WISE AIR 4.0
MEASURE TO MANAGE

USER MANUAL · 2026 EDITION

WAFS-107

Inline Thermal Mass Flow Sensor

Models covered: WAFS-107-A to WAFS-107-F (DN15 to DN50, R thread)



DN15–DN80
Inline meter sizes

±1% rdg
+0.3% FS accuracy

Modbus RTU
RS485, 4–20 mA, pulse

16 bar(g)
Option 40 bar(g)

INSTALLATION · OPERATION · CONFIGURATION · MAINTENANCE

WISEAIR TECHNOLOGIES INDIA LLP

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ABOUT WISEAIR

WiseAir Technologies India LLP designs and supplies smart measurement instruments for compressed air and industrial gases — flow, dew point, pressure and power sensors, data loggers, smart drains and leak detection tools. Every WiseAir product is built to make compressed-air energy use **visible, measurable and manageable**.

WiseAir sensors work on their own or as part of the **WiseAir WASM-604 Smart Monitoring platform**, which collects data over Modbus / 4–20 mA, analyses it and reports energy, demand and leakage in real time.

DOCUMENT

Document	WA-UM-WAFS107-26
Edition	2026 Edition · Rev 1.0
Issued	October 2026
Supersedes	Release 4 – 2023

01 Safety and general information

Read this manual fully before you install, operate or service the sensor. Keep it with the sensor and make it available to everyone who works on it.

The WAFS-107 measures the flow of compressed air and other dry, non-corrosive, non-explosive gases in industrial pipelines. Use it only for this purpose and only within the limits given in *Technical specifications*.

WiseAir is not liable for damage caused by failure to follow this manual, by use outside the stated limits, or by opening or modifying the sensor in any way not described here. Any such action voids the warranty.

Symbols used in this manual

Symbol	Meaning
Danger	Risk of death or serious injury.
Warning	Risk of injury or damage to the sensor or the system.
Caution	Risk of incorrect measurement or minor damage.
Note / Tip	Useful information for correct use.

! **COMPRESSED AIR SAFETY**

- Escaping air or bursting parts can cause serious injury or death.
- Do not exceed the maximum permitted pressure of the sensor.
- Use only pressure-tight installation material rated for the system pressure.
- Depressurise the pipe before installation or maintenance work.
- Keep clear of the line of any part that could be ejected under pressure.

! **ELECTRICAL SAFETY**

- Only qualified personnel may carry out electrical work.
- Follow all local regulations for electrical installations.
- Disconnect the power supply before any maintenance work.
- Use only a safety extra-low voltage (SELV) supply of 18–30 VDC.

INSTALLATION AND USE

- Do not use the sensor in explosive (hazardous) areas.
- Do not exceed the permitted operating, medium and storage limits.
- Install the sensor in the direction of flow marked on the housing.
- Avoid condensation on the sensor element; it seriously affects accuracy.
- Do not open or disassemble the sensor.
- Use a spanner on the pipe connections to tighten the meter; never turn it by the display head.

STORAGE AND TRANSPORT

- Transport temperature: −10 to +60 °C.
- Storage temperature: −10 to +50 °C, humidity < 90 % RH, non-condensing.
- Protect from direct sunlight and UV radiation during storage.
- Calibrate the sensor at least every 2 years.

02 Product overview

The WiseAir WAFS-107 is an inline thermal mass flow sensor for compressed air and gases. The sensor comes with its own calibrated measuring pipe, which you install directly in the line. This gives a defined inner diameter and high accuracy on small and medium pipes (DN15 to DN80).

Measuring principle

The sensor works on the thermal dispersion principle. Two precision RTD temperature elements sit in the gas stream. One element measures the gas temperature. The other is heated so that it stays warmer than the gas. Flowing gas carries heat away from the heated element. The heating power needed to hold the temperature difference rises with the mass flow, so the sensor converts this power directly into mass flow. The relationship is:

```
P / ΔT = K1 + K2 · f(Q)^K3

P  = heating power        ΔT = T(heated) − T(gas)
Q  = mass flow            K1, K2, K3 = gas-specific constants
```

Because the sensor measures mass flow directly, no separate pressure or temperature compensation is needed. The reading is shown as standard (normal) flow at the programmed reference conditions (factory setting 20 °C, 1 bar(a) per ISO 1217).

