# ICP DAS



# DL-1000 series

PM1/2.5/10/CO/CO$_2$/HCHO/TVOC/NH$_3$/H$_2$S/
SO$_2$/O$_2$/Pressure/Temperature/Humidity/
Dew Point Data Logger Module

## ■ Features

- ■ Able to record particle concentration and various gas concentrations
- ■ Non-dispersive Infrared (NDIR) CO$_2$ Sensor
- ■ Up to 180,000 records with date and time stamps
- ■ Web-based Configuration Interface
- ■ Simple and Powerful Software Utility, iOS APP and Android App Included
- ■ Supports the DCON, Modbus RTU/TCP, and MQTT Protocols
- ■ Includes RS-485/Ethernet (PoE) Communication Interfaces
- ■ Relay Output for Audible/Visual Alarm or IAQ Device Control
- ■ Includes redundant power inputs: PoE and DC input
- ■ IP 43 Protection Approval

CE  UKCA  RoHS

## ■ Introduction

The DL-1000 can measure the concentration of particles in the air and various gas concentrations related to human health can also be measured. In addition, DL-1000 can record data and send alarm when concentration is too high.

- **Particles** :
  Concentration of particles(PM1, PN2.5, PM10), particle count (0.3μm, 0.5μm, 1μm, 2.5μm, 5μm, 10μm)

- **Concentration of various gas** :
  CO/ CO$_2$/ O$_2$/ HCHO/ TVOC/ NH$_3$/ H$_2$S/ SO$_2$

DL-1000 stores up to 180,000 downloadable records, including date and time stamps. Real-time data can be accessed from the DL-1000 series Data Logger from anywhere and at any time using the free Windows software, the iOS App or the Android App, as long as they are connected to the same local network as the Data Logger. The DL-1000 series Data Logger can be connected via widely used communication interfaces including RS-485, Ethernet and meaning that the device can be easily integrated into existing HMI or SCADA systems, and is easy to be maintained in a distributed control system. The DL-1000 series is designed for industrial applications in harsh environments that provides IP43 protection rating. The rugged RJ-45 ensures tight, robust connections, and guarantees reliable operation, even for applications that are subject to high vibration and shock.

### ⤷ Multi-platform Remote Access Software

Real-time data from the DL-1000 Data Logger can be accessed from anywhere and at any time using the iAir Utility, the iOS or Android App, or via a regular web browser, as long as they are connected to the same local network as the Data Logger

### ⤷ Simple and powerful utility

The iAir Utility can be used to configure the modules, monitor real-time data, group DL-1000 modules so that the status of distribution groups can be viewed and managed. The utility also allows the log data to be downloaded and exported to a .CSV file that can then be imported into any industry-standard software or spread sheet for analysis.
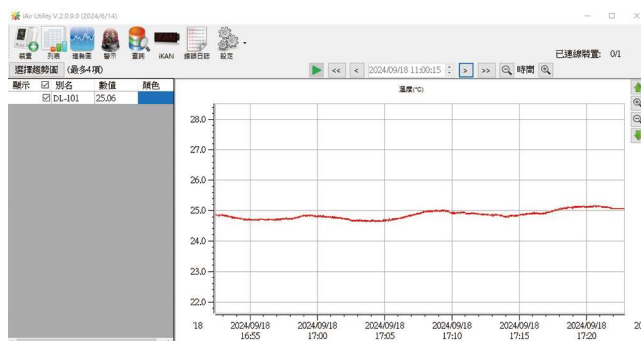
## ➲ Replaceable Filter Patch (FLT-C001)

The windshield filter of DL-1000 is replaceable and with replaceable patches, which makes it easy for user to replace by themselves. Commercially available sensors are easily affected by dust when used outdoors, which may result in continuous alarm readings and the inability to correctly measure ambient gases. They need to be sent back to the original factory for repair, which increases costs and downtime. ICP DAS's design allows users to easily replace the filter, reducing maintenance costs and time caused by dust blockage.

