

OPERATING MANUAL

UDM5 ULTRASONIC FLOWMETER



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1 Overview

The UDM5 ultrasonic flowmeter operates according to the transit-time difference principle. Highly reliable signal-processing circuits and algorithms for sampling, calculation, and correction enable precise flow measurement. The device features an integrated external clamp-on design and can be installed quickly. Since no direct contact with the medium is required, existing production processes are not affected. Accurate flow measurement can be achieved in just a few steps. The clamp-on ultrasonic flowmeter is particularly suitable for small pipe diameters.

2 Product Features

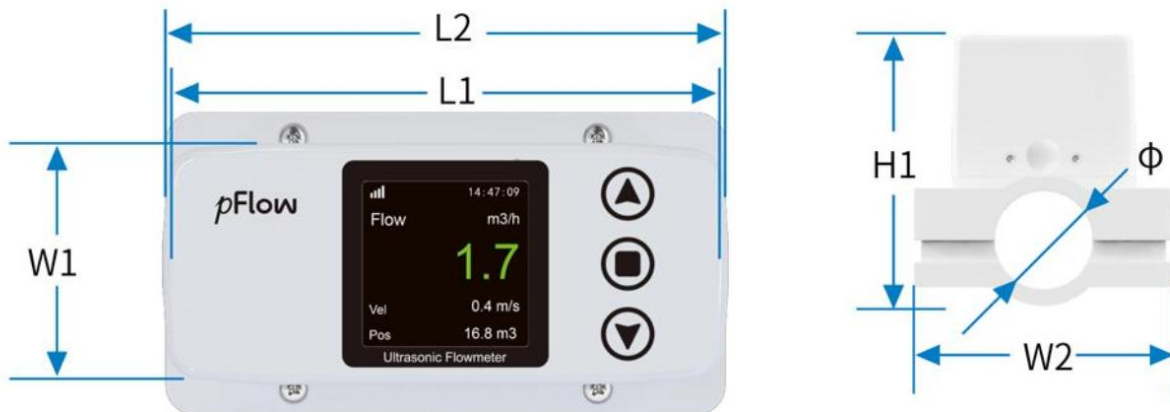
- Easy installation; the pipe does not need to be opened
- No complex adjustment; clamp on and measure
- LCD color display
- Display can be rotated through 360°

3 Technical Parameters

3.1 Dimensions

The dimension designations W1, W2, L1, L2, H1, and ϕ correspond to the drawing shown below.

Nominal Size	W1	W2	L1	L2	H1	ϕ
DN15	42	42	96	110	63	22,5
DN20	42	59,5	96	110	69,5	29
DN25	42	59,5	96	110	76	35,5
DN32	42	64,5	96	110	83	42,5
DN40	42	76,5	96	110	95	54,5
DN50	42	85,5	96	110	104	63,5



3.2 Product Variants

Model	Specification	Output	Application	Pipe Size
UDM5	EM-DNxx	4-20 mA	Geräte-/Anlagenintegration	DN15-DN50
UDM5	HC-DNxx	4-20 mA	Healthcare	DN15-DN50
UDM5	AQC-DNxx	4-20 mA	Aquaculture	DN15-DN50
UDM5	AGC-DNxx	4-20 mA	Agriculture	DN15-DN50

Note: The products are factory-configured according to the intended application sector.

3.3 Technical Specifications

Parameter	Value
Flow Velocity	0,03-5,0 m/s
Accuracy	±2 % bei 0,3-5 m/s
Repeatability	0,4 %
Pipe Sizes	DN15, DN20, DN25, DN32, DN40, DN50
Medium	Water
Pipe Material	Stainless Steel, PVC, Copper, PPR
Communication	RS485, MODBUS
Output	4-20 mA
Power Supply	10-36 VDC / 500 mA
Keypad	3 touch keys
Display	1,54" LCD-Farbdisplay, 240 × 240 Pixel
Temperature	Transmitter: -10 bis 50 °C; Sensor: 0 bis 60 °C
Humidity	0-99% RH, non-condensing
Protection Rating	IP54
Housing	PC engineering plastic
Transmitter	All-in-one
Sensor	Clamp-on
Cable	φ5, 6-core, standard length 2 m

The specified accuracy was determined using Gentos flow calibration facilities. Deviations may occur due to pipe type, medium, temperature, and other operating conditions.