Key features

- Inline meter body with calibrated measuring pipe.
- Measures normal flow, mass flow, consumption and gas temperature.
- Wide 1:2500 turndown (0.1 to 250 Nm/s sensor range).
- No moving parts; stable, vibration-proof signal.
- Full digital signal processing and full electrical isolation.
- 2.8" IPS wide-angle colour LCD with capacitive touch screen.
- RS485 Modbus RTU and isolated 4–20 mA / pulse output as standard.
- Bluetooth for wireless configuration and data transfer.
- Optional data logging, 10,000,000 readings.
- Connections: R thread; flanges to EN 1092-1 or ANSI B16.5.

Typical applications

- Compressed air consumption of single machines and production lines.
- Leak detection and leakage rate determination.
- Process gases such as nitrogen, carbon dioxide and oxygen.

03 What's in the box

- WAFS-107 flow sensor with inline measuring pipe (size as ordered)
- Power adapter
- User manual
- Connection cable, 2 m, with two 5-pin M12 connectors
- Calibration certificate

Optional accessories

- Y-type M12 splitter for several sensors on one RS485 bus.
- WiseAir WADL-301 data logger.
- WASM-604 Smart Monitoring platform.

04 Technical specifications

MEASUREMENT

Measuring principle	Thermal mass flow (thermal dispersion), inline type
Measured values	Normal flow, mass flow, normal velocity, consumption (totaliser), gas temperature
Velocity range	0.1 ... 250 Nm/s (turndown 1:2500); see flow-range table for each size
Accuracy	±(1 % of reading + 0.3 % of full scale)
Reference conditions	20 °C, 1 bar(a) per ISO 1217 (programmable)
Gases	Compressed air, argon (Ar), carbon dioxide (CO_2), helium (He), hydrogen (H_2), natural gas, nitrogen (N_2), nitrous oxide (N_2O), oxygen (O_2). Other gases: specify the gas composition when ordering.

OUTPUTS AND COMMUNICATION

Analogue	4–20 mA (isolated) / pulse output
Digital	RS485, Modbus RTU
Wireless	Bluetooth (standard); LoRa (option)
Connectors	2 × 5-pin M12, female; micro USB service port

POWER SUPPLY

Supply voltage	18–30 VDC
Power consumption	5 W max.

DISPLAY AND DATA LOGGER

Display	2.8" IPS colour LCD with capacitive touch screen
Data logger	10,000,000 readings (option)

OPERATING CONDITIONS

Ambient temperature	−30 ... +70 °C
Medium temperature	−40 ... +150 °C
Operating pressure	0 ... 1.6 MPa (0 ... 16 bar(g)); option 4.0 MPa (40 bar(g))
Storage	−10 ... +50 °C, < 90 % RH, non-condensing

MECHANICAL

Meter sizes	DN15 to DN80 (see ordering codes)
Process connection	R (taper) male thread; flanges to EN 1092-1 or ANSI B16.5 on request
EMC	IEC 61326-1

05 Ordering codes and flow ranges

All models: inline type, 0–16 bar(g), 2.8" IPS wide-angle LCD with capacitive touch panel, R thread.

WAFS-107 sizes and flow ranges – Nm³/h (cfm)

Model	Size	Thread	ID (mm)	Minimum (0.1 Nm/s)	Maximum (120 Nm/s)
WAFS-107-A	DN15	½"	15	0.06 (0.04)	76 (45)
WAFS-107-B	DN20	¾"	20	0.11 (0.06)	136 (79)
WAFS-107-C	DN25	1"	25	0.18 (0.12)	212 (124)
WAFS-107-D	DN32	1¼"	32	0.29 (0.18)	347 (204)
WAFS-107-E	DN40	1½"	40	0.45 (0.29)	543 (319)
WAFS-107-F	DN50	2"	50	0.71 (0.41)	848 (499)
On request	DN65	–	65	1.19 (0.71)	1,434 (843)
On request	DN80	–	80	1.81 (1.06)	2,171 (1278)

Nm³/h values are calculated as velocity × bore cross-section at the reference conditions; cfm values are as published. DN65 and DN80 are listed in the flow table but have no published ordering code – contact WiseAir.

06 Mechanical installation

To achieve the stated accuracy, install the meter inline on pipe of the same inner diameter as the meter bore. Make sure there is enough space at the site for a correct installation.

> **!** **BEFORE YOU START**
> Isolate and fully depressurise the pipe section before you cut the pipe or fit the meter. Check that the meter's pressure rating (16 bar(g), or 40 bar(g) for the high-pressure option) is above the maximum line pressure.

Choosing the location

- Install on a straight section of pipe, away from bends, reductions, valves and pressure regulators. Keep the longest possible straight run upstream of the meter; contact WiseAir for the recommended lengths for your layout.
- Use upstream and downstream pipe with the same inner diameter as the meter. Do not let gaskets or sealant protrude into the bore.
- Install after the first filter or water separator. Do not install directly on the compressor outlet where condensate can form.
- Mount the meter with the display head upright (on top of the pipe) so condensate cannot collect in the head.
- Install indoors. Outdoors, protect the meter from sun and rain.
- Support the pipe on both sides of the meter so that no pipe stress or vibration is carried into the meter body.

