Isao Naito
Sales Group Manager

Shigeki Shimizu
Met Sales Manager, Japan & Korea
Vaisala
Tokyo, Japan

Japan Meteorological Agency Adopts Vaisala Barometers

Vaisala has been a trusted supplier to the Japanese market for years. One of its long-standing partners is the Japan Meteorological Agency (JMA). Recently a decision was made to adopt the Vaisala BAROCAP® Digital Barometer PTB220 in a portable oak case as the JMA round-check standard (reference) barometer.

The selection process for the various instruments used in the JMA surface weather observation system started several years before their actual adoption. Various comparative tests were conducted over a period of time with barometers of several makes.

Following the tests, JMA evaluated potential products, achievements in the market, prices, future potential, and manufacturer's support systems. The Vaisala BAROCAP® Digital Barometer PTB200AD (later replaced by PTB220) was selected through cooperation with partners Sanko Tsusho Co., Ltd. and system integrator Meisei Electric Co. Ltd.

JMA has 57 weather stations and 99 meteorological observatories in Japan, some of which are operated unmanned. The highly reliable Vaisala 3-sensor type PTB220 series is a good match with JMA's automation program.

Replacing the old mercury barometer

JMA had used a mercury barometer as the reference barometer for over 130 years, from the beginning of its history. However, measurement with a mercury barometer is a troublesome task. Temperature and gravity values in particular need compensation that requires skill and experience in handling as well as in reading the values. Because of the toxic nature of mercury in volume, transportation and installation is a genuine burden. Due to these factors, there was a demand at JMA for a round-check reference barometer that is easier to handle.

JMA' s advanced study found that the Vaisala BAROCAP® Digital Barometer PTB220TS in an oak case has a wealth of benefits, including its compact size, durability and ability to indicate the barometric value directly. Data continuity and equipment reliability are the most important features of a reference barometer for JMA. To investigate the long-term reliability and periodical maintenance requirements of the PTB220TS barometer, JMA carried out comparative readings of barometric pressure together with the old mercury barometer for over twelve months. They found that the fluctuation of the PTB220TS stayed within the ±0.15hPa range and showed no trend of shifting to either side.

Vaisala BAROCAP® Digital Barometer PTB220TS in a portable oak case.

Vigorous performance-testing

An air piston pressure gauge was used as the reference meter. Accuracy confirmation tests included instrumental difference, temperature, vibration, long-term stability and durability/safety for transportation. JMA checked and compared the digital barometers with the mercury barometer once a week and applied compensation if necessary. The result of the comparison of all 64 digital barometers during 1995-1998 indicated that the shortest period of offset value fluctuation within ±0.4hpa was 14 months. Therefore the period of reading comparison with the then barometer was set at one year. Due to the good results, JMA decided to adopt the Vaisala digital barometer by 2003, and it has been in active operation since 2004. ●

From left: Yasuhiko Sato, President, Sanko Tsusho Co., Ltd., and Isao Naito

Long-term stability	Comparative tests for approximately 1 year
Temperature characteristics test	Constant temperature chamber tests with -20, 0, 30, 50 degrees Celsius.
Absolute pressure test	Station pressure tests with 5 different points of 880, 920, 980, 1000, 1040 hPa for comparison of increasing and decreasing pressure, and hysteresis.
Accelerated stability test	Reducing the test pressure to about 3hPa lower than the station pressure and resuming normal pressure at 5-minute intervals, until an equivalent of 700 days of operation is reached.
Vibration test	Amplitude: ±2mm, test frequency: 300rpm