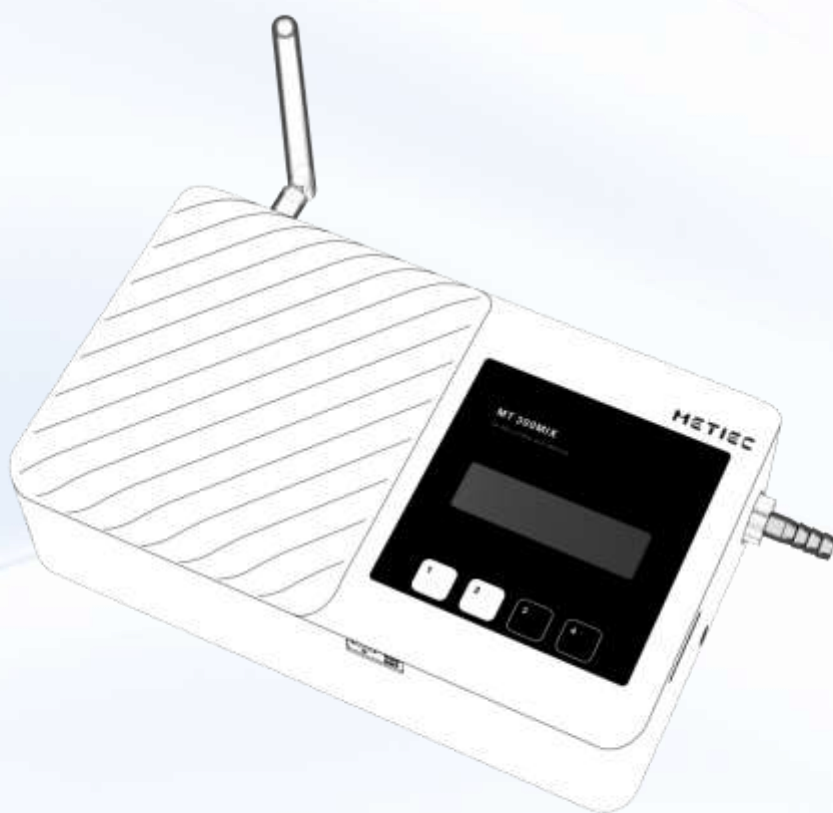# MT300MIX

Gas Monitoring Series

Operation and Installation Manual

METIEC

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Contents

1   Overview

1.1 Operation Instructions of Manual

1.1.1 It is not allowed to print or disclose any content of this Manual, including pictures and audio products, under any name without the consent of Huchuang Union;

1.1.2 The equipment operator may copy some sections of this Operation Manual for internal use only, such as for instructing the user how to deal with emergencies. These sections are clearly listed in the catalogue of this manual;

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1.1.4 The contents of the Manual are subject to change without prior notice.

1.2 Overview

MT300MIX device is used to detect the concentrations of CO_2 and O_2 in premixed gas. It is generally connected to the end of the gas path to detect the gas regularly, display the detected concentration data on the display screen of the local machine, and upload it to the cloud server through wireless technology at the same time.

The equipment has the function of leakage detection: When the equipment leaks, the audio and video alarm system of the equipment can send out alarm sound and automatically close the intake valve. In order to further ensure that the equipment does not leak, a manual valve is installed outside the equipment. If there is a leak alarm, the user can manually close the intake valve.

The device has the low gas pressure detection function: When the gas pressure in the device is less than a certain value, it will trigger the sound and light alarm of low pressure, reminding the user the low gas pressure.

The device is powered through the power adapter. The 1000mAh lithium battery built in the device can only provide the power supply to the device for a short time when being disconnected from the adapter, so the device cannot work under the condition of disconnection from the adapter for a long time; in addition, the equipment has power failure alarm function.

When MT300MIX is installed and used for the first time, it is necessary to add the sampling frequency (operated by professional engineers) in order to empty the excess air inside the device in a short time and ensure the accuracy of premixed gas concentration detection.

Note:

1) The higher the sampling frequency (55 minutes by default) is, the longer the intake time will be (10 seconds by default), and the larger the gas consumption will be.

2) The wireless transmission distance should not exceed 3 rooms.

