



## Calibration technology

# Air data test indicator Model CPA2501



WIKA data sheet CT 29.02

## Applications

- Aviation calibration laboratories
- Aviation repair stations
- Manufacturers of avionics equipment
- Manufacturers of aerospace equipment
- Wind tunnels

## Special features

- Accuracy up to 0.01 % FS
- RVSM compliant
- P<sub>s</sub>, Q<sub>c</sub>, P<sub>s</sub>/P<sub>t</sub> or P<sub>s</sub>/Q<sub>c</sub> configuration with virtual channels
- Altitude and airspeed rate indication
- Altitude ranges to 100,000 ft. and airspeed ranges to 1,150 knots



Air data test indicator, model CPA2501

## Description

### Application

The model CPA2501 air data test indicator is used in aviation and aerospace applications for calibration of altimeters and airspeed indicators, displaying altitude, airspeed, altitude rate (vertical airspeed) and airspeed rate (acceleration). Applied wherever there is a need for a high level of accuracy in an avionics indicator or calibration instrument.

### Functionality

The CPA2501 can be configured with an altitude channel and an airspeed channel consisting of P<sub>s</sub>/P<sub>t</sub> or P<sub>s</sub>/Q<sub>c</sub>. It can be configured as a single-channel altitude/altitude rate indicator, (P<sub>s</sub> only) a single-channel airspeed/airspeed rate indicator (Q<sub>c</sub> only) or it can be a dual-channel unit configured as P<sub>s</sub>/P<sub>t</sub> or P<sub>s</sub>/Q<sub>c</sub>. In the P<sub>s</sub>/P<sub>t</sub> version the airspeed/airspeed rate channel is a calculated channel. An optional barometer can be installed for display in the front panel or as a separate channel. Pressure ranges for each channel can be specified by the customer.

### Versions

The CPA2501 versions are as follows:

- P<sub>s</sub> (altitude version)
- Q<sub>c</sub> (airspeed version)
- P<sub>s</sub>/Q<sub>c</sub> with a virtual P<sub>t</sub> channel
- P<sub>s</sub>/P<sub>t</sub> with a virtual Q<sub>c</sub> channel

An optional barometric sensor can be added to any version.

### Communication

The manual user interface is through a widescreen display with touchscreen. Navigation within the intuitive menu structure is easily learned. Recognisable touchscreen icons open screens for configuration and calibration. Communicating to a remote computer is achieved through RS-232, IEEE-488, USB or Ethernet. Communication commands are the same as the previous version of Mensor avionics gauge models 2108 and 2109 or the WIKA command set "SCPI".

# Specifications

## Model CPA2501

Reference pressure sensor - model CPR8001	
<b>P<sub>s</sub> sensor</b>	
Measuring range	0 ... 950 mbar abs. up to 0 ... 1,253 mbar abs. 0 ... 29.5 inHg at 0 °C up to 0 ... 37 inHg at 0 °C
Accuracy <sup>1)</sup>	0.009 % IS-50 <sup>2)</sup>
<b>P<sub>t</sub> sensor</b>	
Measuring range	0 ... 1,355 mbar abs. up to 0 ... 3,725 mbar abs. 0 ... 40 inHg at 0 °C up to 0 ... 110 inHg at 0 °C
Accuracy <sup>1)</sup>	Standard: 0.01 % FS Optional: 0.01 % IS-50 <sup>2)</sup>
<b>Q<sub>c</sub> sensor</b>	
Measuring range	-34 ... +100 mbar up to -34 ... +3,386 mbar -1 ... +3 inHg at 0 °C up to -1 ... +100 inHg at 0 °C
Accuracy <sup>1)</sup>	0.01 % FS
<b>Barometric reference</b>	
Function	The barometric reference can be used to switch pressure types (absolute <=> gauge). With gauge pressure sensors, the measuring range of the sensors must begin with -1 bar in order to carry out an absolute pressure emulation.
Measuring range	575 ... 1,151 mbar abs. 17 ... 34 inHg abs. at 0 °C
Accuracy <sup>1)</sup>	0.01 % of reading
<b>Pressure units</b>	38 and 2 user-defined units
<b>Aviation units</b>	Altitude: feet, miles, meter, kilometer Airspeed: knots, mph, km/h, meter/s, TAS (True Air Speed), IAS (Indicated Air Speed)
<b>Calibration interval</b>	365 days


- 1) It is defined by the total measurement uncertainty, which is expressed with the coverage factor (k = 2) and includes the following factors: the intrinsic performance of the instrument, the measurement uncertainty of the reference instrument, long-term stability, influence of ambient conditions, drift and temperature effects over the compensated range during a periodic zero point adjustment.
- 2) 0.009 % IS-50 accuracy: Between 0 ... 50 % of the scale range, the accuracy is 0.009 % of the half scale range and between 50 ... 100 % of the scale range, the accuracy is 0.009 % of reading.

