Macro Technology Instruments Co ., Ltd.

Indoor Air Quality Monitor
User Manual

Model：IAQ-Pro

MTI-ML-026-03　17V1.8

Index

01 Attention

Warning!

IAQ-Pro Indoor Air Quality Monitor (hereinafter “IAQ-Pro Monitor”) must be installed in the correct locations. Failure to do so will render the IAQ-Pro Monitor ineffective. Refer to your local codes of practice or national standards for advice.

Caution!

This manual deals with safety-related products. The equipment must be installed and operated in compliance with this manual. The product isn’t designed for hazardous area.

The installation of IAQ-Pro Monitor should avoid locations where close to water or humid environment. It may influence proper operation and where mechanical damage might be possible.

Please do not disassembled and repair the product by yourself if having problem during operation, should contact MTI or dealer for advice. MTI shall not take any responsibility and guarantee of the product if repairing by yourself.

Macro Technology Instruments Co., Ltd. (hereinafter “MTI”) cannot be held responsible for damage caused by non-compliance with the recommendations in the manual of using in a manner conforming to its intended use, or in an environment that exceeds the specifications of it.

NCC (National Communication Commission- Taiwan)  Administrative Regulations on Low Power Radio Waves Radiated Devices!

Article 12

Without permission granted by the DGT, any company, enterprise, or user is not allowed to change frequency, enhance transmitting power or alter original characteristic as well as performance to a approved low power radio-frequency devices.

Article 14

The low power radio-frequency devices shall not influence aircraft security and interfere legal communications; If found, the user shall cease operating immediately until no interference is achieved.

The said legal communications means radio communications is operated in compliance with the Telecommunications Act.

The low power radio-frequency devices must be susceptible with the interference from legal communications or ISM radio wave radiated devices.

Additionally, during the product testing of electromagnetic wave exposure, the value has only 0.0119mW/cm^2 which is far below than the standard value of electromagnetic wave exposure on MPE (1mW/cm^2).

FCC (Federal Communications Commission)

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.

Intended Use!

1. Shall set the Time and Date on Web Server for the first-time installation.
   (please refer to 07-1-2 - Time, page 12)
2. Shall set the IP on the Web Server for the first-time installation.
   (please refer to 07-1-3 - IP Address, page 12)
3. IAQ-Pro Monitor can run 168 hours when the power failure or disconnection caused by external factors, need not reset the time and date.