1.3 Environmental Requirements

1.3.1 Only for indoor use, no high temperature, moisture, water or dust;

1.3.2 Atmospheric pressure: 70kPa～105kPa; Working ambient temperature: 0℃～+50℃;

1.3.3 Storage ambient temperature: 0℃～+50℃; relative humidity in the working environment: ≤80% (non-condensing);

1.3.4 Power adapter (input: AC100V ~ 240V, 50/60Hz; output: 5V, 2.1A, 10.5W);
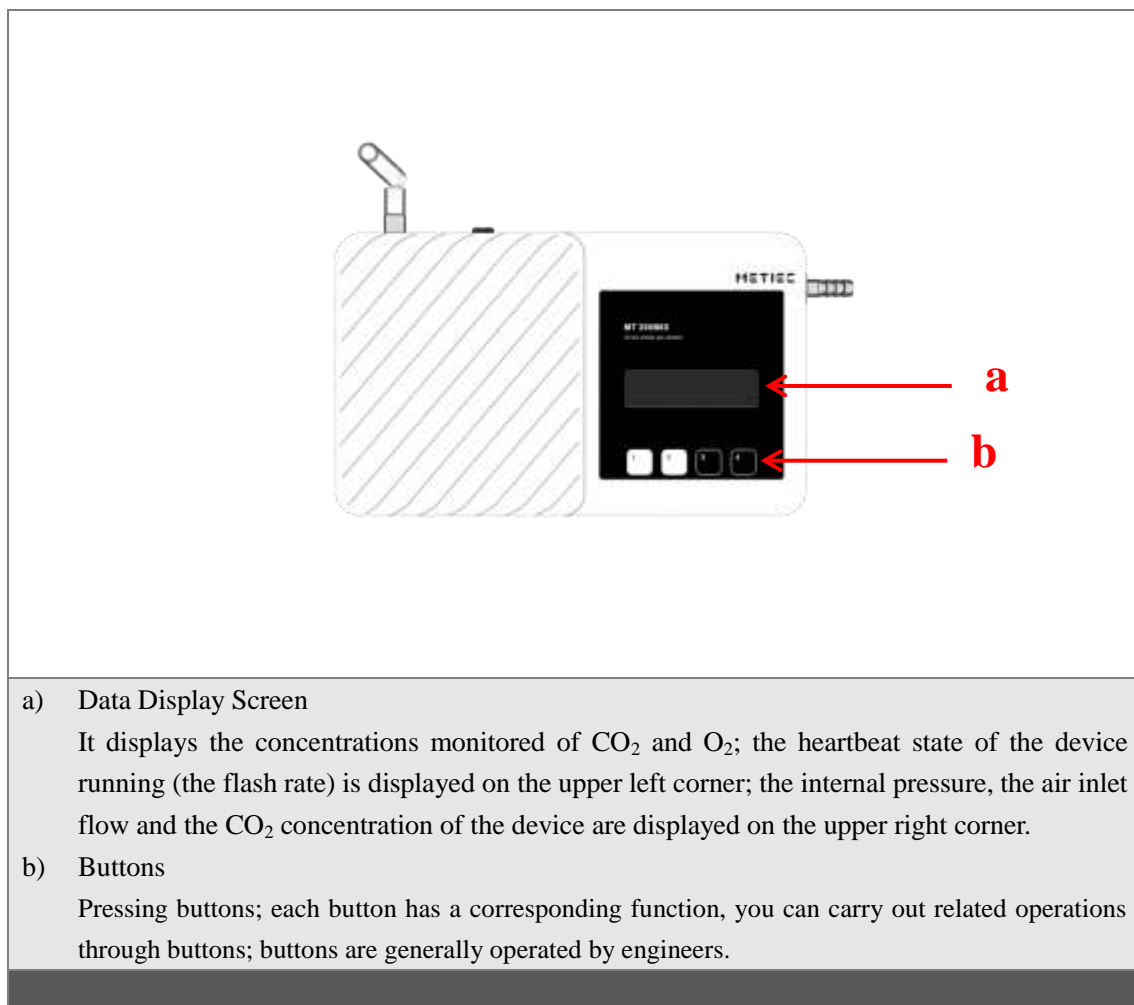
1.4 Environmental Protection Instructions

1.4.1 MT300MIX device contains reusable materials, and its components can be recycled after being cleaned and sterilized.

1.4.2 During recycling and handling MT300MIX, it is recommended that the company's technical personnel dismantle it and recycle it according to different waste groups.

1.4.3 According to national regulations, the compositions of the main raw materials of MT300MIX shall be are shown in (Table 1).
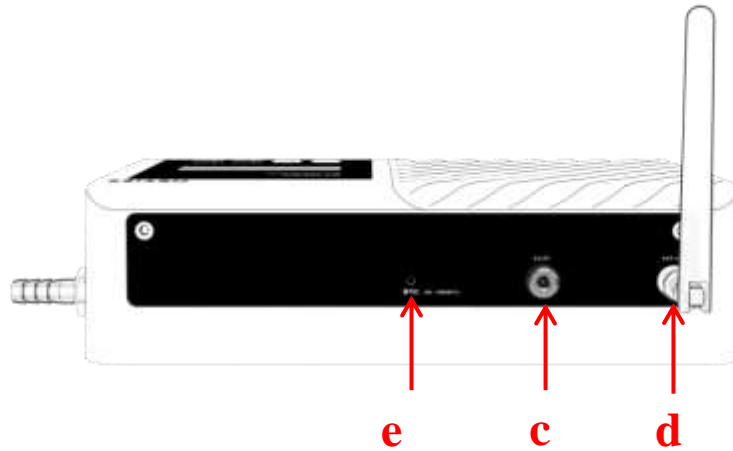
Table 1 Compositions of Main Raw Materials of MT300MIX

Name	Composition
Casing	ABS+PC
Cover plate	Cold-rolled sheet
Side plate	Aluminum alloy
Battery	Polymer lithium battery
PCB	Including electrical components