## ➲ Supports the MQTT Protocol for IoT Applications



**FLT-C001**
**Filter Patch**
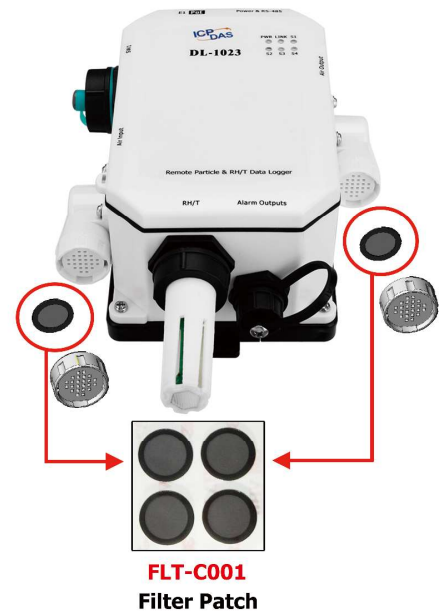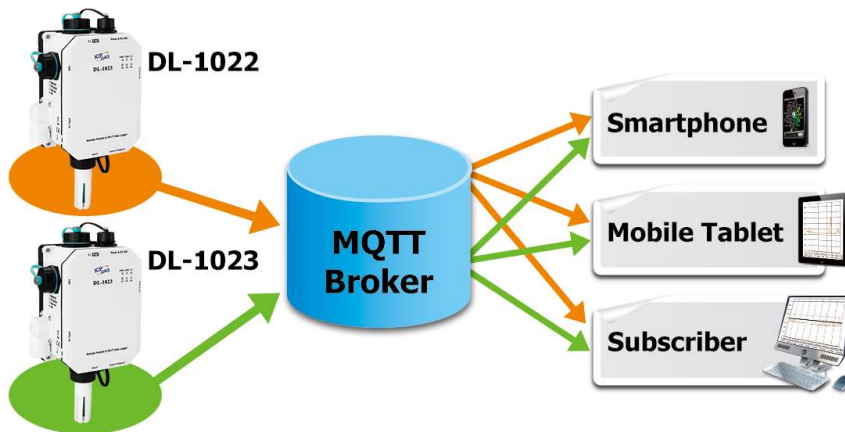
## 🗂 Applications

## ➲ Intelligent Street Lighting in Smart City

DL-1000 series products, with standard industrial communication protocol Modbus RTU/TCP, can integrate with smart city to achieve outdoor air quality monitoring such as $O_2$, CO, $CO_2$, $SO_2$, TVOC, HCHO, and Particle Matter 1/2.5/10. Since these aerosol could accumulate around the sensor and would cause error record after using for a period of time, DL-1000 supports replaceable dust filter patches to easily change the patches inside the filter hood rather than uninstall the device.
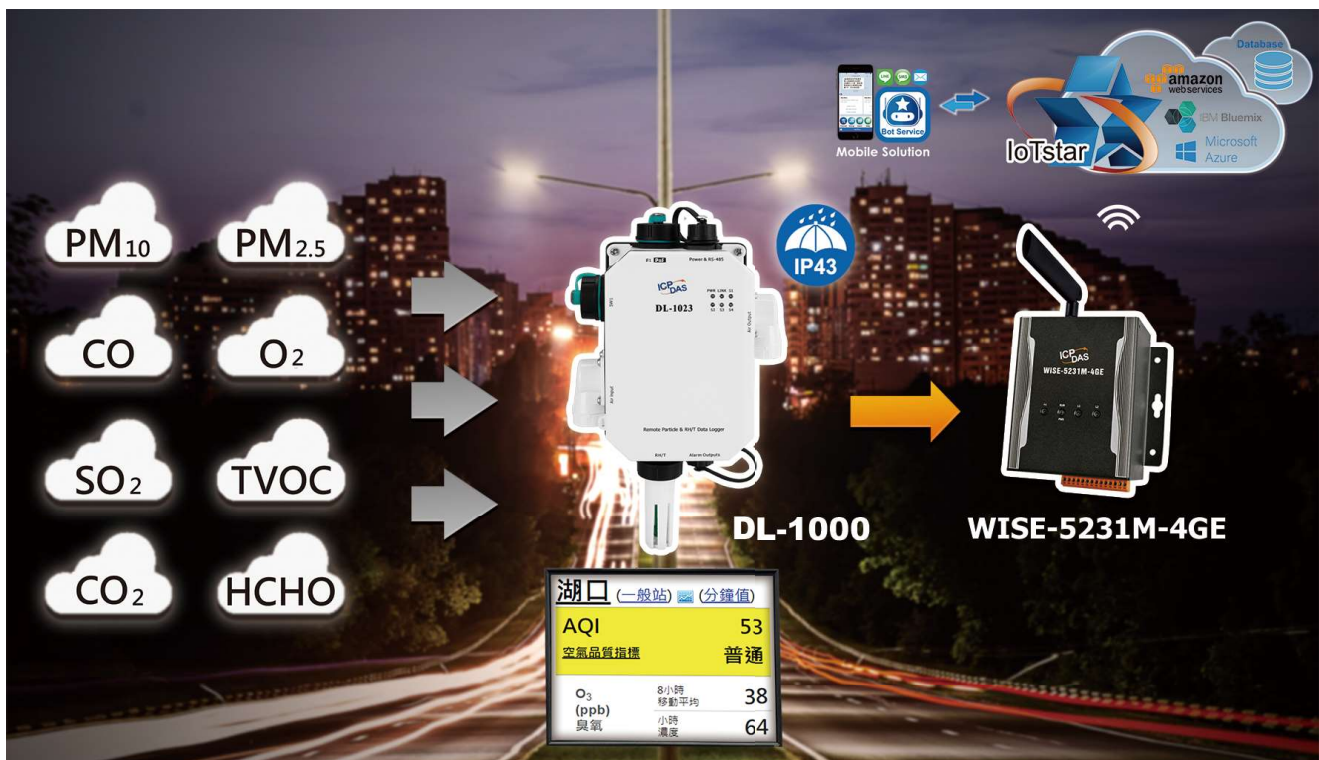
## ➲ Outdoor Mobile Air Quality Detection Application

