

" Weather Station"
[Reference Material for EX Type]

At the beginning

"VICON made Weather Station", which we have developed and sold in the market, is an equipment with its aim quite different from other general meteorological instruments which is merely aiming at meteorological observation.

Our "Weather Station" has been developed and manufactured with its development design aiming at providing method to get the effective weather data for growing agricultural products by obtaining local micrometeorology.

[Characteristics]

- Complete functional research and advanced technology enables economical cost performance.
- Each standard model enables to can collect 7 types of weather data.
- Connectable to other measuring sensors by option when more broad data is required.
- Integrated type weather station with easy maintenance for user to save time.

[Main Function]

- Each standard model is equipped with micrometeorology observation system to collect 7 types of weather data
 1. Wind direction 2. Air speed 3. Amount of rain-fall
 4. Air temperature 5. Humidity 6. Underground temperature
 Select either 1 sensor in the following items.
 - 7A. Surface temperature 7B. Air pressure 7C. Amount of solar radiation
 Then all the above mentioned instrumentation can be performed by one weather station.
- Observation data can easily be collected, graphed out and printed by personal computer.
- Display of current, maximum and minimum values can be confirmed by an indicator at hand whenever necessary.
- Provided with IC memory to record and store the observation data for 1 month by unmanned operation.
- Other than the standard measuring sensors, up to 8 types of measuring sensors are connectable by option.

[Outline of Each Standard Sensor]

1. Wind Direction Sensor

Wind consists of wind direction and wind speed and is essential for a barometer of large scale atmospheric flow that is closely related to pressure distribution. Wind direction sensor is a method to detect the movement of arrow vane with photosensor. Reflecting plate is fixed on an axis of arrow vane and it moves according to the arrow vane movement. Sixteen classified reflector is printed on the reflecting plate to show the 16 wind directions. Pulse signal is issued by photosensor.

2. Wind Speed Sensor

Wind speed consists of average wind speed and instantaneous wind speed. The average wind speed is a value obtained by dividing air flown distance, that is wind run, by time and the instantaneous wind speed is an instantaneous value at wind speed fluctuated. Unit m/sec. is applied for describing both wind speeds. Wind speed sensor is a method to detect the movement of 3-cup anemometer with photosensor. Reflecting plate is fixed on an axis of 3-cup anemometer and it moves according the anemometer rotations.

There are 36 holes perforated in the reflecting plate for photosensor to issue the presence and absence of the hole by pulse signal. Wind speed rotated approximately 1 time in 1 sec. is described as 1 m/sec.

3. Rain-Gauge Sensor

Precipitation phenomenon is one of the indispensable items among the study of meteorology as well as one of the basic observation items among weather observation. The depth of the fallen rain is described by unit millimeter (mm) in weather observation. That is to say, if the rain water do not penetrate into the ground or do not flow out but stayed at a place, the depth of the said water is called the amount of rain-fall or precipitation.

Rain-gauge sensor gathers raindrops fallen on a circle of 142 mm in diameter to the center of it and pour them into a reversing measure. Photosensor is connected to the reversing measure. If raindrops in the reversing measure exceeds 4c.c, the measure is reversed and the photosensor detect the fact. Amount of rain-fall of 0.25 mm is described at one reverse. (The contents recorded in IC memory is 0.253 mm at one reverse. Rounded to three decimal places for describing figures.)

4. Air Temperature Sensor

Air temperature is an indispensable environmental element for human life, glowing plant and for various industries. For surface meteorological observation, W.M.O. (World Meteorology Organization) sets air temperature on the basis of the height of 1.25 to 2 m over surface ground.

Air temperature is described in unit °C.

