



F/A-18 SAI Replica Gauge

USER GUIDE



Contents

1 Overview

2 Getting Started Installation & first power-up

3 Mode Selection DCS-BIOS & SimLink modes

4 DCS World Setup DCS-BIOS installation & configuration

5 SimLink Setup MSFS & X-Plane

6 Controls Reference TEST, encoder, CAGE

7 Display & Backlight

8 Re-Homing

9 Troubleshooting

A Panel Cutout Template

1 Overview

The RHSimTech F/A-18 SAI Replica Gauge is a panel-mounted standby attitude indicator replica designed for use with DCS World (via DCS-BIOS) and Microsoft Flight Simulator / X-Plane (via SimLink). It reproduces the appearance and behaviour of the standby attitude and navigation instrument fitted to the F/A-18C Hornet, EA-18G Growler, and F/A-18E/F Super Hornet.

The gauge features a driven attitude display — pitch and roll are driven directly from simulator data — together with a slip/skid ball, CDI and glideslope needles, horizon level bar, rate-of-turn pointer, and attitude warning flag. A green instrument backlight dims in response to the simulator's lighting bus, matching cockpit ambience.

Compatible simulators

DCS World (via DCS-BIOS): F/A-18C Hornet, EA-18G Growler, F/A-18E/F Super Hornet, P-51D / TF-51D, A-4E-C, Su-25T, and all Flaming Cliffs aircraft (including the VSN F/A-18 and FA-18D mods).

Microsoft Flight Simulator 2020/2024 and X-Plane 11/12 (via RHSimTech SimLink)

2 Getting Started

2.1 Installation

Mount the gauge in your panel using the provided cutout dimensions (see Appendix A). The rear of the gauge has two USB-C ports:

Port	Purpose
Recessed port	Data — connect this port to your PC with a USB-C cable
Black-circled port	Power — connect to a 5 V USB power supply

Connect the **recessed (DATA) port** to your PC. No additional drivers are required — the gauge appears as a standard serial COM port on Windows 10 / 11.

2.2 Power-Up and Homing

On power-up the gauge performs an automatic homing sequence. All driven elements — pitch bar, roll bank, slip ball, CDI needle, glideslope needle, rate-of-turn pointer, and the attitude warning flag — sweep to their reference positions. The sequence takes a few seconds and runs automatically every time the gauge is powered on.

During homing the backlight pulses to confirm the active operating mode (see Section 3). The gauge is ready for use once homing completes.

If no simulator data is received within three seconds of the gauge being ready, the attitude warning flag moves into view. It clears automatically as soon as data begins to arrive.

3 Mode Selection

The gauge supports two operating modes — DCS-BIOS (for DCS World) and SimLink (for MSFS and X-Plane). In normal use **no action is required**: the gauge detects which simulator is sending data and switches to the correct mode automatically, saving the choice for next time.

Mode	Backlight confirmation	Override at power-up
DCS-BIOS	2 pulses	Hold TEST button while powering on
SimLink (MSFS / X-Plane)	1 pulse	Hold CAGE button (encoder push) while powering on

Auto-detect (default): Power on the gauge without holding any button. It starts in the last saved mode and listens for simulator data. As soon as it receives a valid stream from either DCS-BIOS or SimLink it switches to that mode automatically and saves the choice — no manual selection needed.

Manual override: If you want to force a specific mode for the session, hold the appropriate button before applying power (or immediately as the gauge starts). Watch the backlight — it pulses to confirm the chosen mode. Release the button as soon as you see the pulses; homing then begins.

Until the gauge receives valid simulator data the backlight continues to pulse the active mode, so you can always see which mode it is waiting in.

4 DCS World Setup

DCS World support requires two separate components: **DCS-BIOS**, which runs inside DCS World and exports cockpit data over the local network, and **DCSBIOSBridge**, which relays that data stream to the gauge's COM port. Both are free downloads.