02 Product Structure

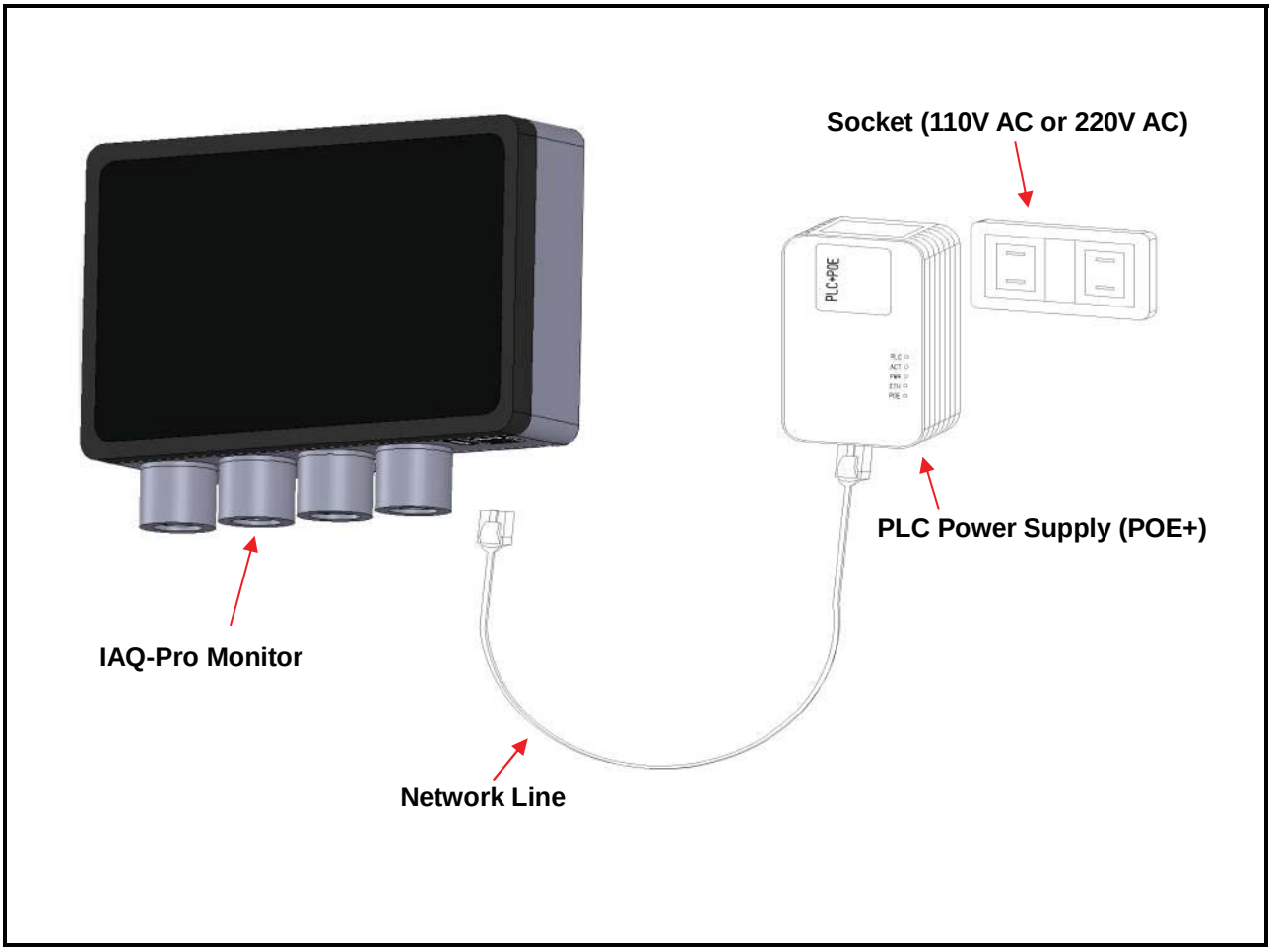


Fig. 2-1 Product Structure

03 Dimensions

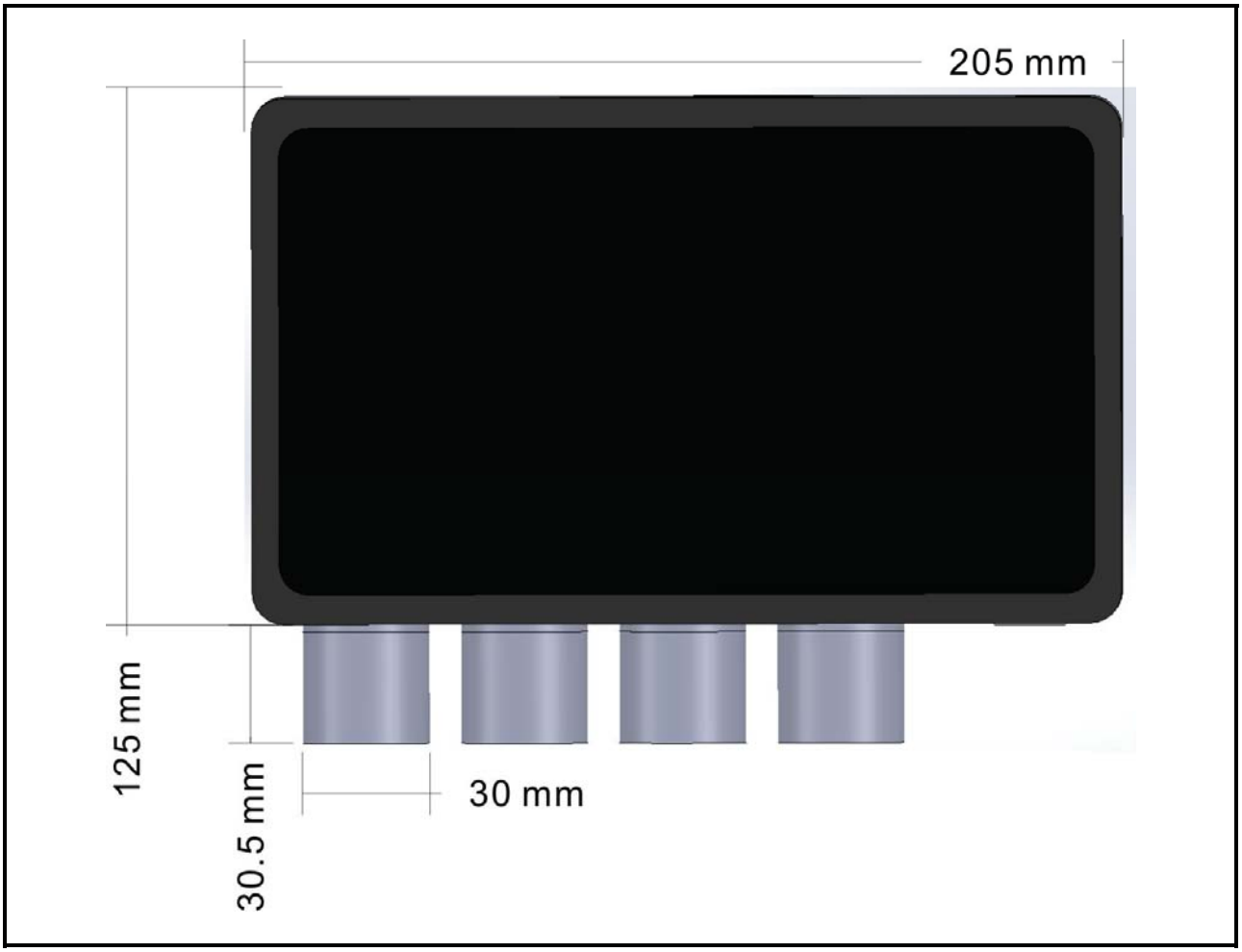


Fig. 3-1 Mechanical Dimensions - Front View Unit: mm

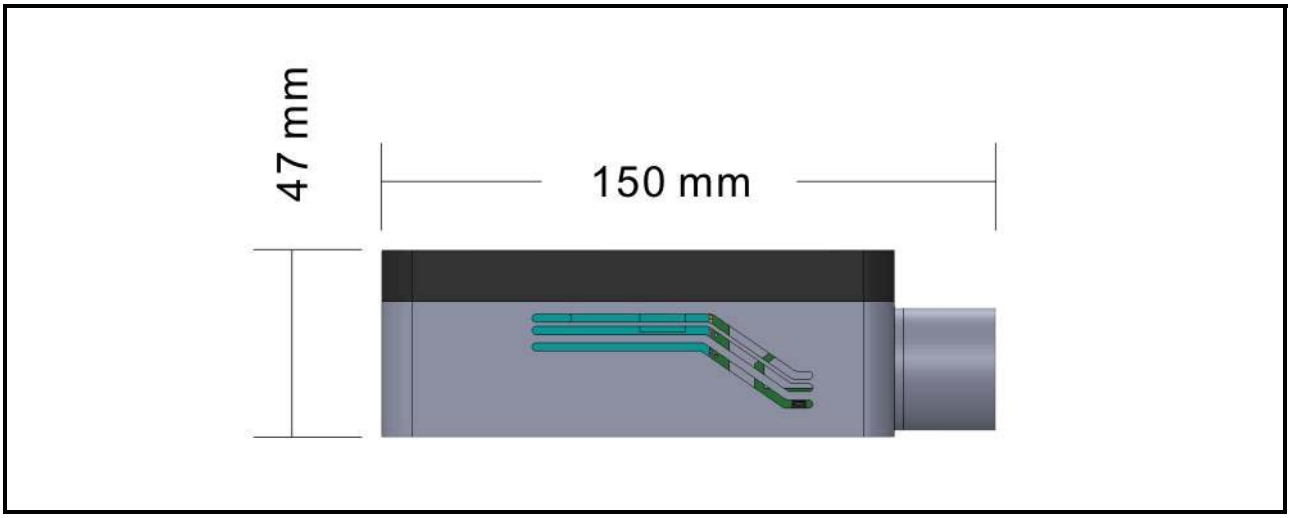


Fig. 3-2 Mechanical Dimensions – Sid e View Unit: mm

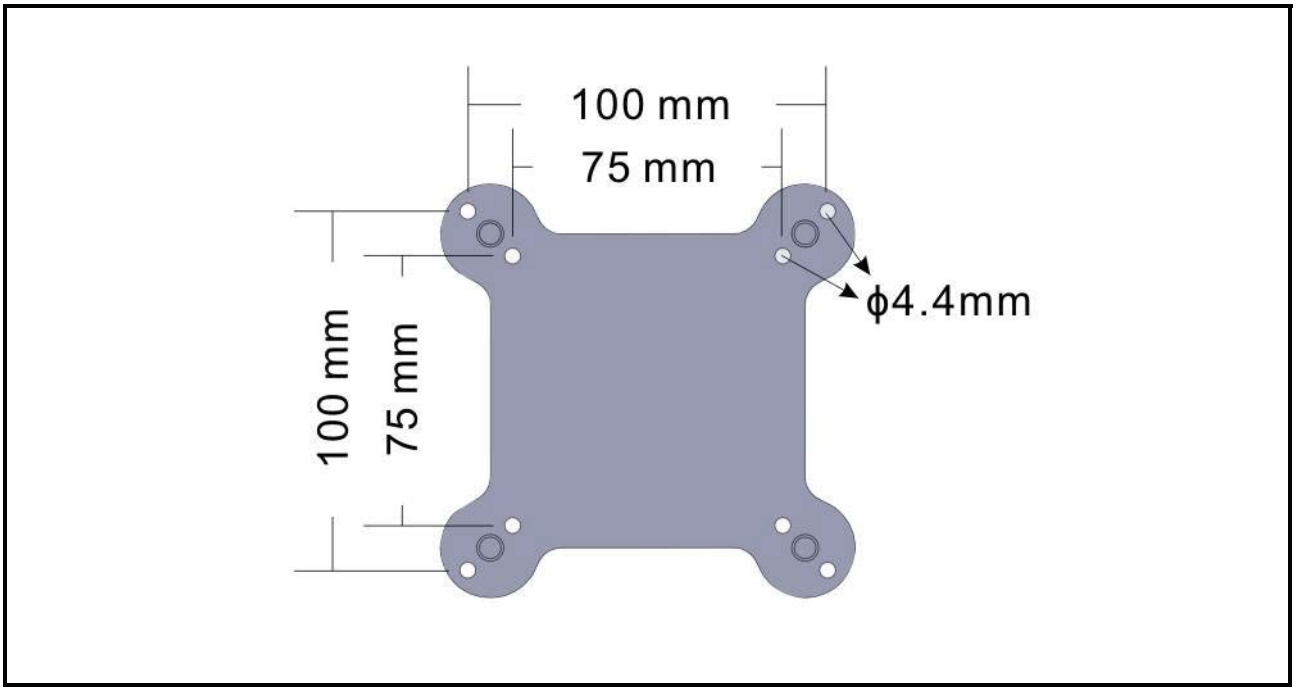


Fig. 3-3 Wall Mount Back Plate Dimensions Unit: mm

04 Installation

04-1 Standard Model

The IAQ-Pro Monitor should be bolted to a vertical surface in a source manner using the mounting feet that are provided. The location and installation material must comply with your local codes of practice and/or national standards to ensure that the unit is mounted at eye level and fully accessible.

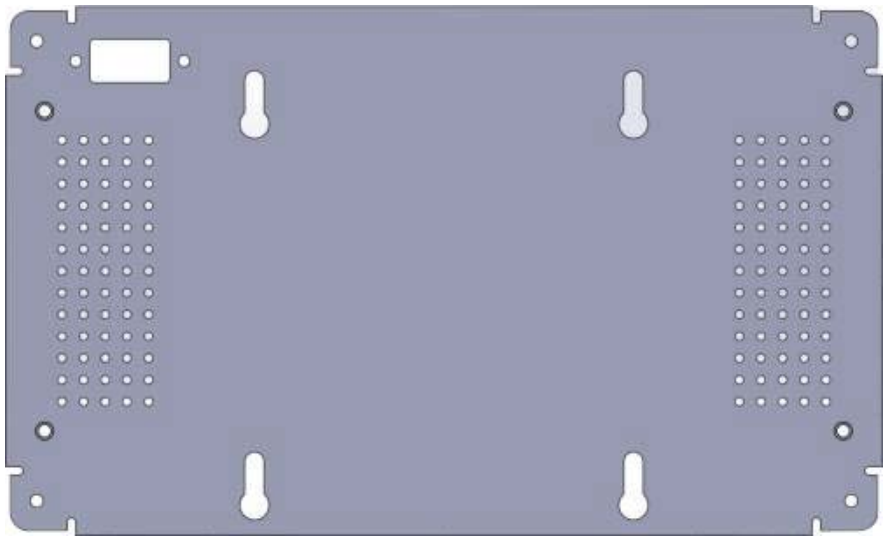
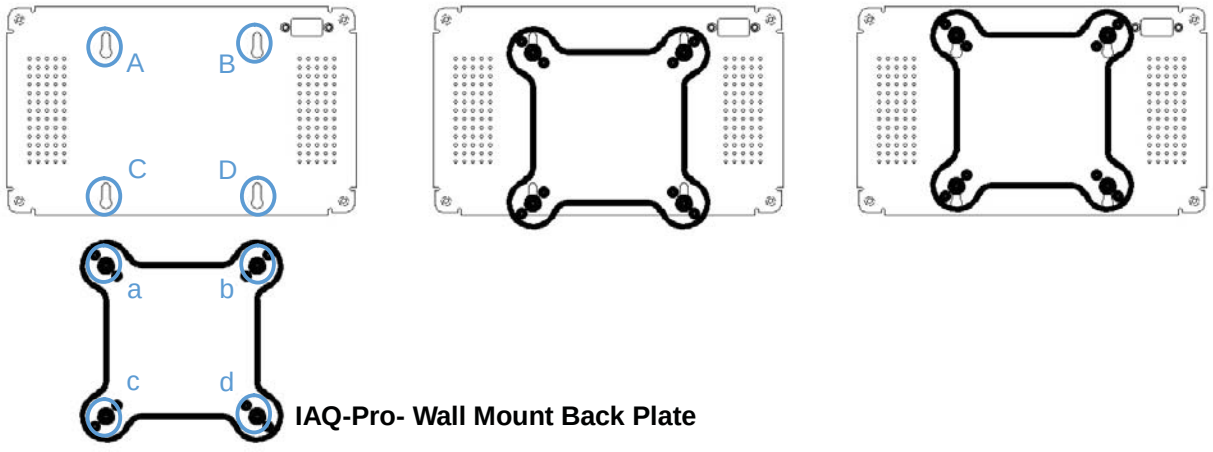