High accuracy platinum resistance thermometer Pt100 Ω (At temperature 0 °C.) is used for temperature sensor. Temperature change via electrical resistance change of the sensor are converted to digital signal to be displayed in temperature value (°C)

5. Humidity Sensor

A large amount of water vapor is included in the air. This dampness (Degree of humidity) is called relative humidity, which is defined as follows.

$$\text{Humidity (\%)} = \frac{\text{Amount of water vapor included in } 1 \text{ m}^3 \text{ air}}{\text{Maximum amount of water vapor included in volume having the same temperature as the above}}$$

Capacitance type thin film humidity sensor is used for humidity sensor.

6. Underground Temperature Sensor

Temperature measured at the place deeper than the ground surface is called underground temperature. It is closely relating to growing plant seeds flowers and vegetables and is especially important for agriculture. High accuracy platinum resistance thermometer Pt100 Ω (At 0°C) is used for underground temperature sensor. Temperature change via electrical resistance change of the sensor are converted to digital signal to be displayed in temperature value (°C).

7A. Surface Temperature Sensor

Temperature of the surface (Ground) is called surface temperature and together with underground temperature, it is also indispensable for agriculture. Approximately 5 to 10 cm above the ground is the place to take the surface temperature. The same sensor as for underground temperature sensor is used.

7B. Air Pressure Sensor

Air pressure is indispensable element to know the weather change in weather forecast. Unit hectopascal (Abbr. hpa) is used to describe air pressure for meteorological observation.

One air pressure means the pressure with 1000 dyne force operating to an area of 1 cm², which may become approximately 1013 hpa on sea surface.

The air pressure sensor senses air pressure with piezoelectric effect semiconductor. (1 hpa: 1mb)

Pressure change is converted to voltage signal to be displayed in hectopascal.

7C. Amount of Solar Radiation Sensor

The amount of solar radiation is the most basic element for energy source of weather phenomenon. The observation value is very important to solve heat balance of surface or atmospheric circulation.

Solar radiation is direct light, scattered light and reflected light having the waveform range between near ultraviolet rays (Approx. 0.3 to 0.4 μ) and near infrared rays (Approx. 3 to 4 μ) among solar radiant energy. Solar radiation sensor converts thermovoltage of solar battery to amount of solar radiation to be displayed in megajoule (MJ·m⁻²).

8. Other optional sensors

- a) Installing more underground temperature sensors is available.
- b) Connectable to soil moisture sensor
- c) Connectable to other sensors.

Note: Regarding the other sensors, consult with a person in charge.

[Standard Model Specification]

- 1) WS-EX20E
Observation items: Air temperature · Humidity · Amount of rain-fall ·
Wind direction · Wind speed · Underground temperature ·
Surface temperature
- 2) WS-EX30K
Observation items: Air temperature · Humidity · Amount of rain-fall ·
Wind direction · Wind speed · Underground temperature ·
Air pressure
- 3) WS-EX40N
Observation items: Air temperature · Humidity · Amount of rain-fall ·
Wind direction · Wind speed · Underground temperature ·
Amount of solar radiation
- 4) WS-EX50KN
Observation items: Air temperature · Humidity · Amount of rain-fall ·
Wind direction · Wind speed · Air pressure · amount
of solar radiation
- 5) WS-EX60KX
Observation items: Air temperature · Humidity · Amount of rain-fall ·
Wind direction · Wind speed · Underground temperature ·
Air pressure · Amount of solar radiation

Any of the above models are equipped with the following settings.

■ Weather station mainbody	1 set	■ Communication cable (200m)	1 pc.
■ Communication cable connector	1 set	■ Indicator	1 unit
■ RS-232S cable	1 pc.	■ Power supply cable (100V AC)	1 pc.
■ Earth cable	1 pc.	■ Back-up battery	1 pc.
■ Instruction Manual	1 copy	■ Basic observation system (VER6.1)	1 set

Other than the above standard models, types combined with optional sensors are ready at hand. Please contact our service shop.

