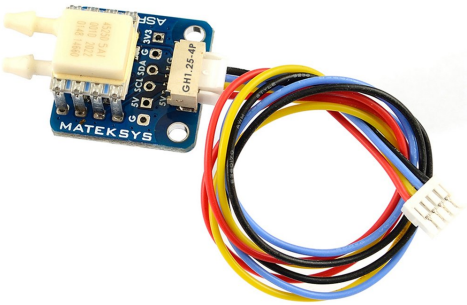
ROTORAMA

ASPD-4525

Digital airspeed sensor
Matek Systems · user manual



Read this entire manual before installation and the first flight. The sensor is intended for installation in RC aircraft with a flight controller (FC) running ArduPilot or INAV firmware.

Rotorama, s.r.o. · www.rotorama.com

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1. Product description

1.1 Purpose

ASPD-4525 is a digital airspeed sensor made by Matek Systems for RC aircraft and flying wings with a flight controller (FC) running **ArduPilot** or **INAV** firmware. The sensor measures the difference between the total (ram air) pressure in the pitot tube and the static pressure of the ambient air. From this difference the flight controller calculates the speed of the aircraft relative to the air.

Unlike GPS speed, which is the speed over ground, airspeed also includes the effect of wind. The flight controller can use it to control speed in automatic and stabilised flight modes. The sensor communicates with the flight controller over the **I2C** bus and is connected with a single four-wire cable.



ASPD-4525 sensor with the pitot tube and JST-GH cable connected

1.2 Technical data and package contents

Product designation	Matek ASPD-4525 (Digital AirSpeed Sensor)
Manufacturer	Matek Systems, www.mateksys.com
Pressure sensor	TE 4525DO-DS5AI001DP
Supply voltage	4–5.5 V DC
Working current	5 mA
Output	I2C (SCL, SDA)
Pressure range	1 PSI (6.89 kPa)
Maximum pressure	20 PSI (137.9 kPa)
Accuracy	±0.25 % of span (SPAN)
Operating temperature	−40 °C to 125 °C
Connector	JST-GH, 4 pins: 5V, SCL, SDA, GND
Indicator	red LED – power
Board dimensions	20 × 20 mm, M2.5 mounting holes, 15 mm spacing
Weight	3.5 g (sensor board)

▶ **Package contents**

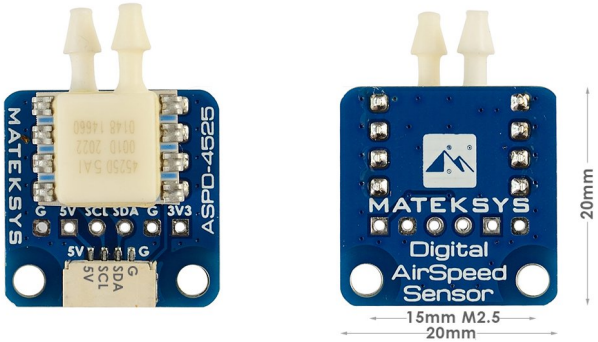
- 1× ASPD-4525 sensor board
- 1× JST-GH 4P to JST-GH 4P cable, 20 cm, silicone wires
- 1× pitot tube
- 1× clear silicone tubing, 40 cm



Package contents

Not included: flight controller (FC), screws or other material for mounting the board and the pitot tube, I2C bus splitter.

1.3 Board description



Sensor board – top and bottom view, dimensions 20 × 20 mm, M2.5 mounting holes, 15 mm spacing

- **Pressure ports** – two barbed ports of the sensor for the tubing from the pitot tube.
- **JST-GH 4P connector** – pin order 5V, SCL, SDA, GND.
- **Solder pads** – marked G, 5V, SCL, SDA, G and 3V3. The manufacturer specifies a 4–5.5 V supply via the 5V pin; the 3V3 pad is not mentioned in the wiring description.
- **Red LED** – power indicator.

2. Use – installation and wiring

2.1 Safety instructions

- Connect and disconnect the sensor only with the flight battery and the USB cable disconnected.
- Observe the wire order. Swapping power (5V) and ground (GND) can destroy both the sensor and the flight controller.
- Do not expose the sensor to pressure higher than 20 PSI (137.9 kPa). Do not use compressed air to clean the tube or tubing.
- Remove the propeller for ground tests with the flight battery connected.
- Protect the board from moisture, dust and mechanical damage. Do not kink the tubing.
- An incorrectly connected, leaking or uncalibrated sensor can feed a wrong airspeed to the flight controller. In modes with automatic throttle control this can lead to loss of airspeed and a crash. Therefore always check the sensor function before flight (Chapter 4).

