FLOWMETER

HLF800series

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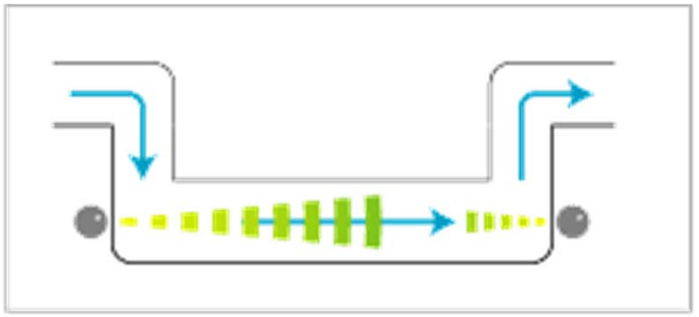
HONDA ELECTRONICS CO.,LTD.

1. Principal

Fluid velocity is measured using ultrasound and liquid flow rate is calculated based on the velocity.



Principle

Transmission lag system

Using ultrasonic waves, the flowmeter measures fluid velocity and calculates the flow rate. Sensors installed upstream and downstream transmit ultrasonic signals in and counter to the direction of flow. The velocity is obtained from the time elapsed for ultrasonic transmission and converted to a value for flow rate.

Advantages

- No structures are placed in piping, allowing flow rate measurements with minimum pressure loss.
- The flowmeter measures a wide range from low velocity to high velocity.

2. Features

- Unique arithmetic processing by DSP (Digital Signal Processor) makes stable flow measurement.
- 2-channel measurement helps cost reduction and space-saving.
- Easy installation with detachable cable.
- No moving parts inside of the sensor and low pressure loss.
- All the wetted surfaces are made of NEW PFA resisting against DIW and various chemical liquids.
- Conformed to EMC standard (EN61326) and complied with RoHS directive.
- Selectable from either HLF820 with display or HLF810 without display.

3. Applications

- Flow measurement of the slurry liquids for CMP (Chemical Mechanical Polishing) process.
- Flow measurement of DIW or ultrapure water for Semiconductor manufacturing process
- Flow control of high corrosive chemical liquids to be dispensed for the manufacturing process

Target end-users:

1) Wet Benches manufacturers
2) Semiconductor manufacturers
3) Other companies who treats chemicals with flowmeter

4. What is DSP (Digital Signal processor)?

Conventional Flowmeter:

In case that type of fluid is varied or air bubble is contained, measurement error is caused since receiving waveform is deviated far from ordinary.

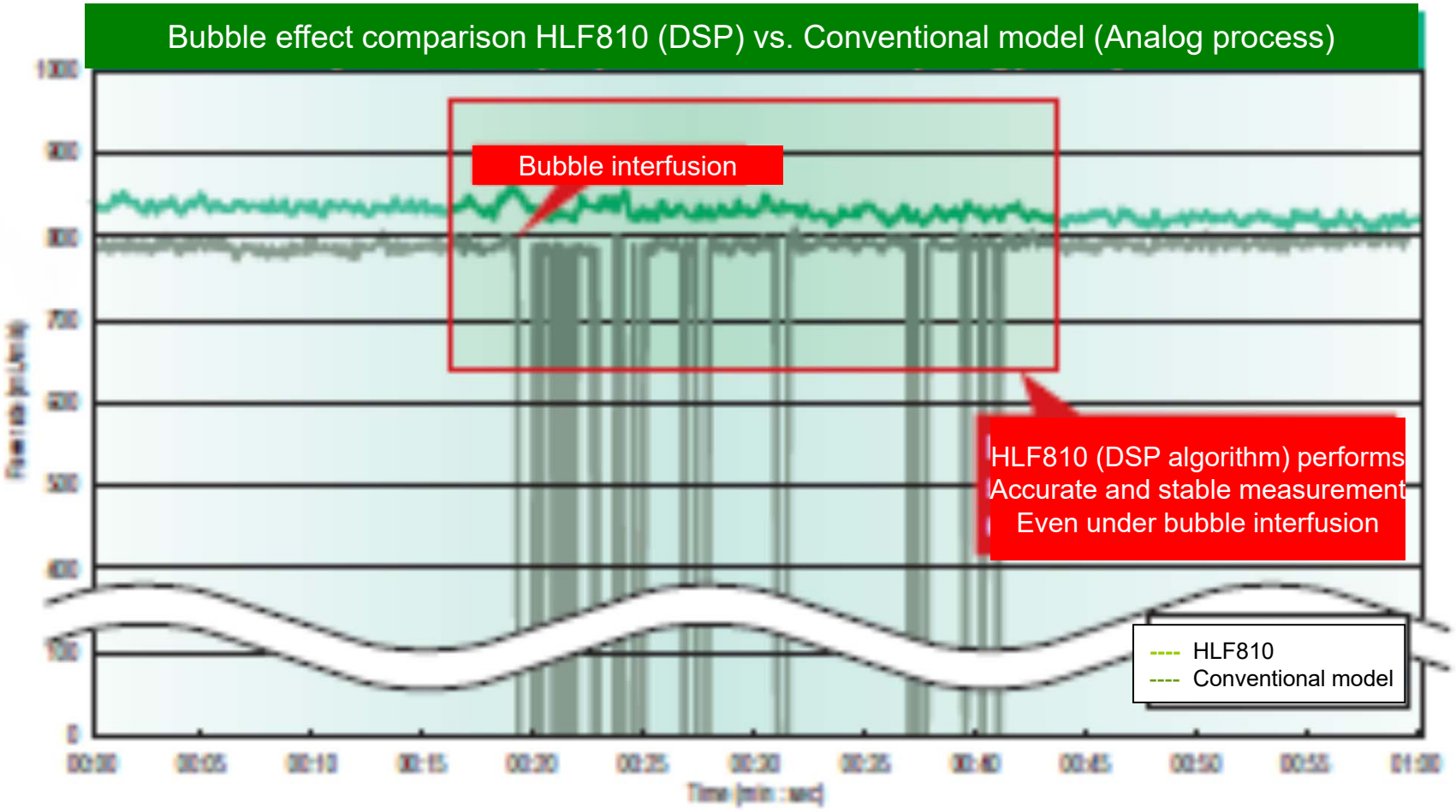
=> Countermeasure with HLF800 :