2 Structure Features and Equipment Parameters

2.1 Structure Features

a) Data Display Screen

It displays the concentrations monitored of CO_2 and O_2; the heartbeat state of the device running (the flash rate) is displayed on the upper left corner; the internal pressure, the air inlet flow and the CO_2 concentration of the device are displayed on the upper right corner.

b) Buttons

Pressing buttons; each button has a corresponding function, you can carry out related operations through buttons; buttons are generally operated by engineers.
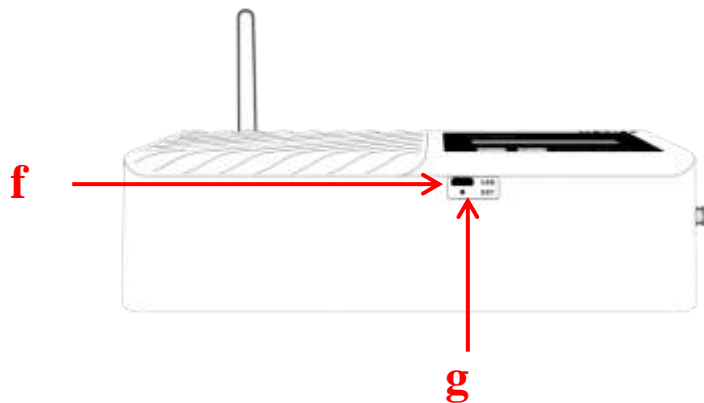
c) Power Interface
    Equipped with a 5V/2A power adapter.

d) Antenna

e) Gas Outlet

Refers to the gas outlet of the device. After the solenoid valve of the device is opened for the intake detection, excess gas will be discharged through the outlet.　Do not block the gas outlet.


f) Upgrade Debugging Port
    Micro USB interface; it has 2 functions: Firstly, it can be used for program upgrade: The special serial cable customized by the company is used for upgrading program instead of Micro USB cable; secondly, it is used to modify parameters: The special serial cable customized by the company shall be used for modifying parameters instead of　Micro USB cable; it needs to work with the modification software of " Huchuang Union Wireless Slaver Debugging Platform.exe".

g) Reset Button (Pin-socket type)
    Refers to the emergency reset hole of the device; the whole system can be reset through the ejector pin here when the equipment breaks down.
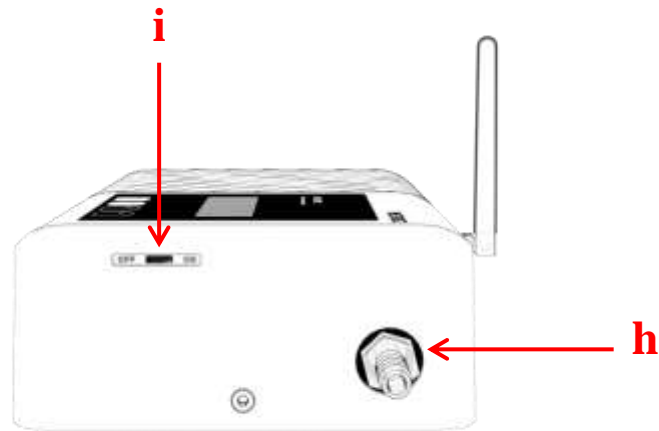
h) Gas Inlet
i) Power Switch

j) Manual Ball Valve
    Refers to the manual valve of the gas inlet pipe; in case of equipment leakage alarm, the user can manually close this valve to ensure that the equipment will not leak.

2.2 Equipment Parameters

Table 2 MT300MIX Parameters

Item	Parameter
Overall dimensions	230mm*126mm*56mm
Weight	1367g
Transmission method	Wireless
Working frequency band	425-445MHz
Transmission distance	1200 m in open area, 1000 m in streets, about 300 m inside buildings (not shielded by metal objects) under the transmission rate of 10Kbps

| Sensor	O_2 sensor, CO_2 sensor
Detection resolution of O_2 concentration	0.01%
Detection accuracy of O_2 concentration	±0.2%
Detection range of O_2 concentration	0%~30%
Detection resolution of CO_2 concentration	0.01%
Detection accuracy of CO_2 concentration	±0.2%
Detection range of CO_2 concentration	0%~10%
Power failure alarm	Audible and visual alarm
Battery	1000mAh, providing the power supply for more than 2 hours after power failure in fully charged state
Display screen	2.23 inches
Data refresh frequency of display screen	1 second/ time
Equipment status upload frequency	3 min/time (modifiable) by default
Concentration sampling frequency	55 min/time (modifiable) by default
Intake time of single sampling	10 seconds (modifiable) by default
Range of external input gas pressure	0.08MPa - 0.2MPa
Power supply mode	DC5V/2A power adapter
Maximum power consumption	0.4A @DC5V
Average power consumption	0.15A @DC5V
Storage temperature	-20℃～+50℃
Operating temperature	+15℃～+30℃
Humidity	≤80% (Non-condensing)

