

**OMRON**



**EQUO Series**

**Differential**

**Pressure Station**

**ZN-DPX21-S□**

# **User's Manual**

## Introduction

Thank you for purchasing EQUO Series Differential Pressure Station ZN-DPX21-S□.

This manual describes the information regarding the functions, performance and usage that are necessary to use the Differential Pressure Station.

- This product must be handled by specialists with electrical knowledge.
- Before using this product, read this sheet thoroughly to acquire sufficient knowledge of the product.
- For your convenience, keep this instruction sheet at hand to refer whenever necessary.

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### Manual type and usage

The major contents of the manuals are shown below. Select and read a manual according to your need.

#### Included manual (Print)

##### Instruction Sheet

Describes the information to ensure the safe and proper use of the product, and information regarding ratings, performance and installation.

##### Startup Guide

Describes the basic procedures including content check, assembly, setting operation, recording operation and data display.

#### Manual available from website (PDF data)

##### User's Manual (This document)

Information to ensure the safe and proper use of the product.

Detailed procedures including content check, assembly, setting operation, recording operation and data display.

Describes the necessary information such as specifications of the unit to use the Fine Differential Pressure Station ZN-DPX21-S□.

## **Read and Understand this Manual**

Please read and understand this manual before using the products. Please consult your OMRON representative if you have any questions or comments.

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## Precautions on Safety



### •Meanings of Signal Words

For the safe operation of ZN-DPX21-S□, this operation manual indicates the precautions by using the marks and symbols as indicated below. The precautions given here contains important information related to safety. Be sure to observe them. The marks and symbols for the safety precautions are as follows:




 <b style="font-size: 1.2em;">WARNING</b>	<p>Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.</p>
--	---

 <b style="font-size: 1.2em;">CAUTION</b>	<p>Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.</p>
--	---

### •Meanings of Alert Symbols

	<ul style="list-style-type: none"> <li>•Disassembly Prohibition</li> </ul> <p>Indicates that disassembly is prohibited to prevent electric shock.</p>
	<ul style="list-style-type: none"> <li>•Explosion Caution</li> </ul> <p>Indicates the possibility of explosion under specific conditions.</p>

### •Warning Indications

 <b style="font-size: 1.5em;">WARNING</b>	
<p>As this product contains a lithium battery, fire, explosion or burning hazards may occur. Dispose of the product as industrial waste. Do not disassemble, deform, heat, or burn this product.</p>	
<p>Do not disassemble or touch inside the unit. Doing so may result in electric shock and/or injury.</p>	

## Precautions for Safe Use

Observe the following precautions to ensure safe operation.

- Do not install the product in the places subject to exposure to water, oil, or chemicals.
- When using an AC adapter, use only the attached AC adapter.
- When using a DC power supply cable, use only the attached DC power supply cable.
- If a voltage that exceeds the rated voltage is applied to the AC adapter or DC cable, smoking may occur. Do not connect a power supply that exceeds the rated voltage. In a situation where a voltage higher than the rating is applied, use protective equipment so that the power supply voltage does not exceed the rated voltage.
- Dispose of the product as industrial waste.
- To use the batteries properly, read the precautions written by manufacturer before use.
- Do not subject the product to a shock such as dropping the product. Doing so may cause damage to or malfunction of the product. It is recommended to secure screws when mounted on the wall surface to prevent damage from dropping the product. If strong impact is applied to the product, stop use of the product.
- When inserting or pulling out the SD card, hold the main unit to prevent damage from dropping the product. When inserting or pulling out an AC adapter or DC power supply cable, alarm output cable, sensor connector or LAN cable, hold the unit as well.
- Mount an appropriate load on the alarm output terminals due to the possibility of smoking.
- If liquid crystal leaks due to a damage to the LCD panel, be careful so that your skin will not touch with or you will not inhale or swallow it. If liquid crystal enters into your mouth, seek medical attention.

## Precautions for Correct Use

### 1. Avoid installing the product in the following places:

- Places exceeding the rated ambient temperature
- Places exposed to extreme temperature changes (prevent condensation.)
- Places exceeding the rated RH level
- Places subject to corrosive or flammable gases
- Places subject to mist, droplets, coarse particles, fiber, salt, metal dust, or large amount of particles
- Places subject to direct shock or vibration
- Places subject to direct sunlight
- Places subject to exposure to water, oil, or chemicals
- Places subject to strong magnetic field or electric field
- Outdoors

### 2. Wiring

- Lay the product cable away from any high-voltage cable or power line.
- If laid in the same conduit or duct, induction noise from them may caused malfunction or breakdown of the product.
- Be sure to turn the power OFF before inserting or removing the I/O terminals. Otherwise it may result in a failure.
- Do not connect the product to a sensor head other than ZN-DPS1□□-S. Do not hold only the sensor head mounted to the product body.

### 3. Battery Use

- Do not combine use of new and old batteries, or do not use batteries in combinations with those of different makers or models. Doing so may result in malfunction.
- Do not insert a battery with the polarity inverted.
- Be sure to mount a battery cover during use. Be careful that the operation of the device cannot be guaranteed if a battery is removed because the battery cover is not mounted.
- Remove the batteries if you do not use the product for a long period of time. If leaving the used batteries in the product for a long period of time, corrosion of the device may occur due to a battery leak.
- Do not disassemble or throw the battery into the fire.
- When the battery level is low, a restart may be repeated. If such event occurs, replace the batteries with new ones.
- When using network connection mode, use an AC adapter because the battery becomes exhausted fast.

### 4. Battery Disposal

- For disposal of batteries after replacement, restrictions may apply depending on the local government. Dispose of the battery according to your local government.

### 6. Mounting screw holes

- The screw hole is M3 and the depth of the screw is 4 mm. Do not tighten a screw with more than 4 mm in depth. Doing so may damage the product.

## How to Read This Manual

### ■ Meanings of Symbols

Menu items that are displayed on the screen, and windows, dialog boxes and other GUI elements displayed on the PC are indicated enclosed by brackets "[ ]".

### ■ Explanation of Symbols

**Important** : Indicates the description of an essential point regarding a function, such as an important point regarding operation or advice on how to use it.

**Note**: Indicates application procedures.



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## Revision History

# 1. Product Overview

## 1.1 Features and Functions

### (1) High-precision Differential Pressure Sensor

Differential Pressure Sensor Head ZN-DPS1 allows for the accurate measurement with a range at -500 to 500 Pa and differential pressure accuracy of +/-3% (zero point accuracy of +/-0.2 Pa). The ZN-DPS1 provides more precise control of the differential pressure, contributing to maintaining clean room environments.

### (2) Network connections

By connecting the Differential Pressure Stations to a PC via LAN cable and using the PC software, the measured values obtained from one or more Differential Pressure Stations can be moved to the PC, and the settings of a Differential Pressure Station can be checked or changed and start/stop recording of the Differential Pressure Station can be specified. (Refer to "Station Utility User's Manual" for details.)

Furthermore, use of the optional software Wave Inspire ES allows for real-time centralized control online.

### (3) Recording with SD card

The measured data can be recorded in the Differential Pressure Station while communicating via LAN with host devices. Up to approximately 11,000 data can be accumulated in the internal memory of the sensors (except for an Air Particle Sensor), and the data recording in the Differential Pressure Station unit can be continued even at an emergency network failure. The data accumulated in the internal memory can be output to the SD card as a CSV file without stopping measurement operation, and the data can be managed by a PC.

### (4) Graphical display software

The data recorded in a PC and the data moved to the SD card with the Differential Pressure Station can be displayed as graphs with the PC software (offline). The data items of different periods can be combined, and the data items of one or more Differential Pressure Station can be displayed side by side. (Refer to "Station Utility User's Manual" for details.)

### (5) Alarm output

The Differential Pressure Station comes standard with the alarm output terminals. The alarm output is activated when the measured differential pressure exceeds upper or lower limit. For example, the Differential Pressure Station can be used for various management systems such as a positive level warning in a clean room, and automatic control of the air conditioning level based on the differential pressure level.

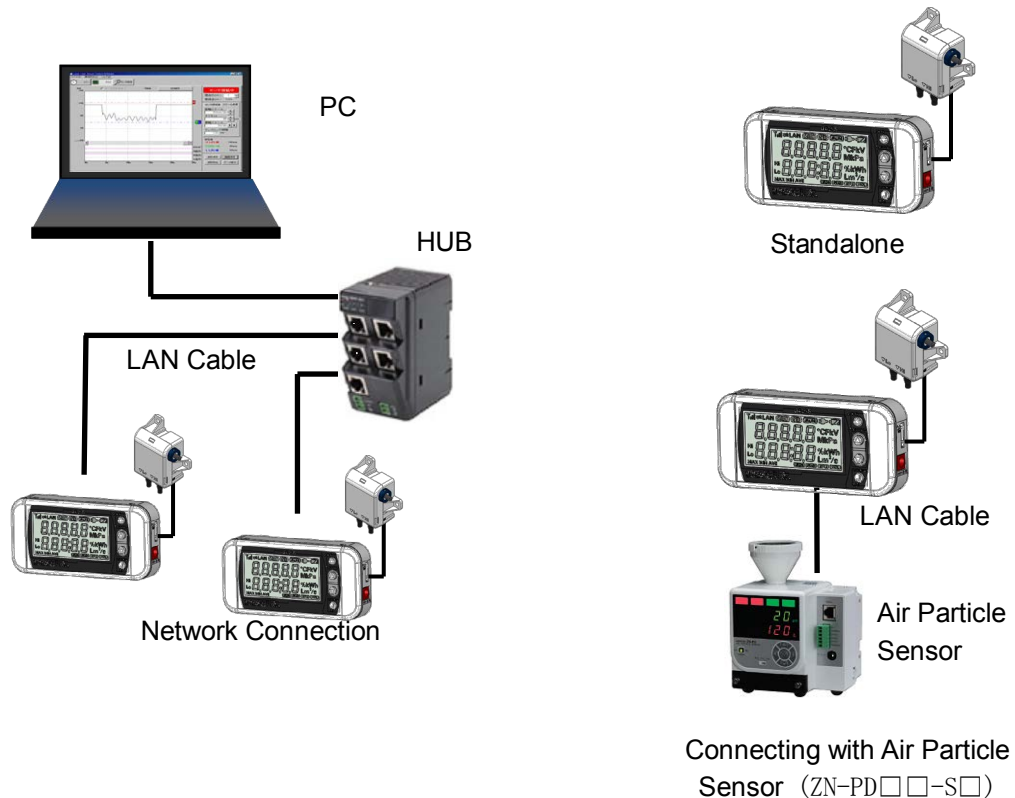
## **(6) Battery backup**

The ZN-DPS1□□-S has a battery backup function (two AAA batteries). Using rechargeable nickel metal hydride batteries or alkaline batteries prevents failure in communications via LAN and recording operations in case of a power failure or power shutdown.

\*1: The ZN-DPS1□□-S can operate up to approximately 2 hours with batteries only. However, the battery life varies subject to measurement environment, conditions, and type or performance of the batteries.

## 1.2 Types of usage

There are three types to use this product as follows:



### 1.2.1 Network Connection

The Differential Pressure Station can be connected with a PC via LAN (Ethernet). The supplied PC software provides the following operations: (Refer to "Station Utility User's Manual" for the details of the PC software.)

#### (1) Remote settings and operation with the PC

Remote settings (except for IP address settings and measured value adjustment settings) of the Differential Pressure Station and remote operation such as starting/stopping recording can be performed.

#### (2) Recording the measured data to a PC

By using Station Utility which is the logging tool of the supplied PC software, the measured data recorded in the Differential Pressure Station can be moved into the PC. The recorded measured data in the PC can be displayed as graphs using SD Viewer ES or Energy Viewer included in Station Utility.

#### **Important**

When connecting a Differential Pressure Station with a PC, the Differential Pressure Station cannot be connected to an Air Particle Sensor (ZN-PD□□-S□) to display or record the measured data.

**Note**

The maximum number of Differential Pressure Stations connected to a PC is 100.

**1.2.2 Stand-alone**

The Differential Pressure Station can be used alone without connecting to a network. The measured data is recorded in the internal memory and can be moved to a PC through an SD card. The recorded data in the SD card can be displayed as graphs using the supplied SD Viewer ES or Energy Viewer which are software included in the Station Utility.

**1.2.3 Connecting with Air Particle Sensor (ZN-PD□□-S□)**

One Air Particle Sensor ZN-PD□□-S□ can be connected to the Differential Pressure Station with LAN cables. The data measured with the Air Particle Sensor (ZN-PD□□-S□) can be recorded in the internal memory of the Differential Pressure Station. The data recorded in the internal memory can be displayed as graphs via the SD card using the SD Viewer ES or the Energy Viewer software included in the Station Utility.

**Note**

When an Air Particle Sensor (ZN-PD□□-S□) is connected with the Differential Pressure Station, the measured data cannot be moved into the PC using the PC software Station Utility via LAN communication.

The optional software Wave Inspire ES can record and monitor the measured data with the network-connected Air Particle Sensor (ZN-PD□□-S□) on the PC.



## 1.3 Setup and Operation Procedure

### 1.3.1 When using the product via network connection

Check the contents.  
⇒3.1 Checking the Contents

Check the necessary items.  
⇒3.2 Preparing the Necessary Items

Connect Sensor Head and alarm output terminals, prepare power supply  
⇒3.3 Assembly

Install the Station Utility PC software  
⇒"Station Utility User's Manual": 1. Overview and Preparation

Connect to a network  
⇒3.5 Connecting to a Network

Record data in PC  
⇒ "Station Utility User's Manual":  
3. Recording in PC

Remotely record data in the unit  
⇒"Station Utility User's Manual":  
2. Remote Setting and Operation Control

Analyze short-period recording data  
⇒ "Station Utility User's Manual": 4. Momentary Value Display

Analyze long-period recording data  
⇒ "Station Utility User's Manual": 5. Integration and Summation

### 1.3.2 When using the product as stand-alone

Check the contents.  
⇒3.1 Checking the Contents

Check the necessary items.  
⇒3.2 Preparing the Necessary Items

Connect Sensor Head and alarm output terminals, prepare power supply  
⇒3.3 Assembly

Install the Station Utility PC software  
⇒"Station Utility User's Manual": 1. Overview and Preparation

Make settings by operating the main unit.  
⇒4. Settings (Main Unit Operation)

Record data into the main unit by operating itself.  
⇒5. Measurement and Recording (Main Unit Operation)

Analyze short-period recording data  
⇒ "Station Utility User's Manual": 4. Momentary Value Display

Analyze long-period recording data  
⇒ "Station Utility User's Manual": 5. Integration and Summation

### 1.3.3 When using the product with Air Particle Sensor (ZN-PD□□-S□) connected

Check the contents.  
⇒3.1 Checking the Contents

Check the necessary items.  
⇒3.2 Preparing the Necessary Items

Connect Sensor Head and alarm output terminals, prepare power supply  
⇒3.3 Assembly

Install the Station Utility PC software  
⇒"Station Utility User's Manual": 1. Overview and Preparation

Connect to Air Particle Sensor (ZN-PD□□-S□).  
⇒6. Connecting to Air Particle Sensor (ZN-PD□□-S□)

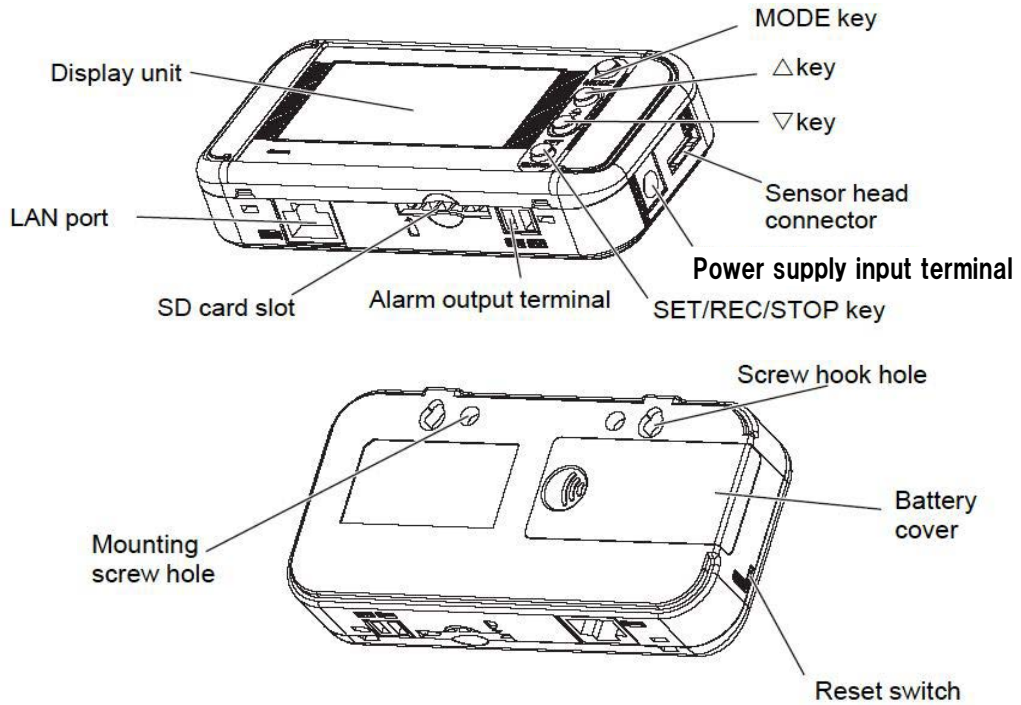
Make settings by operating the main unit.  
⇒4. Settings (Main Unit Operation)

Record data in the main unit by operating itself.  
⇒5. Measurement and Recording (Main Unit Operation)

Analyze short-period recording data  
⇒ "Station Utility User's Manual": 4. Momentary Value Display

Analyze long-period recording data  
⇒ "Station Utility User's Manual": 5. Integration and Summation

## 2. Exterior Features






### 2.1 Display Unit



Display Unit

## Meanings of indicators

Display	Meaning and operation when turned on
	Communicating with the LAN cable.
<b>LAN</b>	The LAN cable is connected. Ready for network communication.
<b>REC</b>	Recording data in the internal memory.
<b>SD</b>	SD card has been inserted. SD is being accessed while light blinking.
<b>ALM</b>	The measured value exceeds the set threshold value.
	The power is supplied by the AC adaptor or the DC power supply.
	The battery level is displayed in 4 levels. Replace batteries when it blinks
<b>Hi</b>	Upper limit threshold
<b>Lo</b>	Lower limit threshold
<b>MAX</b>	The measurement is processed to extract Max. value.
<b>MIN</b>	The measurement is processed to extract Min. value.
<b>AVE</b>	The measurement is processed to extract Ave. value.
<b>RUN</b>	Current operating mode is set to RUN mode.
<b>FUN</b>	Current operating mode is set to FUN mode.
<b>THR</b>	Current operating mode is set to THR mode.
<b>SCL</b>	Adjusting the measured values when it is turned on with RUN on. Current operating mode is SCL when only SCL is turned on.

