



THE HONG KONG
POLYTECHNIC UNIVERSITY

香港理工大學

DEPARTMENT OF APPLIED PHYSICS

應用物理學系

Automatic Weather Station (AWS)



Weather Information

Temperature

Relative Humidity

Rainfall

Ultra Violet Index (UVI)

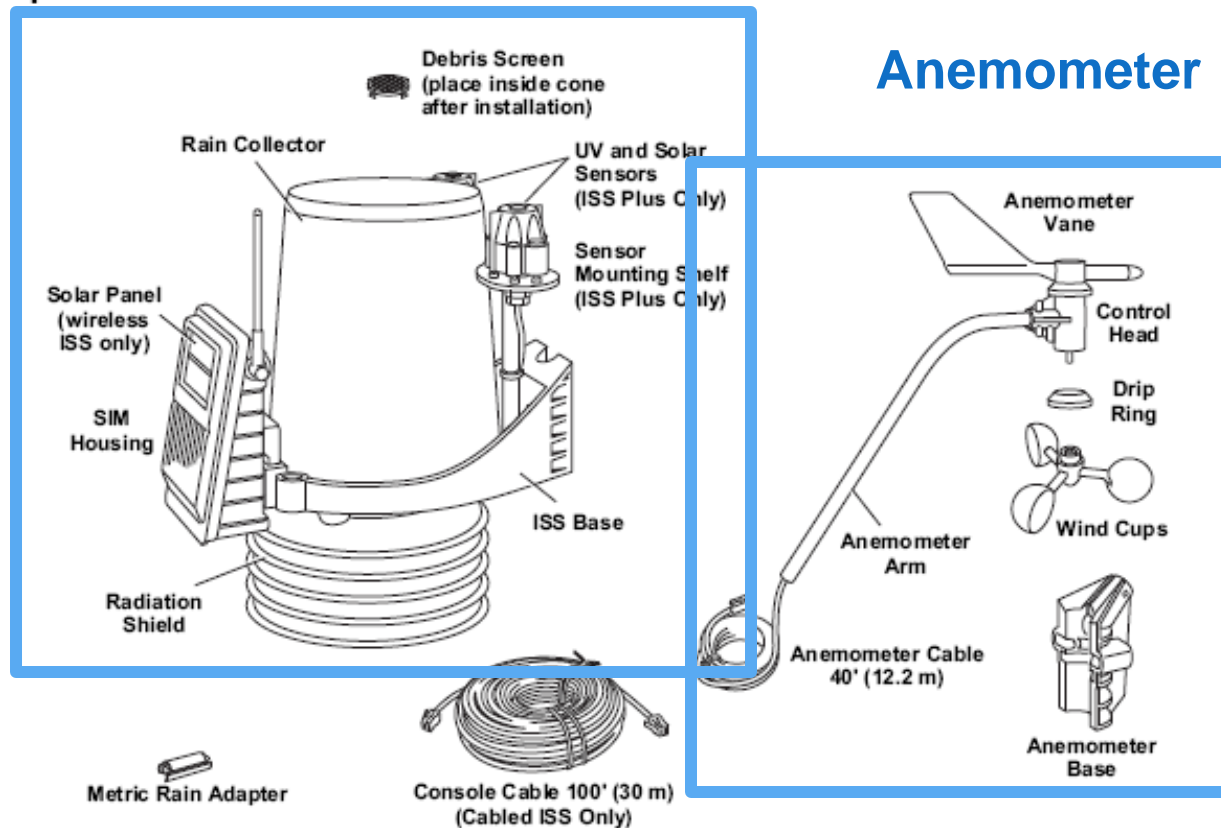
Solar Radiation

Wind Speed & Direction

Pressure

All Components of AWS

Components



ISS
(Integrated
Sensors
Station)

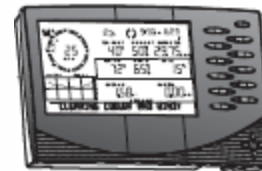
Temperature & Relative Humidity

Two Thermometers and two hygrometers in AWS

Outdoor (ISS)