Accuracy		
<b>P<sub>s</sub> pressure range</b>	0.009 % IS-50 <sup>2)</sup> 0 ... 32 inHg abs.	0.009 % IS-50 <sup>2)</sup> 0 ... 35 inHg abs.
<b>Altitude</b>	Sea level ±3 ft 10,000 ft ±4 ft 25,000 ft ±7 ft 40,000 ft ±12 ft 60,000 ft ±31 ft	Sea level ±3 ft 10,000 ft ±4 ft 25,000 ft ±7 ft 40,000 ft ±13 ft 60,000 ft ±34 ft
<b>Q<sub>c</sub> pressure range</b>	0.01 % FS -1 ... +36 inHg	0.01 % FS -1 ... +103 inHg
<b>Airspeed</b>	50 kn ±1.0 kn 100 kn ±0.4 kn 200 kn ±0.2 kn 500 kn ±0.06 kn	100 kn ±1.0 kn 200 kn ±0.5 kn 500 kn ±0.2 kn 1,000 kn ±0.04 kn

Base instrument	
<b>Instrument</b>	
Instrument version	Standard: Desktop case Option: - 19" rack mounting with side panels incl. rack-mounting kit for single instrument mount - 19" rack mounting with side panels incl. rack-mounting kit for dual instrument mount
Warm-up time	Approx. 15 min
Dimensions	See technical drawings
Weight	< 2.3 kg (< 5 lbs) with all internal options

Base instrument	
<b>Display</b>	
Screen	7" colour LC display
Resolution	Selectable from 4 ... 6 digits, depending on range and units
Input methods	Resistive touchscreen
Languages	English, German, Spanish, French, Italian, Portuguese, Polish, Russian, Chinese, Japanese, Korean
<b>Connections</b>	
Number of integrateable sensors (selectable)	Standard: 1 reference pressure sensor Option: 2nd reference pressure sensor, external pressure sensor and barometric reference
Pressure connections	7/16"- 20 F SAE (adapters provided)
Permissible pressure media	Dry, clean air or nitrogen (ISO 8573-1:2010 Class 5.5.4 or better)
Overpressure limits	110 % FS typical, optional external relief valves are available
Metals in contact with media	6000/7000 series aluminium, stainless steel 316, brass
<b>Voltage supply</b>	
Power supply unit	AC 100 ... 120 V or AC 200 ... 240 V, 50 ... 60 Hz, max. 24 A
Power consumption	max. 90 VA
Power supply	DC 12 V / 1.67 A (includes 4 region-specific plugs adapters)
<b>Permissible ambient conditions</b>	
Operating temperature	15 ... 45 °C (59 ... 113 °F)
Storage temperature	-20 ... +70 °C (-4 ... +158 °F)
Relative humidity	35 ... 85 % r. h. (non-condensing)
Compensated temperature range	15 ... 45 °C (59 ... 113 °F)
Orientation	Negligible, can be removed with re-zeroing
Operating altitude	< 3,048 m (10,000 ft)
<b>Communication</b>	
Interface	RS-232, Ethernet, IEEE-488 and USB
Command sets	Mensor, WIKA SCPI
Response time	80 ms

## Approvals

Logo	Description	Country
	<b>EC declaration of conformity</b> <ul style="list-style-type: none"> <li>■ EMC directive EN 61326-1 emission (group 1, class A) and interference immunity (industrial application)</li> <li>■ Low voltage directive EN 61010-1</li> </ul>	European Community