"Observation Accuracy & Observation Range"

Sensor	Observation range	Observation accuracy	Minimum display unit	MAX display	MAX display
Air temperature	-25~+60°C	±0.5°C	0.1°C	○	○
Humidity	0~100%	±10%	0.1%	○	○
Amount of rain-fall	0.25~50mm/h	~20mm/h→1mm 20mm/h~→±6%	0.25mm	Estimated value of 24 hours	Estimated value of one hour
Wind direction	360°/16 azimuth	±8.25° via ±1°	16 azimuth	—	—
Wind speed	2.0~30m/sec	~10m/sec→ 1m/sec 10m/sec~→ ±10%	0.1m	○	○
Underground temperature	-25~+60°C	±0.5°C	0.1°C	○	○
Surface temperature	-25~+60°C	±0.5°C	0.1°C	○	○
Air pressure	850~1250hpa	10°~30°C→ ±1hpa	1hpa	○	○
Amount of solar radiation	0.01~0.08MJ	±10%	0.01MJ	Estimated value of 24 hours	Estimated value of one hour

- Note: 1) Reflecting plate, directly connected to arrow vane of anemometer, indicates the same direction when it is within ±8.25° to one direction
- 2) Although unit used to describe amount of rain-fall is 0.25mm, measure with 4CC in one reversal is used, which makes the actual unit 0.253mm. That is to say, two reversal will make it become 0.506mm to be displayed in 0.51.

"Mainbody Specification"

Memory capacity ----- 800 hours (Approx. 33 days)
 IF ----- Analog 4CH + Optional 8CH
 ----- Digital 4CH
 ----- RS-422 (For connecting to indicator)

Power supply ----- 12 to 18V DC
 Consumption power ----- 300 mA
 Mainbody dimensions ----- Height; 2040 mm · Width; 920 mm
 Bottom section dimensions --- 1100 mm · 120 degrees x 3 points
 Weight ----- Approx. 40 kg

Operational environment ---- From -25 to +40 °C (Avoid dewdrops)

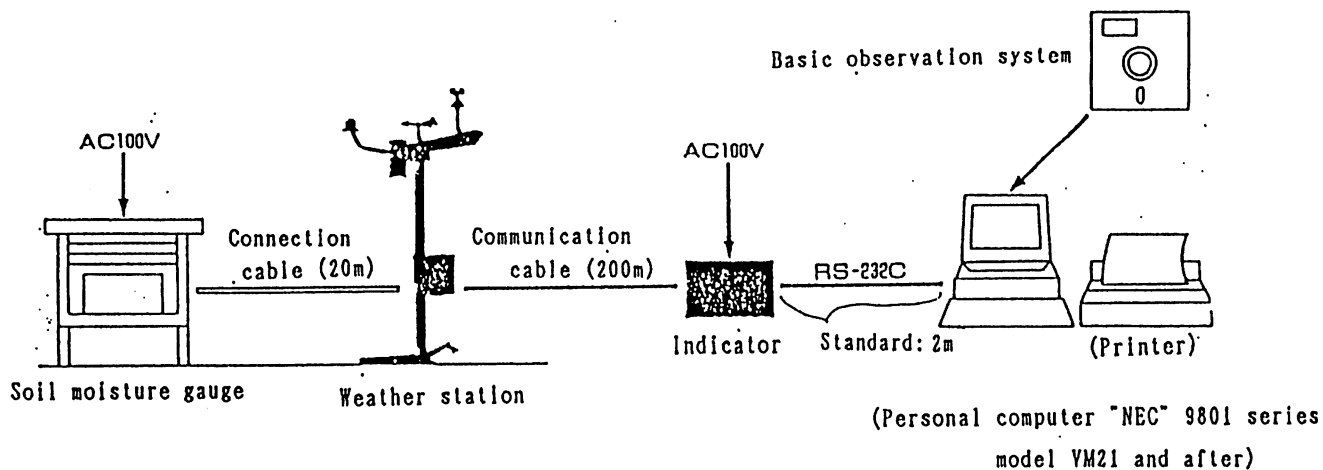
"Indicator Specification"

Display ----- 1 + 3 digits LED
 Operation key ----- 12 keys + Shift key
 IF ----- RS-422 (For connecting to mainbody.)
 ----- RS-232C (For connecting to personal computer.)

