RCATS

AK | AS - Airspeed Sensor
User Guide

Intro

The AeroKore AK-AS airspeed module is designed to deliver clean, confidence-inspiring telemetry rather than raw, noisy sensor output. Behind the scenes, it uses automatic zeroing, signal smoothing, low-speed noise rejection, and advanced logic to provide a more polished and reliable airspeed reading for modern RC Telemetry systems..

This module is fully compatible with the following protocols: Spektrum XBUS, FRSKY S.Port, Jeti EXbus and Futaba SBus2.

Please refer to our website for the most up-to-date specs: www.rcatsystems.com

In this Guide:

Unit Overview

Installing and Configuring the Display

Preparation

- **Required items:**
  - XBUS cable or single-wire connectors (required for FrSky, Jeti, and Futaba).
  - Pitot Tube and Air lines to connect Pitot and Static ports.

Part 1: Wiring & Setup

- **Connect the Telemetry Unit:** Plug the unit into either Spektrum XBUS port; both are interchangeable and allow for daisy-chaining devices. For single-wire connections, use the three-pin servo connector. Always verify correct polarity, ensuring the signal side faces toward the XBUS ports.

Part 2: Selecting the correct Protocol

- Ensure you can access the programming button.
- See section Selecting protocols and screens

Part 3: Secure the Unit

- Mount the unit securely within your aircraft using the two provided mounting tabs (compatible with standard servo screws), double-sided tape, velcro, or another preferred method.
- Note: High vibration environments can cause airspeed sensor variations
- For aircraft that pull high g's (Racing environment,etc), note that during high g maneuvers, the sensor may deflect under load giving biases in airspeed. Consideration may be given such that the unit is oriented with the sensor not in the Z axis

Part 4: Mount the Pitot Tube

- Install the pitot tube with the tip pointing directly into the relative wind.
- Position the tube so the static holes extend at least 1" past the wing's leading edge or any other obstructions. (The further out you can get them, the better)
- For propeller-driven aircraft, ensure the tube is not placed directly in the propwash.
- Connect the "P" (pressure/pitot) and "S" (static) ports on the sensor to the pitot tube using the tubing.

NOTE: Static ports can be placed inside the fuselage, but readings will not be as accurate as a well placed static port on your pitot tube, or on the side of the fuselage perpendicular to the airflow. Internal fuselage static ports but may be subject to biases due to positive pressure or negative pressure in the fuselage.

Selecting protocols and screens

Button Press Types

After you release the button and the quick entry flash finishes:

- A short tap changes to the next mode
  - Think of a short tap as a quick button click
  - The program LED then blinks the selected mode number
- A longer hold saves the currently selected mode
  - The program LED flashes quickly

LED Feedback

- On entry to programming mode, both LEDs flash quickly two times.
- After each valid short tap, the program LED blinks the selected mode number.
- When a save is accepted, both LEDs flash quickly two times again.
- The unit then waits for you to release the button and reboots into the saved mode.

Modes

1. Spektrum XBUS	**2. FrSky S.Port**
3. Jeti ExBus	**4. Futaba SBus2**

Enter Programming Mode

1. Locate the programming button on the side of the unit, which sits below the surface of the case.

2. Press and hold the programming button (use a non-metallic object).
3. While still holding the button, power the unit on or reset it.
4. Wait for the Red program LED to flash quickly two times.
5. Release the button after the quick flash confirmation. You're now ready to program!

When programming mode starts, the selector always resets to Mode 1 first. The saved mode is not automatically loaded upon programming mode entry.

Example to set “Mode 3” - Jeti

1. Hold the button during power-up or reset.
2. Release after the two quick confirmation flashes.
3. *The selector is now at Mode 1.*
4. Tap once to move to Mode 2. The program LED blinks twice.
5. Tap again to move to Mode 3. The program LED blinks three times.
6. Long Hold the button.
7. After the two quick save flashes, release the button.
8. The unit reboots and will now use Mode 3.
9. Power cycle the unit.