Fig. 4-1-1 IAQ-Pro- Back Elevation



IAQ-Pro- Wall Mount Back Plate

After the installation of back plate, aim the wall mount holes (A、B、C、D) at the back of IAQ-Pro Monitor, and make sure all the holes (A 、B 、C 、D) has been matched properly.

Fig. 4-1-2 IAQ-Pro- Wall Mount Illustration

04-2 Expandable / Portable Function Kit

Expandable / Portable Function kit should be bolted to a vertical surface in a source manner using the mounting feet that are provided. The location and installation material must comply with your local codes of practice and/or national standards to ensure that the unit is mounted at eye level and fully accessible.

Fig. 4-2-1 IAQ-Pro- Complete Combination Schematic Diagram

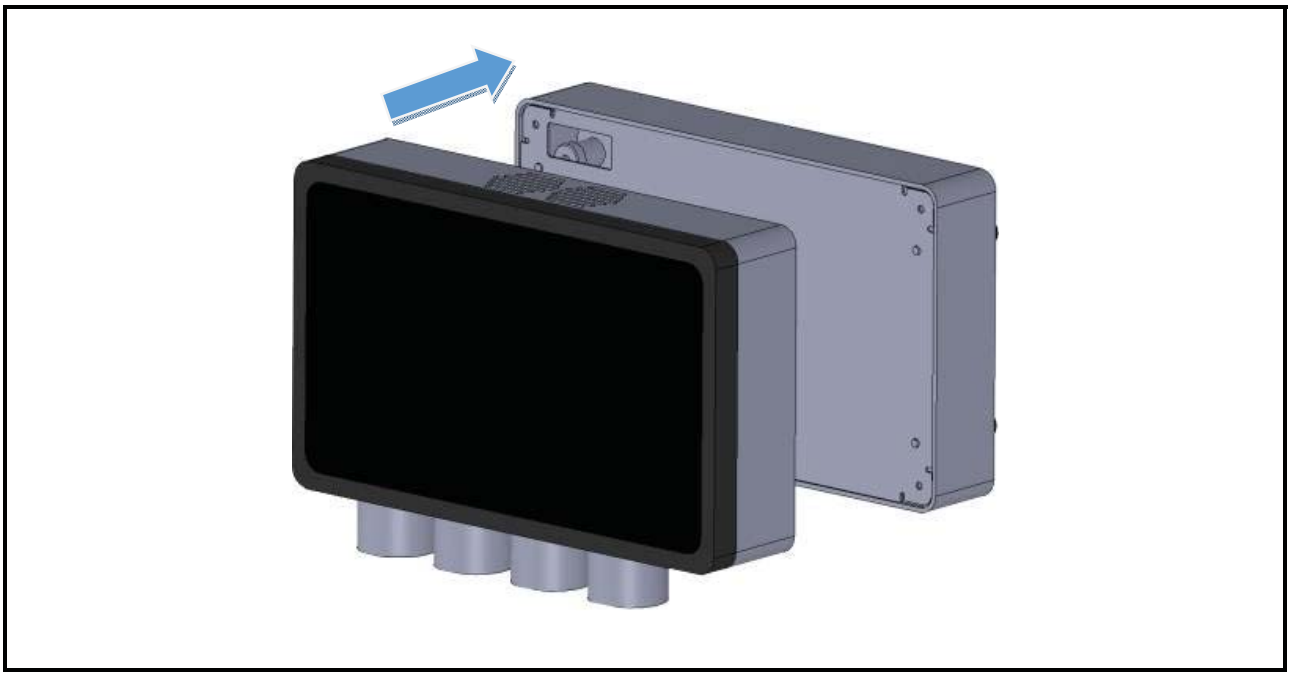


Fig. 4-2-2 IAQ-Pro- Assembly Process Schematic Diagram (1)

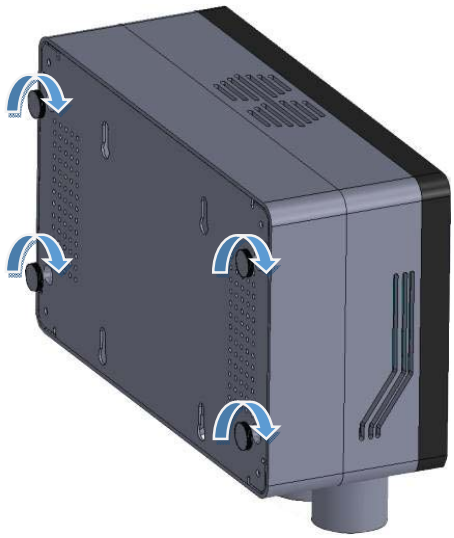
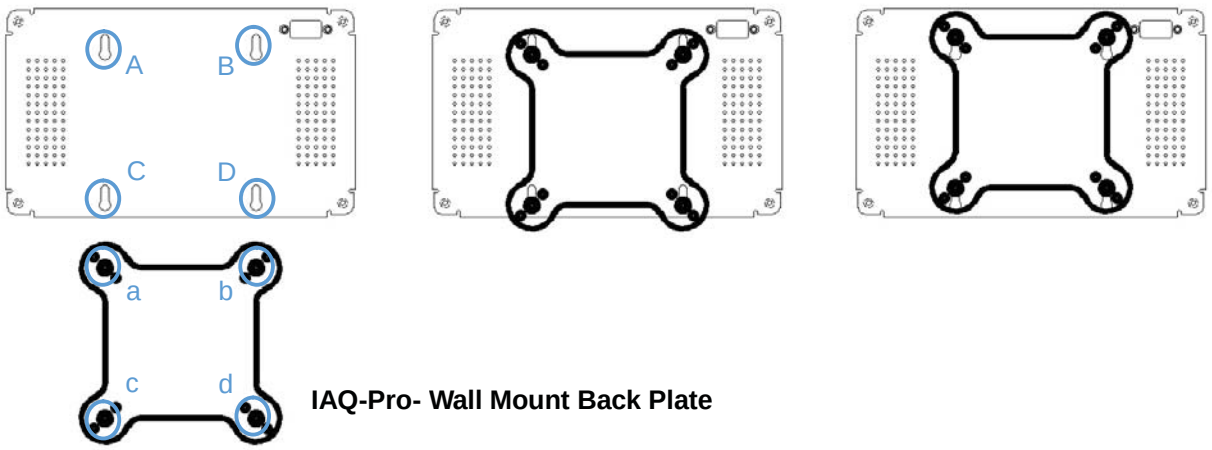


Fig. 4-2-3 IAQ-Pro- Assembly Process Schematic Diagram (2)



IAQ-Pro- Wall Mount Back Plate

After the installation of back plate, aim the wall mount holes (A、B、C、D) at the back of Expandable Function Kit of IAQ-Pro, and make sure all the holes (A 、B 、C 、D) has been matched properly.