3 Basic Operation Instructions

3.1 Power-On for Use

Connect the external 5V adapter and turn the power toggle switch to "ON" position, at the moment, the display screen will be on, and the buzzer will give a short beep, indicating that the system starts normally.
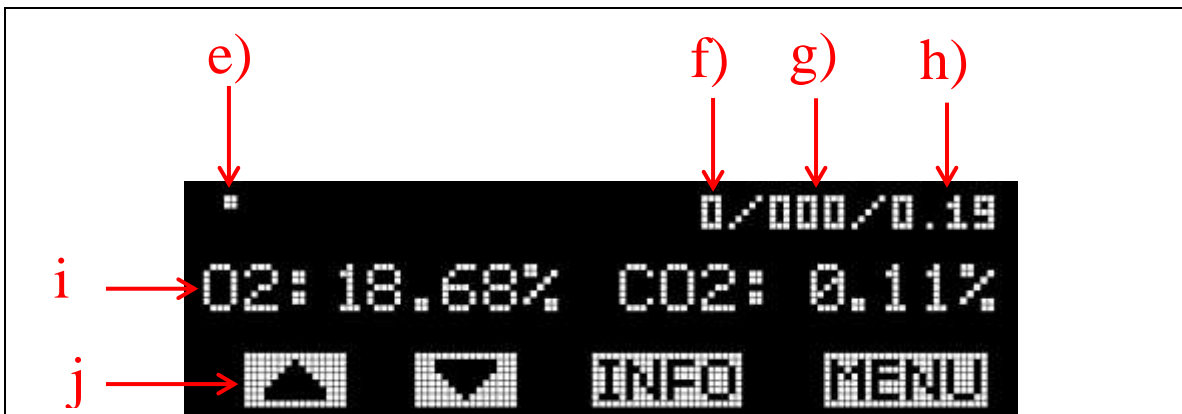
After MT300MIX and MT500 devices are installed normally, users can download the "Laboratory Monitoring System" APP to view the monitored temperature data; or view the temperature data through the computer web version.

3.2 Operation Instructions of Buttons

3.2.1 Button Description

a) UP key
b) DOWN key
c) OK key
d) Menu key
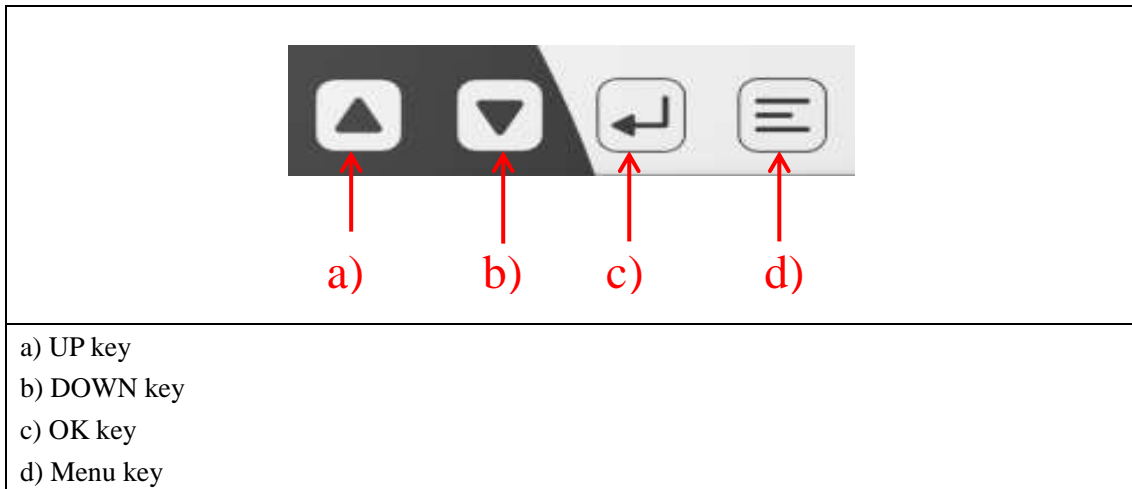
3.2.2 Main Interface Instructions

e) Breathing point of system operating state: It will flash when the system runs normally; it will be normally on or off when the system breaks down; it will turn from " ▦ " to " ✦ " upon power failure, prompting the power failure alarm;

f) Current flow value in the device mL/min (to test whether there is gas leakage inside the device): It is generally displayed as "0" when there is no gas intake, indicating that the equipment is normal;

g) Pressure value input externally and processed by the pressure reducing valve (to test whether the gas source has low pressure);

h) Current CO_2 concentration in the equipment (to detect whether there is gas leakage in the equipment): When the value exceeds 0.5%, an alarm will be triggered;

i) Current concentrations of O_2 and CO_2 in the gas in the external gas pipe monitored by the equipment;

j) Function prompt icon of operation button: The button function will be different with the different interfaces on the display.
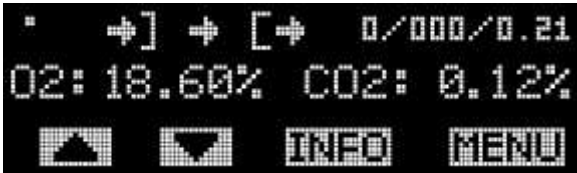
Function Description of Buttons on the Current Interface:

UP key: No function (disabled);

DOWN key: No function (disabled);

OK key: Press it to enter "System information interface";

Menu key: Press it to enter "Parameter setting interface";

Main Interface and Operation Instructions During Intake	
	UP key: No function (disabled)
	DOWN key: No function (disabled)
	OK key: No function (disabled)
	Menu key: No function (disabled)
Main Interface and Operation Instructions During Sampling after Intake	
	UP key: No function (disabled)
	DOWN key: No function (disabled)
	OK key: No function (disabled)
	Menu key: No function (disabled)

Note:

1. When the device is in the state of intake sampling, the control operation will be shielded;

3.2.3 Instructions of System Information Interface

Press the "**INFO**" button on the main interface to enter the "**System information interface**", as shown in the picture below:

First row: Displays equipment model;

Second row: Displays equipment SN;

Third row and fourth row: Displays the equipment software/ hardware version.

