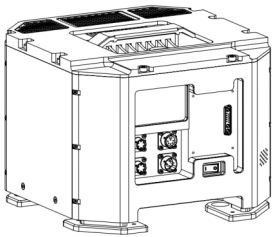
USER MANUAL



A20

UM-A20-APR2024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1 Safety Precautions

Introduction of safety precautions to use the device

1.1 Safety Precautions

DANGER

Please check the structure and assembly of the device before each use to promptly detect hidden dangers such as deformation, breakage, air tube blockage, filter blockage.

DANGER

Drivers are prohibited from operating the device while the vehicle is moving! This behavior may cause serious traffic accidents!

DANGER

Only qualified technicians can open the device. Before handling internal components, make sure the device is disconnected from all power sources, otherwise it may cause damage to the device or electric shock!

DANGER

Users should only operate the device after thoroughly following the guidelines in this manual and completing on-site training provided by certified engineers.

CAUTION

Do not attempt to repair or replace components of the device! When the device doesn't work properly or displays an error message, please refer to the relevant description in this manual for recovery operations or call for after-sales service!

CAUTION

Please pay attention to water on the road during inspection, and do not immerse the air intake into it, which may cause filtration system failure. Please pay attention to foreign objects and dust accumulation on the road during inspections. Inhaling too much dust or foreign objects can reduce the lifespan of the filter or cause malfunctions.

CAUTION

Do not use non-original charger to charge! Please check whether the charging port and charger are damaged or not before charging adapter to avoid short circuit.

CAUTION

Whether the device is started or not, please pay attention to the speed of the vehicle and drive slowly through speed bumps and bumpy roads!


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2 Introduction

Introduction of packaging and configuration, working principle, parameter information.

High-Precision Vehicle-Mounted Laser Natural Gas Leak Inspection System is a gas detection device designed for long-distance urban natural gas pipeline network inspections and constructing urban gas leak distribution maps. The system is equipped with a pump-assisted sampling mechanism that draws external gas into the instrument for real-time analysis.

2.1 System parameters

Model	A20
Detection Subject	Natural gas
Measuring Principle	Mid-infrared laser absorption spectroscopy
Gas Cell Type	Multiple reflection
Sensitivity	1ppb(Methane) | 0.5ppb(Ethane)
Concentration Range	10ppb~10000ppm(Methane) | 1ppb-1000ppm(Ethane)
Operating Temperature	-10~50℃
Response Time	1s
Main Unit Weight	12kg
Main Unit Dimension	300 x 300 x 243 mm
Power Supply & Consumption	12V DC 120W
Positioning System Accuracy	< 1m
Data Display	Digit, image, geographic information image
Dynamic Detection Capability	150m@vehicle speed ≤50km/h
Maximum Detection Speed	90km/h
Inhalation Flow Rate	> 10L/min
Data Storage	Over 2 years locally

2.2 Packing list

Take the device and all accessories out of the packaging[1] , and check if the accessories are complete by comparing the following list. If you find any missing or damaged items, please contact us immediately.

Packaging Box 1（Main unit）

ID	Name	Qty.
1	Detector（including vehicle-mounted controller）	1
2	Main unit power adapter	1
3	Main unit communication cable	1
4	Front air intake (including filter element)	1(set)
5	Maintenance tools (condensation filter, precision filter, lens cleaning cloth, etc.)	1(set)
6	Product manual (manual, quick use guide, etc.)	1(set)

Packaging Box 2（Mast-Environmental data collector）

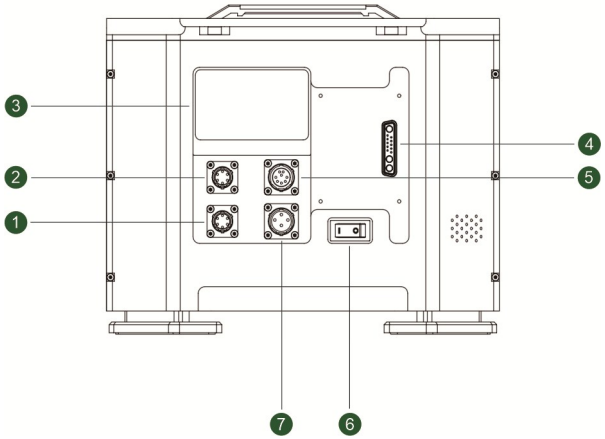
ID	Name	Qty.
1	Power adapter and supporting cables	1(set)
2	Mast power cable	1
3	Mast communication cable	1
4	Camera, anemometer, meteorological integrated mast	1

1 The configuration may change, please refer to the configuration in the packaging box.

2.3 Composition of main unit front panel

The front panel of the main unit houses the user interface and cable ports.