Fig. 4-2-4 IAQ-Pro- IAQ-Pro can also come in combination with Expandable Function Kit as fixed detection module

05 Display Panel

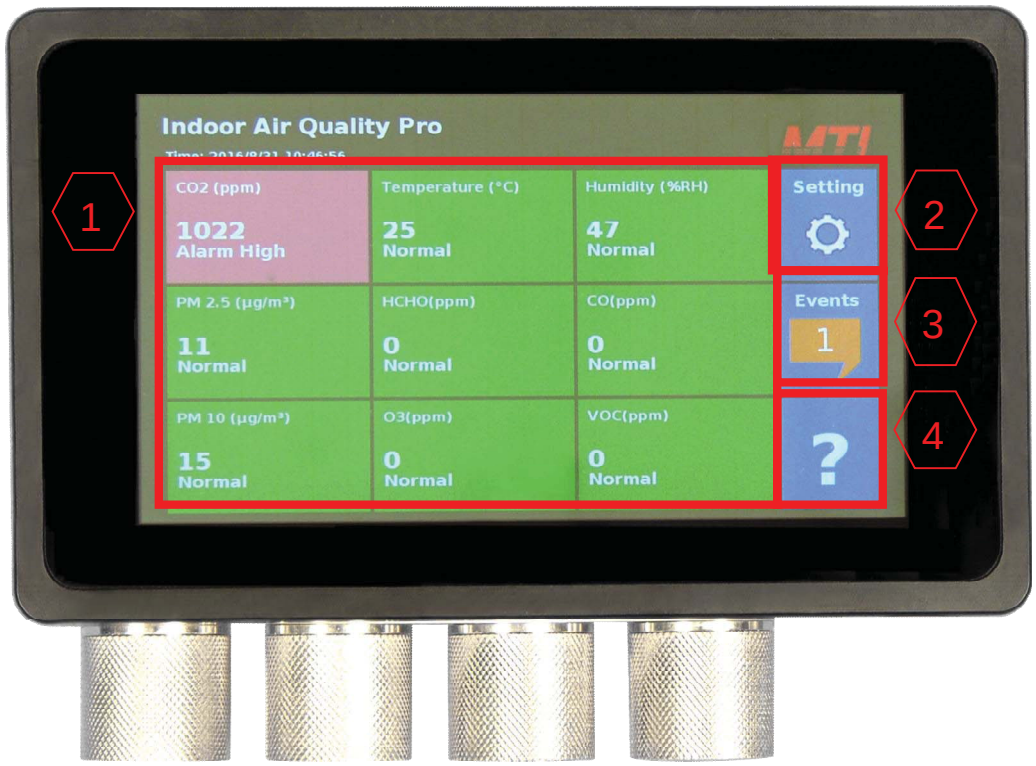


Fig. 5-1 Control Panel

No.	Description	Remark
1.	Status (Detection Items)	Press one of the buttons to check the Trend Chart details of detection items
2.	Setting Mode	Password Needed; calibration and set up are available
3.	Events Log	Historical alarm records
4.	Question Mark	IP information and quick guide

06 Operation Flowsheet

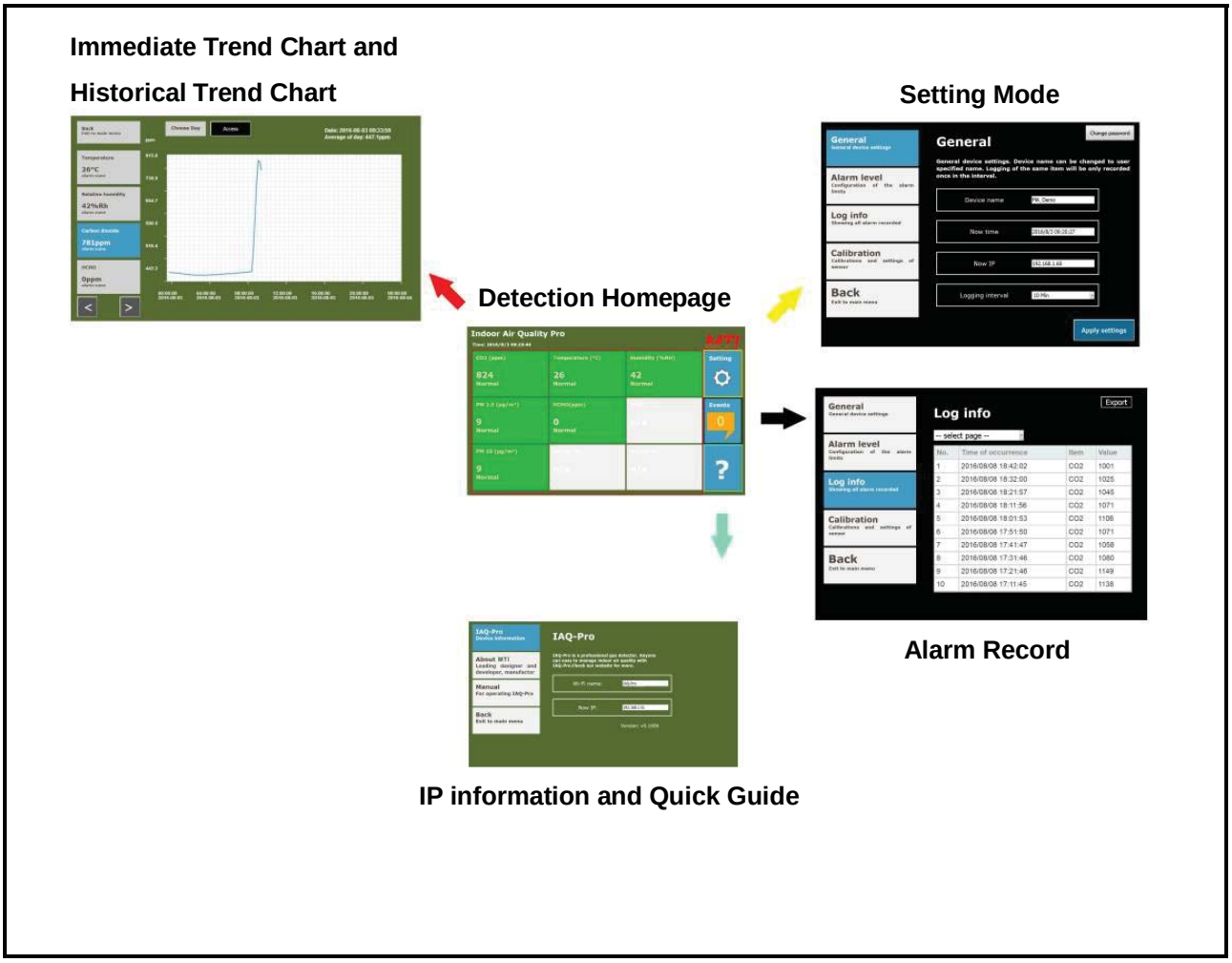


Fig. 6-1 Operation Flowsheet – Guide Map

Remark:
1. The password for Android system users is “mti”.
2. The password for iOS system users is IAQ-Pro (user) and mti (password).

07 Settings

07-1 General Setting

Operation Interface:

07-1-1. Device Name

07-1-2. Time

07-1-3. IP Address

07-1-4. Logging Interval

※More details in the following chapter

07-1-1 Device Name

Changing device name assists user to search IAQ-Pro in certain Local Area Network easily through App or smart handheld devices.

07-1-2 Time

Time will be corrected automatically when IAQ-Pro connect to the Internet (default time-zone: UTC+08:00). Users are able to adjust local time manually.

07-1-3 IP Address

Operation Interface:

07-1-3-1. Ethernet Setting

07-1-3-2. Modbus RTU Setting

07-1-3-3. Wi-Fi

- Client Mode Setting

07-1-3-4. Wi-Fi

- AP Mode Setting

※More details in the following chapter

07-1-3-1 IP- Ethernet Setting

- The system has been pre-assigned DHCP (Dynamic Host Configuration Protocol) as preset mode.
- Users are able to change to static IP address if necessary. Press “Apply Static” button to complete your changes.
- There are no effects on the changes of IP setting.
  (The static IP address will be: 192.168.42.1)

07-1-3-2 IP- Modbus RTU address

Out of service for IAQ-Pro.

- This page is designed with Hexadecimal that apply for Modbus RTU setting.

- Users are able to change Modbus RTU address if necessary. Press “Apply Modbus” button to complete your changes.

07-1-3-3 IP- Wi-Fi Client Mode

Attention: Client mode setting is a preset connection between IAQ-Pro and LAN. Please make sure your network is fully secured before you change to Client Mode.

Steps: 1. Press “scan Wi-Fi” button.
2. Press “your SSID” options.
3. Press “switch to Client mode” button.

