Confidential

Micro Chilled Mirror Hygrometer
FINEDEW™

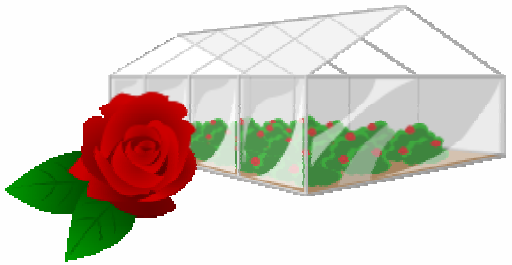
azbil

Ver:3.00oE

All industries require humidity/dew point measurement

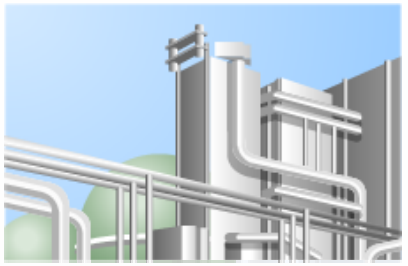
Primary industry (Agriculture)

Agriculture, horticulture
Brewing, Maturing, Fermenting



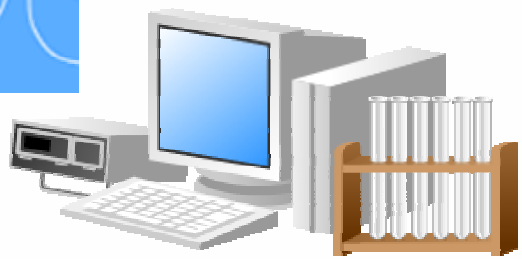
Secondary industry (Manufacture)

Industrial HVAC
Trace moisture management



Tertiary industry (Service)

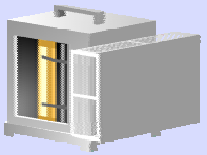
Weather observation
(High altitude/ Surface)
Scientific research



There are three major principles for humidity sensing

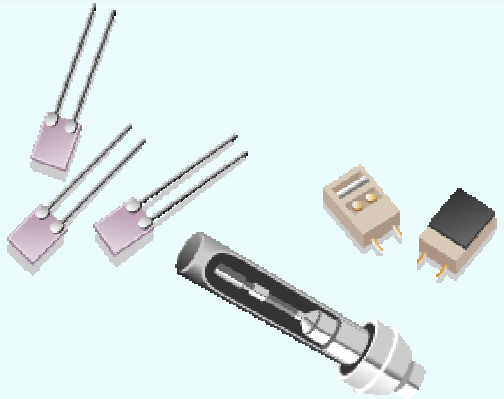
Based on the ductility of the object by moisture adsorption

- Hair
- Nylon



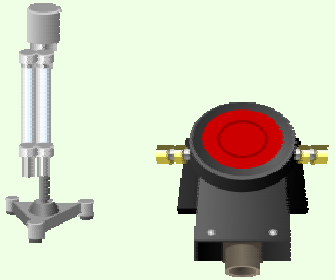
Based on the change of electric impedance by moisture adsorption

- Polymer resistive
- Polymer capacitive
- Al_2O_3 capacitive



Thermodynamic principle

- Dry/Wet bulb Psychrometer
- Chilled mirror



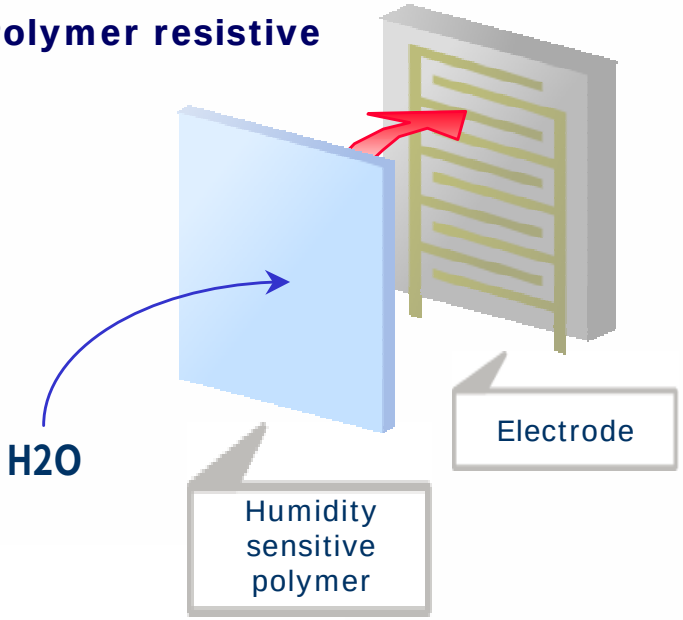
Measuring principles and their characteristics

Based on the ductility of the object by moisture adsorption	Hair Nylon	• Less accuracy and less repeatability for low priced models
Based on the change of electric impedance by moisture adsorption	Polymer resistive	• Doesn't work at low humidity • Manufactured by simple equipment
	Polymer capacitive	• Relatively wide measuring range • Most common technology
	Al_2O_3 capacitive	• Suitable for very low dew point • Very slow response time
Thermodynamic principle	Dry/Wet bulb Psychrometer	• Handling and maintenance are troublesome
	Chilled mirror	• Reliability over accuracy is high • Relatively expensive

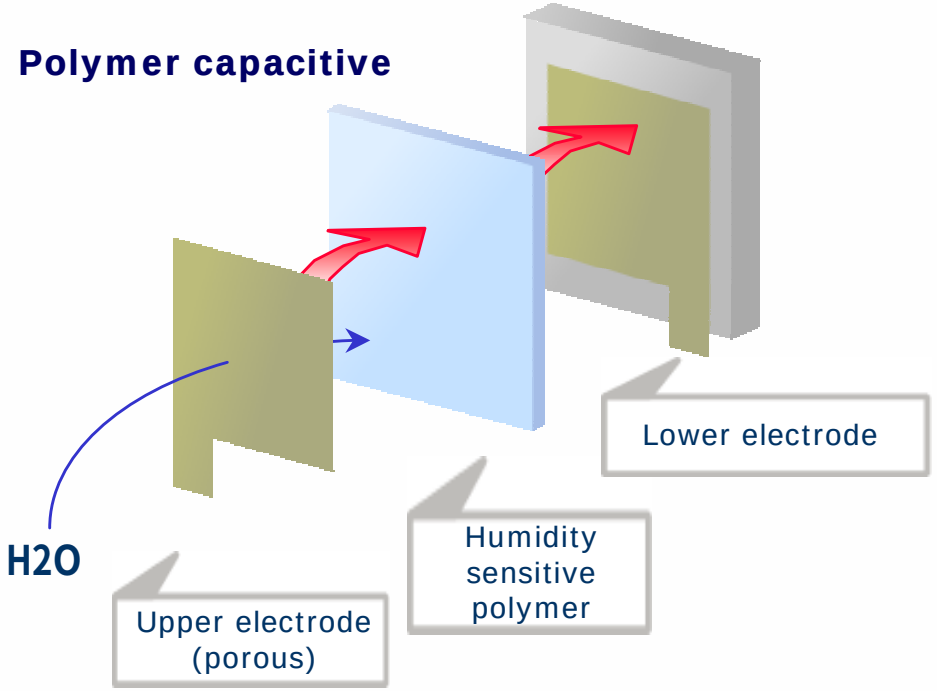
The sensor based on moisture adsorption is most commonly used today...