4.1 Install DCS-BIOS

DCS-BIOS is an open-source Lua export script that streams cockpit data from DCS World over UDP. Installation is a one-time process.

1. Download the latest DCS-BIOS release ZIP from github.com/DCS-Skunkworks/dcs-bios/releases and extract it somewhere on your hard drive.
2. Open Windows Explorer and paste the following into the address bar, then press Enter:
`%USERPROFILE%\Saved Games\DCS`
(If your DCS installation uses the open beta branch, use `Saved Games\DCS.openbeta` instead.)
3. If there is no `Scripts` subfolder, create one.

4. Copy the `DCS-BIOS` folder from the extracted download into `Scripts`, giving:
`Saved Games\DCS\Scripts\DCS-BIOS\`
5. If `Scripts` does **not** already contain an `Export.lua`, copy `Export.lua` from the extracted download there.
6. If you **already have** an `Export.lua` (from another panel or tool), open it in Notepad++ or another plain text editor and append this line at the very end:

```
dofile(lfs.writedir() .. [[Scripts\DCS-BIOS\BIOS.lua]])
```

Never use Word or any word-processor to edit Lua files.

7. Launch DCS World once and exit — this allows DCS-BIOS to complete its first-run initialisation and write its support files.

If you already have DCS-BIOS installed for other hardware the `Export.lua` line will already be in place. The SAI gauge works alongside any other DCS-BIOS panels using the same installation.

4.2 Install DCSBIOSBridge

DCS-BIOS transmits cockpit data over UDP on the local network — it does not write directly to serial COM ports. **DCSBIOSBridge** is a small Windows application that listens to the UDP stream and forwards it to the gauge's COM port.

1. Download **DCSBIOSBridge** from the DCS-Skunkworks GitHub releases page (the same releases page as DCS-BIOS).
2. Extract DCSBIOSBridge to a convenient location — for example, inside the `DCS-BIOS` folder.
3. Run `DCSBIOSBridge.exe`. In the interface:
 - Select the COM port assigned to the SAI gauge.
 - Click **Connect** (or **Start**).
4. DCSBIOSBridge must be running whenever you fly with the gauge. You can leave it running in the background — it uses negligible resources.

Startup order: Start DCSBIOSBridge before powering on the gauge. The gauge will auto-detect the DCS-BIOS stream once DCSBIOSBridge is running. DCSBIOSBridge can be started before or after DCS World — the order does not matter.

4.3 Verify the Connection

1. Confirm DCSBIOSBridge is running and connected to the correct COM port.
2. Power on the gauge. It will auto-detect the DCS-BIOS stream and home in DCS-BIOS mode (**2 backlight pulses**). To force DCS-BIOS mode manually, hold the TEST button at power-up until you see the 2 pulses, then release.
3. Launch DCS World and load a mission with a supported aircraft (see Section 4.4).
4. Once in the cockpit, the attitude warning flag should clear and the gauge should begin following the aircraft's attitude in real time.
5. Adjust the aircraft's instrument lighting knob — the gauge backlight will dim and brighten in step with the cockpit panel lighting.

If the attitude warning flag stays visible after entering the cockpit, work through this checklist: (1) DCSBIOSBridge is running and shows the correct COM port; (2) the gauge is showing 2 backlight pulses (DCS-BIOS mode) — if it is showing 1 pulse it detected SimLink data first; power cycle and start DCSBIOSBridge before SimLink; (3) the `Export.Lua` line is present and saved; (4) DCS World has been launched at least once since DCS-BIOS was installed.

4.4 Supported Aircraft in DCS

The following DCS World modules are supported:

Aircraft	Notes
F/A-18C Hornet	Full SAI data: pitch, roll, slip ball, CDI/GS needles, rate-of-turn, level bar, lighting bus
EA-18G Growler	
F/A-18E/F Super Hornet	
VSN F/A-18 & FA-18D mods	Full SAI data via mod export variables
P-51D / TF-51D	Attitude display, slip ball and rate-of-turn; CDI/GS and level bar operate locally (CAGE and TEST buttons)
A-4E-C	
Su-25T	
All Flaming Cliffs aircraft	Attitude display and slip ball; panel lighting set to a fixed level (FC3 aircraft do not export lighting data)

The gauge runs on any DCS-BIOS data stream regardless of aircraft. For non-Hornet types the attitude ball, slip ball, and rate-of-turn respond to the simulator; CAGE and TEST operate the level bar and CDI/GS needles locally.