For alphabets, numerals and major displayed images on the display screen, refer to the Appendix.

Refer to : List of displayed characters in Appendix.

## 2.2 Control Unit

### 2.2.1 Control key

Name	Main functions
MODE key	Switch operating modes. Release an alarm or an error (press and hold). Cancel settings before fixing.
Item selection key (△ key)	Move up the setting items. Change display screens. Change setting values (increasing).
Item selection key (▽ key)	Move down the setting items. Change display screens. Change setting values (decreasing).
SET/REC/STOP key	Fix setting values etc. Start/stop record (press and hold). Send the recorded data into the SD card.

### 2.2.2 Reset switch

There is a reset switch at the back of the hole located at the left side of the main unit. The Differential Pressure Station will restart by pressing the reset switch with a thin wire, etc. When the Differential Pressure Station restarts, do not touch the front key until the differential pressure is displayed. Settings are not initialized by the reset.

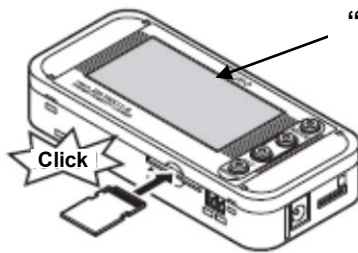
### 2.2.3 Inserting/removing SD card

The Differential Pressure Station has an SD card slot to write the measured data recorded in the internal memory, and to write/read the setting data.

#### **Important**

- When inserting/removing the SD card, make sure to hold the main unit firmly. When the product is mounted with its screw hook hole, inserting/removing the SD card without firmly holding the main unit may result in dropping and damaging the SD card.
- When "SD" on the display is blinking, do not remove the SD card. Doing so may destroy the data in the SD card.
- Do not touch the metal terminal of the SD card.
- Do not bend the SD card.
- When inserting/removing the SD card, be aware of static electricity.
- Do not enable the write-protection of the SD card.

**(1) Inserting SD card**



**“SD” turns ON.**

- (1) Insert the SD card into SD card slot with the metal terminal face up.
- (2) Insert the SD card until it clicks.
- (3) “SD” will be displayed on the display.

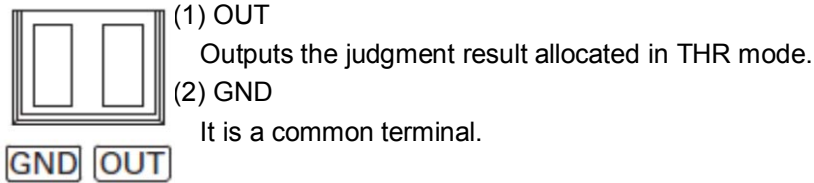
**(2) Removing SD card**

- (1) Push the inserted SD card as far as possible until it clicks.
- (2) When you take off your hand from the card, it will come out. Be careful not to drop it.
- (3) “SD” on the display disappears.

## 2.3 Input/Output Specifications

### 2.3.1 Alarm output

#### (1) Alarm output terminals



Terminal names are inscribed on the unit.

The attached alarm output connector is used for wiring.

#### (2) Output specifications

External power supply voltage	12 to 24 VDC $\pm 10\%$
Load current	45 mA max.
ON residual voltage	1.2 V max.
OFF leakage current	0.1 mA max.
Internal circuit diagram	

#### **Important**

Do not directly connect the external power supply between OUT and GND.  
Be sure to connect the load.



## 3. Check and Preparation

### 3.1 Checking the Contents

This product includes the following items:

- Main Unit ZN-DPX21-S□ 1
- AC adapter or DC power supply cable 1
- Alarm Output Connector 1
- Instruction Sheet 1
- Startup Guide 1

### 3.2 Preparing Necessary Items

The following items are required to use this product.

#### (1) Common

- Differential Pressure Sensor Head ZN-DPS1□□-S 1 (Sold separately)
- PC for the PC Software 1  
Refer to : 3.4.2 System requirements
- SD card (SDHC compatible) 1 (Recommended: HMC-SD291 (2 GB))  
For saving and moving measured data (When recording data with Differential Pressure Station unit)
- AAA Batteries (for battery operation) 2  
Alkaline batteries or rechargeable nickel hydrogen (Ni-MH) batteries

#### **Important**

Manganese batteries cannot be used.

Use two batteries of the same type. Do not mix the old and new batteries.

When connecting the product with a PC via network connection or connecting it with an Air Particle Sensor (ZN-PD□□-S□), the battery life is approximately 2 hours (for 10-minute measurement intervals and using nickel metal hydride batteries). Supply the power with the AC adaptor or the DC power supply.

#### (2) When connecting to network

- LAN Cable (10BASE-T or 100BASE-TX supported, Safety Category 5e or higher, straight)
- HUB for LAN connection (10BASE-T or 100BASE-TX supported)

#### **Note**

When connecting a Differential Pressure Station to a PC, use a hub.

### (3) When connecting to Air Particle Sensor (ZN-PD□□-S□)

- Air Particle Sensor ZN-PD□□-S□ 1
- LAN Cable (10BASE-T or 100BASE-TX supported, Safety Category 5e or higher)

#### Note

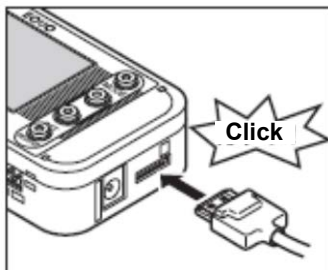
Before setting the Air Particle Sensor (ZN-PD□□-S□), read the Instruction Sheet attached to the product.

Use LAN cable to connect a Differential Pressure Station and Air Particle Sensor (ZN-PD□□-S□). In this case, either straight or cross cable usable.

## 3.3 Assembly

### 3.3.1 Connecting Differential Pressure Sensor

To use this product, an optional Differential Pressure Sensor Head ZN-DPS1□□-S is required.



Insert the Sensor Head into the Sensor Head connector until it clicks.

### 3.3.2 Connecting alarm output terminals

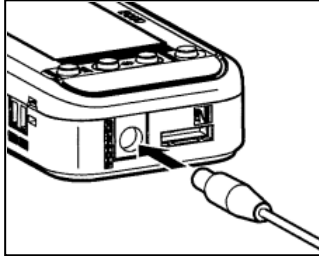
Use the attached alarm output connector to connect OUT and GND to the loads according to the output specifications.

Refer to : 2.3.1 Alarm output

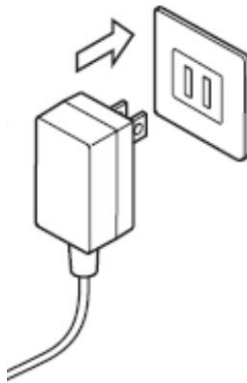
### 3.3.3 Preparing power supply

This product can be driven by supplying power or by batteries

#### (1) When supplying power

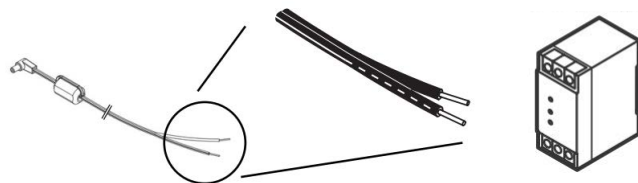


(1) Insert the plug of the AC adapter or DC power supply cable into the power supply input terminal.



(2) When using an AC adapter, insert the plug of the AC adapter into an outlet. (100 VAC to 240 VAC).

When using a DC power supply cable, connect the wire with white line on it to the power(24VDC $\pm$ 10%), and connect the other wire to 0V.



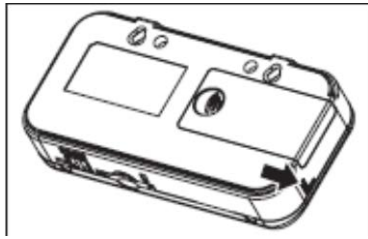
DC power supply

#### Important

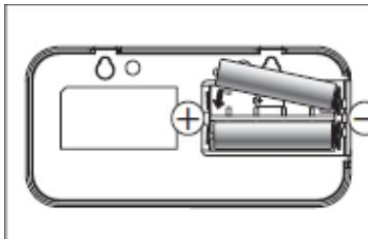
- When using an AC power supply, use the attached AC adapter.
- When using a DC power supply, use the attached DC cable.
- When the product to connect via network or connect with an Air Particle Sensor (ZN-PD□ □-S□), Supply the power with the AC adaptor or DC power supply.

#### Note

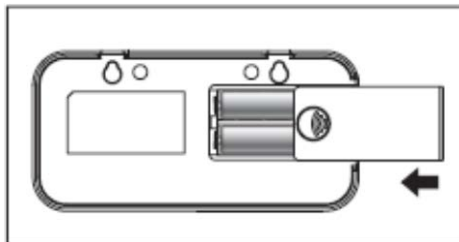
- The main unit does not have a power supply button. When supplying the power to the product, the Air Thermo Station starts operation immediately.
- AC adaptor/DC power supply has priority when connecting AC adaptor or DC power supply as using a battery in the product. When supplying power has stopped due to a power failure, it will be automatically switched to battery power if mounted.

**(2) When using batteries**

(1) Slide to open the battery cover on back of the main unit.



(2) Insert two batteries with careful attention to proper polarity.



(3) Slide to close the battery cover.

**Important**

- When inserting the batteries, be careful about the direction of the polarity. Inserting the battery with wrong polarity may result in damage of the main unit.
- Use two batteries of the same type. Do not mix the old and new batteries.
- When using the product via network connection or connecting it with an Air Particle Sensor (ZN-PD□□-S□), the battery life is approximately 2 hours (for 10-minute measurement intervals and using nickel metal hydride batteries). Supply the power with the AC adaptor or the DC power supply.

**Note**

- When driving the product with batteries without connecting to a network, it is recommended to operate the product in sleep mode. In sleep mode, the Differential Pressure Station cannot be connected to a network and Air Particle Sensor (ZN-PD□□-S□).
- AC adaptor/DC power supply has priority when connecting AC adaptor or DC power supply as using a battery in the product. When supplying power has stopped due to a power failure, the power supply will be automatically switched to battery drive if mounted.
- The main unit does not have a power supply button. When battery attached, the Differential Pressure Station starts operation immediately.
- Charge the batteries before use. The main unit does not have a function to charge batteries.

### 3.3.4 Checking operation

When turning ON the power supply, the model name and version are displayed for a while, and then the differential pressure is displayed.

Pressing the ▽ or △ key switches the display while “RUN” is ON at the bottom of the display.

Refer to : 5.3 Screen Transition in RUN Mode

#### **Important**

Do not touch any front keys after switching the power supply ON until temperature and humidity are displayed.

## **3.4 Overview and Preparation for PC Software Station Utility**

### **3.4.1 Overview**

The Station Utility provides the following four functions.

#### **(1) Setting tool**

The Setting tool enables a remote PC to set up the measuring conditions (except for some settings) and to perform recording to start/stop in the Differential Pressure Station.

#### **(2) Logging tool**

The Logging tool records the measured values of the Differential Pressure Station into a PC via a network.

It also displays the measured value of the Differential Pressure Station.

#### **(3) Momentary Value Display (SD Viewer ES)**

SD Viewer ES displays the data recorded in the PC as graphs offline with the logging tool, as well as the data recorded in the SD card with the Differential Pressure Station unit as graphs. SD Viewer ES also connects the data items recorded in different periods of time, and displays side by side the data recorded with another Differential Pressure Station.

#### **(4) Integration and Summation Tool (Energy Viewer)**

The tool provides summations of data acquired to the PC using the logging tool or Differential Pressure Station data recorded to the SD memory card. The unit of summation periods can be changed and pre-selected summation items on multiple Differential Pressure Station units can be displayed in graphs with this tool. It also provides the comparison of the current data with past summation data or data recorded on other Differential Pressure Station.

### **3.4.2 Installing Station Utility**

Install Station Utility on the PC.

Refer to "Station Utility User's Manual": 1.3 Operating Environment and 1.4 Installation, for the installation procedure.

## 3.5 Connecting to Network

When connecting the Differential Pressure Station to a network, set up network connection to the main unit.

Connect the LAN cable after making the network settings of the main unit.

### Important

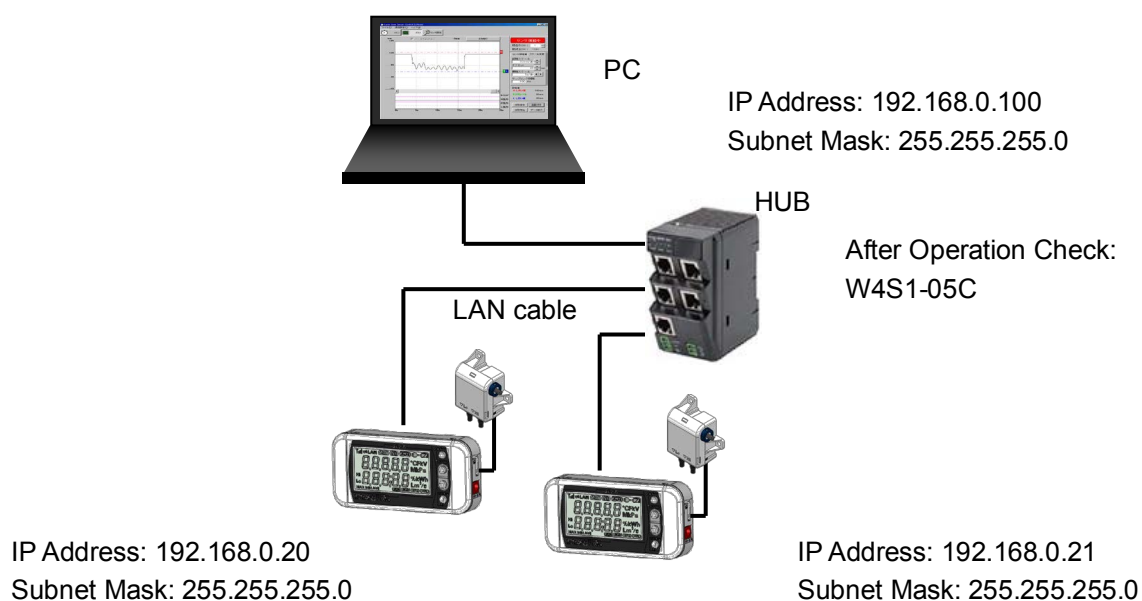
- Before connecting the product to a network, a full understanding of LAN is necessary.
- When connecting the Differential Pressure Station via network, establish a dedicated LAN.
- When the Differential Pressure Station is connected to an in-house network or LAN that has been already operated, the number of available IP addresses may be limited and there may be some rules to be followed. Contact network administrator. In such a case, operation of the Differential Pressure Station or PC software is not guaranteed.
- Even when using the default IP address and subnet mask, set the measurement operation mode (MODE) to “NET”. It will be not connected to network in “SLEEP” or “PD-S” mode.

### 3.5.1 Preparation

Before establishing network connection, define IP address and subnet mask to be used.

Setting example

IP address of Air Thermo Station	(First unit) 192.168.0.20 (factory default) (Second unit) 192.168.0.21
IP address of PC	192.168.0.100
Subnet mask	255.255.255.0 (factory default)



### Note

- The factory default IP address for the Differential Pressure Station is 192.168.0.20 and subnet mask is 255.255.255.0.
- When connecting the Differential Pressure Station and PC to a network, IP address should not be overlapped with other networked devices. In the example above, the IP

address of the second Air Thermo Station is set as 192.168.0.21, while the address of the PC is set as 192.168.0.100. The forth segment value has been changed to distinguish between the devices.

- Set the same values of subnet mask to the Differential Pressure Station and PC that will be connected to a network.
- When changing the subnet mask, contact the network administrator. Even when changing the subnet mask from 255.255.255.0, set different values to the forth segments of IP addresses of the Differential Pressure Station and PC to be connected should be set different values.
- Setting range of each segment of IP address and subnet mask is 0 to 255.

