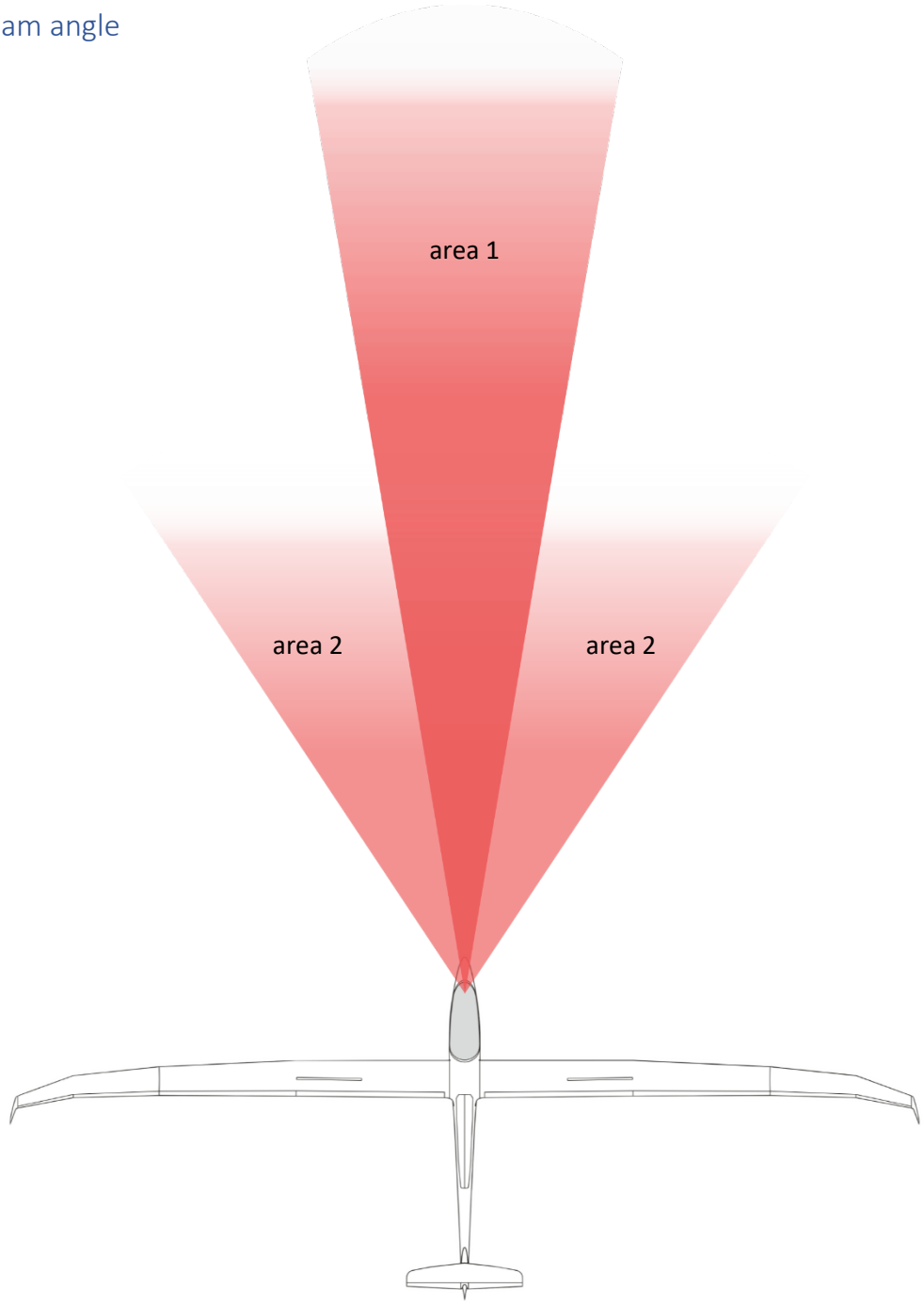
6.1 Canopy flash

Luminous flux	~ 2200 lm (white LEDs, red similar)
Beam angle	~ 18° concentrated light beam, ~ 60-70° visible
Beam current	25000 mW (white LEDs, red similar)
Power consumption	Ø 100mA at 13V and „normal flight flash frequency“ without warnings
Operating voltage	9-15 V DC
Weight	90g
Operating temperature	−30 °C to + 70 °C
Overheat protection	70 °C
Material	3D-printed, resistant PA12 plastic

6.2 connectBOX

Power consumption	Ø 50mA at 13V
Operating voltage	9-15 V DC
Weight	120g
Operating temperature	−30 °C to + 85 °C
Dimensions	50mm x 50mm x25mm
Material	Aluminium housing

6.3 Beam angle



Area 1: ~ 18° concentrated light beam, which can be seen about 3500m, depending on the prevailing conditions.

