



DL-1000 Series

PM1/2.5/10/CO/CO₂/HCHO/TVOC/NH₃/H₂S/Pressure/
Temperature/Humidity/Dew Point Data Logger Module

Introduction

The DL-1000 is a series of particle and gas measurement module that can measure the concentration of aerosols in the air, such as PM2.5, PM1, PM10 and the number of particles (0.3µm, 0.5µm, 1µm, 2.5µm, 5µm, 10µm). In addition, various fume concentrations related to human health can also be measured. For example, CO/CO₂/HCHO/NH₃/H₂S/TVOC. DL-1000 can record data and send alarm when concentration is too high. It can be used to record PM1/2.5/10, CO, CO₂, HCHO, TVOC, NH₃, H₂S, Pressure, temperature, humidity and dew point information, including date and time stamps, and are able to store up to 180,000 downloadable records. 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. It provides popular industrial protocols such as DCON, Modbus RTU, and Modbus TCP, as well as the emerging machine-to-machine (M2M)/IoT (Internet of Things) connectivity protocol-MQTT. 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-300 Data Logger can be accessed from anywhere and at any time using the DL-300 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.



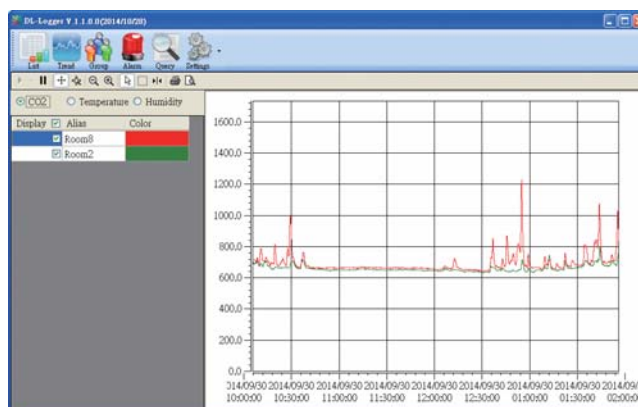
Features

- Able to record PM1/2.5/10, CO, CO₂, HCHO, TVOC, NH₃, H₂S, O₂, Pressure, Temperature, Humidity, and Dew Point Measurements
- Non-dispersive Infrared (NDIR) CO₂ Sensor
- Electrochemical 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 (IEEE 802.3af, Class 1) and DC input
- IP 43 Protection Approval



Simple and powerful utility

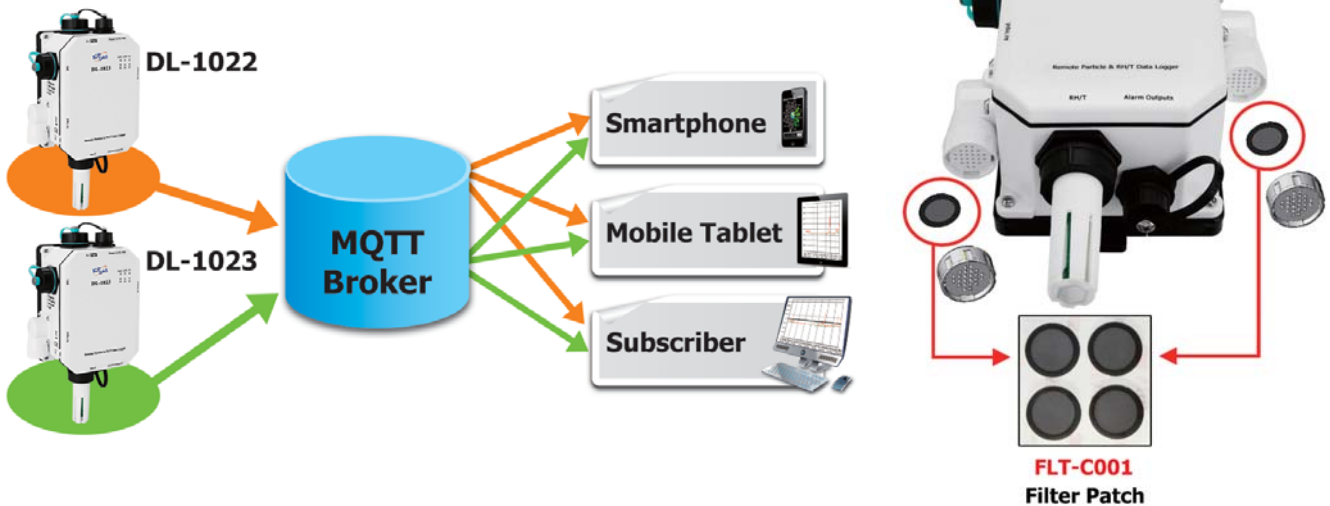
The DL-300 Utility can be used to configure the modules, monitor real-time data, group DL-1000 modules so that the status of distribution groups can be viewed and managed. The utility also allows the log data to be downloaded and exported to a .CSV file, and then it can be imported into any industry-standard software or spread sheet for analysis.