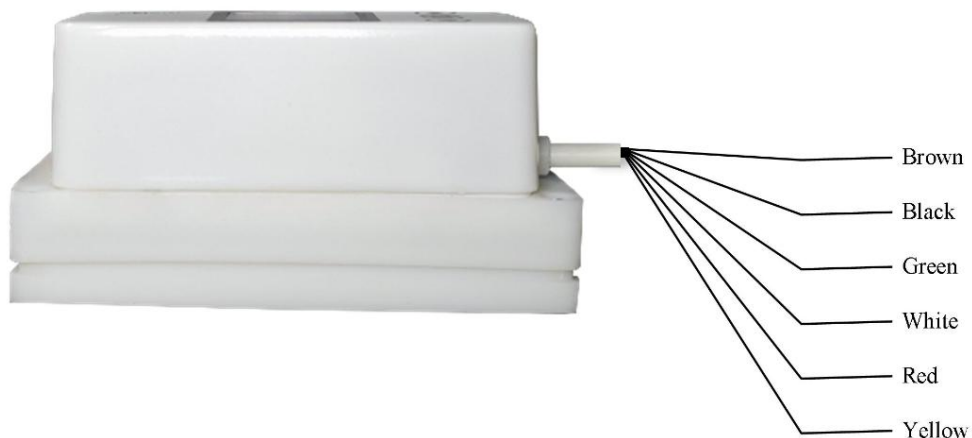
4 Installation and Wiring

4.1 Installation Instructions

1. Carefully read Section 7, "Measuring Point Selection." After selecting the installation position, clean the outside of the pipe and choose a dense, uniform pipe section whenever possible.
2. Apply the coupling material to the center of the sensor. The sensor and pipe wall must be in close contact without air bubbles.
3. The arrow on the nameplate must point in the same direction as the flow of the medium.

4.2 Flowmeter Wiring

Function	Designation	Wire Color
Power Supply 10-36 VDC	+	Brown
Power Supply 10-36 VDC	-	Black
RS485	A	Green
RS485	B	White
4-20 mA	+	Red
4-20 mA	-	Yellow



4.3 Quick Installation Steps

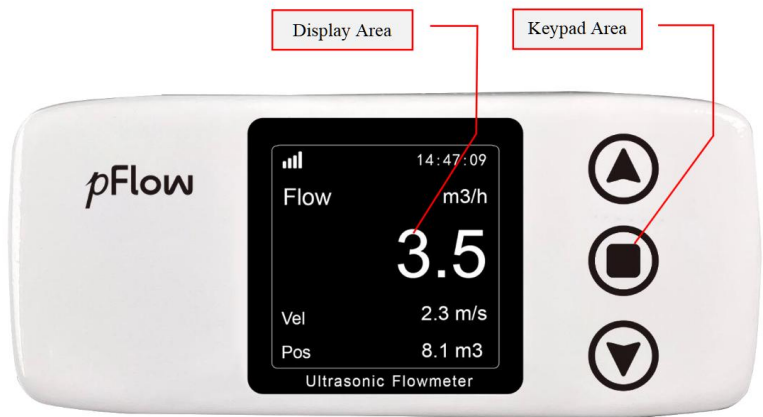
- Step 1 - Clean the pipe: Remove paint, rust, dirt, and other loose contaminants.
- Step 2 - Install the pipe clamp: Place the upper and lower parts around the pipe at the selected location. If there is play, adhesive pads can be attached to the inside.
- Step 3 - Tighten the screws: Securely tighten the four connecting screws.
- Step 4 - Power on and measure: Enter the actual pipe outside diameter, wall thickness, and pipe parameters in the "Pipe Parameter Settings" menu.

If the clamp remains loose, the supplied black rubber pads (2 mm) can be attached to both sides of the inner wall.



5 Display and Settings

5.1 Display Description



Display Area	Content	Meaning
Top	Signal Status	Bar icon: normal measurement; dots: signal search
Top	Time	Current time
Center	Flow	Instantaneous flow
Bottom	Flow Velocity	Instantaneous flow velocity
Bottom	Cumulative Flow	Cumulative flow; automatic reset at 999999999.9

5.2 Key Description

The UDM5 has three keys: ▲, ■, and ▼. ▲ moves the selection upward or increases numbers/values. ▼ moves the selection downward or decreases numbers/values. ■ is used to open, confirm, save, and return. From the measurement screen, press and hold ■ to open the main menu. For numerical input, ■ moves the cursor; press and hold to confirm.

