Sniffer4D V2 Mul	ti-gas Detection & Mapping System - Components & Specs (2022.05	5.11)
Component Name	Functionalities & Specs	Remarks
Sniffer4D V2 Base Unit	 Ultra compact & lightweight structural design: 158x103x88mm, 400~500g depending on the sensing module selection (drone integration kits not included). Anti EMI aluminium air-tight gas chamber with internal vibration reduction mechanism. Active air intake with approx. 5L/min flow rate when subject to zero additional resistance. Support 5VDC 2.5A Max (USB Type-C), or 7~32VDC 2A Max (XT30) power input. Support ultra-low power consumption "Dormant Mode", in which the most crucial sensing components still remain working when Sniffer4D V2 is not powered. "Dormant Mode" helps Sniffer4D V2 achieve negligible warm-up time after powering up. Energy storage component <1.11Wh with auto charging, charging time <60 min, lasts for >40 days per charge. IGHz ARM CPU and 512MB RAM. LEDs indicating Sniffer4D V2's working status: sensor assembly, GNSS, SD card, LTE, drone communication, and external device. Built-in LTE connectivity with no external antenna. Support global 4G, 3G, EDGE, and GPRS network. A micro SIM card needs to be provided by the user. Real-time encrypted data transmission (1Hz) with data retrieval algorithm. Encrypted data output port (USB Type-C), enabling easy communication with other devices (e.g. a flight controller). Built-in high-precision Global Navigation Satellite System (GNSS) with not external antenna. Supports GPS, GLONASS, Galileo, and Beidou. Front & rear high-brightness RGB warning LEDs with solid or blinking options. The LEDs can be configured to automatically vary their color according to the gas/PM concentrations. Swarm supported. One or multiple Sniffer4Ds can communicated with one or multiple PCs. Fully support DJI Payload SDK (PSDK) V2 (a M300 RTK or M210 series integration kit needs to be selected, see below). The user can view Sniffer4D's real-time data or control Sniffer4D using DJI Pidy App running on the DJI remote controller. Support mission data backu	• APN may also needs to be set after inserting the Micro SIM card into Sniffer4D V2.
Sniffer4D Mapper Data Visualization & Analysis Software	 Support Over the Air (OTA) infinivare update. Display real-time working status of Sniffer4D, including device name, GNSS satellite number, relative altitude, volume of data to be retrieved. Control Sniffer4D V2's high-brightness warning LEDs, gas sampling module, and other functionalities. Retrieve unreceived data during communication breakdown. Display real-time measurement values and their time series graphs. Generate real-time 2D grid gas/PM concentration heat map. Generate real-time 2D contour line gas/PM concentration heat map. Generate real-time drone camera view and save geo-tagged screenshots ("Video Streaming Service" needs to be selected). Estimate Fuel Sulfur Content (FSC) using proprietary inversion algorithm. Support loading multiple historical data files into the software for post analysis. Support loading an orthophoto (GeoTiff, WGS84) and displaying it under the concentration heat map. Support loading geo-tagged photos and showing their locations in the concentration heat map. Support automatic PDF mission report generation. Support automatic PDF mission report generation. Support automatic PDF mission files as a CSV datasheet. Track and display multiple Sniffer4Ds simultaneously. Display the detailed working status of internally-mounted sensing modules inside the Sniffer4D. The user can calibrate the sensitivity (slope) and zero point (intercept) of each module. Output decoded Sniffer4D data (json) using UDP. Unlimited software installations and automatic software updates. 	• Require 64- bit Windows 10 OS.
Selectable Internally- mounted Modules Up to 8 internal modules can be installed inside a Sniffer4D V2 base unit. Choose the modules that fit your application.	 Detection method: laser scattering/light scattering; Sense PM1.0 (particle size 0.3~1um), PM2.5 (particle size 0.3~2.5um), and PM10 (particle size 0.3~10um); Particle counting effectiveness: 50% @ 0.3um, 98% @> 0.5um; Range: 0~1500ug/m3; Detection limit: 1ug/m3; Repeatability: <2% FS; Theoretical Resolution: 1ug/m3; Warm-up time from a cold start: <10s; Overall response time: <10s; Estimated service life: >36 months; On-chip proprietary humidity correction algorithm, enabling better data quality in wide humidity range. 	• For general environmental monitoring.