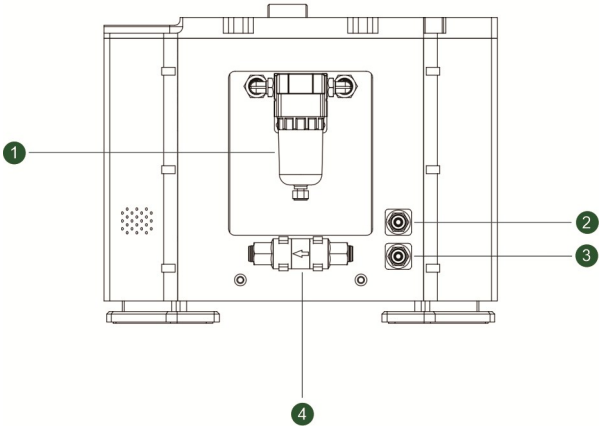
[1] Integrated mast interface
[2] Debugging and expansion interface
[3] Mian unit display
[4] Edge computing unit interface
[5] Data interface
[6] Power switch
[7] Power supply interface



2.4 Composition of the right side of the main unit

The right-side panel of the main unit contains the filter and gas path connectors:

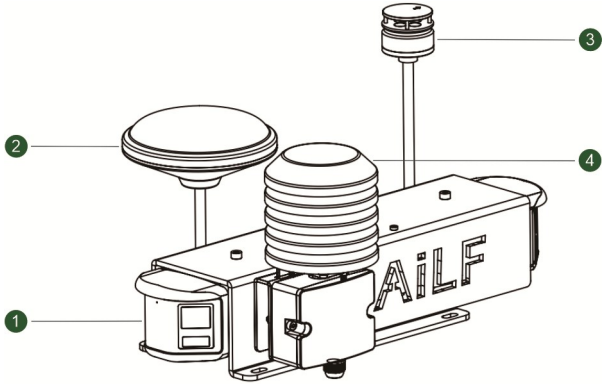
[1] Condensate filter
[2] Air intake
[3] Exhaust port
[4] Precision filter



2.5 Composition of the integrated mast system

The A20 system adopts an integrated mast for wind speed & direction and positioning system.

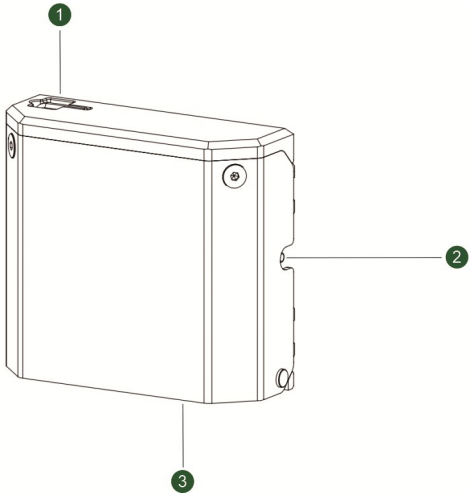
[1] Camera unit
[2] Positioning unit
[3] Wind speed and direction measurement unit
[4] Environmental unit



2.6 Front intake filter composition

A20 system front intake filter

[1] Maintenance wrench
[2] Air outlet interface
[3] Air intake grille

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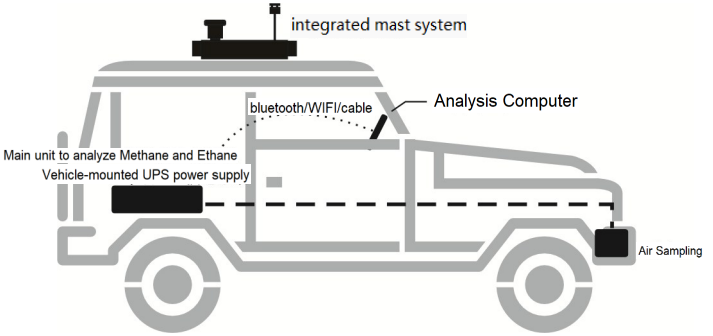
3 Installation

Introduction to the installation steps and debugging methods

3.1 Overview

The system includes a front air sampling intake, an integrated mast, an analysis main unit, installation and fixation of the vehicle-mounted power supply system, and the schematic diagram of cable and gas path laying is as follows:



3.2 Accessories preparation for installation

ID	Name	Qty.
1	A20 main unit	1(set)
2	Main unit power cable	1(piece)
3	Main unit data cable	1(piece)
4	Vehicle-mounted UPS power supply	1(set)
5	Electrical wiring to vehicle	1(piece)

6	Tablet/laptop	1(set)
7	Type-C charger for vehicle	1(piece)
8	Socket	1(piece)
9	Computer desk in vehicle	1(piece)
10	Wireless router	1(set)
11	Integrated mast	1(set)
12	Integrated mast cable	1(piece)
13	Front air intake sampling filter	1(set)
14	Mounting Bracket for Main unit and mobile power supply	1(piece)
15	Vehicle luggage rack	1(set)

Other accessories: 6mm outer and 4mm inner pneumatic tubes, T-screws, nuts, tool kits, aircraft nails, Velcro, nylon cable ties, cable organizers, etc.