5 SimLink Setup

In SimLink mode the gauge connects to MSFS or X-Plane via the RHSimTech SimLink software. SimLink is available as a free download from the [RHSimTech downloads page](#).

Which SimLink download do I need?

Microsoft Flight Simulator (MSFS): Download and run the **SimLink Windows application** (`.exe`). This is a standalone Windows program that bridges MSFS and your hardware panels.

X-Plane 11 / 12: Download and run the **SimLink X-Plane plugin installer**. This installs a plugin into your X-Plane installation that handles the data bridge automatically when X-Plane is running.

5.1 MSFS Setup

1. Download and install the SimLink application from rhsimtech.co.uk/downloads.php.
2. Power on the gauge. It will auto-detect the SimLink stream (**1 backlight pulse**). To force SimLink mode manually, hold the CAGE button at power-up until you see 1 pulse, then release.
3. Launch the SimLink application. In the device list, locate the F/A-18 SAI entry (`RHSimTechFA18SAI`) and assign it to the correct COM port.
4. Start MSFS and load a flight. SimLink will begin forwarding attitude data to the gauge automatically.

5.2 X-Plane Setup

1. Download the SimLink X-Plane plugin installer from rhsimtech.co.uk/downloads.php and run it. The installer places the plugin into your X-Plane plugins folder.
2. Power on the gauge. It will auto-detect the SimLink stream (**1 backlight pulse**). To force SimLink mode manually, hold the CAGE button at power-up until you see 1 pulse, then release.
3. Launch X-Plane. The plugin will detect the gauge on its COM port and begin forwarding data automatically.

SimLink mode encoder function: In SimLink mode the rotary encoder adjusts the horizon level bar position in small increments, allowing you to trim the bar to your preferred horizon reference line. The CAGE button drives pitch and roll to level (0°, 0°).

6 Controls Reference

Control	Action	DCS-BIOS mode	SimLink mode
TEST button	Single press	Moves CDI and glideslope needles to centre position, then returns them at normal speed. Warning flag sweeps at full speed.	Same behaviour.
TEST button	Hold at power-up	Selects DCS-BIOS mode (2 backlight pulses).	
Rotary encoder	Turn (slow)	Adjusts SAI pitch set reference in small steps.	Adjusts horizon level bar position.
Rotary encoder	Turn (fast)	Adjusts SAI pitch set reference in larger steps.	Adjusts horizon level bar position (same step size).

CAGE button (encoder push)	Single press	Sends the CAGE command to DCS (cages/uncages the attitude reference via the sim).	Commands pitch and roll to level (0°, 0°).
CAGE button	Hold at power-up	Selects SimLink mode (1 backlight pulse).	
TEST + CAGE	Hold together 3 s	Re-homes all driven elements (see Section 8).	

6.1 CDI and Glideslope Needle Behaviour

The CDI (vertical) and glideslope (horizontal) needles stow out of view when no valid navigation data is present. They return to view automatically when data becomes active.

The needles stow and un-stow in sequence: the CDI needle always stows first; the glideslope needle follows once CDI is fully stowed. When un-stowing, the glideslope needle moves first and the CDI follows once the glideslope is clear.

7 Display & Backlight

7.1 Attitude Warning Flag

The attitude warning flag appears in the gauge face when the gauge has not received valid simulator data for more than three seconds, or when the simulator's own flag condition is active. The flag clears automatically once data is restored.

