



FTM94/95

Industrial High Accuracy Thermal Mass Flow Transmitter

Suitable for harsh environments, industrial processes flow monitoring or slightly corrosion compressed air



## | Features |

- IP67 Rugged aluminum alloy case, fit in variety harsh environment
- Easy to install, high accuracy, long-term stability
- Switchable physical quantities : m/s, ft/s, Nm<sup>3</sup>/h, Nm/s, L/min, m<sup>3</sup>/min (Air velocity & volume)
- LCD Display of air velocity and temperature
- LCD Display of cumulative flow : m<sup>3</sup>, L (Option)

## | Introduction |

FTM94/95 Hot wire thermal air velocity transmitter working at a constant Temp.

using King's law heat balance equation for:

$e$  : Sensor voltage output(V)

$a'$  : Zero output of constant temperature hot wire anemometer, Can use CTA circuit as temperature compensation

$$e^2 = a' + b'v^n$$

$b'$  : Sensitivity of the sensor, related to the operating temperature

$v$  : Fluid flow rate

$n$  : 0.45 ... 0.5(Standard)

Can be calculated from the formula characteristic curve of constant Temp. hot wire anemometer, special three PT probe and full metal housing design, high accuracy, suitable for a variety of pipe diameters, widely used in industrial fields.

## | Applications |

Exhaust gas removal / Dust environment / Slightly corrosive environment / Burner feeder / Biotechnology industry / Factory building air intake / Exhaust calculation

## | Specification |

### Input

|                       |   |
|-----------------------|---|
| Input type            | Pt20 / Pt300 (Air velocity) / Pt1000 (Temp.)  |
| Measuring range       | 0 ... 120 Nm/s  |
|                       | N : Working condition (Definition : 20°C at 1013 hPa)   |
|                       | Units can be converted Nm/s (Flow rate) or Nm <sup>3</sup> /h(Flow)(Option) or m <sup>3</sup> (Cumulative flow)(Option) |
| Minimum initial value | 0.15 Nm/s   |

### Output

|                              |   |
|------------------------------|---|
| Installation angle effect    | <3% of the measured value (When the installation angle<10°)   |
| Signal                       | 4 ... 20 mA / 0 ... 10 V / RS-485 / Impulse   |
| Preset output                | Out1 : Air velocity ; Out2 : Impulse  |
| Impulse range (1 ... 500 Hz) | (1)1 ... 500 Hz : 4 ... 20 mA<br>(2)1 ... 500 Hz : 0 ... 10 V                                       |
| Signal connection            | 3-wire  |
| Warm-up time                 | <60 sec   |
| Reaction time                | t90<5 sec   |
| Display type                 | LCD Module with back light, double-row<br>(Up air velocity, down temperature(Default: 0 ... 120°C)) |
| Load resistance              | Current output : ≤500 Ω<br>Voltage output : ≥100 KΩ   |

### Accuracy

|                 |                         |
|-----------------|-------------------------|
| Accuracy        | ±1.5% F.S. (Option ±1%) |
| Temp. influence | 0.1% / °C               |
| Repeatability   | 0.5%                    |

### Electrical

|                        |                                       |
|------------------------|---------------------------------------|
| Power supply           | DC 24 V ±10%                          |
| Current consumption    | <0.3 A                                |
| Overvoltage protection | DC : <40 V                            |
| Electrical connections | M12 connector / M16 metal cable gland |

### Environmental

|                       |   |
|-----------------------|---|
| Measuring medium      | Air   |
| Operating Temp.       | -20 ... +60°C   |
| Operating Humid.      | 0 ... 95%RH(Non-condensing)   |
| Probe operating Temp. | 0 ... 120°C / Option:200°C<br>(Increasing operating temperature will affect air velocity error) |
| Storage Temp.         | -20 ... +60°C   |
| Storage Humid.        | 0 ... 95%RH(Non-condensing)   |
| Probe pressure        | 16 bar  |

### Installation

|              |                          |
|--------------|--------------------------|
| Fixed seat   | 1/2"PT movable thread    |
| Installation | Duct type<br>Remote type |

