WISE AIR 4.0
MEASURE TO MANAGE

USER MANUAL · 2026 EDITION

WUFS-904

Clamp-On Ultrasonic Flow Meter

Models covered: WUFS-904 transmitter with clamp-on (TT01, TT02, TT02H, TT03) or insertion (TT05) transducers; optional energy-meter version (RTD module + PT1000)



±1% rdg
Accuracy

±0.03–12 m/s
Velocity range

DN15–DN1200
Pipe sizes

RS485 Modbus
+ 4–20 mA and pulse

INSTALLATION · OPERATION · CONFIGURATION · MAINTENANCE

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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

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01 Safety and general information

Read this manual completely before you install, wire or operate the WUFS-904. Keep it near the instrument for later reference.

Intended use

The WUFS-904 is a transit-time ultrasonic flow meter for **liquids in completely full pipes** – for example cooling water, process water, purified water, chilled water and hot water. The transducers clamp onto the outside of the pipe, so the pipe does not need to be cut and the liquid is not touched. With the optional RTD module and PT1000 temperature sensors, the WUFS-904 also works as a heat/cooling energy meter.

NOT FOR COMPRESSED AIR OR GAS

The WUFS-904 measures liquids only. For compressed air and gases, use a WiseAir thermal mass or vortex flow sensor.

Safety symbols used in this manual

Symbol	Meaning
Danger	Risk of serious injury or death.
Warning	Risk of injury.
Caution	Risk of damage to the flow meter or the installation.
Note / Tip	Useful information for correct installation and operation.

ELECTRICAL SAFETY

- Switch off and isolate the power supply before you open the transmitter or connect any wires.
- Use either the AC supply (90–245 VAC) or the DC supply (10–36 VDC). **Never connect both at the same time.**
- Earth the transmitter reliably before you switch it on.
- Only qualified electricians may carry out electrical work.

HOT AND COLD PIPES

- Pipe surfaces can be very hot or very cold. Wear suitable gloves when you mount the transducers.
- Make sure the pipe surface temperature is within the rating of the transducer type you use (see Technical specifications).

Storage and transport

- Store and transport the meter in its original packaging, in a dry place.
- Protect the transmitter display and the transducer faces from impact and scratches.
- Respect the ambient limits of the transmitter: –20 to +60 °C, up to 99% RH, non-condensing.

02 Product overview

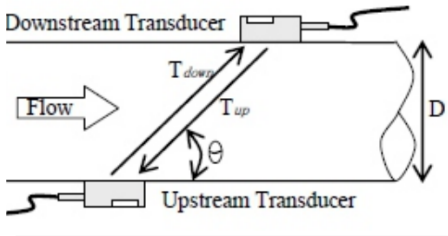
The WUFS-904 consists of a wall-mounted transmitter with a 240 × 128 backlit LCD and keypad, and a matched pair of ultrasonic transducers. The transmitter calculates the flow velocity from the transit times of ultrasonic pulses sent with and against the flow, and then calculates the volume flow from the pipe data you enter.

Measuring principle (transit time)

The two transducers send ultrasonic pulses to each other in turn. A pulse travelling with the flow arrives sooner than a pulse travelling against it. The time difference ΔT is proportional to the flow velocity:

$$V = (M \cdot D / \sin 2\theta) \times \Delta T / (Tup \cdot Tdown)$$

Symbol	Meaning
V	Mean flow velocity of the liquid
M	Number of times the signal crosses the pipe (V method = 2, Z method = 1)
D	Pipe inside diameter
θ	Angle between the ultrasonic path and the flow direction
Tup, Tdown	Transit times with and against the flow
ΔT	Tdown – Tup



Transit-time measurement between upstream and downstream transducers

Typical applications

- Cooling-tower and chiller water
- Process and utility water
- Purified / RO water
- Water treatment
- Chemical and oil-industry liquids
- Heat and cooling energy metering (with RTD option)

Key features

Non-invasive
Clamp-on transducers: no pipe cutting, no pressure drop, no process shutdown.

Matched transducers
Glued, sealed IP68 transducers with integrated cable; pair matching ≤ 2 ns.

Bidirectional
Positive, negative and net totalisers run in parallel, 7-digit display with scale factor.

History
Daily, monthly and yearly net totals stored in the meter (see window M60).

Outputs
4–20 mA, pulse/frequency (OCT), relay, RS485 and RS232 Modbus.

