KANOMAX

ANEMOMASTER

MODEL 6113/6114/6115

Operation Manual

Please read this operation manual carefully and understand the warnings described in this manual before operating the instrument.

Keep this manual handy for ready reference.

05001
08.04

List of Components

MODEL 6113/6114/6115

Item	Model	Qty	Features	6113	6114	6115
Main Body	6113-0J	1	-	●	—	—
	6114	1	-	—	●	—
	6115	1	-	—	—	●
Probe	6113-01	1	Air Velocity/Temperature Probe	●	●	●
Extension Rod	6112-03	1	960mm Probe Extension	●	●	●
Shoulder Strap	-	1	-	●	●	●
Operation Manual	-	1	-	●	●	●
C-size Manganese Batteries	-	6	-	●	●	●
Printer	-	1	Built-in Thermal Printer	●	×	×
Pressure Sensor	6113-07	1	Pos/Neg Static Pressure Measurement Ports	△	△	●
Spare Probe	6113-01	1	Air Velocity/Temperature Probe Spare	△	△	△
Analog Output	6113-08	1	Analog Output Terminal	△	△	△
AC Adapter	6113-02	1	Power Supply	△	△	△
RS232C Cable	6000-02	1	RS232C Communication Cable	△	△	△
Portable ANEMOMASTER Measuring Software	S600-00	1	Data Collection Software	△	△	△

●: Standard　　△: Optional　　×: N/A

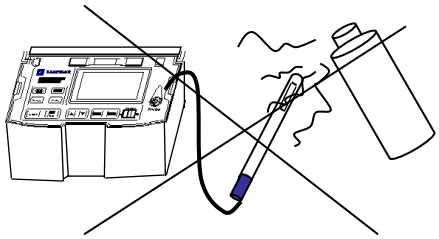
Safety Precautions

PLEASE READ CAREFULLY BEFORE PROCEEDING

These precautions explain how to use the device correctly and safely, thereby preventing injury to yourself or to others. This section has been sub-divided into a WARNING section and a CAUTION section, according to the likelihood and nature of any potential injuries or damage inflicted. They relate to your personal safety, and also help you minimize the risk of damaging the device. Please read these sections carefully before proceeding.

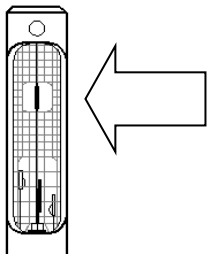
WARNING

Always follow the basic precautions listed below to avoid the possibility of serious injury or even death from electrical shock, short-circuiting, damages, fire or other hazards. These precautions include, but are not limited to, the following:

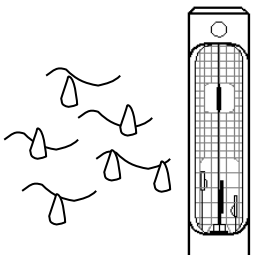


- Do not install the probe in an area where flammable gas is present. Otherwise, there is an increased risk of fire or even explosion.

- Do not open the device or attempt to disassemble or modify it. Otherwise, there is an increased risk of electrical shock or fire. The device contains no user-serviceable parts. If it appears to be malfunctioning, have it inspected by qualified service personnel.



- Do not insert fingers or foreign objects into the device. Otherwise, there is an increased risk of personal injury (such as burning yourself), electrical shock, and damage to the device or fire. Please take particular care if small children are present.



- Do not expose the device to rain, use it near water or in damp or wet conditions or place containers on it that contain liquids which might spill into any openings. Otherwise, there is an increased risk of electrical shock, fire or personal injury.

- Follow the Operation Manual carefully.
  Otherwise, there is an increased risk of personal injury, electrical shock, fire or damage to the unit. Follow the correct procedure when setting up the device.

- If unusual smells, sounds or smoke emanate from the device or if liquids enter the device, switch the device off immediately and take out the batteries and/or unplug it from the power outlet.
  Otherwise, there is an increased risk of electrical shock, fire or damage to the device. Return the device immediately to the nearest KANOMAX authorized service center.

CAUTION

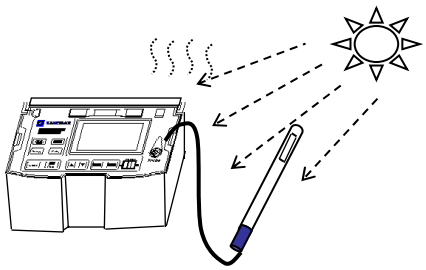
Always follow the basic precautions listed below to avoid the possibility of physical injury to yourself or others, or damage to the instrument or other property. These precautions include, but are not limited to, the following:

- Always unplug the anemometer from the electrical outlet if it will not be used for a prolonged period of time if there is a risk of lightning.
  Otherwise, there is an increased risk of electrical shock, short-circuiting or fire.

- Always take out the batteries before storing.
  Otherwise, there is an increased risk of damage from battery leakage.

- Do not leave exhausted batteries in the unit.
  Otherwise, there is an increased risk of damage from battery leakage.

- Do not expose the device to excessive heat or vibrations or extreme cold or heat (such as in direct sun light or near heater).
  Otherwise, the main body may become disfigured or the internal components may be damaged and no longer function properly.



- When cleaning the device, never use benzene, paint thinners, detergents or chemical-impregnated wiping cloths. Do not place vinyl, plastic or rubber objects on the device or the device may be damaged or its main body may become discolored or disfigured. Use a soft dry cloth to wipe the device.

- Do not impact the device by resting your weight on or placing heavy objects on the device; do not use excessive force on the buttons, switches or connectors.
  Otherwise, there is an increased risk of damage to the device or personal injury.

- Have the device serviced regularly to ensure proper operation and accuracy. For information regarding service, contact your nearest KANOMAX Office or KANOMAX authorized service center. It is recommended the device be calibrated once a year.

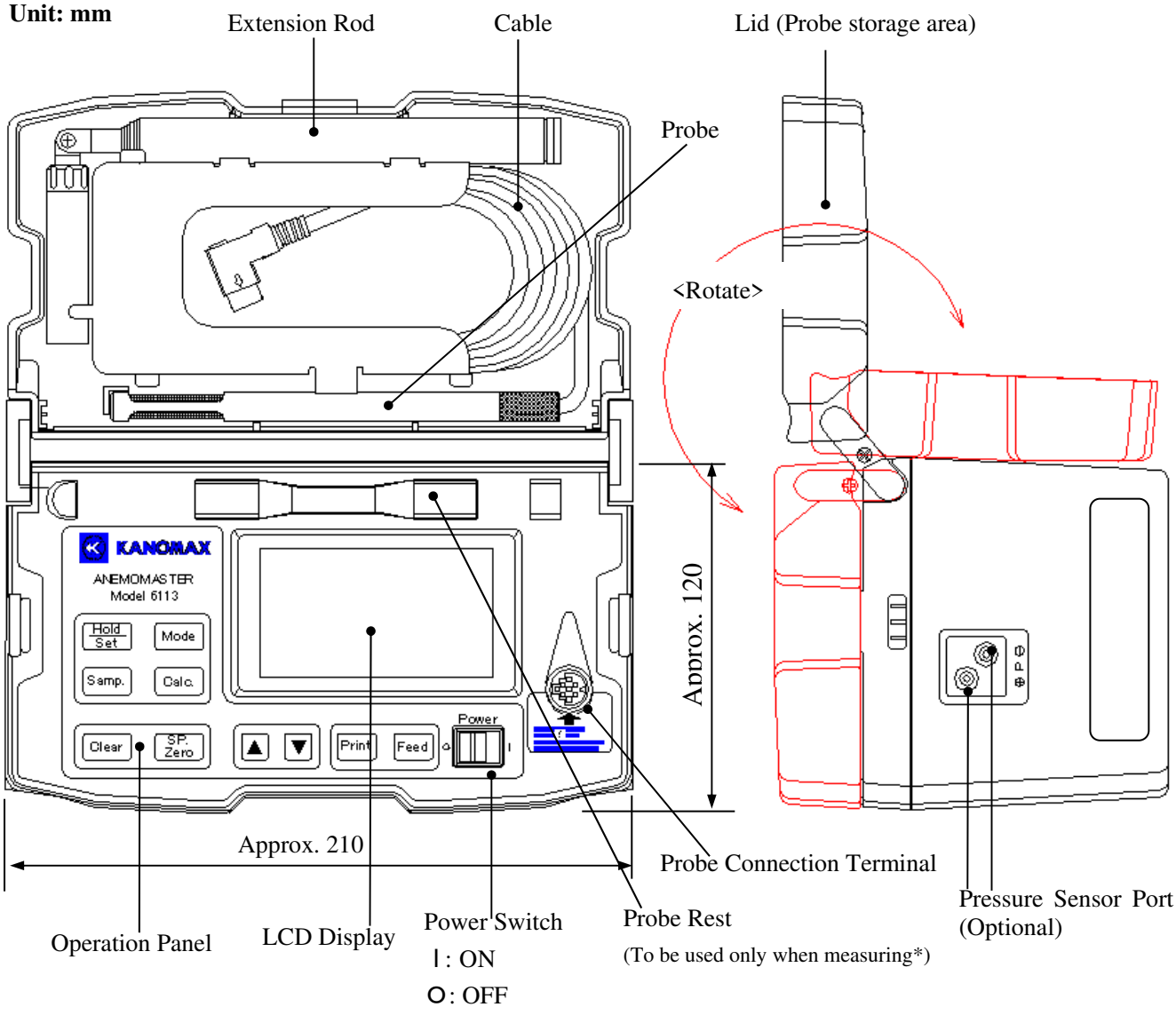
- The sensor is very sensitive to static electricity. Please handle with care.

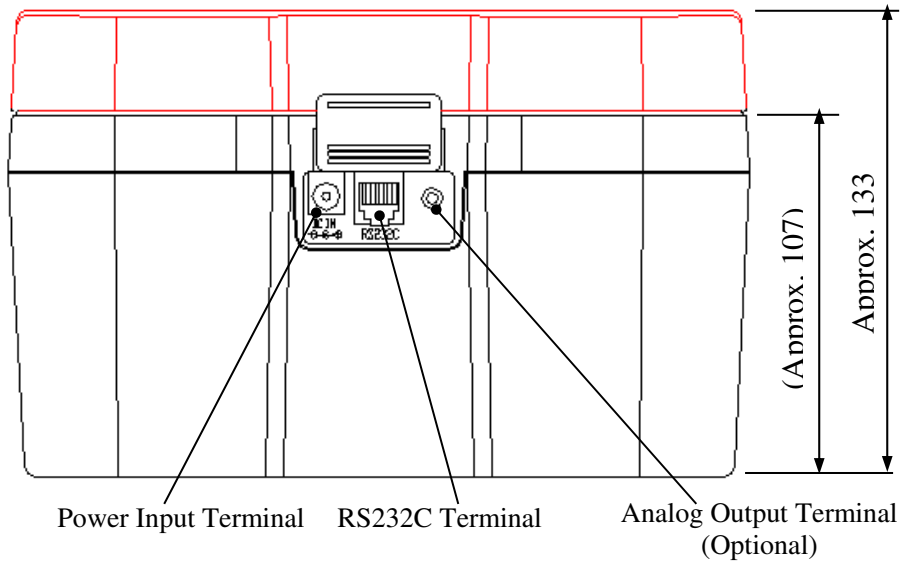
Table of Contents

1. Part Names and Functions

1.1 Main Body

Unit: mm

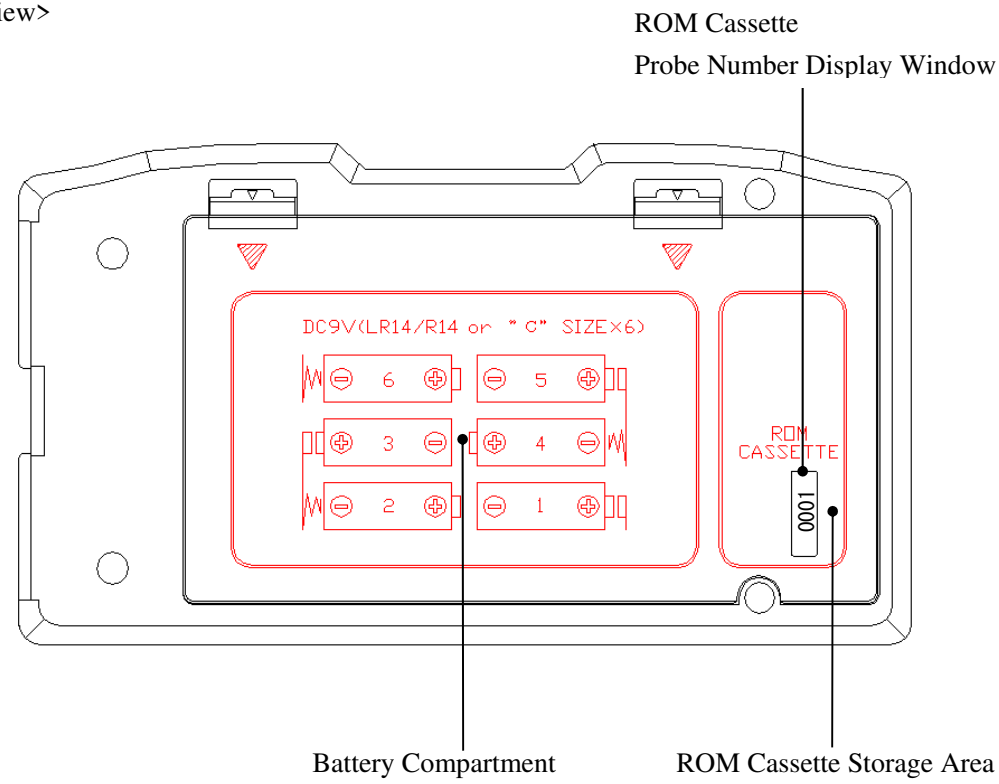




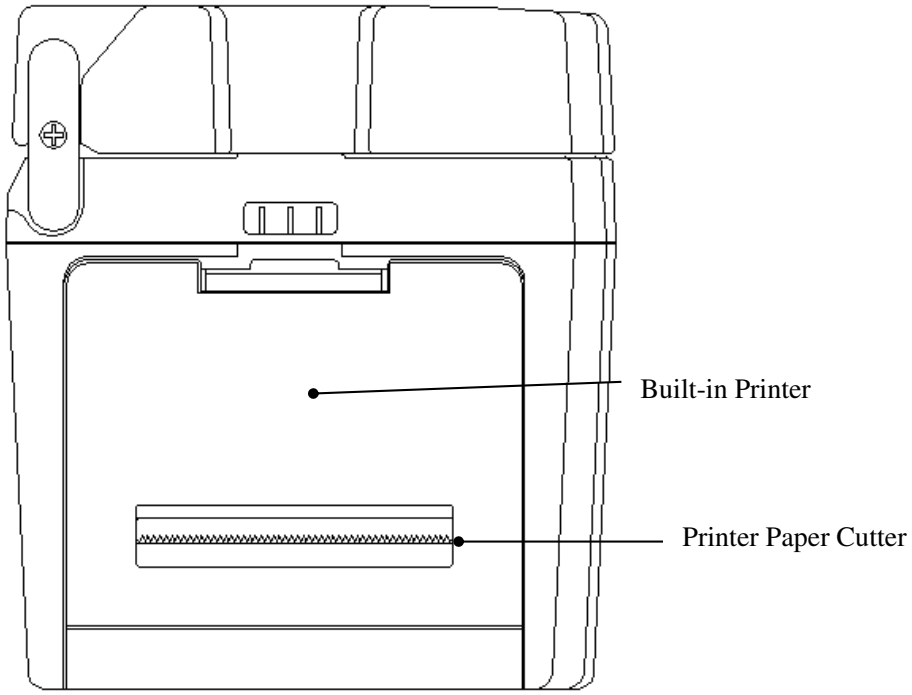
*** Caution**

When you close the lid, make sure to disconnect the probe from the probe connection terminal and store it in the probe storage area. Closing the lid while the probe is still placed on the probe rest may cause damage to the probe cable.