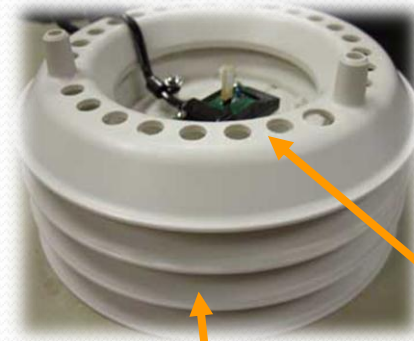


Indoor (Console)



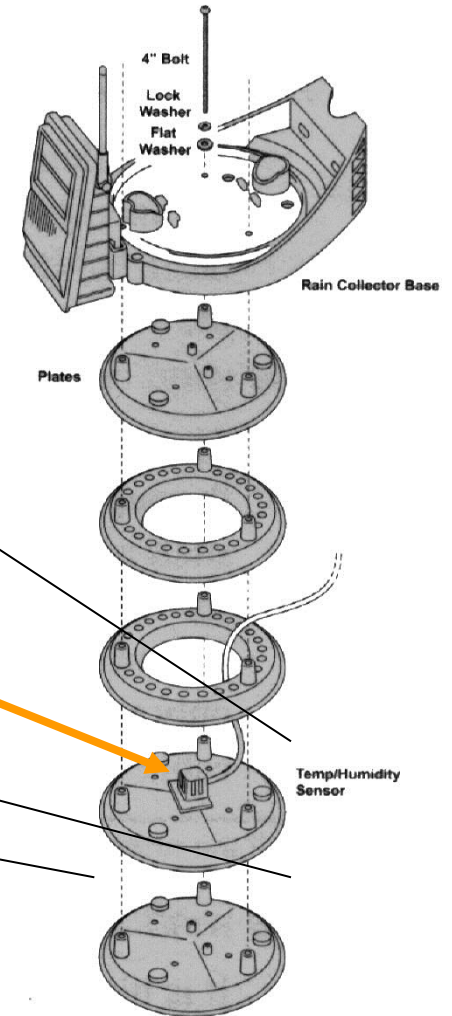
Outdoor Sensors

- Inside Radiation shield



Radiation shield

Sensor board

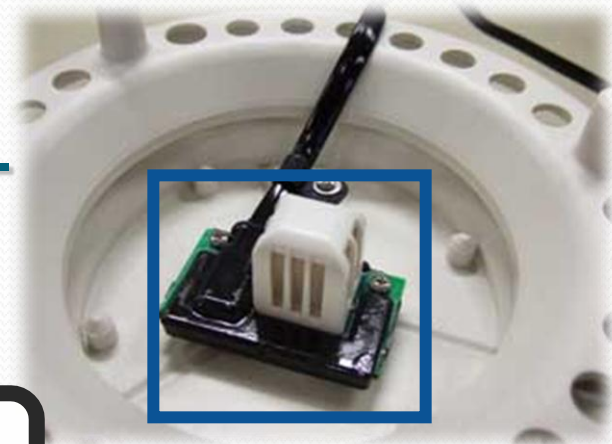
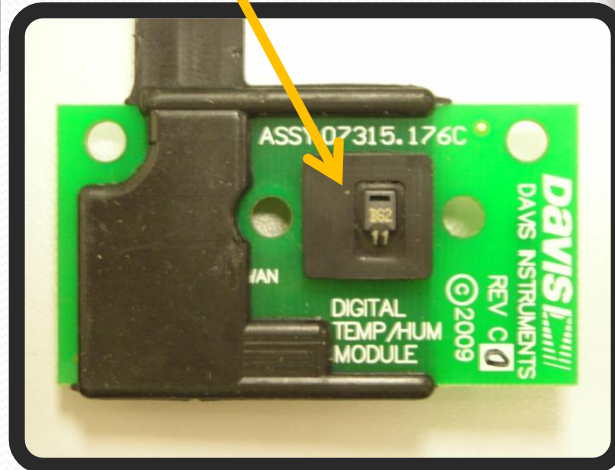