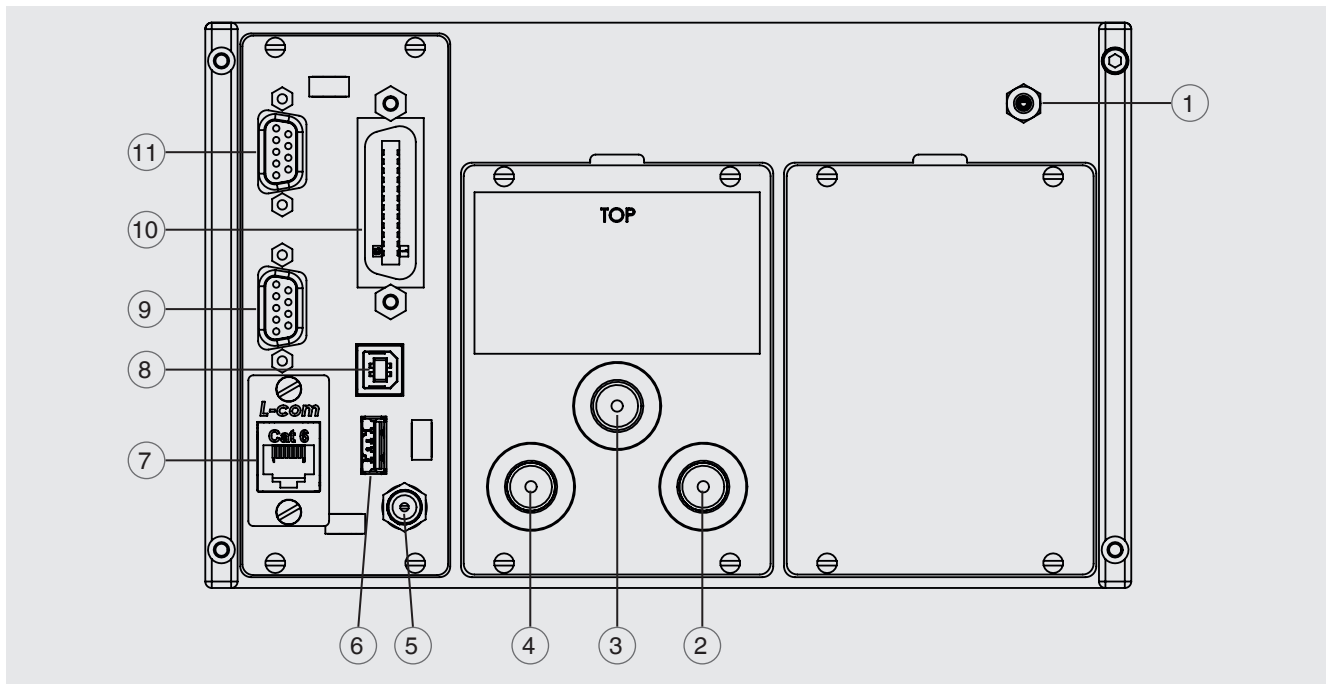
## Certificates

Certificate	
<b>Calibration <sup>3)</sup></b>	Standard: A2LA calibration certificate Option: DKD/DAkkS calibration certificate
<b>Recommended recalibration interval</b>	1 year (dependent on conditions of use)

3) Calibration in a horizontal position.

Approvals and certificates, see website

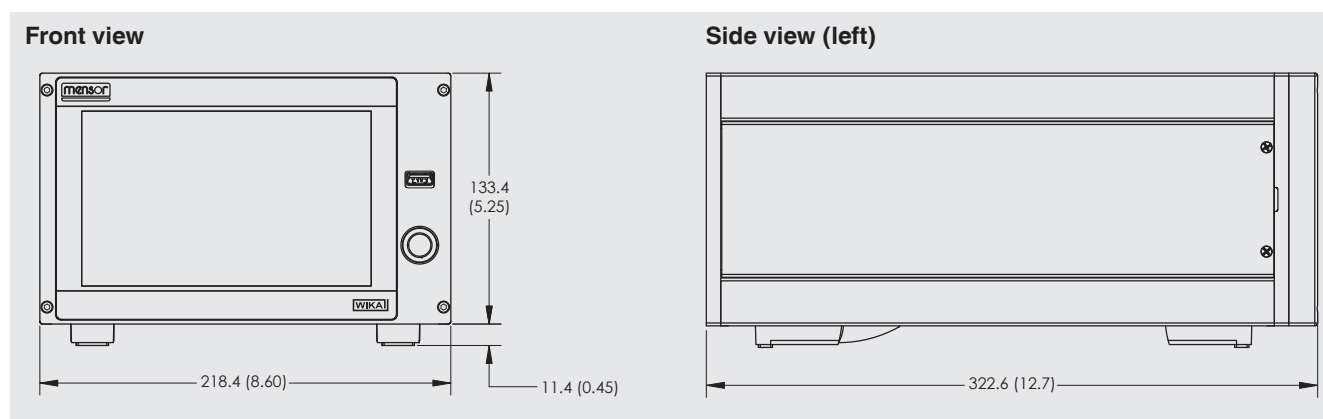
## Electrical and pressure connections - rear view



