Ultrasonic flow measurement

Ultrasonic flowmeter

HLF800 Series

Converter HLF810

Converter HLF820

Principle

Propagation time difference measurement method: Ultrasonic waves are used to measure the fluid velocity, which is then used to calculate the flow rate.
Sensors installed upstream and downstream transmit ultrasonic waves to each other in the forward and reverse directions of flow. The fluid velocity is determined based on the differences between the arrival times of the ultrasonic waves at each sensor, and this velocity is used to calculate the flow rate.

Advantages

- No structures are placed in the piping, so the flow rate can be measured with minimal pressure loss.
- A wide range of flow rates can be measured, from high to low.

Equipped with a digital signal processor that enables high-precision, stable flow measurement

- Stable flow measurement is achieved with our unique signal arithmetic processing method performed by a digital signal processor (DSP)
- The ability to use two channels saves space and improves cost effectiveness
- Wiring work is simplified with detachable sensors and cables
- With no moving parts in the flow path, there is minimal pressure loss
- The use of NEW PFA on all liquid contact surfaces provides high corrosion resistance, which is suitable for measuring the flow rates of DIW or chemical liquids
- Complies with EMC (EN 61326) and RoHS directives
- Able to select from models with a display (HLF820) or without a display (HLF810)

Main applications and usage examples

- Measuring the flow of deionized water or ultrapure water for semiconductor manufacturing processes
- Managing the flow of highly corrosive chemical liquids used in chemical treatment processes
- Measuring the flow of slurry liquids for chemical mechanical polishing (CMP) processes

Patented

Converter

Model No.		HLF810	HLF820
Measurement method		Measuring propagation time difference between sending and receiveng ultrasonic wave	
Accuracy		±1% F.S. (DIW at 20°C)	
Data update cycle		0.01 sec	
Power source	Voltage	24 V DC ±10% (21.6 to 26.4 V)	
	Power consumption	4 W	5 W
Display		—	Vacuum fluorescent display (VFD), 16 characters x 2 lines
Digital input		Open collector input or non-voltage contact input, 2 points Selectable from integrated value reset or zero-point adjustment	
Output	4 to 20 mA current output	2 points Resolution: 12 bits (Max. load resistance 600Ω)	
	Digital output	Open collector output (Max. 35 V/0.1 A), 2 points Selectable from comparison, integrated pulse, instantaneous frequency, or error output	
Interface		RS485 (MODBUS® protocol, RTU mode) Up to 32 converters can be concatenated (Address setting: 1 to 32) Baud rate: 9600,19200,38400,57600bps	
Case material		ABS	
Ambient operating temperature		0 to 50°C (No condensation)	
Weight		130 g	230 g
Installation method		DIN rail	Panel mount

* MODBUS is the registered trademark of Schneider Electric USA, Inc.

Sensor

Model No.		HLFS01-04	HLFS01-06	HLFS01-08	HLFS01-12	HLFS01-16
Measurement target		Ultrapure water/Deionized water/Chemical liquids				
Flow rate measurement range		0 to 2 L/min	0 to 6 L/min	0 to 20 L/min	0 to 50 L/min	0 to 80 L/min
Connection tube size		1/4"	3/8"	1/2"	3/4"	1"
Max. operating pressure		0.5 MPa (0 to 90°C) /0.2 MPa (90 to 200°C)				*1
Fluid temperature	Standard type	0 to 90°C				—
	High-temperature type	0 to 180°C	0 to 200°C			
Ambient operating temperature		0 to 80°C				
Liquid contact surface material		NEW PFA				
Weight		90 g	110 g	130 g	160 g	212 g
Pressure loss factor		3.7863	0.6937	0.1146	0.0138	0.0033

*1 0.5 MPa (0 to 60°C) /0.2 MPa (60 to 200°C)

Pressure loss

$\Delta P = AQ^2$ ΔP: Pressure loss[kPa] A: Pressure loss factor (DIW at 20°C) Q: Flow rate[L/min]

Connection cable between converter and sensor

Model No.	HLFS01 cable 5 m	HLFS01 cable 7 m
Material	ETFE	
Length	5 m	7 m
Weight	150 g	210 g

