SafeAlt 2027

User Manual

Portable altimeter, density altitude and vertical speed • Firmware FW022

SafeAlt combines altitude, a vertical speed indicator (VSI), temperature, and density altitude. Choose the altimeter, altitude history, or VSI focus view.



Figure 1 SafeAlt 2027 portable instrument

Quick start

1. **Charge and position the instrument.** Charge for four hours before first use. Secure it where you can see it and reach the buttons. Keep it out of direct sunlight and allow air to reach the case.
2. **Switch on.** If Setup appears, select US, METRIC, or ICAO with a tap. Hold either button to advance through the rows; hold on TMP to save. Release the button when the action occurs.
3. **Set the local altimeter setting.** Tap LEFT to decrease the yellow pressure setting or RIGHT to increase it. Check the digital altitude against a known ground reference. See page 2.
4. **Let the VSI initialize.** Dashes (----) mean the vertical-speed reading is not ready. Allow about 8–9 seconds after the operating display appears. Wait for a numerical rate before using the VSI.
5. **Choose your view and brightness.** Hold RIGHT until the view changes. Hold LEFT until brightness changes. Release after each action.
6. **Check the indications.** AL, VS and TE normally use white digits. Red digits in those fields indicate a sensor-data problem. DA is always red by design; see page 9.

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1 Controls and power

LEFT and RIGHT are as you face the display. The − and + marks along the bottom of the display identify the LEFT and RIGHT buttons. A tap is a brief press and release. For a hold, keep the button down until the action occurs, then release. A single-button hold normally takes less than a second and performs one action.

During normal operation	Action
Tap LEFT	Decrease the altimeter setting by 0.01 inHg or 1 hPa.
Tap RIGHT	Increase the altimeter setting by 0.01 inHg or 1 hPa.
Tap BOTH briefly	Return the pressure setting to 29.92 inHg or 1013 hPa.
Hold LEFT	Toggle between bright and dim display modes.
Hold RIGHT	Cycle Altimeter → History → VSI focus → Altimeter.
Hold BOTH about 3 seconds	Open Setup. The three-second hold starts when both buttons are pressed.

Set the pressure before use

The yellow number is the altimeter pressure setting, also called the Kollsman setting. Use the current setting appropriate to your flight. A brief BOTH press selects standard pressure; it does not determine the local setting.

The range is 28.00 to 31.00 inHg, or 950 to 1050 hPa. Pressure changes affect indicated altitude and future history points. They do not change the VSI or the density-altitude calculation.

Pressure settings and the selected view save automatically about five seconds after the last change. Allow that time before switching off. Setup values save when you commit the last row. Brightness returns to bright at power-on unless the battery is low.

Battery and USB charging

Charge through the USB port. A red light beside the port indicates charging. SafeAlt can operate while connected to USB power. Use the power switch to turn the instrument on and off.

The voltage and battery symbol at the upper left are a guide to battery condition. A full charge is approximately 4.2 V. Recharge as voltage approaches 3.5 V; the symbol is not a remaining-flight-time display.

Below the low-battery threshold, the voltage and symbol turn red and the display is forced dim. Normal brightness control becomes available again after the indicated voltage recovers to 3.6 V. A LEFT hold cannot override low-battery dimming.

Placement and care

Secure SafeAlt so it cannot fall or interfere with the controls. Leave the case openings and USB port accessible. Keep the instrument dry, protect it from excessive heat, and clean it with a soft dry cloth.

SafeAlt is for portable use. Do not hardwire it into the aircraft. It senses the pressure around the unit; cabin pressurization and directed airflow can affect the readings.

2 Altimeter view

This view combines the large two-hand altimeter with a small VSI and the four digital readouts. The yellow pressure setting sits inside the large dial.