- Changes in the amount of moisture adsorbed into the substance are measured by changes in the ductility or electric impedance.
- This measurement is secondary, and since it may be necessary to adjust the characteristic degradation of a substance, periodic calibration is needed.

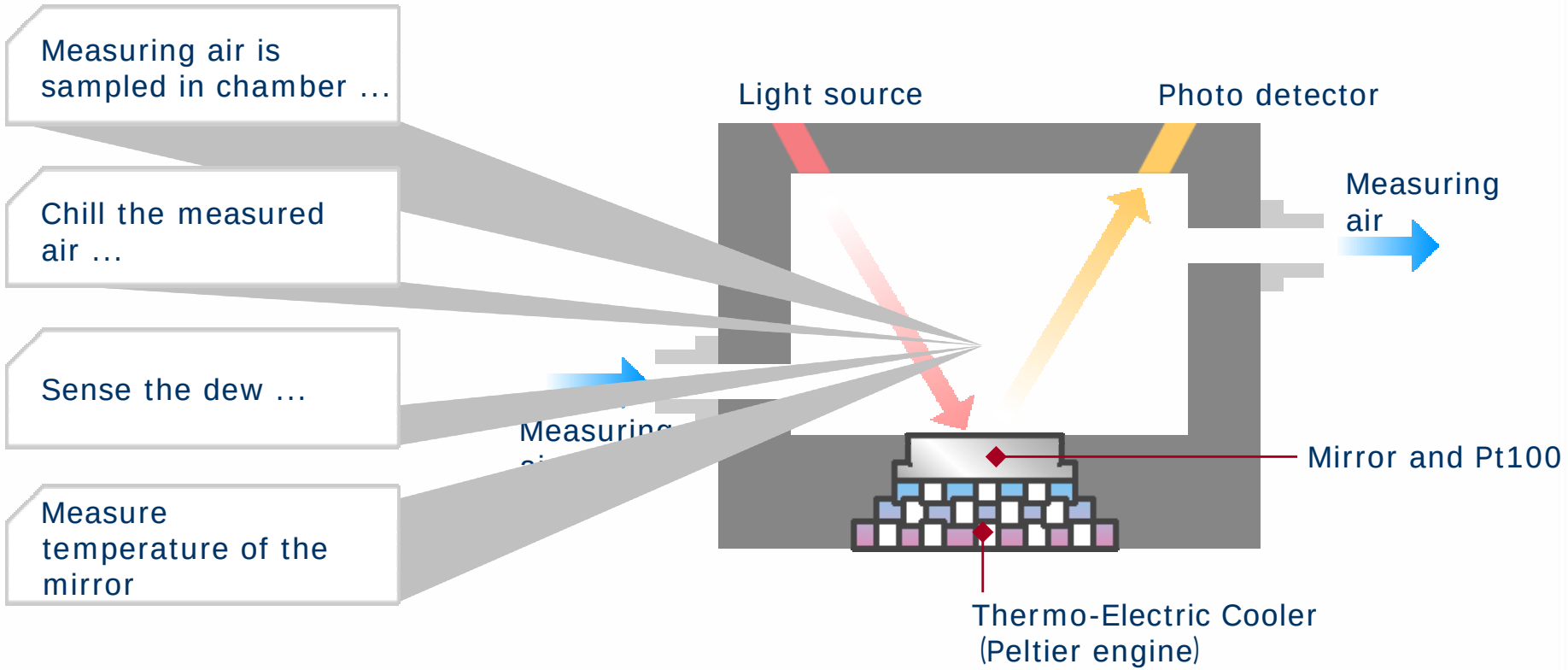
Polymer resistive



Polymer capacitive



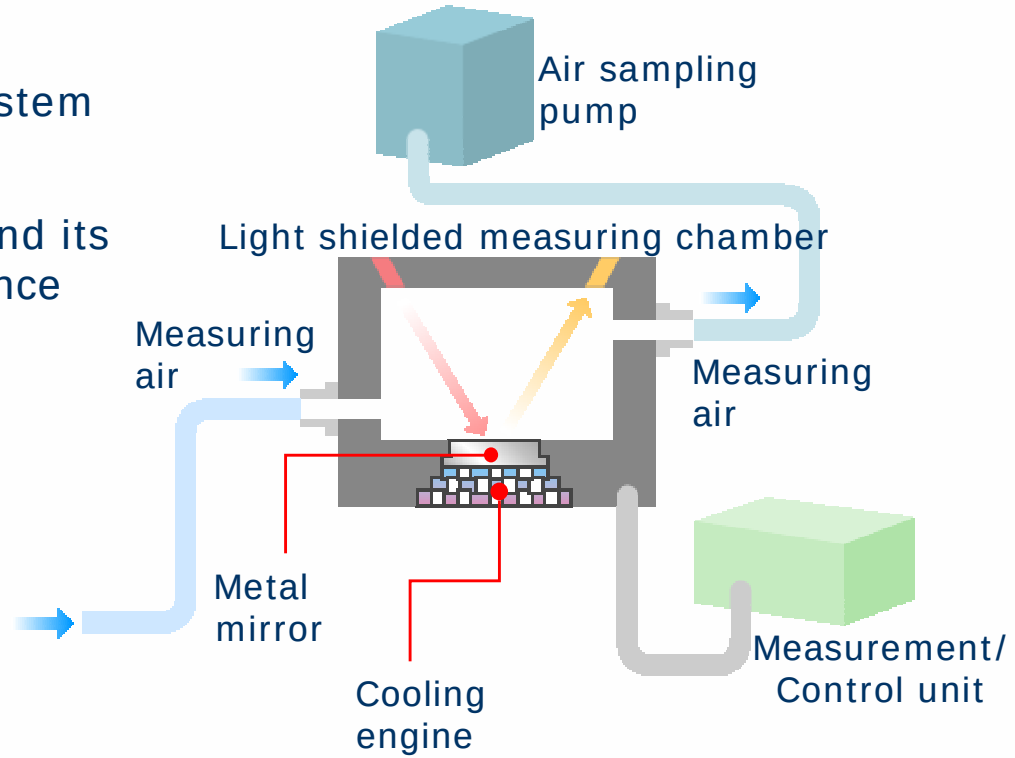
Chilled mirror hygrometer is the most in accuracy