2.2 Pitot tube placement

The pitot tube must be in undisturbed airflow, parallel to the direction of flight and outside the propeller slipstream. According to the ArduPilot documentation, on an aircraft with a nose-mounted propeller the tube should be placed on the wing, at least about 30 cm (1 foot) from the fuselage.

- The side holes of the tube must not be covered. According to the ArduPilot documentation they should protrude at least 1 cm ahead of the nose or leading edge.
- Install the sensor board in the fuselage or wing, protected from impacts and moisture. Use the M2.5 mounting holes to fix it.
- Route the tubing along the shortest path, without kinks and without tension.

2.3 Connecting the tubing

The pitot tube has two ports: **total pressure** (hole at the tip of the tube) and **static pressure** (side holes). Cut the tubing into two pieces of the required length and use them to connect the ports of the tube to the two ports of the sensor. All joints must be airtight.

According to the ArduPilot documentation, the tube coming straight out of the back of the pitot tube connects to the **top** port of the sensor and the tube exiting at an angle connects to the **bottom** port. With the default setting (*ARSPD_TUBE_ORDR* = 2) ArduPilot detects the tube order automatically. If the reading does not respond correctly during the test (Chapter 4.1), check the tubing for leaks and its order.

2.4 Electrical connection

Sensor	Flight controller (FC)
5V	power 4–5.5 V
SCL	I2C – SCL
SDA	I2C – SDA
G	GND (ground)

- Use the supplied JST-GH 4P cable. Before connecting, compare the wire order with the wiring diagram of your flight controller. The pin order of the I2C connector may differ between manufacturers.
- The sensor connects to the I2C bus in the same way as a compass. If the I2C port is already used, for example by a GPS module with a compass, the bus can be split with an I2C splitter.
- When power is applied, the red LED on the board lights up.

3. Flight controller setup

The sensor is supported by **ArduPilot** (ArduPlane) and **INAV** firmware. Parameter and menu names may differ between firmware and ground station versions. If they differ, follow the current firmware documentation: ardupilot.org, github.com/iNavFlight/inav.

3.1 ArduPilot

① In Mission Planner open *CONFIG* → *Optional Hardware* → *Airspeed*, or the *Full Parameter List*.

② Set **ARSPD_TYPE = 1** (I2C-MS4525D0).

③ Set **ARSPD_BUS** to the number of the I2C bus the sensor is connected to (default 1). The number may not match the label on the flight controller board. If the sensor fails to initialise, try another bus (e.g. 0) and reboot the flight controller.

④ For the first tests leave **ARSPD_USE = 0**: the reading is only displayed and logged. Only after checking the function (Chapter 4) set **ARSPD_USE = 1** so that the flight controller uses the reading for control.

⑤ Write the parameters and reboot the flight controller.

3.2 INAV

① Connect the flight controller to INAV Configurator and open the *CLI* tab.

② Enter the command **set pitot_hardware = MS4525** followed by **save**. The flight controller reboots.

③ Check that the flight controller detects the sensor and displays airspeed (Chapter 4.1).

The *pitot_scale* parameter (default 1.0) is a scale factor for fine-tuning the airspeed reading. The sensor can only be used with a flight controller whose INAV firmware includes pitot tube support.

4. Check, calibration and maintenance

4.1 Function check

- Watch the airspeed reading in Mission Planner or INAV Configurator.
- Blow on the pitot tube or press your finger over its opening and watch how the reading responds. According to the ArduPilot documentation the reading should rise to about 6 m/s or more when you blow.
- In still air, oscillation between zero and small values (2–3 m/s) is normal. If you see mostly 0–2 m/s with an occasional bounce to 3–4 m/s, that is fine. You will not see that sort of variability at flying speeds.
- If the reading stays at exactly 0.0 and does not fluctuate at all, the flight controller is not reading the sensor.

Explanation: airspeed varies with the square root of the differential pressure. Near zero, even very small pressure changes therefore cause noticeable changes in the reading, while at flying speeds a much greater pressure change is needed to produce the same change in speed.

4.2 Zero offset calibration (ArduPilot)

- At start-up the flight controller automatically zeroes the sensor and stores the result in the *ARSPD_OFFSET* parameter.
- Before applying power, loosely cover the pitot tube (e.g. with a piece of foam) so that wind cannot blow into the front or side holes. Remove the cover before flight.
- For a more accurate calibration, let the electronics warm up for at least 1 minute after power-up, loosely cover the tube and run *Preflight Calibration* in the ground station.
- The *ARSPD_OFFSET* value should not change significantly (by more than 10–20 points) from one power-up to the next. A large change means the tube was not covered at start-up.