<Bottom View>



<Left Side View>



1.2 Operation Panel

When a key is pressed, you will hear a confirmation beep. You can turn the beep off in the function setting.

Hold/Set Key:

Press this key to hold/release the displayed value of the measurement mode.

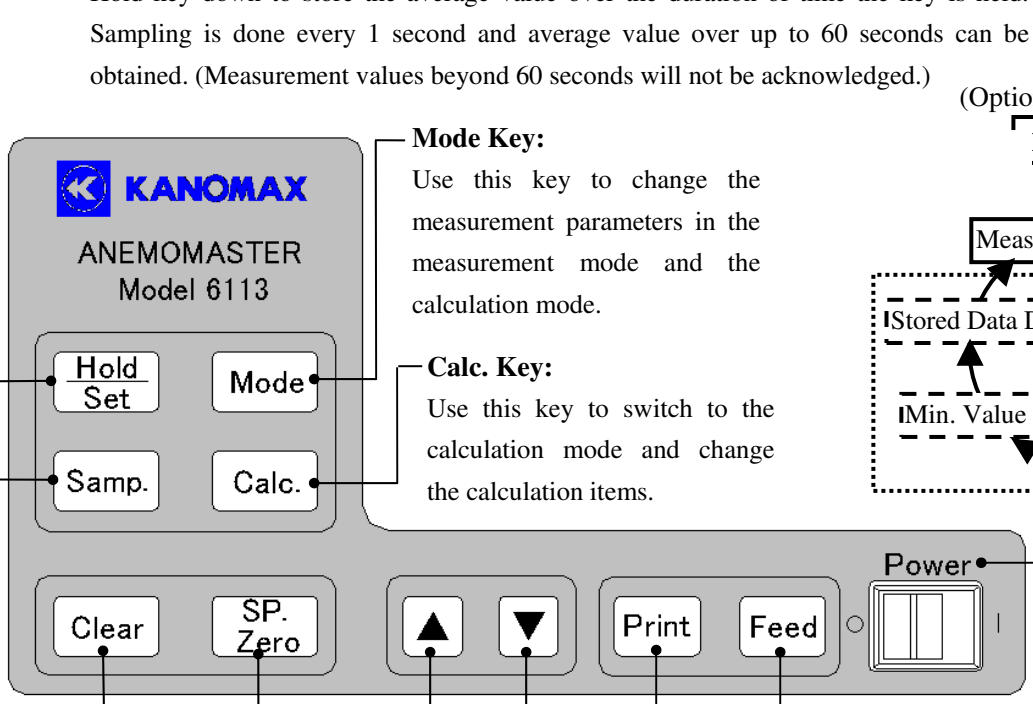
Also use this key to save the selected item in time/date setting mode and function setting mode.

Samp. Key

Press this key briefly to store the displayed value. (All measurement parameters will be stored.)

The maximum number of memory is 100.

Hold key down to store the average value over the duration of time the key is held. Sampling is done every 1 second and average value over up to 60 seconds can be obtained. (Measurement values beyond 60 seconds will not be acknowledged.)

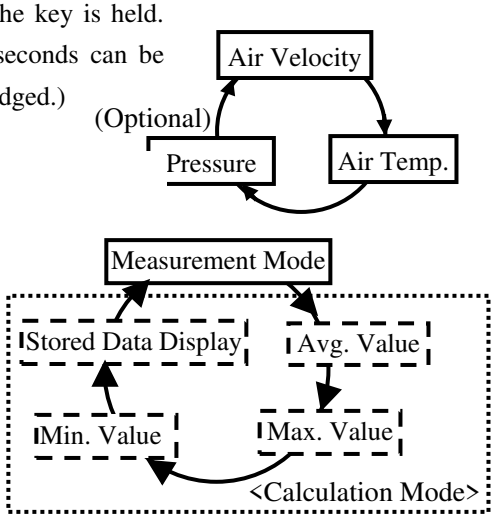


Mode Key:

Use this key to change the measurement parameters in the measurement mode and the calculation mode.

Calc. Key:

Use this key to switch to the calculation mode and change the calculation items.



Power Switch

Turn ON/OFF the power

I:ON

O:OFF

Clear Key

- **When the stored data is displayed:**
  Press this key for one second or longer to delete the last piece of data stored in the memory.
- **In the function setting mode:**
  Use this key to exit setting
- **While printing:**
  Use this key to stop printing.
  (Note that you cannot stop printing the data that has already been transmitted to the printer.)

SP. Zero Key (Optional for 6113/6114)

To adjust the zero point, hold down this key for over 2 seconds when the pressure value is displayed in the measurement mode.

Feed Key (6113 only)

Each time you press this key, the printing paper is fed by 1 line.

▲Key

Press this key in the measurement mode to select a time constant from 1, 5, or 10 seconds for moving average deviations.

▼Key

Press this key to select the range of the bar graph from 1, 5, 10, 25, or 50m/s when you are in the measurement mode.

* You can also use ▲ and ▼ keys to select parameter or to move numeric value up or down.

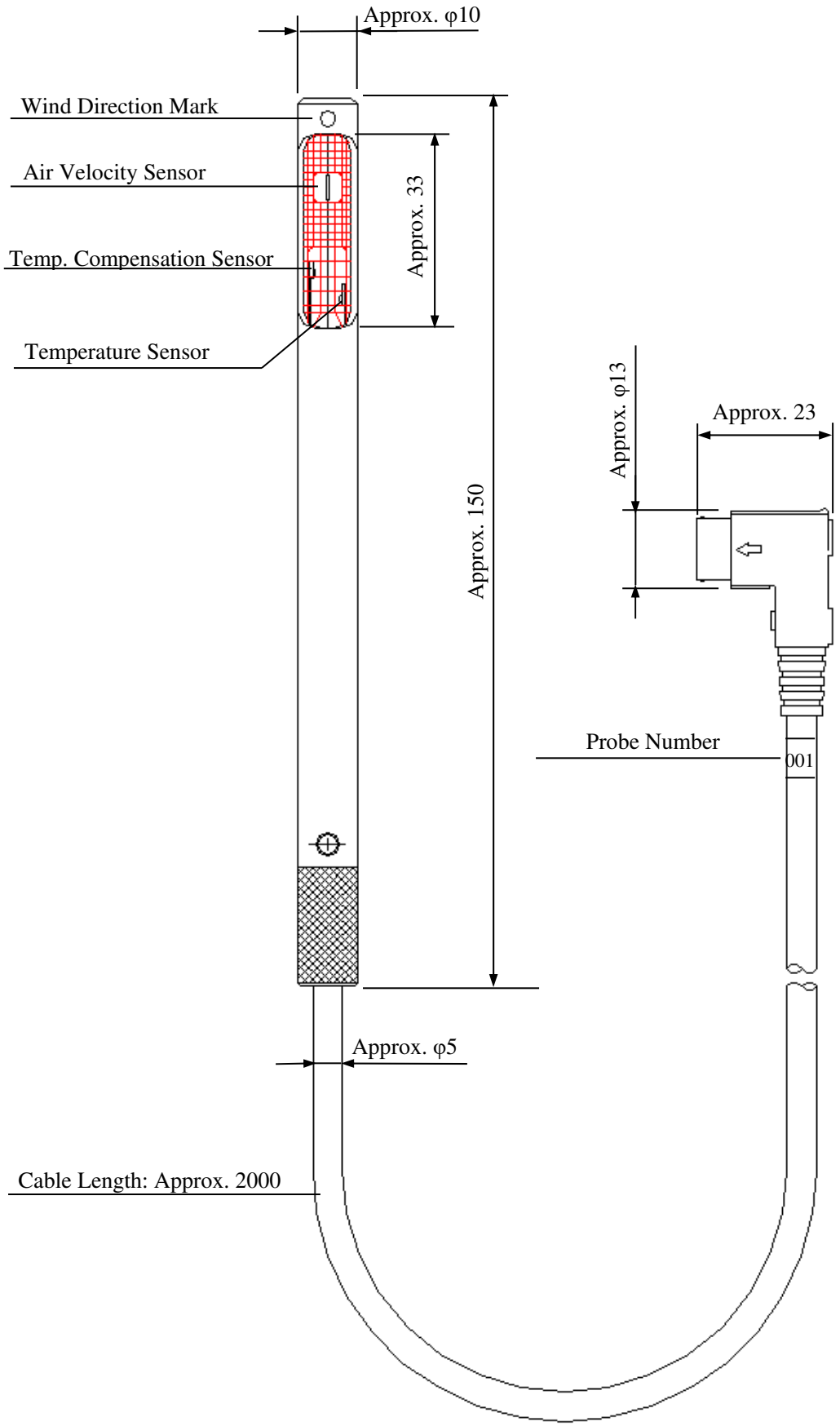
Print Key (6113 only)

Press this key in the measurement mode to print out the displayed value. (All measurement parameters will be printed out.)

In the calculation mode, the calculation results (Ave., Max. and Min.) of the data stored in the memory will be printed out.

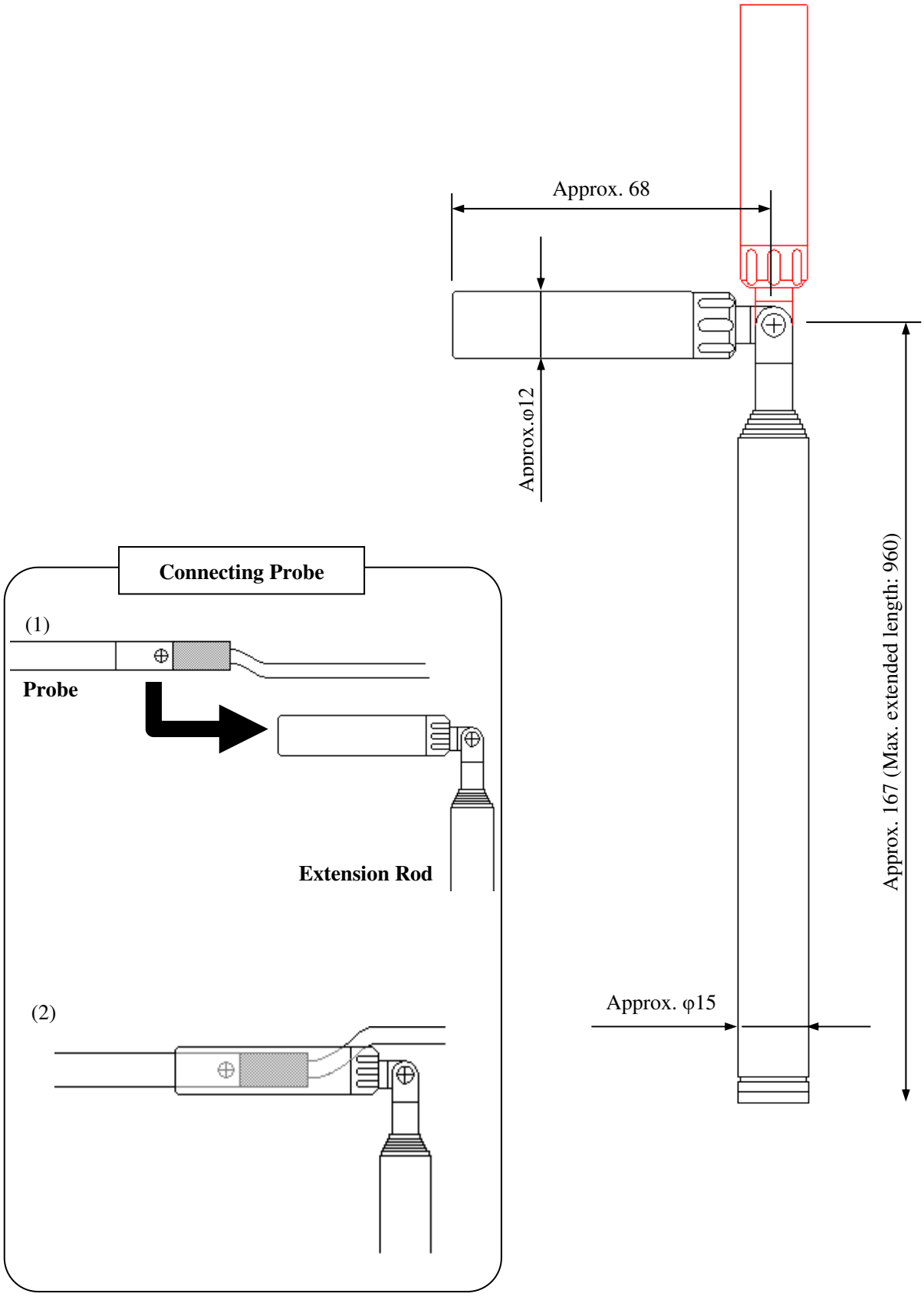
1.3 Probe

Unit: mm



1.4 Extension Rod

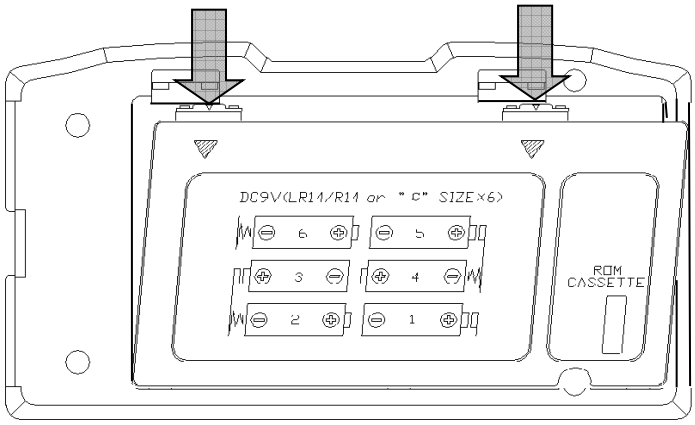
Unit: mm



2. Getting Started

2.1 Installing Batteries

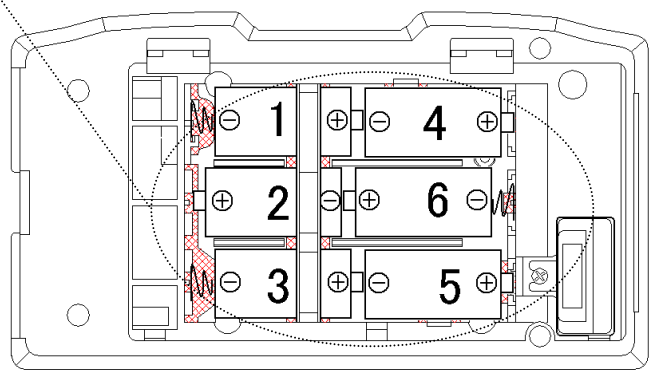
<Bottom View of the Instrument>



1) Press lightly with your fingers at points indicated and pull to open the battery cover.

