

# DENSITY (CONSISTENCY) METER

# LQ Series

## The LQ Series Puts You In Control of Your Product Quality.

Toshiba's Microwave Density (Consistency) Meter LQ series use a new principle, microwave phase difference measurement, to determine the density (consistency) of fluids flowing through pipes.

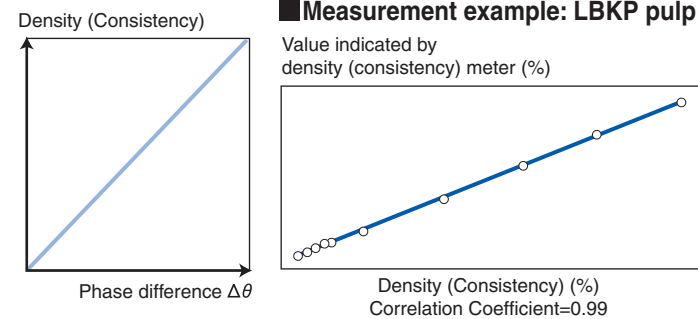
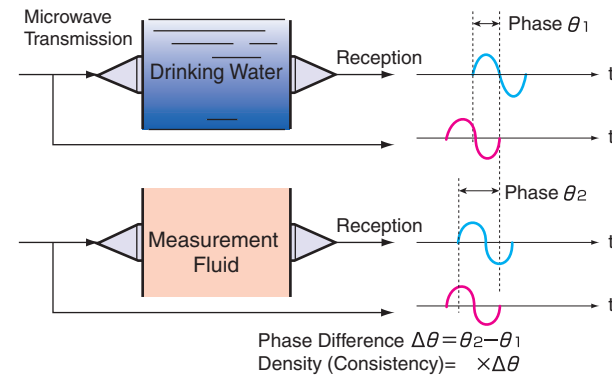
This exploits the way a fluid's density (consistency) affects the propagation of microwaves when they pass through it. This allows the reliable measurement of the fluid's density (consistency) by monitoring the difference in microwave phase between the original wave and one passed through the measured fluid (refer to right diagram).

Unlike that done by monitoring the attenuation of a transmitted wave, measuring fluid density (consistency) by observing a wave's phase difference is unaffected by flow velocity and hardly to the affect such as contaminations.

This method therefore provides excellent measurement precision in the field. On the whole, reliability is high and maintenance requirements are minimal since the equipment has no moving parts and no projections inside the piping.

### MEASUREMENT PRINCIPLE

The figure below illustrates the clear linear relationship between fluid density (consistency) and phase  $\theta_1$  and phase  $\theta_2$  (i.e., phase difference) of a wave transmitted through drinking water (0% density or consistency) and that passed through another fluid of different density (consistency) and comparing them against the wave's original phase.



### LQ series LINE-UP

Available to choose the suitable type depending on your application.

#### LQ500, Spool style (Basic model)

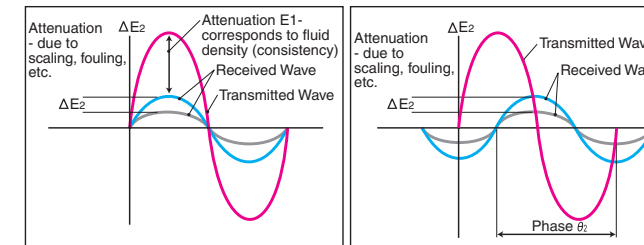
- Standard piping installation.
- Flange type : ANSI 150, DIN 16, DIN 10, and JIS 10K



### FEATURES

Accurate measurements are achieved since contaminants do not easily affect the phase difference measurement.

Since contaminants do not easily affect the LQ series there is an excellent direct relationship between the phase difference and the concentration. Accurate measurement is realized over a wide range from low concentration to high concentration.



**Conventional ultrasonic and optical measurement**  
Attenuation  $\Delta E_2$  : that results from scaling or fouling causes measurement errors in the positive direction.

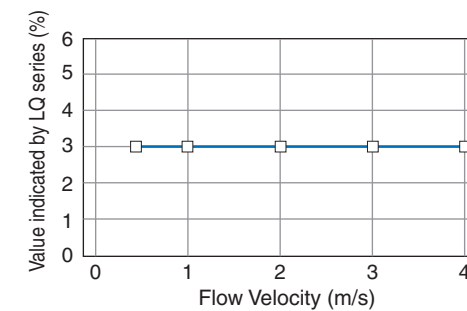
**Microwave phase difference measurement**  
Because scaling, fouling do not easily affected phase, measurements are guaranteed to be accurate and reliable.

### Continuous in-line measurement

Installation into piping allows continuous density (consistency) measurement of any fluid flowing through the system.

### Impervious to flow velocity

No moving parts means measurements are unaffected by flow velocity.

