



# FalconTrace

Trace Moisture Sensor Series

Beyond the wave

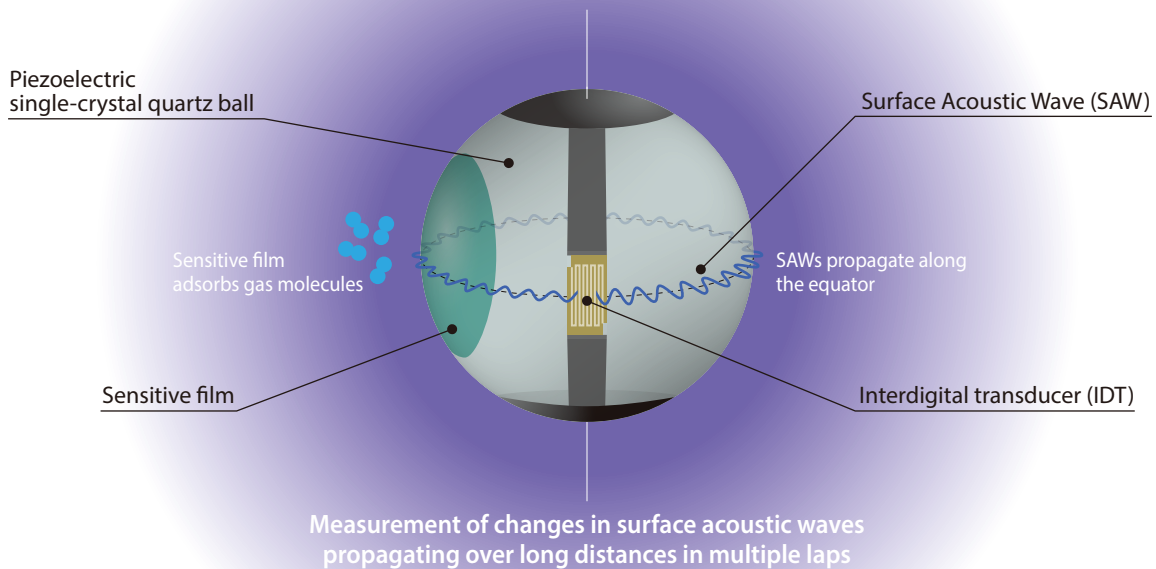


Ball Wave Inc.

# Now is the time for rapid measurement of ultratrace moisture

With surface acoustic waves (SAWs) propagating along the surface of a tiny crystal ball with a diameter of 3.3 mm, Ball Wave has made it possible to measure minute amounts of water on the order of the lower limit ppmv (1 / 1,000,000)\* or ppbv (1/1 billion)\*\*. Moreover, it achieves a high-speed response of only 1 second \* or 30 seconds \*\*. We have a lineup of "FalconTrace Moisture Analyzer Series" that makes the best use of these features.

SAW; Surface Acoustic Wave  
 \* In case of FT-300WT  
 \*\* In case of FT-700WT



## Ball SAW Sensor

Principle of Ball SAW Sensor Measurement	(1) Interdigital transducer (IDT) generates surface acoustic waves.
	(2) Surface acoustic waves propagate around the equator of the ball and react to slight changes in the applied sensitive film.
	(3) The interdigital transducer detects the signal change of the reacted surface acoustic waves.
	(4) Highly sensitive sensing is realized by integrating minute changes by multiple laps.

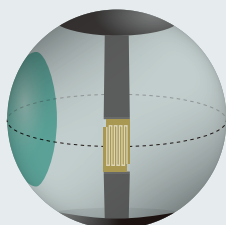
Small size	Single-crystal quartz ball, <b>3.3mm</b> in diameter
High sensitivity measurement	Measurement to the order of <b>ppmv</b> or <b>ppbv</b>
Fast responsiveness	<b>&lt;1 second</b> or <b>&lt;30 seconds</b> with a sensitive film with a thickness of <b>10 nm</b>



Single-crystal quartz ball, 3.3mm in diameter (Actual photo)

### Development Plan )))

Pursuing chemical sensing on the same platform in combination with the optimum sensitive films



#### Types of sensitive films

Amorphous silica	Trace moisture sensor
Polydimethylsiloxane	Gas chromatograph
Palladium alloys	Hydrogen sensor

\*Other types are also under development

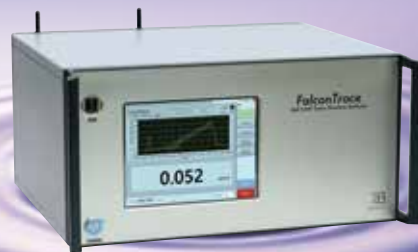
- A series with optimal functions for various measurement applications.  
We have also achieved miniaturization of the sensor unit and flexibly respond to various applications.
- A wide range of detection down to ppmv or even to ppbv order doesn't miss even a small amount of water.
- A sensitive film with a thickness of only 10 nm realizes unprecedented high-speed response.  
It contributes to the realization of a real-time control system for water content, which was difficult until now.