2) Insert batteries in the order shown in the picture (1-6) making sure the polarity of the batteries. This instrument requires six (6) C-size batteries. Types of batteries that can be used are: **Manganese, Alkaline or Ni-Cd batteries**. Do NOT mix different types of batteries. Mixing different types of batteries may cause battery leakage or damage to the instrument.

*Batteries CANNOT be recharged by the (optional) AC adaptor.



3) Put the battery cover back on by reversing the above procedure.

Types of batteries that can be used
- C-size Manganese Batteries
- C-size Alkaline Batteries
- C-size Ni-Cd Batteries

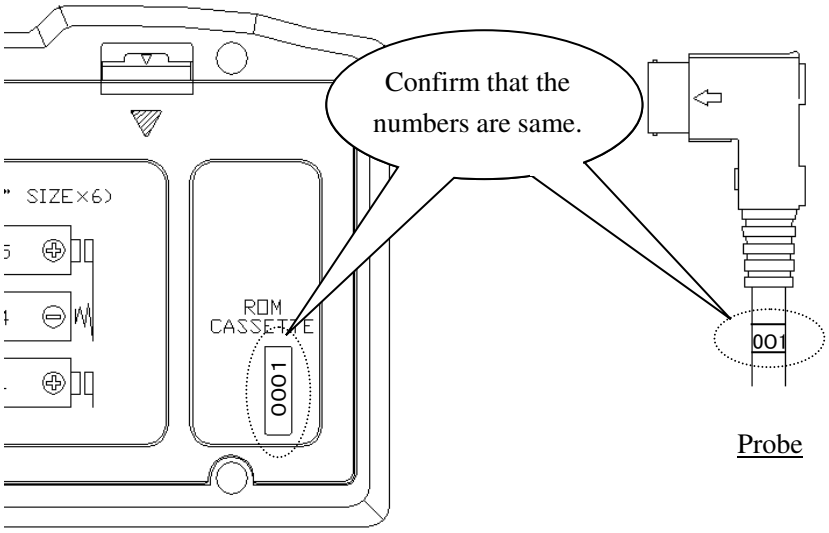
2.2 Confirming Probe Number

Confirm that the number on the probe and the number on the instrument (indicated on the ROM cassette in the bottom of the instrument) are same.

* You need to confirm the probe number if you purchase multiple units or if you own a spare probe.

(The probe number on the instrument is also displayed on the LCD when you turn the power on. See "2.4 Turning ON/OFF the Power" for details.)

Each probe's property data is written in the ROM cassette installed underneath the instrument.
Each Probe has different characteristic. Therefore, in order to make a measurement properly, make sure to confirm the numbers on the instrument and on the probe are same.



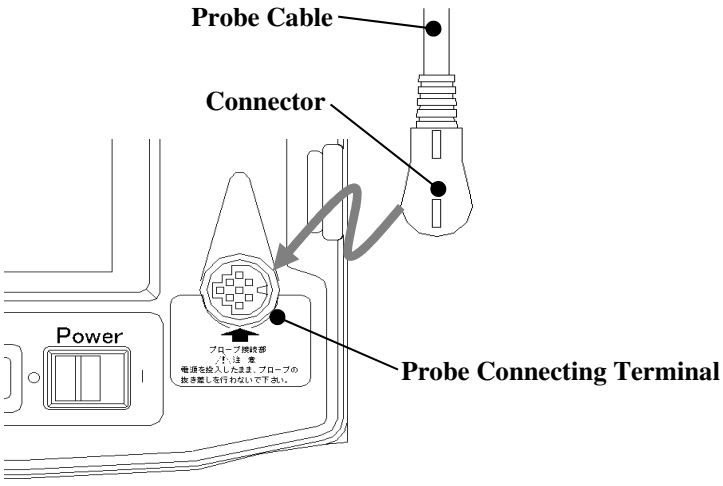
Probe

Bottom view of the instrument

2.3 Connecting Probe

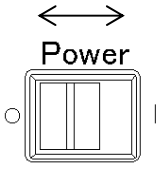
Connect the probe to the probe connecting terminal located at the instrument ensuring the connector's angle as shown in the illustration below.

* Make sure that the power is OFF when connecting or disconnecting the probe.
* Do not squeeze the connector into the terminal ignoring the connector's angle or do not twist the connector after the probe is connected as they will cause damages.
* When you close the lid, make sure to disconnect the probe connector as it may cause damages to the probe cable.



2.4 Turning ON/OFF the Power

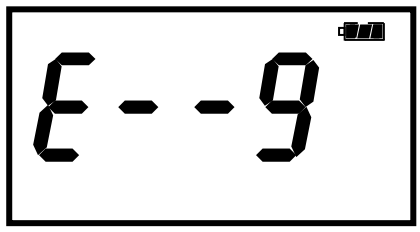
After you connect the probe to the instrument and turn the power ON, the software version followed by the probe number will be displayed. Then the Normal Measurement screen will show up.



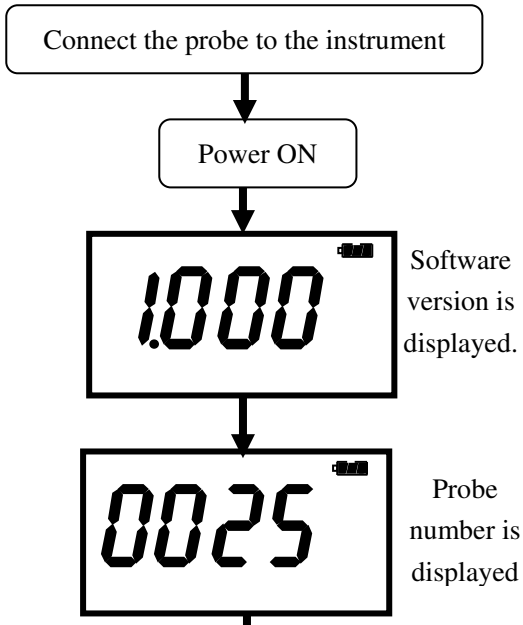
Power Switch

I ON (Turn the power ON)

O OFF (Turn the power OFF)

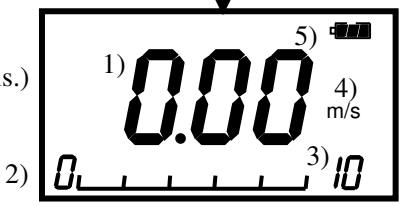


When the ROM Cassette is not properly installed, the error code, "E--9", shown above will be displayed and the instrument will make an error sound.
(Refer to page 37 for Error Code.)
Turn off the instrument and check if the ROM Cassette is properly installed.



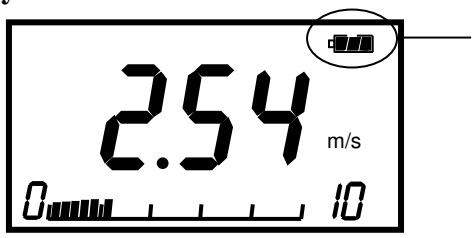
Display Icons
(Normal Mode: Refer to "3. Normal Measurement" in page 11 for details.)

1) Reading or Setting Value
2) Bar Graph
3) Bar Graph Max Value
4) Unit
5) Battery Level Indicator



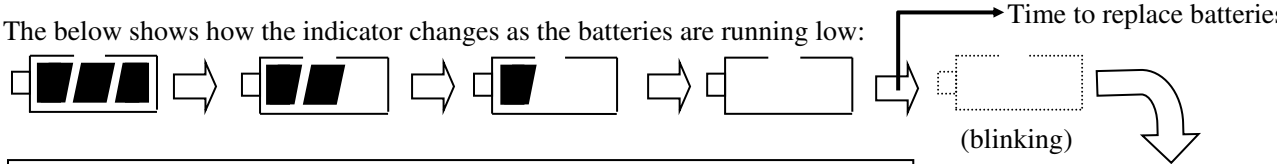
Normal Measurement Mode

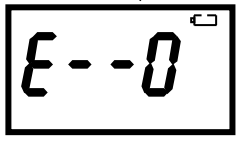
§ Battery Level Indicator



See the Battery Level Indicator in the upper right corner to check the remaining battery level. The battery consumption depends on the air velocity to be measured. When the battery level drops to a level requiring replacement, the indicator starts blinking. Note that it may stop measuring if the indicator starts flashing.

The below shows how the indicator changes as the batteries are running low:



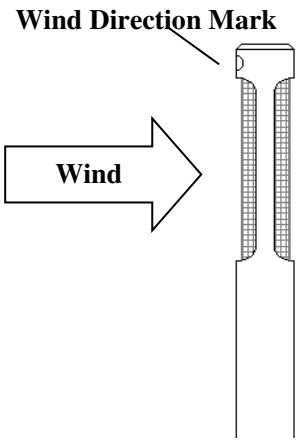


(Operation Halt)

--Operation Halt State--
When the error code, "E--0", shows up, the instrument will become inoperable even when a measurement is being performed. Also please note that the data will NOT be saved in this situation.

2.5 Precautions for Measurement

2.5.1 Air Velocity Measurement Precautions



- Probe has its own directivity characteristics. Make sure that the wind direction mark is facing against the airflow. (For details on the directivity characteristics, refer to "12 Probe Directivity" in page 36.) If you are not sure of the wind direction, slowly rotate the probe and make a measurement at the point where you get the maximum air velocity reading.
- The probe uses the air velocity sensor with the temperature compensation sensor to compensate air velocity change caused by temperature change. In order to obtain this compensation effect, both of the sensors must be evenly exposed to the airflow under the same temperature condition.
- For measurement in the environment with rapid temperature change, you must wait for the reading to become stable after measuring for 20 seconds or longer.

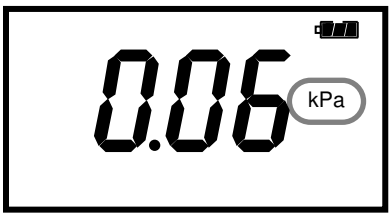
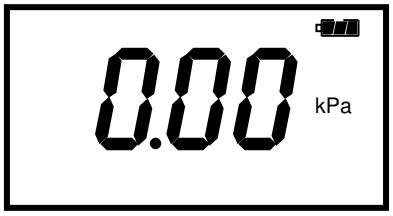
2.5.2 Air Temperature Measurement Precautions

- The response time for temperature measurement improves as the air velocity becomes faster. When the air velocity is 1m/s, the response time is approximately 30 seconds. Wait for the reading to become stable before taking the data.
- When a measurement is performed in a no-airflow condition, the air temperature reading may become higher than the actual due to the heat generated by the air velocity sensor. It is recommended that the measurement is performed in an environment with at least 0.1m/s airflow to obtain accurate reading.

2.5.3 Pressure Measurement Precautions

- Only the model 6115 has the pressure measurement function. If you are using the model 6113 or 6114, you can add this function as an optional extra.
- Do not apply pressure of more than 75kPa to the pressure sensor. Excess pressure may cause serious damage to the sensor.
- The operating temperature is 5-40℃, when measuring pressure. The instrument may not operate properly outside this temperature range.
- Be sure to perform a zero adjustment before measuring pressure. When performing a zero adjustment, leave both pressure ports, (+) and (-), open.

<Zero Adjustment Procedure>

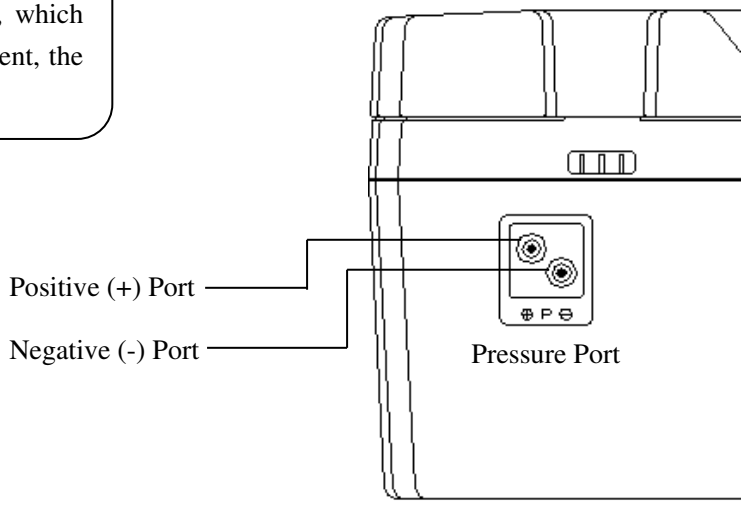
DISPLAY	PROCEDURE
	Press [Mode] key in the Measurement Mode to select pressure measurement. Each time you press the [Mode] key, the measurement item changes in the order of Air Velocity -> Air Temperature -> Pressure.
	If you hold down [SP. Zero] key for over 2 seconds, you will hear a long beep sound, and the pressure will be indicated as "0.00".

<Connecting Pressure Tube>

Connect the pressure tube to the (+) or (-) port.

Connect the other end of the tube to the port (e.g. duct) where the pressure is to be measured.
When the pressure to be measured is positive, connect the tube to the positive (+) port. And when it is negative, connect the tube to the negative (-) port.

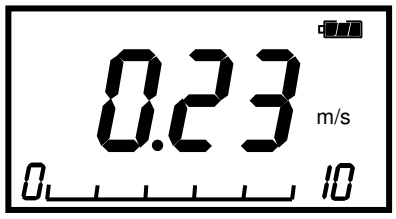
In order to make an accurate measurement, make sure that the tube does not have any holes, which could cause air leakage. Also if the tube is bent, the measurement will not be accurate.



3. Normal Measurement

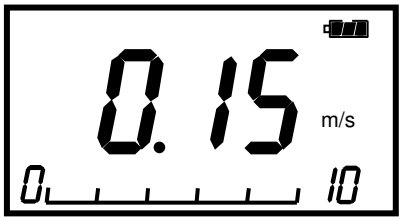
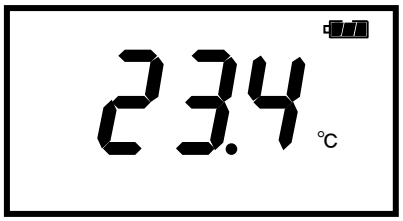
***** Measurement Mode *****

When the instrument is turned ON, the air velocity measurement screen will display automatically.
The displayed measurement data is updated every 1 second.