	High-resolution O3+NO2 Sensing Module	 Detection method: electrochemistry; Sensitive to both O3 and NO2, but unable to identify individual concentrations; Range: 0~11ppm; Detection limit: 5ppb; Repeatability: <4%FS; Overall response time (t90): <45s (0~1ppm); Theoretical resolution: <1ppb; On-chip proprietary environmental and individual difference compensation algorithms, enabling better data quality in wide temperature and humidity ranges; Support "Dormant Mode", warm-up time from a cold start: < 10s; Sensitivity drift: -20~-40%/year (in laboratory environment); Zero drift: 0~20ppb/year (in laboratory environment); Est. service life: >24months; Operating temperature: -30~40°C; Operating humidity: 15-85%RH. 	 For general environmental monitoring. Individual O3 concentration is calculated using: O3=(O3+NO2) -NO2
	High-resolution NO2 Sensing Module	 Detection method: electrochemistry; Range: 0~11ppm; Detection limit: 5ppb; Repeatability: <4%FS; Overall response time (t90): <60s (0~2ppm); Theoretical resolution: <1.1ppb; On-chip proprietary environmental and individual difference compensation algorithms, enabling better data quality in wide temperature and humidity ranges; Support "Dormant Mode", warm-up time from a cold start: < 10s; Sensitivity drift: -20~-40%/year (in laboratory environment); Zero drift: 0~20ppb/year (in laboratory environment); Est. service life: >24months; Operating temperature: -30~40°C; Operating humidity: 15-85%RH. 	• For general environmental monitoring, HAZMAT response, and ship fuel sulfur content monitoring.
	High-resolution CO Sensing Module	 Detection method: electrochemistry; Range: 0~11ppm; Detection limit: 4ppb; Repeatability: <4%FS; Overall response time (t90): <20s (0~10ppm); Theoretical resolution: <0.6ppb; On-chip proprietary environmental and individual difference compensation algorithms, enabling better data quality in wide temperature and humidity ranges; Support "Dormant Mode", warm-up time from a cold start: < 10s; Sensitivity drift: <10%/year (in laboratory environment); Zero drift: <±100ppb/year (in laboratory environment); Est. service life: >36months; Operating temperature: -30~50°C; Operating humidity: 15-90%RH. 	• For general environmental monitoring and HAZMAT response.
	High-resolution SO2 Sensing Module	 Detection method: electrochemistry; Range: 0~15ppm; Detection limit: 5ppb; Repeatability: <4%FS; Overall response time (t90): <40s (0~2ppm); Theoretical resolution: <0.8ppb; On-chip proprietary environmental and individual difference compensation algorithms, enabling better data quality in wide temperature and humidity ranges; Support "Dormant Mode", warm-up time from a cold start: < 15s; Sensitivity drift: <±15%/year (in laboratory environment); Zero drift: <±20ppb/year (in laboratory environment); Est. service life: >36months; Operating temperature: -30~50°C; Operating humidity: 15-90%RH. 	• For general environmental monitoring and HAZMAT response.

-	Wide-range Volatile Organic Compounds (VOCs) Sensing Module	 Detection method: photoionization detection (PID); Target gases: volatile organic compounds (VOCs) with ionization potential energies <10.6eV; Range: 0~50ppm (isobutylene); Detection limit: 1ppb; Repeatability: <4% FS; Response time (t90): <3 seconds (diffusion mode); Theoretical resolution: 3.8 ppb; On-chip proprietary individual difference compensation algorithms; Humidity has almost no effect on the measurement in 0~75%RH; Warm-up time froma cold start: about 5min; Estimated service life: 5000 working hours; Operating temperature: -40~55°C; Operating humidity: 0-95%RH; The default target gas is isobutylene. To measure other types of VOC, users need to adjust the sensitivity correction factor of the module. 	• For general environmental monitoring, oil & gas leak detection, and HAZMAT response.
	Wide-range H2S Sensing Module	 Detection method: electrochemistry; Range: 0~90ppm; Detection limit: 20ppb; Repeatability: <4%FS; Overall response time (t90): <55s (0~2ppm); Theoretical resolution: <3.7ppb; On-chip proprietary environmental and individual difference compensation algorithms, enabling better data quality in wide temperature and humidity ranges; Support "Dormant Mode", warm-up time from a cold start: < 15s; Sensitivity drift: <20%/year (in laboratory environment); Zero drift: <±100ppb/year (in laboratory environment); Est. service life: >24months; Operating temperature: -30~50°C; Operating humidity: 15-90%RH. 	• For general environmental monitoring, oil & gas leak detection, and HAZMAT response.