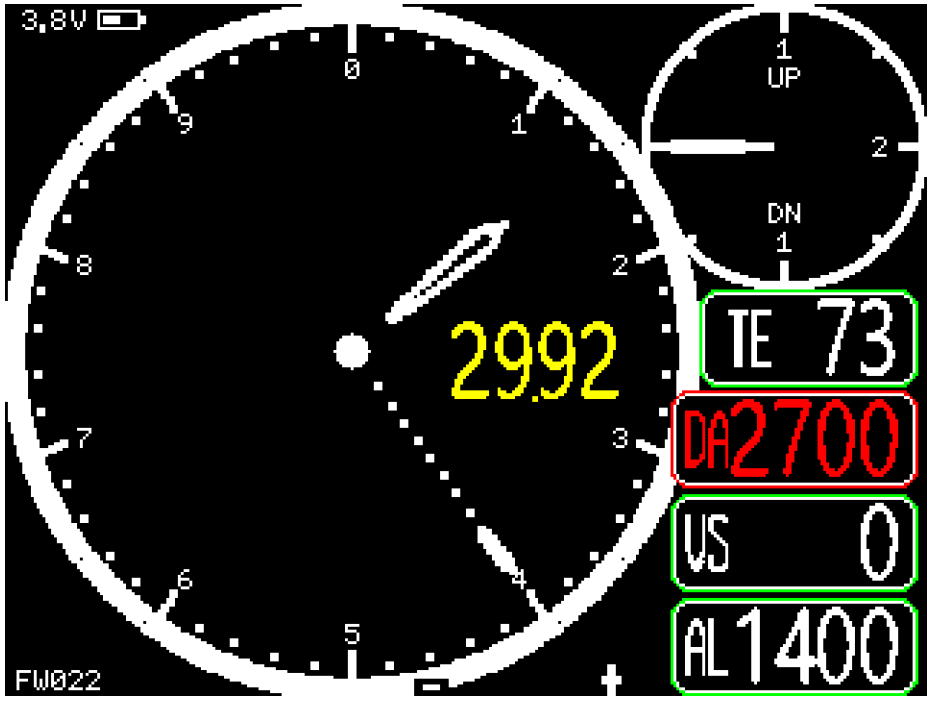


Figure 2 Altimeter view in US units at 1,400 feet

Readout	Meaning
AL	Indicated altitude in feet or meters, according to the selected profile.
VS	Vertical speed. A minus sign means descent; zero indicates approximately level flight.
TE	Temperature measured inside the enclosure, including the stored temperature trim.
DA	Estimated density altitude. Its red color is normal, not a warning threshold.
Yellow number	Altimeter pressure setting in inHg or hPa.
Voltage and battery symbol	Battery condition. Red indicates low-battery dimming.

Read the two hands

In US and ICAO profiles, the long hand makes one turn per 1,000 feet; the short hand makes one turn per 10,000 feet. In METRIC, those same turns represent 1,000 and 10,000 meters. Both increase clockwise.

In the illustration, the long hand is at 400 feet and the short hand is between 1,000 and 2,000 feet: 1,400 feet in total. Use the digital AL value for the full altitude, especially near a dial rollover or below sea level.

Indicated altitude depends on the pressure setting. It is not height above the terrain.

3 Altitude history view

Hold RIGHT to change from the altimeter to history. The plot shows recent indicated altitude, while the small VSI and current digital readings remain visible. The yellow pressure setting moves above the graph.