Area 2: Peripheral area, ~ 60 - 70 degrees wide, but slightly weaker. Visibility can differ significantly, depending on outside conditions.

7 Components overview

7.1 Canopy flash

The housing of the canopy flash is made of resistant PA12 plastic. Cooling fins on the bottom side ensures heat dissipation and minimizes overheat risk, especially in strong sunlight. Five high quality

CREE® LEDs (either white or red) in combination with LED lenses, generating a bundled and strong light beam. An integrated LED on the backside of the canopy flash housing informs the pilot about the proper functioning of the system (see item 3). The heart of each canopy flash is the energy saving LED-control unit with an integrated temperature and error control unit, to prevent system overheat or internal damage. If a temperature of about 70°C is exceeded, the canopy flash automatically switches off, however this temperature cannot be reached in normal operation, only if the system has a malfunction or in extreme sunlight on ground.

7.1.1 LED function indicator

An integrated LED on the backside of the canopy flash housing informs the pilot about the proper functioning of the system. Possible indications can be:

Steady green, active system inflight mode, flashing with energy saving frequency.

Flashing green/red, collision threat recognized, flashing with striking frequency (alarm-mode).

Steady red, automatically switched off to prevent system overheat. Wait until green light appears.

7.2 connectBOX

The connectBOX connects the canopy flash with FLARM® and makes an automatic operation possible. This results in 3 different modes:

- Mode 1: Canopy flash off on ground without movement. (waiting for take-off)

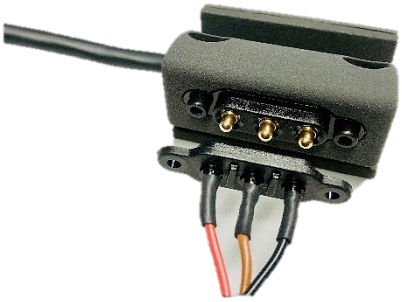
- Mode 2: Once gaining speed and taking-off, the canopy flash automatically starts flashing with the „normal flight flash frequency“
- Mode 3: If an imminent collision is detected by FLARM®, the flash frequency and flash pattern changes instantly.

7.3 Quick separation point

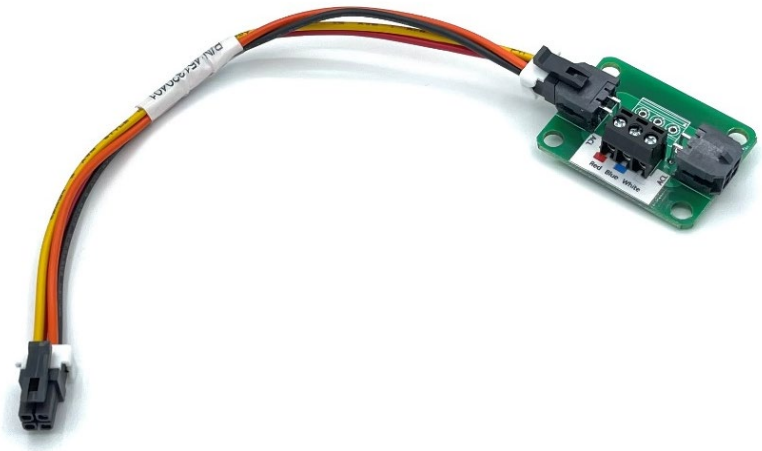
A mini XLR plug without locking guarantees a safe canopy jettison and connects canopy flash and connectBOX. (For gliders like LS8, ASG29, V3M)

7.4 Canopy-power interface (optional)

The canopy-power interface is required for canopies opening to the right (like the most Schempp-Hirth canopies) and guarantees a safe canopy jettison and a permanent power supply.



7.5 Extension Board (optional)



8 Installation instructions

8.1 General

The canopy flash falls within the category standard parts, according to EASA AMC 21.A.303(c), and so installation in gliders is only allowed under certain conditions. Der installation must comply with the EASA Standard Change CS-SC036a „INSTALLATION OF VISUAL AWARENESS LIGHTS“. It is necessary to ensure the following items:

- The Pilot shall not be blinded by the canopy flash system under no circumstances. In certain weather/sunlight conditions and if installed improperly, the pilot might perceive some light on the canopy frame. However, the light intensity is weaker than the LED function indicator on the backside of the canopy flash and is not blinding or distracting the pilot.
- Installation of a switch on the instrument panel, labeled with „on (auto)/off“. The pilot shall be able to cut the power supply by this switch in the event of a malfunction at any time. It is alternatively allowed to use a switch rated circuit-breaker.
- the general flight characteristics are maintained.
- The canopy jettison must not be affected in a negative way. Gliders equipped with a canopy opening to the right (like to most Schempp-Hirth canopies) are obliged to use the SOTECC-canopy-power interface.
- Other aircraft avionics, especially the radio system, are not disturbed.
- Compliance to all center of gravity and mass limitations.
- Approval by an aircraft inspector authorized for such work and a complete documentation.
- In order to guarantee a safe operation, all these items mentioned above need to be checked and have to be complied with, prior any flight.