# FalconTrace

Trace Moisture Sensor Series

## ppbv order

Low water concentration



## FT-700WT Mk-II

**Top model in the series that realizes "ultra" trace moisture measurement**

- Measures a wide range from dew point  $-110^{\circ}\text{C}$  to  $-42^{\circ}\text{C}$
- In addition to dew point measurement, background gas \* composition (equivalent to average molecular weight) is also detected at the% level  
\* Background gas: Gas for which water content is measured
- One unit covers different background gases from natural gas to high-purity gas

Application example

Quality control of industrial gases during the production and at the time of shipment, and purity control of gases for semiconductor manufacturing

## ppbv order

Low water concentrations



## FT-450WT

**High-end model with high-speed response and emphasis on equipment build-in**

- Measures a wide range from dew point  $-100^{\circ}\text{C}$  to  $-42^{\circ}\text{C}$
- Separating the sensor unit from the main body improves layout freedom

Application example

Quality control of industrial gases during the production and at the time of shipment, and build into purifier systems, cylinder cabinets, etc.

## Sub-ppmv order

Moderate water concentrations



## FT-400WT

**Medium model that enables real-time measurement in the middle range**




- Detecting changes from the dew point of  $-90^{\circ}\text{C}$  within 1 second, ideal for real-time control system measurement
- Built-in type is available, too.\*

\* Please contact us

Application example

Quality control of general manufacturing lines, moisture content monitoring of battery manufacturing process

## FalconTrace Trace Moisture Analyzer Series Product Specifications

Item	Specification		
			
Model number	FT-700WT Mk-II	FT-450WT	FT-400WT
Measurement range (dew point)	-110°C to -42°C	-100°C to -42°C	-90°C to 4°C
Measurement range (concentration)	1ppbv to 100ppmv (LDL: 0.01ppbv)	10ppbv to 100ppmv (LDL: 1ppbv)	0.1ppmv to 8000ppmv
Reaction rate	Within 30 seconds	Within 1 second	Within 1 second
Operating environment temperature	10 to 40°C	10 to 40°C	10 to 40°C
Gas pressure range	Atmospheric pressure (Contact us for 100-300kPa)	100-300kPa	Atmospheric pressure (Contact us for reduced pressure)
Corresponding gas (13 types)	Contact us for Air, N2, O2, Ar, He, H2, CO, CO2, CH4, C2H4, C2H6, C3H6, C3H8, other gases.		
How to select the corresponding gas	Automatic selection (Internal calculation)	Automatic selection (Internal calculation)	Manual selection
Gas pressure flow rate range	0 to 1 L / min	0 to 1 L / min	0 to 1 L / min
Gas inlet and exhaust dimensions	1/4 inch VCR plug	1/4 inch VCR plug	1/4 inch VCR plug
Sensor head screw standard	External thread	Internal thread	External thread
Interface	4 - 20mA, Ethernet, WiFi, USB	HDMI, WiFi, USBx2	4 - 20mA, WiFi, USB
Power supply	100-240VAC, 50 / 60Hz	100-240VAC, 50 / 60Hz	100-240VAC, 50 / 60Hz
Power consumption	Up to 100W	Up to 150W	Up to 150W
Size (width x depth x height)	449 × 376 × 222 mm (Excluding protrusions)	Sensor: 63×63×173mm(Excluding protrusions) 186.5×228×106.5mm (Excluding protrusions)	355 × 315 × 132 mm (Excluding protrusions)
Weight	About 17kg	Sensor: about 2kg, Main Unit: about 2.5kg	About 9.5kg

### Ball Wave is a startup company from Tohoku University



Ball Wave Inc. was established in November 2015 with a ball SAW sensor based on a completely new surface acoustic wave mechanism discovered at Tohoku University as its core technology. So far, we have developed technology and accumulated knowledge through the Ministry of Education, Culture, Sports, Science and Technology support programs and the contract research with the Japan Science and Technology Agency. We will continue to lead to further growth through collaboration with people in various fields.

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