Outdoor Sensors



Old sensor board
Hygrometer
Thermistor

New sensor board
IC sensors

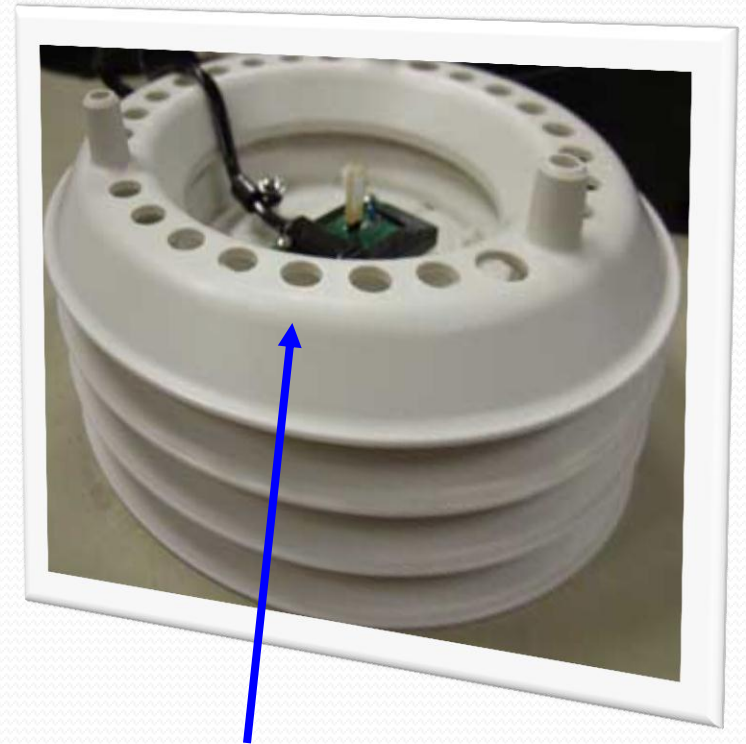


Inside radiation shield

Outdoor Sensors

Why should it be installed in the radiation shield?

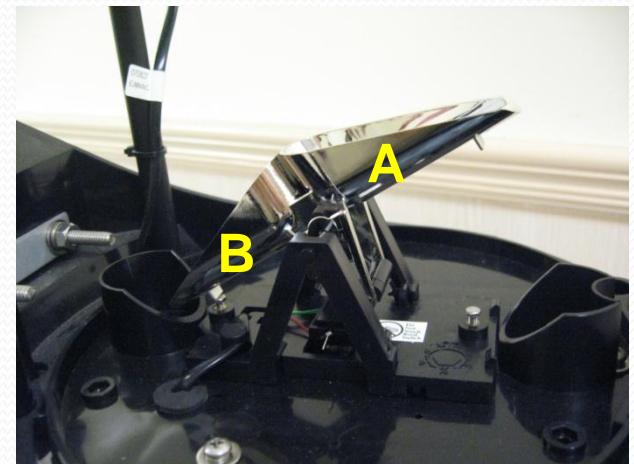
- Dry air Temperature
- Prevent the direct solar radiation
- Good Ventilation