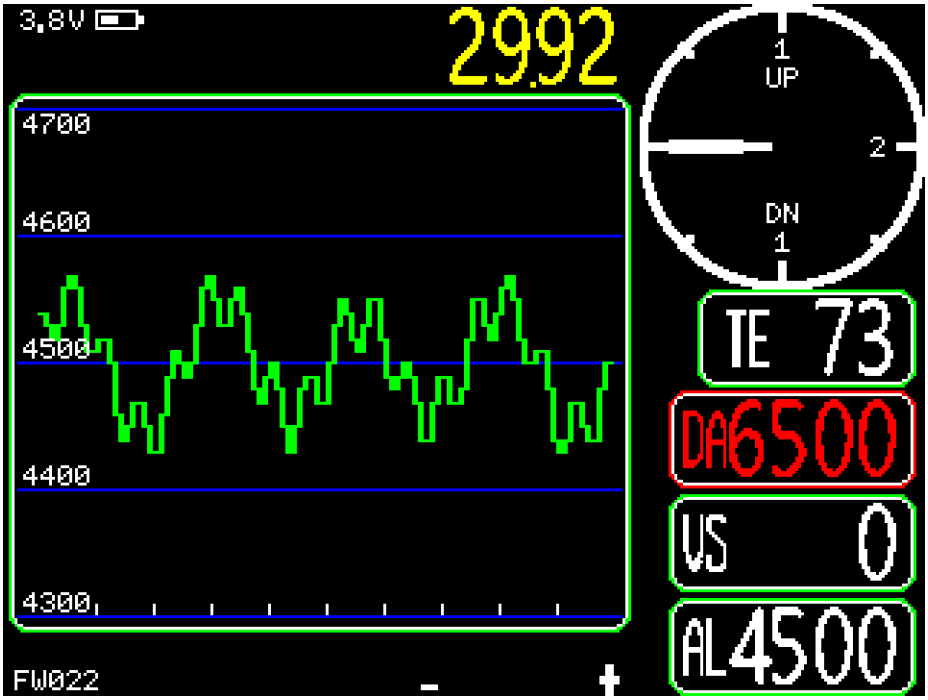


Figure 3 Automatically scaled altitude history in US units

Read the graph

Older points are on the left; the newest point is at the right end of the trace. The graph first fills from left to right. Once full, it scrolls as new points replace the oldest ones.

SafeAlt records a point about every 36 seconds and retains approximately one hour. The short marks along the bottom are about six minutes apart. History continues to collect while either of the other operating views is displayed.

The vertical scale adjusts automatically. Read the numbers beside the blue gridlines rather than assuming a fixed spacing. The 100-foot spacing in this illustration is one example.

Understand gaps and changes

The trace is normally green. A red, flat segment marks a sample taken while sensor data were unavailable. It does not confirm level flight. Red history can remain after the current readings have returned to white.

Changing the pressure setting can produce a step in the trace even when the aircraft has not changed altitude. Previous points retain the setting used when they were recorded.

History clears when SafeAlt restarts or is switched off. Saving Setup during operation also restarts the unit and begins a new history. History is not a saved or exportable flight log.

This is a sampled trend display. Brief maneuvers or turbulence between samples may not appear, and very rapid altitude changes may temporarily lag in the plot. Use the current AL and VSI readings for the present indication.

4 VSI focus view

Hold RIGHT again to give vertical speed the large dial. The small VSI remains at the upper right; altitude, temperature and density altitude stay in the right column.