Instructions for key functions:

After the user presses any key, the system will return to the "Main interface" automatically.

3.2.4 Instructions of Setting Interface

Press the "**MENU**" button on the main interface to enter the "**Setting interface**" which includes three pages and can flip, as shown in the picture below:

Menu Function Description:

"1. SET O2": O_2 concentration calibration function;

"2. SET CO2": CO_2 concentration calibration function;

"3. SET DATA FREQ": Setting function of data upload frequency;

"4. SET SAMPLE FREQ": Setting function of sampling frequency;

"5. SET VALVER TIME": Setting function of intake time of single sampling;

"6.SET FLOW": Flow sensor calibration function;

"7.SET PRESS": Calibration function of pressure sensor in rear of internal pressure reducing valve;

"8. SET WORK MODE": Work mode setting function of equipment;

"9. DISPLAY SERVICE": Real-time data display function.

Operation Instructions of Buttons:

UP key: Press this key to move to the previous option;

DOWN key: Press this key to move to the next option;

"OK": Confirm the selection;

"EXIT": The system exits and returns to the main screen (or the system automatically returns to the main screen after 30 seconds) when the button is pressed;

3.2.5 "1.SET O2"

Select "**1.SET O2**" on the setting interface, and then press the "OK" button to enter the O_2 concentration calibration setting interface, as shown in the picture below:

O_2 Concentration Calibration Interface:
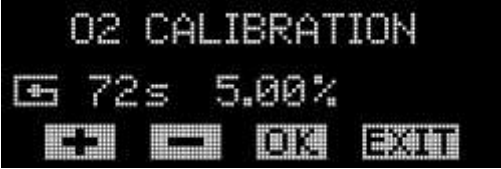

Operation Instructions of Buttons:

"+" key: Press this button to add the value by 0.1% and press and hold this button to add the value by 0.1% continuously;

"-" key: Press this button to reduce the value by 0.1% and press and hold this button to reduce the value by 0.1% continuously;

"START" key : Press this button to start the intake calibration;

"EXIT" key: The system exits and returns to the main screen (or the system automatically returns to the main screen after 30 seconds) when the button is pressed; **press and hold this button for more than 5 seconds** to enter 21% (air calibration) concentration calibration interface;

> **Interface and Operation Instructions When Starting to Intake (Intake for 72 seconds by default)**

O2 CALIBRATION ⏱ 72s 5.00% ＋ ― OK EXIT	UP key: No function DOWN key: No function OK key: No function Menu key: The system returns to the setting interface when this key is pressed
Interface and Operation Instructions Upon O₂ Concentration Calibration Failure	
O2 CALIBRATION 5.00% Err ＋ ― OK EXIT	UP key: Press this button to add the value by 0.1% and press and hold this button to add the value by 0.1% continuously DOWN key: Press this button to reduce the value by 0.1% and press and hold this button to reduce the value by 0.1% continuously OK key: The system does not save the calibration value and directly returns to the setting interface when this key is pressed Menu key: The system does not save the calibration value and directly returns to the setting interface when this key is pressed
Interface and Operation Instructions Upon Successful O₂ Concentration Calibration	
O2 CALIBRATION 5.00% OK ＋ ― OK EXIT	UP key: Press this button to add the value by 0.1% and press and hold this button to add the value by 0.1% continuously DOWN key: Press this button to reduce the value by 0.1% and press and hold this button to reduce the value by 0.1% continuously OK key: The system saves the calibration value and returns to the setting interface when this key is pressed Menu key: The system does not save the calibration value and directly returns to the setting interface when this key is pressed

Note:

1. O_2 concentration calibration setting range: From 0% to 21%;

2. Calibrate two points: 5% concentration and 21% concentration (air calibration);

3. 21% concentration has been calibrated before delivery and does not need to recalibrate. If calibration is required, press and hold the Menu key for more than 5 seconds to enter the calibration interface.