The current version can be found on the EASA-Homepage.

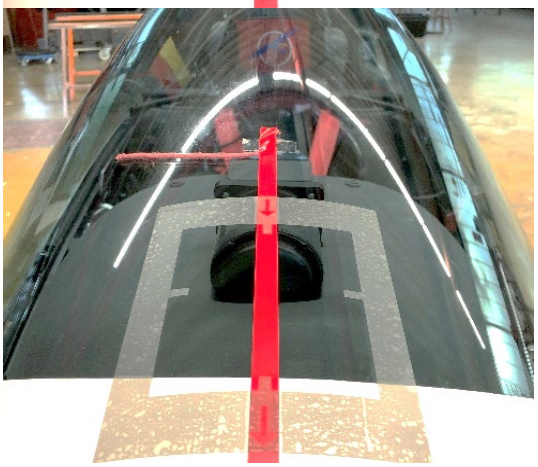
8.2 List of needed tools and materials

- Torx-screwdriver TX8
- 3mm allen key
- Cutter
- Side-cutter
- Velcro tape
- Cable ties
- Thin thread
- Foam cleaner, or the preferred tool to clean the canopy
- 2,5 mm drill

Before fitting, check the foam tapes on the bar of the canopy flasher for correct fit (these can slip or come off during transport). Check the red 3M adhesive strips for pressure points.

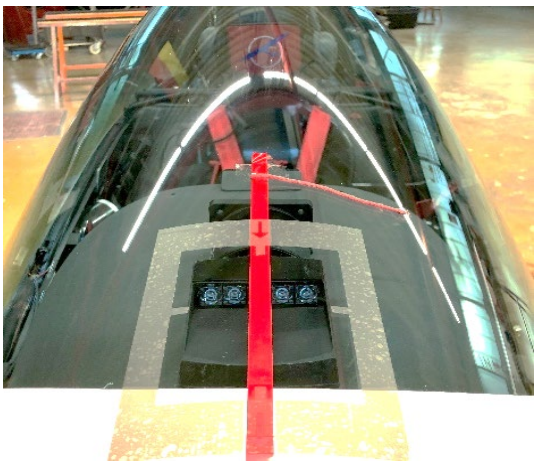
8.3 Installation of the canopy flash with template

Define the middle of the canopy with a thin string or tape, then affix the template from outside. (Be careful: the small string may be positioned eccentrically!) Prior installing the canopy flash, clean the canopy with appropriate cleaning agent.

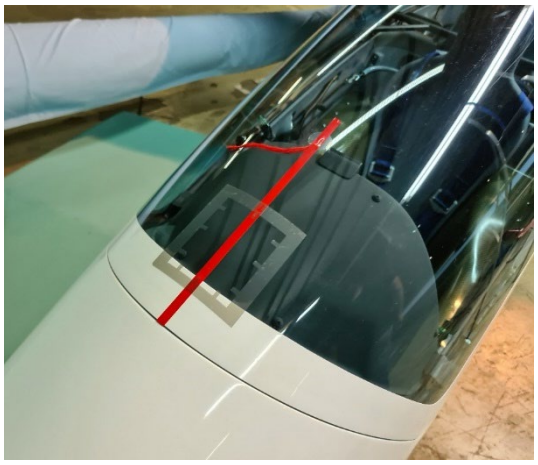


Then carefully remove the protective foil on the 3M adhesive strip with a cutter or something similar.

Be careful: <u>Don´t</u> detach the 3M adhesive strip from the canopy once it had contact with it. (It is simply not possible without destroying the 3M tape.)



Subsequently align the canopy flash in accordance with the template, BUT press on the frontpart first, then swing the rear part up and press it on, this avoids air bubbles.



The front template spacers shall be positioned approx. 1mm behind the canopy paint edge. (direction to the tail). Various installation examples can be found here (https://einbau.sotecc.de). The password can be found in the enclosed cover letter.

8.4 Installation of the canopy-power interface

Only for aircraft with side opening canopies (e.g. Schempp-Hirth). For these aircraft the canopy contact is a necessary component for operation! Aircraft with forward opening canopies without canopy contact go to 8.9 "Wiring".

Lay the cable from the canopy flash into the canopy frame and if necessary, fix it. Make sure to place the power interface as close as possible to the frame. However, the 3M tape must rest flat on the canopy, without any tilt, to guarantee a solid bond. Clean the canopy prior attachment of the canopy-power interface and do not detach it once it already had contact with the canopy. Loosen the two big screws just a little bit, so that the canopy-power interface can be moved smoothly and without big resistance on the mounting bracket. Now put the plastic template (in the bag) on the Allen screws of the canopy-power interface and remove the protection foil of the double-sided tape.