Energy metering
Optional RTD module and PT1000 sensors for heat and cooling consumption.

03 What's in the box and accessories

Standard delivery

- WUFS-904 wall-mount transmitter
- One matched pair of transducers (type as ordered) with double-shielded cable – standard length 9 m
- Pipe straps / mounting fixtures for the transducers
- This user manual

> **NOTE**
> Confirm the exact scope of supply against your order acknowledgement. Coupling compound and an SD card are not listed as standard items.

Transducer options

Type	Mounting	Operating temperature
TT01	Clamp-on (standard)	–40 to +80 °C
TT02	Clamp-on	–40 to +80 °C
TT02H	Clamp-on, high temperature	–40 to +180 °C
TT03	Clamp-on, high temperature	–40 to +130 °C
TT05	Insertion (hot-tap fittings with ball valve)	–40 to +130 °C
Small-pipe pair	Clamp-on, DN15–DN40	Up to 70 °C

Transducer kits (ordering codes)

Code	Description
GAC 11	Transducer pair for DN15–DN100, with 5 m cable and metal stretcher
GAC 12	Transducer pair for DN50–DN700, with 5 m cable and metal stretcher
GAC 13	Transducer pair for DN300–DN600, with 5 m cable and metal stretcher

Other accessories

- RTD module with PT1000 temperature sensor pair (clamp-on TT03-PT1000 or insertion TT05-PT1000 heat meter)
- Double guide bracket for accurate transducer spacing
- Micro SD card data memory (option)
- WiseAir WADL-301 data logger and WASM-604 Smart Monitoring platform for remote monitoring

04 Technical specifications

PERFORMANCE	
Velocity range	±0.03 to ±12 m/s (±0.09 to ±39 ft/s)
Accuracy	±1% of measured value
Repeatability	0.2% of measured value
Linearity	±1%
Pipe size	DN25–DN1200 (standard transducers); DN15–DN40 with the small-pipe transducer pair
Medium	Homogeneous liquids, pipe completely full

OUTPUTS AND COMMUNICATION	
Analogue output	4–20 mA (or 0–20 mA / 0–4–20 mA), max. load 750 Ω
Pulse / frequency	OCT open-collector output, 0–10 kHz
Relay	1 × relay output (alarm or totaliser pulse)
Communication	RS485 Modbus RTU; RS232
Analogue inputs	AI1, AI2 (energy-meter version)
Data memory	Micro SD card (option), up to 512 files

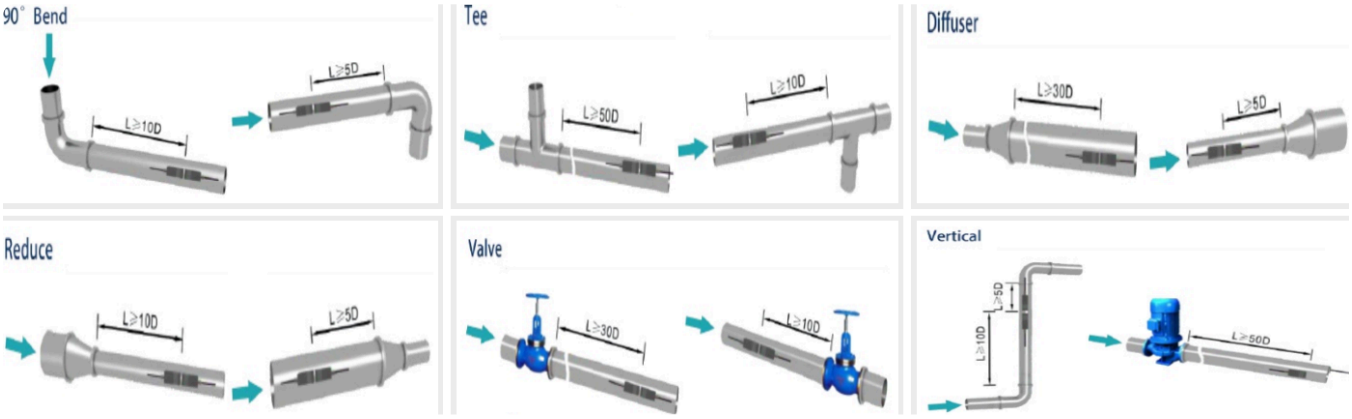
TRANSMITTER	
Power supply	10–36 VDC (1 A max.) or 90–245 VAC – specify at order
Display	240 × 128 backlit LCD, membrane keypad
Housing	PC/ABS, IP65, wall mounting
Ambient temperature	–20 to +60 °C
Humidity	Up to 99% RH, non-condensing