3.2.6 "2.SET CO2"

Select "**2.SET CO2**" on the setting interface, and then press the "OK" button to enter the CO_2 concentration calibration setting interface, as shown in the picture below:

CO_2 Concentration Calibration Interface:

Operation Instructions of Buttons:

"+" key: Press this button to add the value by 0.1% and press and hold this button to add the value by 0.1% continuously;

"-" key: Press this button to reduce the value by 0.1% and press and hold this button to reduce the value by 0.1% continuously;

"START" key : Press this button to start the intake calibration;

"EXIT": The system exits and returns to the main screen (or the system automatically returns to the main screen after 30 seconds) when the button is pressed;

Interface and Operation Instructions When Starting to Intake (Intake for 72 seconds by default)	
	UP key: No function DOWN key: No function OK key: No function Menu key: The system returns to the setting interface when this key is pressed
Interface and Operation Instructions Upon CO_2 Concentration Calibration Failure	
	UP key: Press this button to add the value by 0.1% and press and hold this button to add the value by 0.1% continuously DOWN key: Press this button to reduce the value by 0.1% and press and hold this button to reduce the value by 0.1% continuously OK key: The system does not save the calibration value and directly returns to the setting interface when this key is pressed Menu key: The system does not save the calibration value and directly returns to the setting interface when this key is pressed
Interface and Operation Instructions Upon Successful CO_2 Concentration Calibration	
	UP key: Press this button to add the value by 0.1% and press and hold this button to add the value by 0.1% continuously DOWN key: Press this button to reduce the value by 0.1% and press and hold this button to reduce the value by 0.1% continuously OK key: The system saves the calibration value and returns to the setting interface when this key is pressed

	Menu key: The system does not save the calibration value and directly returns to the setting interface when this key is pressed

Note: CO_2 concentration calibration setting range: From 0% to 10%.

3.2.7 "3. SET DATA FREQ"

Select "**3. SET DATA FREQ**" on the setting interface, and then press the "**OK**" button to enter the data upload frequency setting interface, as shown in the picture below:

Operation Instructions of Buttons:

"+" key: Press this button to add the value by 1 and press and hold this button to add the value by 1 continuously (in the range from 1~3600 seconds);

"-" key: Press this button to reduce the value by 1 and press and hold this button to reduce the value by 1 continuously (in the range from 1~3600 seconds);

"OK" key: The system saves the parameter and returns to the main interface when this key is pressed;

"EXIT" key: The system does save the parameter and directly returns to the main screen (or the system automatically returns to the main screen after 30 seconds) when the button is pressed;

Note: The upload frequency is 180 seconds by default.

3.2.8 "4.SET SAMPLE FREQ"

Select "**4.SET SAMPLE FREQ**" on the setting interface, and then press the "**OK**" button to enter the sampling frequency setting interface, as shown in the picture below:

Operation Instructions of Buttons:

"+" key: Press this button to add the value by 1 and press and hold this button to add the value by 1 continuously (in the range from 5~1440 seconds);

"-" key: Press this button to reduce the value by 1 and press and hold this button to reduce the value by 1 continuously (in the range from 5~1440 seconds);

"OK" key: The system saves the parameter and returns to the main interface when this key is pressed;

"EXIT" key: The system does save the parameter and directly returns to the main screen (or the system automatically returns to the main screen after 30 seconds) when the button is pressed;

Note: The sampling frequency is 55 seconds by default.

3.2.9 "5. SET VALVE TIME"

Select "**5. SET VALVE TIME**" on the setting interface, and then press the "**OK**" button to enter the intake time setting interface for single sampling, as shown in the picture below:

SET VALVE TIME
10s
+ − OK EXIT

Operation Instructions of Buttons:

"+" key: Press this button to add the value by 1 and press and hold this button to add the value by 1 continuously (in the range from 1~3600 seconds);

"-" key: Press this button to reduce the value by 1 and press and hold this button to reduce the value by 1 continuously (in the range from 1~3600 seconds);

"OK" key: The system saves the parameter and returns to the main interface when this key is pressed;

"EXIT" key: The system does save the parameter and directly returns to the main screen (or the system automatically returns to the main screen after 30 seconds) when the button is pressed;

Note: The intake time is 10 seconds by default.

3.2.10 "6.SET FLOW"

Select "**6.SET FLOW**" on the setting interface, and then press the "**OK**" button to enter the flow sensor calibration interface, as shown in the picture below:

SET FLOW
0 mL/min
+ − OK EXIT

Operation Instructions of Buttons:

"+" key: Press this button to add the value by 1 and press and hold this button to add the value by 1 continuously (in the range from 1~1000 mL/min);

"-" key: Press this button to reduce the value by 1 and press and hold this button to reduce the value by 1 continuously (in the range from 1~1000 mL/min);

"OK" key: The system saves the parameter and returns to the main interface when this key is pressed;

"EXIT" key: The system does save the parameter and directly returns to the main screen (or the system automatically returns to the main screen after 30 seconds) when the button is pressed;

Note: The flow sensor is used to detect leakage of the device. The factory has calibrated the zero, so it is does not need to be calibrated by default; if the calibration is required, plug the gas inlet and outlet and then calibrate the zero.

3.2.11 "7.SET PRESS"

Select "**7.SET PRESS**" on the setting interface, and then press the "**OK**" button to enter the work mode setting interface of the equipment, as shown in the picture below:

```
      SET PRESS
        0kPa
  ┌─┐  ┌─┐  ┌──┐ ┌────┐
  │+│  │─│  │OK│ │EXIT│
  └─┘  └─┘  └──┘ └────┘
```

Operation Instructions of Buttons:

"+" key: Press this button to add the value by 1 and press and hold this button to add the value by 1 continuously (in the range from 1~200 kPa);

"-" key: Press this button to reduce the value by 1 and press and hold this button to reduce the value by 1 continuously (in the range from 1~200 kPa);

"OK" key: The system returns to the main interface when this key is pressed;

"EXIT" key: The system does save the parameter and directly returns to the main screen (or the system automatically returns to the main screen after 30 seconds) when the button is pressed;

Note: The pressure sensor is used to test whether the input pressure is too low. The factory has calibrated the zero, so it is does not need to be calibrated by default; if the calibration is required, do not input the gas into the pipeline but directly calibrate the zero under the atmospheric pressure.