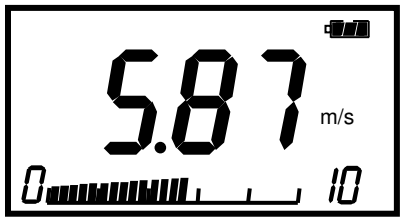


<Air Velocity Measurement Display>

3.1 Changing Measurement Mode

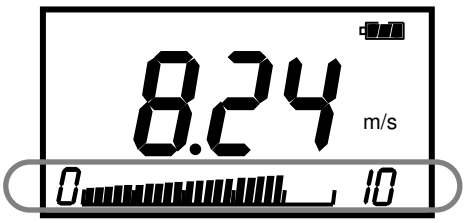
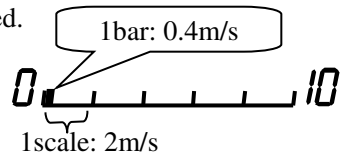
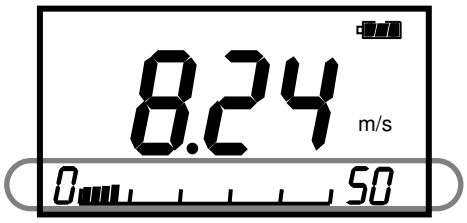
DISPLAY	PROCEDURE
(1) 	When the Normal Measurement screen in the left shows up, press [Mode] key. In the measurement mode, press [Mode] key to change the screen in the order of; (2) Air Temperature Measurement Screen -> (3) Pressure Measurement Screen (optional for 6113 and 6114) -> (1) Air Velocity Measurement Screen.
(2) 	**<Air Temperature Measurement Screen>** ∗ When measuring air temperature, there will be no bar graph displayed under the measurement value.
(3) 	**<Pressure Measurement Screen>** ∗ When measuring pressure, there will be no bar graph displayed under the measurement value. ∗ The pressure measurement screen does not display if the instrument does not have the pressure measurement function.

3.2 Holding the Reading

DISPLAY	PROCEDURE
	While the Normal Measurement screen (Measurement Mode) is on the screen, press [Hold Set] key. (You can also use this function in the Air Temperature Measurement Mode and Pressure Measurement Mode.)
	Hold mark will appear at the upper right of the display while the reading is held. Press [Hold Set] key again to release the hold mode.

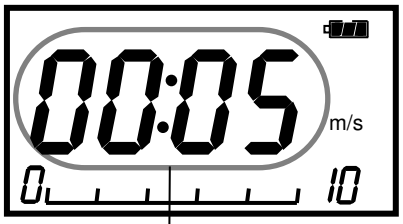
3.3 Changing the Display Range of the Bar Graph

Bar graph shows up only when measuring air velocity.

DISPLAY	PROCEDURE
	Press [▼] key when the Normal Measurement mode screen (Air Velocity Measurement Mode) is displayed. * In the default setting the range is 0~10m/s and each scale is equivalent to 2m/s. 
	The value on the right end of the bar graph changes. Now the range is 0~25m/s. (Each scale is equivalent to 5m/s.)
	Each time you press [▼] key, the value on the right end of the bar graph changes. The range changes in the following order: <Default Setting> 0~10m/s (1scale: 2m/s, 1bar: 0.4m/s) → 0~25m/s (1scale: 5m/s, 1bar: 1m/s) → 0~50m/s (1scale: 10m/s, 1bar: 2m/s) → 0~1m/s (1scale: 0.2m/s, 1bar: 0.04m/s) → 0~5m/s (1scale: 1m/s, 1bar: 0.2m/s) → 0~10m/s * Once you turn the power OFF, the setting will return to the default setting (0~10m/s).

3.4 Changing Time Constant

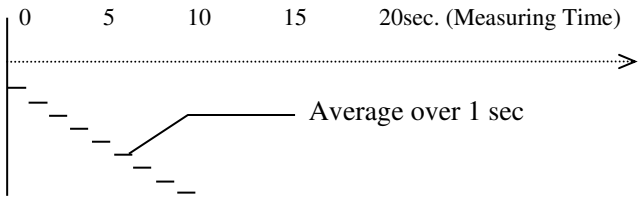
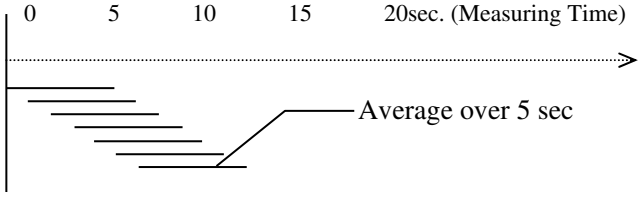
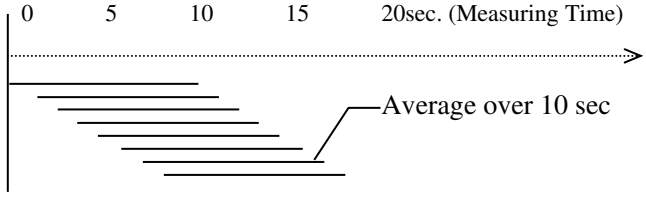
You can change the Time Constant only when measuring air velocity. The Time Constant for air temperature and pressure (optional for 6113/6114) is fixed at 1 second.

DISPLAY	PROCEDURE
 Time Constant	As you press ▲ key when the Normal Measurement screen (Air Velocity Measurement Mode) is displayed, the configured time constant shows up for a moment as shown in the left and then the time constant for measurement value will be changed. * The default setting is 1 second. Every time you press ▲ key, the time constant changes to 1sec, 5sec and 10sec. You can select Time Constant from 1sec, 5sec and 10sec. 00:01-----Moving average deviation over 1sec will be displayed. 00:05-----Moving average deviation over 5sec will be displayed. 00:10-----Moving average deviation over 10sec will be displayed. * Once you turn the power off, the time constant will revert to the default setting of 1 second.

*** * * What is Time Constant? * * ***

Time Constant is moving average deviations over a certain period of time. If you set the larger value for time constant, the reading will be stable. On the other hand, if you set the smaller value for time constant, the reading will be more responsive to the change in air velocity.

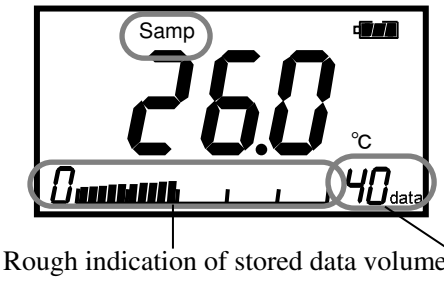
This function cannot be used in the Air Temperature Mode and Pressure Measurement Mode.

MODE	How to Take In Measurement Data	EXPLANATION
00:01 (1sec)		Take data 10 times in 1 second and display its average as an instantaneous value every 1 second.
00:05 (5sec)		Displays average value over 5 seconds every 1 second. Data shifts by every 1 second.
00:10 (10sec)		Displays average value over 10 seconds every 1 second. Data shifts by 1 second.

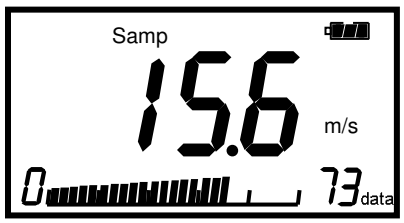
4. Saving and Deleting Measurement Data

4.1 Saving Measurement Data

(1) Saving Instantaneous Value

DISPLAY	PROCEDURE
	Press Samp. key when the Normal Measurement screen (Measurement Mode) is displayed. (This procedure can be performed in any measurement mode of measuring Air Velocity, Air Temperature, and Pressure.)
	As shown in the left, "Samp", the data number and a bar graph show up for a moment, and the measurement data for all of the measurement parameters (Air Velocity, Air Temperature and Pressure) will be stored as a set of data. (The bar graph shown momentarily is a rough indication of stored data amount.) The maximum amount of data that can be stored is 100.

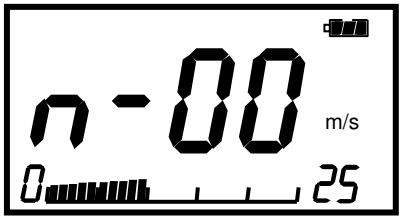
(2) Saving Average Value --- Saving average value of the consecutive data for maximum 60 seconds

DISPLAY	PROCEDURE
	Hold down Samp. key for more than a second when the Normal Measurement screen (Measurement Mode) is displayed. The average value of the data over the time the key is pressed is stored as a set of data. Sampling is performed every one second (you will hear a beep sound), and you can obtain the average data for a maximum 60 seconds. Also, while Samp. key is pressed, "Samp" and the data number will be on the screen. (For example, if you keep holding down Samp. key for 10 seconds, the single average value of 10 sampling values will be stored.) * If you keep pressing the key for longer than 60 seconds, you will hear an alarm and it will stop measuring average value.

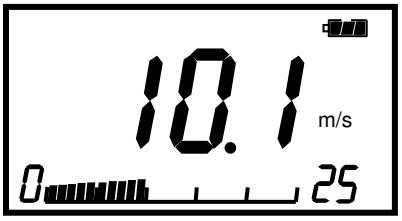
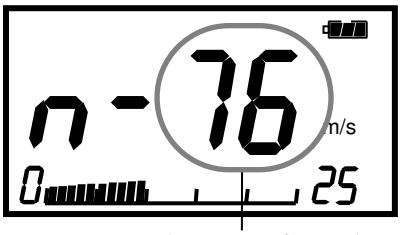
* Once the measurement data is stored, it will not be lost even after the instrument is turned OFF.
Also, when changing the batteries, the data will be kept with the built-in back-up batteries.
However, please note that if the built-in back-up battery is worn out over time, it is possible that data may not be kept.

4.2 Deleting Measurement Data

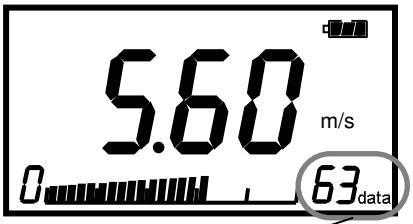
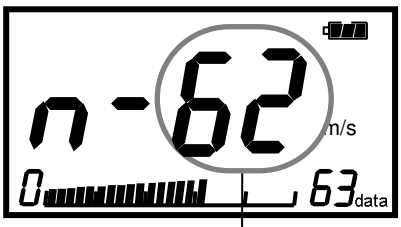
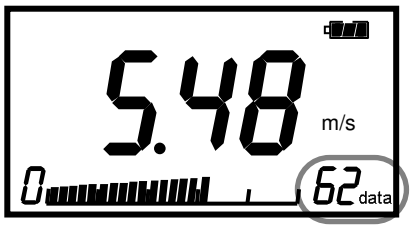
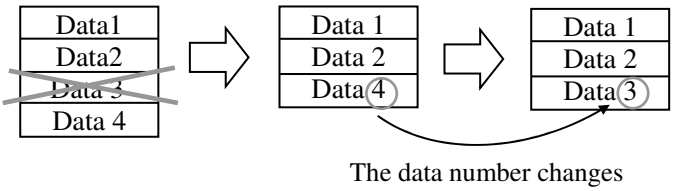
4.2.1 Deleting All: Deleting All Stored Measurement Data

DISPLAY	PROCEDURE
	Press [Clear] and [Mode] keys simultaneously for 4 seconds or longer on the Normal Measurement screen (Measurement Mode). Then "n-00" will be displayed as shown in the left, and all of the stored data will be deleted.

4.2.2 Deleting the Last Data: Deleting a Single Measurement Data Last Stored

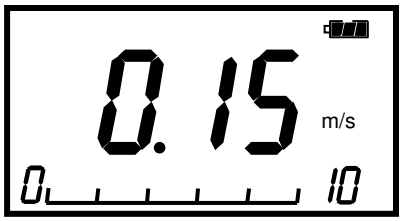
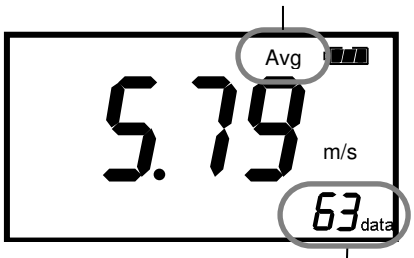
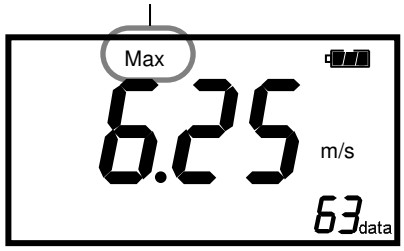
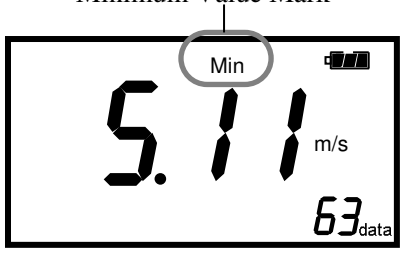
DISPLAY	PROCEDURE
 <Measurement Mode Screen>	Press [Clear] key for over a second in the Normal Measurement screen (Measurement Mode). (This procedure can be performed in any measurement mode of measuring Air Velocity, Air Temperature, and Pressure.)
 Total amount of stored measurement data	"n-xx" shows up as shown in the left, and the data stored at the last will be deleted. (The number representing by xx indicates the total amount of stored data after the deletion. "n-00" indicates that there are no stored measurement data.) The only data you can delete using this procedure is the last data you stored and the other data cannot be deleted. (For example, when 75 data is stored, you cannot delete the 40th data.)

4.2.3 Deleting Selected Data: Deleting Single Specified Stored Data

DISPLAY	PROCEDURE
 <Stored Measurement Data Display>	Press [Calc.] key 4 times on the Normal Measurement screen (Measurement Mode) to display the Stored Measurement Data Display in the Calculation Mode. (For details on Calculation Mode, refer to "5. Measuring AVG, MAX and MIN Value" in page 17.) Press [▲] [▼] key to select the number of the data you would like to delete.
	Press [Clear] key for 4 seconds or longer to delete the selected data. (This procedure can be performed in any measurement mode of measuring Air Velocity, Air Temperature, and Pressure.) When you hear a beep sound, the data is deleted and the total amount of the stored data is displayed. Then it will return to the screen showing the stored measurement data.
	To delete data successively, press [▲] [▼] key to select the data that you want to delete, and press [Clear] key for 4 seconds or longer to delete it. You can delete only one data at a time. After the selected page is deleted, the page number of the remaining data will shift up. (See example below.) Example: There are four data. If the 3rd data is deleted, the 4th data will be shifted up to the 3rd data, and the data from page 1 to page 3 will be remained. 

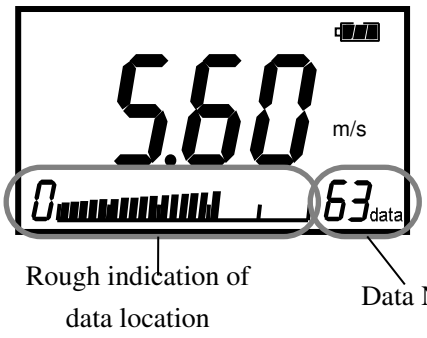
5. Measuring AVG, Max and Min Value *** Calculation Mode ***

Calculation Mode calculates the maximum, minimum, and average value of the stored data.
If there are no stored data, you must store measurement data first referring to "4. Saving and Deleting Measurement Data" in page 14.
The calculation is performed using all of the stored measurement data. (You cannot select certain data and perform calculation.)