6 Menu Window Description

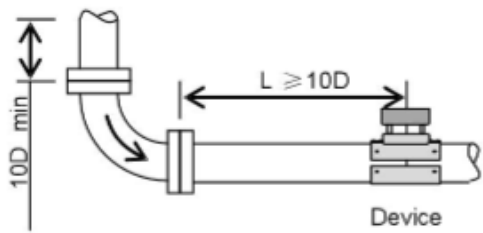
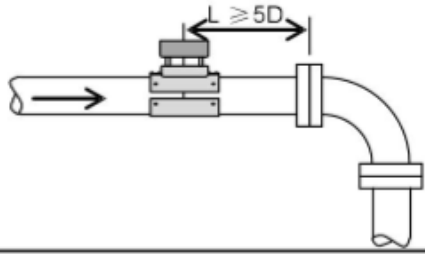
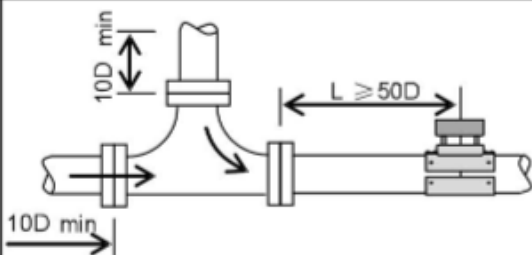
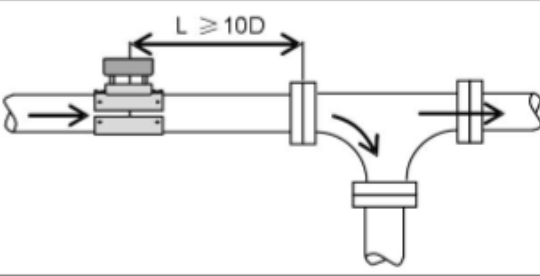
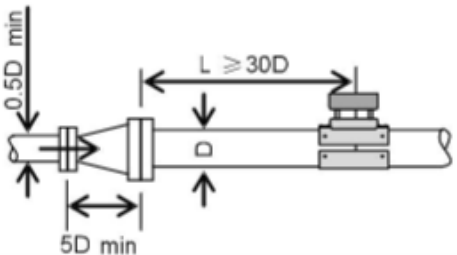
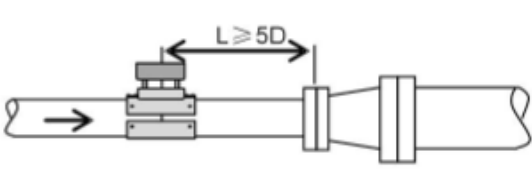
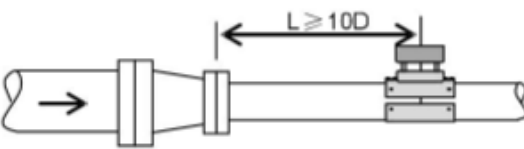
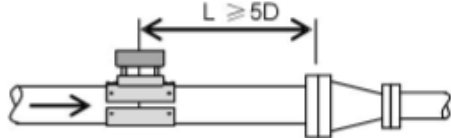
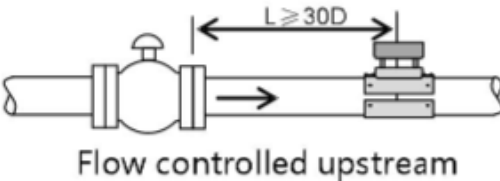
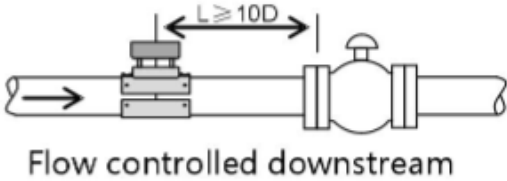
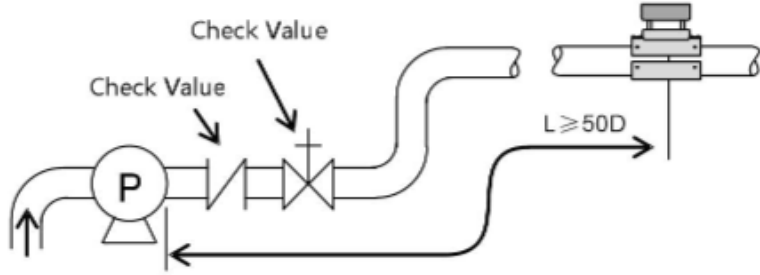
6.1 Menu Interface