➤ Replaceable Filter Patch (FLT-C001)

Generally, the PM2.5 measuring sensor on the market is usually installed in outdoor applications. Because the outdoor air is quite dusty, the measuring channel of PM2.5 sensor is easily clogged by aerosol, resulting in continued alarms for the heavy concentration. Due to the error data from the clogged sensor, this module is returned to the factory for repair. Downtime during the repair period often causes significant costs and losses. In order to solve this problem, ICP DAS designs the CL-200 series and DL-1000 series with replaceable patches, FLT-C001, which makes it easy for users to replace them without uninstalls the devices. The cost of repair and time can be reduced by this innovated mechanical design.

➤ Supports the MQTT Protocol for IoT Applications



📁 Applications

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 O₃, CO, CO₂, SO₂, NO₂, 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 uninstalls the device.

The image shows a DL-1000 sensor in an outdoor setting at night, connected to a WISE-5231M-4GE gateway. The sensor is surrounded by icons for various pollutants: PM₁₀, PM_{2.5}, CO, O₃, SO₂, TVOC, NO₂, and HCHO. The gateway is connected to a cloud service (IoTStar) which integrates with Amazon Web Services, Microsoft Azure, and other services. A mobile solution icon is also present. In the foreground, a digital display shows air quality data for '湖口 (一般站) (分鐘值)'. The display shows an AQI of 53 (普通) and specific pollutant levels: O₃ (ppb) 8小時移動平均 38, and 臭氧 小時濃度 64.

湖口 (一般站) (分鐘值)	
AQI	53
空氣品質指標	普通
O ₃ (ppb)	8小時移動平均 38
臭氧	小時濃度 64

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, H₂S 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 H₂S 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-10



Pressure Sensor

- 0 : -
- 1 : Pressure



Particle Matter Sensor

- 1 : PM2.5
- 2 : PM2.5/1/10+Particle
- 3 : PM2.5/1/10+Particle +CO+CO₂
- 5 : O₂
- **PM Size :**
0.3μm, 0.5μm, 1μm, 2.5μm, 5μm, 10μm