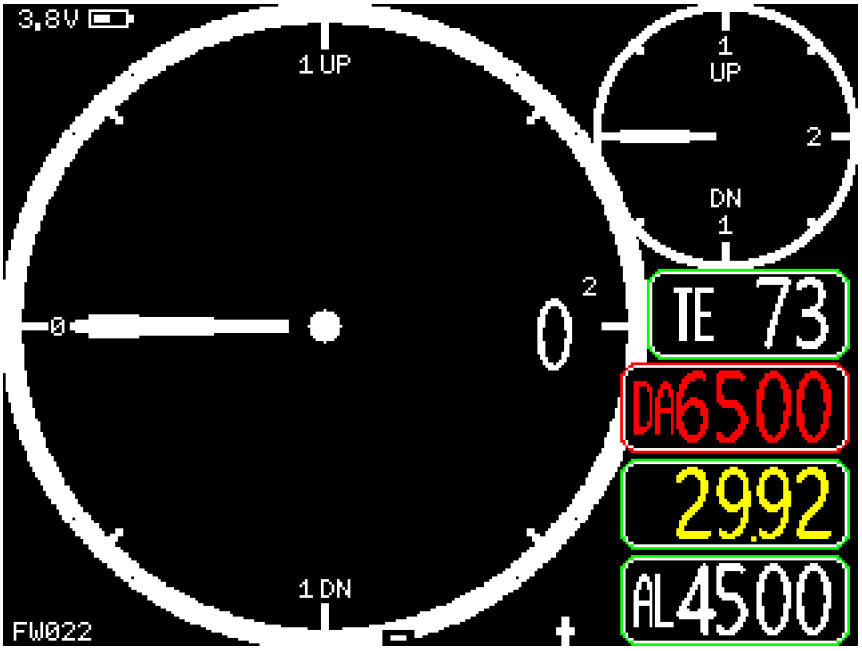


Figure 4 VSI focus in US units with zero vertical speed at 4,500 feet

Read the dial and number

Zero is at the left. Climb moves the needle through the upper half marked UP; descent uses the lower half marked DN. A minus sign on the digital rate means descent. The large white number inside the dial is vertical speed; the yellow number in the right column is the pressure setting.

Profile	Normal range	More sensitive range
US or ICAO	2K: ±2,000 ft/min	1K: ±1,000 ft/min
METRIC	10: ±10 m/s	5: ±5 m/s

Choose the range in Setup. The lower range doubles needle movement for the same rate; it does not change response time. Both VSI dials use the same range.

On the ft/min dials, 1 and 2 mean 1,000 and 2,000 ft/min; 500 means 500 ft/min.

At the right end of the dial, the full-scale climb and descent positions meet. Use the digital sign to distinguish them. The number continues beyond the needle range, up to ±9,990 ft/min in US/ICAO or ±50 m/s in METRIC. The digits round to 10 ft/min or whole m/s.

Initialization and response

Dashes (----) mean the VSI is initializing. They normally clear about 8–9 seconds after the operating display appears or after sensor recovery. Wait for a numerical rate; the zero-position needle during initialization does not confirm level flight.

The VSI is smoothed over several seconds, so it takes time to settle after a maneuver. Small fluctuations near zero are suppressed. It is a climb/descent trend indicator, not an instantaneous turbulence measurement.

5 Setup

Make setup changes on the ground. Hold BOTH for about three seconds during operation. To enter at power-on, hold RIGHT while switching on and keep holding through the startup screen until Setup appears, then release. A unit without saved settings opens Setup automatically.

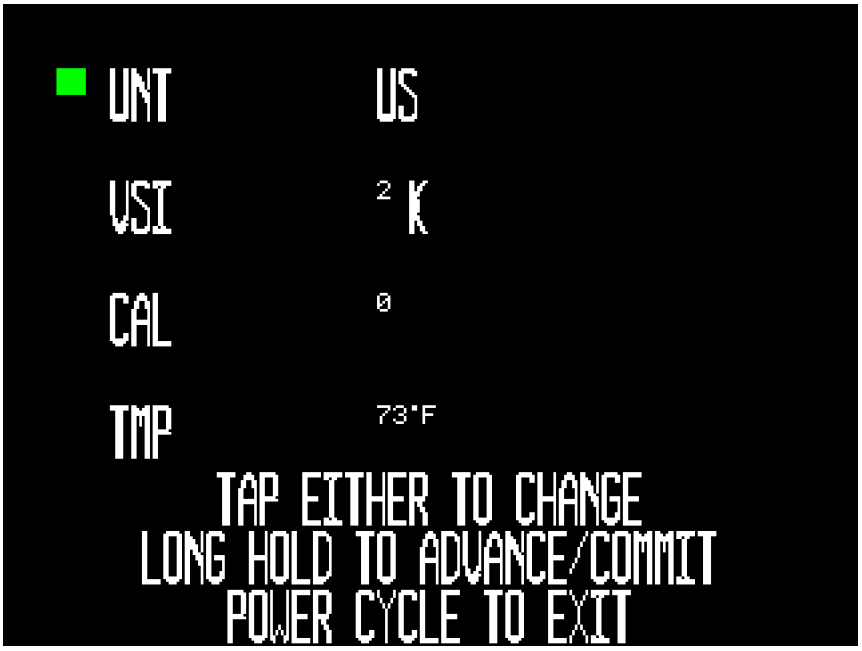


Figure 5 Setup with US units and the 2K VSI range selected

Change and save the settings

1. **Find the green square.** It marks the active row. Tap LEFT or RIGHT to change its value. LEFT decreases and RIGHT increases numeric settings; either button changes the VSI range.
2. **Advance one row.** Hold either button until the green square advances, then release. Rows advance in order: UNT, VSI, CAL, TMP.
3. **Save on the final row.** With TMP selected, hold either button again. This commits all four rows. Release the button; SafeAlt returns to operation. When entered from operation, it restarts and clears history.
4. **Discard unfinished changes.** Switch off and back on before committing TMP to exit without saving your edits.