DISPLAY	PROCEDURE
(1)  <Normal Measurement Display>	Press Calc. key on the Normal Measurement screen (Measurement Mode) to go to the Calculation Mode. (You can perform this procedure in any measurement mode of measuring Air Velocity, Air Temperature and Pressure.) In the Calculation Mode every time you press Calc. key, the display changes as follows: (2) Average Value Display (Avg) → (3) Max Value Display (Max) → (4) Minimum Value Display (Min) → (5) Stored Measurement Data Display → (1) Normal Measurement Display
(2) Average Value Mark  Total amount of stored measurement data	**<Average Value Display>** When the average value shows up, the total amount of stored measurement data is displayed at the bottom. In this mode every time you press Mode key, the average value of the followings is displayed as follows: Air Temperature → Pressure → Air Velocity.
(3) Maximum Value Mark  	**<Maximum Value Display>** When the maximum value shows up, the total amount of stored measurement data is displayed at the bottom. In this mode every time you press Mode key, the maximum value of the following is displayed as follows: Air Temperature → Pressure → Air Velocity
(4) Minimum Value Mark  	**<Minimum Value Display>** When the minimum value shows up, the total amount of stored measurement data is displayed at the bottom. In this mode every time you press Mode key, the minimum value of the following is displayed as follows: Air Temperature → Pressure → Air Velocity

DISPLAY	PROCEDURE

(5)

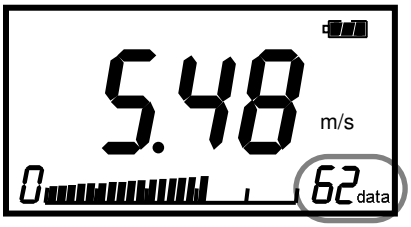


Rough indication of data location

Data Number

<Stored Measurement Data Display>
The latest stored measurement data is displayed with the data number and bar graph. (The bar graph shows the rough indication of the stored data location.)

In this display every time you press Mode key, each of the stored measurement data is displayed as follows:
Air Temperature → Pressure → Air Velocity



Also, press ▲ ▼ keys to display other data pertaining to other data numbers.

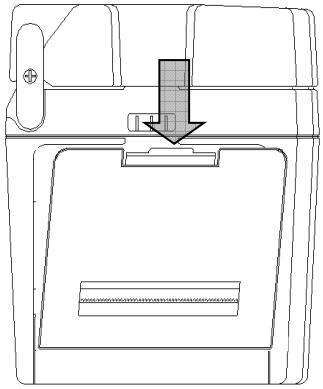
In likewise every time you press Mode key, each of the stored measurement data is displayed as follows:
Air Temperature → Pressure → Air Velocity

* You can also select and delete data from this display. For details refer to "4.2 Deleting Measurement Data" in page 15.

6. Data Output

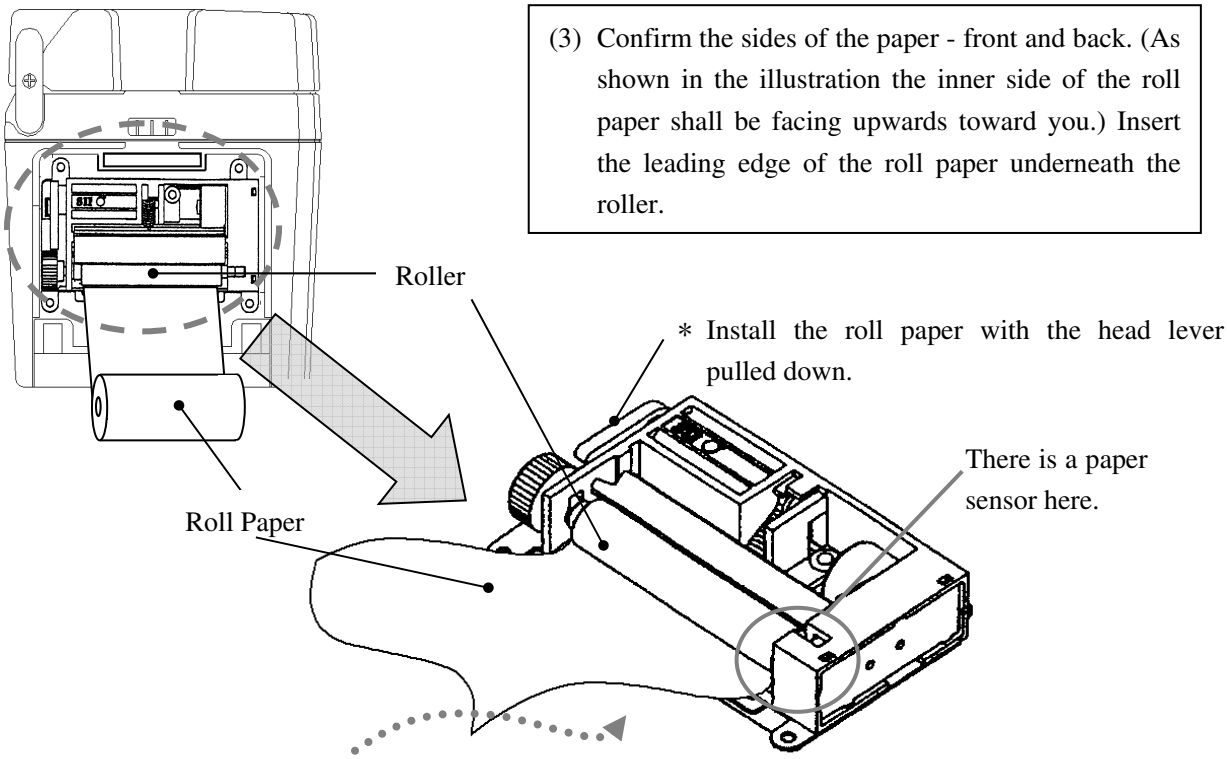
6.1 Printing Out Measurement Data (Only applicable to 6113)

6.1.1 Setting Printer Paper (Roll Paper)



(1) Press lightly where indicated and pull the printer cover to open it.

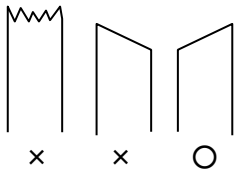
(2) Turn the power ON and press Feed key.



(3) Confirm the sides of the paper - front and back. (As shown in the illustration the inner side of the roll paper shall be facing upwards toward you.) Insert the leading edge of the roll paper underneath the roller.

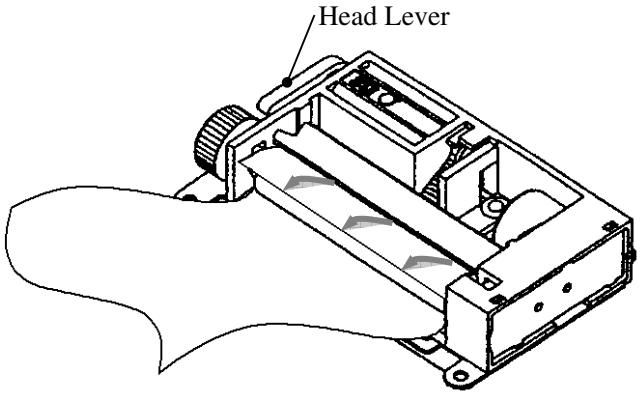
* Install the roll paper with the head lever pulled down.

How to Cut Roll Paper



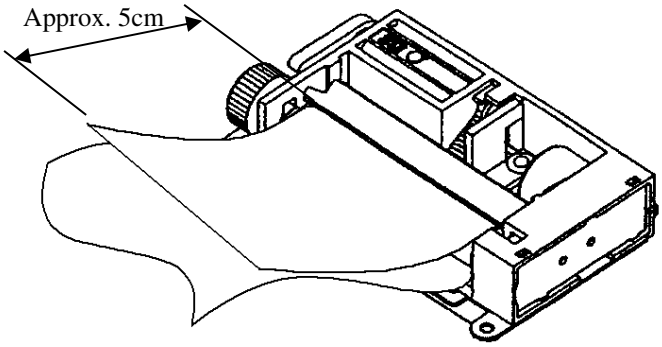
As shown in the left illustration, cut the roll paper diagonally making the right edge is longer then the left. The sensor to detect the roll paper is located at the right side of the roller. Therefore, it would be easier to set the roll paper if the right side of the paper is slightly longer.

* Use the designated thermal paper. (TP-202L by Seiko Instruments).



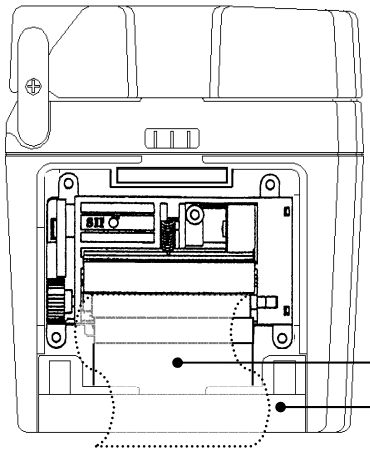
(4) As you insert the leading edge of the roll paper, the roller will automatically rotate to reel in the paper and the paper comes out from the top.

* If the paper is not set properly (the paper is placed diagonally or bent), pull the head lever up, remove the paper and repeat the above procedure from (2) to (4).



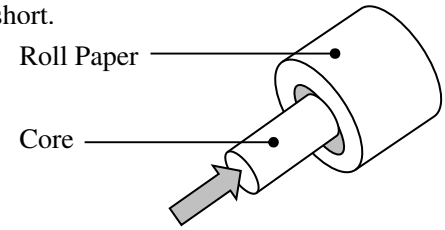
(5) Press Feed key to feed the paper until the length of the paper coming out from the roller reaches approximately 5cm.

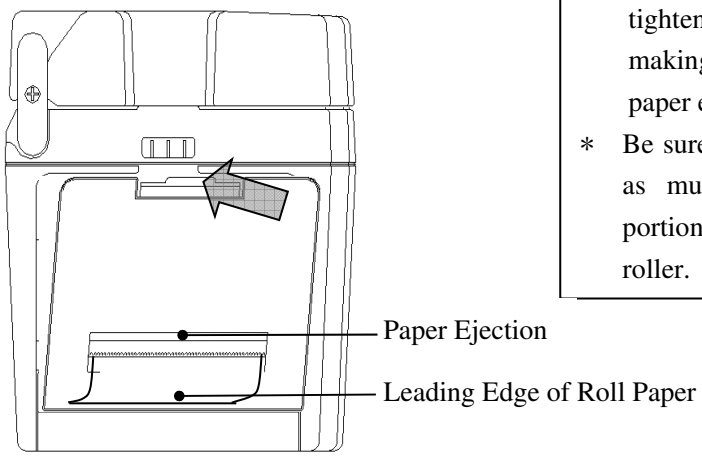
* Make sure that the paper which just comes out from the roller will not be caught in the roller again.



(6) Insert the provided core into the roll paper in order to remove any slack from the roll paper.

* This procedure prevents the roll paper to be caught in the printer header when the roll paper runs short.

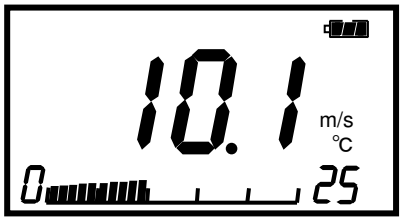




(7) Install the roll paper into the holder as tightening the roll. Close the printer cover making sure that the paper comes out of the paper ejection located on the printer cover.

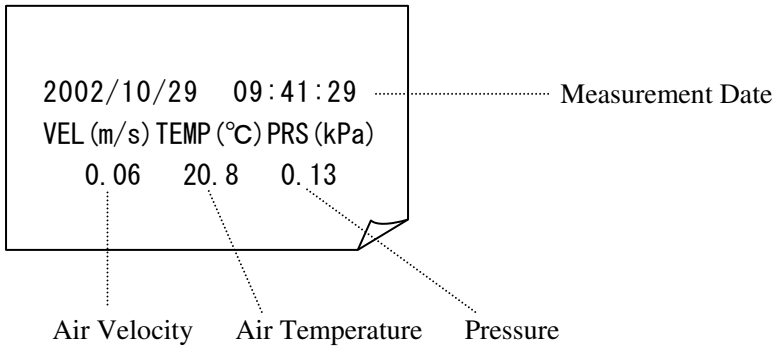
* Be sure to eliminate any slack on the roll paper as much as possible. Otherwise, the loose portion may accidentally get pulled into the roller.

6.1.2 Printing Out Instantaneous Value

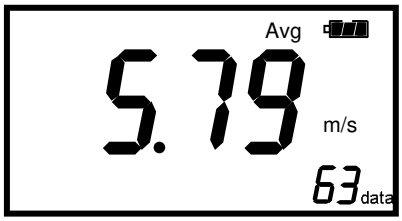
DISPLAY	PROCEDURE
	Press Print key on the Normal Measurement display (Measurement Mode) to hold the measurement values of the all parameters and print them out. (Air Velocity, Air Temperature and Pressure).

Example of Print Out

<Measurement Result>

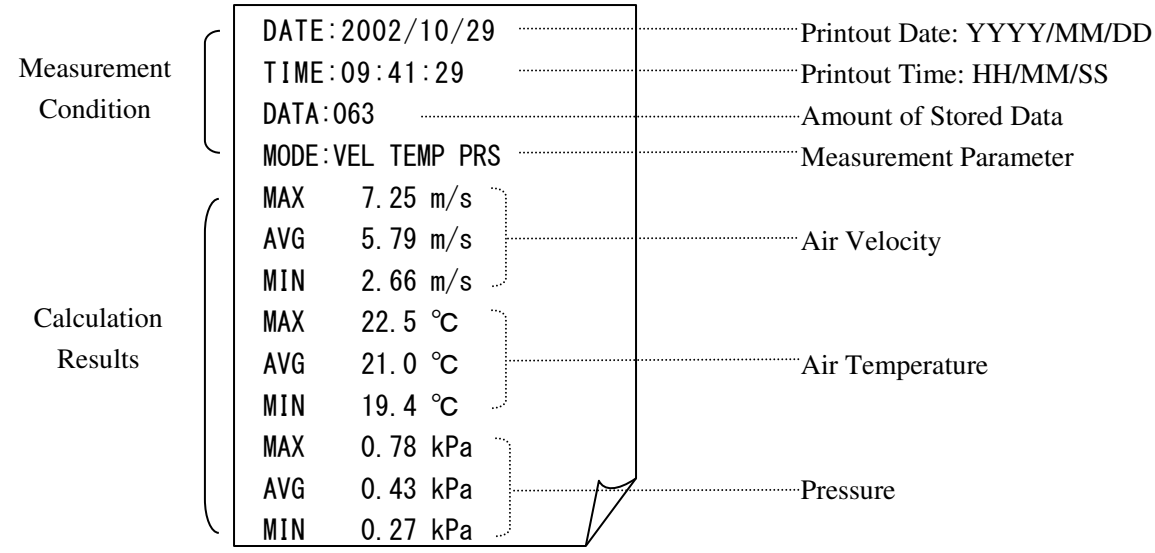


6.1.3 Printing Out Calculation Result

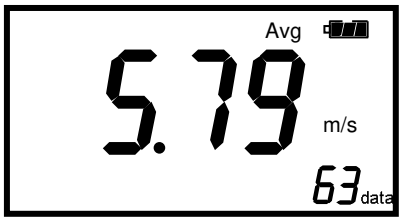
DISPLAY	PROCEDURE
	Display the Calculation Mode (by Pressing Calc. key in the Normal Measurement screen), and press Print key to print out the calculated values (Average, Maximum and Minimum) of all measurement parameters.

Example of Data Print Out

<Calculation Results>



6.1.4 Printing Out Stored Data

DISPLAY	PROCEDURE
	Display the Calculation Mode (by pressing Calc. key in the Normal Measurement screen). While holding down ▼ key, press Print key to print out the calculation values (Average, Maximum and Minimum) of all the measurement parameters as well as the stored measurement data. Please see the below example of printout.