Types of Gas Sensor

- 0 : -
- 1 : CO
- 2 : CO₂
- 3 : CO+CO₂
- 4 : HCHO + TVOC
- 5 : NH₃
- 6 : H₂S
- 7 : HCHO
- 8 : TVOC



Communication

- ☐ : Ethernet/PoE
- WF : Wi-Fi

DL-10xx Series		Type of Sensor										Communication	
		Particle		Gas Sensor									
Basic Type	Wi-Fi	PM1/PM2.5/PM10/Particle	O ₂	CO	CO ₂	HCHO	NH ₃	H ₂ S	TVOC	T & RH	Pressure		
DL-1020	DL-1020-WF	√	-	-	-	-	-	-	-	√			
DL-1021	DL-1021-WF			√	-	-	-	-	-				-
DL-1022	DL-1022-WF			-	√	-	-	-	-				-
DL-1023	DL-1023-WF			√	√	-	-	-	-				-
DL-1024	DL-1024-WF			-	-	√	-	-	√				-
DL-1025	DL-1025-WF			-	-	-	√	-	-				-
DL-1026	DL-1026-WF			-	-	-	-	√	-				-
DL-1027	DL-1027-WF			-	-	√	-	-	-				-
DL-1028	DL-1028-WF			-	-	-	-	-	-				√
DL-1034	DL-1034-WF			√	√	√	-	-	√				-
DL-1035	DL-1035-WF			√	√	-	√	-	-				-
DL-1036	DL-1036-WF			√	√	-	-	√	-				-
DL-1037	DL-1037-WF			√	√	√	-	-	-				-
DL-1038	DL-1038-WF			√	√	-	-	-	-				√
DL-1050	DL-1050-WF	-	√	-	-	-	-	-	-				
DL-1051	DL-1051-WF			√	-	-	-	-	-				-
DL-1052	DL-1052-WF			-	√	-	-	-	-				-
DL-1053	DL-1053-WF			√	√	-	-	-	-				-
DL-1054	DL-1054-WF			-	-	√	-	-	-				√
DL-1055	DL-1055-WF			-	-	-	√	-	-				-
DL-1056	DL-1056-WF			-	-	-	-	√	-				-
DL-1057	DL-1057-WF			-	-	√	-	-	-				-
DL-1058	DL-1058-WF			-	-	-	-	-	-				√
DL-1125	DL-1125-WF	√	-	-	-	-	√	-	-	√			
DL-1126	DL-1126-WF	√	-	-	-	-	-	√	-		√		

Basic type:
RS-485
+ Ethernet/PoE

WF type: Wi-Fi
+ RS-485
+ Ethernet/PoE

System Specifications

Power	Powered from Terminal Block	+12 to +48 VDC	
	Powered from PoE	IEEE 802.3af, Class 1 (48 V)	
	Power Consumption	PoE	3.5 W MAX
		Non-PoE	3.3 W MAX
System	Alarm	PM1/PM2.5/PM10/O ₂ /CO/CO ₂ /HCHO/TVOC/NH ₃ /H ₂ S/RH/Temperature	
	Real Time Clock	Yes	
	Data Logger	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 mm x 211 mm x 70 mm	