Row	What it changes
UNT	Unit profile: US, METRIC, or ICAO. See page 7.
VSI	The range of both analog VSI dials: 2K/1K or 10/5 m/s.
CAL	Stored altitude correction. The value is an offset, not field elevation.
TMP	Temperature adjustment. The value shown is the live adjusted temperature, not the offset amount.

After a unit-profile change, reset the local pressure setting. Changing UNT selects the new profile's standard pressure, even if you cycle back to the original profile.

6 Units, calibration and density altitude

Choose the unit profile

UNT	Pressure	AL and DA	Vertical speed	Temperature
US	inHg	Feet	ft/min	°F
METRIC	hPa	Meters	m/s	°C
ICAO	hPa	Feet	ft/min	°C

The profile applies to all three views. Most operating readouts do not show a full unit suffix, so confirm the profile in Setup before use. ICAO keeps altitude in feet and vertical speed in ft/min. A METRIC example and specifications are on page 8.

CAL altitude correction

Use CAL to correct a persistent offset against a trusted altitude reference. First set the correct local pressure and allow the reading to settle. Make this adjustment on the ground; use the normal pressure controls for routine weather-setting changes.

CAL allows ±500 feet, or about ±152 meters. Each tap changes the correction by 10 feet in US/ICAO or approximately 2 meters in METRIC. The correction is stored when Setup is committed and also feeds the density-altitude calculation.

Example: with CAL at zero, if SafeAlt consistently reads 70 feet high against the reference, set CAL to -70 feet. If a correction already exists, adjust that value by the remaining error.

TMP temperature adjustment

Let SafeAlt and a trusted thermometer stabilize in the same shaded air. On TMP, compare the live displayed temperature with the thermometer. Tap LEFT to reduce it or RIGHT to increase it, then hold to commit Setup.

Each tap is approximately 1°F in US or 0.5°C in METRIC/ICAO. The maximum trim is ±20°C. The readout rounds to whole degrees, so a small adjustment may not immediately change the displayed number.

Use density altitude for preflight awareness

DA combines pressure altitude and measured temperature to estimate the altitude associated with the air density. A higher DA generally means reduced takeoff and climb performance. Use the aircraft's performance charts to determine the effect on your flight.

The temperature sensor is inside the enclosure. For a useful preflight DA, let the instrument acclimate to outside air, keep it out of sunlight, and check TE against the surrounding conditions. Cabin heat or a sun-warmed case can produce a misleadingly high DA; temperature trim cannot correct changing exposure.

DA is rounded to the nearest 100 feet or 50 meters. It uses the CAL correction but is independent of the yellow pressure setting. Its red color is always normal; SafeAlt does not issue a high-DA alarm.

7 Metric example and specifications

Select METRIC on the UNT row in Setup. The same controls and three operating views are available in every unit profile.