TRANSDUCERS	
Construction	Encapsulated, IP68
Cable	Double-shielded; 9 m standard, 300 m maximum
Temperature	TT01/TT02: –40 to +80 °C TT03/TT05: –40 to +130 °C TT02H: –40 to +180 °C
Pair matching	≤ 2 ns

05 Selecting the measuring point

Accuracy depends mainly on the measuring point. The flow profile must be fully developed and the pipe must always be full of liquid.

- [ ] Choose a pipe section that is **always full** – for example a vertical pipe with upward flow, or a full horizontal pipe. Avoid high points where air collects.
- [ ] Provide the straight pipe lengths shown below upstream and downstream of the transducers.
- [ ] On horizontal pipes, mount the transducers at the **3 o'clock or 9 o'clock** position. Do not mount at 12 o'clock (air bubbles) or 6 o'clock (sediment).
- [ ] Make sure the pipe surface temperature is within the transducer rating.
- [ ] Choose a pipe section with little internal corrosion or scale, and a sound-conducting pipe material.
- [ ] Avoid seam-welded pipe sections where possible; their walls are often irregular.



Minimum straight pipe lengths (D = pipe diameter)

Minimum straight lengths

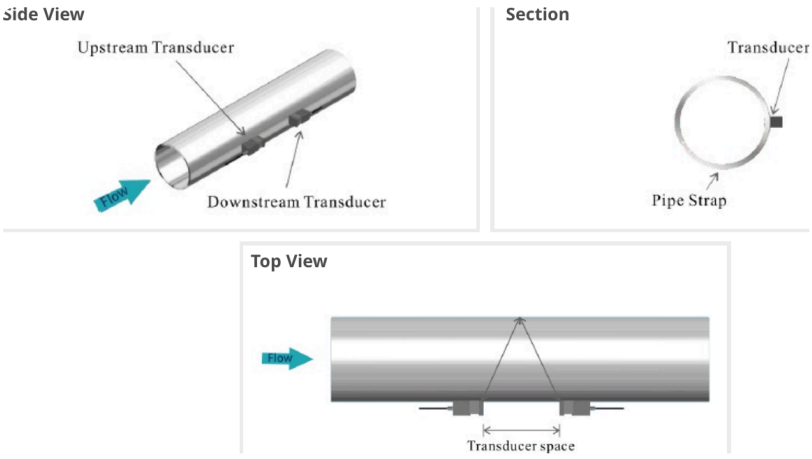
Disturbance	Upstream	Downstream
90° bend	≥ 10 D	≥ 5 D
Tee	≥ 50 D	≥ 10 D
Diffuser (expansion)	≥ 30 D	≥ 5 D
Reducer	≥ 10 D	≥ 5 D
Valve	≥ 30 D	≥ 10 D
Pump	≥ 50 D	–
Vertical pipe after bend	≥ 10 D	≥ 5 D

06 Transducer installation

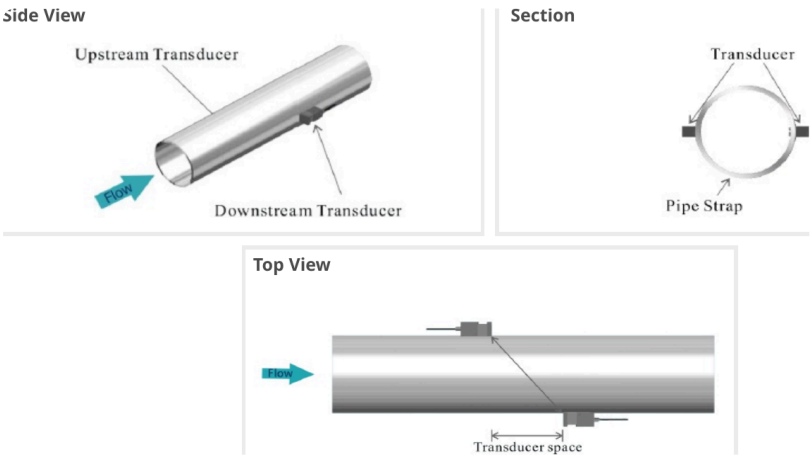
Mounting methods

Two mounting methods are used. Select the method in window M13 before you mount the transducers – the required spacing depends on it.