Pitot Tube Installation Considerations

Installation of the pitot tube requires some considerations in order to obtain acceptable and accurate indicated airspeed (IAS) data. For airspeed measurements, there are two key aspects of pressure to understand:

- **Static Pressure:** The ambient pressure of the air around the aircraft. This pressure exists whether the plane is moving or sitting still on the workbench. Pressure typically decreases as you increase altitude.
- **Total (Ram) Pressure:** The pressure of the air ramming directly into the front of the aircraft as it flies forward.

Your AeroKore sensor calculates airspeed by finding the **Dynamic Pressure**. It does this by taking the Total Pressure and subtracting the Static Pressure to get a differential. The faster the aircraft flies, the higher the ram pressure is compared to the surrounding static air. The sensor reads this difference and converts it into your airspeed.

For further background on airspeed theory, see: Wikipedia Pitot Static System

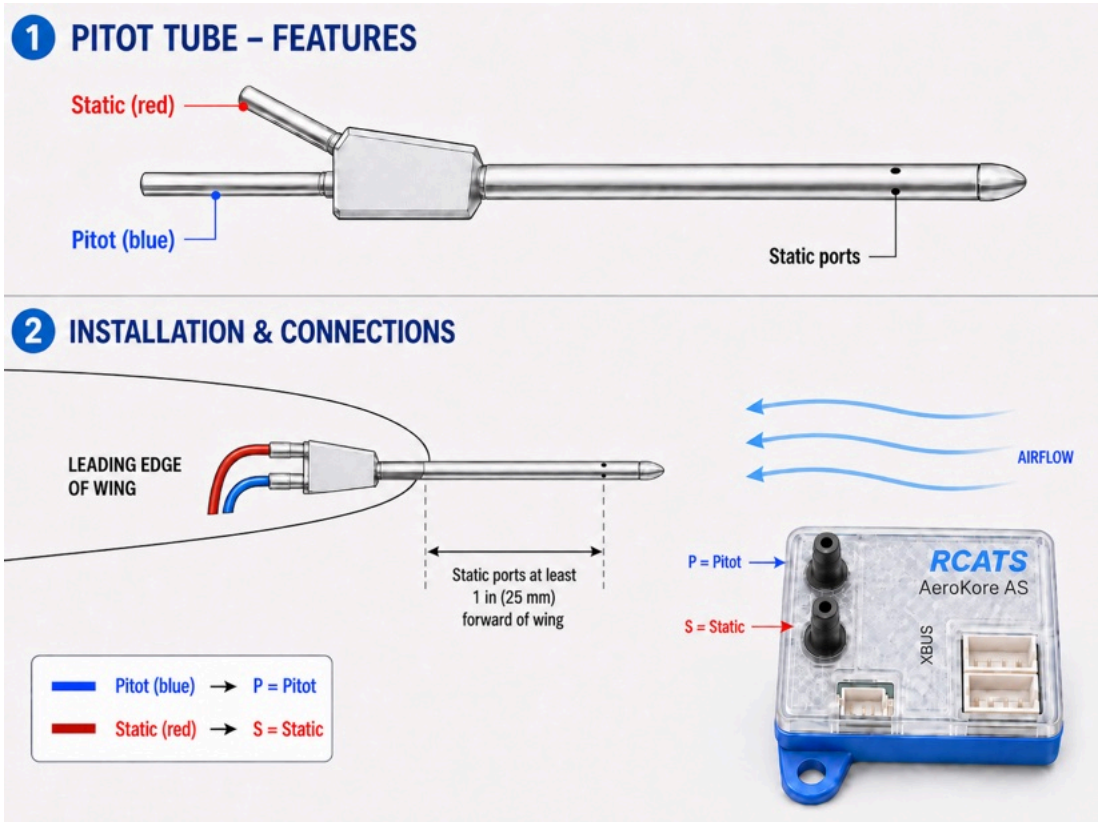
Because there are two sources of pressure that require different measurements, one can either use a pitot tube with static ports located elsewhere on the aircraft or a combined pitot-static probe. In either case, there are installation considerations. Both the total pressure and static ports must be in clean air and out of the boundary layer. The closer they are to the aircraft structure, the more likely it can be influenced by local airframe effects. There are rules of thumb for installation of such and they are influenced by airspeed and the size of the aircraft. For a smaller aircraft, the short 4” probe that we offer is a reasonable choice if it is mounted a sufficient distance from the structure, but larger aircraft may require a different probe. You can either purchase a probe or make one yourself.