3.2.12 "8.SET WORK MODE"

Select "**8.SET WORK MODE**" on the setting interface, and then press the "**OK**" button to enter the work mode setting interface of the equipment, as shown in the picture below:

```
    SET WORK MODE
  1.normal mode
  2.sleep  mode
  ┌─┐  ┌─┐  ┌──┐ ┌────┐
  │▲│  │▼│  │OK│ │EXIT│
  └─┘  └─┘  └──┘ └────┘
```

Operation Instructions of Buttons:

"+" key: Press this key to switch over to the previous option;

"-" key: Press this key to switch over to the next option;

"OK" key: The system saves the parameter and returns to the main interface when this key is pressed;

"EXIT" key: The system does save the parameter and directly returns to the main screen (or the system automatically returns to the main screen after 30 seconds) when the button is pressed;

Note: The default working mode is "Normal Mode". "Sleep Mode" is generally applicable to MT300MIX with battery function: In this mode, all detection functions are disabled and the device enters the sleep state.

3.2.13 "9. DISPLAY SERVICE"

Select "**9. DISPLAY SERVICE**" on the setting interface, and then press the "**OK**" button to enter the real-time display interface of sampled data, as shown in the picture below:

Operation Instructions of Buttons:

"RUN" key: Used to update the concentration data of O_2 and CO_2 in real time;

"STOP" key: Used to pause update the concentration data of O_2 and CO_2 in real time;

"OK" key: The system returns to the main interface when this key is pressed;

"EXIT" key: The system returns to the main screen (or the system automatically returns to the main screen after 5 minutes) when the button is pressed;

Note: This function can view the current sampled data in real time and be convenient for engineers to debug the device. The sampled data on the main interface will be updated only when the intake is sampled, and will be automatically locked until the next sampling.

4   Installation Instructions

4.1   Installation Method 1

Connect the pre-mixing gas pipe to MT300MIX through a gas tee;
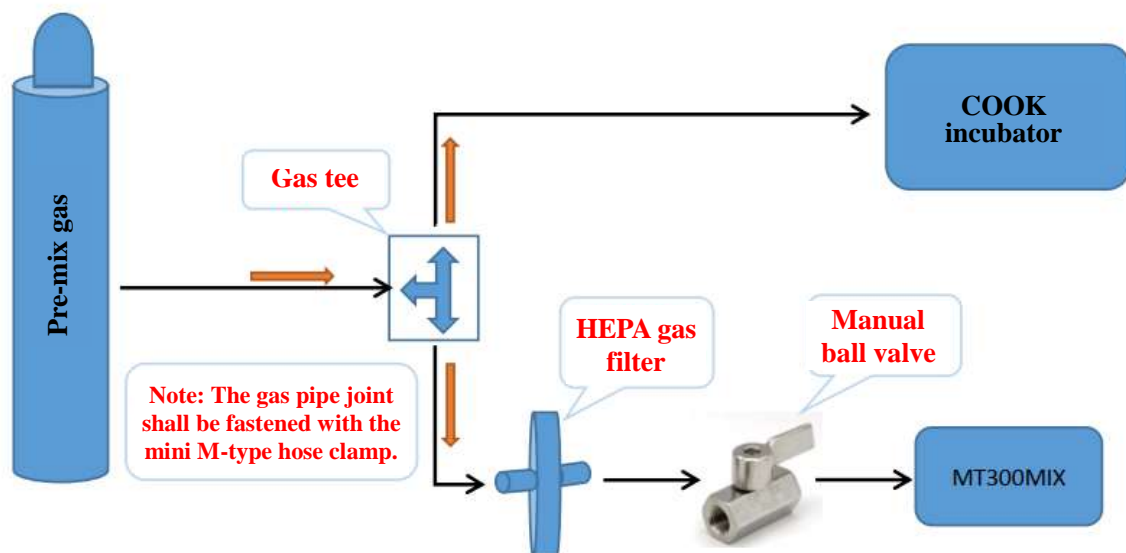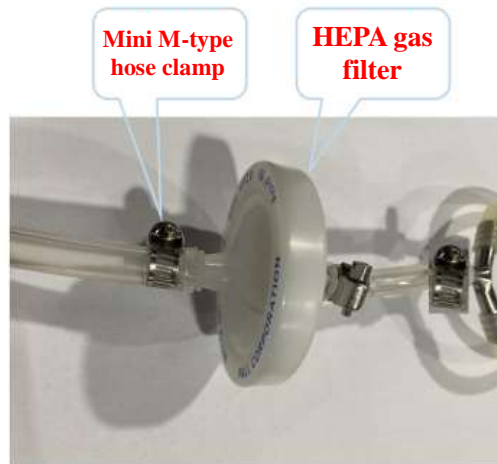
Note:

    1) In this installation mode, a disc filter should be added at the front end of the gas intake of MT300MIX to prevent impurities from entering the equipment;

    2) Hoops shall be installed at hose joints and tightened;

    3) Pay attention to the pressure range of MT300MIX: 0.08MPA-0.2MPa;

    4) Note that the total length of the pipe from tee to MT300MIX should not exceed 2 meters.