Ventus 3S: Installation without mounting bracket.

8.5 Canopy-power interface counterpart attachment with template

Tip: Sometimes this step is easier when sitting inside the cockpit.

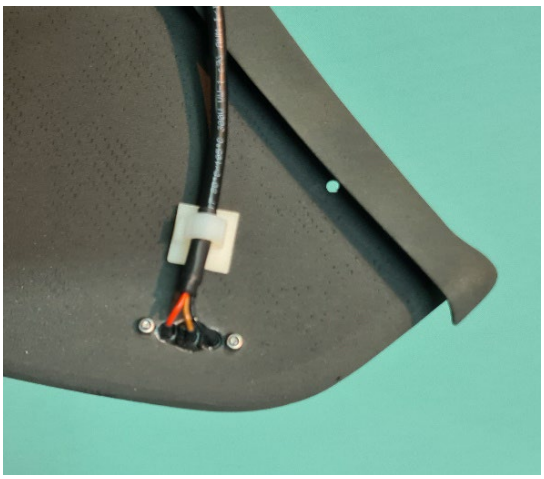
Now close & lock the canopy and place the contact with the doubled-sided tape flat on to instrument panel cover and press it on. Then tighten the two screws to avoid movement of the canopy-power interface on the bracket. Open the canopy carefully and make sure, that the template does not get out of place.

8.6 Installation of the counterpart to the instrument panel cover

Remove the panel cover for this step.

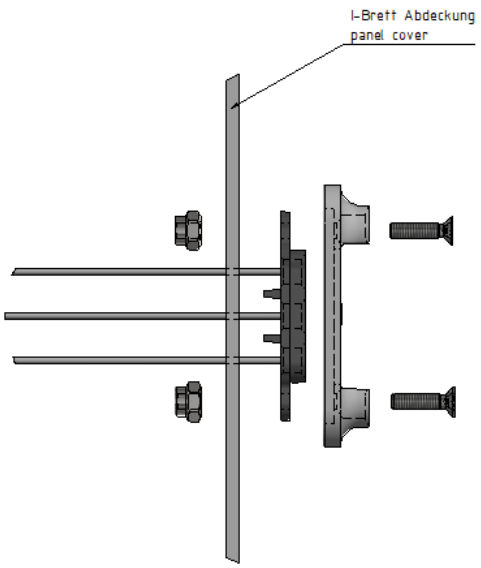
Fix the template by drilling two 2,5mm holes and screw it tight. Now mill out the inner part of the template, either with a milling tool or with two drills. (7mm left and right and 10mm in the middle)

If necessary, finish it with a round file, then remove the template (keep the screws).



Put the counterpart cable through the panel. Use the plastic component (looks quite similar to the template) and tighten the screws (already used for the template).

Caution: Red/plus must be to the front inflight direction. Or take heed of the white dot, they have to lie on top of each other.



Fix the cable with the cable holder, install the suppressor, mount the panel cover and check if canopy-power interface and the counterpart align to each other by closing the canopy carefully.

If the canopy-power interface and the counterpart are not aligned to each other, it is possible to make smaller adjustments on the canopy-power interface. Loosen the two screws and relocate the contact on the bracket. Larger deviations can only be solved by relocating the whole canopy-power interface on the canopy. (If this is unavoidable, please notice us via info@sotecc.de)

When closing the canopy, the canopy-power interface and the counterpart must not jam each other.

8.7 connectBOX

Install the connectBOX if possible close to the quick separation point or to the counterpart to have access to the ports and fix it either with screws or with Velcro.

8.8 Video

A detailed video about the installation can be found here:

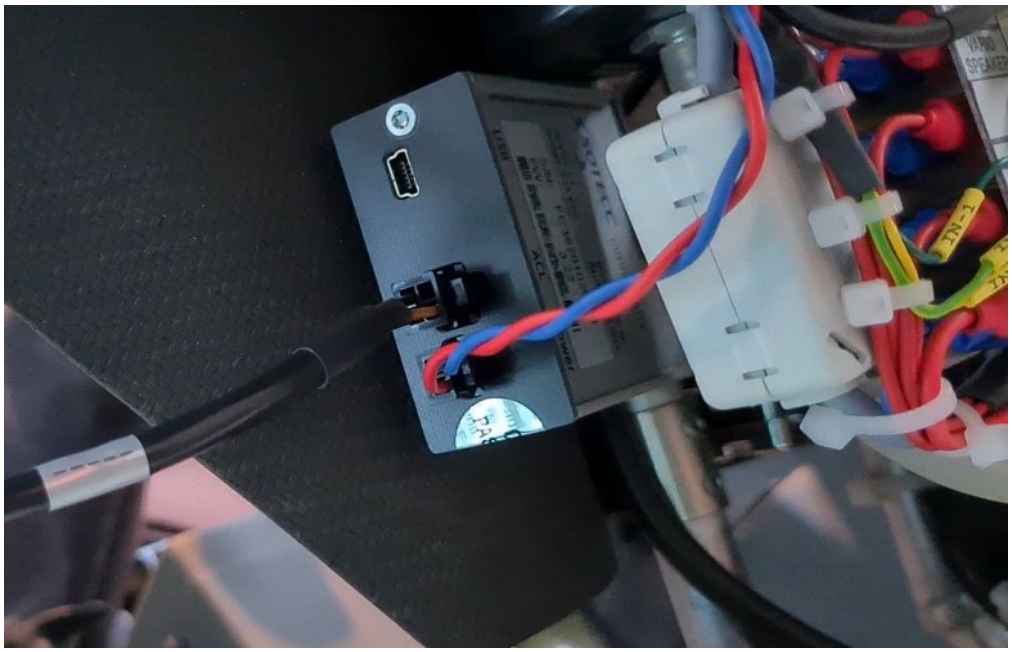
https://www.youtube.com/watch?v=yTdoDFpJMLg&feature=emb_title

8.9 Wiring

Plug the 4-pin connector cable of the counterpart (in the panel cover, see step 5, lower picture) into the ACL-port of the connectBOX.

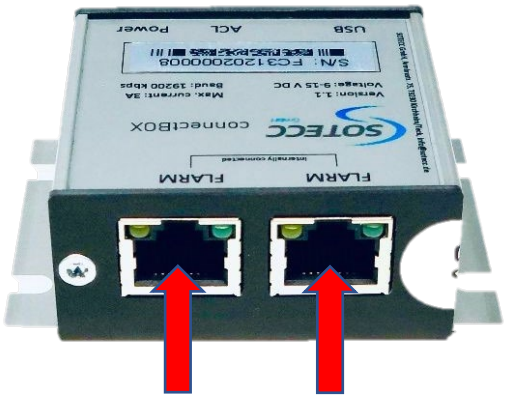
Similar way for canopy flash systems with quick separation point (like V3M, LS8)

Connect the connectBOX to the on-board power supply with the 2-pin cable and install a 3-5 A fuse. If necessary shorten the power cable and then plug it into the power port of the connectBOX. To disconnect the connectBOX manually from the on-board power, place the switch between the power cable.



Cable to the canopy-flasher at the top (ACL), connection to the on-board power supply at the bottom (Power). (The connectBOX is installed tilted 90 degrees to the right in the photo).

The quick separation point must not be glued or secured, otherwise the ease of separation would be lost!



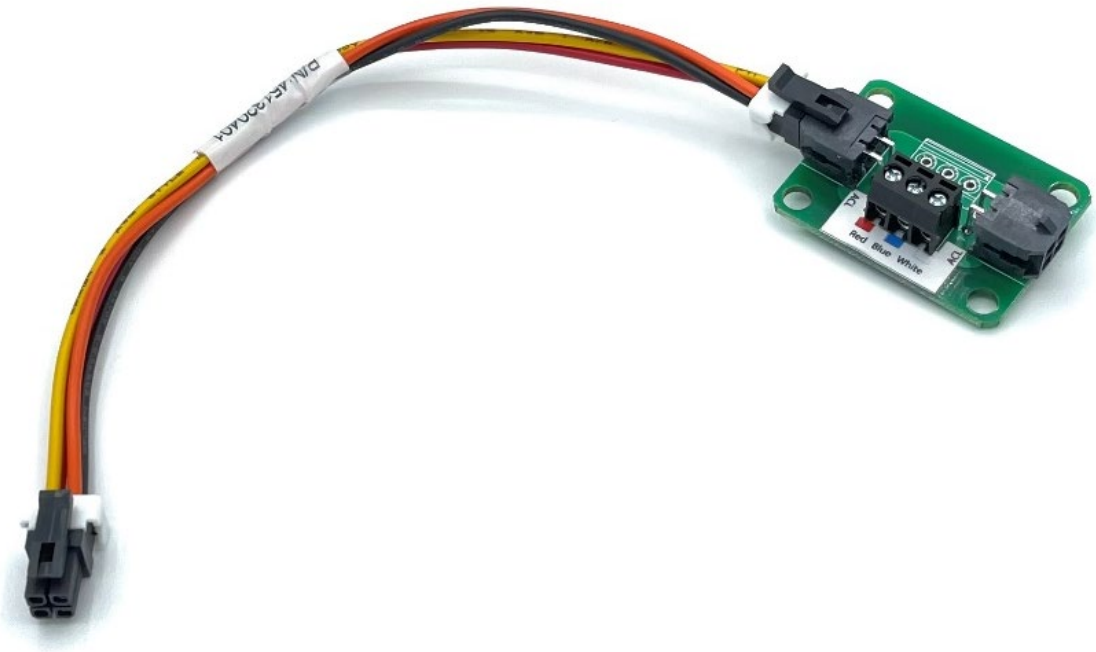
Finally connect FLARM® with RJ45 or RJ12 cable to the connectBOX.