7.2 Backlight

The gauge features a green instrument backlight. In DCS-BIOS mode the backlight level is driven by the F/A-18's instrument lighting bus, dimming and brightening in step with the cockpit panel lighting. In SimLink mode a fixed backlight level is used.

At power-up the backlight pulses to indicate the selected operating mode: two pulses for DCS-BIOS, one pulse for SimLink.

8 Re-Homing

If the gauge appears to have drifted or misaligned during use, a re-home can be triggered without restarting the gauge.

Re-home procedure:

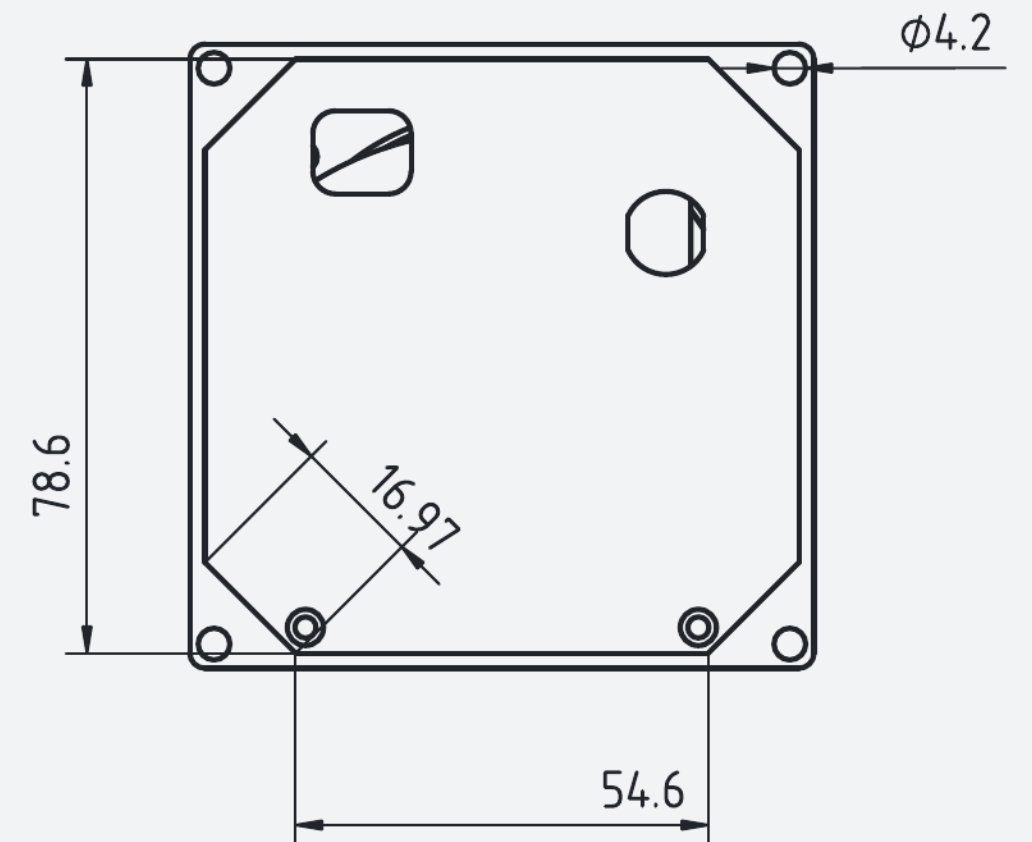
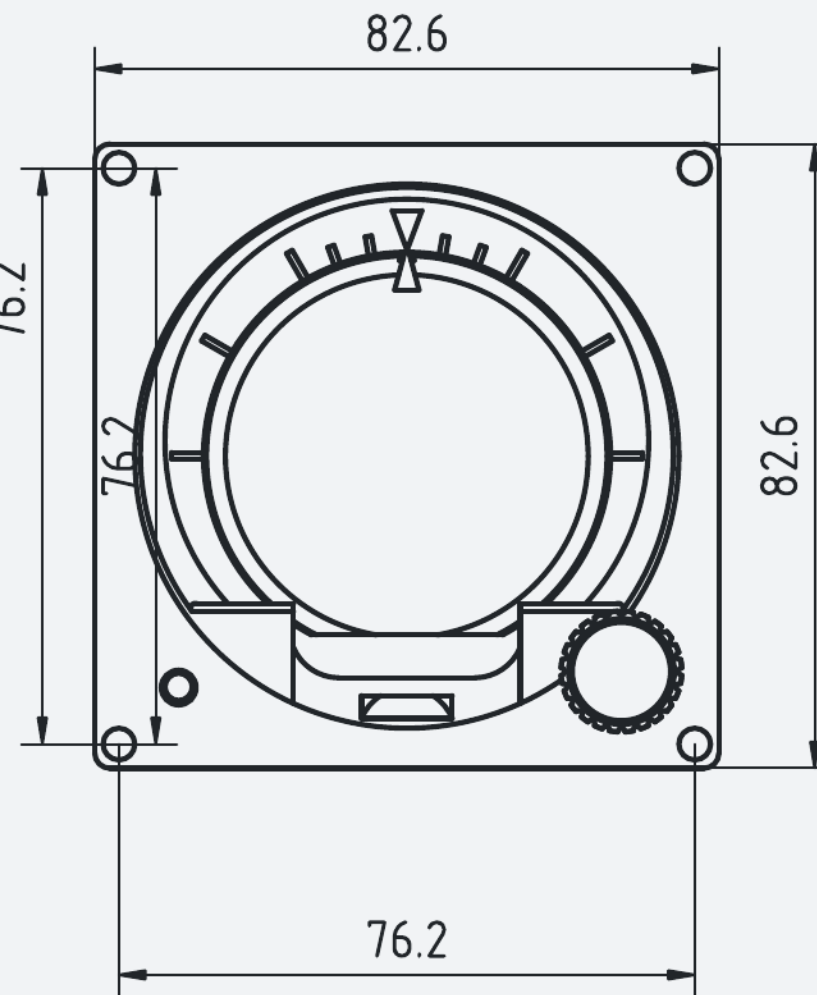
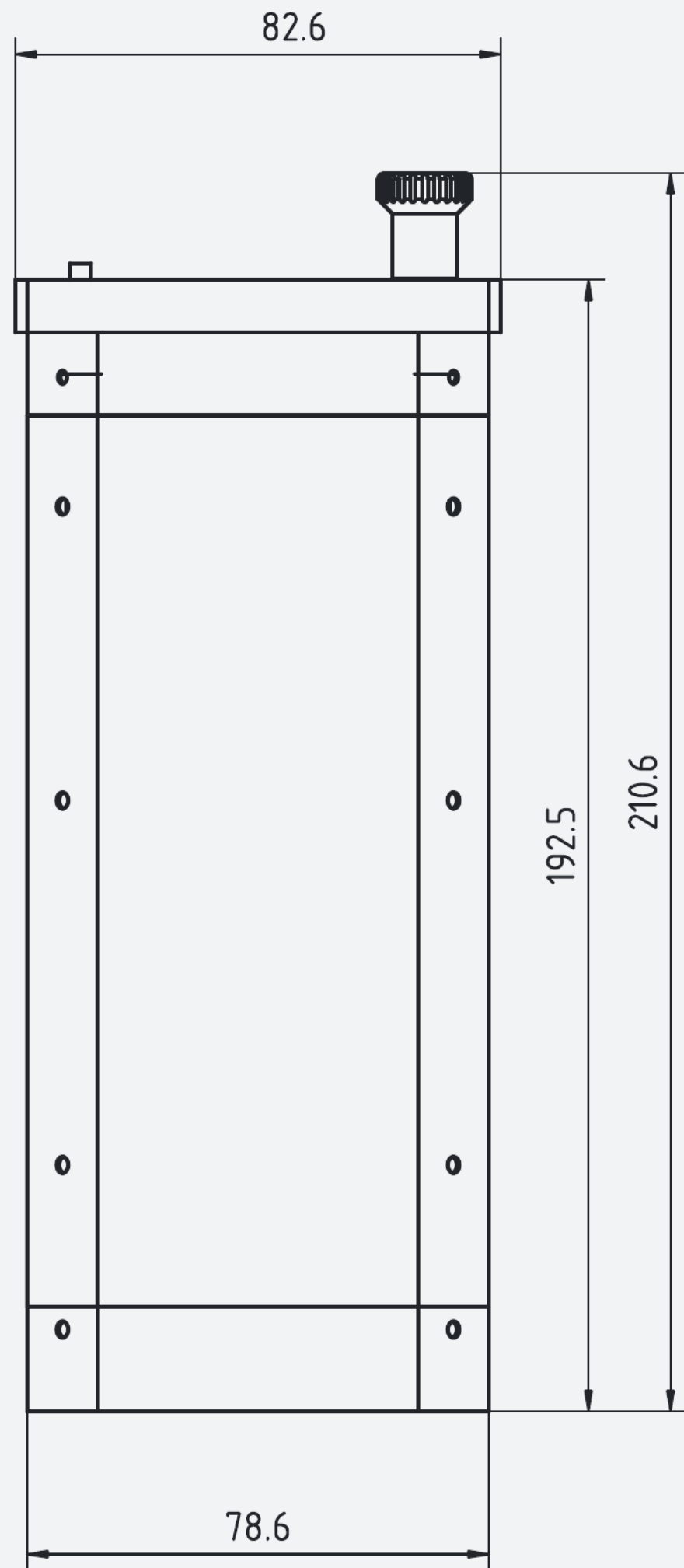
Hold the **TEST button** and the **CAGE button** (encoder push) simultaneously for **three seconds**.