### 3.5.2 Setting IP address of the Differential Pressure Station

For the second Differential Pressure Station, the setting procedure of IP address is described below. (Example: changing from 192.168.0.20 (factory default) to 192.168.0.21)

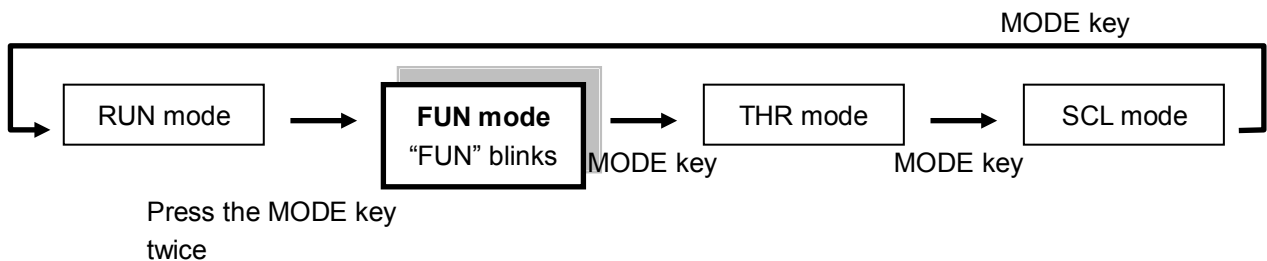
#### Note

For details of the meanings of the messages shown on the display and on the functions of operation keys, refer to the following sections.

Refer to : 2.1 Display, 2.2 Control Unit

#### (1) Setting operation mode to “FUN”

To change the IP address, press MODE key until “FUN” at the right bottom of the display starts blinking.





**(2) Setting measurement operation mode to “NET”**

Display (upper line/ lower line)	Operation
CYCLE 10s ("FUN" blinks)	Press the ▽ or △ key until MODE is displayed in the upper section of the display.
↓▽ or △ key	
MODE NET	If "NET" is displayed in the lower section, measurement operation mode is set to "NET". Setting of measurement operation mode is complete. When SLEEP or PD-S is displayed, press the SET/REC/STOP key. The lower section starts blinking.
↓SET/REC/STOP key	
MODE SLEEP ↑ blinks	Press the ▽ or △ key to display "NET" in the lower section.
↓▽ or △ key	
MODE NET ↑ blinks	Press the SET/REC/STOP key to fix the measurement operation mode to "NET". The lower section stops blinking.
↓SET/REC/STOP key	
MODE NET	

**(3) Setting ETC and IP to “DISP”**

Display (upper line/ lower line)	Operation
MODE NET ("FUN" blinks)	Press the ▽ or △ key until ETC is displayed on the upper section of the display.
↓▽ or △ key	
ETC OFF	When pressing the SET/REC/STOP key, "OFF" in the lower section blinks.
↓SET/REC/STOP key	
ETC OFF ↑ blinks	Press the ▽ or △ key to display DISP.
↓▽ or △ key	
ETC DISP ↑ blinks	Press the SET/REC/STOP key to confirm DISP. Blinking stops.
↓SET/REC/STOP key	
ETC DISP	Press the ▽ or △ key to display IP on the upper section.
↓▽ or △ key	
IP OFF	Press the SET/REC/STOP key to blink OFF at the lower section.
↓SET/REC/STOP key	
IP OFF ↑ blinks	Press the ▽ or △ key to display DISP.
↓▽ or △ key	
Display (upper line/ lower line)	Operation
IP DISP ↑ blinks	Press the SET/REC/STOP key to confirm DISP. Blinking stops.
↓SET/REC/STOP key	
IP DISP	Continue to IP address settings.

**(4) Changing IP address (from factory default 192.168.0.20 to 192.168.0.21)**

Display (upper line/ lower line)	Operation
IP DISP	Display the first segment of IP address. Press the ▽ or △ key until "IP 1" is displayed in the upper section.

↓▽ or △ key

IP 1 192	Check that "192" is displayed in the lower section and then press the ▽ key. If "192" is not displayed, change the value referring to the example of changing "IP 4" as described later.
-------------	--

↓▽ key

IP 2 168	Check that "168" is displayed in the lower section and then press the ▽ key. If "168" is not displayed, change the value referring to the example of changing "IP 4" as described later.
-------------	--

↓▽ key

IP 3 0	Check that "0" is displayed in the lower section and then press the ▽ key. If "0" is not displayed, change the value referring to the example of changing "IP 4" as described later.
-----------	--

↓▽ key

Display (upper line/ lower line)	Operation
IP 4 20	To change the value at the lower section to 21 that is different from the displayed value, press the SET/REC/STOP key.

↓SET/REC/STOP key

IP 4 020 ↑ blinks	The numeric value blinks. Press the ▽ or △ key to set the value to 21.
-------------------------	--

↓▽ or △ key

Display (upper line/ lower line)	Operation
IP 4 021 ↑ blinks	Press the SET/REC/STOP key to confirm the value. Blinking stops.

↓SET/REC/STOP key

IP 4 21	To further check and change subnet mask, press the ▽ key to display "SUB1" in the upper section.
------------	--

↓▽ key

Similarly, check that SUB1 to SUB4 are 255, 255, 255 and 0 respectively, and set them. After completion of setting SUB1 to SUB4, press the MODE key. "RESET" is displayed and the system is restarted.

### 3.5.3 Setting the PC's IP address

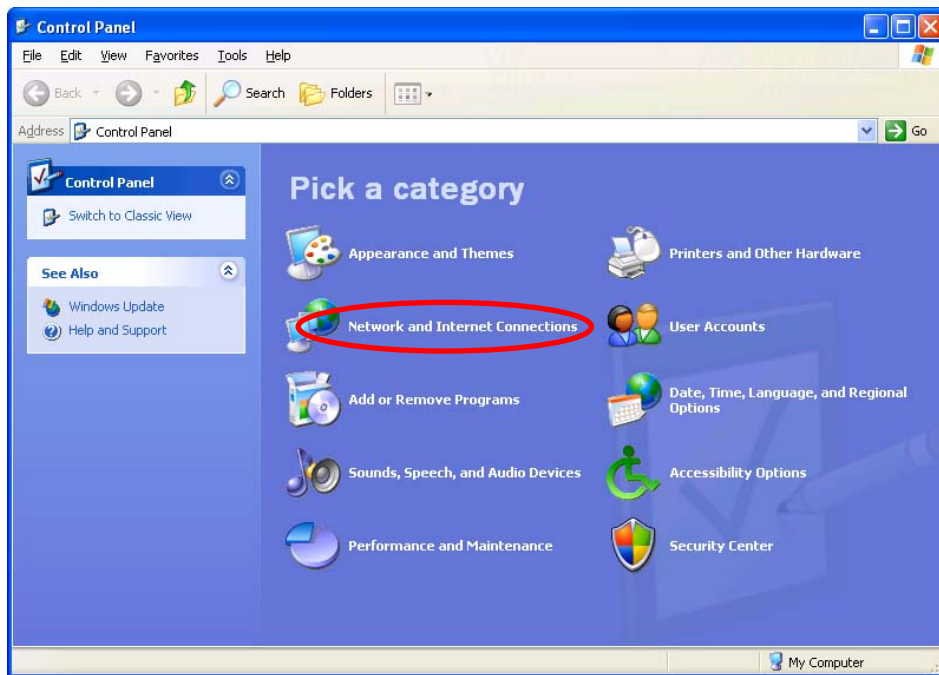
This section describes how to set an IP address of the PC to 192.168.0.100.

To set an IP address of the PC, log in with a user account with administrator/manager authority.

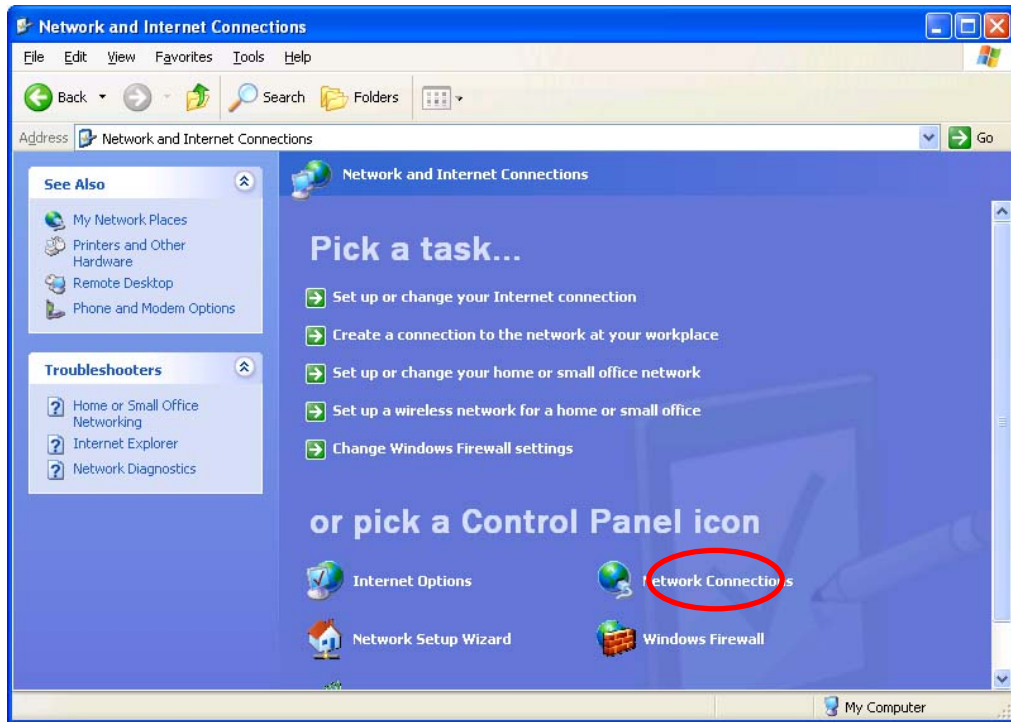
#### (1) Windows XP

Follow the procedure below to set the IP address.

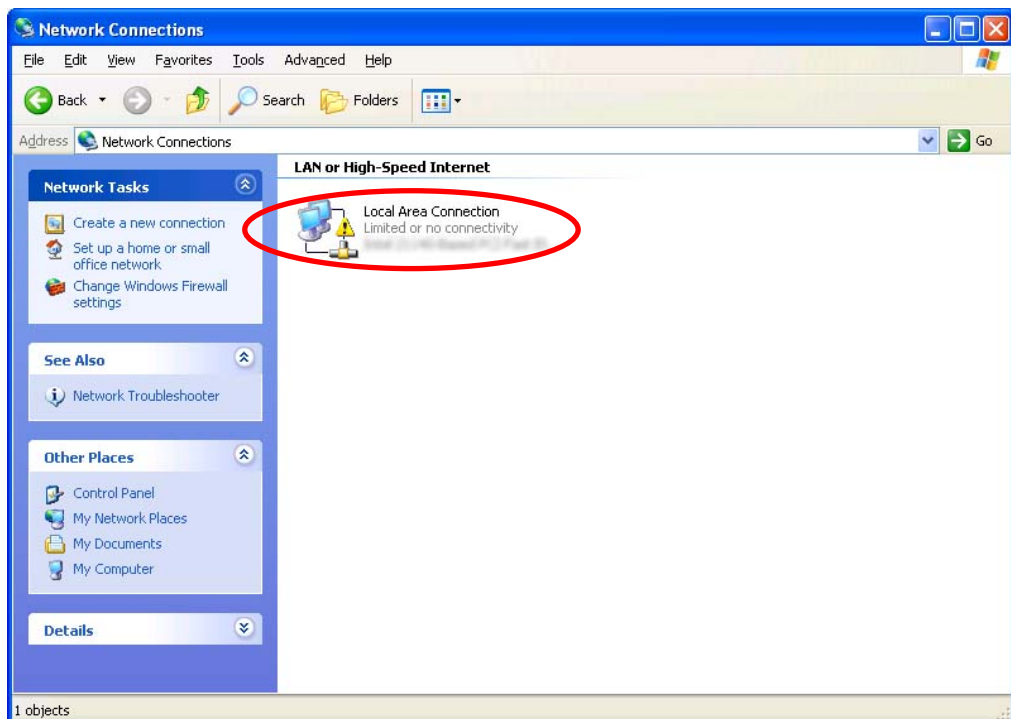
- (1) Select “Start menu” – “Setup” – “Control Panel” to display the Control Panel and then click “Network and Internet Connections”.



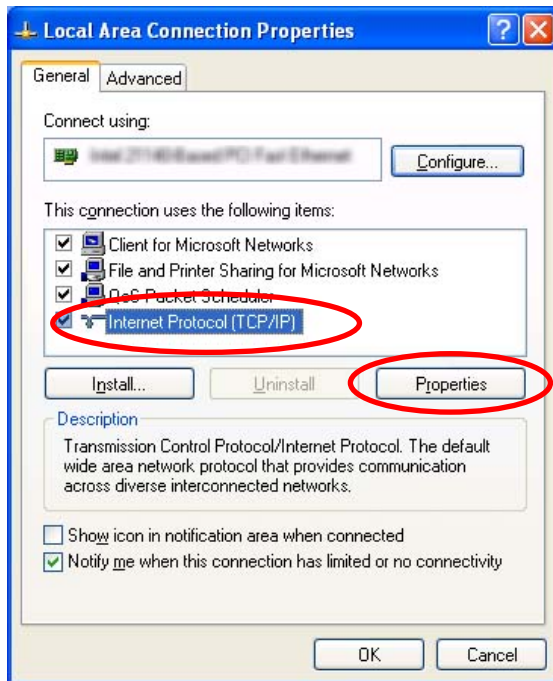
(2) Click “Network Connections”.



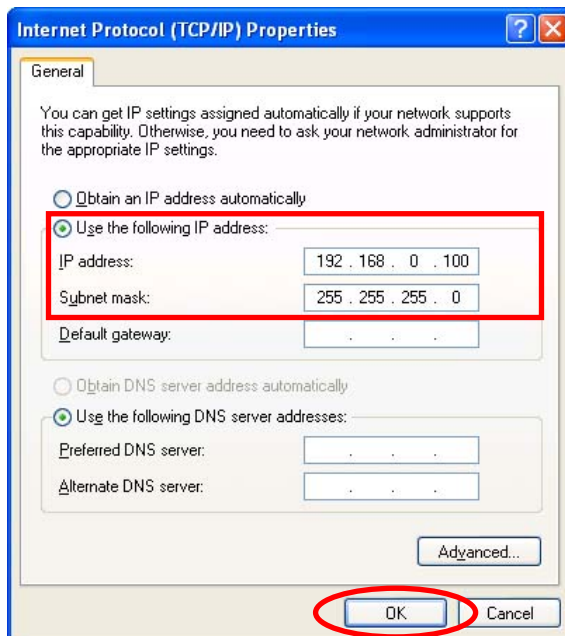
(3) Right-click “Local Area Connection” and select “Properties”.



(4) Highlight “Internet Protocol (TCP/IP)” and then click “Properties”.



(5) Select “Use the following IP address” and then set “IP address” to 192.168.0.100 and “Subnet mask” to 255.255.255.0. Press “OK” to close the window.

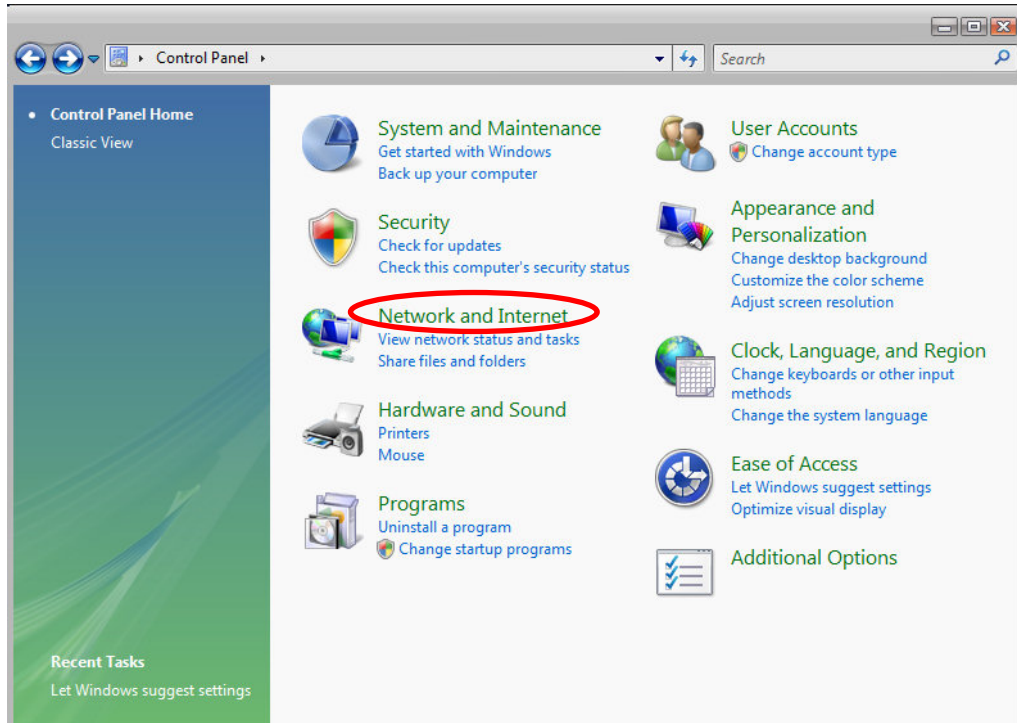


(6) In “Local Area Connection Properties”, press “OK” to close the window.