07-1-3-4 IP- Wi-Fi AP Mode

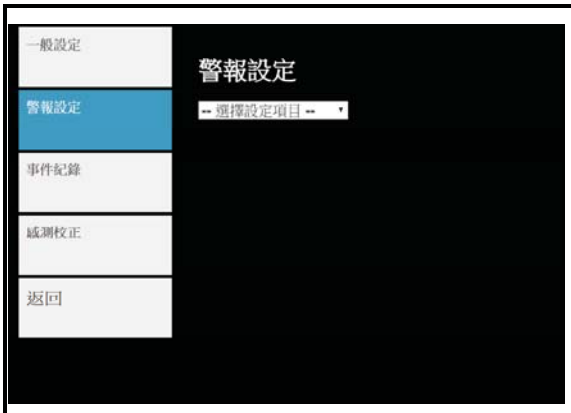
- AP mode setting can help users to turn IAQ-Pro into a Wireless Access Point.
- Preset Password: 8868215277

※Attention: AP mode is preset model for IAQ-Pro. Users can choose either one (Client mode or AP mode).

07-1-4 Logging Interval

- The preset logging interval is 10 minutes. Users are able to adjust it if necessary.

07-2 Alarm level



- Users are able to setup the alarm level (high and low) based on the indoor air quality standards.

- When reading is over high level alarm, the detection item will turn into red color.

- When reading is below the low level alarm, the detection item will turn into red color.

- Both alarm values will be recorded to events log.

07-3 Log info

- Users are able to review log information that shows chronologically on this page.

- Users are able to output events log data by using web browser.

- The output file will be log file which can be opened by Excel.

07-4 Calibration

- This page provides calibration list for both standard detection item and Smart Sensor.

- Standard Detection Item contains: CO2 / Temperature / Humidity / PM2.5 / PM10.

- Optional Smart Sensor contains: TVOCs / HCHO / CO / NO / NO2 / O3 / O2 / H2S / SO2 / NH3 etc.

- Please refer to Chapter 9 (Calibration) and follow-up the calibration steps.

08 Calibration Kit

A. Calibration tools:

1. Sampling bag with Zero Air
2. Sampling bag with Span Gas
3. Pump for calibration (flow rate: 500~2,000 ml/min)
4. PTFE conduit
5. Calibration adapter for IAQ-Pro

B. Calibration Figure:

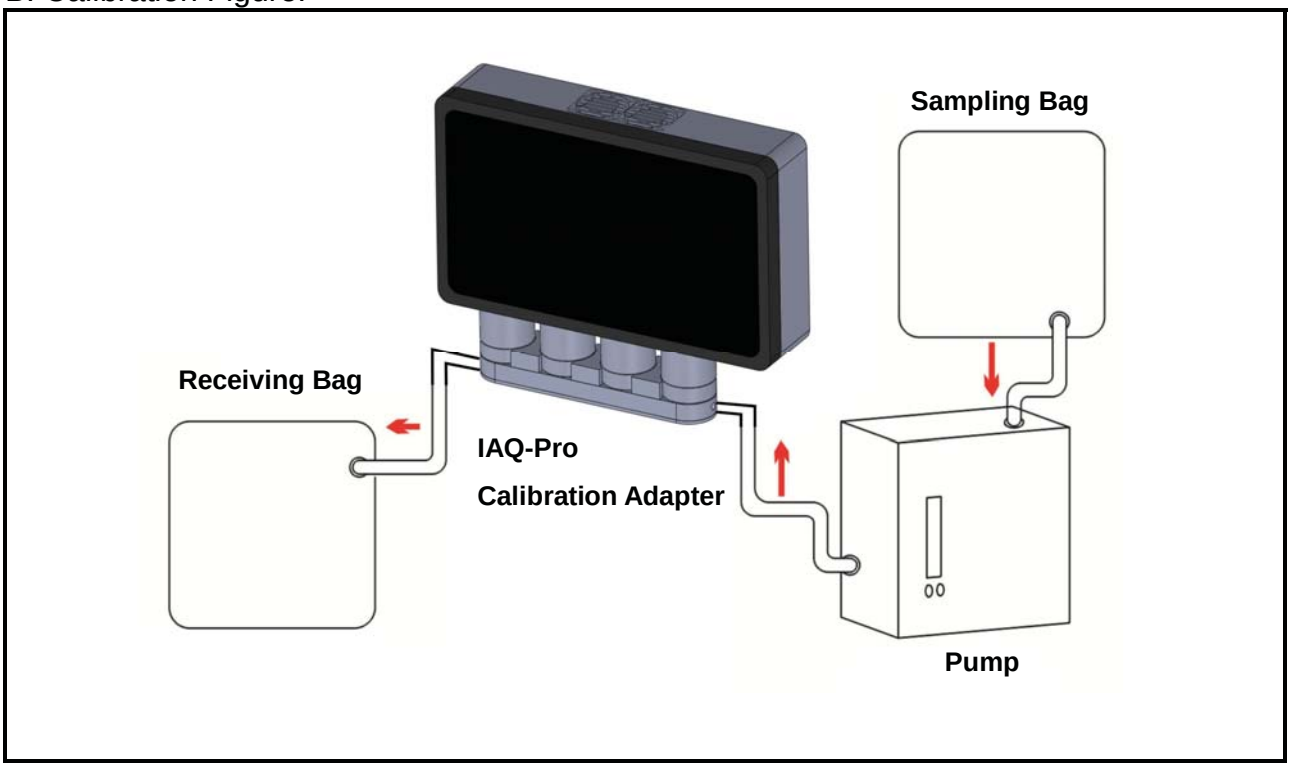
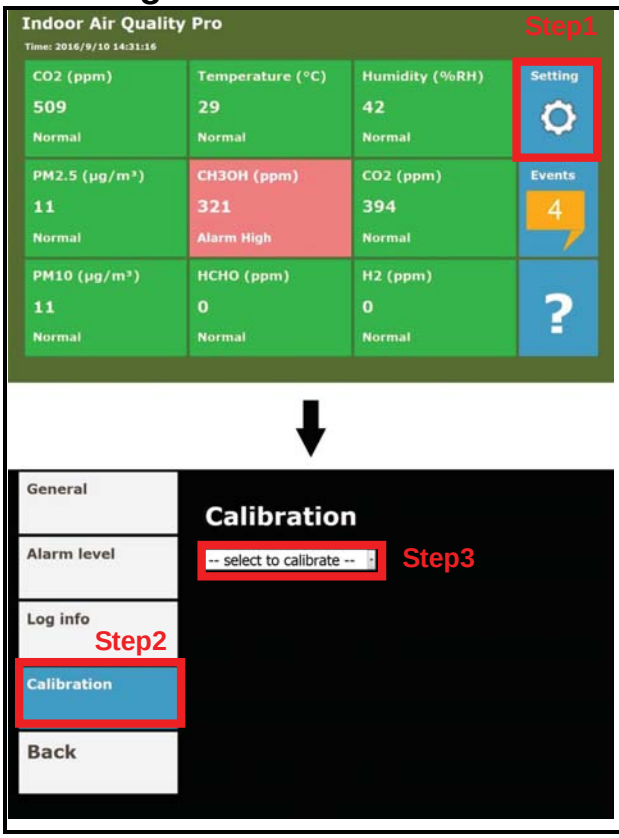


Fig. 8-1 Calibration Assembly

1. Aim the Smart Sensor holes of the calibration adapter to the Smart Sensor that under IAQ-Pro Monitor, and lock the adapter tightly.
2. Switch on the Sampling bag and start the Pump, set the flow-rate on 1ltr/min and wait for 2 minutes. When Monitor acquired the reading is stable then do Zero or Span calibration.

09 Calibration Procedures

1.Setting Menu

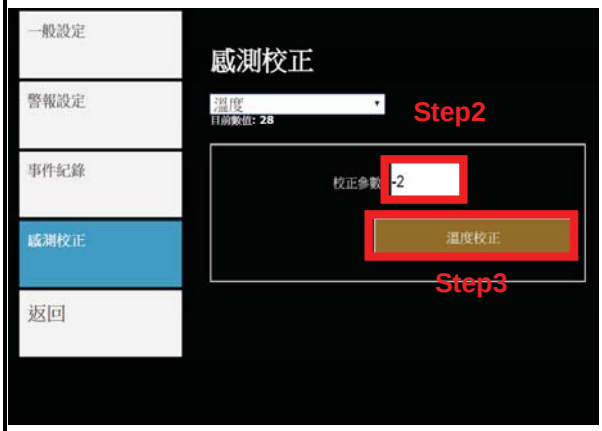


Step1: Press “Setting” button to enter the setting menu.

Step2: Select “Calibration” button.

Step3: Select the detection item.

2.Calibration for Standard Detection Items (Carbone Dioxide / Temperature / Humidity / Particulate Matter)



For example: (Temperature)

Step1: Check the degrees (temperature) of the thermometer under the same environment.

Step2: Type-in the difference reading of temperature into the column “Adjusting Parameter”.

