

GPS Radiosonde

iMS-100



Outline

GPS radiosonde is an upper-air sounding instrument to measure various types of meteorological data; wind speed, wind direction, pressure, temperature and humidity. Wind speed, wind direction and pressure are calculated from the travel speed and altitude obtained by GPS positioning techniques. Every 1 second measured data are transmitted to ground receiving system via 400-406 MHz band.

Compact and commonly-used devices are aggressively adopted in iMS-100 to achieve downsizing (just only 38 g including one battery) and its cost reduction. iMS-100 also serves for total operation cost saving by using smaller balloon and reducing the gas amount depending on the target height. Furthermore, the lightweight package greatly enhances safety in the sounding operation even without parachute when it accidentally falls down on land, especially.

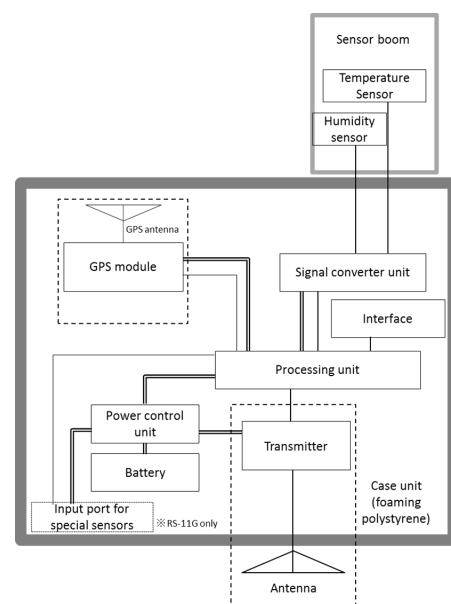
Improved sensor boom achieves higher accuracy in temperature measurement. Also, newly developed high response humidity sensor enables more accurate humidity measurement even in low temperature environment (below -40°C). In addition to the advantages of cost and safety, the innovative downsizing can minimize pendulum motions and heat contamination from the sonde itself during launch, which improves the measurement performances in terms of wind and temperature.

Features:

Compact & Light Weight Radiosonde

- Much higher accurate measurements of temperature and humidity, wind for the upper-air soundings
- Light weight 38 g iMS-100 helps enhancing safe operation especially when it falls down to the ground.
- Tiny iMS-100 effectively reducing overall operational costs (smaller balloon, fewer gas consumption) depends on the target height
- Downsized iMS-100 can contribute to reduce environmental burden through the entire life cycle (manufacturing, transportation, storage, and disposal)
- One lithium battery enables more than 4 hours sounding operation.
- High stability transmitter complying with ETSI (EN 302 054 V1.1.1)
- Easy preparation through wireless infrared communication (IrDA) between radiosonde and sonde checker unit before launch
- Biomaterial package, which is environmental friendly, is optionally available

Block Diagrams



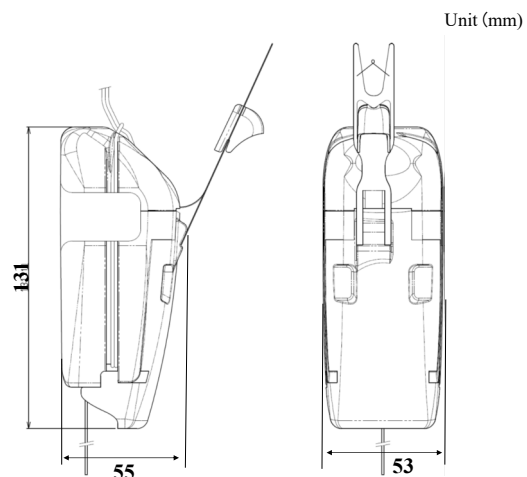
Specifications (Uncertainty evaluation^{*1)})