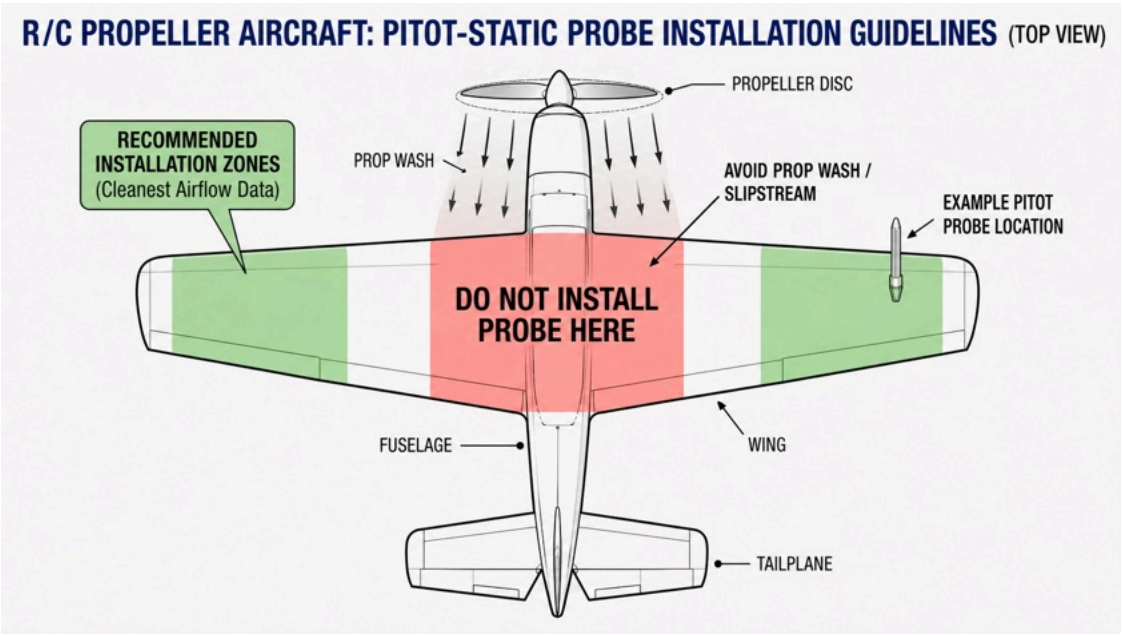
If you choose to utilize a simple probe for the total port and place the static ports elsewhere, consider that a static port inside the fuselage may work in some instances, however biases could exist due to the fuselage having positive or negative pressure in the cavity. This will be exacerbated by installations like a ducted fan aircraft due to the fuselage pressure being affected by fan speeds. We have tested fuselage static port locations and if you so choose to place the static ports on the fuselage itself, we would recommend placing them on each side of the fuselage (opposite to each other) and teeing them together. The static ports need to be perpendicular to the flow of air and not provide a ram or venturi effect upon the measurement.

Ideal locations for a combined pitot tube or pitot-static probe

- Mounted on leading edge of wing clear of any prop wash
- Nose of aircraft such as a jet
- Top of vertical fin if clear of prop wash
- L-head probe on bottom of wing

For any of these installations, the user has to take into consideration that mounting of the probe may mean altering or modifying the structure of the aircraft. Any modifications that affect the structure are up to the user and the user is responsible for ensuring structural integrity of the aircraft due to any modifications.





Examples of pitot-static installations:

F-86 EDF Installation with pitot-static probe using an off the shelf-probe available from RCATS.