All driven elements will return to their reference positions and re-home. The gauge will then resume normal operation.

A full homing sequence also runs automatically each time the gauge powers on, so cycling power is an alternative if a re-home is required.

9 Troubleshooting

Symptom	Likely cause	Action
Attitude warning flag stays visible in DCS	No data reaching the gauge	Confirm DCSBIOSBridge is running and connected to the correct COM port. Check the <code>Export . Lua</code> line is present. Confirm the gauge is in DCS-BIOS mode (2 backlight pulses at power-up). Confirm a supported Hornet module is loaded in DCS.
Attitude warning flag stays visible in SimLink	No data from SimLink	Confirm the SimLink application (MSFS) or X-Plane plugin is running and the correct COM port is selected. Confirm the gauge is in SimLink mode (1 backlight pulse at power-up).
Gauge does not respond to attitude changes	Wrong mode or COM port	Confirm the gauge is in the correct mode (2 pulses = DCS-BIOS, 1 pulse = SimLink). In SimLink mode, verify the correct COM port is selected in the SimLink application or X-Plane plugin. Check the COM port number in Device Manager.
Backlight does not dim or brighten in DCS	Instrument lighting bus not active	Use the cockpit instrument lighting knob in DCS to adjust panel brightness. The gauge follows the lighting bus in DCS-BIOS mode.
Attitude display appears offset	Calibration drift or physical misalignment	Perform a re-home (TEST + CAGE, 3 seconds). If the offset persists, use the RHSimTechSAICal calibration application.
Gauge not detected on USB	Cable or port issue	Try a different USB cable and a different USB port on the PC. Confirm the COM port appears in Windows Device Manager.
Homing runs but elements don't reach correct position	Calibration required	Run the RHSimTechSAICal calibration application to set correct end-stop positions.



RHSimTech HAND-CRAFTED FLIGHT SIMULATOR HARDWARE		TITLE F18 SARI	
DRAWING No. RHS-185	SCALE 1:1	SHEET 1 / 1	REV A
DRAWN BY R. HULME	DATE 16/10/2026	DIMENSIONS IN mm DO NOT SCALE FROM PRINT	