6.1.5 Printing Out the Function Settings (Printing Test)

DISPLAY	PROCEDURE
	Press Print and Feed keys simultaneously for 2 seconds or longer on the Normal Measurement screen to print out the function setting information. * For details on function setting, refer to "7.2 Other Function Settings" in page 29. * This function can be used for test printing.

Example of Data Print Out

<Calculation Result＋Measurement Data>

Measurement Conditions

```
DATE:2002/10/29
TIME:09:41:29
DATA:063
MODE:VEL TEMP PRS
```

Calculation Results

```
MAX    7.25 m/s
AVG    5.79 m/s
MIN    2.66 m/s
MAX    22.5 ℃
AVG    21.0 ℃
MIN    19.4 ℃
MAX    0.78 kPa
AVG    0.43 kPa
MIN    0.27 kPa
```

Measurement Data

```
NUM   m/s    ℃    kPa
01    3.89   21.8  0.33
02    4.41   22.0  0.41
03    5.01   22.4  0.32
```

<Information on Function Set-up>

```
6113 ANEMOMASTER
Ver.1.000
DATE:2002/10/29
TIME:15:06:49
**********
PROBE No.   1
PROBE Type.10
SensorTime     150min
----------
HARD SW SETTING
Bit PR  ON
Bit PRS ON
----------
SOFT SW SETTING
BAUD RATE 4800
BUZZER ON
Vel  Unit m/s
Temp Unit ℃
PRS  Unit kPa
ANALOG Vel 0 - 5.0
ANALOG Temp 0 – 50.0
ANALOG PRS –5.0 – 5.0
DATE DISPLAY JP
**********
TEST PRINT
0123456789-+/*()
```

Probe Number

Hardware Setting Info (This cannot be modified.)

Baud Rate

Buzzer ON/OFF

Air Velocity Unit

Air Temperature Unit

Pressure Unit

Analog Output Rang (AirVelocity)

Analog Output Range (Air Temp)

Analog Output Range (Pressure)

Test Printing

Function Setting Info

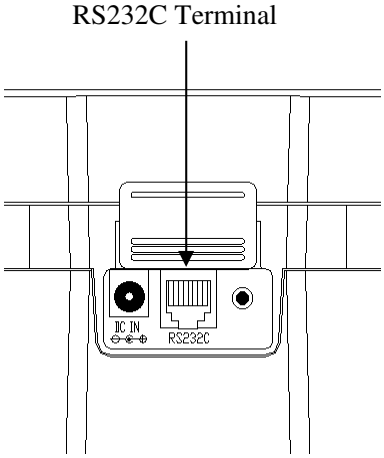
6.1.6 Printing Precautions

When printing out on the Model 6113's built-in printer, the instrument draws a large current. If the battery is running low, enough current may not be provided to the printer as the battery's voltage decreases dramatically. Consequently, temporary battery voltage drop occurs and the instrument's voltage becomes lower than the level that it requires for operation, which may cause the instrument to stop working.

Depending on the battery's condition, even when the battery level indicator shows that the instrument still has enough battery, the battery voltage may drop enough to cause a malfunction during printing.

When printing repeatedly or printing out a large amount of data, we recommend that you use the Model 6113's AC adaptor which is sold separately.

6.2 Digital Output



6.2.1 Preparation for Digital Output

To download the data stored in the ANEMOMASTER to your PC, connect the ANEMOMASTER to your PC using the RS232C cable (Optional).

<What you need>

- ●Personal Computer
- ●RS-232C Cable (Sold Separately)
- ●Communication Software (Example: Windows has hyper terminal software.)

<Baud Rate Setting>

The baud rate setting of the instrument and the PC must be the same.

The baud rate setting of the main unit is as follows:

Data Bit Length	8 bits
Parity	None
Stop Bit	1
Delimiter	CRLF
Baud Rate	Based on the setting value*

*As for the baud rate setting, refer to "7.2 Other Function Settings" in page 29.

As for your PC setting, refer to the operation manual of your PC

<Connecting the instrument to a PC>

(1) Connect the instrument to a PC by inserting a connecting cable into RS232C terminal on the instrument.

(2) Turn ON the instrument.

Make sure that instrument is in Normal Measurement mode.

RS232C Cable Wiring Diagram

PC (D-Sub9 pin)		Connection	ANEMOMASTER			
Signal	Pin No.		Pin No.	Signal	Description of Signal	Signal Direction
NC	1		1	GND	Signal Ground	
RXD	2		2	TXD	Transmitting Data	Output
TXD	3		3	RXD	Receive Data	Input
NC	4		4	CTS	Clear to Send	Input
GND	5		5	RTS	Request to Send	Output
NC	6		6	NC		
RTS	7					
CTS	8					
NC	9					

* The measurement software is available for Windows. (Sold separately)

6.3 Entering Command from PC to Output Data

To connect the ANEMOMASTER to your PC, refer to "6.2.1 Preparation for Digital Output" in page 24.

---Icon and its Meaning---

␣: Space

↵: Line Break or Press Enter

*: To enter number

Command	Function
D****↵	To set how many data to read
N↵	Receive Interrupt
S↵	To output measurement condition
U↵	To output measurement unit
P↵	To output stored data volume.
T****↵	To output stored data

* Enter all commands in capitals.

6.3.1 Transmission of Raw Data (data measured every 1sec)

DISPLAY	PROCEDURE
Example: When entering "D0005" in the Air Velocity Measurement Mode. AD↵ ␣␣␣0.19;␣␣␣26.8;␣␣␣73.4↵ ␣␣␣0.51;␣␣␣26.8;␣␣␣73.5↵ ␣␣␣0.61;␣␣␣27.0;␣␣␣76.1↵ ␣␣␣0.24;␣␣␣27.0;␣␣␣77.5↵ ␣␣␣0.15;␣␣␣26.9;␣␣␣76.0↵	**<To set how many data to read>** Enter "D****↵". (Enter the number of data to be read in 4 digit number.) After the command is received, "AD" will be returned. Then the raw data that appears on the instrument's screen and is updated every second will be output. The maximum amount of data which can be set is 9999 data. To read more than 9999 data, send another command. **<Output >** With Pressure Measurement Function (Optional): Air Velocity; Air Temperature; Pressure Without Pressure Measurement Function: Air Velocity; Air Temperature; 0000000
AN↵	**<Receive Interrupt>** Enter "N↵". After the command is received, "AN" will be returned and the reception will be interrupted.
DISPLAY	**PROCEDURE**
AS↵ VT-;01;↵	**<To output measurement condition>** Enter "S↵". After the command is received, "AS" will be returned. The measurement parameters displayed on the screen and time constant (See page 13) will be output. **<Output>** Measuring Parameter (**VT-, PRS**); Time Constant; **VT-:** Air Velocity or Air Temperature **PRS:** Pressure (Optional)
DISPLAY	**PROCEDURE**
AU↵ m/s;℃;kPa↵	**<To output measurement unit>** Enter "U↵". After the command is received, "AU" will be returned. Configured measurement at the time will be output. **<Output Content>** Air Velocity Unit; Temperature Unit; Pressure Unit

6.3.2 Transmission of Stored Data (Data stored in memory)

DISPLAY	PROCEDURE
AP↵ P0012↵	**<To output stored data volume>** Enter "P↵". After the command is received, "AP" will be returned and the amount of stored data will be output.
DISPLAY	**PROCEDURE**
AT↵ 2002/10/30;14:25:46↵ 011;␣␣␣0.15;␣␣␣25.5;␣␣␣0.10↵	**<To output stored data>** Enter "T****↵" (Enter the page number of the stored data that you want to output in 4 digit number.) After the command is received, "AT" will be returned. The data stored in the selected page will be output. * Any calculation data such as Min, Avg and Max value will not be output. * The measurement unit in the output data depends on the current measurement unit setting. **<Output >** With Pressure Measurement Function (Optional): Data Number, Air Velocity, Air Temperature, Pressure Without Pressure Measurement Function: Data Number, Air Velocity, Air Temperature, 0000000
DISPLAY	**PROCEDURE**
ED↵	**<Error Message>** If the page number is entered incorrectly, "ED" will be returned.

6.4 Setting to Output Single Parameter of Measurement Data

When this function is ON, the only value displayed on the Normal Measurement screen (Measurement Mode) during the operation will be printed out or sent as a digital output. For example, when the Air Velocity Measurement mode is displayed, only the air velocity value will be output.) See "7.2 Other Function Settings" in page 29.

6.4.1 Printing with Single Parameter Output Setting

Refer to "6.1 Printing Out Measurement Data" in page 19 for how to print out the measurement data.

Example of Data Printout

<Measurement Result (Air Velocity)>

```
2002/10/29  09:41:29
MODE VEL
  0.06 m/s
```

<Calculation Results (Pressure)>

```
DATE:2002/10/30
TIME:07:52:55
DATA:006
MODE:PRS
MAX    0.44 kPa
AVG    0.33 kPa
MIN    0.21 kPa
```

6.4.2 Digital Output with Single Parameter Output Setting

Please refer to "6.2 Digital Output" in page 24 for how to digitally output print out measurement data.

Display

<Downloaded Data Output (Air Temperature)>

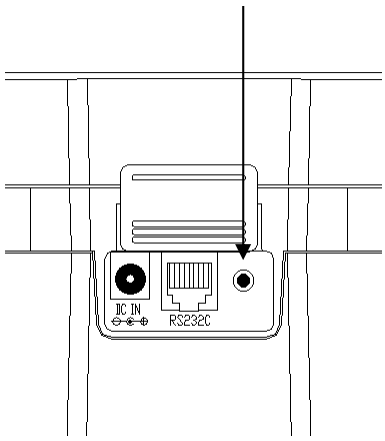
```
AD↵
0000000;␣␣␣26.8;0000000↵
0000000;␣␣␣26.7;0000000↵
```

<Stored Data Output (Air Velocity)>

```
AT↵
2002/10/30;14:25:46↵
011;␣␣␣0.15;0000000;0000000↵
```

6.5 Analog Output (Optional)

Analog Output Terminal



(1) Data Update Interval : 0.1 seconds
(2) Load Impedance: 5KΩ or higher
(3) Output Current : DC 0~1V

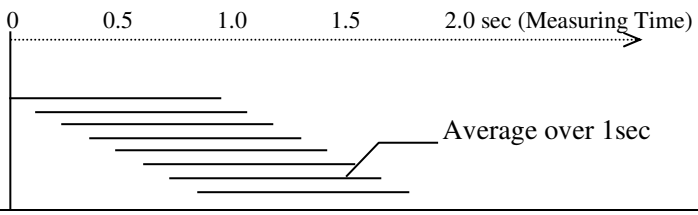
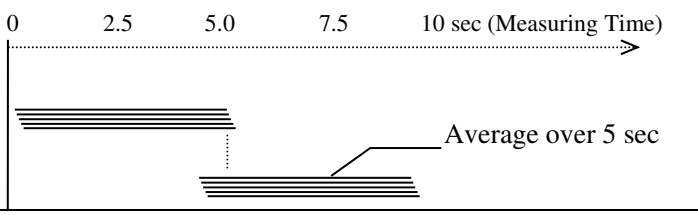
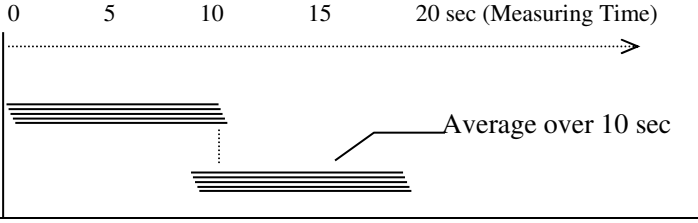
For analog output, select one setting from the output range listed in the table below. The measurement value displayed on the Normal Measurement screen (Measurement Mode) will be output. For the setting procedure, refer to "7.2 Other Function Settings" in page 29.

	Output Range	Conversion Formula (Voltage: V)
Air Velocity (U)	0 ~ 5 m/s	U = 5×V m/s
	0 ~ 10 m/s	U = 10×V m/s
	0 ~ 25 m/s	U = 25×V m/s
	0 ~ 50 m/s	U = 50×V m/s
	0 ~ 1000 FPM	U = 1000×V FPM
	0 ~ 2000 FPM	U = 2000×V FPM
	0 ~ 5000 FPM	U = 5000×V FPM
	0 ~ 9999 FPM	U = 9999×V FPM
Air Temperature (T)	-10 ~ 40 ℃	T = 50×V-10 ℃
	0 ~ 50 ℃	T = 50×V ℃
	0 ~ 100 ℃	T = 100×V ℃
	14 ~ 104 ºF	T = 90×V+14 ºF
	32 ~ 122 ºF	T = 90×V+32 ºF
	32 ~ 212 ºF	T = 180×V+32 ºF
Pressure (P)	-5 ~ +5 kPa	P = 10×V -5 kPa
	-2 ~ +2 kPa	P = 4×V -2 kPa

Output Range: The output is linear output with the minimum value of 0V and maximum value of 1V.

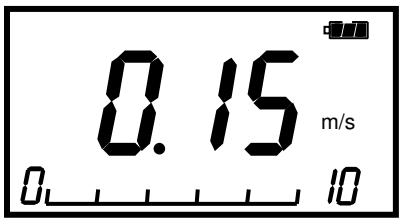
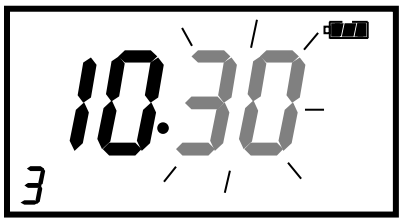
The output data will be output every 0.1 seconds.

The configured time constant will be in effect. To change the time constant, refer to "3.4 Changing Time Constant" in page 13.

Mode	How to take in measurement data (Analog output)	Explanation
TC1		Take data 10 times in 1 second and output the average value of those data as an instantaneous value every 0.1 second.
TC5		Output the average value over 5 seconds every 0.1 seconds. Data shifts by every 0.1 seconds.
TC10		Output the average value over 10 seconds every 0.1 seconds. Data shifts by every 0.1 seconds.

7. Function Settings

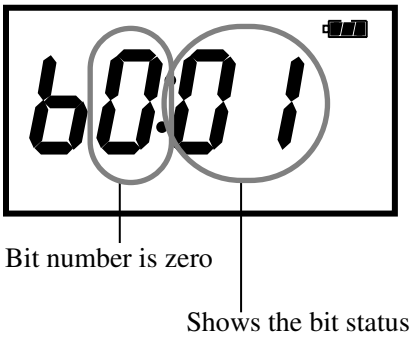
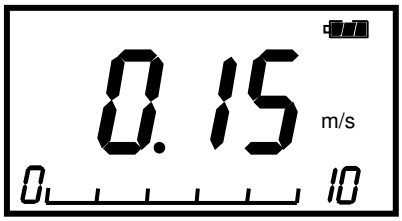
7.1 Changing Date and Time

DISPLAY	PROCEDURE
	Press ▲ and ▼ keys simultaneously for 2 seconds or longer on the Normal Measurement screen (Measurement Mode).
 Set-up Phase	The set-up phase number that indicates what you are adjusting appears at the bottom left, and the last 2 digits of the year flash. Use ▲ and ▼ keys to adjust the year. Then press Hold/Set key. * The set-up phase numbers correspond to the followings: 1 …… Year 4 …… Hour 2 …… Month 5 …… Minute 3 …… Date
	Next, the numeric value indicating month flashes. Use ▲ and ▼ keys to adjust the month. Then press Hold/Set key.
	Next, the numeric value indicating date flashes. Use ▲ and ▼ keys to adjust the date. Then press Hold/Set key.
	Next, the numeric value indicating hour flashes. Use ▲ and ▼ keys to adjust the hour. Then press Hold/Set key.
	Next, the numeric value indicating minute flashes. Use ▲ and ▼ keys to adjust the minute, and press Hold/Set key. After pressing Hold/Set key, the Normal Measurement screen will be displayed and the setting is complete. * If the Mode key is pressed before saving the setting, you will return to the Normal Measurement screen without saving the setting.