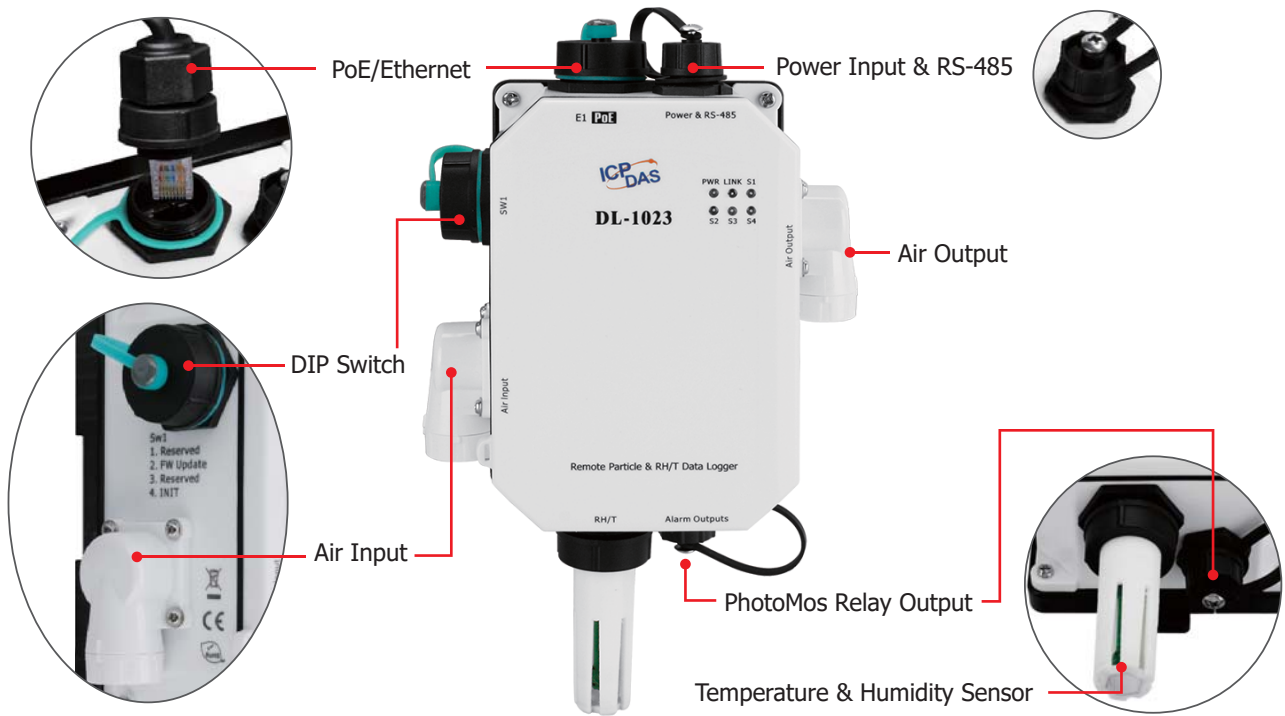
I/O Specifications

Type of Sensor	Range	Resolution	Accuracy	Response Time	Warm-up Time	Life Time
PM1/PM2.5/PM10/ Particle (Note1)	0 to 1,000 µg/m ³ (Laser Type)	1µg/m ³	± 10% of FSR.	1 seconds	20 seconds	5 years
CO	0 to 1000 ppm (Electrochemical)	1 ppm	±5% of measured value	30 seconds	60 seconds	5 years
CO₂	0 ~ 9999 ppm (NDIR)	1 ppm	±30 ppm ±3% of measured value	120 seconds	300 seconds	15 years
HCHO	0 ppb to 2000 ppb (Electrochemical)	1 ppb	0 ~ 300ppb : ±30ppb > 300ppb : ±10%	≤60 seconds	180 seconds	3 years
TVOC	0 ppb to 60000 ppb (MEMS Metal Oxide)	1 ppb	±15%	60 seconds	180 seconds	5 years
NH₃	0 to 100 ppm (Electrochemical)	1 ppm	±5% of measured value	< 40 seconds	60 seconds	2 years
H₂S	0 to 100 ppm (Electrochemical)	1 ppm	±5% of measured value	< 30 seconds	60 seconds	2 years
O₂	0 ~ 25% (Luminescence for O ₂ sensor)	0.01%	±2%	< 30 seconds (typical)	120 seconds	5 years
Temperature	-20 to +50°C	0.1°C	±0.6°C	-	-	10 years
Relative Humidity	0 to 100% RH, Non-condensing	0.1% RH, Non-condensing	±5% RH, Non-condensing	-	-	10 years
Dew Point	Calculated using temperature and relative humidity	0.1°C	-	-	-	10 years
Pressure	300 ~ 1200 hPa	0.1 hPa	1 hPa	-	-	-

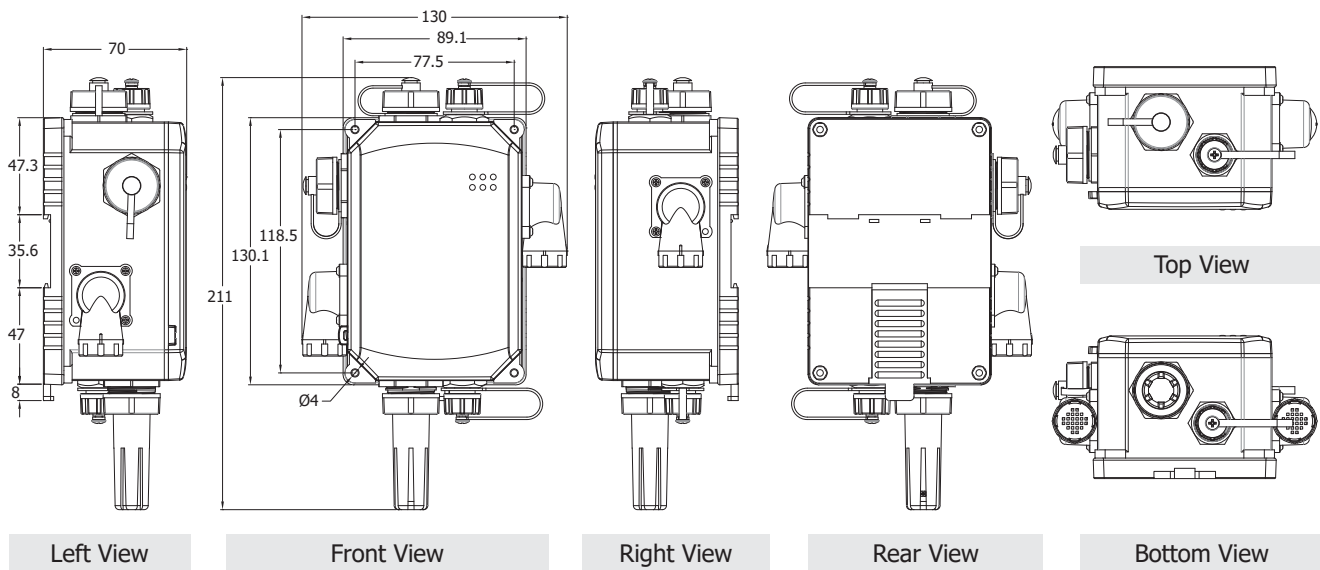
Note1: 5 years, the filter patch (FLT-C001) by replaceable