- The definition of dew point temperature itself is used as a core technology ... so the user can trusts the accuracy

Chilled mirror hygrometer is the most in accuracy, but there are several drawbacks

- The need for a measuring chamber and air sampling pump makes the system large
- To prevent moisture absorption into the measuring chamber and air sampling system, care is required in measuring high humidity
- A time delay at the air sampling system can slow down the response time
- A Metal mirror is commonly used and its surface requires periodic maintenance

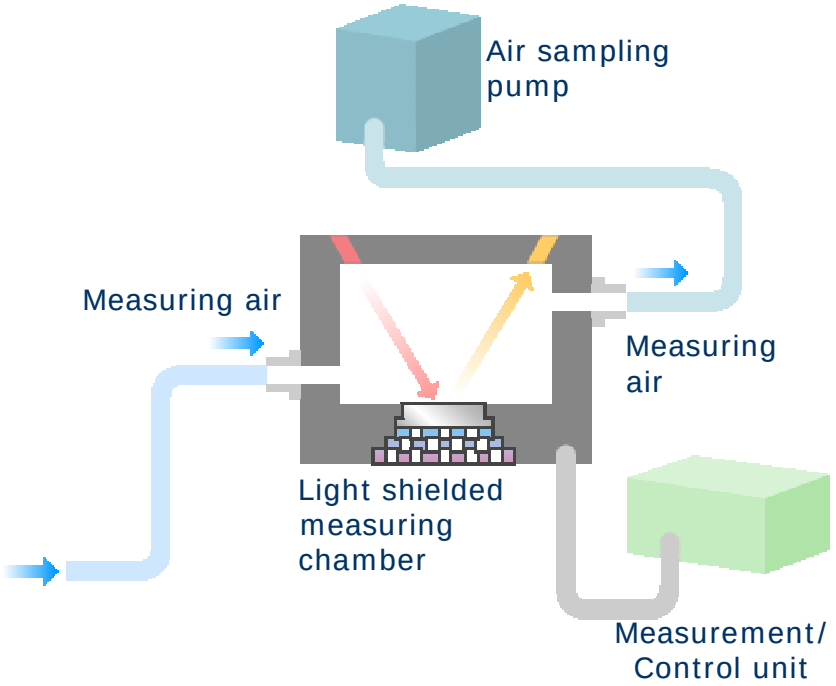


Yamatake solves the drawback,

FINEDEW™ provides the benefit of miniaturization

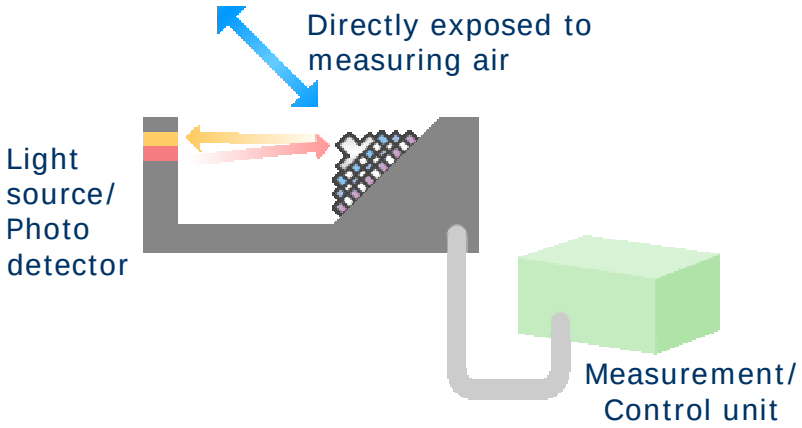
Traditional chilled mirror　Drawback 1

The need for a measuring chamber and air sampling pump makes the system large



FINEDEW™　Improvement 1

By eliminating the measuring chamber and exposing the mirror, significant miniaturization is realized



- By using modulated light, it eliminates the need for a measuring chamber to shield the outer light, as well as the sampling pump
- No chamber configuration makes the size small

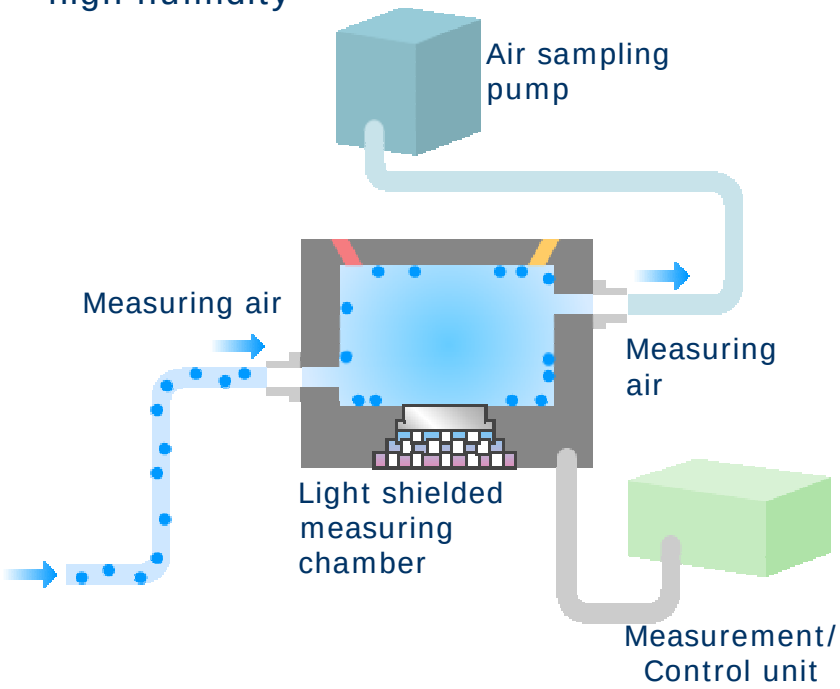
Yamatake solves the drawback,

FINEDEW™ ensures high humidity measurement

Traditional chilled mirror

Drawback 2

To prevent moisture absorption into the measuring chamber and air sampling system, care is required in measuring high humidity

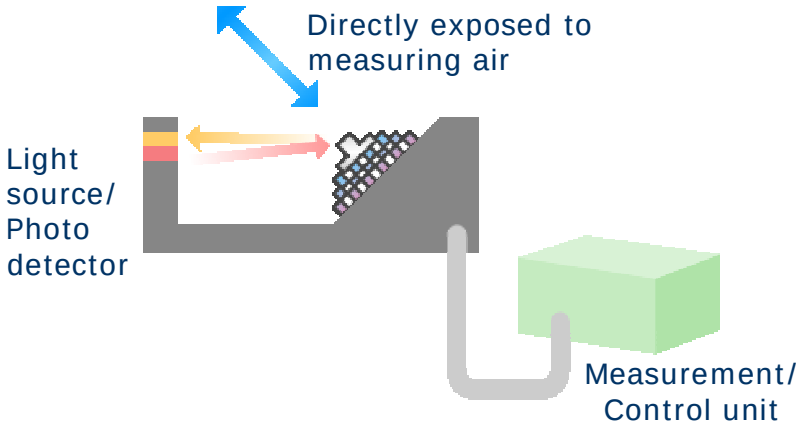


●Moisture may be adsorbed in chamber

FINEDEW™

Improvement 2

By eliminating the air sampling system, the possibility of moisture adsorption is low and the high humidity measurement is ensured