7.2 Other Function Settings

You can configure the baud rate, measurement units, data output parameters using the bit settings on the screen (Soft Dip Switch). Once the setting is stored, it will not be lost even if the instrument is turned OFF because of the back-up batteries.

7.2.1 Setting Procedure

DISPLAY	PROCEDURE
	Turn the power OFF once. Then turn the power back ON pressing [Hold Set] key. Keep holding down [Hold Set] key until you see a display like the one shown on the left. The "b0" on the left indicates the bit number, and "01" on the right shows the bit status. (See "7.2.2 Dips Switch Setup Chart" in the next page for the details on bit number and bit status.)
	Using [▲] [▼] keys to select the bit status. Press [Hold Set] key to save the setting and move to the next bit number. (After the bit number reaches 9, it will go back to 0.)
	After completing all of the bit number settings, press [Clear] key to return to the Normal Measurement screen.

7.2.2 Dip Switch Setup Chart

* ▭ = Factory Default Setting

Setup Parameter	Specification		Bit Status Display	
Baud Rate Setting [b0, b1]	4800bps		**b0:00**	**b1:00**
	9600bps		**b0:01**	**b1:00**
	19200bps		**b0:00**	**b1:01**
	38400bps		**b0:01**	**b1:01**
Buzzer ON/OFF Setting [b2]	YES		**b2:00**	—
	NO		**b2:01**	—
Wind Velocity Unit Setting [b3]	m/s		**b3:00**	—
	FPM <1m/s = 196FPM>		**b3:01**	—
Air Temperature Unit Setting [b4]	℃		**b4:00**	—
	°F <T(°F) = 1.8×T(℃) + 32 >		**b4:01**	—
Analog Output (Optional) [b5] Range Setting	Wind Velocity	0~5m/s	**b5:00**	**b6:00**
		0~10m/s	**b5:01**	**b6:00**
		0~25m/s	**b5:00**	**b6:01**
		0~50m/s	**b5:01**	**b6:01**
		0~1000FPM	**b5:00**	**b6:00**
		0~2000FPM	**b5:01**	**b6:00**
		0~5000FPM	**b5:00**	**b6:01**
		0~9999FPM	**b5:01**	**b6:01**
	Wind Temp.	0~50℃	**b5:00**	**b6:00**
		0~100℃	**b5:01**	**b6:00**
		-10~40℃	**b5:00**	**b6:01**
		32~122°F	**b5:00**	**b6:00**
		32~212°F	**b5:01**	**b6:00**
		14~104°F	**b5:00**	**b6:01**
	Pressure	-5~+5kPa	**b5:00**	**b6:00**
		-2~+2kPa	**b5:01**	**b6:00**
Data Output Parameter Setting [b7]	Output All Parameters		**b7:00**	—
	Output Single Parameter		**b7:01**	—
Date Display Format Setting [b8, b9]	Japanese Format: YY/MM/DD		**b8:00**	**B9:00**
	American Format: MM/DD/YY		**b8:01**	**B9:00**
	European Format: DD/MM/YY		**b8:00**	**B9:01**

8. Cleaning Probe

If the sensor is contaminated with impurities such as dust, particles, soot or machine oil, the heat dissipation rate will change causing inaccurate readings. In most cases, as heat dissipation decreases, the air velocity readings will also decrease.

The same thing can be said for probes which are equipped with a mesh cover. The same problem will occur if the mesh is deformed or clogged with impurities.

If impurities are attached to the sensor or mesh from using the instrument in an unclean environment, it is recommended that the sensor is cleaned right after use.

Cleaning Method

Clean the sensor of the probe in an ultrasonic cleaner for approx. 10-20 sec.

Do not clean the sensor longer than required as excess cleaning may cause damage to the sensor coating. Use water for cleaning. The sensor can also be cleaned in a vessel filled with cleaning agent and gently shake it.

When the sensor of the probe is contaminated with oil, rinse the head of it with alcohol and dry it.

! CAUTION !

!) Make sure to turn the power OFF before cleaning.

!) Dry the probe completely after cleaning. Do not turn ON the power before the probe is completely dried.

9. Specifications

Product		Anemomaster
Model		6113/6114/6115
Measuring Object		Clean air flow
Air Velocity	Measuring Range	0.10 ~ 50.0m/s
	Resolution	0.00 ~ 9.99m/s:0.01m/s, 10.0~50.0m/s:0.1m/s
	Accuracy	±(3% of the reading + 0.1) m/s
	Response Time	Approx. 1sec (at Air Velocity: 1m/s, Response: 90%)
	Temp.Compensation Accuracy	±(5% of the reading + 0.1)m/s in the temperature range of 5 ~ 80℃
Air Temperature	Measuring Range	0.0 ~ 100.0℃ (0.1℃)
	Resolution	0.1℃
	Accuracy	±0.1℃
	Response Time	Approx. 30sec (at Air Velocity: 1m/s, Response: 90%)
Pressure	Measuring Range	-5.00 ~ +5.00kPa
	Resolution	0.01kPa
	Accuracy	±(3% of the reading + 0.01)kPa
	Response Time	Approx. 1sec
Measurement Functions		- Hold the reading - Time constant setting (1, 5 and 10sec) - Remaining battery level indicator (5 levels) - Selection of measurement unit (Air Velocity: m/s, FPM; Air Temperature: ℃, °F; Pressure*1: kPa) - Measurement data storage: Instantaneous Value - Avg. Value (Max 60sec), - Max 100 data storage - Calculation function: Calculating Max, Min and Avg value of data - Raw data display - Calendar function - Bar graph display indicating air velocity
Output		Digital Output: RS-232C (4800, 9600, 19200 and 38400 bps) for outputting to PC Printer Output*2: Print out calculation results and measurement data Analog Output*3: DC 0~1V (Selecting one from Air Velocity, Temperature, Pressure*1)
Power		6 × C size Manganese Batteries (Alkaline and Ni-Cd can also be used.) AC Adaptor*3: AC 100~240V (50/60Hz)
Battery Life		Approx. 10 hours (when using for air velocity: 5m/s, air temperature: 20℃, with alkaline batteries, and not using printer)
Operating Environment		Main Unit: 5~40 ℃, Probe: 0~100℃, Storage Temperature: 5~40℃
Weight		6113: Approx. 1.1kg, 6114: Approx. 1kg, 6115: Approx. 1kg (excluding batteries)
Standard Accessories		1×Operation Manual, 6×C size Manganese Batteries, 1×Probe (cable:2m), 1×Extension Rod, 1×Shoulder Strap, 1×Printer Roll Paper
Optional Accessories (Sold Separately)		Spare Probe, Analog Output, Pressure Sensor, RS-232C Cable, Measurement Software (for Windows), AC Adaptor

*1: Pressure function (with tube) is available only for Model 6115. For Model 6113/6114 you can add this function as an optional extra.

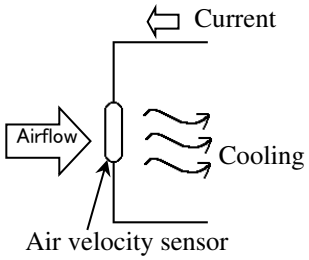
*2: Only Model 6113 has a built-in printer.

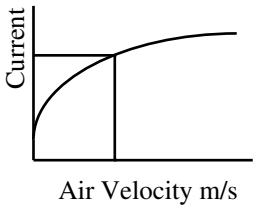
*3: Optional

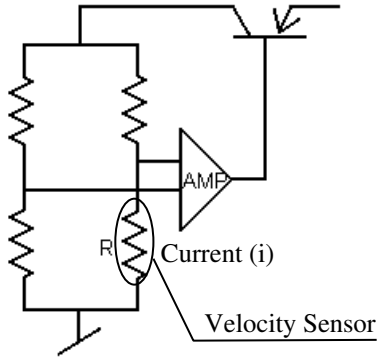
10. Measurement Principles

10.1 Hot-wire Anemomaster Principle

When the heated air velocity sensor is exposed to airflow, the sensor temperature will change by the heat drawn by the airflow. Accordingly, the sensor resistance values will change. This change in the resistance values will vary largely as the air velocity increases. Therefore, if the relation between the air velocity and the resistance value is known, the air velocity can be obtained by measuring the resistance value (or current).







The *Anemomaster* anemometer uses this above mechanism. Generally, a hot-wire anemometer employs a feedback circuit to control the sensor to maintain constant temperature. (Constant Temperature Type)

When there is a change in the air velocity, the heat drawn from the sensor (heat dissipation) will change accordingly. In order to maintain constant temperature, current is applied to the sensor to compensate this change. Thus, the air velocity value can be obtained from the amount of the applied current (i).

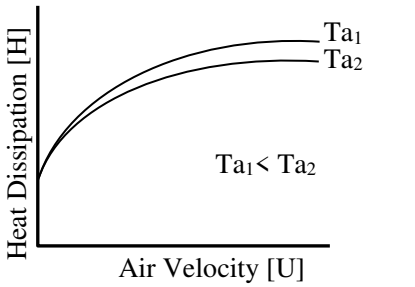
The amount of heat [H] drawn from the air velocity sensor can be expressed by the following formula.

$$H = (a + b\sqrt{U})(T - Ta) \quad \cdots\cdots King's\ \ fomula$$

Where;

H: Heat Dissipation T: Sensor Temperature

Ta: Air Temperature U Air Velocity a, b: Constant



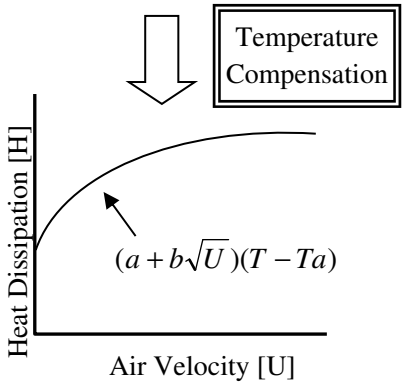
The Heat Dissipation [H] can also be expressed by the following formula from the sensor resistance (R) and current (i).

$$H = RI^2$$

(R is kept constant regardless of the air velocity change.)

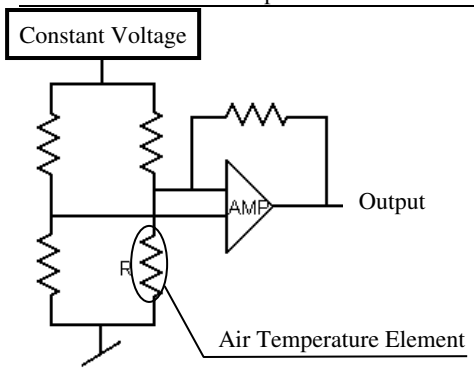
Thus: $RI^2 \propto a + b\sqrt{U}$

As shown by this formula, the change in the air velocity "U" can be interpreted as the change in the current "i".



➢ **Temperature Compensation**

When the air temperature changes, the measurement values will also change since the amount of heat dissipation will change accordingly even when the air velocity is constant. Thus, *Anemomaster* employs a temperature compensation circuit to enable accurate air velocity measurement by eliminating the influence of the temperature change. For this purpose, a temperature measurement sensor Rc having the same temperature coefficient as the air velocity is provided at the opposite side of the bridge, and the bridge is adjusted to keep the difference with the air temperature (T-Ta) constant.



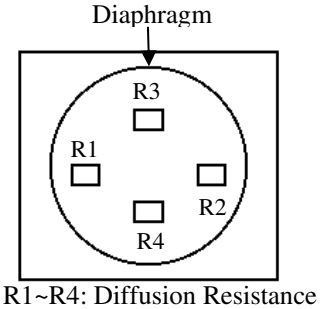
➢ **Air Temperature Measurement**

An air temperature element (platinum thin film element) whose resistance value changes by the air temperature is incorporated in one side of the bridge. The air temperature can be obtained by measuring the variance in the resistance value.

➢ **Pressure Measurement (Optional)**

A diffusion-type semiconductor pressure sensor is employed to measure pressure. This diffusion-type semiconductor pressure sensor is based on the Piezoresistance Effect, in which the resistance value changes when pressure is applied. It is configured with four (4) diffusion resistances (sensor chips) located on a thin silicon diaphragm (Fig.1).

When pressure is applied from to the pressure sensors and the diaphragm is deflected as shown in Fig. 2, compressive stress is applied to R3 and R4 located at the center of the diaphragm while tensile stress is applied to R1 and R2. The resistance value of the diffusion resistance changes in accordance with the strength of the stress applied.



R1~R4: Diffusion Resistance

Fig.1 Pressure Sensor

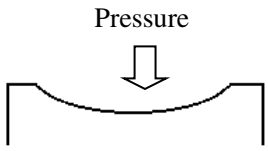


Fig.2

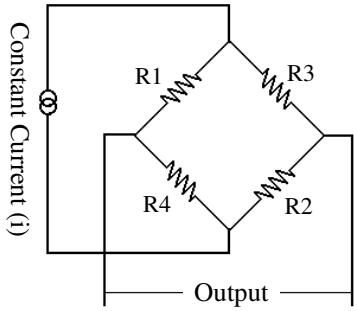


Fig.3 Detection Circuit

By configuring the bridge of the detection circuit (Fig.3) with these diffusion resistances, voltage that is proportional to the pressure can be obtained. In addition, since the diffusion resistance is dependent on temperature, temperature compensation resistance is employed for the resistance.

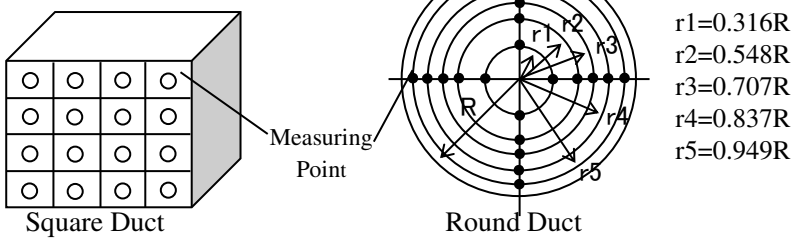
10.2 Air Volume Calculation

Average air velocity inside a duct multiplied by the cross section of the duct equals air volume inside the duct. To calculate the average air velocity inside the duct, divide the cross section of the duct into several divisions. Measure the air velocity of each division and average out the air velocity in the each division.