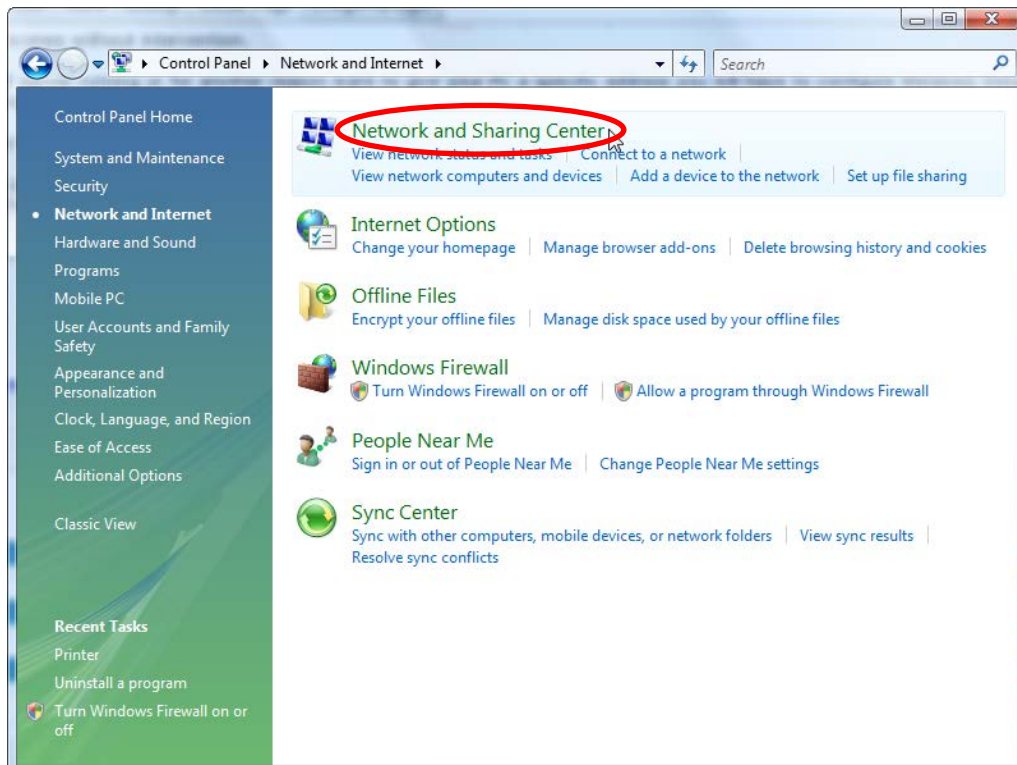
## (2) Windows Vista

Follow the procedure below to set the IP address.

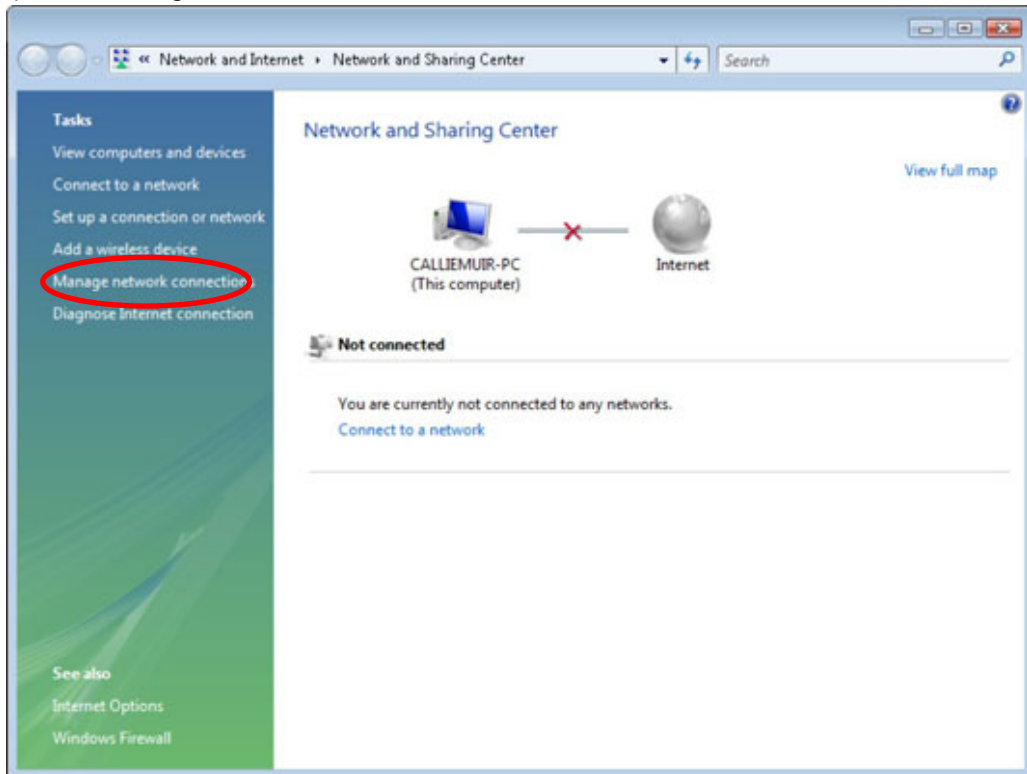
(1) Select “Start menu” – “Control Panel” and then click “Network and Internet”.



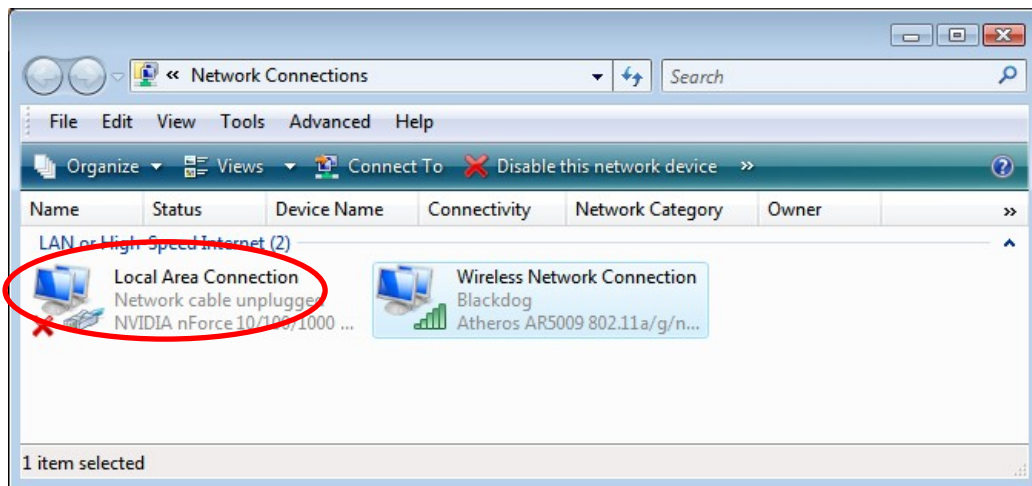
(2) Click “Network and Sharing Center”.



(3) Click “Manage network connections”.



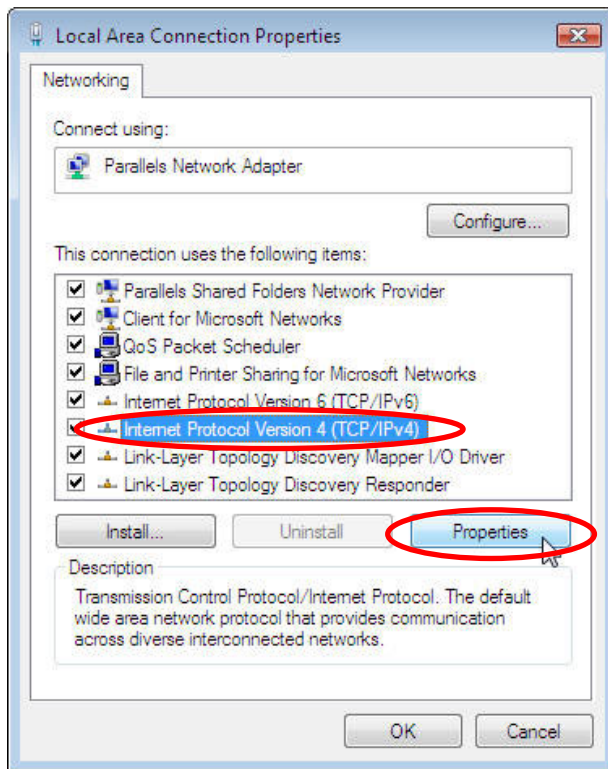
(4) Right-click “Local Area Connection” and select “Properties”.



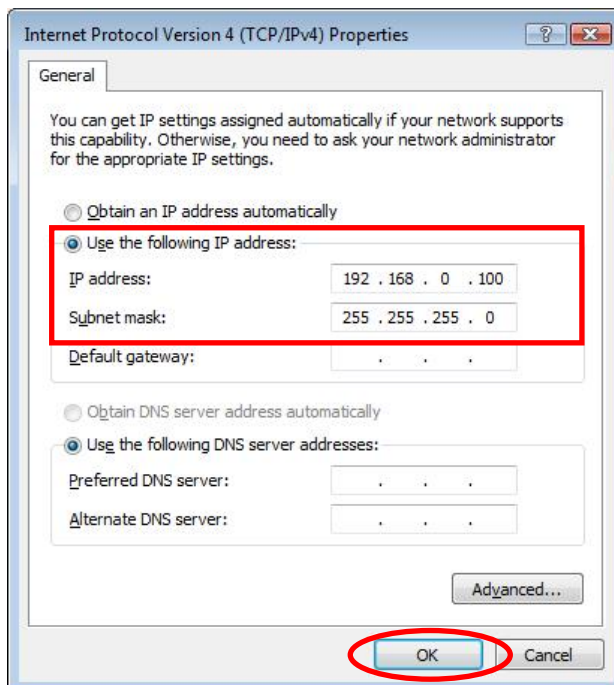
(5) When “User Account Control” window appears, click “Continue”.



(6) Select “Internet Protocol Version 4 (TCP/IPv4)” and click “Properties”.



(7) Select “Use the following IP address” and then set “IP address” and “Subnet mask”. Press “OK” to close the window.

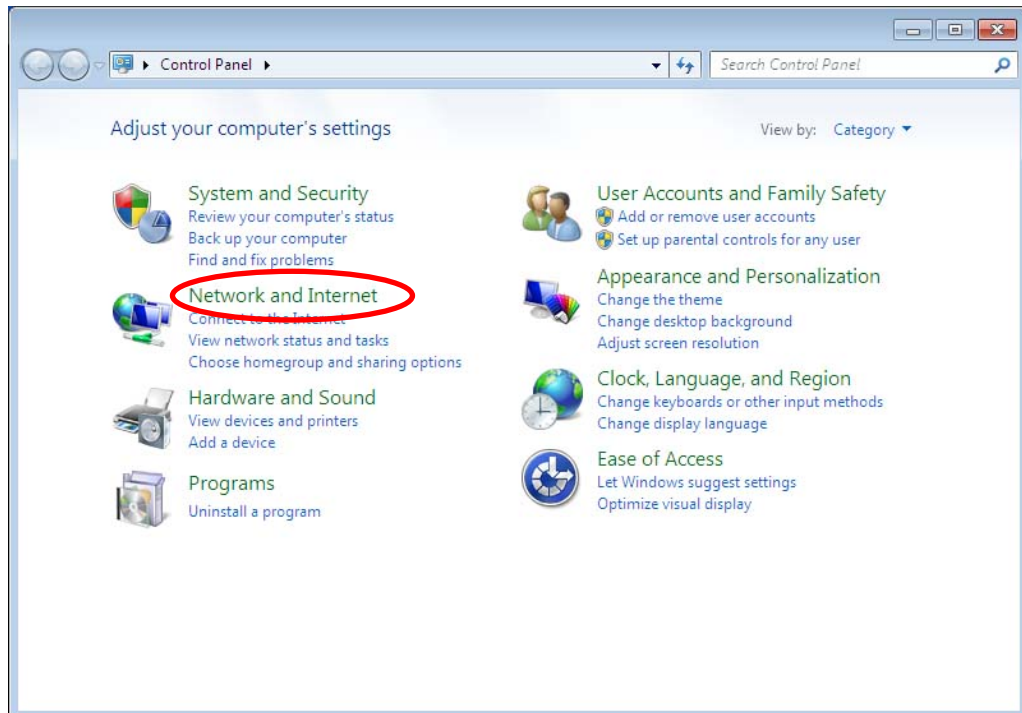


(8) In “Local Area Connections Properties”, click “Close” to close the window.

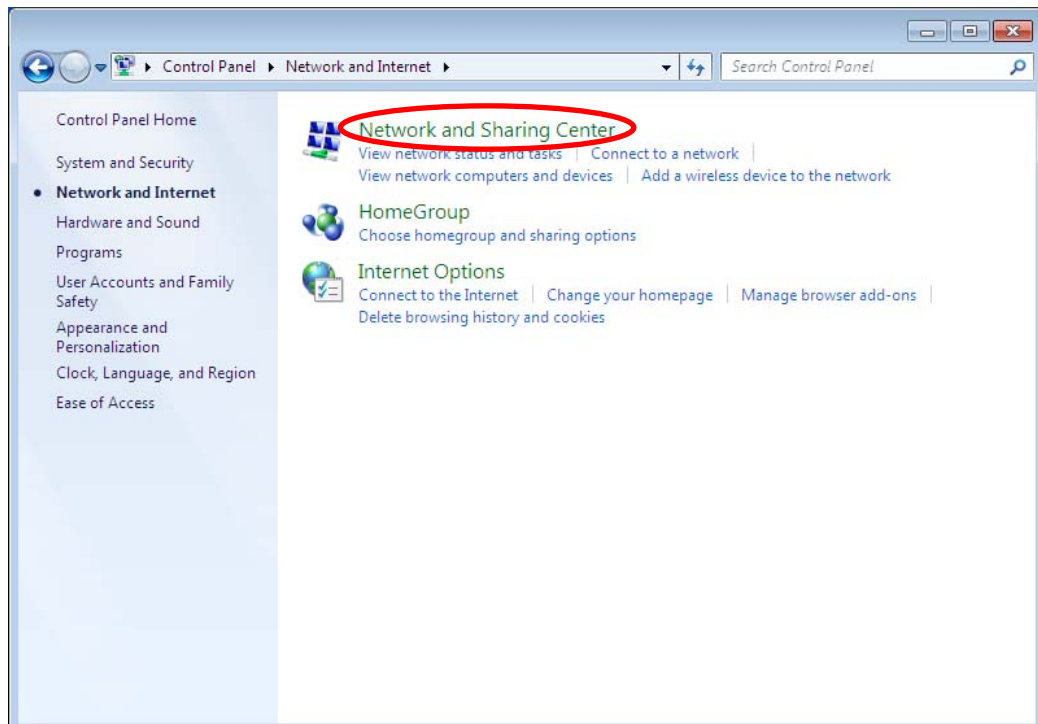
### (3) Windows 7

Follow the procedure below to set the IP address.

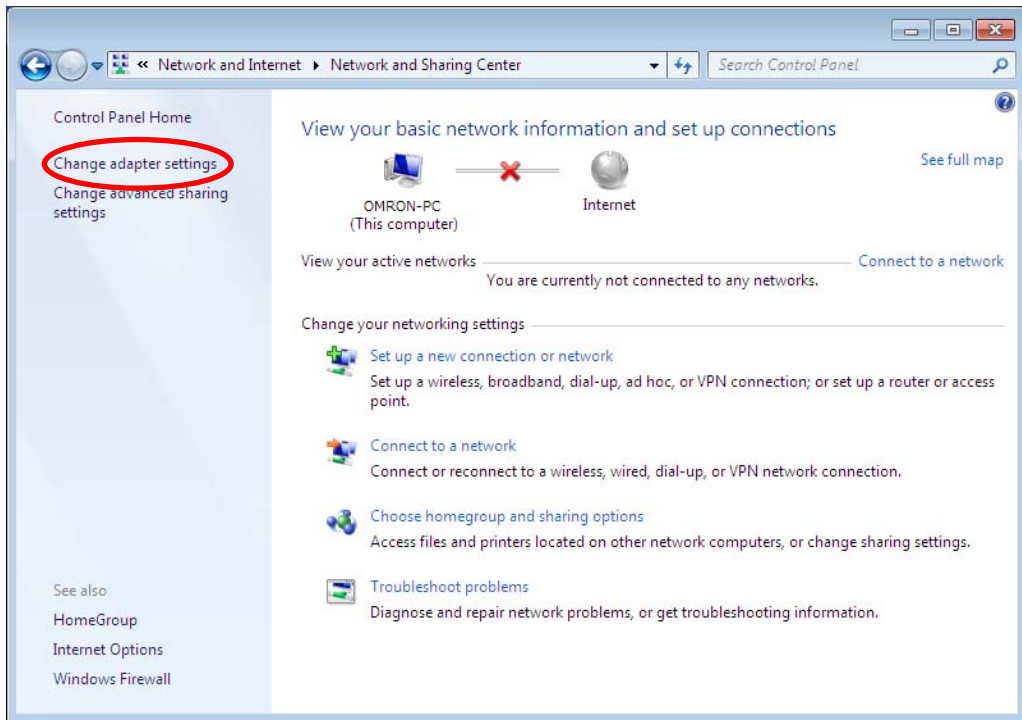
(1) Select “Start menu” – “Control Panel” and then click “Network and Internet”.