3.3 Installation steps

Installation of power cable

[1] Prepare two power cables and select the corresponding fuse box electrical extractor according to different vehicle models, and insert two 20A fuses into the electrical extractor.

[2] Open the fuse box, select two locations where the vehicle is powered when it is started and the power is off when the vehicle is turned off to draw power, insert one end of the cable into the vehicle fuse, and select the other end to ground at the nearest location.

[3] After the power supply wire is connected, pull the cable out of the fuse box and route it through the hidden inside of the car's interior decorative panel.

[4] Route one of the power supply wires to the trunk to supply power to the UPS.

[5] Install another wire in the rear seat and insert it into the Baseus charging head for power supply to the laptop.

Installation of air intake filter and air tube

[1] Install the front intake filter in front of the co-pilot seat and fix it with four aircraft nails. Note that the air intake port is facing downward.

[2] Extend the air tube from the air intake grille into the engine compartment, and then enter the car from the front passenger seat. Note that the part of the interior of the air pipe engine compartment needs to be protected by a threaded pipe and try to avoid contact with the engine. The movable part needs to be fixed with a cable tie.

[3] Route the air intake tube hiddenly through the car decorative panel, extending it to the instrument in the car trunk, and connecting it to the intake port of the main unit after installation.

Installation of integrated mast

The integrated mast is fixed to the front right of the vehicle through the car luggage rack.

[1] Place the car luggage rack on the roof (note that the front is longer and the back is shorter), fix it according to the length of the mast screw hole, adjust the width of the luggage rack (center spacing is about 256mm), and use T-type screws and anti-loosening nuts to fix it. Be aware the black anemometer faces the front of the car, the white antenna and meteorological sensor face the back of the car, and install the rubber seal for the vehicle luggage rack .

[2] Route the mast data cable and panoramic camera network cable (quick connector on the roof, network cable head in the car) from the mast position along the luggage rack to the trunk of the car. The cable of the roof part needs to be fixed to the luggage rack with structural glue.

[3] After the cable is brought to the trunk position, extend the two wires into the car through the vehicle's own threading sleeve, then lay them along the interlayer, and finally pass them out from the trunk.

Installation of main unit and UPS power supply

[1] Fix the bracket frame to the vehicle with Velcro, and then put the main unit and the UPS power supply in one go.

[2] Connect the main unit data cable (the other end is connected to the router), the main unit power cable (connected to the socket), and the mast data cable (the other end is on the roof) in sequence. Connect the instrument air intake tube (connected to the front air intake of the vehicle) and the air outlet tube, with the upper part for air intake and the lower part for air outlet.

[3] Install the UPS power supply onto the bracket frame and connect the socket plug to the UPS power supply for powering the main unit and the router.

[4] Connect the charging port of the UPS power supply to the previously laid power supply line through the cigarette lighter.

[5] Use Velcro to fix the router to the frame, connect the power supply, and then use Velcro to fix the socket and main unit charger to the bottom plate of the trunk.

[6] Use cable ties and cable organizers to organize all cables.

3.4 First start-up and debugging of the device

[1] Turn on the UPS main switch and 220V AC switch in sequence to supply power to the router and A20 main unit.

[2] The following operations take Huawei router B311B-853 as an example. If you use other routers, please complete the same configuration. Turn on the computer and connect to the router's initial WIFI, named HUAWEI_XXXX_XXXX, without a password.

[3] After the connection is completed, it will automatically enter the router settings interface. If not, enter 192.168.8.1 manually to enter, set the WIFI name to A20-WIFI, set the password to a123456789, and select the same as the WLAN password, and click Next.

[4] Click Advanced Settings - Routing Settings - DHCP Settings in sequence to change the local address to 192.168.16.1.

