# 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, Nm³/h, Nm/s, L/min, m³/min (Air velocity & volume)
- LCD Display of air velocity and temperature
- LCD Display of cumulative flow : m³, L (Option)

## | Introduction |

FTM94/95 Hot wire thermal air velocity transmitter working at a constant Temp.
using King's law heat balance equation for:

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

e : Sensor voltage output(V)

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

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 |
| | Nm³/h(Flow)(Option) or m³(Cumulative flow)(Option) |
| Minimum initial value | 0.1 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, (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 |
| | (Up air velocity, down temperature(Default: 0 ... 120°C)) |
| Load resistance | Current output : ≦500 Ω, Voltage output : ≧100 KΩ |

## Accuracy

| | |
|---|---|
| Accuracy (Including hysteresis, | 0 ... 40 m/s : ±(1% of mv+0.5 m/s) |
| non-linearity and repeatability) | 40 ... 60 m/s : ±(1% of mv+1 m/s) |
| | 90 ... 120 m/s : ±(1% of mv+1.5 m/s) |
| Temp. influence | 0.2% / °C |
| Repeatability | 0.5% |
| Uncertainty of factory calibration | ±1% |

## 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 |
| | (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 |
| | Remote type |

## Protection

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

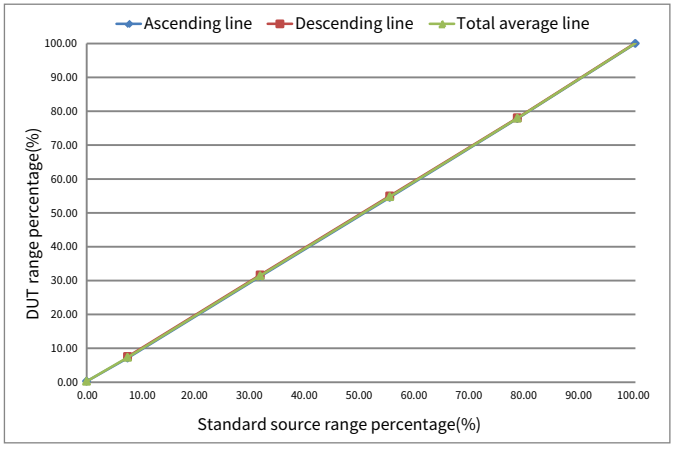
## Certification

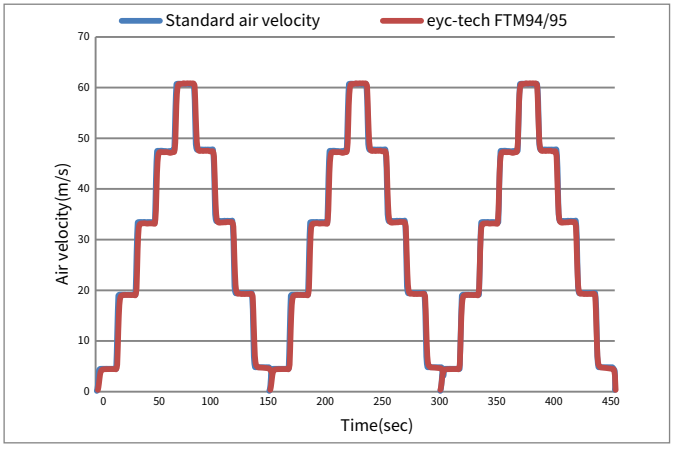
| | |
|---|---|
| Certification | CE |

## Material

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

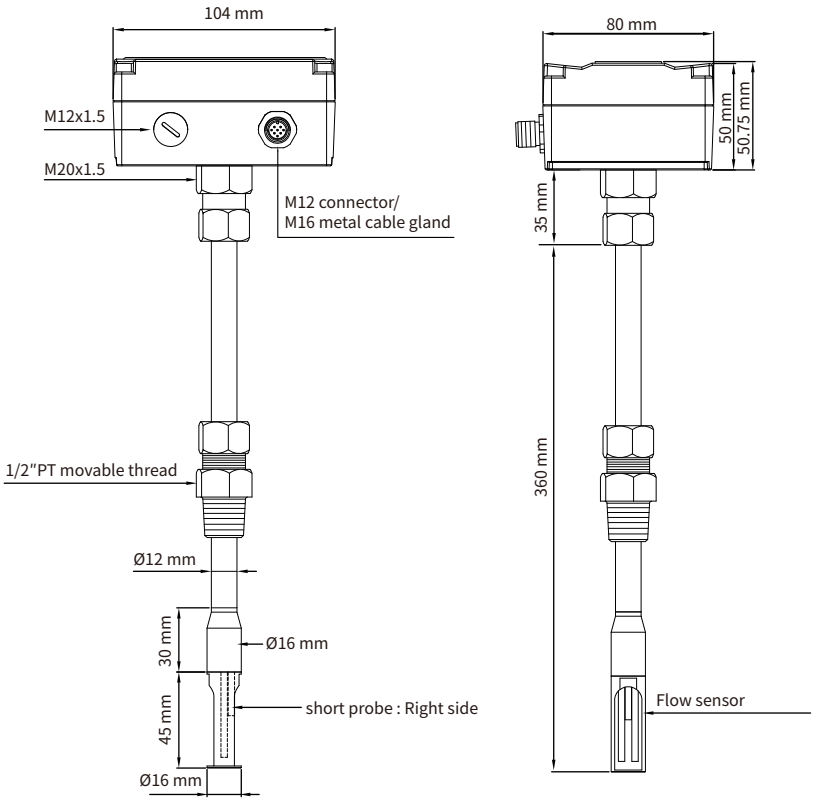
# | 3-Cycle curve |



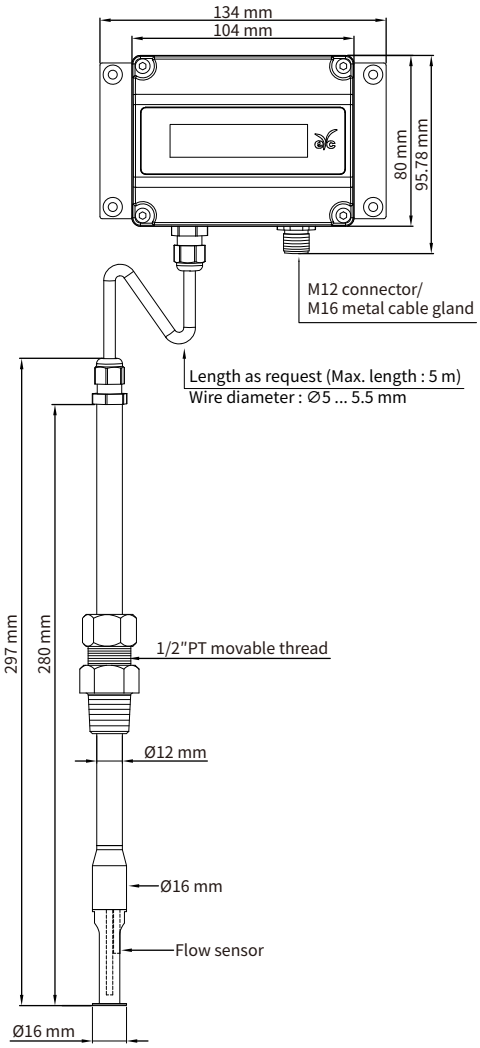



# Dimension | Unit : mm

FTM94 (Duct)