Both RJ Ports of the connectBOX are internally connected and can be used as a splitter (loop-through). It is possible to use 8-pin (RJ45), or 6-pin (RJ12) plugs.

TRX-1090 “Bluebox“ can not be connected to the connectBOX. If necessary, connect FLARM® upstream with the connectBOX and then “Bluebox” downstream.

8.10 Option Extension Board

If the connectBOX is difficult to access or if it is installed in combination with a SOTECC-strobe, the extension board is used, to enable easy plugging in and unplugging when removing the instrument panel cover.



9 SOTECC-Configurator

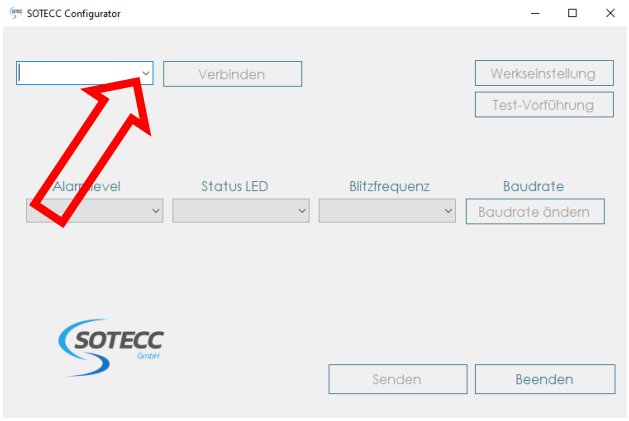
With the supplied SOTECC configurator, it is possible to configure the canopy flash via the connectBOX individually. You can find the program attached on the supplied USB-stick. The following values can be changed:

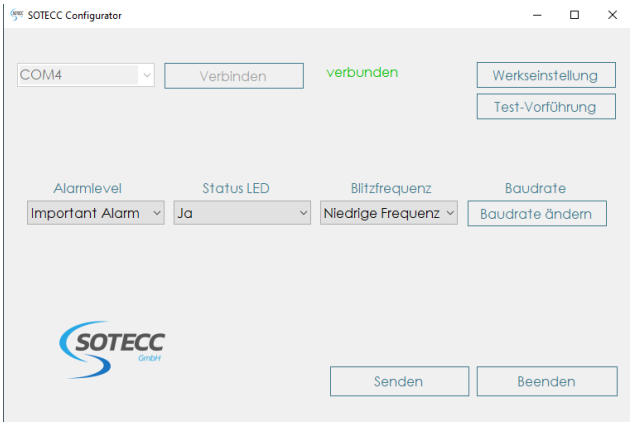
- Flash frequency
- Alarm-level threshold
- LED
- Baud rate

9.1 Establish connection

To configure the canopy flash via the connectBOX, connect the micro USB-cable to its designated port on the box, ensure power e.g. aircrafts on-board power supply, start the SOTECC configurator, select the COM-port, press „connect“ and wait for connection (2-5 sec). If there is no COM-port indicated on the upper left side of the program, you may try to

- Connect onboard power supply, switch batteries on
- Load USB-drivers, which should be done automatically, if there is a connection to the internet (duration is about one minute)





After successful connection, you will see the current (default) parameters and „connected“ in green next to the „connect“ button. If there is no response after 5 seconds, you may try to

- Select the correct COM-port
- Retry to load the USB-drivers

9.2 Programming

9.2.1 Programmable Parameters

9.2.1.1 Alarm level

Alarm level means the threshold at which an alarm is triggered. For more information, see chapter 3. You can select one of the following:

- „low alarm“
- „important alarm“
- „urgent alarm“

Default setting is „important alarm“.

9.2.1.2 Function LED

It is possible to switch off the pilot-facing function LED. Default setting is “ON”.

9.2.1.3 Flash frequency

Frequency means the normal frequency without any alarm from the FLARM. There is:

- Low frequency (one flash every 2,2s)
- Normal frequency (one flash every 1,5s)
- High frequency (approximately 1Hz)

9.2.1.4 Baud rate

The Baud rate is set to 19,2 kbps by default. There might be (especially multi-function-) systems, that require a higher baud rate. You can change the value by pressing “Baud rate”. Normally it is not necessary to change it. Please check the documentation of your connected system.