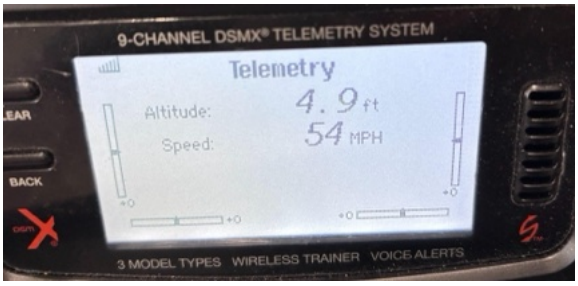
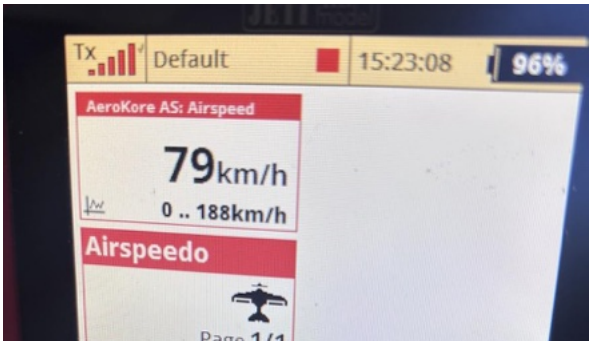
Nose of T-33 EDF with pitot-static probe using an off the shelf-probe available from RCATS.

Giant Scale P-47 Warbird with a custom made probe.

Custom F-18 L head pitot probe in scale location with fuselage static ports (dual static ports not shown).

Displayed Measurements & Examples

This sensor integrates with multiple ecosystems, including Spektrum, Jeti, FrSky, and Futaba. While the hardware provides the data, the user interface and display configuration are determined by your specific radio system manufacturer. We do our best to test against as many different radio versions as possible with all manufacturers. Jeti and FrSky are much more flexible with their displays and we also offer free LUA scripts on our website to help optimize your display.

Example DX9 Screen with airspeed displayed	Example IX20 homescreen with airspeed displayed
	
Example Jeti screen with airspeed displayed	Example Futaba screen with airspeed displayed
	
Example Lua Script on FrSky	
	

Alerts

Consult Your Radio Manual: For detailed, step-by-step instructions on navigating the telemetry alarm menus, please refer to your specific radio manufacturer's instructions.

Normal Operations

During the initial power-up sequence, the AK-AS module performs an automatic zeroing of the sensor to ensure accurate flight data. **If in windy conditions, It is critical that you shield the pitot tube from any wind or direct airflow during the first few seconds of boot-up.** You can simply use your hand or something solid to shield the pitot port. This allows the sensor to establish a correct baseline reference. When shielding the pitot, DO NOT plug the sensor ports, which can trap pressure and give incorrect readings.

NOTE: Failure to shield the pitot tube during this initialization period may result in an incorrect sensor zero, causing displayed airspeed readings to be lower than actual flight speeds. Always ensure the tube is clear of obstructions but protected from gusting air during system startup.

Configuring Sensors in Spektrum Radios

This is a basic overview for how to get your sensors to display in your Spektrum radio. Please follow Spektrum's official instructions for a more detailed setup.

Spektrum DX and NX Series
Prerequisites: Ensure the transmitter and receiver are bound. The receiver and all connected telemetry sensors must be powered on before starting this process.

- From the main transmitter screen, press the scroll wheel to access the Function List.
- Scroll down and select Telemetry.
- Select Auto-Config.
- Note: On older DX firmware versions, you may need to scroll down to Settings first, and then select Auto-Config.
- The screen will briefly flash "Configuring..." for a few seconds while the transmitter pings the receiver.
- Once the scan is complete, your active sensors will automatically populate in the telemetry list.

Spektrum iX Series (Such as iX12, iX14, iX20)
Prerequisites: Ensure the transmitter and receiver are bound. The receiver and all connected telemetry sensors must be powered on before starting this process.

- From the main Spektrum AirWare dashboard, tap on Model Setup.
- Tap on Telemetry.
- Tap the Auto-Config button.
- The system will scan for active sensors and automatically populate them into your telemetry list.

FrSky:

Prerequisites: Ensure the transmitter and receiver are bound. The receiver and all connected telemetry sensors should be powered on before starting this process.

The telemetry module must be connected to the S.Port of your FrSky RX and the RX's telemetry port must be configured as "S.Port"

Wire plugged into S.Port:	RX Telemetry Port setting as "S.Port"
	
Speed displayed on a LUA script	Speed display on a standard Ethos screen.
	