In developed countries, the air quality detection, statistics and evaluation is in urgent need for improvement.  In a vast area, it can only rely on the vehicle  to move to record status of air quality in the area, and to extract the off-line data and send it back. ICP DAS's DL-1000 series can integrate with our 3G/ 4G controllers to transmit data back to the control center wirelessly.
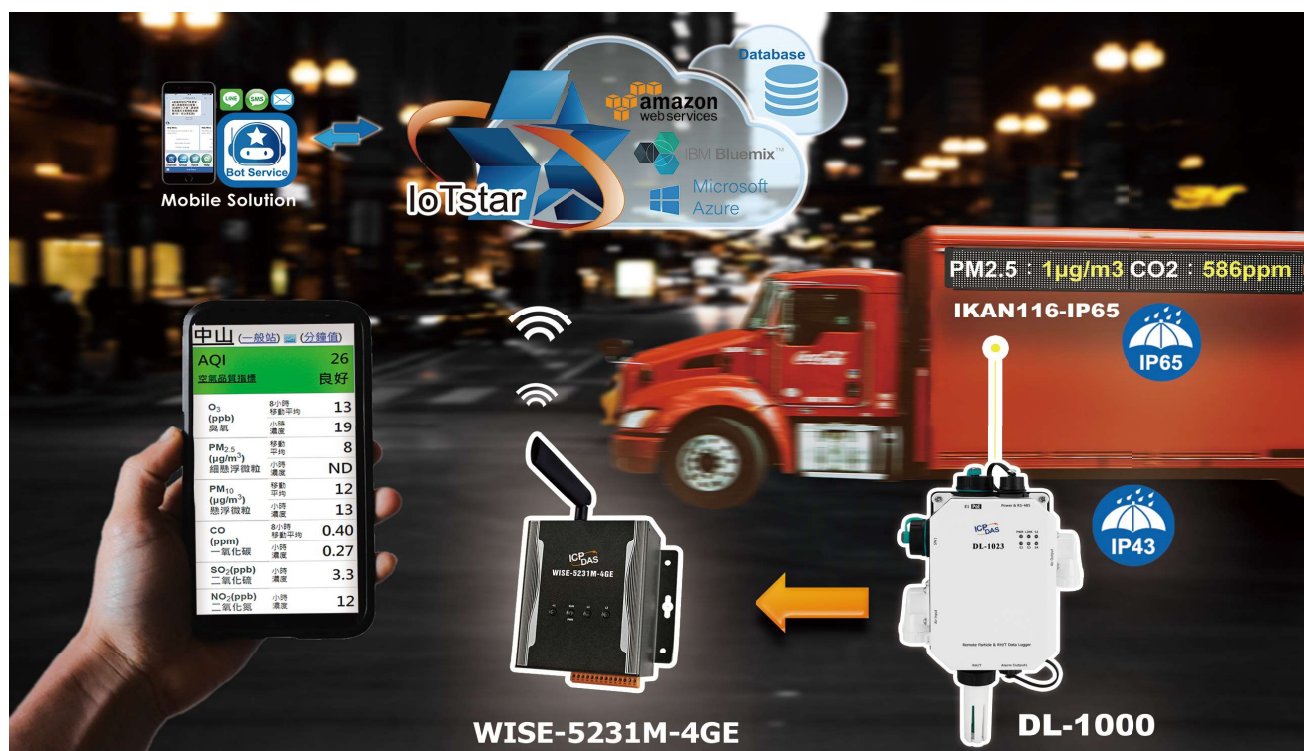