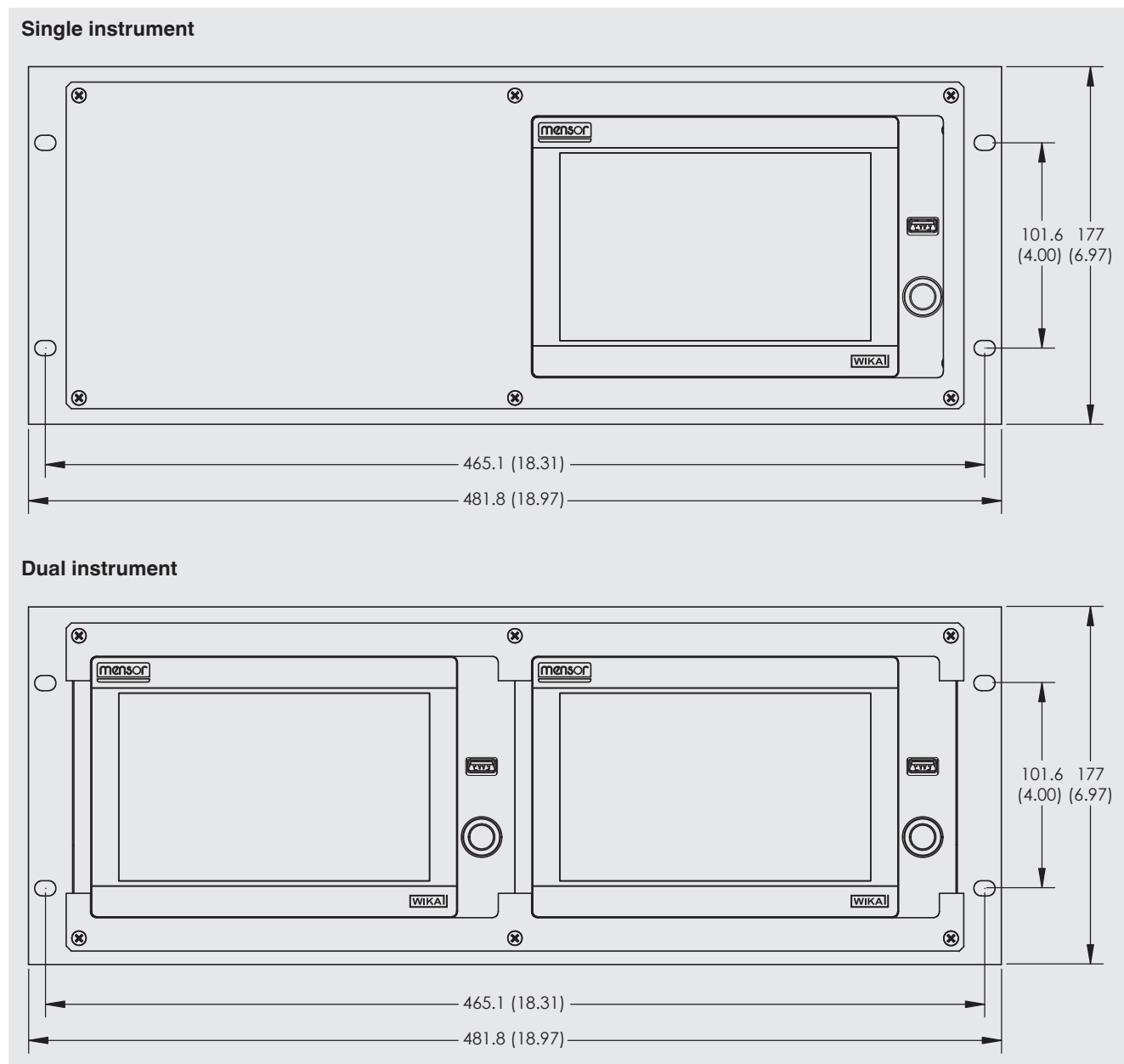
- |  |                              |
|--|------------------------------|
| ① Connection for optional barometric reference | ⑦ Ethernet port              |
| ② Port $P_s$                                   | ⑧ USB interface (instrument) |
| ③ Port $Q_c$                                   | ⑨ RS-232 interface           |
| ④ Port $P_t / Q_c$                             | ⑩ IEEE interface             |
| ⑤ Power supply                                 | ⑪ External sensor connection |
| ⑥ USB interface (host)                         |                              |