●A directly exposed mirror prevents undesired moisture adsorption

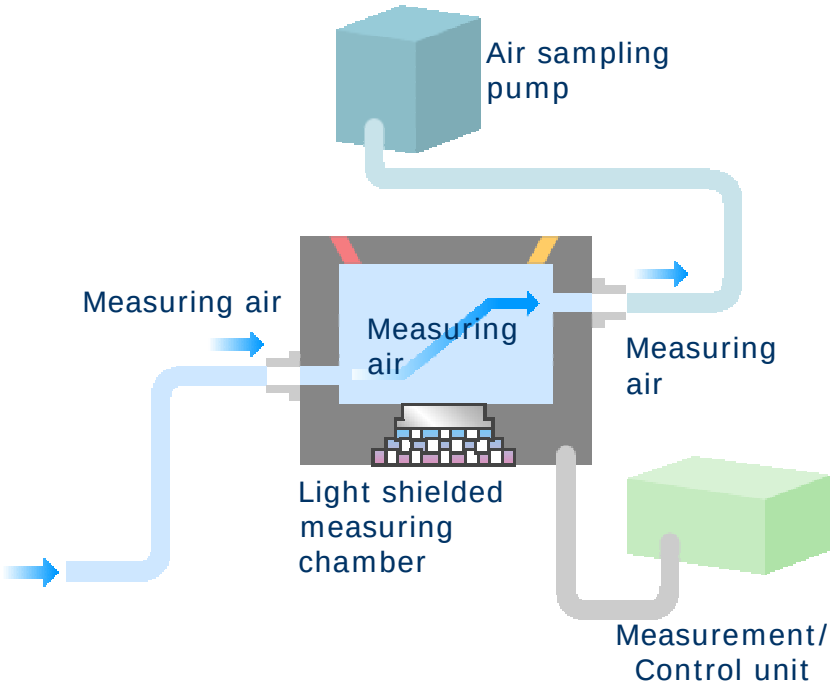
Yamatake solves the drawback,

FINEDEW™ realizes the quick response

Traditional chilled mirror

Drawback 3

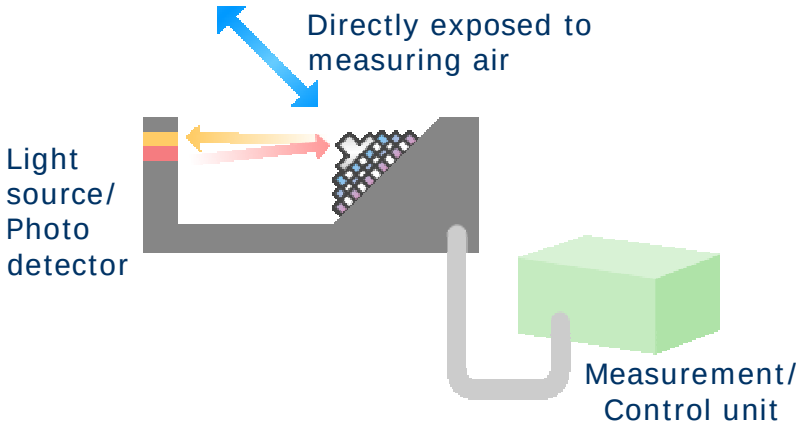
A time delay at the air sampling system can slow down the response time



FINEDEW™

Improvement 3

By eliminating the sampling system and it can measure the air directly, quick response is expected



- It can be directly inserted to the measuring environment so response delay may not produce easily