Fitting the meter

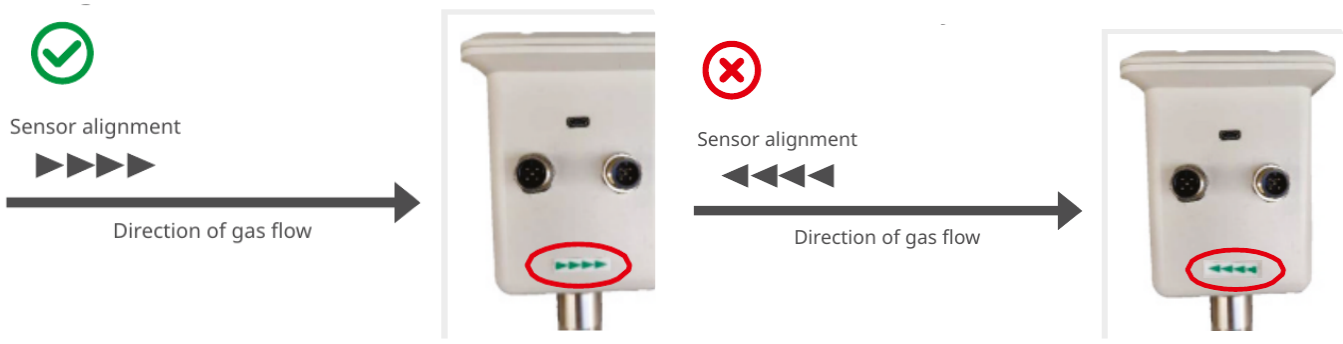
1. **Check the flow direction**
   Find the four green arrows on the connector side of the display head. They must point in the direction of gas flow.

2. **Prepare the pipe**
   Cut the pipe to suit the meter length and clean out burrs, swarf and dirt.

3. **Seal the joints**
   For threaded meters use a thread sealant or PTFE tape suitable for compressed air. For flanged meters use gaskets that match the flange standard and pressure rating.

4. **Tighten**
   Use a spanner on the meter body connection when tightening the pipe. Never turn or hold the meter by the display head.

5. **Pressurise and check**
   Raise the pressure slowly and check all joints for leaks.



Correct: arrows in the flow direction

Incorrect: arrows against the flow

PIPE DIAMETER SETTING

The meter is calibrated with its own measuring pipe. Check that **Settings > Pipe Diameter** shows the meter bore given on the calibration certificate. Do not change it unless instructed by WiseAir support.

07 Electrical connection

The sensor has two 5-pin M12 sockets on the underside of the housing: **A** (power and Modbus) and **B** (analogue and pulse outputs), plus a micro USB service port.

CAUTION

Screw the M12 connectors in by hand. Do not force them; this can damage the pins.

WARNING

Switch off the power supply before connecting or disconnecting cables.



1 = Connector A, 2 = Connector B, 3 = micro USB



M12 pin numbering, viewed on the sensor sockets (left: A, right: B)

Pin	Connector A – power and Modbus	Connector B – outputs
1	RS485 Data + (A)	4–20 mA +
2	RS485 Data – (B)	4–20 mA –
3	Not used	Pulse
4	+18 … 30 VDC	Pulse
5	0 V (supply ground)	Not used

Wiring notes

- Always power the sensor through connector A (pins 4 and 5), even if you use only the analogue output.
- Use shielded twisted-pair cable for RS485. Connect Data + and Data – to the same terminals on every device on the bus. Terminate long buses at both ends.
- The 4–20 mA output is electrically isolated. Configure its channel and scaling in **Settings > Analog Setting**.
- The pulse output gives one pulse per set volume (**m^3/pulse**) for totalising consumption.
- Keep signal cables away from power cables and variable-speed drives.

08 Display and configuration

The sensor has a 2.8" colour LCD with a capacitive touch screen. Use your fingertip; the screen does not respond to fingernails, pens or gloves.

Navigating

- Swipe up or down to see more items in a list (a scroll bar shows on the right).
- Swipe left or right to move between the three home-screen pages (shown by the dots at the bottom).
- Tap an item to open it.
- Press the arrow button to save a selection and go back.

Unlocking the screen

The screen locks automatically after 60 seconds. To unlock it, press and hold the lock symbol and drag it to the right. Change the lock time in **Settings > System Setting > Screen Setting**.