### Protection

|                       |   |
|-----------------------|---|
| IP rating             | IP67(Probe) ; IP65(Housing)                             |
| Electrical protection | ■ Reverse polarity<br>■ Over-voltage<br>■ Short-circuit |

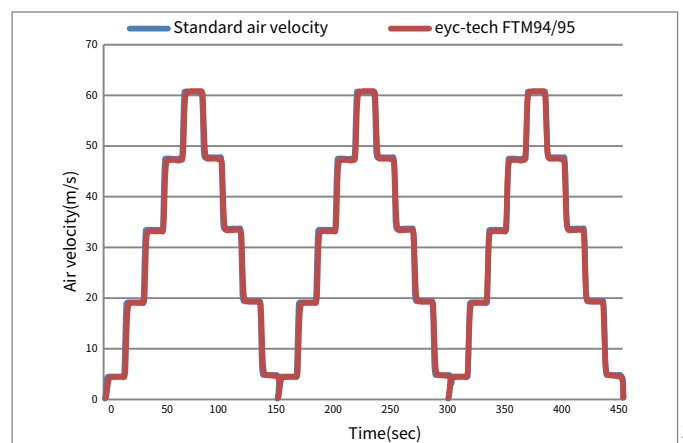
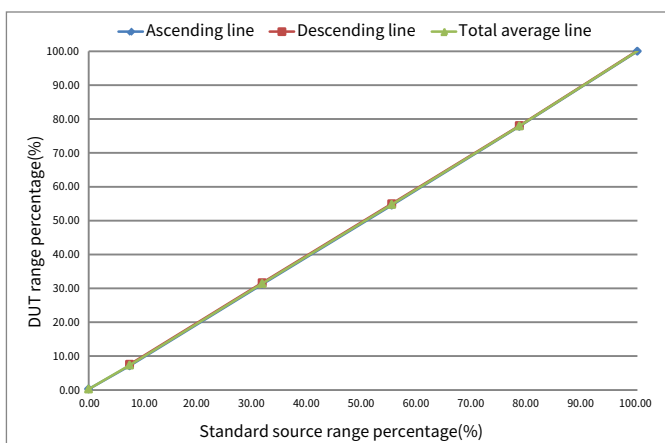
### Certification

|               |    |
|---------------|----|
| Certification | CE |
|---------------|----|