Main Menu	Submenu / Setting	Description
1. Pipe Settings	Pipe Material	Select stainless steel / PVC / copper / PPR.
1. Pipe Settings	Outside Diameter	Enter the actual pipe outside diameter; the range is factory-limited according to nominal size.
1. Pipe Settings	Wall Thickness	Minimum 0.5 mm, maximum 1/3 of the outside diameter.
2. Output	4-20 mA	Set the mode and the values assigned to 4 mA and 20 mA.
2. Output	RS485	Baud rate: 4800, 9600, 19200, 38400, 50400, 57600, 76800, 115200; network ID 1-247.
3. Units	System / Flow / Total	Metric/imperial; m ³ /h, m ³ /min, L/h, L/min, Gal/h, Gal/min; total units m ³ , L, Gal.
4. System	Totalizer / Damping / Low Flow	Clear totalizer; damping 1-99 s (typically 3-10); low-flow default 0.03 m/s.
4. System	Date/Time / Language / Display	Date and time; English/Chinese; 0°, 90°, 180°, 270°.
4. System	System Lock / Buzzer / Factory Settings	6-digit password; buzzer on/off; restore factory settings.
5. Calibration	4-20 mA / Zero Point / K-Factor	Calibrate current output; set/clear zero point; K-factor 0.5-1.5.
6. Device Information	Serial Number / Firmware	Factory serial number and software version.

7 Measuring Point Selection

For accurate measurement, select a pipe section with a uniform flow profile.

- Select a pipe section that is completely filled with the medium; for vertical piping, upward flow is preferred.
- Where possible, provide a straight upstream length of 10D and a downstream length of 5D; there should be no valves, bends, reducers, or other flow disturbances in this area.
- The temperature at the measuring point must be within the permitted operating range.
- Select a uniform, dense pipe section that is free of deposits whenever possible.

Name	Straight length of Upstream piping	Straight length of Downstream piping
90° bend		
Tee		
Diffuser		
Reducer		
Value		
Pump		

8 Communication Protocol

The flowmeter uses response communication mode. Asynchronous communication is normally performed at 9600 bps. Data format: 1 start bit, 8 data bits, 1 stop bit, no parity.

8.1 MODBUS Communication Protocol

MODBUS RTU; CRC-16-IBM (polynomial $X^{16} + X^{15} + X^2 + 1$, mask word 0xA001). Data is transmitted in hexadecimal format.

Function Code	Function
0x03	Read Register
0x06	Write Single Register

Function Code 0x03 - Request Format

Field	Size	Range / Value
Slave Address	1 Byte	0x01-0xF7
Function Code	1 Byte	0x03
First Register Address	2 Byte	0x0000-0xFFFF
Number of Registers	2 Byte	0x0000-0x7D
Check Code	2 Byte	CRC

Example 1, instantaneous flow in m³/h, address 1: 01 03 00 04 00 02 85 CA

Example response at 1.234567 m³/h: 01 03 04 06 51 3F 9E 3B 32

Example 2, positive cumulative flow: 01 03 00 08 00 03 84 09

Response at 2.46 m³: 01 03 06 00 F6 00 00 FF FE 29 10

MODBUS Data	Factor	Power
FFFD	×0,001	10 ⁻³
FFFE	×0,01	10 ⁻²
FFFF	×0,1	10 ⁻¹
0000	×1	10 ⁰
0001	×10	10 ¹
0002	×100	10 ²
0003	×1000	10 ³
0004	×10000	10 ⁴

Example 3, change address 1 to 2: 01 06 10 03 00 02 FC CB

8.1.3 Error Handling

Error code 0x02 indicates an error in the first data address. Example request: 01 03 00 01 00 01 D5 CA. Error response: 01 83 02 C0 F1.