	Wide-range CxHy/CH4/LEL Sensing Module	 Detection method: non-dispersive infrared (NDIR); Target gases: hydrocarbons (flammable gases); Range: 0~5%VOL (0~100%LEL) methane, or 0~2%VOL propane; Detection limit: 0.01%; Repeatability: <2%FS; Accuracy: ±10%; Response time (t90): <30s; Theoretical resolution: 0.01%/100ppm; On-chip proprietary environmental and individual difference compensation algorithms, enabling better data quality in wide temperature and humidity ranges; Warm-up time from a cold start: about 45s; Zero drift: <±0.05% VOL/month; Estimated service life: >5 years; Operating temperature: -20~50°C; Operating humidity: 0~95%RH; The default target gas is methane (CH4). To measure other types of hydrocarbon, users need to adjust the sensitivity correction factor of the module. 	• For general environmental monitoring, oil & gas leak detection, and HAZMAT response.
	Wide-range CO2 Sensing Module	 Detection method: non-dispersive infrared (NDIR); Range: 0~5%VOL; Detection limit: 0.01%; Repeatability: <2%FS; Accuracy: ±10%; Response time (t90): <30s; Theoretical resolution: 0.01%/100ppm; On-chip proprietary environmental and individual difference compensation algorithms, enabling better data quality in wide temperature and humidity ranges; Warm-up time from a cold start: about 45s; Zero drift: <±0.05% VOL/month; Estimated service life: >5 years; Operating temperature: -20~50°C; Operating humidity: 0~95%RH. 	• For HAZMAT response.

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-	Wide-range NH3 Sensing Module	 Detection method: electrochemistry; Range: 0~100ppm; Detection limit: 5ppm; Repeatability: <5%FS; Overall response time (t90): <150s (0~50ppm); Theoretical resolution: <0.2ppm; On-chip proprietary individual difference compensation algorithms; Support "Dormant Mode", warm-up time from a cold start: < 30s; Sensitivity drift: <3%/year (in laboratory environment); Zero drift: <±2ppm/year (in laboratory environment); Est. service life: >24months; Operating temperature: -30~50°C; Operating humidity: 15-90%RH. 	• For HAZMAT response.
	Wide-range HCI Sensing Module	 Detection method: electrochemistry; Range: 0~100ppm; Detection limit: 1ppm; Repeatability: <4%FS; Overall response time (t90): <200s (0~25ppm); Theoretical resolution: <15ppb; On-chip proprietary individual difference compensation algorithms; Support "Dormant Mode", warm-up time from a cold start: < 30s; Est. service life: >24months; Operating temperature: -30~50°C; Operating humidity: 15-90%RH. 	• For HAZMAT response.
	Wide-range O2 Sensing Module	 Detection method: electrochemistry; Range: 0~50%; Detection limit: 0.5%; Overall response time (t90): <15s (20.9%~0); Theoretical resolution: <0.1%; On-chip proprietary individual difference compensation algorithms; Warm-up time from a cold start: about 60s; Est. service life: >24months; Operating temperature: -30~55°C; Operating humidity: 5-95%RH; Operating pressure: 80~120kPa. 	• For HAZMAT response.
-	Wide-range SO2 Sensing Module	 Detection method: electrochemistry; Range: 0~100ppm; Detection limit: 50ppb; Repeatability: <4%FS; Overall response time (t90): <40s (0~2ppm); Theoretical resolution: <8ppb; On-chip proprietary environmental and individual difference compensation algorithms, enabling better data quality in wide temperature and humidity ranges; Support "Dormant Mode", warm-up time from a cold start: < 10s; Sensitivity drift: <±15%/year (in laboratory environment); Zero drift: <±20ppb/year (in laboratory environment); Est. service life: >36months; Operating temperature: -30~50°C; Operating humidity: 15-90%RH. 	• For HAZMAT response, and ship fuel sulfur content monitoring.
	Wide-range H2 Sensing Module	 Detection method: electrochemistry; Range: 0~5000ppm; Detection limit: 17ppm; Repeatability: <5%FS; Overall response time (t90): <55s (0~400ppm); Theoretical resolution: <0.7ppm; On-chip proprietary individual difference compensation algorithms; Support "Dormant Mode", warm-up time from a cold start: < 30s; Zero drift: <±10ppm/year (in laboratory environment); Est. service life: >24months; Operating temperature: -30~50°C; Operating humidity: 15-90%RH. 	
	Cl2 Sensing Module	 Detection method: electrochemistry; Range: 0~20ppm; Detection limit: 0.5ppm; Repeatability: <4%FS; Overall response time (t90): <60s (0~10ppm); Theoretical resolution: <10ppb; On-chip proprietary individual difference compensation algorithms; Support "Dormant Mode", warm-up time from a cold start: < 30s; Est. service life: >24months; Operating temperature: -20~50°C; Operating humidity: 15-90%RH. 	• For HAZMAT response.