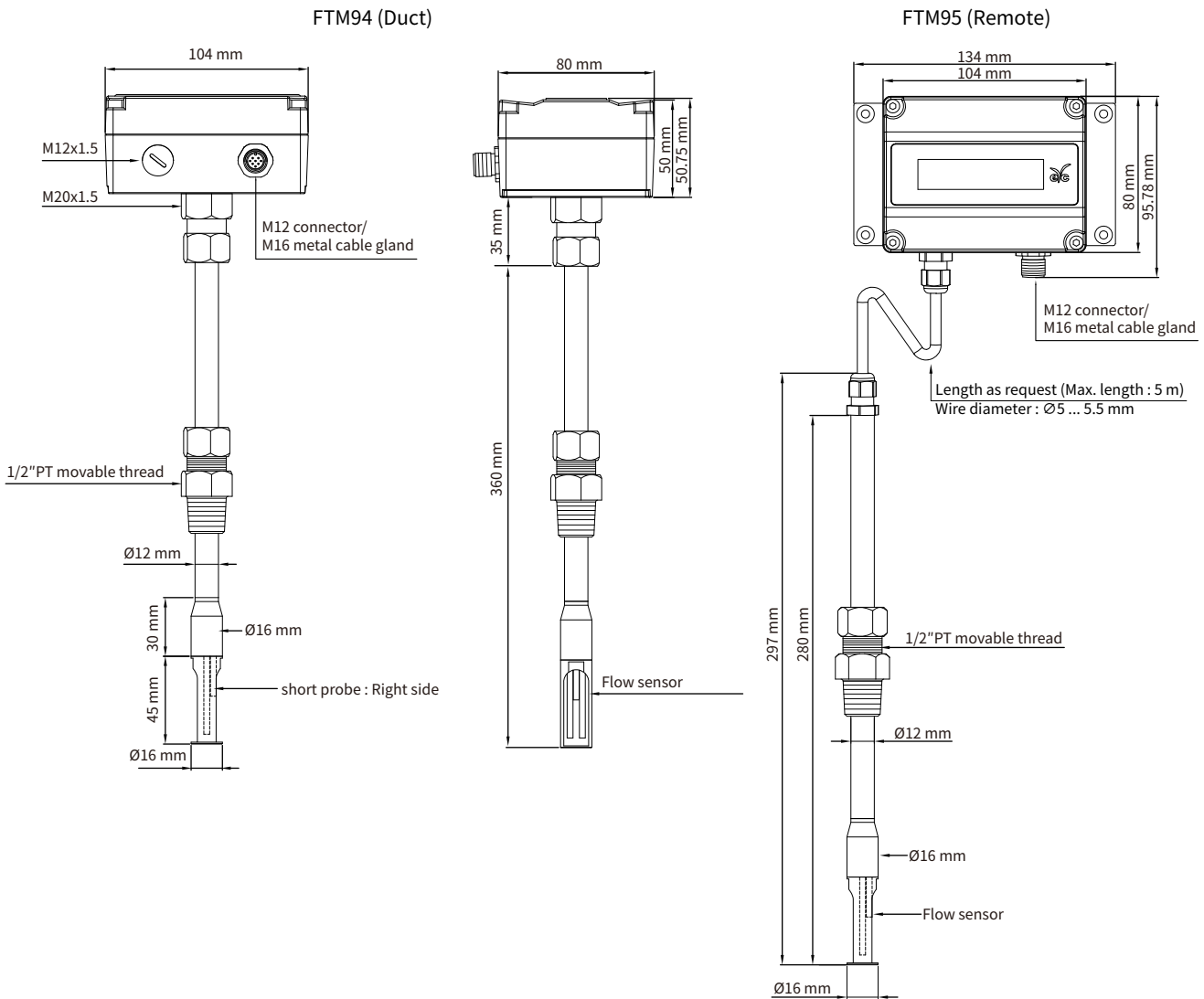
### Material

|                    |                                |
|--------------------|--------------------------------|
| Housing            | Aluminum alloy                 |
| Probe              | SS304 ( Option SUS316)         |
| Remote probe cable | TEFLON (Remote FTM95)          |
| Weight             | FTM94 : 720 g<br>FTM95 : 832 g |