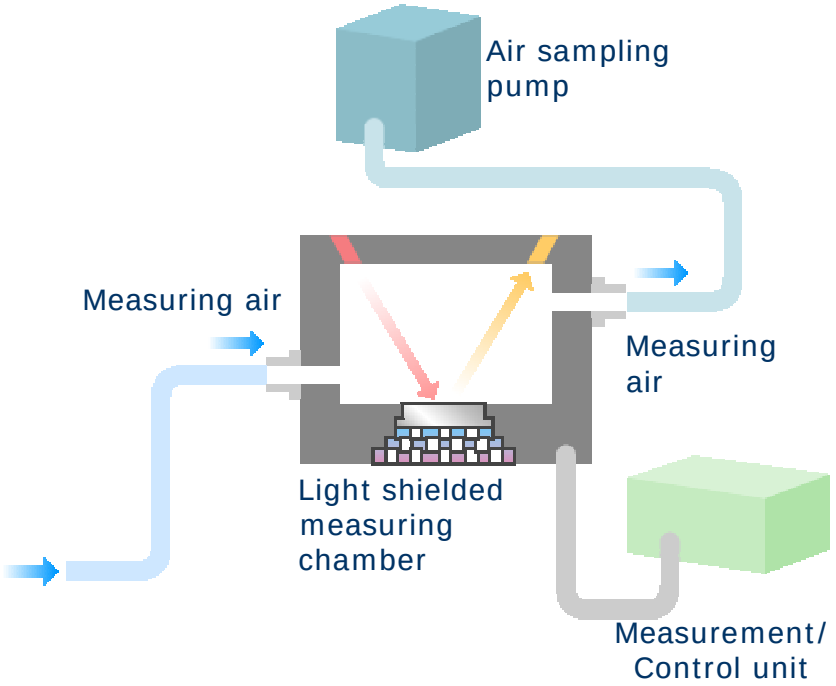
Yamatake solves the drawback,

FINEDEW™ allows to long term use with minimal maintenance

Traditional chilled mirror

Drawback 4

A Metal mirror is commonly used and its surface requires periodic maintenance

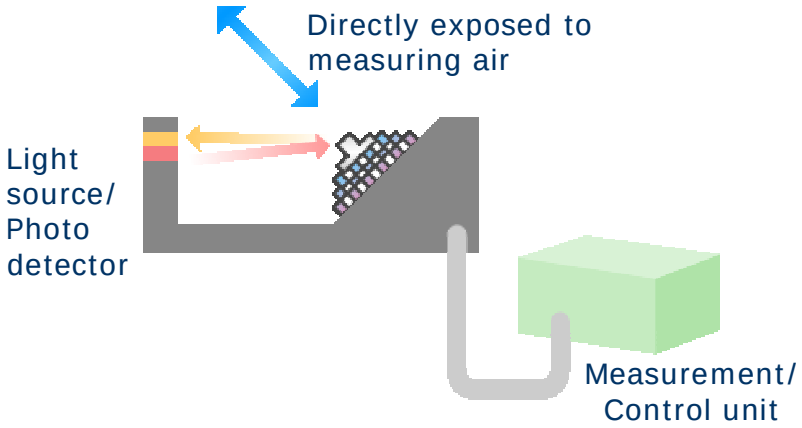


●Periodic mirror surface maintenance is necessary

FINEDEW™

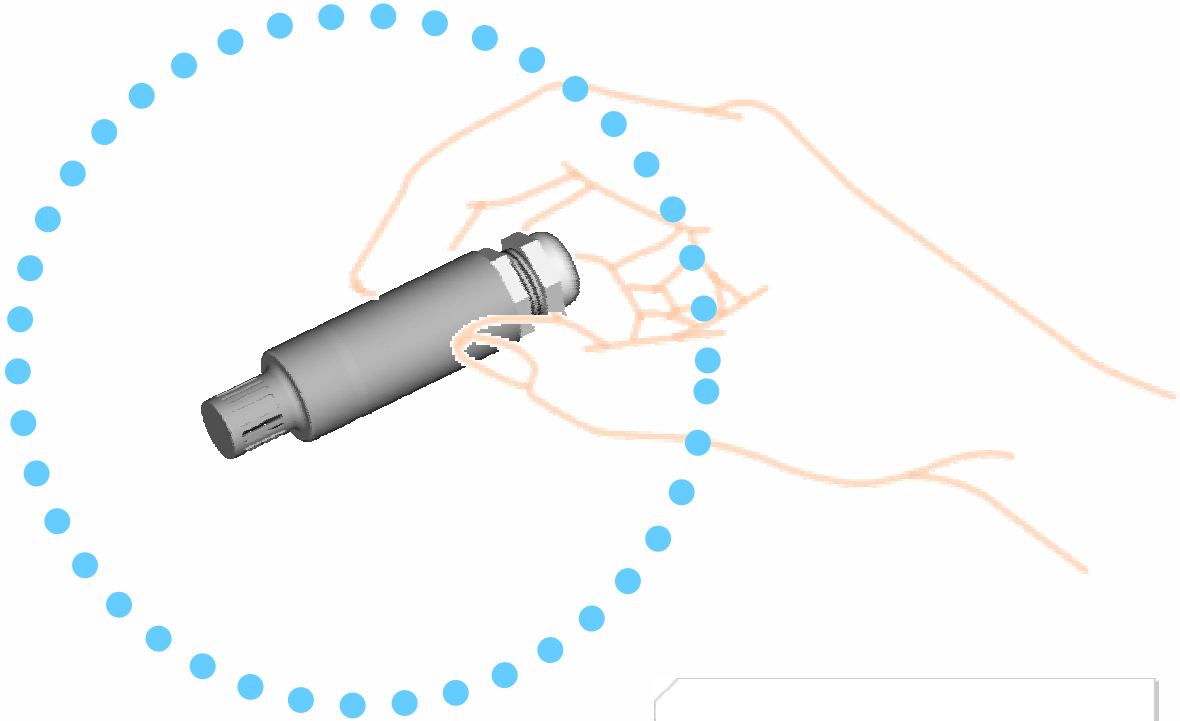
Improvement 4

Non-metal mirror has excellent durability so long term use with minimal maintenance is allowed



●Non-metal mirror can maintain a stable surface for a long time

Micro chilled mirror hygrometer FINEDEW™



- Fast response
- Incredibly small
- Novel technology
- Economical solution

This illustration is an image.

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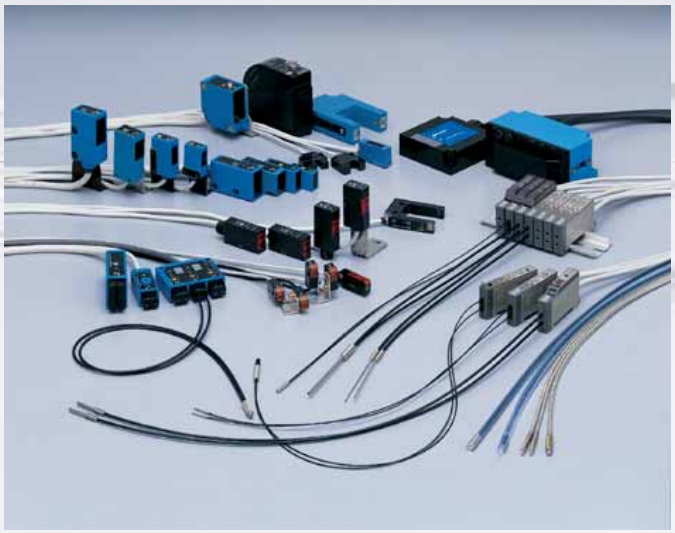
For optical sensing

Yamatake is the authority in **optical sensing**

- Micro optical sensing technology
- Detection technology for modulated light



For digital control

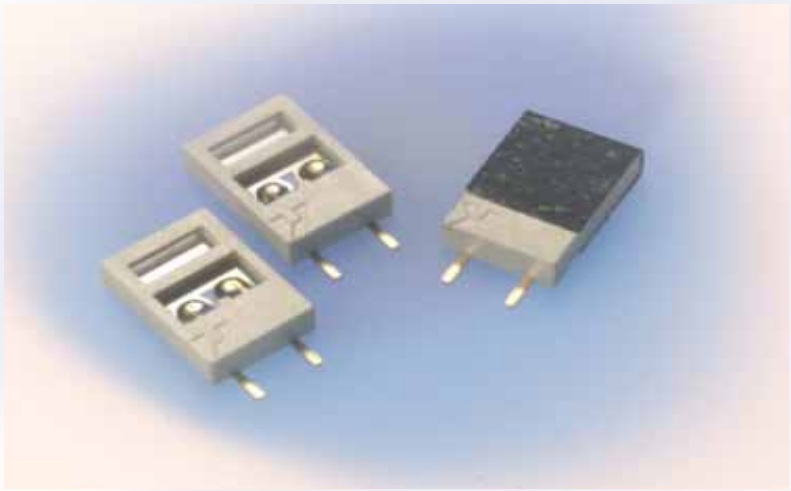
Yamatake is the expert in **temperature control**

- Optimum control for cooling system
- Experienced in optimal PID parameter tuning or wide variety of PID simulations