## ➲ Factory Gas Detection Application

In some factories, $H_2S$ is one of the harmful gases. Since the colorless and odorless are two characteristics quite hard to find or feel, sometimes the workers inside the factory get injured inevitably. Joint liability from the injury brings the company massive fines.

DL-1026 $H_2S$ detector module can be put on the spot. It is equipped with standard industrial protocols and with high flexibility to integrate information from devices and  transmit it back to the control center. When the concentration of gas is too high, DL-1026 can also send alarm signals to inform relative personnel to evacuate people there.

# DL-1 XX X - X

**Pressure Sensor**
**0** : -
**1** : Pressure

**Particle Matter Sensor**
**2** : PM1/2.5/10 + Particle Count
**3** : PM1/2.5/10 + Particle Count + CO + CO2
**5** : $O_2$

**Types of Gas Sensor**
**0** : -
**1** : CO
**2** : $CO_2$
**3** : $CO+CO_2$
**4** : HCHO + TVOC
**5** : $NH_3$
**6** : $H_2S$
**7** : HCHO
**8** : TVOC
**9** : $SO_2$

**Communication**
□ : Ethernet/PoE
**WF** : Wi-Fi

※ **Any related customized needs, please contact our sales team.**

| DL-10xx Series | | Type of Sensor | | | | | | | | | | | Communication |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Particle | Gas Sensor | | | | | | | | | | |
| Basic Type | Wi-Fi | PM1, PM2.5, PM10 +Particle Count | CO | $CO_2$ | $O_2$ | HCHO | $NH_3$ | $H_2S$ | TVOC | $SO_2$ | T&RH | Pressure | |
| DL-1020 | DL-1020-WF | √ | - | - | - | - | - | - | - | - | √ | - | Basic type: RS-485 + Ethernet/PoE

WF type: Wi-Fi + RS-485 + Ethernet/PoE |
| DL-1021 | DL-1021-WF | | √ | - | - | - | - | - | - | - | | | |
| DL-1022 | DL-1022-WF | | - | √ | - | - | - | - | - | - | | | |
| DL-1023 | DL-1023-WF | | √ | √ | - | - | - | - | - | - | | | |
| DL-1025 | DL-1025-WF | | - | - | - | - | √ | - | - | - | | | |
| DL-1028 | DL-1028-WF | | - | - | - | - | - | - | √ | - | | | |
| DL-1029 | DL-1029-WF | | - | - | - | - | - | - | - | √ | | | |
| DL-1034 | DL-1034-WF | | √ | √ | - | √ | - | - | √ | - | | | |
| DL-1038 | DL-1038-WF | | √ | √ | - | - | - | - | √ | - | | | |
| DL-1050 | DL-1050-WF | - | - | - | √ | - | - | - | - | - | | | |
| DL-1052 | DL-1052-WF | | - | √ | √ | - | - | - | - | - | | | |