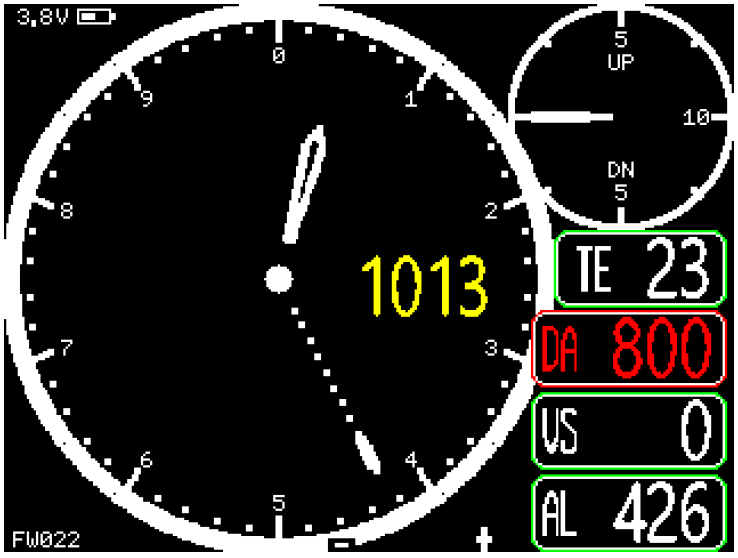


Figure 6 Altimeter view in METRIC units at 426 meters

In this example, AL is 426 meters, DA is 800 meters, TE is 23°C, and VS is 0 m/s. The yellow 1013 is the pressure setting in hPa. On the small VSI, 5 means 5 m/s up or down; the selected full-scale range is ±10 m/s.

Specifications

Item	Display or setting
Altitude display increment	1 ft in US/ICAO; 1 m in METRIC.
Digital VSI	Up to ±9,990 ft/min in 10 ft/min increments; METRIC: up to ±50 m/s in whole m/s.
VSI needle ranges	Selectable ±1,000 or ±2,000 ft/min; METRIC: ±5 or ±10 m/s.
Density altitude	Rounded to the nearest 100 ft or 50 m.
Pressure setting	28.00–31.00 inHg in 0.01 inHg steps; 950–1050 hPa in 1 hPa steps.
Altitude history	100 points, about 36 seconds apart; approximately one hour. Clears at restart.
Display	Color LCD with bright and dim settings.
Power and charging	USB-rechargeable battery; operation on USB power. Charge for four hours before first use.

Display increments describe the digits shown, not measurement accuracy. See page 2 for charging and low-battery indications.

8 Troubleshooting and support

What you see	Meaning and action
VSI shows ----	Initialization normally takes about 8–9 seconds. Wait for a numerical rate. Dashes also appear after sensor recovery.
AL, VS or TE digits turn red	Treat AL, VS, TE and DA as unavailable. On the ground, restart the unit; contact support if the fault persists.
DA is red while AL, VS and TE are white	Normal display colors. DA is not a color-coded performance warning.
A red graph segment remains	It records an earlier sensor-data gap. Current white readings may already have recovered.
The display dims and the battery turns red	Recharge or connect USB power. Low-battery dimming cannot be overridden with a button hold.
Altitude differs from the expected value	Check the unit profile and current pressure setting. Use CAL only after comparison with a trusted reference.
Density altitude seems unexpectedly high	Check TE and allow the instrument to acclimate in shaded outside air. Recheck aircraft performance using an appropriate temperature.
History is blank or short	A restart or committed Setup begins new history. Wait for samples to accumulate; changing views alone does not clear it.

Sensor recovery

A sustained loss of fresh sensor data changes the AL, VS and TE digits to red after about four seconds. The instrument attempts to recover automatically. Fresh data restore their normal color, and the VSI initializes again. White needles and the permanently red DA field do not independently confirm valid data.

Intended use

SafeAlt is a portable advisory instrument for situational awareness and backup use in VFR conditions. It is not TSO-certified or manufactured under a PMA. Do not use it as the sole or required altitude or vertical-speed reference, or where its failure could endanger safe flight or human life. Do not hardwire it into the aircraft.

SafeAlt provides visual indications only; it has no altitude alarm or audible warning. It does not measure terrain clearance. Always use the aircraft's approved information and performance charts for flight planning.

Warranty and support

SafeAlt carries a three-year warranty. For product support, email support@radiantinstruments.com. For warranty service, email info@radiantinstruments.com. Include the product name, firmware number shown at the lower left, purchase information, and a description or photograph of the issue.

Current warranty and return terms:

Manuals and updates

Revision B covers firmware FW022. Screen illustrations show example operating conditions.

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