	Wide-range PH3 Sensing Module	 Detection method: electrochemistry; Range: 0~2000ppm; Detection limit: 20ppm; Repeatability: <5%FS; Overall response time (t90): <30s (0~800ppm); Theoretical resolution: <0.15ppm; On-chip proprietary individual difference compensation algorithms; Support "Dormant Mode", warm-up time from a cold start: < 30s; Sensitivity drift: <4%/year (in laboratory environment); Zero drift: <1.5ppm/year (in laboratory environment); Est. service life: >24months; Operating temperature: -20~50°C; Operating humidity: 20-90%RH. 	
	Wide-range CO Sensing Module	 Detection method: electrochemistry; Range: 0~1000ppm; Detection limit: 70ppb; Repeatability: <4%FS; Overall response time (t90): <20s (0~10ppm); Theoretical resolution: <0.6ppb; On-chip proprietary individual difference compensation algorithms; Support "Dormant Mode", warm-up time from a cold start: < 5s; Est. service life: 36 months; Operating temperature: -30~50°C; Operating humidity: 15-90%RH 	
	NO Sensing Module	 Detection method: electrochemistry; Range: 0~11ppm; Detection limit: 5ppb; Repeatability: <4%FS; Overall response time (t90): <60s (0~2ppm); Theoreticalresolution: <1.1ppb; On-chip proprietary individual difference compensation algorithms; Support "Dormant Mode", warm-up time from a cold start: < 5s; Est. service life: 24 months; Operating temperature: -30~40°C; Operating humidity: 15-85%RH 	
	Wide-range HCN Sensing Module	 Detection method: electrochemistry; Range: 0~100ppm; Detection limit: 50ppb; Repeatability: <5%FS; Overall response time (t90): <120s (0~30ppm); Theoretical resolution: <0.05ppm; On-chip proprietary individual difference compensation algorithms; Support "Dormant Mode", warm-up time from a cold start: < 30s; Est. service life: >12months; Operating temperature: -30~50°C; Operating humidity: 15-90%RH 	
	Wide-range HF Sensing Module	 Detection method: electrochemistry; Range: 0~100ppm; Detection limit: 1ppm; Repeatability: <4%FS; Overall response time (t90): <200s (0~25ppm); Theoretical resolution: 15ppb; On-chip proprietary individual difference compensation algorithms; Support "Dormant Mode", warm-up time from a cold start: < 30s; Est. service life: >24months; Operating temperature: -30~50°C; Operating humidity: 15-90%RH. 	
	OU Sensing Module	 Detection method: Electrochemistry; Range: 0~10ppm; Detection limit: 0.1ppm; Repeatability: <5%FS; Overall response time (t90): <30s (0~10ppm); Theoretical resolution: 0.01ppm; Est. service life: 36 months; Operating temperature: 0~25°C; Operating humidity: 30-70%RH 	

Optional		Connect to Sniffer4D V2's "Sampler" port.	
Externally- mounted	Gas Sampling	 Start or manually stop gas sampling via DJI Pilot App or Sniffer4D Mapper. Monitor air pressure inside the sampling bag and stop automatically when the bag is 	
Modules	Module	full.	
Installed outside Sniffer4D V2 base		 Quick release mount for DJI M300RTK or M210. Can also be platform agnostic. Include 1x1L sampling bag. Also adaptable to bags with different capacities. 	
unit.		Connect to Sniffer4D V2's "Ext. Istm." port.	
	Ultrasonic Wind Speed & Direction Sensing Module	 No moving parts. Wind speed range & resolution: 0-50m/s, 0.1m/s. Wind speed accuracy: ±0.1m/s (0-10m/s), ±1% (11-30m/s), ±2% (31-50m/s). Wind direction range & resolution: 0-360°, 1.0°. Wind direction accuracy: ±1.0°. Built-in algorithms for compensating translational motion, attitude, and rotational motion, enabling wind measurement while in motion*. 	*Currently support DJI M210 & M300 RTK
	TDLAS Methane Detection Sensing Module	• Range: 0~15000ppm;	*Currently support DJI M300 RTK
	Nuclear Radiation Sensing Module	 Detection method: Energy Compensation-based Geiger-Müller Counter; Range: 0.1µSv/h ~ 8.3mSv/h; Theoretical resolution: 0.01µSv/h; Single accumulation range: 0.01µSv ~ 16000µSv; Sensitivity: 1.2µGy/h (60Co radiation source); Energy range: 30KeV ~ 3MeV; Power consumption: 0.2W; Warm-up time: about 20s; Detection limit: about 0.1µSv; Operating temperature: -40°C~60°C; Estimated service life: 8.3×10^8µSv (10^9 pulses); Size: 140x120x40mm; Weight: 86.7g (net weight, bracket not included); Installation: Mounted underneath the drone cabin. Connect to Sniffer4D V2 through "Ext. Istm." port and USB Type-C cable for both power supply and data transmission. 	Available 2020 Q4 (est.)