Radiation Shield

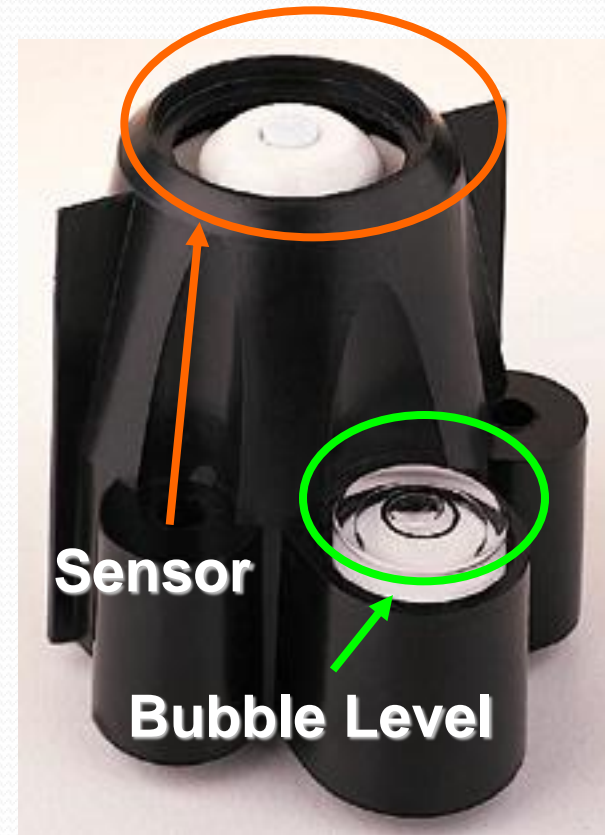
Rainfall

- Funnel shape rain collector collects rain drops
- Tipping bucket type
- 1 tip = 0.2 mm
- Rainfall = tipping times \times 0.2 mm



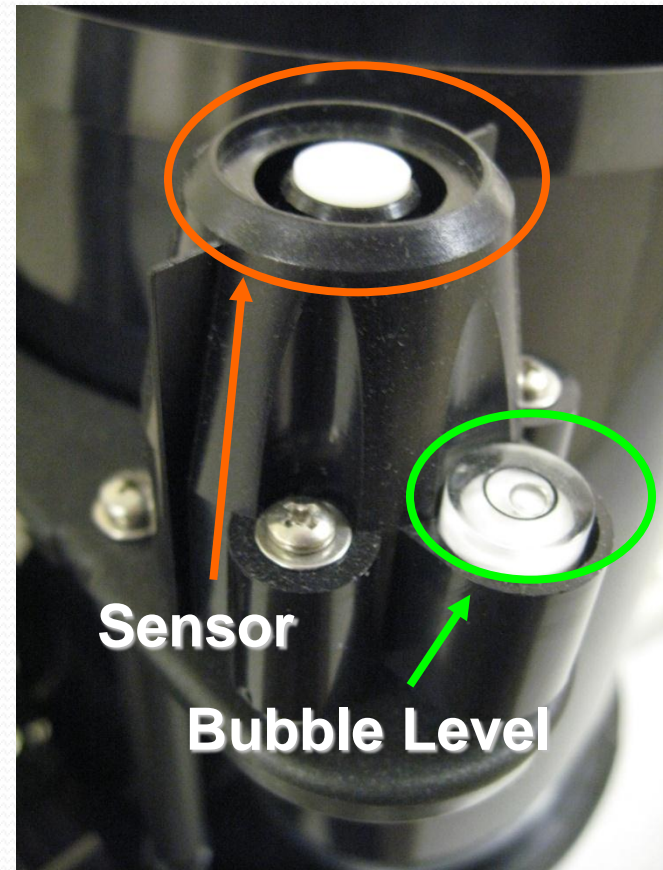
Ultra Violet (UV) Index

- Wavelength(λ) for UVI: 295 to 325 nm
- Adjusted according to the sensitivity of human skin (McKinlay-Diffey Erythema action spectrum)
- No unit
- Typical value:
 - 15 (highest record in HK)



Solar Radiation

- Power of sunlight on a surface - irradiance
- Unit:
Watt per meter square (Wm^{-2}) - Power per unit area