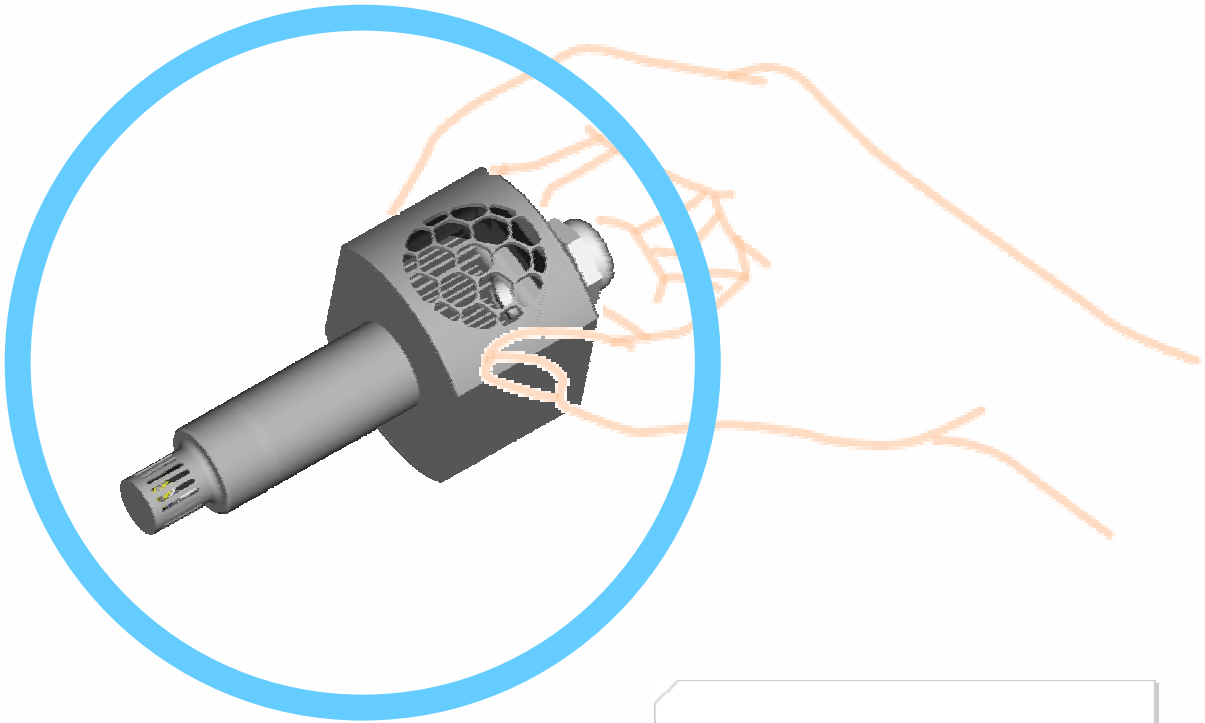
For humidity measuring

Yamatake is a leading manufacturer of **humidity measurement** for HVAC

- More than 20 years of research and development
- Accredited JCSS laboratory



Micro chilled mirror hygrometer FINEDEW™
Introduction of the recent prototype



- Fast response
- Incredibly small
- Novel technology
- Economical solution

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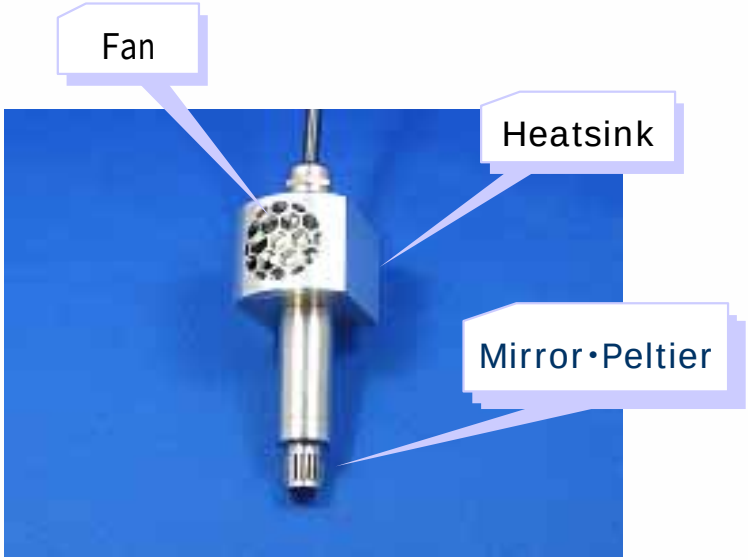
Micro chilled mirror hygrometer FINEDEW™ Prototype

Sensor head

S Type Probe
Size：19.05ø×80
(3/4 ø×3.2”)

L Type Probe
Size：19.05ø×61＋51ø×50
(3/4 ø×2.44” + 2.04 ø×2”)



Measurement/ Control unit

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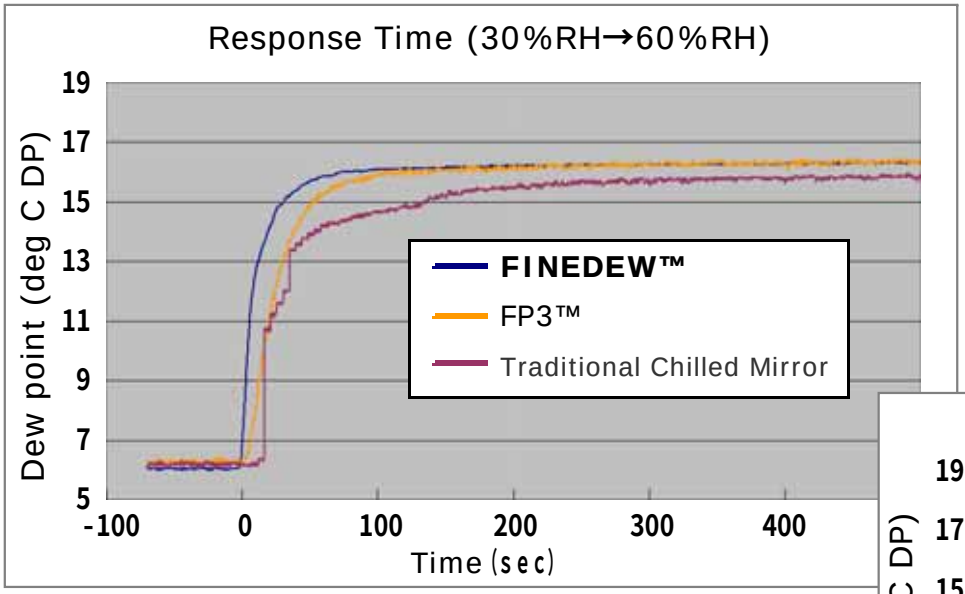
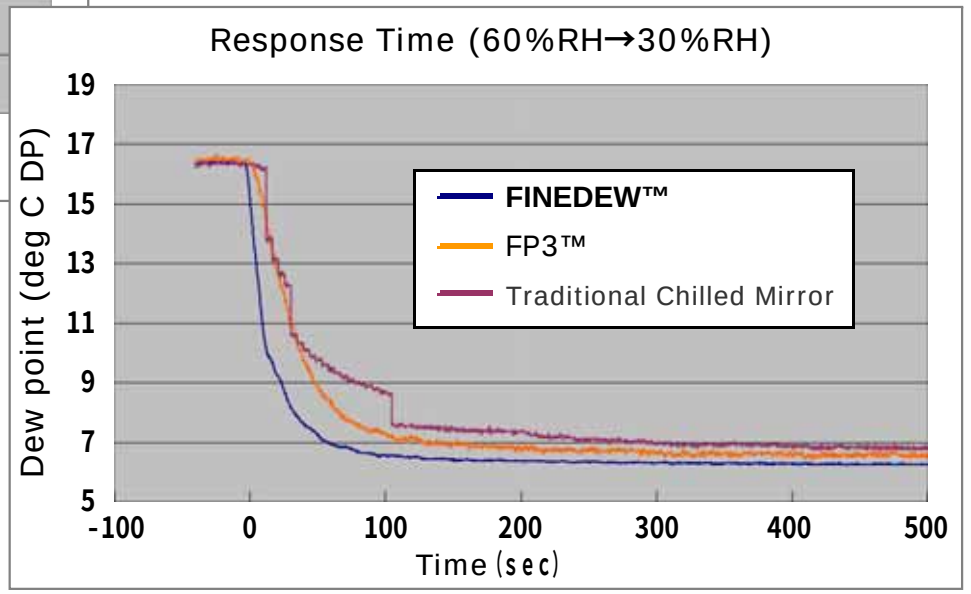
Evaluation of Response time