[5] After the router is set up, turn on the A20 main unit switch, the pump starts working, and the device starts self-check. After the methane and ethane concentration curve appears on the screen, the self-check is completed. Turn on the computer and connect to A20-WIFI. After the connection is completed, open the software to check whether the GPS signal, vehicle speed, wind speed, system status, front and rear cameras, and positioning location information are normal.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4 Maintenance and Troubleshooting

Introduction to maintenance and related components and corresponding troubleshooting

4.1 Routine maintenance

In order to keep the device in a good status, please follow below recommendations for routine maintenance.

[1] Stored in the carry case — Not in use for a long time

[2] Charge the mobile power supply before turning on — Not in use for a long time

[3] Use soft and wet cloth to clean device's outer surface — Necessarily

[4] Avoid rain and sun exposure for parking — Recommend

[5] When cleaning the vehicle, high-pressure flush the air intake — Forbidden

CAUTION

Please pay attention to water, foreign objects and dust on the road, do not immerse the air sampling tube in water as it may cause filtering system failure and even damage the detection gas cell. Excessive dust will also affect the performance of the device and reduce the life of the filtering system.

4.2 Maintenance for other components

Filtering system maintenance

The laser gas sampling cell inside the device is a precision optical component that is easily contaminated by dust and water, causing malfunctions. Therefore, the sampled air needs to be well filtered before entering the device.

The filtering system consists of a three-stage filter: a filter located in front of the vehicle, a condensate filter inside the main unit, and precision filter located at the air intake of the main unit. The service life of the filter components will vary depending on the operation environment and frequency.

TIPS

Please clean and inspect at least **once a week**, and replace contaminated and damaged components in time to extend the service life of the device.

[1] Inspection:

Place the gas collection unit and turn off the pump and power off the main unit.

Check the air intake and manifold, clean dust and foreign objects, and replace the air tube and filter element if necessary.

Remove the air tube filter and check for accumulated water or excessive dust contamination inside.

[2] Replace the air tube filter:

The air tube filter is located on the sampling air tube. The air tubes on both sides can be directly pulled out for removal and replacement.

With the system prompts, please replace the filter in time.

If you have any additional needs, please contact after-sales service for purchase.

[3] Replace the precision filter sheet:

The precision filter element is located on the main unit, and the part of the sampling air tube entering the main unit can be disassembled. After disassembly, the precision filter element can be seen. Please pay attention to the rubber sealing rings on both sides (of inside and outside) when replacing it.

Free spare parts are included in the packaging. If you have any additional needs, please contact after-sales for purchase.

4.3 Troubleshooting

The device has a self-diagnostic function. If an error occurs there will be an error code like "E001" displaying on the software and screen of the main unit. The meaning of the code (trigger conditions), device behavior and recommended methods of handling are as follows:

[E100] Core module lost (communication failure between controller and core module)

Communication failure of the Methane and ethane detection module, please contact after-sales service

[E101] Core module error (After core module turned on, initialization failure for more than 5 minutes)

The methane and ethane detection module system is abnormal. Please contact after-sales service

[E110] Abnormal temperature on core module (exceeds the range of -20~50 ℃)

Ambient temperature of ethane and ethane detection module is abnormal, please contact after-sales service

[E111] Core module ambient temperature cannot be stabilized (After temperature control is turned on for more than 25 minutes, the core module temperature cannot be stabilized)

Turn on the air conditioner of the car and start again after half an hour

[E112] Core module temperature sensor error (core module temperature sensor damaged - abnormal sampling value)

The temperature sensor of the methane and ethane analysis module is abnormal. Please contact after-sales service

[E130] Remote module lost

Edge computing module lost

[E140] Display lost (communication failure between controller and display)

Main unit display communication is abnormal, please contact after-sales service

[E160] Integrated mast lost (communication between controller and integrated mast failed)

Integrated mast communication abnormality, please contact after-sales service

[E161] GPS lost (communication failure between integrated mast and GPS module)

GPS module abnormality, please contact after-sales service

[E170] Weak GPS signal (the number of GPS satellites is less than 10)

Move to an open area to recover

[E171] Integrated mast temperature error (exceeds the range of -40~90℃)

The methane and ethane detection module system is abnormal, please contact after-sales

[E191] System temperature error (controller temperature exceeds -20~65℃)

Please turn on the air conditioning to cool down the instrument

[E192] Abnormal ambient temperature (ambient temperature exceeds -20~50℃ when turned on or exceeds -20~65℃ after start for a period of time)

Please turn on the air conditioning to cool down the instrument

[E193] Network communication is abnormal (network communication is unavailable)

The computer cannot establish communication with the main unit, check the communication cable or contact after-sales

[E195] Ambient temperature sensor is damaged (controller ambient temperature sensor is damaged (abnormal sampling value)

Abnormal temperature sensor of the main unit, please contact after-sales service