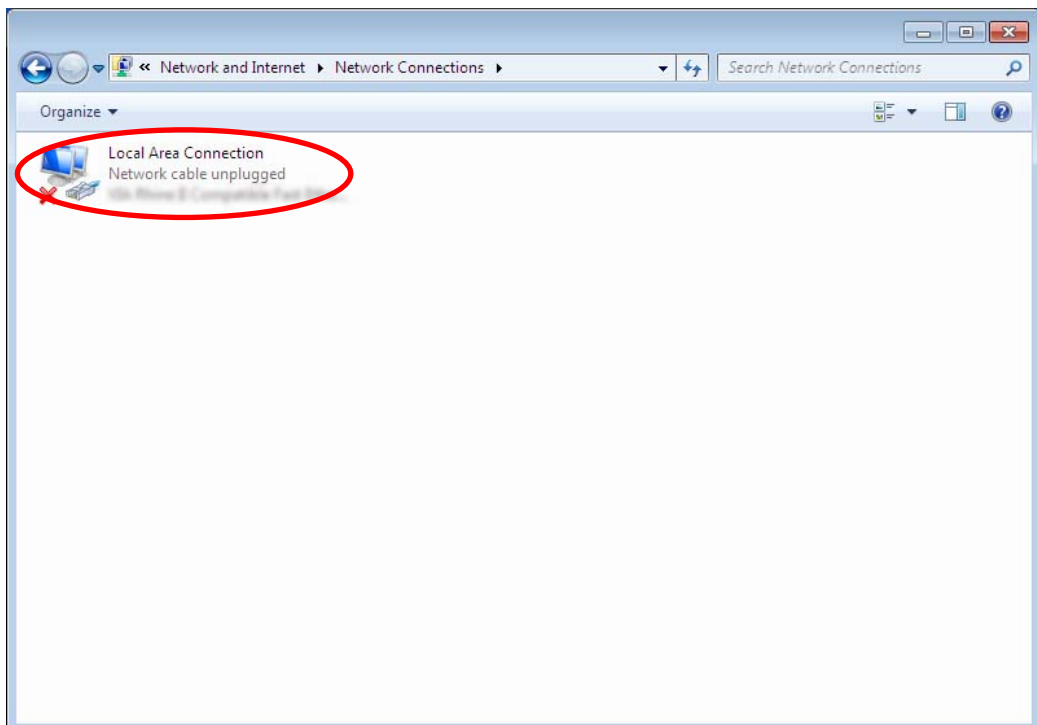
(2) Click “Network and Sharing Center”.



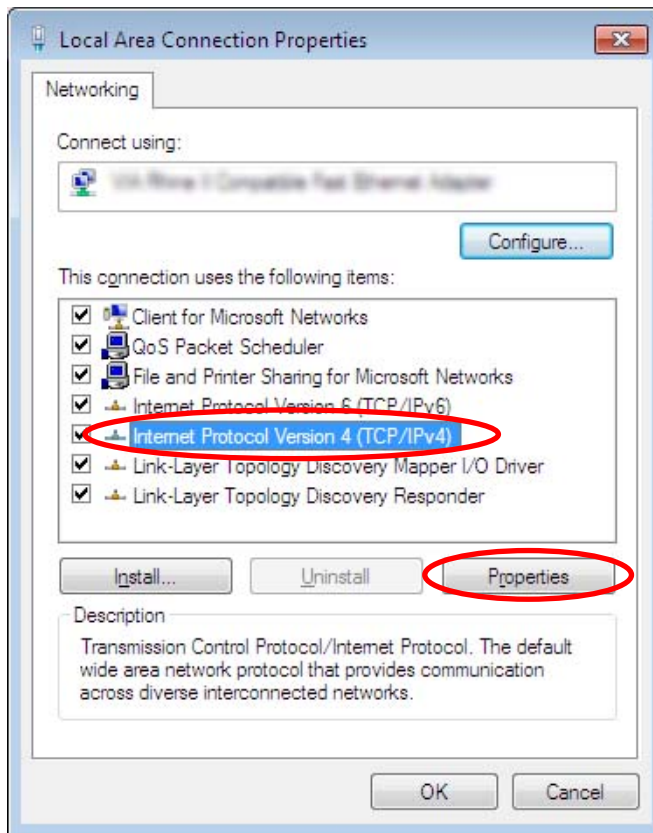
(3) Click “Change adapter settings”.



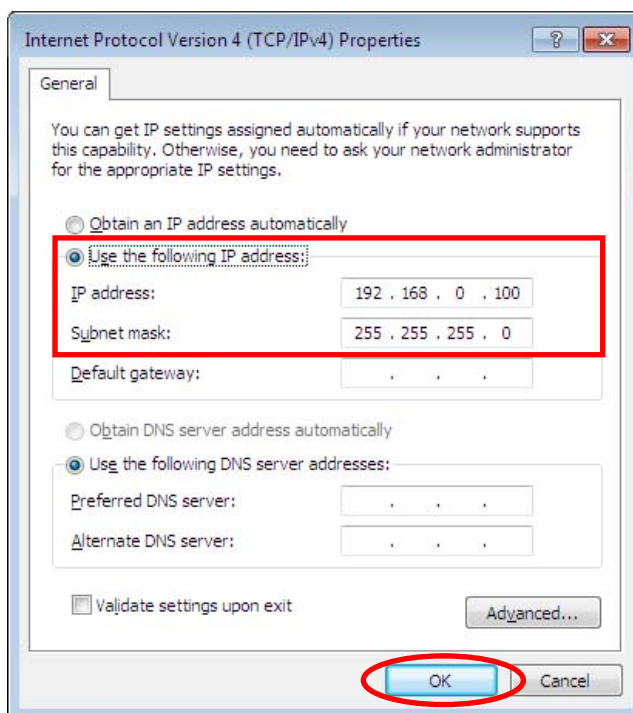
(4) Right-click “Local Area Connection” and select “Properties”.



(5) Select “Internet Protocol Version 4 (TCP/IPv4)” and click “Properties”.



(6) Select “Use the following IP address” and then set “IP address” and “Subnet mask”. Press “OK” to close the window.

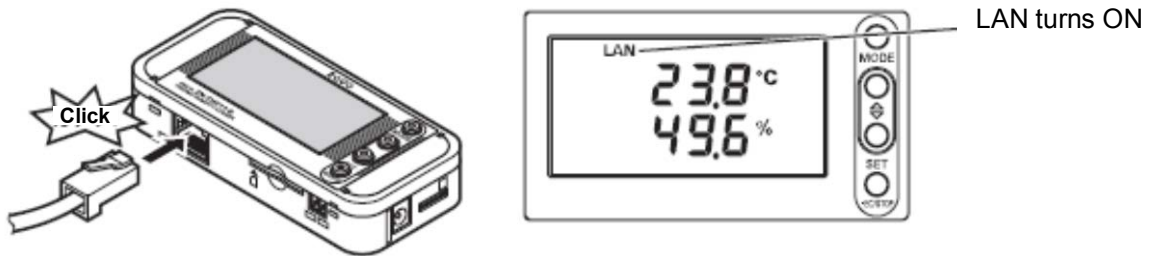


(7) On “Local Area Connections Properties”, click “Close” to close the window.

### 3.5.4 Connecting LAN cable

Connect LAN cable to the Differential Pressure Station and PC.

When the LAN cable is connected properly, "LAN" is shown on the display.



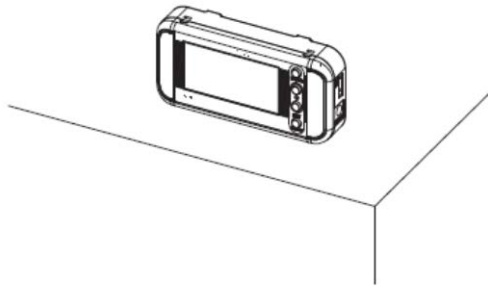
## 3.6 Installing Differential Pressure Station

This section describes how to install the Differential Pressure Station.

### Important

This product is precision equipment. Do not drop the product when mounting it. Use the mounting screw hole to secure the product when installing the product to the wall or equipment where vibration or shock may affect the main unit directly.

### 3.6.1 Standing installation

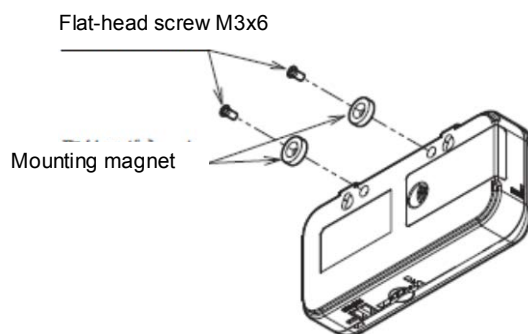


### Important

When placing the product on the desk, etc., place it enough distance from the edge of the desk to prevent damage from dropping it. Do not get stuck with the power cable, Sensor Head cable and LAN cable.

### 3.6.2 Securing with mounting screws

There are mounting screw holes at the back of the unit to secure the products on the wall or other surface. The unit also can be secured with round magnets to the screw holes.



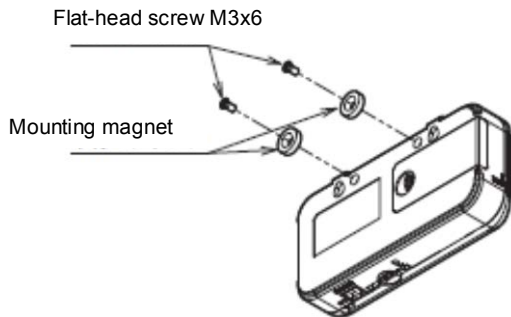
### Important

The depth of the screw hole is 4 mm. Do not tighten screws more than 4 millimeters. It will cause the damage to the product.

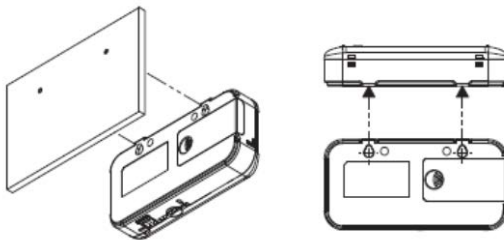
**Note**

The product can be secured by mounting a magnet for ZN9-WM01-S (sold separately) to the screw hole. (Tightening torque: 0.4 N/cm to 0.6 N/cm)

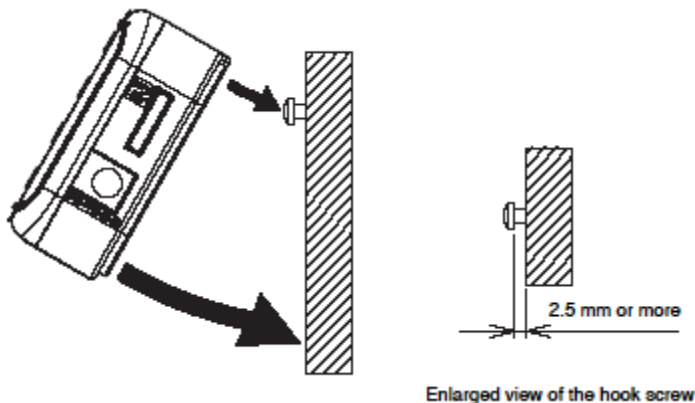
When mounting the product with magnet, place it where a mechanical shock is not applied. When the magnet is attached, be careful of wiring cables not to apply the load of Sensor Head and cables to the product.

**3.6.3 Mounting with screw hook hole**

There are two hook holes below the convex section of the upper unit for the product to be secured on the wall.



Use M3 screws to hook the screw head on the screw hook holes. Attach the device with an interval of 2.5 mm or more between the bottom of the screw head and the wall surface.

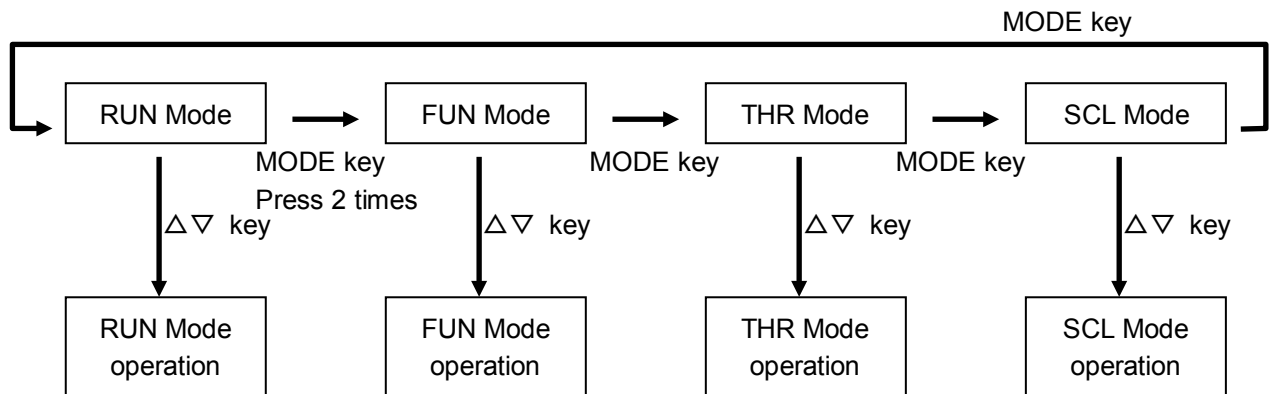
**Important**

Firmly hold the main unit with your hands to insert or remove the SD card from the Air Thermo Station which is mounted with screw hook holes. Otherwise it may result in dropping and damaging the SD card.

## 4. Setting Differential Pressure Station (Unit Operation)

### 4.1 Setting Procedure and Operation Modes

This section describes the operation and setting procedure of the Differential Pressure Station.



The Differential Pressure Station has four operation modes. These modes can be switched with the MODE key.

To change mode from RUN to FUN, press the MODE key twice. When pressing the MODE key once, "RUN" blinks. When pressing it twice, "FUN" blinks to be switched.

Use the  $\Delta$  and  $\nabla$  keys to change setting items and display items in each operation mode.

Table: Operation mode

Display	Name	Description
RUN ON	Measurement execution mode (RUN mode)	Measures and records differential pressure.
FUN blinks	Function setting mode (FUN mode)	Sets measurement and recording.
THR blinks	Threshold value setting mode (THR mode)	Sets threshold values (upper/lower limits) for an alarm output of the differential pressure.
SCL blinka	Measurement value adjustment setting mode (SCL mode)	Adjusts measurement value.

#### Note

While data is being recorded in the internal memory in RUN mode ("REC" in the display is turned ON), mode cannot be shifted to other than RUN mode.



## 4.2 Settings in FUN Mode

In FUN mode, settings regarding measurement and recording of the Differential Pressure Station are made.

### 4.2.1 List of setting items

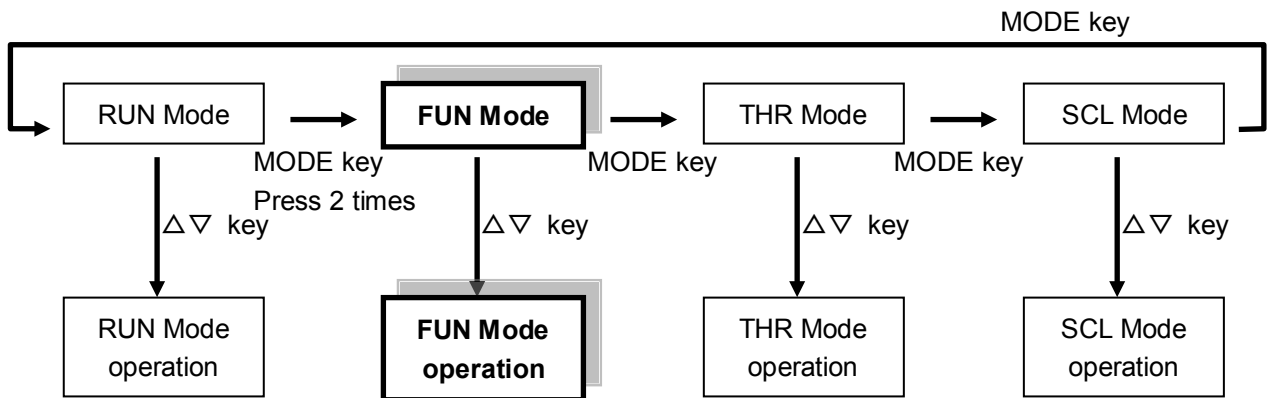
The list below shows the setting items in FUN mode.

Display item		Display	Setting item	Setting value	Factory default
CYCLE		<i>cYcLE</i>	Measurement value update cycle	1 s (sec)/2 s/5s/10s/20 s/30 s/1 m (min)/2 m/5 m/10 m/20 m//30 m/1 h (hour)	10 s
MEAS		<i>mEAS</i>	Processing mode	NORM/MAX/MIN/AVE	NORM
MODE		<i>mOdE</i>	Measurement operation mode	Differential Pressure Station is reset and restarted when operation mode is changed with MODE key after the setting values of NET/SLEEP/PD-S is confirmed.	NET
REC		<i>rEc</i>	Recording mode	CONT/RING	CONT
INIT		<i>iNIt</i>	Return to factory default	When holding the SET/REC/STOP key, initialization starts. After "DONE" is displayed and operation mode is changed with the MODE key, the Differential Pressure Station is reset and restarted.	-
ETC (DISP)	RESTR	<i>rEstR</i>	Read the setting data from the SD card.	When inserting the SD card and holding the SET/REC/STOP key, the setting data is read from the SD card and is set to the main unit. When changing operation mode with the MODE key after DONE has been displayed. The Differential Pressure Station is reset and restarted.	-
	BCKUP	<i>bCkUP</i>	Write the setting data into the SD card.	When inserting the SD card and holding the SET/REC/STOP key, the setting data is saved into the SD card.	-
TIME (DISP)	YEAR	<i>yEAR</i>	Year	Year setting	Not initialized by INIT.
	MONTH	<i>mOnth</i>	Month	Month setting	
	DAY	<i>dAY</i>	Day	Day setting	
	CLOCK	<i>cLoCk</i>	Hour : Minute	Hour/minute setting	

IP (DISP)	IP1 to IP4	<i>IP</i>	IP address	0 to 255	192. 168. 0. 20
	SUB1 to SUB4	<i>SUB</i>	Subnet mask	0 to 255	255. 255. 255. 0
SDISP		<i>sd, sP</i>	Display mode at sleep	OFF/ON	OFF

#### 4.2.2 Selecting operation mode “FUN”

Press the MODE key to change the operation mode to “FUN”. “FUN” at the lower right of the display blinks.