Method	Signal path	Use for
V method (reflect)	Signal crosses the pipe twice; both transducers on the same side	Standard method; most pipes up to approx. DN300
Z method (direct)	Signal crosses the pipe once; transducers on opposite sides	Pipes over DN300 (12 in), liquids with suspended solids, thick scale or lining, or weak V-method signal



V method: both transducers on one side, at the pipe centreline



Z method: transducers on opposite sides of the pipe

Mounting procedure

1. **Enter the pipe data**
   Enter the pipe outside diameter, wall thickness, pipe material, lining, liquid and transducer type/method (windows M10–M13). See Quick start.

2 **Read the spacing**

Read the transducer spacing in window M14. The spacing is measured between the **ends** of the two transducers.

3 **Prepare the pipe**

Remove rust, scale and loose paint at both transducer positions until the surface is smooth and clean.

4 **Apply coupling compound**

Apply a wide band of coupling compound along the centre of each transducer face and on the pipe surface. There must be no air bubbles or particles between transducer and pipe.

5 **Fix the transducers**

Place the transducers at the pipe centreline, parallel to the flow, at the spacing shown in M14 (flow arrows in the direction of flow). Tighten the straps securely.

6 **Check the signal**

Switch on and check window M04 (see Installation check). Move the transducers slightly to get the strongest signal.

Installation check (window M04)

Value	Target	If not reached
Signal strength (UP and DN)	Above 75.0 (scale 00.0–99.9)	Re-check spacing and coupling compound; clean the pipe; try the Z method
Signal quality Q	Above 60 (scale 00–99)	Move the transducers slowly to find the best position
Transit time ratio	100 ± 3%	Check pipe data (OD, wall, material, lining), spacing and centreline alignment
Delta time fluctuation	Less than ±20%	Poor signal, poor installation or wrong parameters
Measured sound velocity	Close to the liquid value set in M12	Check liquid setting and transducer installation

! **PIPE DATA MUST BE CORRECT**

Wrong pipe data gives a wrong spacing and wrong flow values. Measure the outside diameter and wall thickness – do not rely on nominal sizes.

07 Electrical connection

DANGER

Switch off the power before wiring. Use either AC or DC supply – never both. Earth the transmitter reliably.

Open the transmitter cover. The terminal block on the power board is arranged from left to right: power supply, relay output, OCT output, transducers, 4–20 mA output, RS232, RS485, analogue inputs (and temperature inputs on the energy-meter version).

Terminal assignment

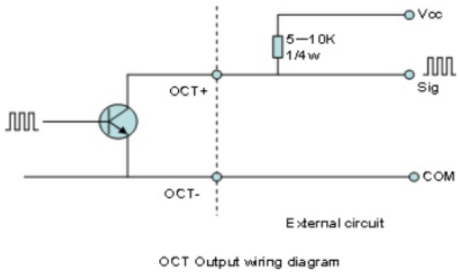
Terminal	Function	Notes
L, N, ⏚	AC power 90–245 VAC, earth	AC version only
DC+, DC–	DC power 10–36 VDC	DC version only
RL OUT+, RL OUT–	Relay output	Configure in M34
OCT OUT+, OCT OUT–	Open-collector pulse / frequency output	Configure in M33
UP+, UP–, GND	Upstream transducer	+ brown, – blue, GND black (shield)
DN+, DN–, GND	Downstream transducer	+ brown, – blue, GND black (shield)
I OUT+, I OUT–	4–20 mA output, max. 750 Ω	Configure in M32
TX, RX, GND	RS232	Max. cable length 15 m
A, B	RS485 (Modbus RTU)	Max. cable length 1000 m
AI1, AI2, GND	Analogue inputs	Energy-meter version only
IN1+, IN1–, GND	Temperature sensor – supply (inlet) line	Energy-meter version only
IN2+, IN2–, GND	Temperature sensor – return (outlet) line	Energy-meter version only

NOTE

RS232 and RS485 cannot be used at the same time.

OCT (pulse / frequency) output wiring

The OCT output is an open-collector transistor. Connect an external pull-up resistor of 5–10 kΩ (¼ W) between the supply (Vcc) of the receiving device and OCT+. Take the signal from OCT+ and connect OCT– to the common (COM) of the receiving device.