8.1.4 MODBUS Register Address List

Addr.	Register	Data Description	Data Type
\$0000	40001	Instantaneous flow/sec - low byte	32 Bit Real
\$0001	40002	Instantaneous flow/sec - high byte	
\$0002	40003	Instantaneous flow/minute - low byte	32 Bit Real
\$0003	40004	Instantaneous flow/minute - high byte	
\$0004	40005	Instantaneous flow/hour - low byte	32 Bit Real
\$0005	40006	Instantaneous flow/hour - high byte	
\$0006	40007	Flow velocity - low byte	32 Bit Real
\$0007	40008	Flow velocity - high byte	
\$0008	40009	Positive cumulative flow - low byte	32 Bit Int
\$0009	40010	Positive cumulative flow - high byte	

\$000A	40011	Positive cumulative flow - index	16 Bit Int
\$0016	40023	Upstream signal strength - low byte	32 Bit Real
\$0017	40024	Upstream signal strength - high byte	
\$0018	40025	Downstream signal strength - low byte	32 Bit Real
\$0019	40026	Downstream signal strength - high byte	
\$001A	40027	Signal Quality	16 Bit Int
\$001B	40028	4-20 mA output current - low byte	32 Bit Real
\$001C	40029	4-20 mA output current - high byte	
\$001D	40030	Error code - characters 1,2	String
\$001E	40031	Error code - characters 3,4	Reserved
\$001F	40032	Error code - characters 5,6	Reserved
\$003B	40060	Flow velocity unit - characters 1,2	String
\$003C	40061	Flow velocity unit - characters 3,4	
\$003D	40062	Instantaneous flow unit - characters 1,2	String
\$003E	40063	Data Description	
\$003F	40064	Instantaneous flow/sec - low byte	String

Notes: Available cumulative units are m³, L, and Gal. After changing the address or baud rate, the new communication parameters are used immediately after the response. 16-bit Int = short integer, 32-bit Int = long integer, 32-bit Real = floating-point number, String = character string.

9 Appendix 1 - Pipe Diameter Comparison Table

Nominal Size	Range A (mm)	Range B (mm)	Adapter Pipe Outside Diameter (mm)	Flow Range (m ³ /h)
DN15	18,5-22,5	-	φ18,5-φ22,5	0,02-3,5
DN20	24-29	22,5-27,5	φ22,5-φ29	0,04-6
DN25	30,5-35,5	29-34	φ29-φ35	0,05-9
DN32	37,5-42,5	36-41	φ36-φ42,5	0,09-15
DN40	49,5-54,5	48-53	φ48-φ54,5	0,13-23
DN50	58,5-63,5	57-62	φ57-φ63,5	0,20-35

Applicable to UDM5 with stainless steel, PVC, PPR, and copper pipes. Range B is achieved by attaching the supplied rubber pads to both sides of the inner wall of the pipe clamp.

Model Pipe Material	Nominal Size	Applicable Pipe Outside Diameter - Range A (mm)	Range B (mm)	Adapter-Rohr Außendurchmesser (mm)	Measurable Flow Range at 0.03-5 m/s (m ³ /h)
Stainless Steel / UDM5 PVC / PPR / Copper	DN15	18,5-22,5	-	Ø 18,5-Ø 22,5	0,02-3,5
Stainless Steel / UDM5 PVC / PPR / Copper	DN20	24-29	22,5-27,5	Ø 22,5-Ø 29	0,04-6

Model Pipe Material	Nominal Size	Applicable Pipe Outside Diameter - Range A (mm)	Range B (mm)	Adapter- Rohr- außendurchmesser (mm)	Measurable Flow Range at 0.03-5 m/s (m³/h)
Stainless Steel / UDM5 PVC / PPR / Copper	DN25	30,5-35,5	29-34	Ø 29-Ø 35	0,05-9
Stainless Steel / UDM5 PVC / PPR / Copper	DN32	37,5-42,5	36-41	Ø 36-Ø 42,5	0,09-15
Stainless Steel / UDM5 PVC / PPR / Copper	DN40	49,5-54,5	48-53	Ø 48-Ø 54,5	0,13-23
Stainless Steel / UDM5 PVC / PPR / Copper	DN50	58,5-63,5	57-62	Ø 57-Ø 63,5	0,20-35