Power supply ----- 100V AC ±10 % 50/60Hz
 Consumption power ----- 15 VA
 Dimensions ----- 175 mm (H) x 270 mm (D) x 80 mm (T)
 Weight ----- 5 kg

Operational environment ---- From 0 to +40 °C (Avoid dewdrops.)
 To be used indoors as a rule.

"System Configuration Drawing"



Note: Color in ■ is of the standard model.
 Color in □ is optional.

"Operational Environment of Basic Observation System Version 6.1 Program"

1) Applicable types

NEC PC-9801 series: On and after the model Vm21

- * Installed with calendar LSI to correspond to leap year.
- * Standard equipment of 16-color graphic board
- * Standard equipment of memory more than 640 KB
- * Standard equipment of 1MB/640KB FDD

(Note) Not corresponding to high resolution mode.

2) Required memory

Standard installation memory 640 KB or more

3) Hardware disc

20 MB or more

- * Either built-in or external installation is acceptable.
- * Any of SASI, SCSI, ESDI, IDE is applicable.

(Reference) In order to store observation data for one year, approximately 3.3MB capacity is required. Usually, 3 floppy discs (1MB per are used.

4) Printer

NEC PC-PR201 or more

- * Number of printout digits : 136 digits/line

5) Operation System (OS)

NEC MS-DOS Version 3.3 or more

Note: For connecting with types other than the above, contact us or our service shop in advance.


If you have any questions, please contact the following address.

(The above mentioned details are as of April 1, 1993.)

Head Office

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Person in charge : Hayato Uchiyama
Sales Agency

Agent

 **A r b e x Corporation**
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Minato-ku, Tokyo 106, Japan
Telephone: (03)3583-8631
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■ Daily Maintenance for Weather Station ■