Particle	
Sizes	0.3µm, 0.5µm,,1µm, 2.5µm,,5µm, 10µm

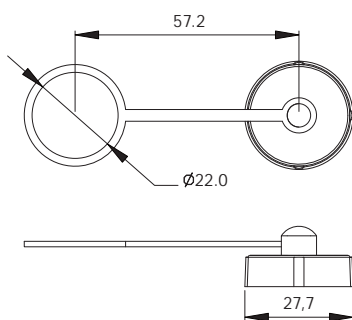
Appearance



Dimensions (Units: mm)

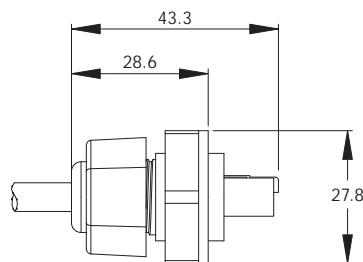


IP65 Ethernet Cap with Tether



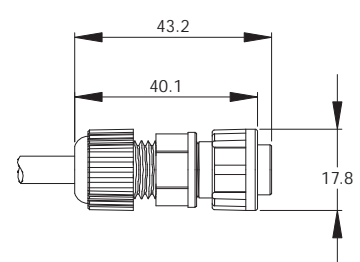
IP65 Ethernet Plug

Cable Dia:
Max. 7.0 mm
Min. 5.5 mm






IP65 PWR Plug

Cable Dia:
Max. 6.5 mm
Min. 5.0 mm



Accessories

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

FLT-C001	Replaceable Filter Patch (Circle) (1 Pack 4 Patches) (RoHS) Size: (OD :16, ID:12)mm
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<p>IP67 RJ-45 Plug</p> 	<p>IP67 Waterproof Cable, 1M</p> 	<p>Cap with Tether</p> 	<p>Replaceable Filter Patch</p> 
4SASO-0001	CA-05BFFM-LL7A01	4SASO-0004	FLT-C001

■ 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-1024 CR	Remote PM1/2.5/10/HCHO/TVOC/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-1026 CR	Remote PM1/2.5/10/H ₂ S/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS)
DL-1027 CR	Remote PM1/2.5/10/HCHO/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-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-1051 CR	O ₂ /CO/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)
DL-1053 CR	O ₂ /CO/CO ₂ /Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS)
DL-1054 CR	O ₂ /HCHO/TVOC/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS)
DL-1055 CR	O ₂ /NH ₃ /Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS)
DL-1056 CR	O ₂ /H ₂ S/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS)
DL-1057 CR	O ₂ /HCHO/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS)
DL-1058 CR	O ₂ /TVOC/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS)
DL-1125 CR	PM1/2.5/10/NH ₃ /Pressure/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS)
DL-1126 CR	PM1/2.5/10/H ₂ S/Pressure/Temperature/Humidity/Dew Point Data Logger with Ethernet/RS-485 and PoE (RoHS)