Step3: Press “Temperature Calibration” button and wait for 5 seconds to finish calibration.

3.Zero Calibration for Smart Sensor

For example: (Formaldehyde)

Step1: Aim the calibration adapter to the holes of HCHO Smart Sensor.

Step2: Switch on the Zero Air and wait for 1 minute.

Step3: Press “HCHO Zero Calibration” button and wait for 5 seconds to finish calibration.

Note:

1. System will redirect user to calibration index automatically after calibration.
2. Please use “Nitrogen” (100%VOL) as Zero air gas when calibrating O_2 and CO_2 Smart Sensors.

4.Span Calibration for Smart Sensor

For example: (Formaldehyde)

Step1: Aim the calibration adapter to the holes of HCHO Smart Sensor.

Step2: Switch on the Span Gas and wait for 1 minute.

Step3: Type-in the value of span gas into the column which has been circled.

Step4: Press “HCHO Span Calibration” button and wait for 5 seconds to finish calibration.

Note:

1. System will redirect user to calibration index automatically after calibration.
2. Please refer to Chapter 10 and cite the correction coefficient information as reference.

10 Cross Sensitivity Table

P/N	Detection Item	Calibration gas	Concentration	Cross sensitivity
9840021	SO2 75ppm(max) Smart Sensor	SO2	10~20ppm	
9840212	CO 2000ppm(max) Smart Sensor	CO	50~100ppm	
9840331	O2 30%VOL(max) Smart Sensor	O2	20~25%VOL	
9850431	H2S 250ppm(max) Smart Sensor	H2S	15~30ppm	
9840621	NO2 150ppm(max) Smart Sensor	NO2	10~20ppm	
9840712	NH3 100ppm(max) Smart Sensor	NH3	50~100ppm	
9840812	NO 1000ppm(max) Smart Sensor	NO	50~100ppm	
9851651	TVOCs 50ppm(max) Smart Sensor	i-C4H8	10~50ppm	
9842410	O3 1ppm(max) Smart Sensor	NO2	1ppm	NO2:O3=1:0.6
9896301	HCHO 30ppm(max) Smart Sensor	CO	50~100ppm	CO:HCHO=10:1

11 Communication Protocol

Data Format (Standard Format)

Detection Items	Number	Details	Data Format
CO2	40001	Value	Float
	40002		
	40003	Status	Dec
PM2.5	40004	Value	Float
	40005		
	40006	Status	Dec
PM10	40007	Value	Float
	40008		
	40009	Status	Dec
Temperature	40010	Value	Float
	40011		
	40012	Status	Dec
Humidity	40013	Value	Float
	40014		
	40015	Status	Dec
Sensor-1	40016	Value	Float
	40017		
	40018	Status	Dec
Sensor-2	40019	Value	Float
	40020		
	40021	Status	Dec
Sensor-3	40022	Value	Float
	40023		
	40024	Status	Dec
Sensor-4	40025	Value	Float
	40026		
	40027	Status	Dec

Signal Format (Status)

Value	Status Table
0000	Normal
0001	Low Alarm Level
0002	High Alarm Level
0003	Error (Fault)
0004	Fault-1 (cannot access the Smart Sensor)
0005	Fault-2 (reading error more than 5 times)
0006	Fault-3(cannot identify the detecting item)

Data Format (Others Format)

Detection Items	Number	Details	Data Format	
CO_2	30001	Name	First、Second Character	ASCII
	30002		Third、Fourth Character	
	30003		Fifth、Sixth Character	
	30004		Seventh、Eighth Character	
	30005		Ninth、Tenth Character	
	30006	Unit	First、Second Character	ASCII
	30007		Third、Fourth Character	
	30008		Fifth、Sixth Character	
PM2.5	30017	Name	First、Second Character	ASCII
	30018		Third、Fourth Character	
	30019		Fifth、Sixth Character	
	30020		Seventh、Eighth Character	
	30021		Ninth、Tenth Character	
	30022	Unit	First、Second Character	ASCII
	30023		Third、Fourth Character	
	30024		Fifth、Sixth Character	
PM10	30033	Name	First、Second Character	ASCII
	30034		Third、Fourth Character	
	30035		Fifth、Sixth Character	
	30036		Seventh、Eighth Character	
	30037		Ninth、Tenth Character	
	30038	Unit	First、Second Character	ASCII
	30039		Third、Fourth Character	
	30030		Fifth、Sixth Character	
Temperature	30049	Name	First、Second Character	ASCII
	30050		Third、Fourth Character	
	30051		Fifth、Sixth Character	
	30052		Seventh、Eighth Character	
	30053		Ninth、Tenth Character	
	30054	Unit	First、Second Character	ASCII
	30055		Third、Fourth Character	
	30056		Fifth、Sixth Character	

Data Format (Others Format)

Detection Items	Number	Details	Data Format	
Humidity	30065	Name	First、Second Character	ASCII
	30066		Third、Fourth Character	
	30067		Fifth、Sixth Character	
	30068		Seventh、Eighth Character	
	30069		Ninth、Tenth Character	
	30070	Unit	First、Second Character	ASCII
	30071		Third、Fourth Character	
	30072		Fifth、Sixth Character	
Sensor-1	30081	Name	First、Second Character	ASCII
	30082		Third、Fourth Character	
	30083		Fifth、Sixth Character	
	30084		Seventh、Eighth Character	
	30085		Ninth、Tenth Character	
	30086	Unit	First、Second Character	ASCII
	30087		Third、Fourth Character	
	30088		Fifth、Sixth Character	
	30089	Dot	Decimal Point	Dec
	30090	Range	Detection Range(multiplied by “Dot”)	Dec
	30091	Alarm1	Low Level Alarm(multiplied by “Dot”)	Dec
	30092	Alarm2	High Level Alarm (multiplied by “Dot”)	Dec
	30093	Sensor P/N	Please check Sensor Model list	Dec
	30094	Production Date	Year	Dec
	30095		Month	Dec
	30096		Serial Number of the month	Dec

Data Format (Others Format)

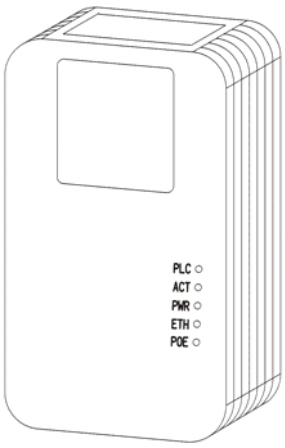
Detection Items	Number	Details	Data Format	
Sensor-2	30097	Name	First、Second Character	ASCII
	30098		Third、Fourth Character	
	30099		Fifth、Sixth Character	
	30100		Seventh、Eighth Character	
	30101		Ninth、Tenth Character	
	30102	Unit	First、Second Character	ASCII
	30103		Third、Fourth Character	
	30104		Fifth、Sixth Character	
	30105	Dot	Decimal Point	Dec
	30106	Range	Detection Range(multiplied by “Dot”)	Dec
	30107	Alarm1	Low Point Alarm(multiplied by “Dot”)	Dec
	30108	Alarm2	High Point Alarm (multiplied by “Dot”)	Dec
	30109	Sensor P/N	Please check Sensor Model list	Dec
	30110	Production Date	Year	Dec
	30111		Month	Dec
	30112		Serial Number of the month	Dec
Sensor-3	30113	Name	First、Second Character	ASCII
	30114		Third、Fourth Character	
	30115		Fifth、Sixth Character	
	30116		Seventh、Eighth Character	
	30117		Ninth、Tenth Character	
	30118	Unit	First、Second Character	ASCII
	30119		Third、Fourth Character	
	30120		Fifth、Sixth Character	
	30121	Dot	Decimal Point	Dec
	30122	Range	Detection Range(multiplied by “Dot”)	Dec
	30123	Alarm1	Low Level Alarm(multiplied by “Dot”)	Dec
	30124	Alarm2	High Level Alarm (multiplied by “Dot”)	Dec
	30125	Sensor P/N	Please check Sensor Model list	Dec
	30126	Production Date	Year	Dec
	30127		Month	Dec
	30128		Serial Number of the month	Dec

Data Format (Others Format)

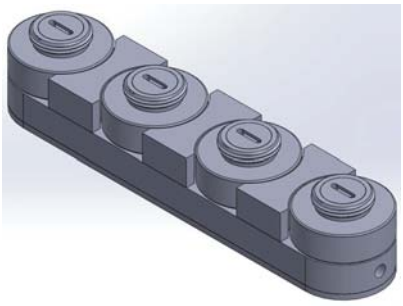
Detection Item	Number	Details	Data Format	
Sensor-4	30129	Name	First、Second Character	ASCII
	30130		Third、Fourth Character	
	30131		Fifth、Sixth Character	
	30132		Seventh、Eighth Character	
	30133		Ninth、Tenth Character	
	30134	Unit	First、Second Character	ASCII
	30135		Third、Fourth Character	
	30136		Fifth、Sixth Character	
	30137	Dot	Decimal Point	Dec
	30138	Range	Detection Range(multiplied by “Dot”)	Dec
	30139	Alarm1	Low Level Alarm(multiplied by “Dot”)	Dec
	30130	Alarm2	High Level Alarm (multiplied by “Dot”)	Dec
	30141	Sensor P/N	Please check Sensor Model list	Dec
	30142	Production Date	Year	Dec
	30143		Month	Dec
	30144		Serial Number of the month	Dec