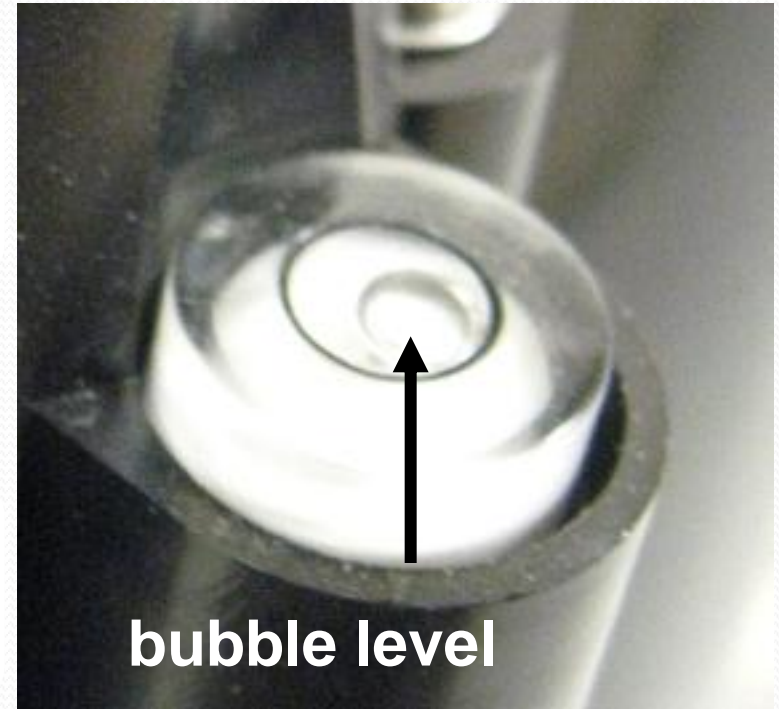
Solar and UV sensor

Bubble Level

- To ensure the sensor is horizontal to the sea level

Why?

- Detect the non-directional radiation



bubble level

Adjust the sensors until the bubble is at the centre of the black circle

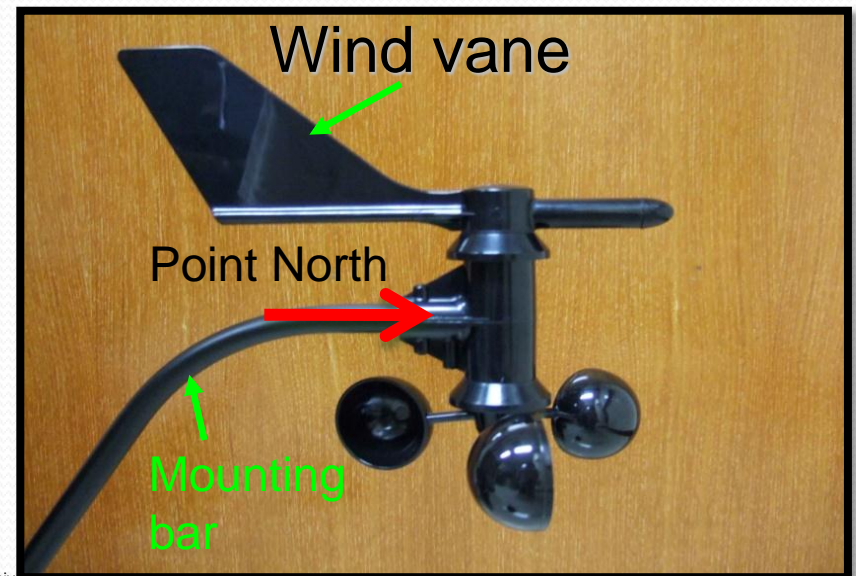
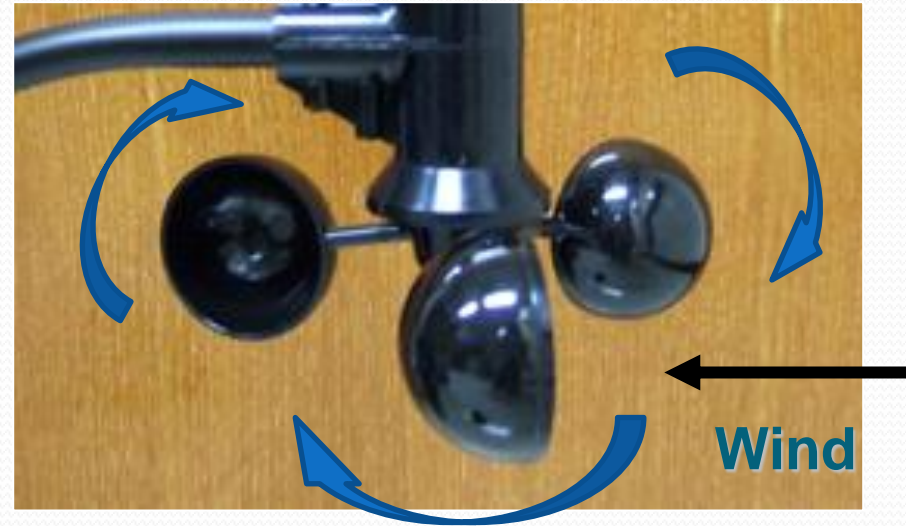
Wind