# ◼ System Specifications

| | | |
|---|---|---|
| **Power** | Powered from Terminal Block | +12 to +48 VDC |
| | Powered from PoE | IEEE 802.3af, Class 1 (48 V) |
| | Power Consumption — PoE | 3.6 W MAX |
| | Power Consumption — Non-PoE | 3.4 W MAX |
| **System** | Alarm | PM1/PM2.5/PM10/O$_2$/CO/CO$_2$/HCHO/TVOC/NH$_3$/H$_2$S/Pressure/SO$_2$/RH/Temperature |
| | Real Time Clock | Yes |
| | Data Logger **(Note1)** | Yes, up to 180,000 records |
| | Relay Output | PhotoMos Relay × 4, 100 VDC @ 1 A |
| **LED Indicators** | PWR | Green for normal operation |
| | Link | Green for the Ethernet-linked |
| | S1 ~ S4 | Red for an alarm condition |
| **Environment** | Operating Temperature | -20 to +50°C |
| | Storage Temperature | -30 to +75°C |
| | Humidity | 10 to 90% RH, Non-condensing |
| | Protection Rating | IP43 |
| **Communication** | RS-485 Port | Baud Rate = 1200 ~ 115200 bps |
| | Ethernet Port | 10/100 Base-TX, 8-Pin RJ-45 x1 (Auto-negotiating, Auto-MDI/MDIX, LED indicators) |
| | Security | IP filter (whitelist) and Password (web) |
| | Protocol | Modbus RTU (RS-485), Modbus TCP (Ethernet) and MQTT (Ethernet) |
| | Dual Watchdog | Yes, Module (2.3 sec), Communication (Programmable) |
| **Mechanical** | Installation | DIN-Rail or Wall Mounting |
| | Dimensions (W x L x H) | 130 × 211 × 70 (W × L × H) |

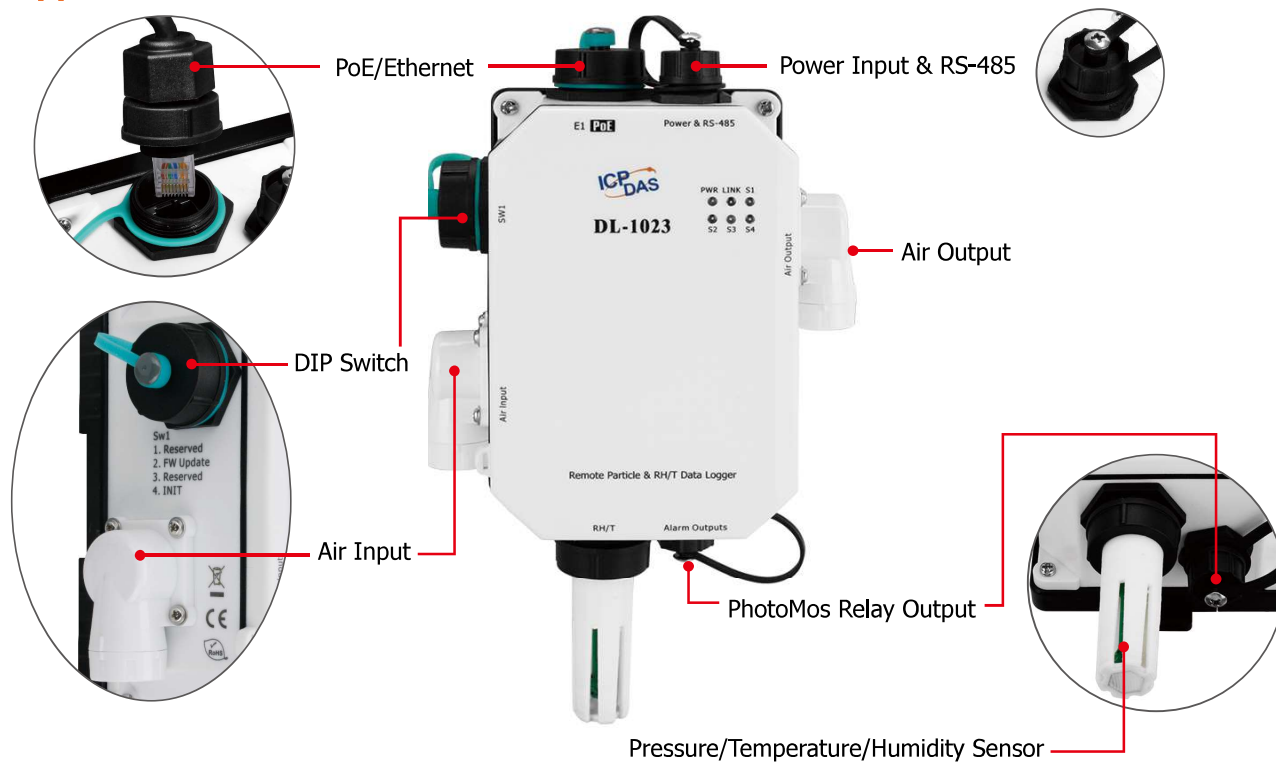**Note1:** DL-1038 Data Logger up to 160,000 records