Air Volume: Air volume per unit time [m^3/min, m^3/h, ft^3/min, ft^3/h]

Air Volume (Q) = Average Air Velocity (U) × Cross section (A)

The right illustration shows an example of measuring points in a duct as described in the JI-B8330. According to JIS specifications, the cross section of a square duct shall be divided into 16 or more divisions and the center point of each division shall be the measuring points. For a round duct, there are 20 measurement points that have a right angle to each other on the cross section. For more details refer to JIS-B8330.



Square Duct

Round Duct

11. Air Velocity Compensation

The air velocity sensor of this instrument is heated. The air flowing past the heated sensor removes heat from the sensor. The instrument uses the relation between how much heat removed (dissipation heat) and air velocity to indicate the air velocity.
Since the instrument is calibrated with clean airflow with normal temperature and pressure, when the condition of air to be measured is different from that of the air used for calibration, the heat dissipation amount will differ even when the velocity is consistent (i.e. velocity reading is influenced by the condition of air).

11.1 Influence of Air Temperature

The instrument is a hot-wire anemometer, which measures air velocity using a heat dissipation method. Thus, if temperature compensation is not provided, air velocity readings will be affected by ambient air temperature changes even when the air velocity is consistent. In order to prevent such influence, the instrument is equipped with a temperature compensation circuit for measuring and compensating for air temperature in the range of 5℃ to 60℃.

11.2 Influence of Atmospheric Pressure

The instrument is calibrated under atmospheric pressure of 1013hPa. Since change in the atmospheric pressure will influence the heat dissipation amount, compensation of the atmospheric pressure is required. Compensation can be provided by using the following formula.

$$Um = \frac{1013}{Pm} \times Uc$$

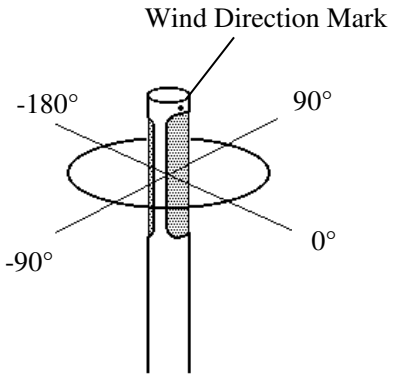
Where, Um: Actual Air Velocity [m/s]
Uc: Air Velocity Reading
Pm: Atmospheric Pressure at the Time of Sampling [hPa]

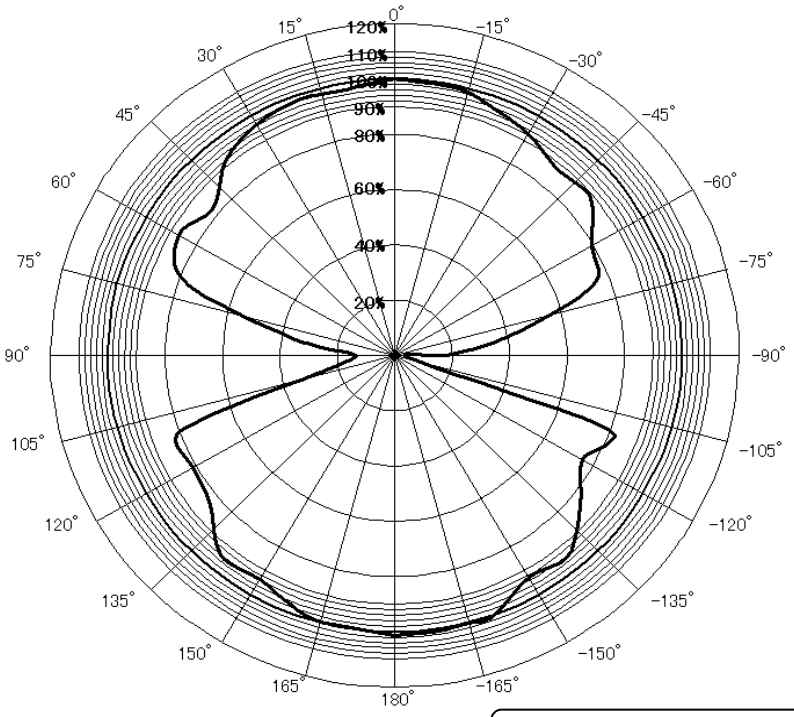
11.3 Influence of Air Composition

Compensation is required when the measurement is to be performed in an environment including any gas other than air. Compensation shall be performed by calculating the heat dissipation amount from the physical properties of the gas, and comparing it with the heat dissipation amount of the air.

12. Probe Directivity (Air Velocity)

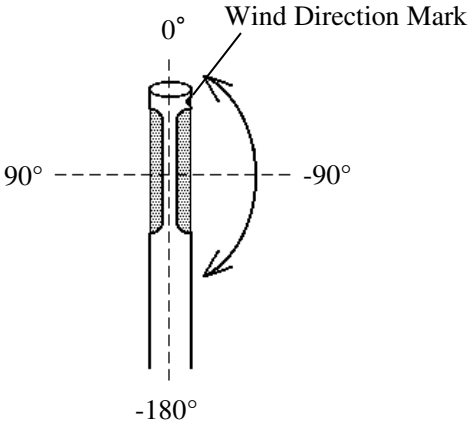
12.1 Horizontal Directivity

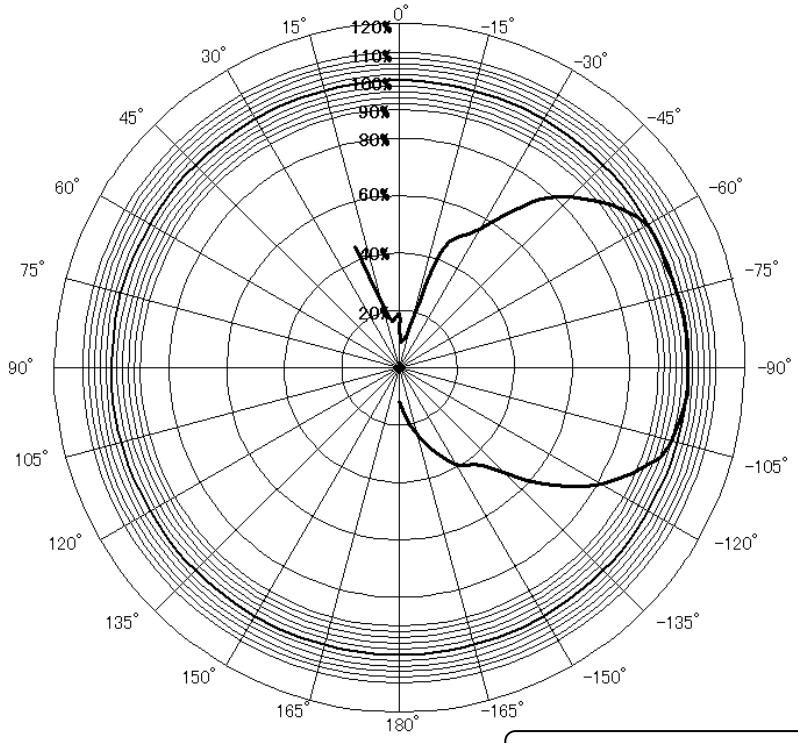




When Air Velocity is 5m/s

12.2 Vertical Directivity





When Air Velocity is 5m/s

13. Troubleshooting

13.1 Batteries

Symptom	Possible Cause(s) / Solution(s)	Refer To (Page No.)
Nothing appears on the screen when the power is turned ON.	The batteries may be low. → Turn the power OFF and replace the batteries.	6
Nothing appears on the screen after new batteries are installed.	Batteries may be installed with incorrect polarity. → Turn the power OFF and install the batteries correctly.	6
"E--0" is displayed on the screen.	The batteries may be low. → Turn the power OFF and replace the batteries.	6

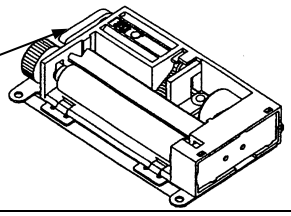
13.2 Initial Operation

Symptom	Possible Cause(s) / Solution(s)	Refer To (Page No.)
"E--9" is displayed on the screen.	ROM Cassette is not installed. → If the ROM Cassette is already installed, turn the power OFF and inspect to ensure ROM is properly seated.	8
"----" is displayed on the screen.	Probe is not connected properly. → Turn the power OFF, and connect the probe properly.	7
The measurement unit is not correct.	You can change the Air Velocity unit (m/s⇔FPM) and the Air Temperature unit (℃⇔°F).	29

13.3 During Operation

Symptom	Possible Cause(s) / Solution(s)	Refer To (Page No.)
Reading is displayed as "----".	Measurable range is exceeded. → Use the instrument within the specified measurement range.	32
	Probe/Probe Cable may not be connected property. → Check probe connection.	7
	Probe/Probe Cable wire is disconnected or the sensor is damaged. → Contact your local KANOMAX Office or service center.	
Incorrect air velocity reading	Confirm that the direction mark of the probe is facing against the airflow.	9
Air temperature reading is high.	Correct reading cannot be obtained when there is no airflow. Minimum 0.1m/s velocity is required for measurement.	9
The response for Air Velocity Measurement is slow.	Confirm the Time Constant settings.	13
Display shows "E - - 8" when adjusting pressure zero point.	Pressure Port (＋, －) may be blocked. → Unblock both (＋) and (－) ports.	9
	The adjustment exceeds the range specified for the Zero Adjustment. → Contact your local KANOMAX Office or service center.	9

13.4 Printing

Symptom	Possible Cause(s) / Solution(s)	Refer To (Page No.)
Printing Failure	Printing paper may not be installed properly. → Open the printer cover and confirm there is no ejected paper caught inside the printer.	19
	Printing paper may be running short. → If a red mark appears on the edges of the paper, install a new printing paper.	19
	The batteries may be low. → Turn the power OFF and replace the batteries.	6
Printed characters are too light or faint.	The batteries may be low. → Turn the power OFF and replace the batteries.	6
While printing or feeding paper, the instrument stops working or restarts.	The batteries may be low. → Turn the power OFF and replace the batteries. → If you print data often or print out a large amount of data, use the AC adaptor (sold separately).	23
Only the value shown on the display is printed out.	Single parameter output mode is activated in the data output setting. Switch to all parameters output mode in the function setting.	29
Cannot cancel printing.	You cannot cancel printing.	
"E--1" is displayed on the screen.	The printer paper is not set. → Check to ensure printer paper is properly set in the roller.	19
"E--2" is displayed on the screen.	The battery is low. → Turn the power OFF and replace the batteries.	6
	Printer Head has overheated due to continuous printer use. → Stop printing temporarily and allow printer to cool.	
"E--3" is displayed on the screen.	The Printer Head Lever is up. → Pull the lever down. Printer Head Lever 	19

13.5 Digital Output

Symptom	Possible Cause(s) / Solution(s)	Refer To (Page No.)
Data Transfer Failure	The RS232C cable may not be connected properly. → Communication cable exclusively for this model is required.	24
	The baud rate setting may not be correct. Check the settings of the ANEMOMASTER and the computer.	24
	Confirm that the communication command is correct.	25

13.6 Analog Output

Symptom	Possible Cause(s) / Solution(s)	Refer To (Page No.)
Output Failure	Confirm that the polarity of the output terminal is correct.	27
	Confirm that normal measurement mode is selected.	11
Air Velocity output has a staircase pattern.	Check the Time Constant (TC) setting.	13
Incorrect Output Value	Confirm that the analog output setting is correct.	27
	Confirm that the output range setting is correct.	27
	The load impedance may be set lower than the defined value. (Load impedance: 5kΩ or higher)	27

14. Warranty and After-sales Service

KANOMAX Limited Warranty

The limited warranty set below is given by KANOMAX with respect to the KANOMAX brand anemometer, its attachment parts including Probe and other accessories (hereafter referred to as “PRODUCT”) that you have purchased. PRODUCT you have purchased shall be the only one that the limited warranty stated herein applies to.

Your PRODUCT, when delivered to you in new condition in its original container, is warranted against defects in materials or workmanship as follows: for a period of one (1) year from the date of original purchase, defective parts or a defective PRODUCT returned to your sales representative, as applicable, and proven to be defective upon inspection, will be exchanged for a new or comparable rebuilt parts, or a refurbished PRODUCT as determined by your sales representative. Warranty for such replacements shall not extend the original warranty period of the defective PRODUCT.

This limited warranty covers all defects encountered in normal use of the PRODUCT, and does not apply to the following cases:

(1) Use of parts or supplies other than the PRODUCT sold by your sales representative, which cause damage to the PRODUCT or cause abnormally frequent service calls or service problems.
(2) If any PRODUCT has its serial number or date altered or removed.
(3) Loss of damage to the PRODUCT due to abuse, mishandling, improper packaging by the owner, alteration, accident, electrical current fluctuations, failure to follow operating, maintenance or environmental instructions prescribed in the PRODUCT's instruction manual provided by KANOMAX, or service performed by other than KANOMAX.

NO IMPLIED WARRANTY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, APPLIES TO THE PRODUCT AFTER THE APPLICABLE PERIOD OF THE EXPRESS LIMITED WARRANTY STATED ABOVE, AND NO OTHER EXPRESS WARRANTY OR GUARANTY, EXCEPT AS MENTIONED ABOVE, GIVEN BY ANY PERSON OR ENTITY WITH RESPECT TO THE PRODUCT SHALL BIND KANOMAX. KANOMAX SHALL NOT BE LIABLE FOR LOSS OF STORAGE CHARGES, LOSS OR CORRUPTION OF DATA, OR ANY OTHER SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES CAUSED BY THE USE OR MISUSE OF, OR INABILITY TO USE, THE PRODUCT, REGARDLESS OF THE LEGAL THEORY ON WHICH THE CLAIM IS BASED, AND EVEN IF KANOMAX HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL RECOVERY OF ANY KIND AGAINST KANOMAX BE GREATER IN AMOUNT THAN THE PURCHASE PRICE OF THE PRODUCT SOLD BY KANOMAX AND CAUSING THE ALLEGED DAMAGE. WITHOUT LIMITING THE FOREGOING, THE OWNER ASSUMES ALL RISK AND LIABILITY FOR LOSS, DAMAGE OF, OR INJURY TO THE OWNER AND THE OWNER'S PROPERTY AND TO OTHERS AND THEIR PROPERTY ARISING OUT OF USE OR MISUSE OF, OR INABILITY TO USE, THE PRODUCT NOT CAUSED DIRECTLY BY THE NEGLIGENCE OF KANOMAX. THIS LIMITED WARRANTY SHALL NOT EXTEND TO ANYONE OTHER THAN THE ORIGINAL PURCHASER OF THE PRODUCT, OR THE PERSON FOR WHOM IT WAS PURCHASED AS A GIFT, AND STATES THE PURCHASER'S EXCLUSIVE REMEDY.

After-sales Service

If your PRODUCT is malfunctioning, please check the “Troubleshooting” section of this manual to find a possible resolution prior to calling for support.

Repair parts are retained for a minimum period of five (5) years after production cessation of the PRODUCT. This storage period of repair parts is considered as the period during which KANOMAX can provide repair service.

For more information please contact your sales representative. Please be sure to have the following product information at hand:

(1) PRODUCT name;
(2) Model number;
(3) Serial number;
(4) Probe number;
(5) Description of Symptom, and;
(6) Date of purchase

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