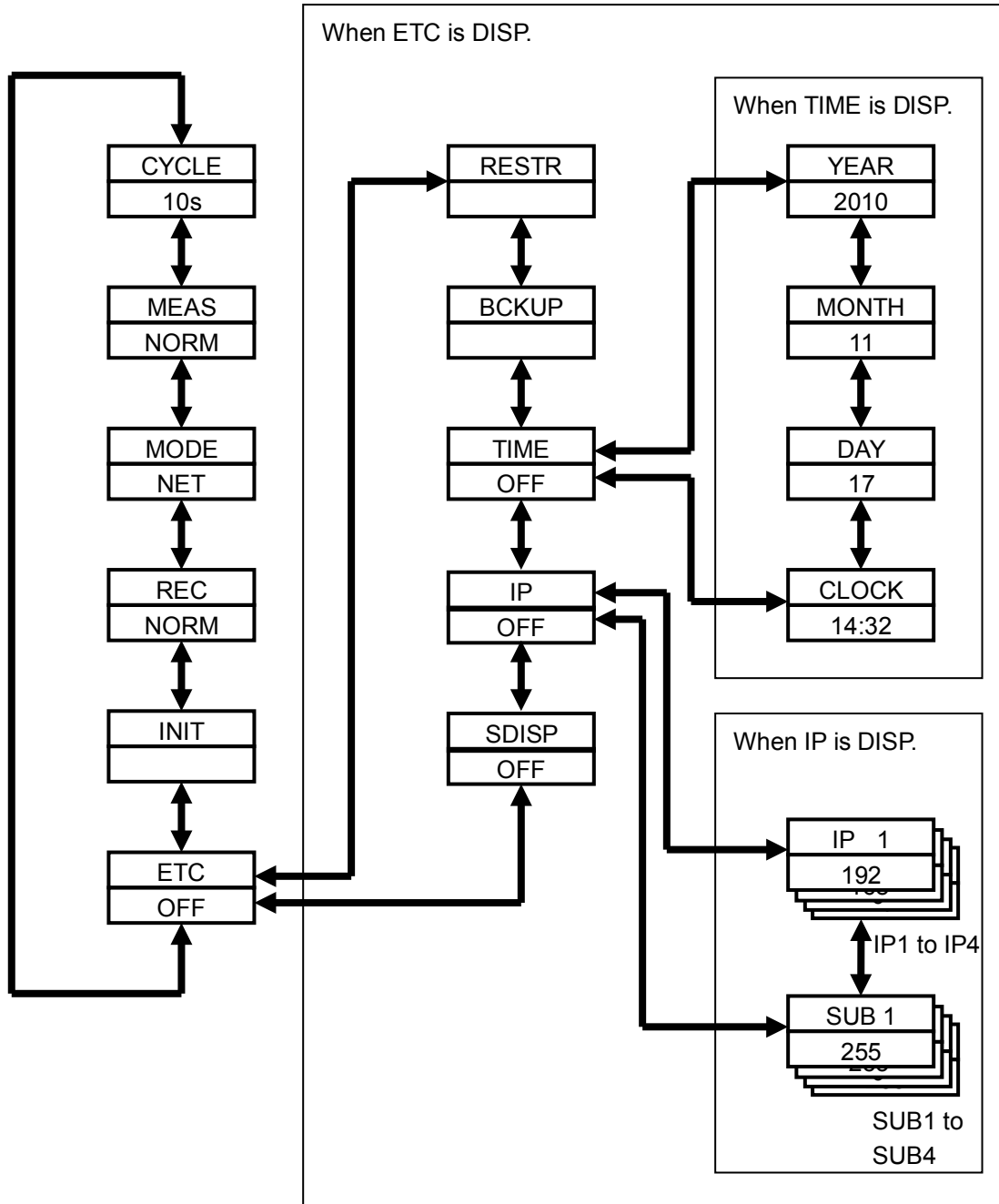


**Note**

While data is being recorded in the internal memory in RUN mode (“REC” in the display is turned ON), mode cannot be shifted to FUN mode.

### 4.2.3 Selecting items

Move the items with the  $\Delta$  and  $\nabla$  keys. To change the set value, select an item with  $\Delta$  or  $\nabla$  key and then confirm it with the SET/REC/STOP key. Press the MODE key to change the operation mode.



#### 4.2.4 Description of items

##### (1) Measured value update cycle (CYCLE)

Specifies an update interval of measured values.

Selected range (selection type):

1 s (second) / 2 s / 5 s / 10 s / 20 s / 30 s / 1 m (minute) / 2 m / 5 m / 10 m / 20 m / 30 m  
/ 1 h (hour)

Initial value: 10 s

##### (2) Processing mode (MEAS)

Specifies the calculation method of displayed and recorded measured values.

Selected range (selection type):

NORM / MAX / MIN / AVE

Initial value: NORM

Processing mode	Measured value
NORM (Instantaneous value)	Measured values at each measurement update cycle (CYCLE).
MAX (Maximum value)	Maximum value of measured values at every 10 seconds during the measured value update cycle (CYCLE).
MIN (Minimum value)	Minimum value of measured values at every 10 seconds during the measured value update cycle (CYCLE).
AVE (Average value)	Average value of measured values at every 10 seconds during the measured value update cycle (CYCLE).

When the measured value update cycle is set for 10 seconds, the measurement is performed for 10 times every 1 second. When processing mode (MEAS) is set for AVE/MAX/MIN, the maximum/minimum/average values of each 10 measured values are given as the measured values.

When processing mode is set for MAX/MIN/AVE, "MAX", "MIN" and "AVE" are turned ON at the lower left of the display.

##### Note

When MAX/MIN/AVE is specified as processing mode or the operation mode is switched from "SCL" to "RUN", the display may remain showing "----". This is because the Air Thermo Station waits for the necessary data to be accumulated. The estimated time (which has been set with CYCLE) will be 1 seconds.

**(3) Measurement operation mode (MODE)**

Specifies the mode of measurement operation.

Selected range (selection type):

NET / SLEEP / PD-S

Initial value: NET

Measurement operation mode	Operation
NET	Network connection mode: The Differential Pressure station and PC will be connected via a network to record measured data. Remote setting is also available.
SLEEP	Sleep mode: The Differential Pressure Station operates in power saving mode. The CPU enters into standby state except when measuring through measurement value update cycles. As the Ether port also is on standby state, network connection is not available. If SDISP, which is described later, is OFF, the display will not be shown. Even if the display is not shown, you can press any key to resume the display. However, when there is no key operation for 5 seconds, the display will disappear again. Operating Differential Pressure Station in sleep mode is recommended for battery drive.
PD-S	Air Particle Sensor connection mode: Connect an Air Particle Sensor an Air Particle Sensor ZN-PD□□-S□ via LAN cable to record the values measured with the Air Particle Sensor in the internal memory of the Differential Pressure Station.

**Note**

- Change the operation mode with the MODE key after changing the measured operation mode by confirming it with the SET/REC/STOP key. The Air Particle Sensor is reset and restarted.
- When the alarm output is ON (including alarm holding state), the power will be consumed even if the Differential Pressure Station is set to SLEEP mode. By specifying the threshold value to beyond the assumed range, unnecessary power consumption can be prevented.
- When the display is not shown in SLEEP mode, pressing the key can activate the display only. To execute functions allocated to the key, press the key again after the display is shown.
- In Air Particle Sensor connection mode (PD-S), the Differential Pressure Station cannot connect to a PC via a network.

**(4) Recording mode (REC)**

Specifies the operation for SD card writing during data recording.

Selected range (selection type):

CONT / RING

Initial value: CONT

Recording mode	Operation
CONT	Continue mode When the internal memory becomes full during recording, a file is output to the SD card to continue recording. If an error occurs due to the SD card uninserted, the recording will stop and the data in the internal memory is maintained.
RING	Ring mode When the internal memory becomes full during recording, the internal memory is overwritten from the oldest data to continue recording.

**Note**

By pressing the SET/REC/STOP key (less than 3 seconds) during recording, the data accumulated in the internal memory up to that point can be output to the SD card as files while recording continues.

**(5) Initialization (INIT)**

Initializes the setting values to the factory default (except for year, month, day, hour and minute).

Operation:

Holding the SET/REC/STOP key starts initialization and it is completed when "DONE" is displayed.

When pressing the MODE key after initialization to change the operation mode, the Differential Pressure Station will be reset and restarted.

**(6) Others (ETC)**

Specifies whether or not to display the items of read/write of the setting file and time settings.

Setting range:

OFF / DISP

Initial value: OFF

Installation value	Operation
OFF	Does not display the items of read/write of the setting data, time setting, and the display setting in sleep mode. After pressing SET/REC/STOP key, press the ▽ key to return to the items for CYCLE.
DISP	Displays the items of read/write of the setting data, time setting, and the display setting in sleep mode. Fix them with the SET/REC/STOP key, then press the ▽ key to return to the items for RESTR.

**Note**

ETC returns to OFF after restarting.

**(7) Reading setting data (RESTR)**

Restore the settings of the main unit by using SD card in which the setting data has been saved as a backup with BCKUP (described later).

Operation:

Insert the SD card in which the setting data has been saved, and hold the SET/REC/STOP key. Reading completes when "DONE" is displayed.

When pressing the MODE key to change the operation mode, the Air Thermo Station will be reset and restarted.

**Note**

- The number of the setting data items that can be stored in one SD card as a backup is one for a unit. The setting data that has been backed up with a different Differential Pressure Station can be restored with other Differential Pressure Station.
- When ETC is OFF, the setting data cannot be read.

**(8) Writing the setting data (BCKUP)**

Saves the setting data of the Differential Pressure Station unit into the SD card.

Operation:

Insert an SD card and hold the SET/REC/STOP key.

Saving is complete when "DONE" is displayed.

**Important**

The number of the setting data items that can be stored in one SD card as a backup is one for a unit. When performing a backup using the SD card in which the setting data has already been backed up, the setting data will be overwritten. The data will also be overwritten if a backup is performed on another Differential Pressure Station.

**Note**

- The setting data is written into the system folder of the SD card.
- When ETC is OFF, reading of the setting data cannot be performed.

**(9) Setting time (TIME)**

Specifies the time setting.

Selected range (selection type):

OFF / DISP

Initial value: OFF

Installation value	Action
OFF	Time cannot be set. Moves to IP by pressing the ▽ key after confirmation with the SET/REC/STOP key.
DISP	Time can be set. Moves to YEAR by pressing the ▽ key after confirmation with the SET/REC/STOP key.

**Note**

- When ETC is OFF, TIME cannot be specified.
- After a restart, TIME returns to OFF.



**(10) YEAR, MONTH, DAY, CLOCK**

Sets year, month, day and time.

Setting range (numeric value input type):

YEAR: 2000 to 2099

MONTH: 1 to 12

DAY: 1 to 31

CLOCK: 00:00 to 23:59

**Note**

When ETC is OFF and TIME is OFF, the year, month, day, hour and minute cannot be set.

**(11) Setting IP address (IP)**

Specifies whether setting IP address or not.

Selected range (selection type):

OFF / DISP

Initial value: OFF

Setting value	Operation
OFF	IP address cannot be set. Moves to SDISP by pressing the ▽ key after confirmation with the SET/REC/STOP key.
DISP	IP address can be set. Moves to item 1 of IP by pressing the ▽ key after confirmation with the SET/REC/STOP key.

**Note**

- When ETC is OFF, IP cannot be specified.
- After a restart, IP returns to OFF.

**(12) IP address and subnet mask (IP 1 to IP 4, SUB 1 to SUB 4)**

Sets 4 segments of the IP address (IP 1 to IP 4) and 4 segments of the subnet mask (SUB 1 to SUB 4).

Setting range (numeric value input type):

IP 1, IP 2, IP 3, IP 4: 0 to 255

SUB 1, SUB 2, SUB 3, SUB 4: 0 to 255

Initial value: IP 1. IP 2. IP 3. IP 4 = 192.168.0.20

SUB 1. SUB 2. SUB 3. SUB 4 = 255.255.255.0

**Note**

- The Air Particle Sensor will be reset and restarted after changing the IP address and subnet mask after confirmation with the SET/REC/STOP key and change the operation mode with the MODE key.
- When ETC is OFF and IP is OFF, the IP address and Subnet mask cannot be set.

**(13) Display mode at sleep (SDISP)**

Specifies whether or not performing display during operation in sleep mode.

Selected range (selection type):

OFF / ON

Initial value: OFF

Setting value	Operation
OFF	If there is no operation for 5 seconds during operation in sleep mode, the display disappears. When any key is pressed, the display will be restarted.
ON	Continues the display even during operation in sleep mode.

Refer to : 4.2.4 (3) Measurement operation mode (MODE)

**Note**

- Pressing the key when the display is not shown in SLEEP mode only specifies to restart the display. To execute functions allocated to the key, press the key again after the display is shown again.
- When ETC is OFF, SDISP cannot be specified.

### 4.2.5 Changing the setting value

There are two specification types: the selection type to select among the predetermined options, and to input the numeric value.

#### (1) Changing the setting value of the selection type (Example: Changing CYCLE)

Press the MODE key several times to enter FUN mode, and then press the  $\nabla$  or  $\triangle$  key to display CYCLE.

Display (upper line/ lower line)	Operation
CYCLE 10 s	Press the MODE key repeatedly until "FUN" will blink. Press the $\nabla$ or $\triangle$ key to display CYCLE in the upper line of the display. When pressing the SET/REC/STOP key, the value in the lower line blinks.

SET/REC/STOP key  $\downarrow$

Display (upper line/ lower line)	Operation
CYCLE 10 s $\uparrow$ blinks	Settable values are displayed in sequence by pressing the $\nabla$ or $\triangle$ key. When pressing the MODE key, the setting is cancelled.

$\nabla$  or  $\triangle$  key  $\downarrow$

Display (upper line/ lower line)	Operation
CYCLE 30 s $\uparrow$ blinks	Press the $\nabla$ or $\triangle$ key to display the desired value, and then press the SET/REC/STOP key. The value will be confirmed and blinking will stop.

SET/REC/STOP key  $\downarrow$

Display (upper line/ lower line)	Operation
CYCLE 30 s	

After the settings above, has done, the setting items can be changed again with the  $\nabla$  or  $\triangle$  key, and the operation mode can be changed with the MODE key as well.

## (2) Changing the setting value of the numeric value input type (Example: Changing YEAR)

Press the MODE key several times to enter FUN mode, and then press the  $\nabla$  or  $\triangle$  key to display YEAR.

To display YEAR, ETC and TIME need to be set to DISP.

Display (upper line/ lower line)	Operation
CYCLE 10 s ("FUN" blinks)	Press the MODE key repeatedly until "FUN" will blink. "CYCLE" is displayed in the upper line. Press the $\nabla$ or $\triangle$ key to display YEAR. To display YEAR, ETC and TIME need to be set to DISP.

$\nabla$  or  $\triangle$  key  $\downarrow$

Display (upper line/ lower line)	Operation
YEAR 2010	When pressing the SET/REC/STOP, the least significant digit in the lower line blinks.

SET/REC/STOP key  $\downarrow$

Display (upper line/ lower line)	Operation
YEAR 2010 $\uparrow$ blinks	When pressing the $\nabla$ or $\triangle$ key, the value increases/decreases. When holding the $\nabla$ or $\triangle$ key, the range of increase/decrease becomes wider. When pressing the MODE key at this point, the setting is cancelled.

$\nabla$  or  $\triangle$  key  $\downarrow$

Display (upper line/ lower line)	Operation
YEAR 2011 $\uparrow$ blinks	Press the $\nabla$ or $\triangle$ key to display the desired value, and then press the SET/REC/STOP key. The value will be confirmed and blinking will stop.

SET/REC/STOP key  $\downarrow$

Display (upper line/ lower line)	Operation
YEAR 2011	

After the settings above, the setting items can be changed with the  $\nabla$  or  $\triangle$  key, and the operation mode can be changed with the MODE key.

### 4.3 Making Settings (Operation in THR Mode)

Set the threshold value regarding the alarm output of the Differential Pressure Station in THR mode.

And set the upper limit and lower limit of the differential pressure.

When the measured value is either larger than the upper limit or smaller than the lower limit during operation in RUN mode, the alarm output terminal turns ON and "ALM" on the display turns ON.

When returned from the alarm state during measurement, you can set whether or not the alarm output state is maintained.

#### Note

Alarm monitoring cannot be stopped.

To avoid alarm monitoring, set each threshold value to beyond the assumed measurement range. The factory default has been set as non-alarm monitoring (setting the alarm upper/lower limit to be measurable).