	Ultraviolet Spectrophotome try Ozone Sensing Module	• Connect to Sniffer4D V2's "Ext. Istm." port.	Available 2020 Q4 (est.)
	External GNSS Module	 Connect to Sniffer4D V2 via a USB Type-C cable. Can be used in scenarios where Sniffer4D V2's built-in GNSS module does not have good reception, for example, when the Sniffer4D V2 is placed upside down. 	
Data Connection Services	Data Connection Service	 Provide real-time internet data transmission between Sniffer4D V2 and Sniffer4D Mapper software. Encrypted data transmission. 	
	Video Streaming Service	 Stream live camera view (720p/1080p) remotely to Sniffer4D Mapper. Confirmed compatibility with DJI M210 series, M300 RTK, and M600 series. May also be compatible with other drone platforms. 	
	Plaintext Data Forwarding Service	• Forward the decoded real-time measurement data (json) from the Sniffer4D V2 to a user-specified IP address using TCP/UDP.	Available 2020 Q4 (est.)
Drone Integration Kits	DJI M300 RTK Integration Kit	 Quickly mount a Sniffer4D V2 onto a DJI M300 RTK aircraft. Material: high-strength aluminium alloy. When the Sniffer4D V2 is powered by a DJI SkyPort, the user can view the real-time readings and control the Sniffer4D V2 via DJI Pilot App running on the DJI remote controller. The Sniffer4D V2 can be powered alternatively by the OSDK port in the aircraft using the OSDK power adapter that comes with the kit. 	
	DJI Mavic 2 Series Integration Kit	 Compatible with Mavic 2 Enterprise / Enterprise Dual / Enterprise Dual Advanced / Pro / Zoom. Material: high-performance nylon. The Sniffer4D V2 is powered by Mavic 2's battery. Max flight time 16 mins. 	

	DJI M210/M210 RTK Integration Kit	 Quickly mount a Sniffer4D V2 onto a DJI M210/M210 RTK (V1 or V2) aircraft. Material: high-strength aluminium alloy. When the Sniffer4D V2 is powered by a DJI SkyPort, the user can view the real-time readings and control the Sniffer4D V2 via DJI Pilot App running on the DJI remote controller. The Sniffer4D V2 can be powered alternatively by the XT30 port in the aircraft. Quickly mount a Sniffer4D V2 onto a DJI M600/M600 Pro aircraft. 	
	DJI M600 Pro Integration Kit	 • Quickly include a sinile 4D v2 onto a Dimoto probability of a life area. • Material: high-strength carbon fiber. • The Sniffer4D V2 is powered by the XT30 port in the aircraft. The kit includes a XT30 splitter cable so that powering other equipment (e.g. the Z3 camera) is not affected. 	
After-sales Supports & Services	1-year Warranty for Non-human Damages	• For non-human damages, all repair costs are covered by Soarability during the standard 1-year warranty period.	
	Remote Training & Technical Support	and video conferencing. • Face-to-face training & support can be arranged (additional cost may occur).	
	Advanced Calibration Service	 The user follows the guidelines provided by Soarability's support engineer to obtain datasets from reference instruments and Sniffer4D V2. Soarability computes the new calibration parameters for the device and guide the user to write the parameters into Sniffer4D V2. 	
	Warranty Extension	 Extend the default warranty for 1-2 more years. Policies need to be made case by case. In principle, warranty extension needs to be purchased together with the product. 	
	Paid Repairing Service	• For man-made damages, you could send the broken product back to the manufacturer for paid repair, or ask the manufacturer to send out a technical to repair the product onsite.	
Product Customiza- tion	Base Unit Top Surface Logo Customization	 Customize laser-engraved logo on the top surface of Sniffer4D V2. Details about the manufacturer and the product (laser-engraved on the bottom of Sniffer4D V2) may not be able to be modified due to compliance requirements. 	
	Software Logo Customization	 Customized logo at the bottom right corner of Sniffer4D Mapper. Customized name for Sniffer4D mapper. Customized icon for Sniffer4D mapper. 	
	Deep Customization	 Customized internally mounted or externally mounted modules. Customized software functionalities. Customized appearance & structural design. 	