# ◼ I/O Specifications

| Type of Sensor | Range | Resolution | Accuracy | Response Time | Warm-up Time | Life Time |
|---|---|---|---|---|---|---|
| **PM1/PM2.5/PM10 (Note)** | 0 ~ 1000 ug/m3 (Laser Type) | 1µg/m3 | ±10 % | 1 seconds | 20 seconds | 5 years |
| **CO** | 0 ~ 1000 pm (Electrochemical) | 1 ppm | ±5 % | 30 seconds | 60 seconds | 5 years |
| **CO$_2$** | 0 ~ 9999 ppm (NDIR) | 1 ppm | ±3 % | 120 seconds | 300 seconds | 15 years |
| **HCH0** | 0 ~ 2000 ppb (Electrochemical) | 1 ppb | - | ≤60 seconds | 180 seconds | 3 years |
| **TVOC** | 0 ~ 60000 ppb (MEMS Metal Oxide) | 1 ppb | ±15% | 60 seconds | 180 seconds | 5 years |
| **NH$_3$** | 0 ~ 100 ppm (Electrochemical) | 1 ppm | ±5 % | < 40 seconds | 60 seconds | 2 years |
| **H$_2$S** | 0 ~ 100 ppm (Electrochemical) | 1 ppm | ±5 % | < 30 seconds | 60 seconds | 2 years |
| **O$_2$** | 0 ~ 25 % (Luminescence for O2 sensor) | 0.01% | ±2% | < 30 seconds | 120 seconds | 5 years |
| **SO$_2$** | 0 ~ 100 ppm (Electrochemical) | ± 5% | 0.1 ppm | < 40 seconds | 60 seconds | 5 years |
| **Temperature** | -20 ~ +50°C | 0.1°C | ±5% | - | - | 10 years |
| **Relative Humidity** | 0 ~ 100 % (Non-condensing) | 0.1 % (Non-condensing) | ±6 % (Non-condensing) | - | - | 10 years |
| **Dew Point** | Calculated using temperature and relative humidity | 0.1°C | - | - | - | - |
| **Pressure** | 300 ~ 1200 hpa | 0.1 hPa | 1 hPa | - | - | 10 years |

**Note: The filter patch (FLT-C001) by replaceable**

| **Particle Count** | |
|---|---|
| **Sizes** | 0.3um, 0.5um, 1um , 2.5um, 5um, 10um |