Menu icon (top left)

- **Home** – return to the home screen.
- **Camera** – save a screenshot of the current screen.
- **Notepad** – open the data-logging information.
- **USB** – shown when a USB device is connected; press it before removing the device.

Settings icon (top right)

Opens the settings menu shown in the table below.

Menu structure

Menu	Item	Options / description
Home	Readings	Normal flow, normal velocity, normal consumption, flow, temperature, pressure*
Settings	Pipe Diameter	Inner diameter of the pipe (not the outer diameter)
	Unit Setting	Flow: m^3/h, m^3/min, m^3/s, l/min, l/s, cfm, kg/h, kg/min, kg/s Velocity: m/s, ft/s Consumption: m^3, ft^3, kg Pressure: Pa, hPa, kPa, MPa, mbar, bar, psi Temperature: °C, °F
	Gas Type	Air, oxygen, nitrogen, hydrogen, carbon monoxide, carbon dioxide, sulphur hexafluoride, argon, helium, methane, nitrous oxide, ethane, propane, butane, biogas, natural gas
	Logging	Logging on/off, history
	ScreenShot	View saved screenshots
	Normalization	Reference temperature and pressure for normal flow (default 20 °C, 100 kPa); flow unit prefix
	RS485 Setting	Baud rate (1200 … 115200), parity (none, odd, even), stop bits (1, 2), response delay, device address
	Analog Setting	4–20 mA channel (flow, velocity, pressure*, temperature, normal flow, normal velocity); 4–20 mA scaling low / high; pulse output; volume per pulse (m^3/pulse)
	System Setting	Screen Setting (rotation, brightness, screen timeout); Language Setting; System Information; System Update
	Advanced Setting (password protected)	Velocity offset ratio, velocity filter gradient, consumption (actual / normal), anti-condensation, constant temperature, pressure calibration*, cut-off velocity, new password, password reset

* Pressure items apply only to sensors with a pressure input; contact WiseAir support. Advanced settings are factory set; contact WiseAir support before changing them. The password is supplied by WiseAir on request.

WIRELESS SET-UP

The sensor has Bluetooth as standard for wireless configuration and data transfer. Contact WiseAir support for the WiseAir Configuration App and pairing instructions.

Changing the display language

1. Unlock the screen if the lock symbol is shown.
2. Open the Menu icon (top left) and press **Home**.
3. Press the Settings icon (top right).
4. Scroll to the bottom and press **System Setting** (second item from the bottom).
5. Press **Language Setting** (second item from the top).
6. Select the language and press the arrow button to save and return.

09 Communication (Modbus RTU)

The sensor communicates over RS485 using the Modbus RTU protocol. Change the settings in **Settings > RS485 Setting** or through the configuration registers below.

Default RS485 settings

Device address	Baud rate	Data / parity / stop	Response time	Response delay	Frame spacing
1	9600 bps	8 / N / 1	1 s	0 ms	7 characters

Measured values (holding registers, read only)

Register address	Data type	Length	Value
0	32-bit float (Float_L)	4 bytes (2 registers)	Flow
2	32-bit float (Float_L)	4 bytes (2 registers)	Velocity
4	64-bit double (Double_L)	8 bytes (4 registers)	Consumption (totaliser)
8	32-bit float	4 bytes (2 registers)	Temperature

Read with function code 03 (read holding registers). Values are in the units selected on the display. The suffix "_L" denotes the word order used by the sensor; confirm the order in your master device if values look wrong.

Communication configuration (holding registers)

Register no.	Address	Length	Description	Default	Access
51	50	2 bytes	Restart device – write 1 to restart	–	Write
52	51	2 bytes	Device address, 1–247	1	Read / write
53	52	2 bytes	Baud rate code (baud rate ÷ 100): 12 = 1200, 24 = 2400, 48 = 4800, 96 = 9600, 144 = 14400, 192 = 19200, 384 = 38400, 560 = 56000, 576 = 57600, 1152 = 115200 bps	96 (9600 bps)	Read / write
54	53	2 bytes	Parity: 0 = none, 1 = odd, 2 = even	0	Read / write
55	54	2 bytes	Stop bits: 1 = 1 bit, 2 = 2 bits	1	Read / write
56	55	2 bytes	Response delay, 0–255 ms (1 ms per step)	0	Read / write

"Register no." is the 1-based register number; "Address" is the 0-based address sent in the Modbus frame. New communication settings take effect after a restart.

CONNECTING TO WISEAIR MONITORING

For continuous monitoring, connect the RS485 line to a WiseAir WADL-301 data logger or gateway and view the data on the WASM-604 Smart Monitoring platform (smartmonitoring.wiseair.asia). Use a Y-type M12 splitter to connect several sensors on one RS485 bus; give each sensor a unique address.