Type name and specifications

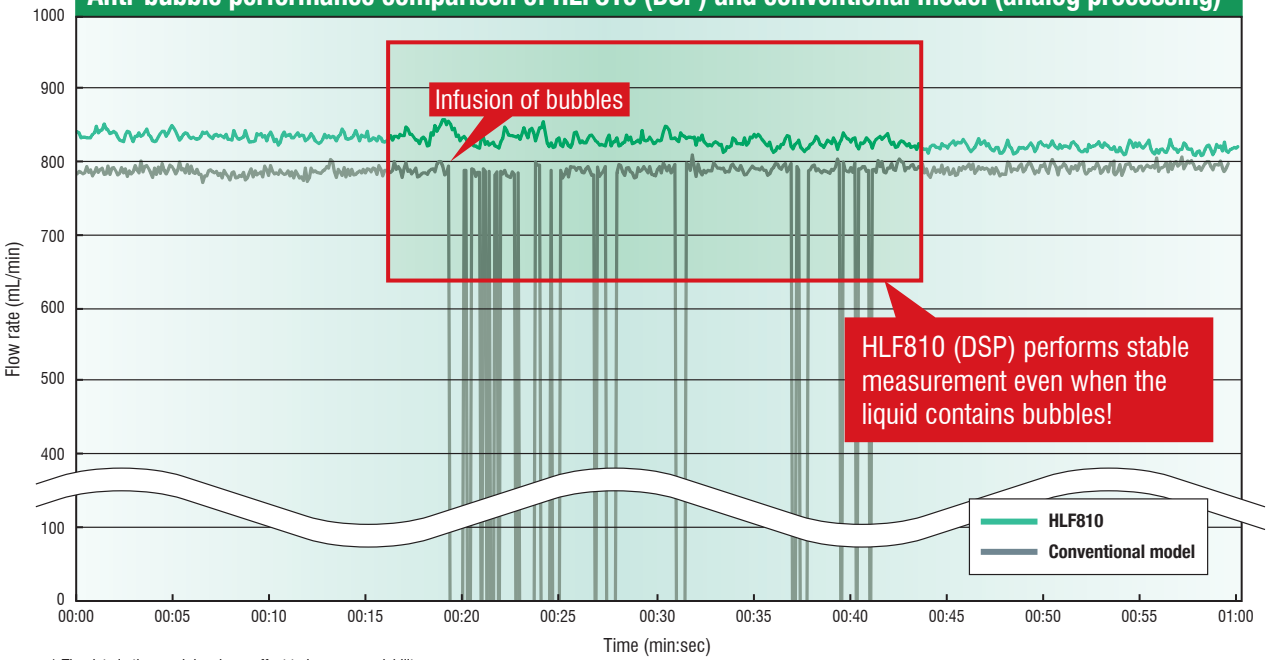
HLFS01-○○△□

Applicable temperature None: Standard, 0 to 90°C
K: High-temperature, 0 to 200°C (or up to 180°C for 04 type)

Shape U: U-shape Z: Z-shape

Connection tube size 04: 1/4″
06: 3/8″
08: 1/2″
12: 3/4″
16: 1″
* See table above for flow rates

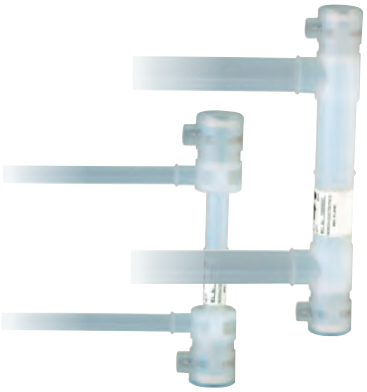
Anti-bubble performance comparison of HLF810 (DSP) and conventional model (analog processing)



* The data in the graph has been offset to improve readability.

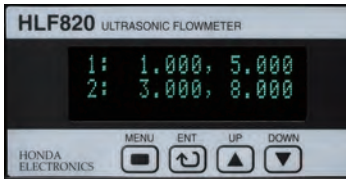
Two different sizes of sensors can be connected to the same converter

The ability to connect two sensors to one converter saves space and improves cost performance, by enabling flow rates to be measured at multiple locations. The sensors can be used to measure the flow rates of different fluids, or different sizes of sensors can be connected.



Equipped with VFD display

The vacuum fluorescent display (VFD) provides excellent visibility. (HLF820 only)

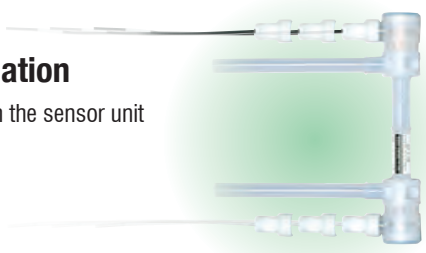


Supports measurement of high-temperature chemical liquids

Suitable for use in recent applications that incorporate a diversity of chemicals at a wide range of temperatures. All liquid contact surfaces are made of NEW PFA, which provides excellent chemical resistance. Our self-developed transducers enable flow measurement at high temperatures of up to 200°C (K type). *The maximum temperature for the 04 size model is 180°C.

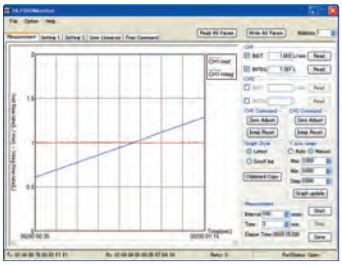
Detachable cables enable easy installation

Setup is simplified with cables that can be detached from the sensor unit before installation, and then reattached later.
Cable lengths of 5 m or 7 m can be selected.