## ◼ Appearance



PoE/Ethernet

Power Input & RS-485

DIP Switch

Air Output

Air Input

Sw1
1. Reserved
2. FW Update
3. Reserved
4. INIT

PhotoMos Relay Output

Pressure/Temperature/Humidity Sensor

## ◼ Dimensions (Units: mm)



| Left View | Front View | Right View | Rear View | Bottom View |

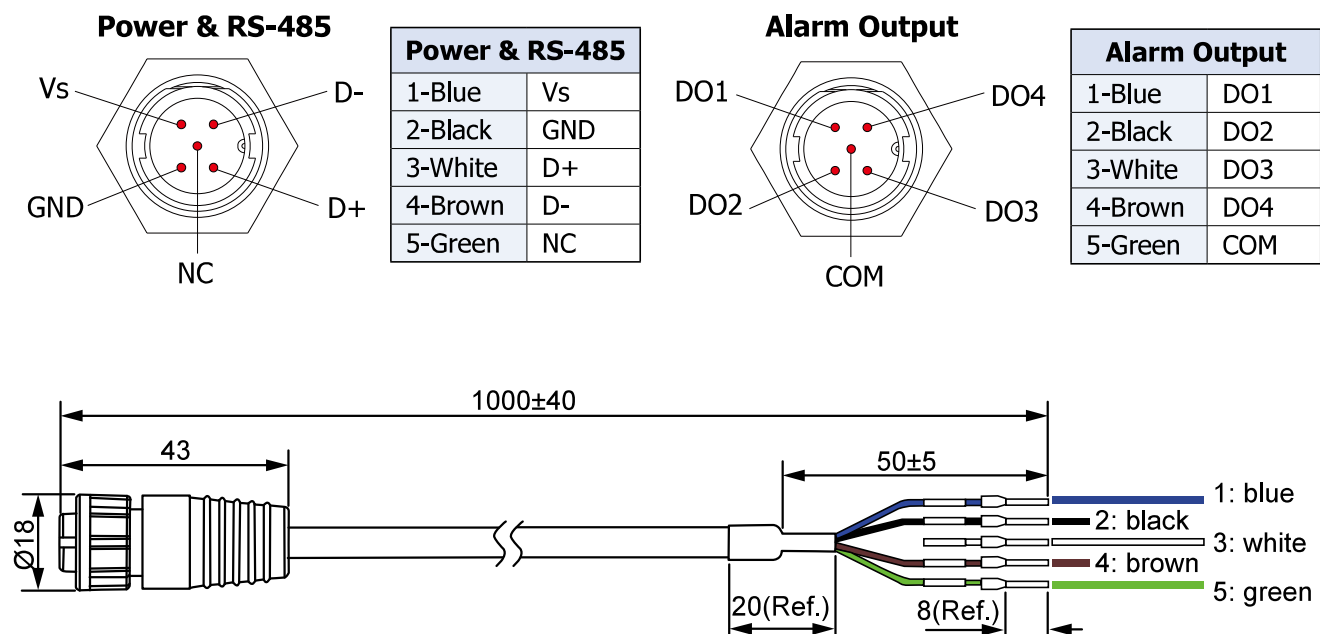Top View
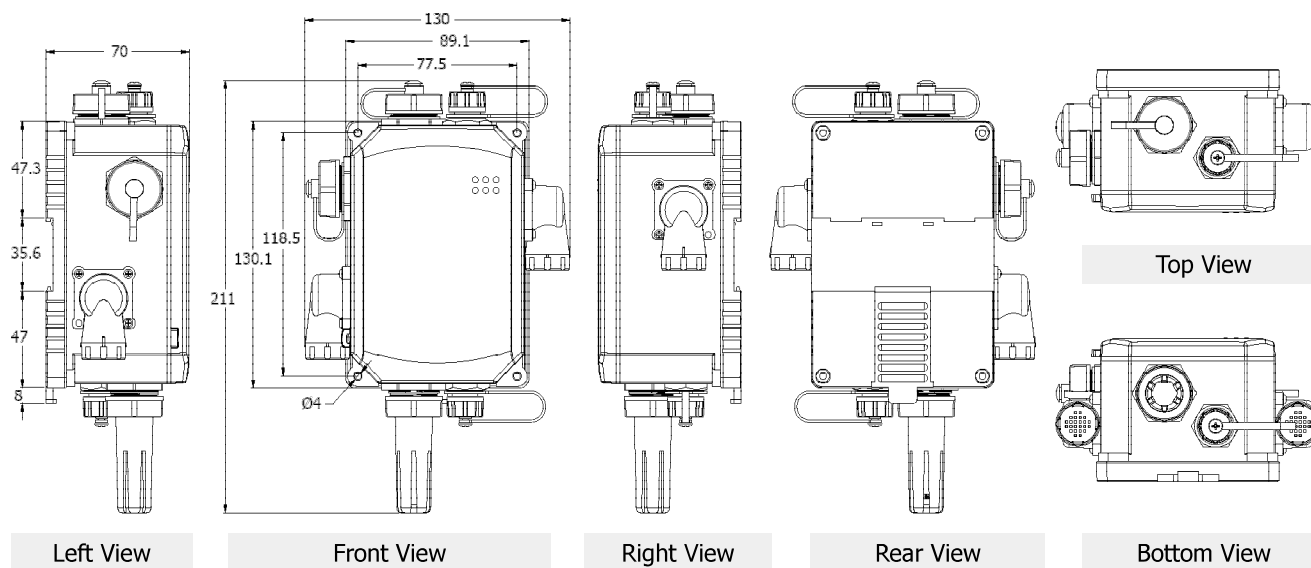
## ▣ Accessories
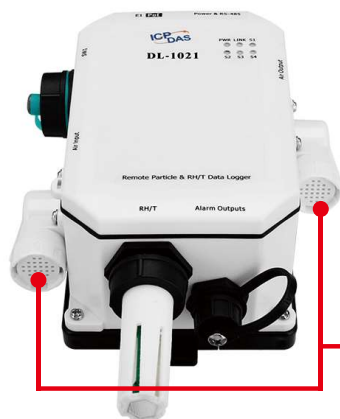