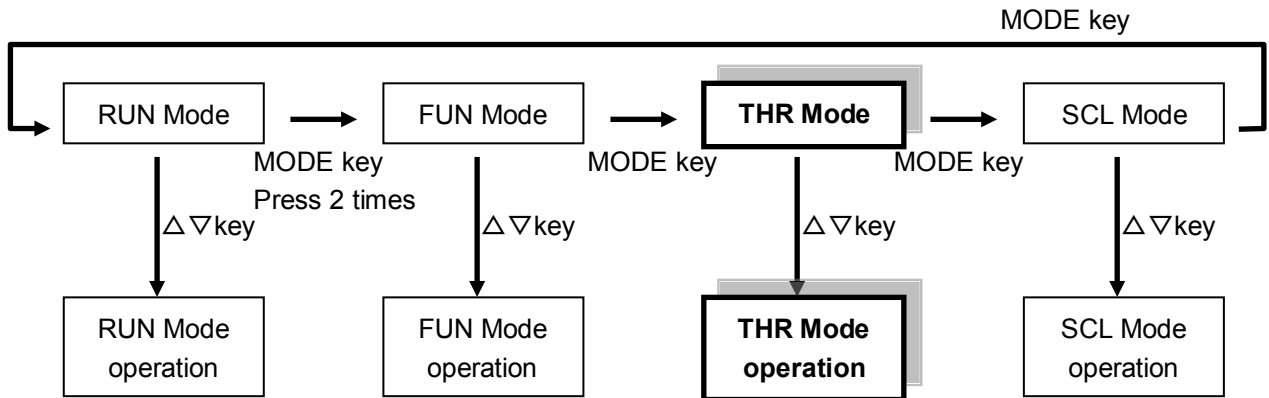
#### 4.3.1 List of setting items

The table below shows a list of setting items in THR mode.

Display item	Display	Setting item	Function/operation	Factory default
DP HI	<i>dP H.</i>	Upper limit of the differential pressure threshold value	Sets the upper limit of the differential pressure for an alarm output.	100%
DP LO	<i>dP Lo</i>	Lower limit of the differential pressure threshold value	Sets the lower limit of the differential pressure for an alarm output.	0%
HOLD	<i>HoLd</i>	Alarm hold setting	Sets whether or not for alarm output stays ON when the measured value returns to within the range of upper/lower limit of the threshold from the outside of the range (alarm state) during measurement in RUN mode.	OFF

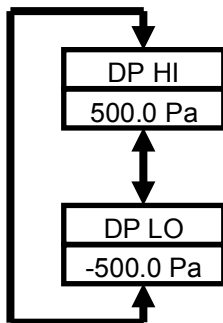
### 4.3.2 Selecting operation mode

Press the MODE key to change the operation mode to "THR". "THR" at the lower right of the display blinks.



### 4.3.3 Selecting items

Move the items with the  $\Delta$  and  $\nabla$  keys. To change the set value, select an item with  $\Delta$  or  $\nabla$  key and then confirm it with the SET/REC/STOP key. Press the MODE key to change the operation mode.



#### 4.3.4 Description of items

##### (1) Upper limit of the differential pressure threshold value (DP HI)

Sets the upper limit of the differential pressure threshold value for an alarm output.

When the measured differential pressure is higher than the set value, "ALM" and the alarm output are turned ON.

Setting range (numeric value input type):

-500.0 Pa to 500.0 Pa

Initial value:

500.0 Pa

##### (2) Lower limit of the differential pressure threshold value (DP LO)

Sets the lower limit of the differential pressure threshold value for an alarm output.

When the measured differential pressure is lower than the set value, "ALM" and the alarm output are turned ON.

Setting range (numeric value input type):

-500.0 Pa to 500.0 Pa

Initial value:

-500.0 Pa

##### (3) Setting alarm hold

Set whether or not for the alarm output in the ON state and "ALM" ON state on the display to be maintained when the measured value is returned to within the range of upper/lower limit of the threshold value from outside of the range (alarm state) during measurement in RUN mode.

To release the alarm from the maintained state, hold the MODE key (at least 3 seconds) for "ALM" to turn OFF to stop alarm.

Setting range (selection type):

OFF: Maintains an alarm output ON state.

ON: Maintains the alarm output ON state.

Initial value:

OFF

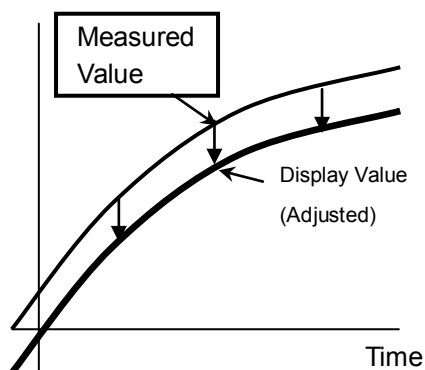
#### 4.3.5 Changing the setting value

Change the value in the same way as changing the settings in FUN mode.

Refer to : 4.2.5 Changing the setting value

## 4.4 Making Settings (Operation in SCL Mode)

The adjustment of the measured value of the Differential Pressure Station is set in SCL mode. Adjust the values to be displayed or recorded by adding or subtracting by the predetermined setting values for the values measured with the Differential Pressure Station (offset).



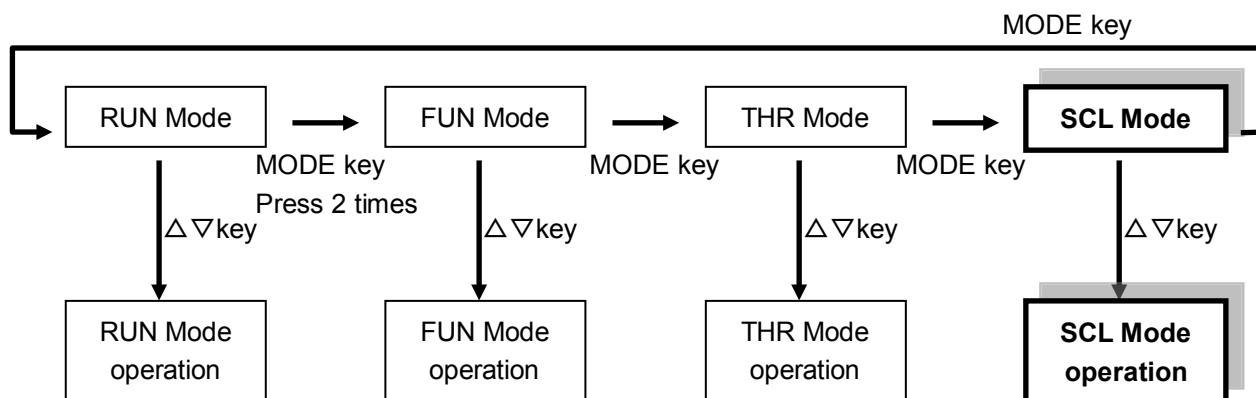
### 4.4.1 List of setting items

The table below shows a list of setting items in SCL mode.

Setting item	Display	Function/operation	Factory default
Differential pressure adjustment	Upper line: Measured differential pressure Lower line: Value after adjustment	Sets the differential pressure adjustment value.	Values of the upper and lower lines are equal. (not adjusted)

### 4.4.2 Selecting operation mode

Press the MODE key to change the operation mode to "SCL". "SCL" at the lower right of the display will blink.





### 4.4.3 Selecting items

Move the select items with the  $\triangle$  and  $\nabla$  keys. To change the set value, select an item with  $\nabla$  and  $\triangle$  keys and then confirm it with the SET/REC/STOP key. Press the MODE key to change the operation mode. There is only one mode for the Differential Pressure Station.

Current differential pressure Pa
Value after adjustment

### 4.4.4 Description of items

#### (1) Adjusting differential pressure

The differential pressure measurement value is displayed on the upper line, and the value after adjustment on the lower line.

The value will not be adjusted if in the lower line you set the value after adjustment to the same as the value currently displayed on the upper line. If a different value is set, the difference between the values in the upper line and the lower line will be added to the measured value as an offset value. The adjustment range is  $\pm 50.0$  Pa.

When adjustment has been set, "SCL" is ON during measurement in RUN mode.

Setting range (numeric value input type):

-50.0 Pa (Displayed value in the upper line) to +50.0 Pa (Displayed value in the upper line)

Initial value:

The same value as the measured value (not adjusted)

### 4.4.5 Changing the setting value

Change the value in the same way as changing the settings in FUN mode.

Refer to : 4.2.5 Changing the setting value

## 4.5 Copying the Settings When Using Multiple Air Thermo Stations

The settings can be the same among multiple Differential Pressure Stations by reading the setting data from one Differential Pressure Station to the other using the SD card to which setting data has been written on a certain Differential Pressure Station. If the settings are shared among multiple Differential Pressure Stations, only one Differential Pressure Station needs to be set through the unit operation, and the rest of the Differential Pressure Stations can be set by restoring them. This contributes to less setting time and less miss-settings.

Refer to : 4.2.4 (8) Writing setting data (BCKUP), 4.2.4 (7) Reading setting data (RESTR)

## 5. Measurement and Recording (Unit Operation)

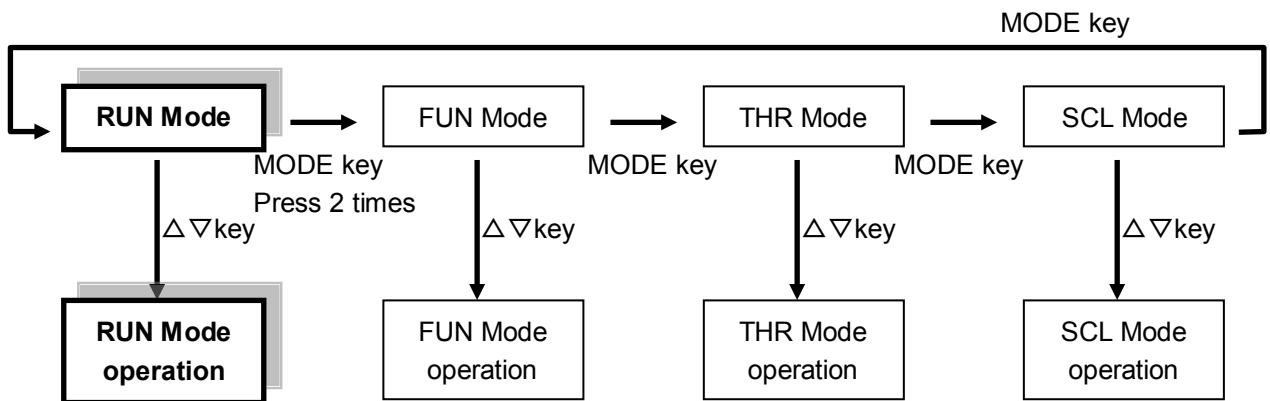
### 5.1 Overview

There are two methods to record measured values; recording in a Differential Pressure Station unit, and recording in a PC via a network. This chapter describes recording to the Differential Pressure Station unit.

### 5.2 Selecting Operation Mode

Differential pressure is measured in RUN mode.

Press the MODE key to change the operation mode to "RUN". "RUN" at the bottom right of the display turns ON.

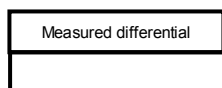


#### Note

- Move to another mode other than to RUN mode is prohibited during recording.
- When mode has been changed from other mode to RUN mode, "----" may be displayed for a long period of time.  
(Approx. "time that has been set in CYCLE – 10" seconds when processing mode is MAX/MIN/AVE.)

### 5.3 Screen Transition in RUN Mode

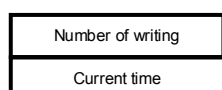
Pressing the  $\nabla$  or  $\triangle$  key in RUN mode switches the display as follows. Pressing the MODE key changes the operation mode.



The differential pressure measurement value (Pa) is displayed in the upper line.

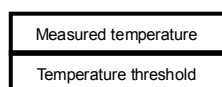
If computation for the measured value has been set, the value after computation is displayed with "MAX"/"MIN"/"AVE" and "RUN" turned ON.

If adjustment has been set, the value after adjustment is displayed with "SCL" and "RUN" turned ON.



The number of writings to the internal memory since the recording start is displayed in the upper line, the current time is displayed in the lower line.

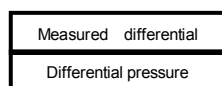
When measured data is written in the internal memory per time cycle specified by measurement update cycle (CYCLE), the value in the upper line increases by 1. When the internal memory becomes full, "FULL" is displayed. If the data accumulated in the internal memory is written to the SD card due to an event such as the SET/REC/STOP key having been pressed during recording, the value will be cleared to 0.



Temperature measurement value ( $^{\circ}\text{C}$ ) is displayed in the upper line and temperature threshold value is displayed in the lower line. The threshold value is displayed alternately between upper limit (Hi) and lower limit (Lo).

If computation has been set, a temperature measurement value after computation is displayed with "MAX"/"MIN"/"SCL" and "RUN" turned ON.

If adjustment has been set, a temperature measurement value after adjustment is displayed with "SCL" and "RUN" turned ON.



The differential pressure measurement value (Pa) is displayed in the lower line and differential pressure threshold value is displayed in the lower line. The threshold value is displayed alternately between upper limit (Hi) and lower limit (Lo).

If computation has been set, a differential pressure measurement value after computation is displayed with "MAX"/"MIN"/"SCL" and "RUN" turned ON.

If adjustment has been set, a differential pressure measurement value after adjustment is displayed with "SCL" and "RUN" turned ON.

Returns to the differential pressure display.

#### Note

- "REC" turns ON during data recording.
- "ALM" turns ON when the measured value exceeds the upper limit threshold value or when the measured value falls short of the lower limit threshold value and the alarm output is

turned ON. When the alarm hold has been set, the alarm output state is maintained and “ALM” keeps turned ON even if the alarm state is released. Hold the MODE key to stay alarm.

- “MAX”, “MIN” and “AVE” turn ON when processing mode has been set to MAX, MIN and AVE. They are not displayed in “NORM”.

## 5.4 Starting/Stopping Recording

### 5.4.1 Starting recording

When holding the SET/REC/STOP key (for at least 3 seconds) in RUN mode, recordings of the differential pressure data start and “REC” turns ON.

The measured data is recorded and accumulated in the internal memory, and is output as a CSV file into the SD card when the SET/REC/STOP key is pressed.

#### **Important**

If a recording starts when the recorded data still remained in the internal memory, the recorded data will be lost. When pressing the SET/REC/STOP key for less than 3 seconds before recording, the file can be output to the SD card. A state in which the recorded data remains in the internal memory occurs due to a power failure or the reset switch being pressed during recording and therefore the Differential Pressure Station restarted. If a recording stop operation is performed properly, the recorded data will not be remained.

In RUN mode, press the  $\nabla$  or  $\triangle$  key to display the time at the lower line. If the value in the lower line is 0, there is no recorded data in the internal memory.

#### **Note**

- The SD card is not always required to be inserted during recording. However, it needs to be inserted when pressing the SET/REC/STOP key or while the recording is stopped.
- Move to another mode other than to RUN mode is prohibited during recording.

### 5.4.2 Stopping Recording

When pressing the SET/REC/STOP key (for at least 3 seconds) while “REC” is turned ON during recording, the recording stops and the file is output to the SD card, and “REC” is turned OFF.

#### **Important**

Be sure to insert a writable SD card when recording stops. Even though the writing to the SD card failed, recording will not stop. If the SD card cannot be ready when you want to change the operation mode due to setting changes, press the reset switch or shut down the power supply and then restart the Differential Pressure Station. Although the data recorded in the internal memory before a restart will be maintained even after the restart, the data will be lost after recording starts. Insert the SD card before starting recording and press the SET/REC/STOP key to output the file.

## 5.5 Outputting the File to SD card

The data recorded in the SD card is output to files in the following conditions.

- (a) The SET/REC/STOP key has been pressed during recording (less than 3 seconds).  
Recording to the internal memory continues.
- (b) The SET/REC/STOP key has been pressed during recording (at least 3 seconds).  
Recording to the internal memory stops.

Refer to : 5.4.2 Stopping recording

- (c) The content of the internal memory has become full. Recording to the internal memory continues. (Only when the recording mode is set to be continue mode.)

Refer to : 4.2.4 (4) Recording mode (REC)

- (d) Not during a recording but the SET/REC/STOP key was pressed when the recorded data still remains in the internal memory (less than 3 seconds, RUN mode). Such situation occurs after a restart of the Differential Pressure Station due to a power failure or the reset switch being pressed during recording.

## 5.6 Releasing the Held Alarm

- “ALM” turns ON when the measured value exceeds the upper limit threshold value or when the measured value falls short of the lower limit threshold value. Then the alarm output is turned ON. When the alarm hold setting is ON, the alarm output state is maintained and “ALM” keeps turned ON even if the alarm state is released.

To release the held alarm, hold the MODE key for at least 3 seconds.

Refer to : 4.3.5 (5) Setting alarm hold

## 5.7 Hiding the Display

During operation in RUN mode, if no operation is performed in 5 seconds, the display may disappear. In this case, measurement operation mode is set to be sleep mode and the sleep display mode is OFF. Recording continues during recording even if the display is not shown.

Press any key to restart the display. Pressing the key when the display is not shown can only activate the display. To execute functions allocated to the key, press the key again after the display is shown.

Refer to : 4.2.4 (3) Measurement operation mode (MODE), 4.2.4 (13) Display mode at sleep (SDISP)

## 6. Connecting with Air Particle Sensor (ZN-PD□□-S□)

### 6.1 Connection Setting of Differential Pressure Station

To connect the Differential Pressure Station with Air Particle Sensor (ZN-PD□□-S□), set the Differential Pressure Station as follows.