## | 3-Cycle curve |

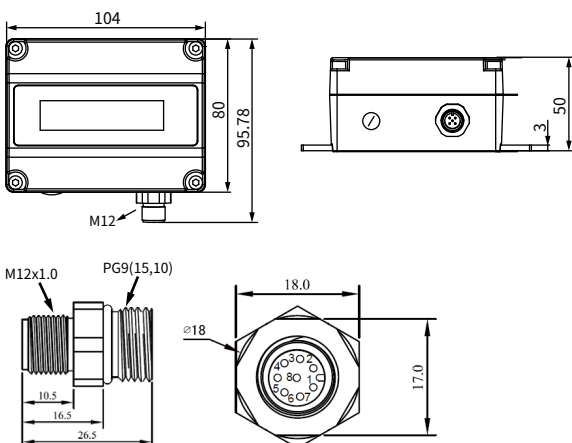


## Dimension | Unit : mm

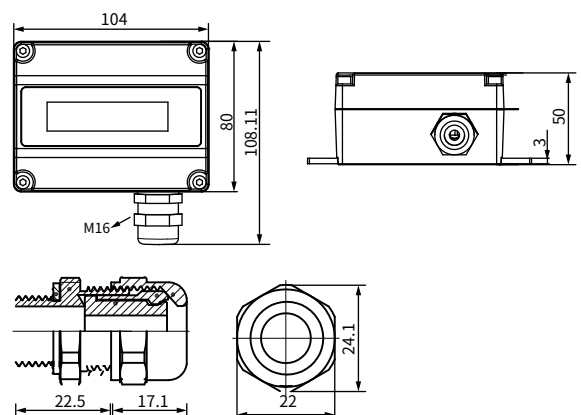


## Electrical Connector | Unit : mm

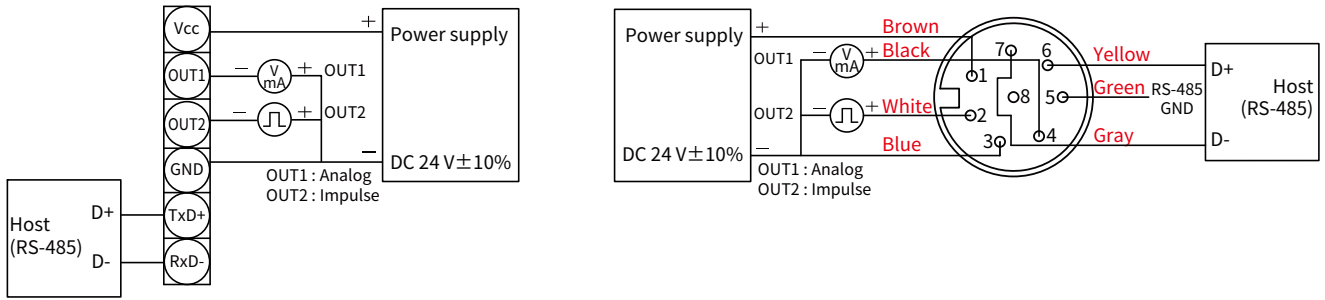
M type :  
M12 connector (RS-485+analog)



N type :  
M16 metal cable gland (RS-485+analog)



## | Diagram | Analog+RS-485 & Impulse



\*Please make sure the product and the device which connect with RS-485 are on common ground, avoid damaged product.

## | Hot-wire measurement principle |

The thermal measuring principle abstraction of heat from a heated body by an enveloping gas flow (Hot-film Anemometer)

T between  $R_h$  and  $R_t$  = constant

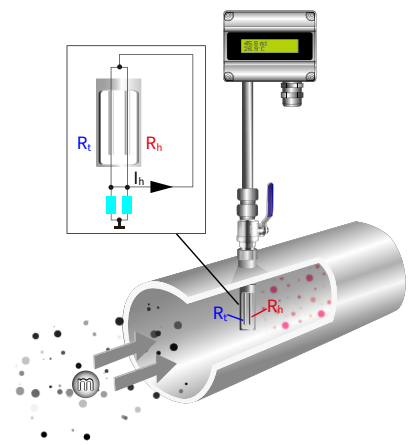
The loss of heat depends on the number of molecules that collide with  $R_h$

$m$  : Mass flow

$I_h$  : Heating current

$R_h$  : Platinum thin-film resistor – electrically heated

$R_t$  : Platinum thin-film resistor – gas temperature



## | Ordering Guide |

|            | Installation                       | Measuring range   | Output   | Remote probe cable                       | Display                   | Option   |
|------------|------------------------------------|---|--|--|---------------------------|--|
| <b>FTM</b> | <b>94</b>                          | <b>02</b>   | <b>11</b>  | <b>X</b>                                 | <b>D</b>                  | <b>N</b>   |
|            | 94 : Duct type<br>95 : Remote type | 02 : 20 Nm/s<br>04 : 40 Nm/s<br>06 : 60 Nm/s<br>09 : 90 Nm/s<br>12 : 120 Nm/s | 11 : 4 ... 20 mA+impulse+RS-485<br>21: 0 ... 10 V+impulse+RS-485 | 2 : 2 m cable<br>5 : 5 m cable<br>X : No | D : LCD display<br>N : No | M : M12 connector with 2 m cable<br>N : M16 metal cable gland<br>W : Other request / Cumulative flow |

## | Additional Option Test Report | For more detailed information please contact us.

### ■ ILAC / TAF

YUDEN-TECH CO.,LTD. Calibration Laboratory - ( ILAC / TAF ) Test report.

(TAF accreditation : 3032, complying with ISO / IEC 17025 ) TAF has mutual recognition arrangement with ILAC MRA

| Project                  | Measurand level or range |
|--------------------------|--------------------------|
| Air velocity transmitter | 0.2 m/s ... 60 m/s       |

### ■ ISO 9001

| Project                   | Measurand level or range   |
|---------------------------|--|
| Air velocity / Air volume | Air velocity : $\leq 120$ m/s<br>Air volume : 0.5 m <sup>3</sup> /h ... 1000 m <sup>3</sup> /h |