Speed:

- Counting frequency of 2 metal clips in contact

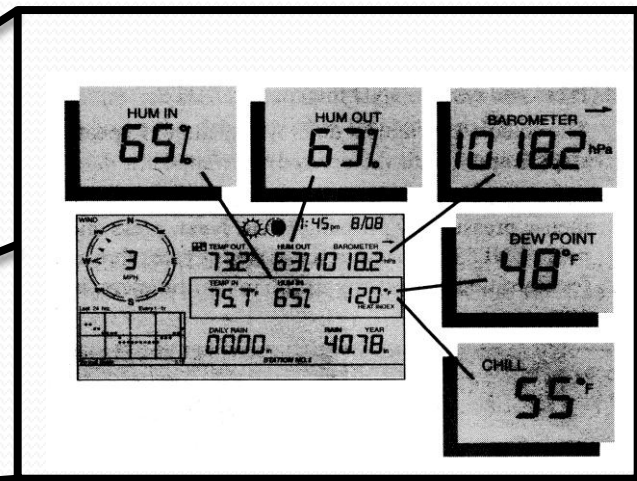
Direction:

- Wind vane points to where the wind come from
- Mounting bar must point to north when install



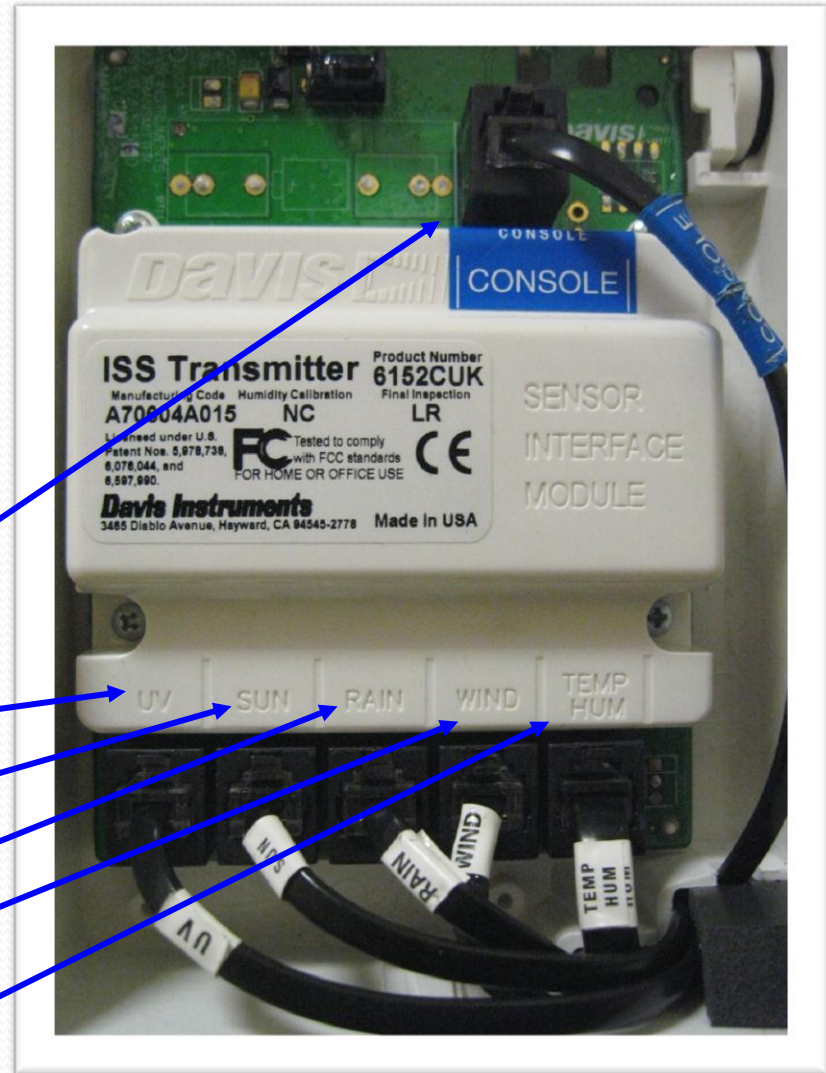
Pressure

- Barometer in the console
- Working principle:
 - Measure the resistance of thin film (薄膜) in piezoresistive (壓阻式) sensor exerted by the atmosphere