12 Accessory

12-1 Standard Accessory



0960001 Powerline Router (with POE)



0700303 Sampling housing(AL)
0700304 Sampling housing(SUS304)

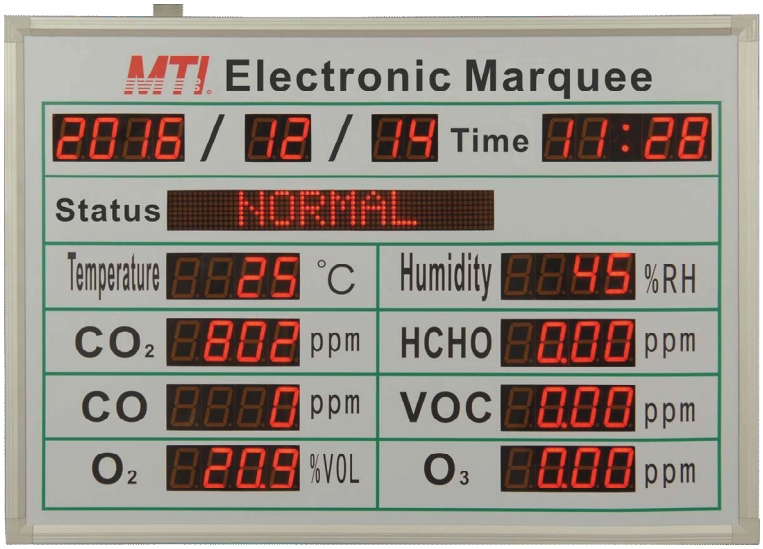
12-2 Optional Accessory

12-2-1 Functional Detection Accessory

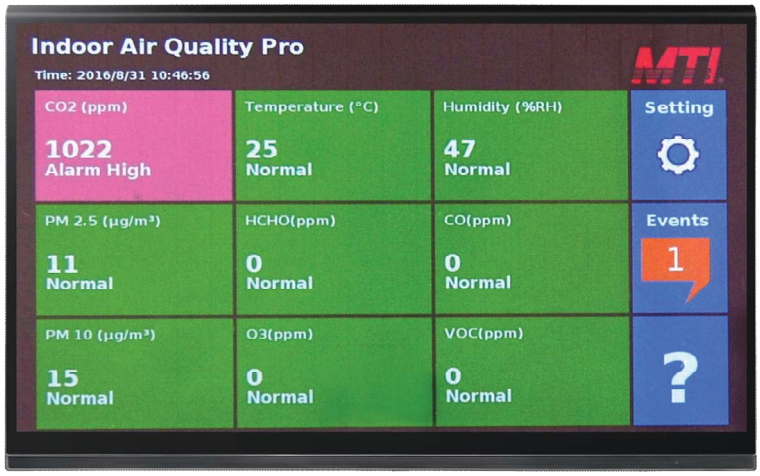
P/N	Type	Functions
0950218	Expansion Function Kit	Expandable up to 8 channels gas sensing module
0950220	Portable Function Kit	Built-in sampling pump
		Built-in battery

※Please refer to chapter 04-2 and see the combination method.

12-2-2 Indoor Air Quality Electronic Marquee



Indoor Air Quality Electronic Marquee (LED)



Indoor Air Quality Electronic Marquee (LCD)