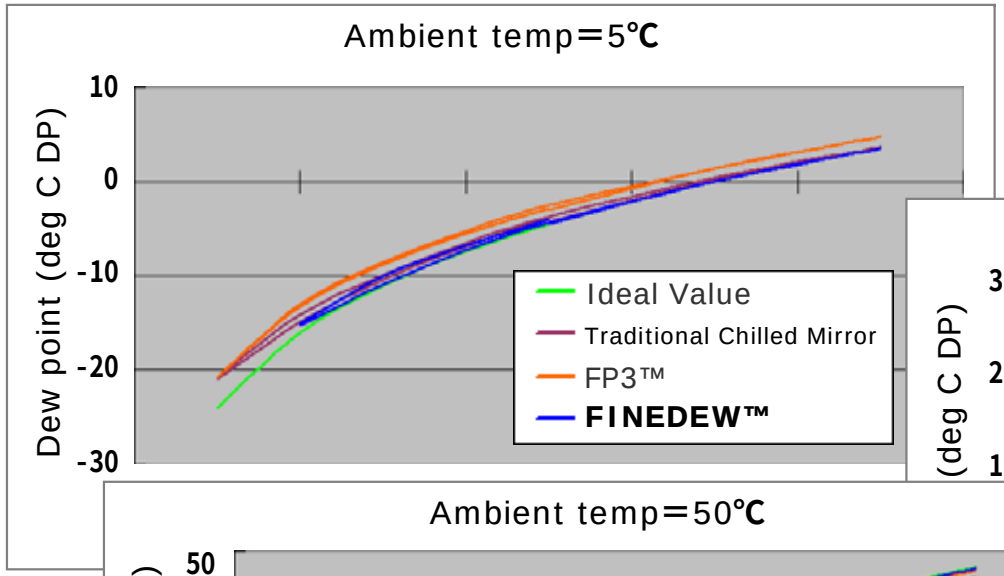
FINEDEW™ realizes fastest response time

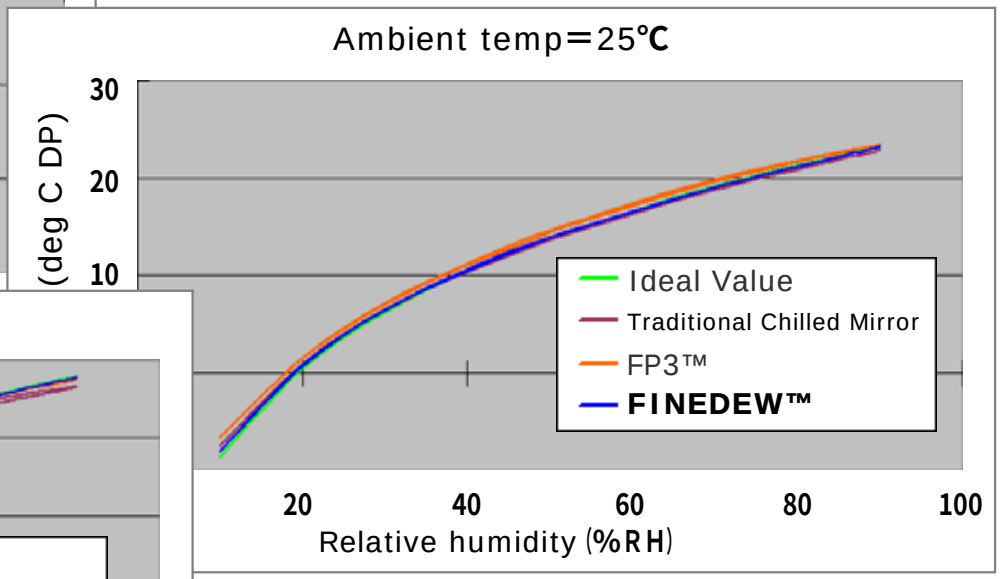


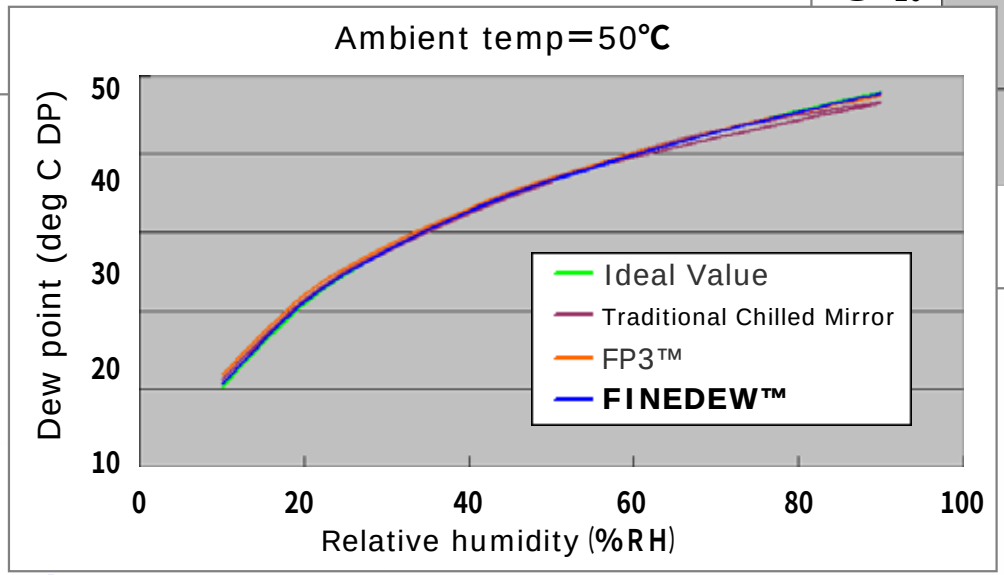


Evaluation of Accuracy and Hysteresis

Accuracy and hysteresis of FINEDEW™ are adequate

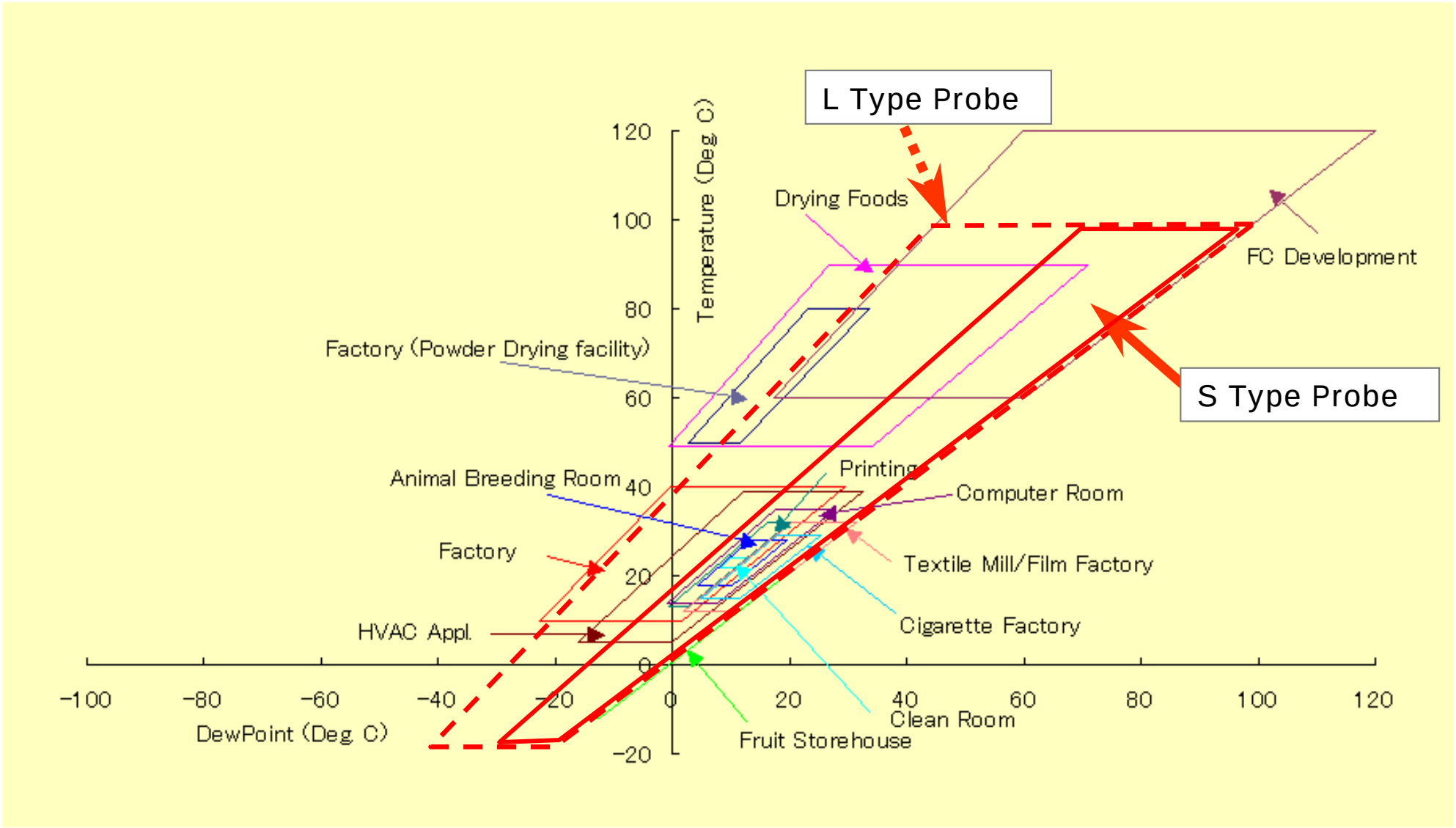






Measuring range of typical humidity control application

Prototype has covered mid to high temp & humi application

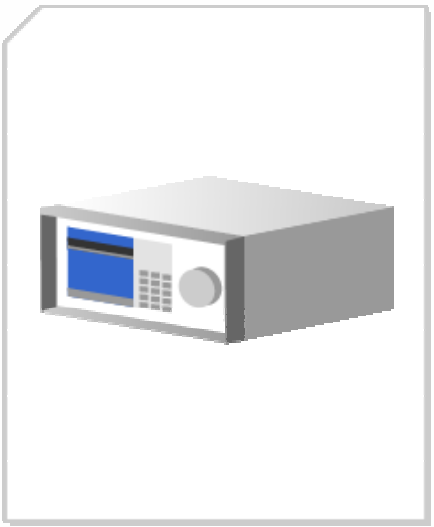


FINEDEW™ Prototype Specification

		S Type Probe	L Type Probe
Measuring range	Temperature	0～100℃	0～100℃
	Dewpoint	0～25℃DP (@25℃) 55～80℃DP (@80℃) 75～100℃DP (@100℃)	-30～25℃DP (@25℃) 25～80℃DP (@80℃) 45～100℃DP (@100℃)
Accuracy		±0.5℃DP	±0.5℃DP
Peltier stage		2 stage	2 stage
Depression capacity (at 25 deg C)		30℃	60℃
Cooling		Air cool without blower	Forced air cooled (Internal Fan)
Pressure Pating		1MPa	1MPa

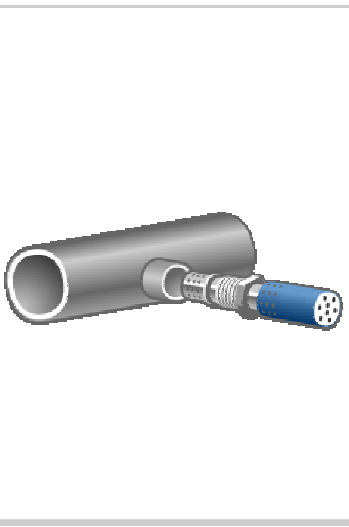
What Yamatake offers

- FINEDEW™ can satisfy any customer needs



Lab Instruments

Field Instruments



Field transmitters

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New applications

Thank you

If you have any questions or comments, please contact with no hesitation to;

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