OCT output wiring

Powering on

At switch-on the meter starts with the last saved parameters. The status code at the top right of the display shows ***D** while the gain is adjusted and ***R** when normal measurement has started. On a new site, enter the site parameters first (see Quick start). All settings are saved permanently until you change them. Measurement and outputs continue whichever window is displayed.

08 Display, keypad and quick start



Transmitter display and keypad

Key	Function
0–9, .	Enter numbers or a window number
⌫	Delete the character to the left, or go back
▲ / ▼	Previous / next window; scroll options; + and – when entering numbers
Menu	Press, then enter a 2-digit window number to jump to it (e.g. Menu 1 0 → M10)
Enter	Start editing a value, then confirm it

All settings and readings are organised in numbered **windows** (M00–M64). To change a value, open the window, press **Enter**, enter or select the value and press **Enter** again.

> **NOTE**
> If a value cannot be edited after pressing Enter, the meter is locked. Unlock it in window M54 with the password.

Quick start – example

Example: PVC pipe, 200 mm outside diameter, 4 mm wall, no lining, water, standard clamp-on transducers, V method.

1. **Pipe size (M10)**
   Enter outside diameter 200 mm and wall thickness 4 mm. Press Enter to confirm each value.

2. **Pipe material (M10)**
   Select *0. PVC* with ▲/▼ and press Enter.

3. **Lining (M11)**
   Select *0. No liner*.

4. **Liquid temperature (M12)**
   Enter the water temperature (0–80 °C), e.g. 25 °C for room temperature.

5 **Transducer type and method (M13)**
Select the transducer type (here *Clamp-On D*, the standard clamp-on transducer) and the mounting method (here *0. V method*).

6 **Spacing (M14)**
Read the transducer spacing and mount the transducers exactly at this spacing.

7 **Read the flow (M01)**
Window M01 shows flow rate and velocity. Check the signal in M04.

09 Operating functions

Status codes

Code	Meaning	Action
*R	System normal – measuring	None
*D	Adjusting signal gain before measuring	Normal at start-up. If it does not change to *R, check installation
*E	No signal detected	See Troubleshooting

Low flow cut-off (M21)

Velocities below the cut-off value are displayed and totalised as zero. This stops the totaliser from counting small liquid movements after a pump stops. Recommended setting: 0.03 m/s. The cut-off has no effect on readings above the cut-off value.

Zero setting (M22)

Every meter shows a small reading at true zero flow (the zero point). At low flow this error matters, so carry out a static zero after installation: make sure the liquid is completely still (pipe full, flow stopped), then select *Cutoff* → *Yes* in M22. The display shows “success” and returns to M01. Use *Reset* to clear a user zero. The *Offset* function adds a fixed value to the reading and is only for experienced users; normally leave it at 0.

! **CAUTION**
Never set zero while liquid is flowing. If the meter reads zero although liquid is flowing and *R is shown, reset the zero in M22.

Scale factor (M26)

The scale (K) factor is the ratio of the actual flow to the displayed flow. Example: actual flow 2.00, displayed 1.98 → K = 2.00 / 1.98 = 1.010. Leave K at 1.000 unless you have a result from a real flow calibration on that pipe.

4–20 mA output (M32)

- **Mode:** select 4–20 mA, 0–20 mA, 20–4–20 mA (flow in either direction, by magnitude) or 0–4–20 mA (reverse flow = 0–4 mA, forward flow = 4–20 mA).

- **Range:** enter the flow value for 4 mA (LowerL) and for 20 mA (UpperL). Example: 0–1000 m³/h → LowerL 0, UpperL 1000.
- **Check:** the output can be forced to fixed test currents (4, 8, 12 and 20 mA) to test the loop with an ammeter.
- The output is factory calibrated. Re-calibrate in M62 (password required) only if the measured current differs from the value shown in M32.

Frequency output (M33)

The OCT output can give a frequency proportional to flow. Example – flow 0–5000 m³/h as 100–1000 Hz: set M33 Range LowerL = 0, UpperL = 5000; Mode Frange = 100 and 1000; Option = *a. Flow Rate*. Other options are positive, negative or net total, energy rate, heat total, cool total, batching and serial-port control.

Totaliser pulse output (M33 / M34)

The OCT or the relay can give one pulse per unit volume. Example – one relay pulse per 10 m³ of positive flow: M41 unit = m³; M41 multiplier = ×10; M34 option = *g. POS Total*.