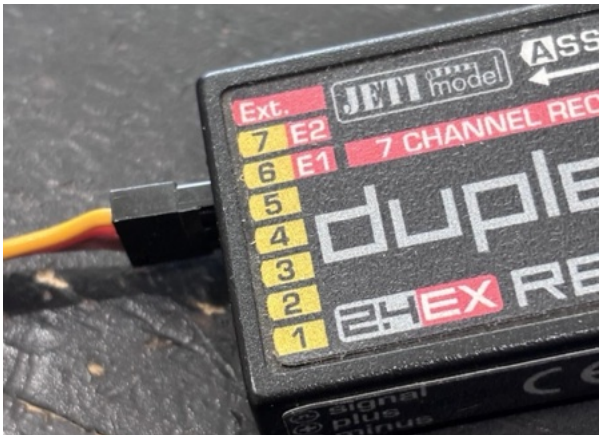
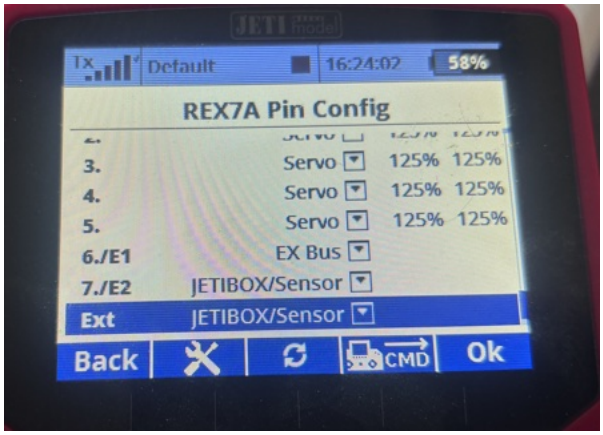
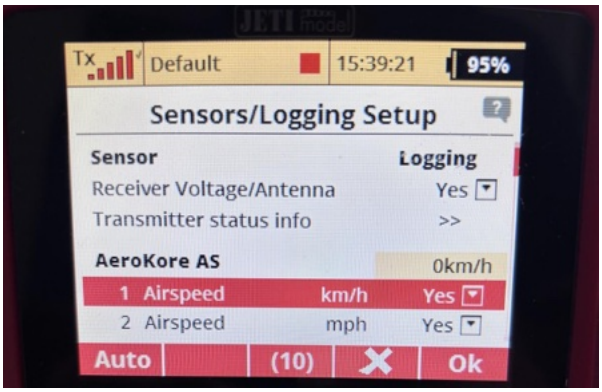
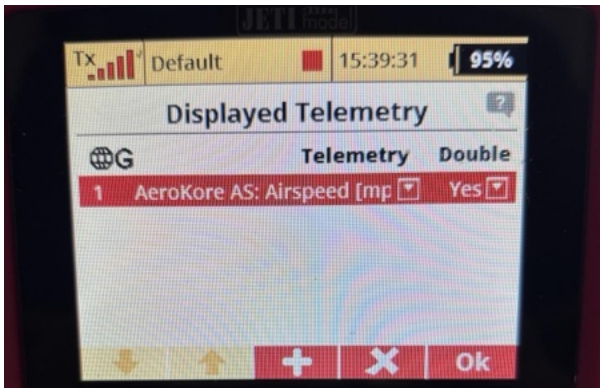
Configuring the sensor

- Go to Model Setup
- Select Telemetry
- Toggle Discover new sensors
- The following new sensors will show up:
    - Air speed
- Once selected, change the name and set the units. FrSky defaults to “knots”.
        - Protocol Decimals / unit: Select the correct unit value such as Knots, Mph, or Km/H for what you want it to be displayed as on your screen.
        - The sensors are now ready to be mapped to your configured screens.
- To use a custom LUA script
    - Follow FrSky’s instructions on loading scripts onto your radio. RCATS Aerokore scripts can be downloaded from https://www.rcatsystems.com/support

Jeti:

Prerequisites: Ensure the transmitter and receiver are bound. The receiver and all connected telemetry sensors must be powered on before starting this process.