## Dimensions in mm (in)

### Desktop case

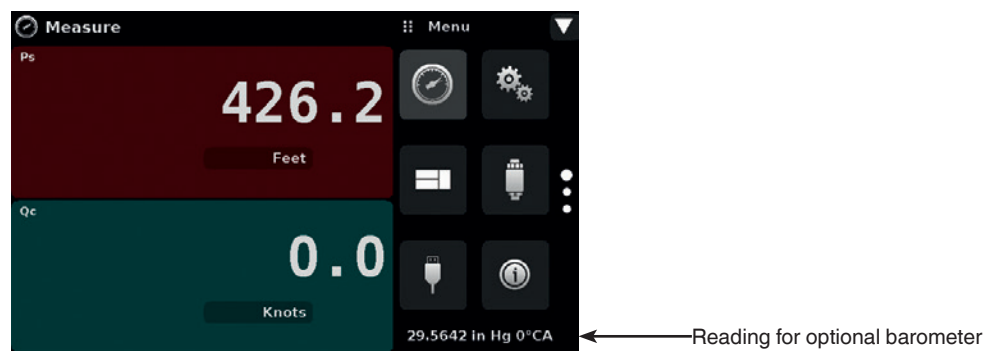


### 19" rack mounting, front view

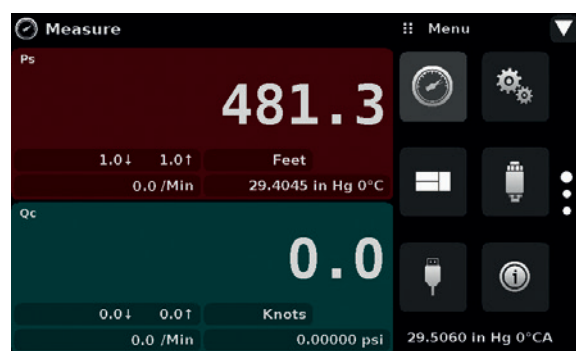


Operator interface

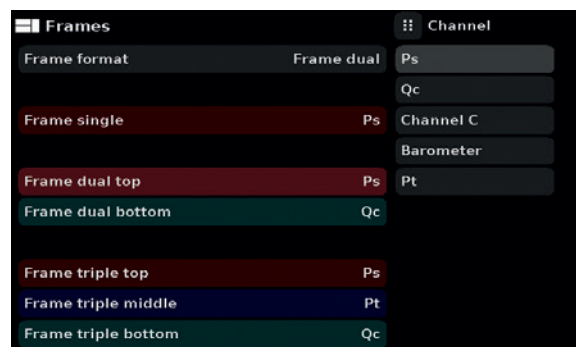
Dual-frame channel “P<sub>S</sub>” and “Q<sub>C</sub>” without auxiliary display



Dual-frame channel “P<sub>S</sub>” and “Q<sub>C</sub>” with auxiliary display



Frame configuration



Local operation

The intuitive operator interface of the CPA2501 provides visibility of one, two or three channels, each with or without the auxiliary display. Readings from the optional barometer can also be displayed in the lower right-hand corner. Pressure units for each channel and the barometer can be selected from a list of 38 metric and imperial units. The setup “apps” are continuously visible for fast configuration of various applications.

Remote operation

Remote control of the CPA2501 is achieved through the use of the IEEE-488, RS-232, Ethernet or USB interface.

## Reference pressure sensors

### Interchangeable sensor CPR8001

One or two pressure sensors can be chosen (see specifications).

The interchangeable sensor CPR8001 are a special feature of the air data test indicator. Interchangeable sensors guarantee long-term operation with practically no downtime. The sensor can be removed for calibration and replaced by a freshly calibrated sensor. The ability to remove a sensor for calibration and replace it with a freshly calibrated sensor while the instrument remains in service saves time and money.

Simply remove the four slotted screws on the rear panel, slide the reference pressure sensor out and remove the interface cable.

An optional removable internal barometric reference can also be ordered. The instrument can be adapted to different calibration and measurement tasks due to the easily exchangeable sensor technology. All relevant sensor calibration and characterisation data is stored on the sensor electronics which is individually generated for each sensor.

All CPR8001 reference pressure sensors can be calibrated while in the instrument using the instrument firmware. They can also be calibrated externally with an optional interface cable/power cord, calibration sled (barometer only) and remote calibration software.



Reference pressure sensor model CPR8001



Removable or replaceable barometric reference



- ① Slotted screws (typical)
- ② Removable reference pressure sensors model CPR8001



## Scope of delivery

- Air data test indicator, model CPA2501
- 2 m (6 ft) power cord
- Operating instructions
- A2LA calibration certificate

## Accessories

- Calibration sled
- Robust transport case
- Pressure adapters
- Interface cable

## Options

- Reference pressure sensor model CPR8001
- DKD/DAkkS calibration certificate
- 19" rack mounting with side panels for a single instrument
- 19" rack mounting with side panels for two instruments side by side
- Barometric reference

## Ordering information

Model / Case type / Reference pressure sensor / Barometric reference / Type of certificate for barometric reference / Additional ordering information

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