At the beginning

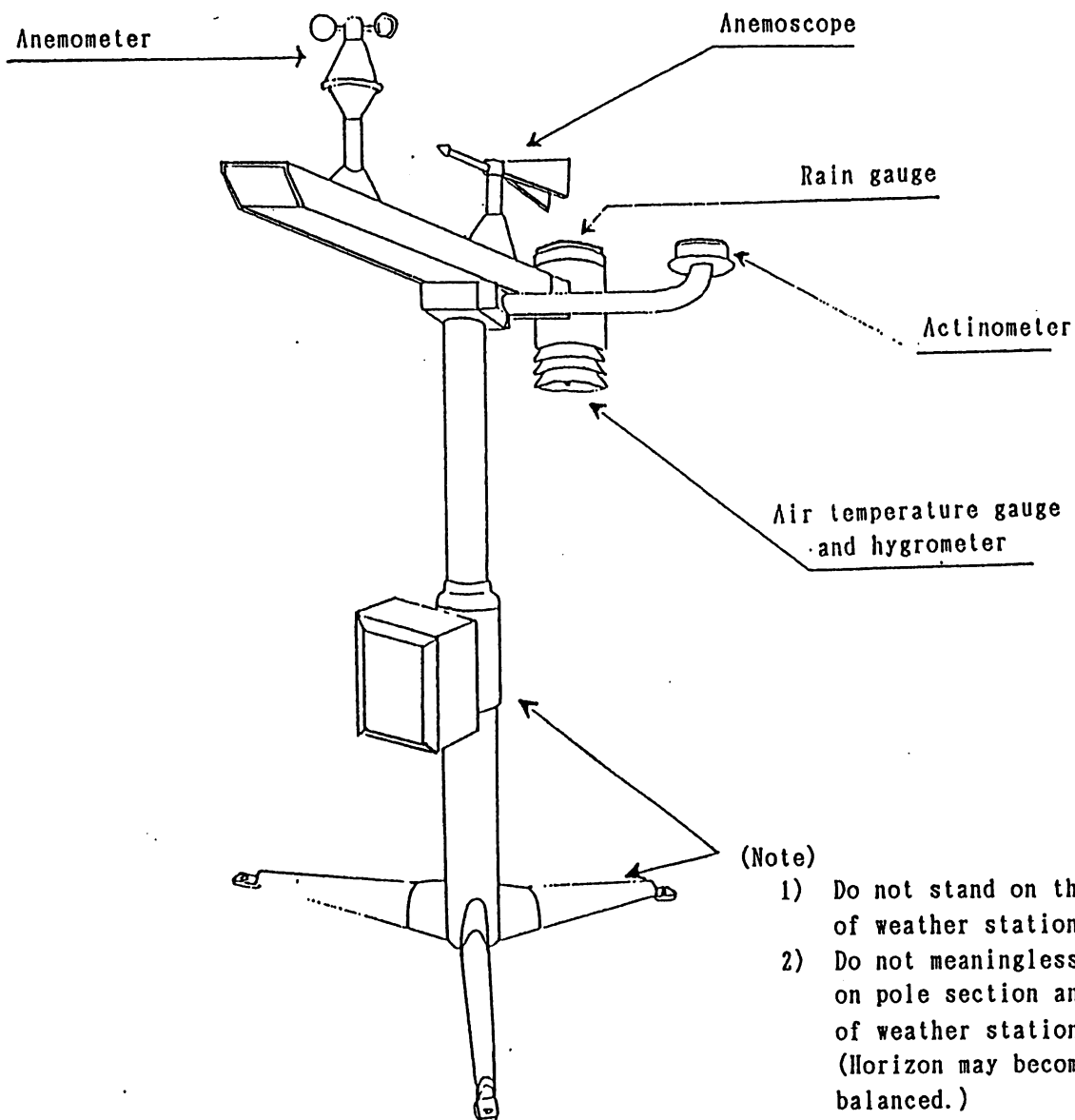
Weather station is continuously measuring for 365 days and keeps sending the necessary data for managing lawns, etc.

Since measurement is performed in natural environment, dust, fallen leaves or insect eggs are apt to dirt the measuring section to disturb the correct measurement. In order to perform correct measurement in superior condition, inspect and clean every once in a month according to the following procedures.

● Tools required for cleaning

- a) A stepladder or a stand (With its height 70 cm is appropriate.), enough
- b) Water in a bucket four-fifths full
- c) Soft waste cloth : 1 pc.
- d) Tooth brush : 1 pc.

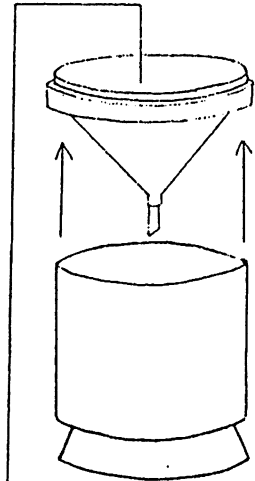
1) Parts to be cleaned in weather station



2) Inspection and Cleaning of Rain Gauge

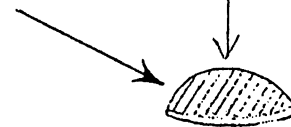
a) How to remove rain collecting funnel.