The telemetry module must be connected to an “Ex” configured port, and the transmitter must be configured as well. **(Example: Menu > Model > Device Explorer)** See images below as examples of the actual pin connection and selection:

Wire plugged into the E1 Port we want to config:	TX Pin Config Screen showing E1 as “EX Bus”
	
Sensors/Logging Setup Screen with mph&km/h	Selecting “Aerokore AS” to display mph
	

- Go to Menu and then Timers/Sensors
- Select “Sensors/Logging Setup”
    - The AeroKore AS module will be shown. It passes over km/h and MPH in two separate values. These can be selected in your Displayed Telemetry.
- Once completed, go to Displayed Telemetry
    - Click “+” and select “Telemetry”
    - Select whichever AeroKore AS: Airspeed you want to be displayed.

- To use a custom LUA script
    - Follow Jeti's instructions on loading scripts onto your radio. RCATS Aerokore scripts can be downloaded from https://www.rcatsystems.com/support
    - Once loaded onto your radio, click Applications → User Applications → +
    - Select the AS-AEROK~X file and click "OK".

Futaba:

Prerequisites: Ensure the transmitter and receiver are bound. The receiver and all connected telemetry sensors must be powered on before starting this process.

Note: These instructions below are setting Futaba T16IZ as the example Transmitter.

Wire plugged into an SB2 Port:	TX Telemetry Screen showing Air speed in slot 16
	
Futaba T16IZ for setting alerts:	
	

- Go to Linkage Menu and then Sensor
- Scroll to the page where you find box “16”
- Select “Speed Sensor” and set the “ID” to “16 as well.
- Once completed, go back to “Linkage menu” and “Telemetry” to confirm the value is showing.
    - This also allows you to set alerts/limits.

Safety, Installation Warnings, & Limitation of Liability

Any addition to your radio system—including telemetry modules, electronic valves, or extended wire leads—can introduce new variables to your RF environment. To ensure the highest level of safety and performance, please observe the following guidelines. **Note that the user assumes full and sole responsibility for the safe operation of their aircraft and all actions taken during use.**

Installation Guidelines

- **RF Interference & Long Leads:** The addition of long servo extensions or telemetry leads can occasionally act as antennas, potentially picking up or radiating interference. Always route your wiring away from your receiver antennas and ignition systems to minimize signal noise. When power and signal lines are located in close proximity, crossing these leads at 90 degree angles is best practice to help prevent interference.
- **System Integrity & Power:** Ensure your power system is capable of handling the additional load of any connected telemetry modules.
- **Mandatory Range Testing:** You should always perform a comprehensive ground range test after installing any new hardware or changing your aircraft's wiring configuration. Verify that the system operates correctly with the engine/motor both off and running.

Assumption of Risk & Liability

Failure to verify the integrity of your radio link and power system after installation could result in a loss of control or unexpected failsafe activation. By using the AeroKore AS, you agree to the following:

1. **User Responsibility:** The operator is exclusively responsible for the airworthiness of the aircraft and the safety of the flight environment.
2. **Limit of Liability:** In no event shall **RCAT Systems** be liable for any direct, indirect, or consequential damages arising from the use of this product. **RCAT Systems** is not responsible for any crashes, collisions, or damages to the aircraft, surrounding property, or persons, regardless of the cause. This includes, but is not limited to, operator error, hardware failure, or environmental interference.

Always prioritize a "safety-first" approach by confirming system behavior on the ground before flight. Use of this product constitutes acceptance of these terms.

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Specifications

- Dimensions: 20mm x 30mm x 8mm (0.79” x 1.18” x 0.31”)
- Weight: 0.25oz (7 grams)
- Power: 5V - 8.4V
- Interface: Spektrum XBUS, Single Wire for Jeti, FrSky, Futaba, SRXL2
- Measurement range: ~6mph to ~290mph

FAQ

- What do the LED indications on the unit mean?
    - Green:
        - Solid: Board is powered on
    - Red:
        - Flashes during communication and during programming modes, see Programming Modes.
- What if I wanted to use my own pitot tube?
    - Any pitot tube where you provide sufficient pressure and static will work! Just ensure that you install the tube in line with best practices.
- What is the min airspeed it will measure?
    - ~6mph
- What is the max airspeed it will measure?
    - ~290mph
- What if I plug in the Pitot and Static lines backwards?
    - No problem, we have implemented auto-polarity detection in the event your lines are crossed and the telemetry will still read correctly.