Indoor Air Quality Electronic Marquee (LED) - Installation Illustration

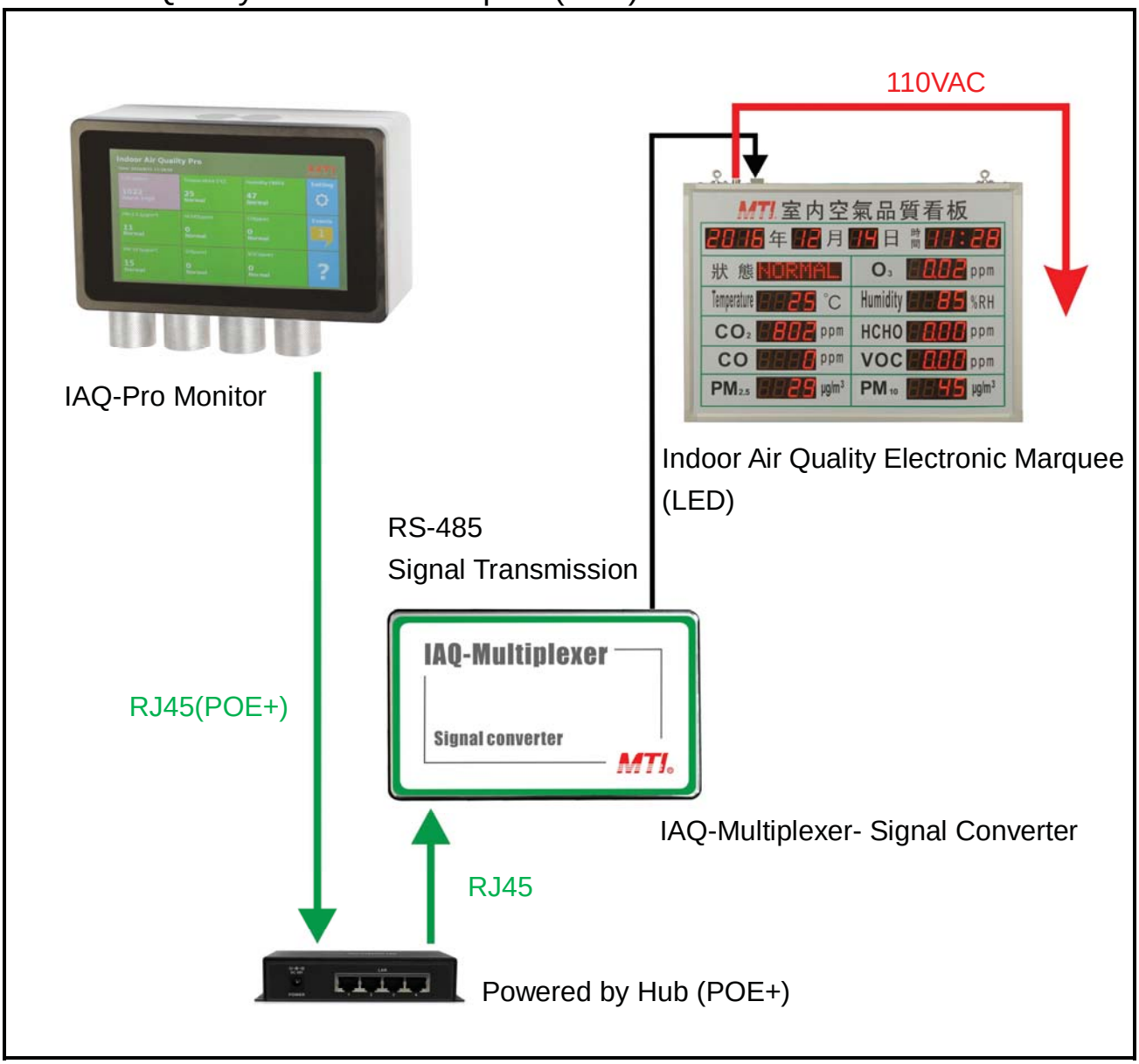


Figure 12-2-2-1: The structure of IAQ-Pro match with LED Electronic Marquee

Indoor Air Quality Electronic Marquee (LED) - Installation Illustration

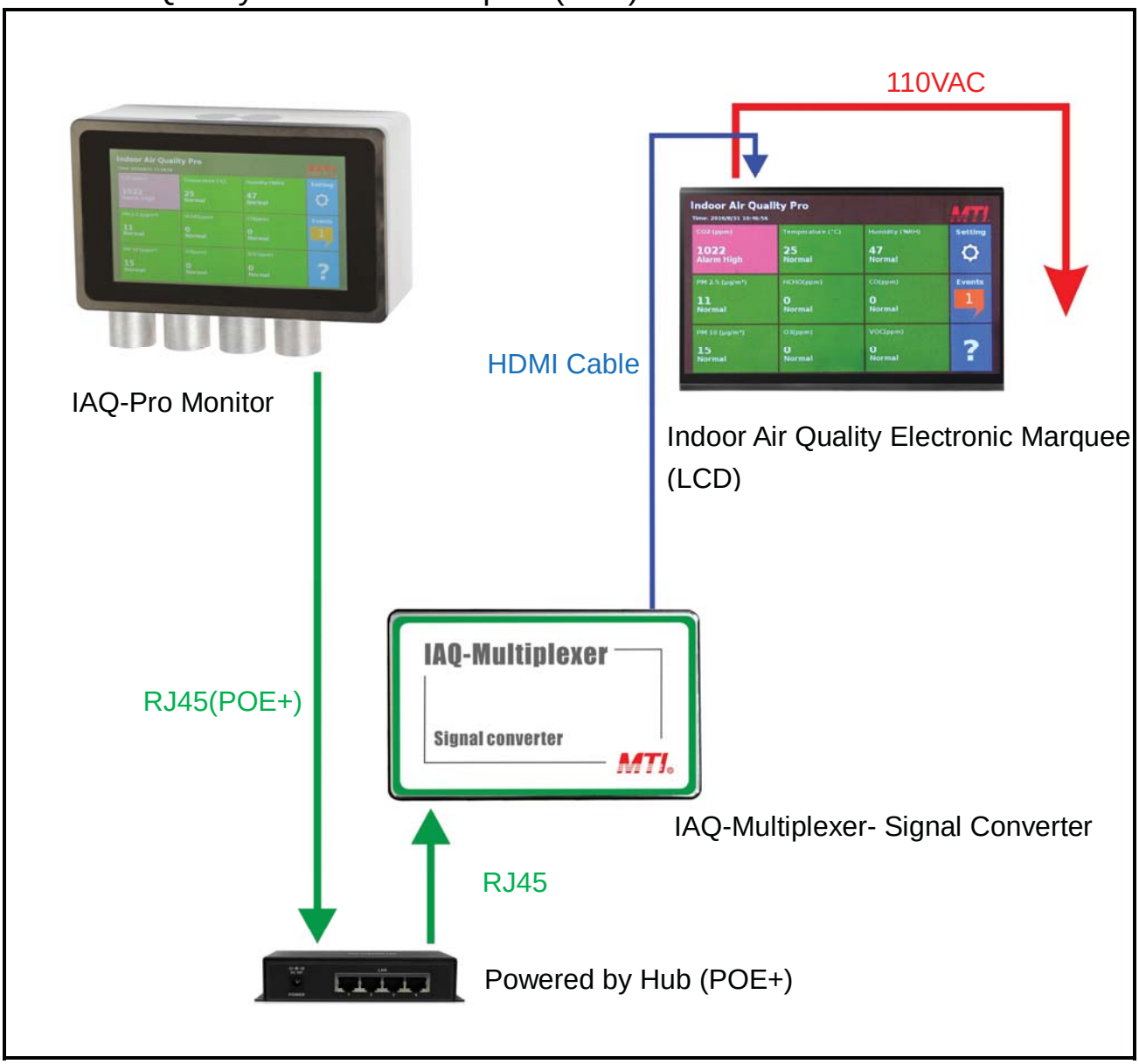
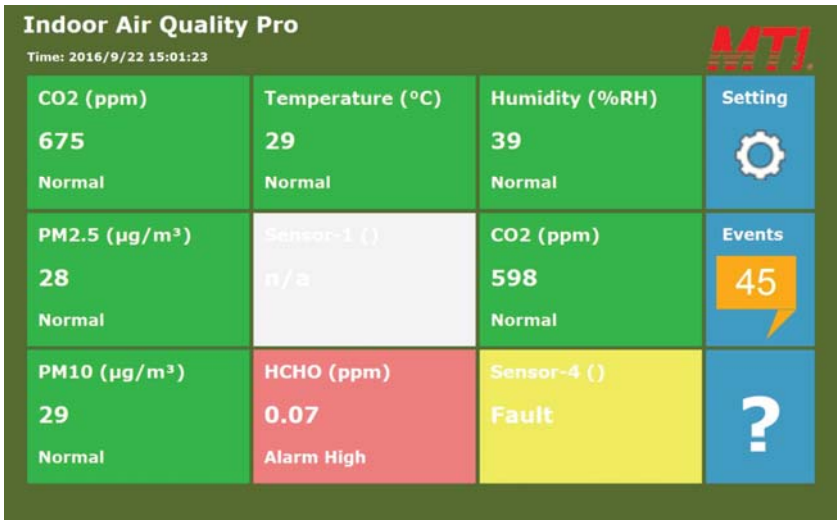


Figure 12-2-2-2: The structure of IAQ-Pro match with LCD Electronic Marquee

13 Status Specification



Status	Description	Trouble Shooting
Black-Screen	No Power	1. Check if the network cable (RJ45) installed correctly. 2. The Powerline Router connected with IAQ-Pro, check if is with POE. 3. Please contact with distributor or agent apply for on-site inspection service if necessary.
Green (Normal)	Normal Monitoring Status	N/A
Red (Alarm High)	The detection Item surpass the alarm level	1. Check if the indoor ambient air or temperature-humidity are abnormal, and then resolve the problem till the green light is resumed on the screen. (e.g. enhanced ventilation system) 2. If alarm continuing after improvement, please contact with distributor or agent apply for on-site inspection service.

Red (Alarm Low)	The detection item lower than alarm level	1. Check if the indoor ambient air or temperature-humidity are abnormal, and then resolve the problem till the green light is resumed on the screen. (e.g. enhanced ventilation system) 2. If alarm continuing after improvement, please contact with distributor or agent apply for on-site inspection service.
Yellow (Fault)	Smart Sensor connection failed	1. Please contact with distributor or agent apply for on-site inspection service if standard detection item has been damaged. 2. Check if Smart Sensor cannot be connected with IAQ-Pro (faulty), and then rearrange the Smart Sensor till the green light is resumed on the screen. 3. Please replace the Smart Sensor.
White (N/A)	Uninstalled Smart Sensor	1. Please make sure that Smart Sensor has been installed. 2. Please contact with distributor or agent apply for on-site inspection service if standard detecting item has been damaged. 3. Check if Smart Sensor cannot be connected with IAQ-Pro (faulty), and then rearrange the Smart Sensor till the green light is resumed on the screen. 4. Please replace the Smart Sensor.

14 Maintenance

Macro Technology Instruments Co., Ltd. (hereinafter “MTI”) can take no responsibility for installation and/or use of its equipment if it has not been carried out in accordance with the appropriate manual.

The user of this manual should ensure that it is appropriate in all details to the exact equipment to be installed and /or operated.

MTI service the right to change or revise the information supplied in this document without notice and without obligation to notify any person or organization of such revision or change. If in doubt, the user should contact MTI for advice.

Repairs carried out to this instrument must be performed by qualified personal.

15 Warranty

Products manufactured by MTI are guaranteed to be free of defects in material and workmanship to the original purchase for a period of one year unless otherwise noted. Under this warranty, the liability of MTI is limited to servicing, adjusting and replacing any defective part(s) that is (are) of MTI consequential or other damages, labor, losses or expenses in connection with or by season or the use of or inability to user the products manufactured by MTI.

Guarantee of parts and components not manufactured by MTI shall be the same as the guarantee extended by the manufacture of such components or spare. Where possible, such parts returned to MTI will be send to the manufacture for credit or replacement. The final decision on these items will rest with the manufacture. All shortages must be reported within ten days from receipt of shipment.

Except where deviations are specified in literature describing particular products, the limited warranty above is applicable to MTI products, provided the products are returned to MTI and are demonstrated to the satisfaction of MTI to be defective.

Transportation costs of all products returned to MTI must be borne by the customer, and products must be returned to MTI within one year after delivery. MTI cannot assume responsibility for repairs or changes not authorized by MTI, or damages resulting from abnormal use or misuse.

All service work is scheduled in order of receipt. Repair or service work not covered under the limited warranty will be billed at current service rates. MTI will provide expedited warranty service at a premium rate equal to 50% of the standard rate at the customer’s request.

MTI undertakes to maintain appropriate, up-to-date and accurate records to enable the immediate recall of any Products or batches of Products from customer’s end users. MTI may take changes to the specifications of the Products, provided the changes do not adversely affect the quality of the Products.

MTI will make available warranty service at customer’s location, provided customer elects to pay all travelling time and expenses. MTI will not accept any product returned for refund unless such refund is authorized in writing by an office of MTI. MTI reserves the right to make changes in design and construction of its products at any time without incurring any obligation to make any changes whatsoever on units previously purchased. MTI does not assume any liability with respect to design or construction of products not of MTI manufactured.

Federal Communication Commission Interference Statement

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 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.

FCC Caution: To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

FCC Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

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.

Macro Technology Instruments Co., Ltd.

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