Gently lift up the funnel and wire net from rain gauge tube described in the right drawing and remove them.



b) Cleaning Funnel and Wire Net

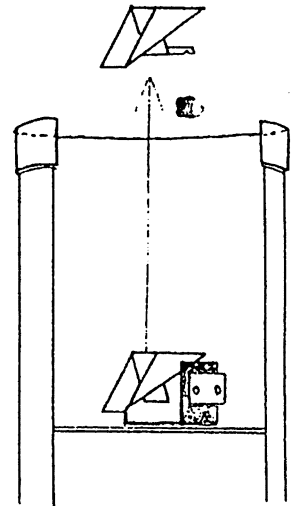
Wash the funnel and wire net with water in the bucket.



c) How to Remove Reversing Measure

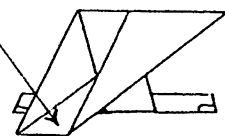
Remove reversing measure from rain gauge sensor described in the right drawing. As the reversing measure is falling down to either left or right sides, gently remove it upward as it is in slanting status.

(Note) On removing, if the reversing measure is slanted to left or right sides, the rain gauge may operate. Take great care for handling.



d) Cleaning Reversing Measure

Remove dust and dirt attached at this partition with toothbrush, etc.

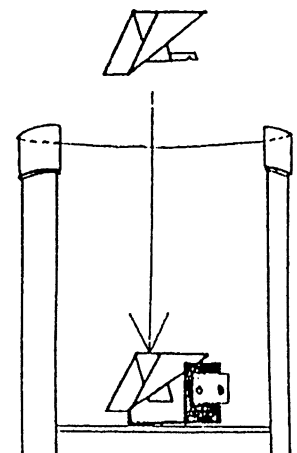


e) Reversing Measure Assembly

Reverse the order of removing the reversing measure, see the right drawing and assemble it gently on the rain gauge funnel.

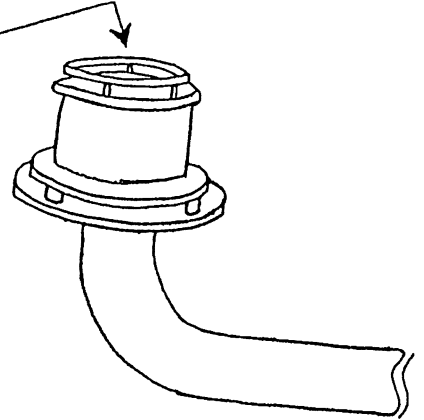
(Note) Insert knife partition of the reversing measure to V groove of sensor.

(Note) After insertion, if the reversing measure is slanted to left to right, rain gauge may operate. Take great care for handling.



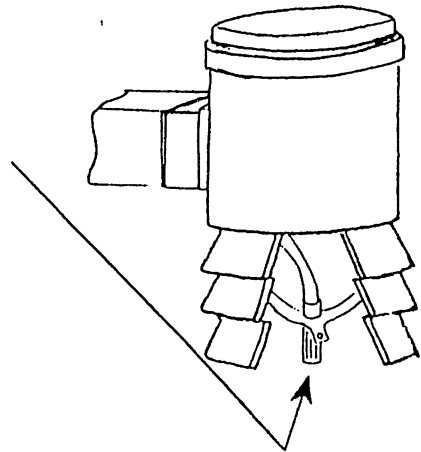
3) Cleaning Actinometer

Remove dust and dirt from this partition with wet soft waste.



4) Cleaning Air Temperature Gauge and Hygrometer

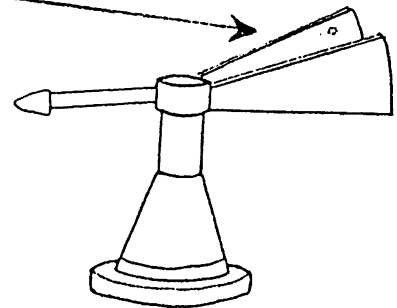
Remove dirt and insect eggs from this partition with wet soft cloth.



5) Cleaning Anemoscope

Remove dirt and insect eggs from this partition with wet cloth.

(Note) After cleaning, lightly turn it with hands to confirm its movement.



6) Cleaning Anemometer

Remove dirt and inset eggs from this partition with wet soft cloth.

(Note) After cleaning, lightly turn it with hands to confirm its movement.