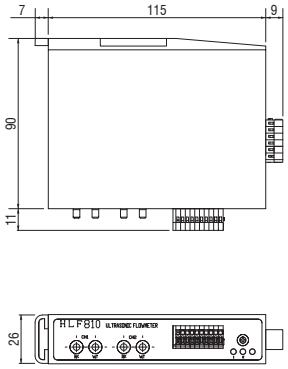
RS-485 enables remote monitoring via computer

With the standard-equipped RS-485 communication function, the dedicated control software (HLF800 Monitor) can be used on a computer to set the parameters and monitor the flow rate data remotely.

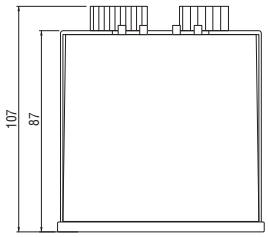


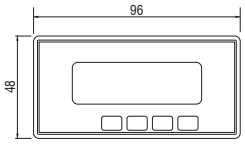
HLF810/820

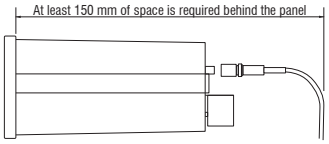
Converter (HLF810)

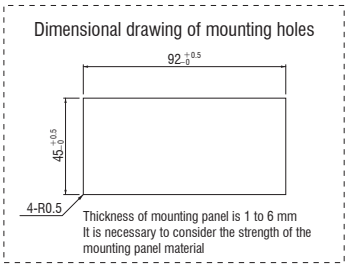


Converter (HLF820)



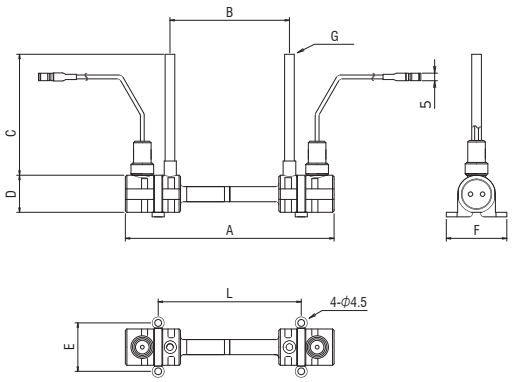


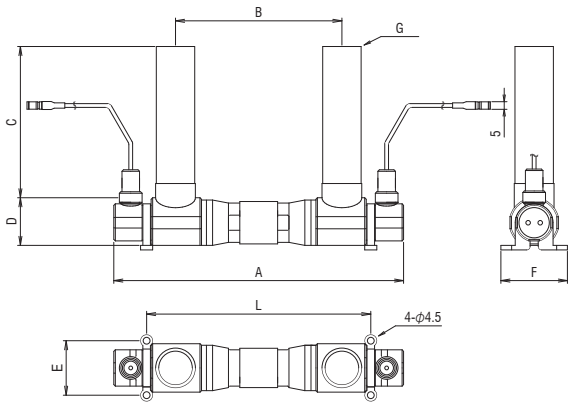




Sensor (HLFS01)

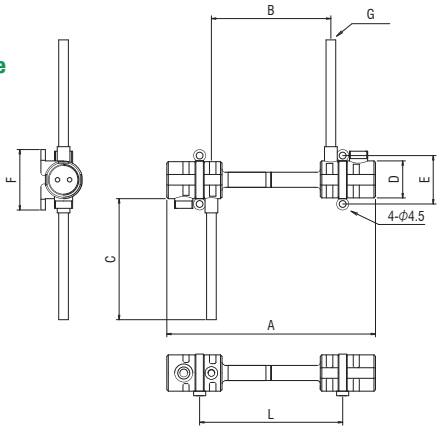
U-shape

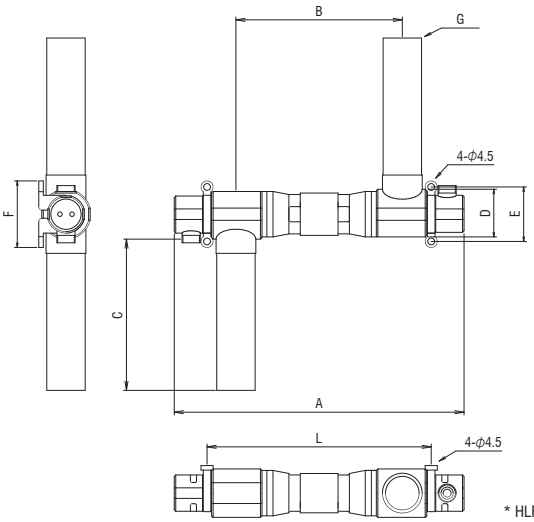




* HLFS01-16 only

Z-shape





* HLFS01-16 only

Model No.	A	B	C	D	E	F	G	L
HLFS01-04	138	80	80	24.5	32	40	1/4"	94.6
HLFS01-06	145	80	100	24.5	32	40	3/8"	101.6
HLFS01-08	178	110	100	24.5	32	40	1/2"	134.6
HLFS01-12	184	110	100	24.5	32	40	3/4"	140.6
HLFS01-16	192	110	100	31.5	36	44	1"	148.2

(Unit: mm)

* Actual product dimensions may vary slightly from those provided here.

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