Setting item		Setting value
Differential Pressure Station	Measurement mode (MODE)	PD-S
	IP address	192.168.0.20 (factory default)
	Subnet mask	255.255.255.0 (factory default)
Air Particle Sensor (ZN-PD□□-S□)	IP address	192.168.0.10
	Subnet mask	255.255.255.0

Set the measurement operation mode of the Differential Pressure Station according to "4. Setting (Unit Operation).

Refer to: 4. Setting (Unit Operation)

Regarding the Air Particle Sensor (ZN-PD□□-S□), read the Instruction Sheet of the Air Particle Sensor (ZN-PD□□-S□).

### 6.2 Recording

By starting recording operation of the Differential Pressure Station unit, the measured values of differential pressure of the Differential Pressure Station and particle values of the Air Particle Sensor (ZN-PD□□-S□) can be recorded.

Refer to: 5. Measurement and Recording (Unit Operation)

#### Note

- Although the measured particle values are recorded as the recorded data, they cannot be shown on the display of the Differential Pressure Station.
- When an Air Particle Sensor (ZN-PD□□-S□) is connected to the Air Thermo Station, these values are recorded as well.

### 6.3 Displaying Graph

The particle values as well as temperature and humidity recorded in the Differential Pressure Station can be displayed using SD Viewer ES or Energy Viewer of the supplied PC software Station Utility.

Output the recorded data to the SD card on the Differential Pressure Station, and insert it into the SD card slot of the PC to open data with SD Viewer ES or Energy Viewer.

Refer to: "Station Utility User's Manual": 4. Momentary Value Display.

Refer to: "Station Utility User's Manual": 5. Integration and Summation.

## 7. Ratings and Performance

Item	Content
Connectable sensor	Differential Pressure Ssensor Head ZN-DPS1□□-S
Display	LCD 7-seg 5-digit 2-step display, auxiliary information indicator display
Measurement cycle	1s,2s,5s,10s,20s,30s,1min,2min,5min,10min,20min,30min,1h
Processing mode	Instantaneous value, maximum value, minimum value, average value
Measurement operation mode	Network connection mode, sleep mode*1, air particle sensor communication mode*2
Recording mode	Continue*3, ring*4
Externla output	Alarm output*5 (photocoupler output) Alarm hold is configurable.
Communication interface	Ethernet (10BASE-T, 100BASE-TX)
Memory capacity (internal)	Internal memory: Approx. 11,000 data items*6
Storage device (external)	SD card with SDHC support (save measured value, save and read setting value)
Power supply	DC input: 24 VDC±10%, AC adapter: 100 to 240 VAC/50 to 60 Hz, Battery: 2 AAA batteries*7
Current consumption	70 mA max. (AC adapter used)
Battery life <sup>8</sup>	Approx. 1 year (sleep mode) Approx. 2 hours (network connection mode, air particle connection mode) Both require measurement interval of 10 minutes with 2 AAA nickel metal hydride batteries, with SD card not inserted
Operating temperature	Main unit: 0 to 60 °C, AC adapter: 0 to 40°C
Storage temperature	-15 to +60 °C (no condensation or icing)
Operating humidity	20 to 85%RH (no condensation)
Storage humidity	20 to 85%RH (no condensation or icing)
Insulation resistance	20 MΩ (500 VDC)
Withstand voltage	1000 VAC, 50/60 Hz 1 min
Vibration resistance	10 to 150 Hz, 0.7 mm double amplitude, acceleration: 50 m/s <sup>2</sup> for each in X, Y and Z directions for 80 min*9
Shock resistance	150 m/s <sup>2</sup> in 6 directions (+/-X, +/-Y, and +/-Z directions), 3 times each*9
Material	ABS
Degree of protection	IP30
Mounting method	Screw mounting, hook, floor installation
Dimensions (WDH)	117.2×24.6×56.8 mm (excluding protruding part)
Weight (packaged)	Approx. 500g
Accessories	Instruction Sheet, Startup Guide, AC adapter or DC power supply cable*10, alarm output connector*11

\*1 Power saving mode. The display is always OFF in default setting (It turns ON with

- button operation). Network communication with the host device is not available.
- \*2 A mode in which a Differential Pressure Station is connected with an Air Particle Sensor (ZN-PD□□-S) by LAN cable to log the particle count value and differential pressure data to the SD card simultaneously.
  - \*3 Automatically writes data into the SD card when the internal memory reaches the upper limit, and continues recording until the SD card will reach the capacity limit. If the SD card is not inserted when the internal memory reaches the upper limit, recording ends. (Data can be output to the SD card by pressing the button after inserting the SD card.)
  - \*4 A mode to record the latest measurement value for the maximum capacity of the internal memory at all times. (when reaching the upper limit of the internal memory, data item will be discarded from the oldest.)
  - \*5 Output when the value exceeds the upper limit that has been set in threshold value setting mode, or falls short of the lower limit.
  - \*6 Except for Air Particle Sensor connection mode.
  - \*7 Nickel metal hydride batteries or alkaline batteries can be used. Manganese batteries cannot be used.
  - \*8 The battery life varies according to measurement environment, sampling, measurement operation mode, battery's type and performance.
  - \*9 In case using Mounting Magnet ZN9-EM01-S (sold separately), install the product in a location where impact is not applied.  
Vibration resistance is 10 to 50 Hz, double amplitude 0.3 mm, acceleration 20 m/s<sup>2</sup>, 50 min for each in X, Y and Z directions.
  - \*10 AC adaptor comes with ZN-DPX11-S. DC power supply cable and the ferrite core comes with ZN-DPX11-SA.
  - \*11 The attached connector is XW4B-02B1-H1.



# Appendix

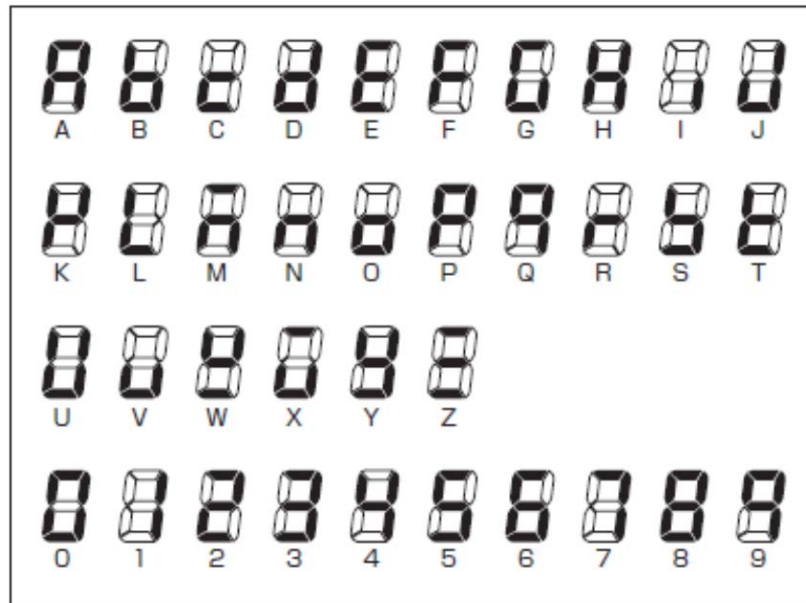
## List of Displayed Errors

Display Upper/lower	Content	Action to be taken
DATA E1100	Failed to write measured data	Failed to write the recorded data to the SD card due to no free space or card being removed during writing. Insert the writable SD card. Hold the MODE key for 3 seconds or more to release the error display.
SEN E2000	Sensor error	The sensor Head is not connected. Connect the Sensor Head properly.
NO SD E3000	SD card not inserted	SD card is not inserted. Insert the writable SD card. Hold the MODE key for 3 seconds or more to release the error display.
BATLO E3001	Unable to access SD card	Unable to access to the SD card due to low battery voltage. Replace the battery or connect to the AC adapter. Hold the MODE key for 3 seconds or more to release the error display.
SDLCK E3002	SD card write prohibited	Writing to the SD card is prohibited. Insert the writable SD card. Hold the MODE key for 3 seconds or more to release the error display.
SD ER E3003	SD card recognition error	Failed to recognize the SD card. Insert an appropriate SD card. Hold the MODE key for 3 seconds or more to release the error display.
PDINT E4000	Air Particle Sensor (ZN-PD□□-S□) communication initialization error	Air Particle Sensor cannot be initialized. Connect with Air Particle Sensor properly. Hold the MODE key for 3 seconds or more to release the error display.
PD-S E4001	Air Particle Sensor (ZN-PD□□-S □)measurement acquisition error	Failed to obtain the measured value from the Air Particle Sensor. Connect with the Air Particle Sensor properly. Hold the MODE key for 3 seconds or more to release the error display.
RESTR E5000	Invalid setting file data	The setting data within the SD card is invalid due to invalid model type or setting value. Hold the MODE key for 3 seconds or more to release the error display.
BCKUP E5001	Failed to write the setting file	Failed to write to the SD card of the setting file due to no free space or writing prohibited. Insert a writable SD card. Hold the MODE key for 3 seconds or more to release the error display.
RESTR E5002	Failed to read the setting file	There is not setting file in the SD card. Insert the SD card in which the setting file has been written. Hold the MODE key for 3 seconds or more to release the error display.

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HARD E****	Hardware error	There may be a hardware error. Please contact the distributor or OMRON representative office to inform the displayed error code.
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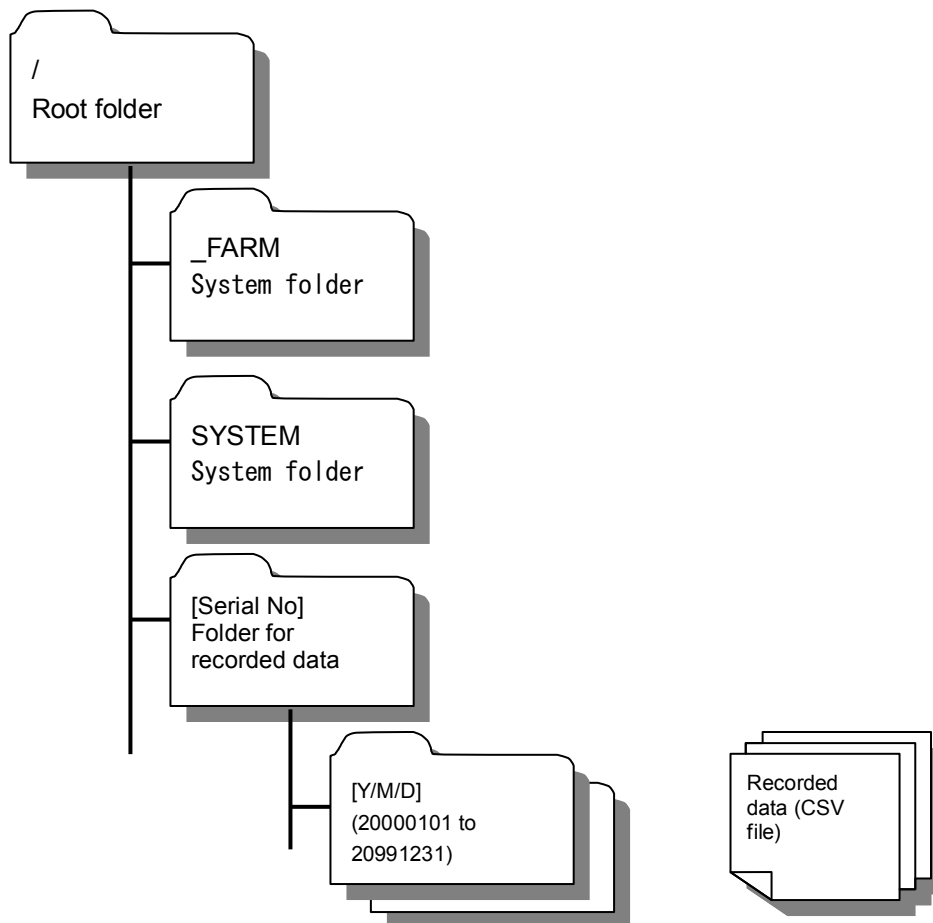
## List of Displayed Characters



Display	Character strings	Display	Character strings	Display	Character strings
	CYCLE		SDISP		DP HI
	MEAS		OFF		DP LO
	PD-S		ON		HOLD
	MODE		DISP		RESET
	REC		NORM		DONE
	INIT		MAX		DATA
	ETC		MIN		SEN
	RESTR		AVE		NO SD
	BCKUP		NET		SDLCK
	TIME		SLEEP		HARD
	YEAR		IP		
	MONTH		SUB		
	DAY		CONT		
	CLOCK		RING		

Major messages

## Configuration of SD Card Folder



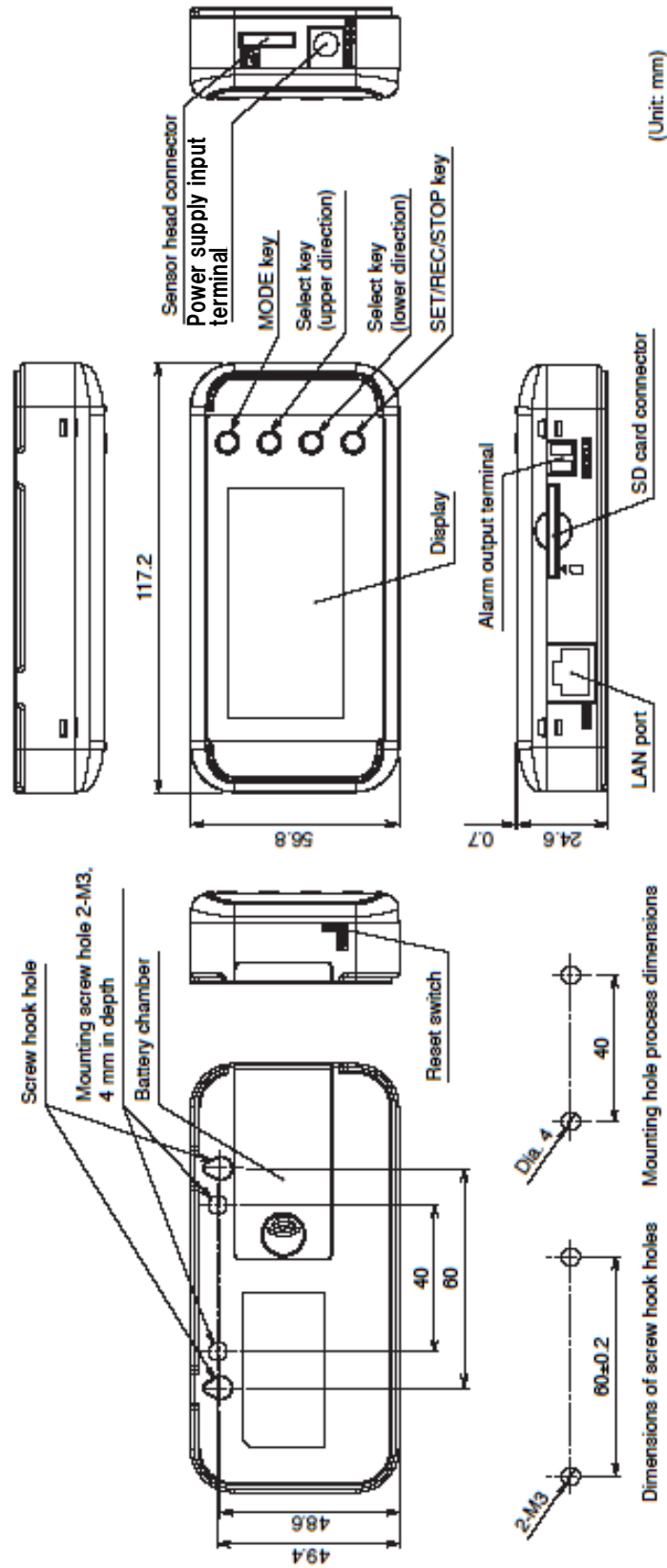
File/folder name	Content
_FARM	For system. Do not change the file name or internal file.
SYSTEM	For system. Do not change the file name or internal file.
“Serial No”	Folder to store recorded data. The serial number of the Differential Pressure Station is used for the folder name.
“Y/M/D”	Subfolder to store recorded data. Recorded date (YYYYMMDD) is used for the folder name. The recorded data file is CSV format. The file name is as follows. “Hour, minute, second + serial No” .CSV Example: 12345601.CSV Recorded data file written to the file at 12:24:56.

## Calibration

Calibration is not required for the Differential Pressure Station unit.

Perform calibration for the Differential Pressure Sensor Head (ZN-DPS1□□-S). Read the Instruction Sheet of the Sensor Head.

# Dimensions

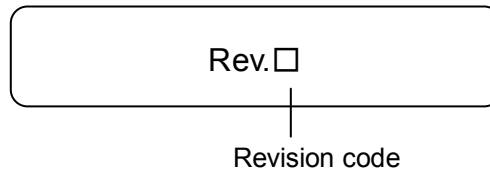


## Revision History

The specifications of this product you have just purchased are subject to changes in adding new functions or making improvements. This operation manual will be revised whenever such changes incur with the changes reflected on its contents. The revised manual contains the history of revision with the manual revision codes and the revision descriptions.

### About the manual revision code

The manual revision code is affixed to the tail of the “Rev. No.” given in the lower right corner of the manual.



### History of Revision

Revision code	Date	Description of revision
A	January 2011	First edition
B	June 2011	Addition of DC power supply cable model
C	July 2011	Correction of error in writing in table of contents.
D	October 2011	Correction of descriptions.
E	November 2011	The description of Station Utility is Separated into the new manual.
F	February 2012	Power-supply-voltage clerical error correction
G	December 2016	Revised due to change of PC software distribution method.

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