TIP

Choose the pulse value so that the output gives 1–3 pulses per second at maximum flow. Too many pulses wear the relay and pulses can be lost; too few give a slow update.

Alarms (M34 / M35)

The relay or OCT can switch on: no signal (*E), reverse flow, alarm 1 or alarm 2 (flow outside the low/high limits set in M35), batch end, or totaliser pulses. Example – alarm when the flow is outside 300–1000 m³/h: M35 Alarm1 LowL = 300, Alarm1 UpperL = 1000; M34 option = *d. Alarm1*.

SD card data memory (M37, option)

- Logging interval: 1 to 3600 s. Logged data: date and time, flow rate, velocity, totals (and energy values on the energy-meter version).
- Format: FAT16, plain-text (.TXT) files, maximum 512 files. Each record is about 120 bytes.
- Example: logging every 5 s uses about 2.1 MB per day, so a 1 GB card holds about 487 days. When the card is full, the oldest files are overwritten.
- Switch off the power before you insert or remove the card. Copy files to a PC before processing them.

System lock (M54)

Lock the meter to prevent unauthorised changes. Parameters can still be read. The 6-digit password set by the user is the only way to unlock. Record it in a safe place; if it is lost, contact WiseAir support (details on the back cover).

10 Menu reference

Window	Name	Content / options
M00	Flow totaliser	Net, positive and negative totals
M01	Flow rate	Flow rate, total and velocity (alternate every 6 s; Enter stops)
M02 / M03	Heat / cool rate	Energy rate and total, inlet/outlet temperature (energy-meter version)
M04	Status	Signal strength UP/DN, quality Q, sound velocity, transit-time ratio, total time and delta time
M10	Pipe settings	Outside diameter (10–1200 mm), wall thickness, material: 0 PVC, 1 carbon steel, 2 stainless steel, 3 cast iron, 4 ductile iron, 5 copper, 6 aluminium, 7 asbestos cement, 8 fibreglass, 9 other (enter sound velocity)
M11	Lining	Liner thickness and material: 0 none, 1 tar epoxy, 2 rubber, 3 mortar, 4 polypropylene, 5 polystyrol, 6 polystyrene, 7 polyester, 8 polyethylene, 9 ebonite, 10 Teflon, 11 other (enter sound velocity)
M12	Medium	Water temperature, 0–80 °C
M13	Transducer	Type: 0 Clamp-On C, 1 Clamp-On D, 2 Clamp-On X, 3 Plug-In, 4 Plug-In X. Method: 0 V, 1 Z, 2 N
M14	Installation spacing	Calculated transducer spacing (read only)
M20	Damping	1–999 s (1 = no damping); 3–10 s recommended
M21	Low flow cut-off	Velocity cut-off, 0.03 m/s recommended
M22	Zero settings	Cutoff (set zero), Reset, Offset
M23	Totaliser	Totaliser type (POS/NEG/NET), energy type (heat/cool), on/off, reset (POS, NEG, NET, all; heat, cool, all)
M24	Temperature	Heat input source (RTD or AI), temperature sensitivity 0–20 °C (default 0.2 °C), specific heat
M25	Power-off compensation	On: estimates flow during power loss from the average before and after
M26	K factor	Scale factor
M27	Correction	Sectional correction on/off; delay correction and transducer power control (engineer settings – keep factory values)
M28	SQA	Signal quality statistical analysis
M30	RS232/RS485	Baud rate (2400–56000, no parity) and Modbus address (ID)
M31	AI settings	AI1/AI2 range (lower/upper)
M32	Current loop	Mode, range, check
M33	OCT	Signal source, range, frequency range, check (500/1000/3000/5000 Hz)
M34	Relay	a no signal, b *E, c reverse, d alarm 1, e alarm 2, f batch, g POS total, h NEG total, i NET total, j not used
M35	Alarm values	Alarm 1 and 2 low/high limits
M36	Batching	Control source: key, AI1, AI2 or serial port
M37	Micro SD (option)	Record content (no energy / all), interval 1–3600 s

Window	Name	Content / options
M40–M43	Units	Metric/British; flow unit (m^3, l, US gal, Imp gal, million gal, ft^3, US bbl, Imp bbl, oil bbl) per day/h/min/s – default m^3/h; energy unit; °C/°F
M50	Serial number	Electronic serial number (ESN) and software version
M51–M53	Clock, key tone, language	Date/time; key tone on/off; language
M54	System lock	Lock / unlock with 6-digit password
M55	System reset	Restore factory settings
M60	Date totaliser	Net total per day (last 31 days), month (last 12 months), year (last 6 years)
M61	Running time	Total working days
M62–M64	Adjustment	4–20 mA, RTD and AI calibration (password protected)

NOTE

Windows for temperature, heat, cooling and energy (M02, M03, M24, M42, M63) are active only on the energy-meter version.