10 Maintenance, cleaning and calibration

Cleaning

- Disconnect the power and depressurise (or isolate) the sensor before cleaning the sensor element.
- Clean the housing and screen with a clean, dry cloth.
- For stubborn marks on the sensor element use only distilled water or isopropyl alcohol. Do not touch the element with tools or abrasive material.
- Contamination (oil, dust, water) on the sensor element changes the calibration. Cleaning may not restore the original accuracy; recalibrate if in doubt.

Calibration

Each sensor is calibrated before delivery. The calibration date is on the calibration certificate supplied with the sensor. How often calibration is needed depends mainly on how contaminated the gas is.

Calibrate the sensor every 2 years. To calibrate, depressurise and isolate the line section and remove the meter from the pipe, then return it to WiseAir. Calibration is not covered by the product warranty. Contact WiseAir support to arrange calibration.

11 Troubleshooting

Symptom	Possible cause	Action
Screen does not respond to touch	Screen locked; dirty screen; using fingernail, pen or glove	Unlock the screen. Clean it. Touch with a bare fingertip; try pressing more firmly or more lightly.
Not all menu items visible	List is longer than the screen	Swipe up or down; watch the scroll bar on the right.
Display in the wrong language	Language changed	Follow *Changing the display language*.
No display	No power; wrong wiring	Check 18–30 VDC on connector A pins 4 (+) and 5 (0 V).
Reading is zero at low flow	Flow below the cut-off velocity	Check the cut-off velocity in Advanced Setting with WiseAir support.
Reading too high or too low	Wrong pipe inner diameter, gas type or units; normalisation changed	Check Pipe Diameter (inner diameter), Gas Type and units. Reset normalisation to 20 °C / 100 kPa if it was changed.
Reading unstable or wrong	Incorrect installation	Check flow direction and straight pipe runs.
Reading drifts over time	Contaminated sensor element; condensate	Clean the element. Install after a filter / water separator. Recalibrate.
No Modbus communication	Wrong address, baud rate or parity; A/B swapped; bus not terminated	Check settings against the master. Swap Data+ / Data−. Terminate long RS485 lines.
4–20 mA signal wrong	Wrong channel or scaling	Check Analog Setting: channel, scaling low and high.

If the problem remains, note the serial number and the readings shown, then contact WiseAir support (details on the back cover).

12 Warranty and service

WiseAir Technologies gives a 12-month warranty on this sensor from the date of delivery. The warranty covers defects in material and workmanship when the sensor is used within the stated operating conditions. Report any fault immediately and within the warranty period.

During the warranty period WiseAir will repair or replace a faulty sensor free of charge for parts and repair labour. Other costs, such as removal, reinstallation and transport, are charged. A warranty repair does not extend the warranty period.

Not covered

- Improper use or failure to follow this manual.
- Use of unsuitable accessories.
- External influences such as vibration, transport damage, excess heat or moisture.
- Calibration.

Warranty is void if

- The sensor is opened without written instruction in this manual.
- Repairs or modifications are made by third parties or unauthorised persons.
- The serial number is changed, damaged or removed.

For service, calibration or spare parts, contact your WiseAir dealer or WiseAir support (details on the back cover).

13 Commissioning report

ABOUT THE SENSOR	
Part number	
Serial number	
Installed by	
Installed on	
Calibration valid until	
Warranty valid until	
SITE	
Customer	
Location	
Pipe ID / gas / unit	
Modbus address	

Installation checklist

No.	Task	Yes	N/A	No	Comments
1	Sensor installed in the correct location and orientation	☐	☐	☐	
2	Required straight pipe runs available upstream and downstream	☐	☐	☐	
3	Meter bore matches the pipe; joints leak-free	☐	☐	☐	
4	Sensor aligned with the direction of gas flow	☐	☐	☐	
5	Electrical wiring checked (power, RS485, 4–20 mA / pulse)	☐	☐	☐	
6	Settings checked: pipe inner diameter, units, gas type	☐	☐	☐	
7	Modbus / analogue settings checked at the receiving device	☐	☐	☐	
8	Readings (flow, velocity, consumption, temperature) visible on the display	☐	☐	☐	

WiseAir representative

Customer

WISE AIR 4.0
MEASURE TO MANAGE

Need help with your WAFS-107?

Our product specialists support installation, commissioning, configuration and calibration — remotely or on site.

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> When you contact support, please keep the sensor serial number, firmware version and a photo of the installation ready.

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Specifications are subject to change without notice.