DSP enables accurate and stable measurement with unique calculation even though type of fluid is varied with less affection on air bubbles.

Because DSP calculates with reference to the correlation of whole received waveform.

5. Advantage of DSP

Flowmeter with DSP doesn't have affect on air bubble

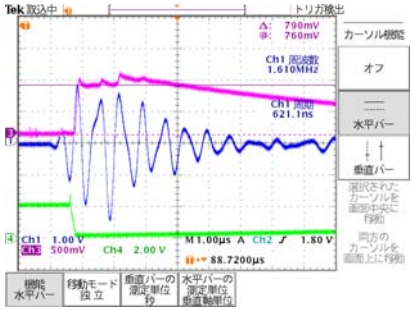


6. Comparison of received waveform

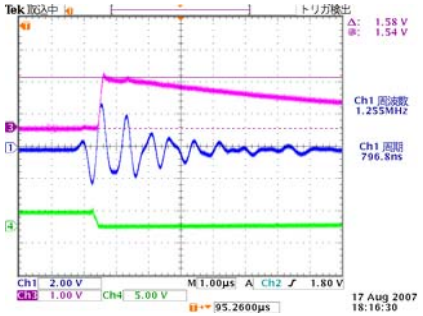
Example of received waveform each type of fluid and tube size

=> DSP can calculate with reference to the correlation of whole received waveform so that flow measurement can be stable

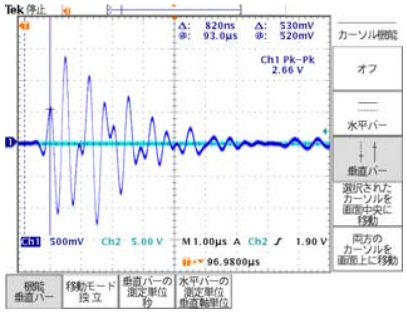
DIW with tube size A



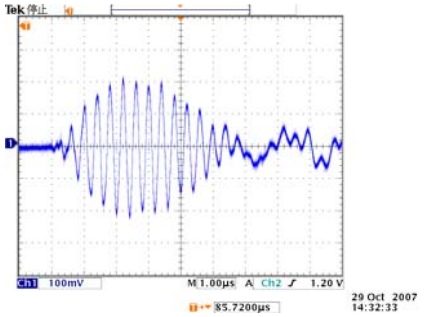
DIW with tube size B



Fluorine with tube size A



Fluorine with tube size B



7. Expectation from Semiconductor manufacturers (1)

1) Cleanness in pipe (no impure substance, less particle) .
2) No damage by some chemicals.

=> Countermeasure with HLF800 :

All the wetted surfaces are made of NEW PFA.

* High resisting against some chemicals.

7. Expectation from Semiconductor manufacturers (2)

Accurate minute flow measurement is required for high level monitoring because of recent progress of semiconductor process technologies.

=> Countermeasure with HLF800 :

Installed DSP (Digital Signal Processor)

*Stable and accurate measurement

7. Expectation from Semiconductor manufacturers (3)

Many semiconductor manufacturers requires a flowmeter which can measure chemical liquids with high temperature (100 ~ 200 deg. C).

=> Countermeasure with HLF800 :

There are another class of model resisting against 200 deg. C.

8. Specifications (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.

9. Specifications (Sensor)

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)

Supplement

There are some different type of flowmeters in market. Ultrasonic Flowmeter is basically used in Semiconductor process rather than others.

Flow Meter	Applications	Pressure Loss	Accuracy FS = Full Scale	Effects from changing viscosity?	Cost
Turbine	Clean, viscous liquids	High	+/- 0.25% of rate	High	High
Positive Displacement	Clean, viscous liquids	High	+/- 0.5% of rate	High	High
Electromagnetic	Clean, dirty, viscous, conductive liquids and slurries	None	+/- 0.5% of rate	None	Medium
Thermal Mass Flow	Clean dirty viscous liquids some slurries	Low	+/- 1% FS	None	Medium
Coriolis Mass Meter	Clean, dirty. viscous liquids, some slurries	Low	+/- 0.5% of rate	None	High
Ultrasonic	Clean, viscous and some dirty liquids (depending on brand) and slurries	None	+/- 1% FS	None	Medium
Vortex	Clean, dirty liquids	Medium	+/- 1% of rate	Medium	Medium