11 Communication

The WUFS-904 can be read over RS485 (up to 1000 m) or RS232 (up to 15 m) with Modbus RTU or a simple ASCII command protocol. Set the baud rate and the device address in window M30. The serial format is 8 data bits, no parity, 1 stop bit.

Protocol	Modbus RTU, function codes 0x03 (read) and 0x06 (write single register)
Address	1–247 (set in M30 or via register 44100)
Baud rate	2400, 4800, 9600 (typical), 19200, 38400, 56000
Check	CRC-16 (polynomial 0xA001), low byte first
Data format	32-bit values: IEEE 754 float; low-order register (word) first

Write registers (function 0x06)

Register	PDU addr.	Value	Type
44100	0x1003	Device address (1–247)	Int, R/W
44101	0x1004	Baud rate: 0 = 2400, 1 = 4800, 2 = 9600, 3 = 19200, 4 = 38400, 5 = 56000	Int, R/W

Modbus examples (device address 1)

```
Read flow per hour (40005–40006):
  Request : 01 03 00 04 00 02 85 CA
  Response: 01 03 04 06 51 3F 9E 3B 32
  Value   : words 3F9E 0651 → IEEE 754 float = 1.2345678 m³/h

Change device address from 1 to 2 (register 44100):
  Request : 01 06 10 03 00 02 FC CB
  Response: 01 06 10 03 00 02 FC CB

Invalid start address (40002):
  Request : 01 03 00 01 00 01 D5 CA
  Response: 01 83 02 C0 F1   (exception 0x02 – illegal data address)
```

Read registers (function 0x03)

Register	PDU addr.	Value	Type	Regs
40001	0x0000	Flow per second	Float	2
40003	0x0002	Flow per minute	Float	2
40005	0x0004	Flow per hour	Float	2
40007	0x0006	Velocity (m/s)	Float	2
40009 / 40011	0x0008 / 0x000A	Positive total – mantissa / exponent	Long / int	2 + 1
40012 / 40014	0x000B / 0x000D	Negative total – mantissa / exponent	Long / int	2 + 1
40015 / 40017	0x000E / 0x0010	Net total – mantissa / exponent	Long / int	2 + 1
40018	0x0011	Energy flow	See note	2
40020 / 40022	0x0013 / 0x0015	Energy total (heat) – value / exponent	Float / int	2 + 1
40023 / 40025	0x0016 / 0x0018	Energy total (cool) – value / exponent	Float / int	2 + 1
40026	0x0019	Upstream signal strength (0–99.9)	Float	2
40028	0x001B	Downstream signal strength (0–99.9)	Float	2
40030	0x001D	Signal quality (0–99)	Int	1
40031	0x001E	Status code (R / D / E)	String	1
40060	0x003B	Velocity unit (m/s)	String	2
40062	0x003D	Flow rate unit	String	2
40064	0x003F	Flow total unit	String	1
40065	0x0040	Energy rate unit	String	2
40067	0x0042	Energy total unit	String	1
40068	0x0043	Instrument address	See note	2
40070	0x0045	Serial number (8 characters)	String	4
40074	0x0049	Analogue input AI1 (temperature with RTD option)	Float	2
40076	0x004B	Analogue input AI2 (temperature with RTD option)	Float	2
40078	0x004D	4–20 mA output value (mA)	Float	2

Totals = mantissa × $10^{exponent}$. Always read a 2-register value starting at its first register; reading from the second register returns exception 0x02. Data type of registers 40018 and 40068: needs confirmation.

Unit codes

Flow unit	Code
Cubic metre	m3
Litre	l
US gallon	ga
Imperial gallon	ig
Million gallons	mg
Cubic foot	cf
US barrel	ba
Imperial barrel	ib
Oil barrel	ob

Energy unit	Code
Gigajoule	GJ
Kilocalorie	Kc
MBtu	MB
Kilojoule	KJ
Btu	Bt
US tonne	Ts
US ton	Tn
kWh	kw

ASCII command protocol

Commands are ASCII strings ending with carriage return and line feed (CR LF). The meter answers each command; numbers are returned in exponent format, e.g. +1.234567E+00.