An incorrect zero offset can make the flight controller show a higher airspeed than the real one. In modes with automatic throttle control it then reduces throttle and the aircraft may crash.

4.3 ARSPD_RATIO calibration (ArduPilot)

① Set **ARSPD_AUTOCAL = 1** and write the parameter.

② Fly a repeated circuit or a loiter circle for about 5 minutes. Turns are required for a good estimate.

③ After landing set **ARSPD_AUTOCAL = 0**.

④ Check **ARSPD_RATIO**. The usual value is 1.5–3.0. If it is outside this range, check the tubing for leaks and consider relocating the pitot tube.

The default value of *ARSPD_RATIO* is about 2.0. After replacing or relocating the pitot tube, reset it to the default and repeat the calibration. Do not leave automatic calibration enabled during long straight flights.

4.4 Maintenance and troubleshooting

- Before every flight check that the openings of the pitot tube are not blocked (dirt, insects, water) and that the tubing is not cracked, kinked or slipped off the ports.
- Check that the JST-GH connector is firmly seated and the cable is in good condition.
- After a crash check the tube, the tubing and the sensor board, and verify the function according to Chapter 4.1 before the next flight.

Problem	Possible cause and solution
Flight controller does not detect the sensor	Check the wiring and wire order and whether the red LED is lit. Check the *ARSPD_TYPE* or *pitot_hardware* setting. In ArduPilot try another *ARSPD_BUS* value and reboot.
Reading stays at 0.0	The flight controller is not reading the sensor – proceed as in the previous row.
Reading barely rises when blowing	Blocked tube, leaking joint or tubing slipped off. Check the tube, the tubing and the tubing order.
High reading on the ground, offset changes significantly	The tube was not covered at start-up. Cover it and repeat the zero offset calibration (Chapter 4.2).
ARSPD_RATIO outside 1.5–3.0	Leaking tubing or unsuitable tube placement (propeller slipstream, covered side holes).

5. Information for the EU and Czech Market

5.1 Importer and responsible person in the EU

The product is placed on the European Union market by the importer stated below, who is at the same time the responsible person within the meaning of Article 16 of Regulation (EU) 2023/988 of the European Parliament and of the Council on general product safety (GPSR).

Importer / responsible person in the EU	Rotorama, s.r.o.
Company ID (IČO)	051 57 692
VAT ID (DIČ)	CZ05157692
Registered office	Okrajová 1351, 674 01 Třebíč, Czech Republic
E-mail	info@rotorama.cz
Phone	+420 252 252 098
Website	www.rotorama.com

5.2 Disposal of electrical equipment



- The crossed-out wheeled bin symbol on the product, its packaging or in the documentation means that at the end of its service life the product **must not be disposed of together with mixed municipal waste**.
- Hand it over at a take-back point for electrical equipment – at a collection yard, at a take-back point of a collective system, or at the retailer when purchasing a new equivalent product. Take-back is free of charge for the end user.
- The obligations under Act No. 542/2020 Coll., on end-of-life products, are fulfilled by the importer through a collective take-back system.
- Proper disposal helps prevent negative impacts on the environment and human health and contributes to the reuse of secondary raw materials.

Through its contractual partner **ASEKOL a.s.**, the company ensures the take-back of waste electrical equipment from households and the separate collection of waste electrical equipment, batteries and accumulators in accordance with the applicable legislation. The customer is entitled to hand over old electrical equipment or a battery or accumulator at any collection point of the above contractual partner. The addresses of these take-back points are listed at www.asekol.cz, www.ecobat.cz and also https://visoh2.mzp.cz/RegistrMistZO/RegistrMistZOPublic/MapaMistZpetOdberu.

6. Warranty and rights arising from defective performance

The rights and obligations of the contracting parties are governed by Czech law, in particular by Act No. 89/2012 Coll., the Civil Code, and Act No. 634/1992 Coll., on consumer protection.

- The seller is liable to the buyer for the product being free of defects on receipt. If the buyer is a consumer, a defect may be notified **within two years of receipt** of the product (Section 2165 of the Civil Code).
- If a defect appears within **one year** of receipt, the product is deemed to have been defective already at the time of receipt (Section 2161(5) of the Civil Code).
- When purchasing online, a consumer has the right to **withdraw from the contract within 14 days** of receiving the goods without giving a reason (Section 1829 of the Civil Code).
- Claims should be made with the retailer from whom you purchased the product. The importer's contact details are given in Chapter 5.1.
- The competent body for out-of-court settlement of consumer disputes is the **Czech Trade Inspection Authority**, Štěpánská 796/44, 110 00 Prague 1, www.coi.cz.