You can decide between the following options:

- 9600 bps
- 19200 bps
- 38400 bps
- 57600 bps
- 115200 bps

9.2.2 Test mode

By pressing “test mode“, the canopy flash begins a 15 seconds test-mode and shows the programmed flash frequency allowing the pilot to check the functionality of the canopy flash system. Please do not interfere during this mode. (No programming during test mode).

Handling on ground: do not look directly into the light!

9.2.3 Finish programming

To finish the programming process, press “send”. The program confirms a successful programming by showing the following message “programming successful”. After receiving this message, please restart the connectBOX (turn off the onboard power), wait for at least 3 seconds and restart the system.

10 Safety notes

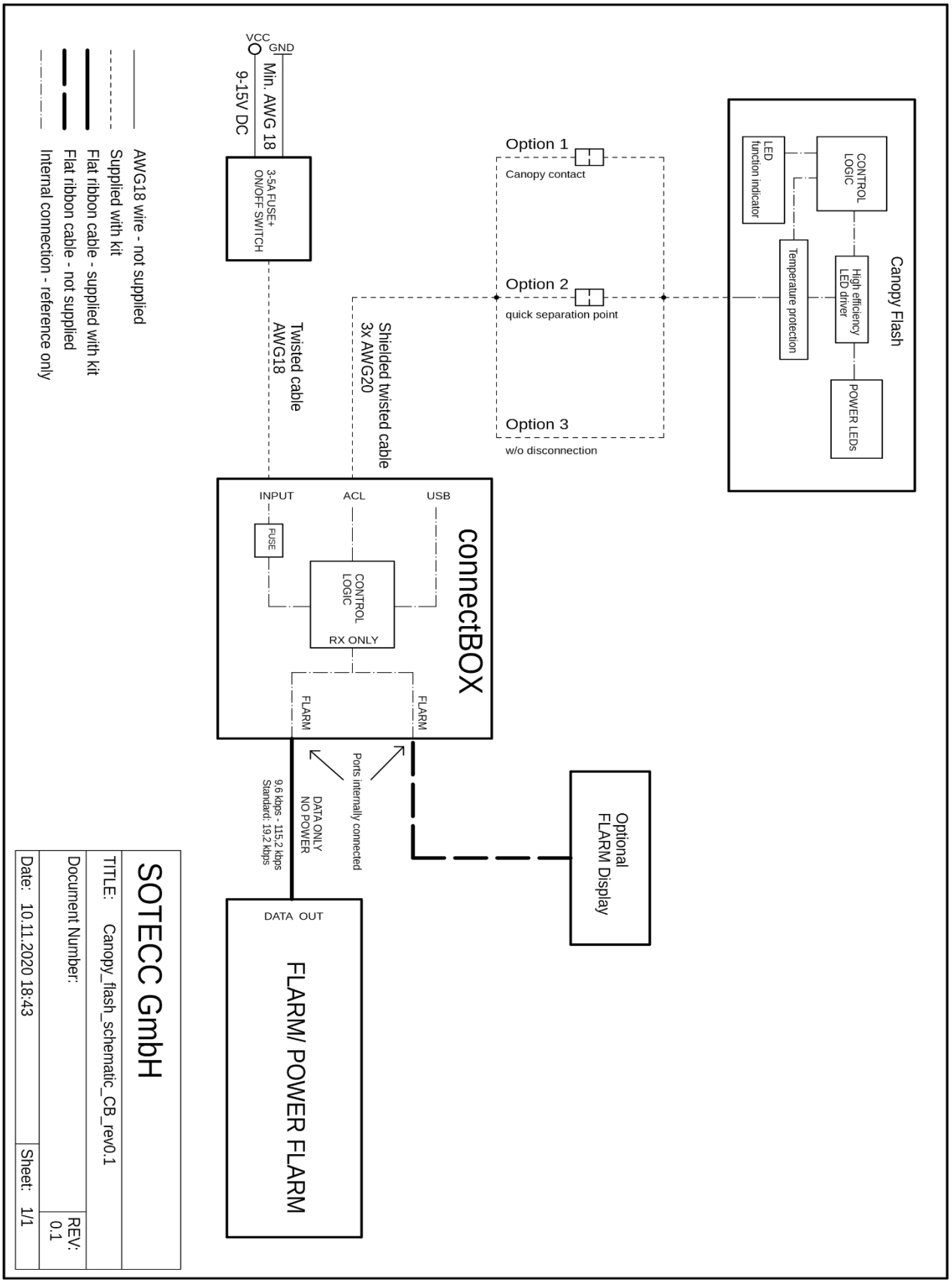
The canopy flash is a system to improve visibility by other air traffic participants in the airspace. It serves only as a support and under no circumstances replaces an active airspace observation by the pilot in command. The installation of the system should not lead to any changes in the responsibilities of the pilot in command. The rules for aircraft of the respective country in whose airspace the aircraft is located apply. For a safe operation with connectBOX, GPS (Global Positioning System) with sufficient signal and a functional FLARM® device with current firmware is required.