Command	Returns
RFR	Instantaneous flow
RVV	Instantaneous velocity
RT+ / RT− / RTN	Positive / negative / net total
RTH	Heat energy total
RER	Instantaneous energy
RA1 / RA2	Analogue input AI1 / AI2
RID	Network address
RSS	Signal strength and quality (UP:dd.d DN:dd.d Q=dd)
REC	Status code (*R / *D / *E)
RRS	Relay status (ON/OFF)
RDT	Date and time
RSN	Serial number
SFQdddd.d	Set OCT frequency – answers OK
SCLdd.d	Set current output – answers OK
SRS	Start batch control – answers OK

- **Prefix W + address** (0–255, not 10 or 13) addresses one meter on a network, e.g. `W123RVV` reads the velocity of meter 123.
- **Prefix P** adds a checksum: the reply ends with "!" and one byte equal to the low 8 bits of the sum of all reply characters. W and P can be combined, e.g. `W123PRT+`.

12 Maintenance and calibration

- The transmitter and transducers have no parts that need routine replacement.
- Clean the transmitter with a damp cloth only. Do not use solvents on the display window.
- Check the signal strength and quality in M04 at regular intervals. A falling signal usually means the coupling compound has dried out or the transducers have moved: clean, re-apply compound and re-mount at the M14 spacing.
- Check that the straps are tight and the cable glands are closed.
- The meter is calibrated at the factory. Re-verify at an interval set by your quality system, or after re-installation on a different pipe. For calibration service, contact WiseAir support (details on the back cover).

13 Troubleshooting

Symptom	Possible cause	Action
***E – no signal**	Transducers loose; wrong spacing; too little coupling compound; rust, scale or paint on the pipe; wrong pipe data	Re-check pipe data (M10–M13) and spacing (M14). Clean the pipe to bare metal, apply plenty of compound, tighten the straps
***E on a new, good pipe**	Pipe not full; transducers reversed or on the wrong side; wiring error	Check that the pipe is full, the flow arrows point with the flow, and UP/DN wiring is correct
Weak or no signal on an old pipe	Heavy internal scale; distorted pipe; new lining not yet cured	Try the Z method or a vertical pipe with upward flow; move the transducers slowly to find the best signal; choose a cleaner section; wait until the lining has cured
***D does not change to *R**	Signal too poor to lock on	Improve installation as above
Transit-time ratio outside 100 ± 3%	Wrong pipe data or spacing; transducers not on the centreline	Correct the parameters; re-measure the spacing
Reading unstable	Air bubbles; too close to a pump, valve or bend; electrical interference	Move to a better location; increase damping (M20); route cables away from power cables
Zero flow shown although liquid is flowing (*R)	Zero set while liquid was flowing	Reset the zero in M22
4–20 mA output wrong	Wrong mode or range; loop not calibrated	Check M32 mode and range; test with M32 Check; re-calibrate in M62 if necessary
Parameters cannot be changed	System locked	Unlock in M54

14 Warranty and service

The WUFS-904 is covered by the WiseAir warranty stated in your quotation or order acknowledgement. The warranty does not cover damage caused by incorrect installation, wrong power supply, operation outside the specified limits, or opening of sealed transducers.

Before you contact support, note the serial number and software version (window M50), the status code and the M04 values. Contact WiseAir support (details on the back cover).

15 Commissioning report

SITE	
Customer / site	
Measuring point (tag) / liquid	
INSTRUMENT	
Transmitter serial no. (M50)	
Transducer type / power supply	
Modbus address / baud rate (M30)	
PIPE DATA	
Outside diameter / wall (mm)	
Pipe material / lining	
Straight run up / down (D)	
Mounting method (V / Z)	
SIGNAL CHECK (M04)	
Spacing set (M14, mm)	
Signal UP / DN / Q	
Transit-time ratio (%)	
OUTPUTS	
4–20 mA range (M32)	
Pulse / alarm settings	
Zero set (M22) / flow reading	

Installed by

Customer representative

Date

WISE AIR 4.0
MEASURE TO MANAGE

Need help with your WUFS-904?

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.