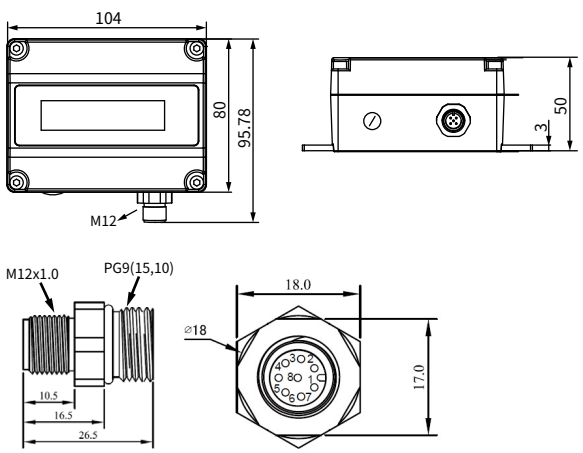



FTM95 (Remote)

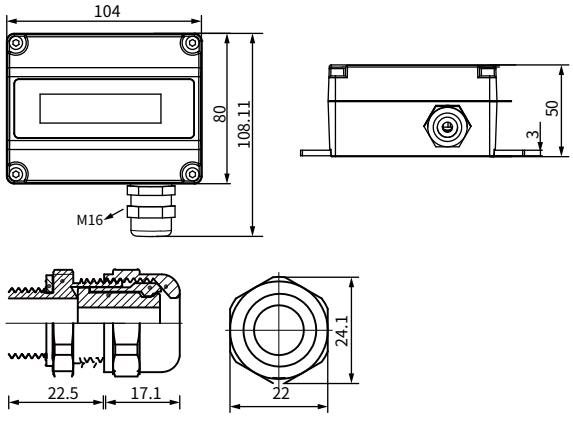



# Electrical Connector | Unit : mm

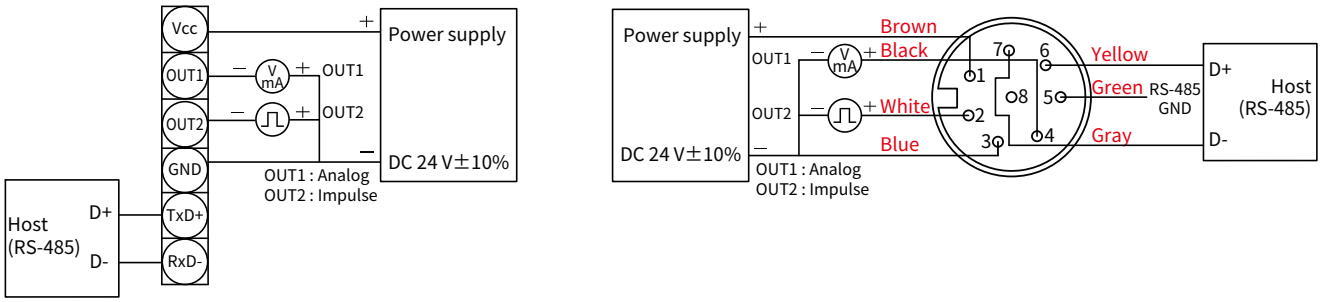
M type :
M12 connector (RS-485+analog)




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



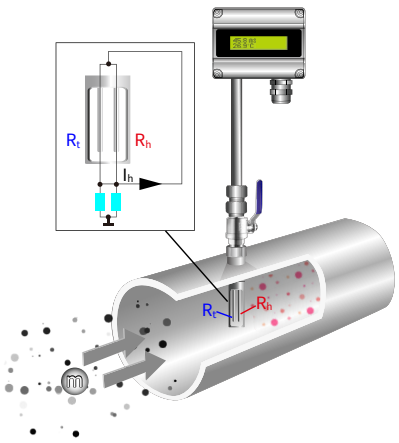
## | Diagram | Analog+RS-485 & Impulse




*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 Rh

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 |

FTM **94** – **02** **11** – **X** **D** **N**

| Installation | Measuring range | Output | Remote probe cable | Display | Option |
|---|---|---|---|---|---|
| 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 : ≦ 120 m/s |
| | Air volume : 0.5 $m^3$/h ... 1000 $m^3$/h |