The system is only to be used for the intended purpose according to this manual.

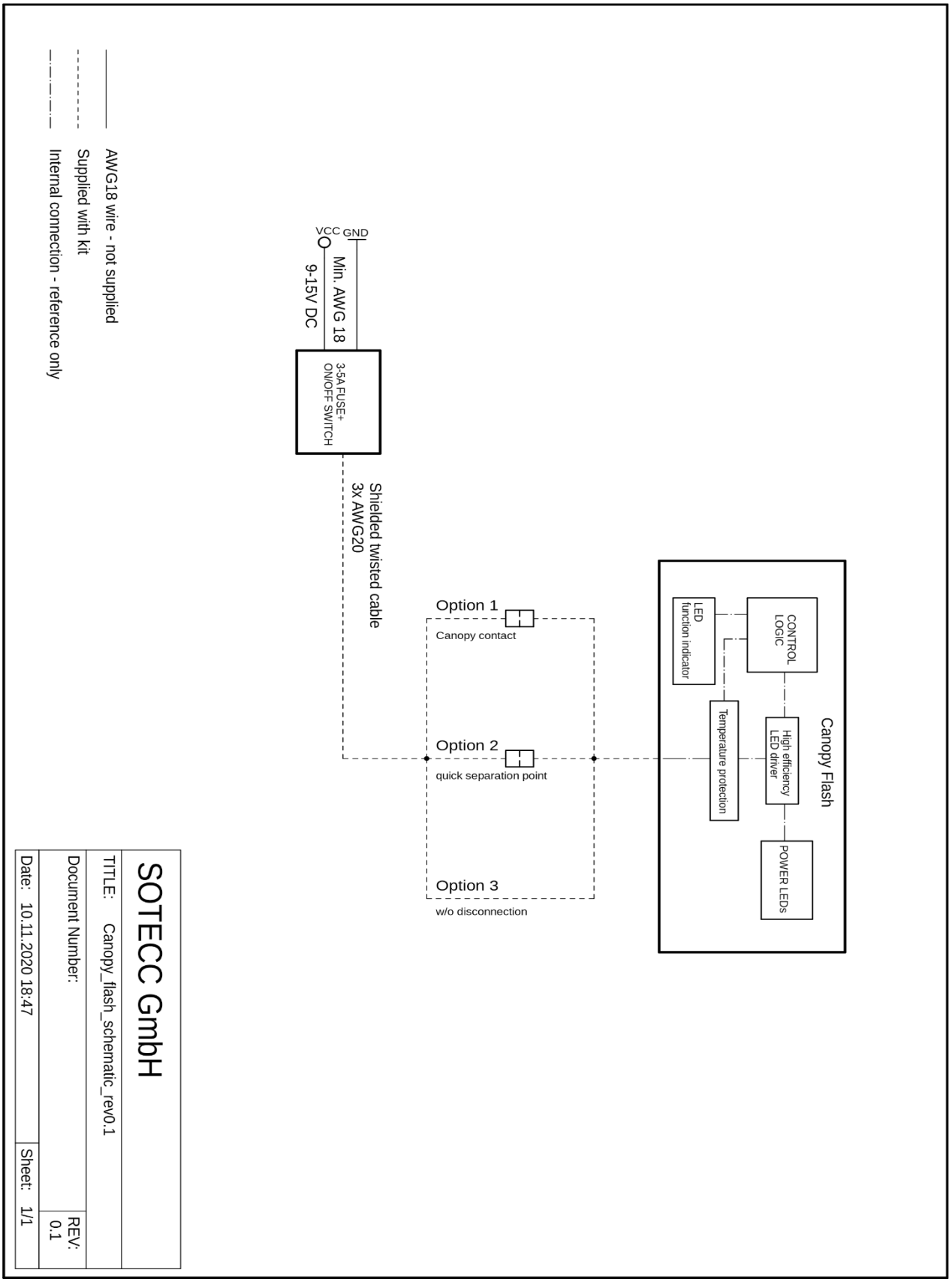
We have provided all information to the best of our knowledge and belief. They correspond to the current state of the art. The information does not constitute a warranty in the legal sense. SOTECC is not responsible for damages resulting from negligence or improper use.

11 Attachments

11.1 Electrical schematic canopy flash with connectBOX



11.2 Electrical schematic canopy flash



12 Spare parts

Spare parts can be ordered via ersatzteile@sotecc.de or in our shop https://shop.sotecc.de.

Please specify serial number and type of aircraft.

13 contact

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