Sensor Interface Module

- Collect raw data from all sensors
- Transmit coded data to the console
- Max range: 300m



Console

UV

SUN

RAIN

WIND

TEMP

& HUM



The Console



- Receive and decode data from sensor interface module
- Display latest weather information
- Transfer data to computer for:
 - display and storage
 - webpage generation
 - sending back to Co-WIN database server



社區天氣資訊網絡
Community Weather Information Network

Co-WIN website

- AWSs located at different school and organization members
- Keep sending data back **every minute** to Co-WIN database server in the Department of Applied Physics, HKPolyU via internet
- Provide latest weather information to the public
- As a local weather reference complementary to weather stations of HKO



社區天氣資訊網絡
Community Weather Information Network

Co-WIN website

Temperature

Max/Min Temperature

Relative Humidity

Wind Speed

Rainfall

UV

Max UV

Solar Radiation

Pressure

- Parameters in weather map:
 - Temperature
 - Max/Min Temperature
 - Relative Humidity
 - Wind Speed
 - Rainfall
 - UV Index
 - Solar Radiation
 - Pressure



Co-WIN website

- View weather data history from different location
- Time series display

The screenshot shows the Co-WIN website interface. At the top, there are logos for The Hong Kong Polytechnic University, Department of Applied Physics, and the Hong Kong Observatory. The main title is '社區天氣資訊網絡' (Community Weather Information Network). Below the title is a navigation menu with links: 'What's New Contact us', 'About us Disclaimer', 'Weather Map 中文', 'Time Series', 'Data Download', 'Photo Gallery', and 'Member List'. The main content area is divided into two columns. The left column has a 'Location:' dropdown menu set to 'China Holiness Church Living Spirit College' and a 'Time Series of Weather Information:' dropdown menu set to 'Air Temperature'. Below these is a calendar for April 2010 with the 15th selected. The right column displays a time series plot titled 'Time Series of Air Temperature on 2010/04/15 (China Holiness Church Living Spirit College)'. The plot shows the 1-minute mean dry bulb temperature in degrees Celsius over a 24-hour period. The temperature starts at approximately 19°C at 00:00, remains relatively stable until 08:00, then drops to about 12°C by 12:00, and continues to decrease to around 10°C by 24:00.

Location: China Holiness Church Living Spirit College

Time Series of Weather Information: Air Temperature

Apr Enter 2010

April 2010						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

China Holiness Church Living Spirit College

Time Series of Air Temperature on 2010/04/15 (China Holiness Church Living Spirit College)

1-minute mean dry bulb temperature

This website is a collaborative effort between the Department of Applied Physics of the Hong Kong Polytechnic University and the Hong Kong Joint-School Meteorological Association, with technical advice from the Hong Kong Observatory.

This page is best viewed under a resolution of 1280 x 1024 using Firefox 2 or IE 6 or above. Please report any problem or suggestion to [Co-WIN](#).



Co-WIN website

- Download weather data history
- Data exported in .csv format
- MS Excel compatible

Weather Data Download

Note:

- Data download in csv format.
- Download may take over 10 minutes for large amount of data.
- Each query is limited to 200,000 data points.
- Maximum 5 schools and 31 days time range per download.
- Click [here](#) to show the measurement units of Co-WIN meteorological data.

Station: (Hold Ctrl key to select multiple stations. Max 5 allowed.)

Sensor: (Max 2 allowed.)

From: (yyyy/mm/dd) (hh/mm) 00 00

To: (Max 31 days allowed.) (yyyy/mm/dd) (hh/mm) 00 00

Time Interval Per Data Point: Minute

Download options

Download source (check all that apply)

CSV file MEDALS

Download Reset



社區天氣資訊網絡
Community Weather Information Network

Co-WIN website

- Development

- More weather information will be available soon
- Release of new design with Google map
- Integrate more functions for mobile learning

END



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