4.2   Installation Method 2

Connect MT300MIX to the final end of the pre-mixing gas pipe through the coupler of the corresponding incubator;
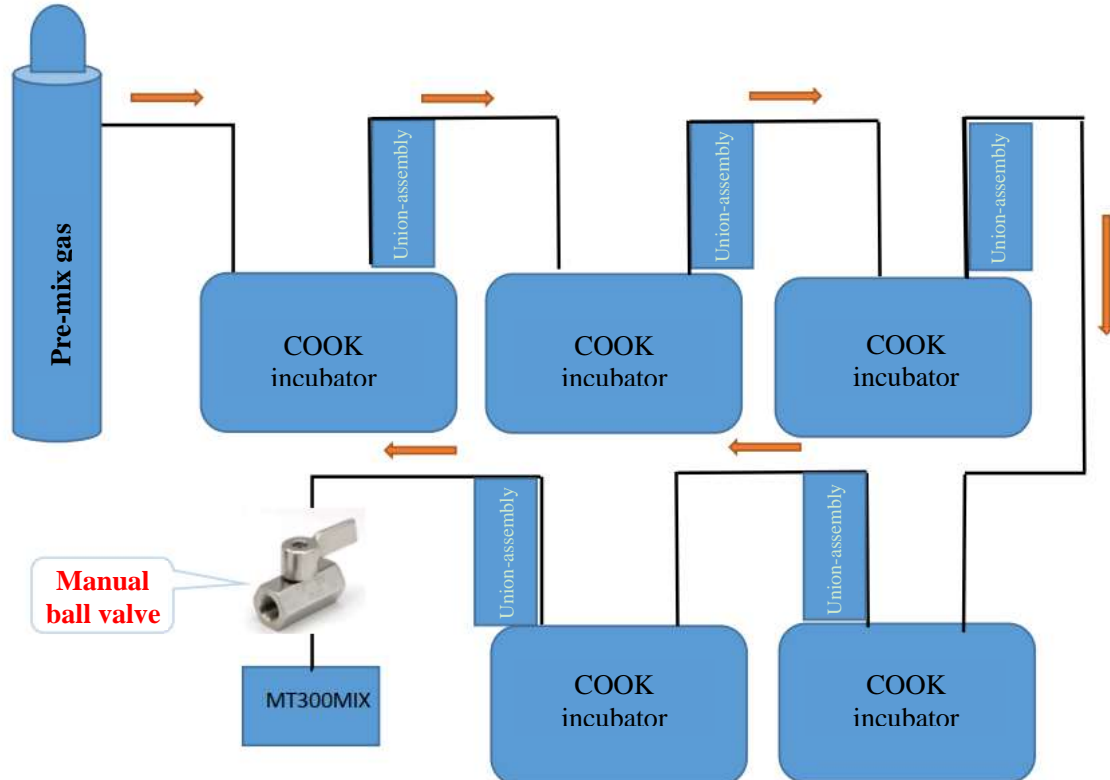
Note:

    1) Hoops shall be installed at hose joints and tightened;

    2) Pay attention to the pressure range of MT300MIX: 0.08MPA-0.2MPa;

3) Note that the total length of the pipe from the last incubator to MT300MIX should not exceed 2 meters.

5   Precautions

- ➢ When MT300MIX is installed and used for the first time, because there is air inside the device, the air cannot be guaranteed to be emptied at one time, therefore, the concentrations tested first few times after the installation of the device will be inaccurate;
- ➢ The wireless transmission distance of MT300MIX is limited and should generally not exceed 3 rooms. If the walls of the rooms are made of metal materials, it is better to install a MT500 or MT1100 receiver in each room;
- ➢ MT300MIX is not waterproof, so the equipment shall not directly contact with liquid water;
- ➢ MT300MIX is equipped with polymeric battery and shall be not allowed to contact the high temperature environment to prevent battery damage.
- ➢ The total length of the pipe from the last gas outlet (tee or last incubator) to MT300MIX should not exceed 2 meters.

6   FCC   Warning

15.19 Labeling requirements.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1)

This device may not cause harmful interference, and (2) this device must accept any interference received,

including interference that may cause undesired operation.

15.21 Information to user.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the

user's authority to operate the equipment.

15.105 Information to the user.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device,

pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against

harmful interference in a residential installation. This equipment generates uses and can radiate radio

frequency energy and, if not installed and used in accordance with the instructions, may cause harmful

interference to radio communications. However, there is no guarantee that interference will not occur in a

particular installation. If this equipment does cause harmful interference to radio or television reception,

which can be determined by turning the equipment off and on, the user is encouraged to try to correct the

interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

Wuhan Huchuang United Technology Co., Ltd.

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