| Filter Patch | FLT-C001 |
|---|---|
| | Replaceable Filter Patch (Circle)<br>(1 Pack 4 Patches) (RoHS)<br>Size: (OD :16, ID:12) mm |

| 1 × 4SASO-0001 | 2 × CA-05BFFM-LL7A01 |
|---|---|
| IP67, RJ45 Plug | IP67, 1M Waterproof Cable |
| for Ethernet | for Power & RS-485, Alarm Output |

## ▣ Optional products

| Mode Name | NS-205-IP67 | NS-208PSE-IP67 | NS-208-IP67 |
|---|---|---|---|
| Picture | | | |
| PoE | – | 802.3af × 8 | – |
| Input Voltage Range | +10 VDC ~ +30 VDC<br>(1 kV Isolated) | +46 VDC ~ +53 VDC | +12 VDC ~ +53 VDC |
| Installation | Wall Mounting | Wall Mounting | |
| Dimensions (Unit: mm) | 85 × 76 × 137 (W × L × H) | 190 × 155 × 104 (W × L × H) | |

## Pin Assignments

**Power & RS-485**



| Power & RS-485 | |
|---|---|
| 1-Blue | Vs |
| 2-Black | GND |
| 3-White | D+ |
| 4-Brown | D- |
| 5-Green | NC |

**Alarm Output**



| Alarm Output | |
|---|---|
| 1-Blue | DO1 |
| 2-Black | DO2 |
| 3-White | DO3 |
| 4-Brown | DO4 |
| 5-Green | COM |



## Ordering Information

| DL-1020 CR | Remote PM1/2.5/10/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS) |
|---|---|
| DL-1021 CR | Remote PM1/2.5/10/CO/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS) |
| DL-1022 CR | Remote PM1/2.5/10/$CO_2$/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS) |
| DL-1023 CR | Remote PM1/2.5/10/CO/$CO_2$/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS) |
| DL-1025 CR | Remote PM1/2.5/10/$NH_3$/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS) |
| DL-1028 CR | Remote PM1/2.5/10/TVOC/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS) |
| DL-1029 CR | Remote PM1/2.5/10/$SO_2$/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS) |
| DL-1034 CR | Remote PM1/2.5/10/CO/$CO_2$/HCHO/TVOC/Temperature/Humidity/Dew Point Data Logger with Ethernet/ RS-485 and PoE (RoHS) |
| DL-1038 CR | Remote PM1/2.5/10/CO/$CO_2$/TVOC/Temperature/Humidity/Dew Point Data Logger with Ethernet/ RS-485 and PoE (RoHS) |
| DL-1050 CR | $O_2$/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS) |
| DL-1052 CR | $O_2$/$CO_2$/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS) |