Temperature	Measurement range	-95°C to +60°C	Transmitter	Center freq.	404.5 MHz
	Resolution	0.01°C		Tuning range ^{*6}	400 MHz ~ 406MHz
Humidity	Daytime:	0 to 16km : <0.5°C	Modulation	Band width	< 15 kHz
	Above 16km : <0.8°C			Output power	< 100 mW
Pressure	Night time:	0 to 16km : <0.4°C	Power	Transmitter type	FM
	Above 16km : <0.4°C			Standard	EN302 054 V1.1.1
Geopotential Height	Response time	<0.4 s (1,000 hPa, 5 m/s)	Size & Weight ^{*7}	Modulation type	Digital PCM
				Baud rate	1,200 bps
Wind Direction	Measurement range	0%RH to 100%RH	Accompanying items	Range	>300 km (with Yagi antenna)
	Resolution	0.1%RH		Sampling	1 second
Wind Speed	Uncertainty ^{*2}	0 to 12km : <5%RH ^{*3}	GPS Receiver	Voltage	3.0 VDC
	12 to 17km : <5%RH			Current	< 200 mA
Usage Environment	Response time	< 0.2 s (Absorbing, 1,000 hPa, 6 m/s, 0°C)	Unwinder	Battery type	Lithium battery × 1 (CR-123)
		< 14 s (Absorbing, 1,000 hPa, 6 m/s, -60°C)		Operating time	> 240 min.
GPS Receiver	Measurement range	1100.0 hPa to 3.0 hPa	Balloon/parachute	Dimensions	55(W) × 53(D) × 131(H) mm
	Resolution	0.1 hPa		Weight (Including a battery)	38 g (EPS) < 50 g (Bio-based package) ^{*8}
Usage Environment	Uncertainty ^{*2,4}	1km : <1.2hPa	Unwinder	Weight	38 g (EPS)
		10km : <1.2hPa		(Including a battery)	< 50 g (Bio-based package) ^{*8}
Usage Environment		16km : <0.5hPa	Balloon/parachute	Unwinder	10m/ 15m/ 30 m
		24km : <0.5hPa		Balloon/parachute	Optional, please contact us.
Usage Environment		32km : <0.13hPa			
Usage Environment	Measurement range	-500 m to 40,000 m			
	Resolution	0.1 m			
Usage Environment	Uncertainty ^{*2,4}	1km : <11gpm			
		5km : <11gpm			
Usage Environment		10km : <11gpm			
		16km : <11gpm			
Usage Environment		20km : <11gpm			
		32km : <11gpm			
Usage Environment	Measurement range	0° to 360°			
	Resolution	0.01°			
Usage Environment	Uncertainty ^{*4,5}	0 to 16km : <1° with speed <10m/s			
		<1° with speed >10m/s			
Usage Environment		Above 16km : <1° with speed <10m/s			
		<1° with speed >10m/s			
Usage Environment	Measurement range	0 m/s to 200 m/s			
	Resolution	0.01 m/s			
Usage Environment	Uncertainty ^{*4,5}	0 to 16km : <0.15m/s			
		Above 16km : <0.15m/s			
Usage Environment	Frequency	1574.25 MHz ± 1MHz L1-C/A code			
	Number of channels	24 channels			
Usage Environment	Positioning Technology	DGPS (SBAS)			
Usage Environment	Pressure	1100.0 hPa to 3.0 hPa			
	Temperature	-95°C to +60°C			
Usage Environment	Humidity	0%RH to 100%RH			

Note

- *1) The uncertainty values are calculated by the latest (April, 2016) JMA-GRUAN evaluation
- *2) Expressed with coverage factor, k=2, unless otherwise explicitly specified.
- *3) Expect rapid humidity change around tropopause
- *4) Under optimal conditions of GPS reception : PDOP = 1
- *5) 1σ statistical uncertainty evaluated with GPS simulator by using sonde sounding scenario
- *6) Frequency can be changed every 100 kHz within the tuning range of 400 MHz and 406 MHz. Applicable Radio Law/Regulations should be complied.
- *7) Dimensions excluding antenna and sensor boom. Weight includes a battery, etc.
- *8) Bio-based material package type is optionally available.

Outline View



⚠ Cautions

- For safe and correct usage, please read the "Operation Manual" prior to the use of the products.
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