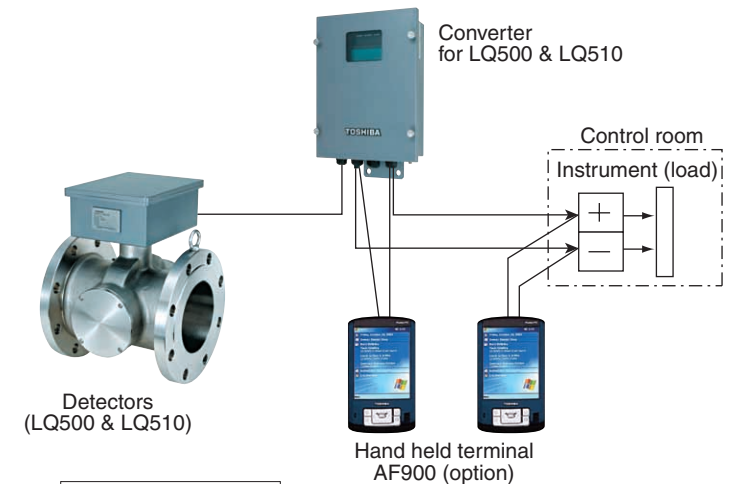


### High reliability, easy maintenance

No moving parts and no in-line projections guarantee high reliability and minimal maintenance requirements. The absence of moving parts also greatly reduces costs for consumables like O-rings and bearings.



### Configuration diagram for communication



\* HART protocol ... HART (Highway Addressable Remote Transducer) protocol is a communication protocol for industrial sensors recommended by HCF (HART Communication Foundation).

### Easy operation

Setting the measurement range and calibrating the meter are easily done via key operations while viewing the LCD display.



LQ500 Converter

### MAIN APPLICATIONS

#### Wastewater Industry

Raw sludge, excess sludge, mixed sludge, digested sludge, dehydrated sludge

#### Paper pulp Industry

Consistency measurement of L-material (broad-leaved tree-hardwood) /N-material (needle-leaved tree) /hemp pulp, GP (groundwood pulp) /TMP (thermomechanical pulp) /DIP (deinking pulp), bleached pulp/unbleached pulp, various additives, pulp sludge, etc.

#### Building material Industry

Consistency measurement in various production processes such as press materials & ceiling materials, etc.

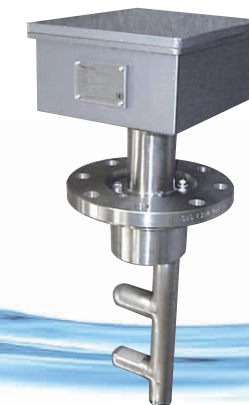
#### Food Industry

Concentration measurement in the production process such as starch, sugar, evaporated juice and other food slurries. Moisture measurement in water such as cream cheese and evaporated juice.

#### LQ500, Insertion style

- Suitable for large size pipe installation 250mm (10") or larger.
- Suitable for High conductivity application.
- Available for concentration measurement in tank.

※ NO UL APPROVAL



#### LQ510, Sanitary style

- Suitable for daily foods application.
- All stainless steel (316L SS) at the wetting parts as metal part.
- Available to meet CIP and SIP depending on the condition.
- ISO2852 clamp (IDF clamp) or Tri-Clamp® connection.
- Available to meet HACCP system.



Tri-Clamp® is a registered trademark for Tri-Clamp Inc..

DENSITY (CONSISTENCY) METER **LQ Series**

**MAIN SPECIFICATIONS**

Style	LQ500 Spool style		LQ500 Insertion style	LQ510 Sanitary style	
Mounting style	Separate type				
Size (mm) (inch)	50 2"	80, 100, 150, 200, 250, 300 3", 4", 6", 8", 10", 12"	250 or larger 10" or larger	25, 40, 50 1S, 1 1/2S, 2S	80, 100 3S, 4S
Span (*1, *2)	2 to 50 %TS	1 to 50 %TS		2 to 50 %TS	1 to 50 %TS
Repeatability (*1, *3)	+/-0.02 %TS	+/-0.01 %TS		+/-0.02 %TS	+/-0.01 %TS
Resolution (*1, *3)	0.002 %TS	0.001 %TS		0.002 %TS	0.001 %TS
Max. Conductivity	20 mS/cm	80mm ( 3" )	16 mS/cm	15 mS/cm	20 mS/cm
		100mm ( 4" )	15 mS/cm		
		150mm ( 6" )	10 mS/cm		
		200mm ( 8" )	8 mS/cm		
		250mm (10" )	8 mS/cm		
300mm (12" )	6 mS/cm				
Process temperature (No freezing)	0 to 100 deg.C (32 to 212 deg.F)				
Environment condition (No condensation)	Standard: 0 to 50 deg.C (32 to 122 deg.F) Option: -20 to 50 deg.C (-4 to 122 deg.F)			0 to 50 deg.C (32 to 122 deg.F)	
Structure	Detector	IP67, Water tight			
	Converter	IP65, Water tight			
Connection method (*4)	ANSI 150, DIN 16, DIN 10, JIS 10K	ANSI 150, DIN 16, DIN 10, JIS 10K	ISO 2852 clamp (Tri-clamp®)		
Power supply	100 to 240 Vac, 50/60Hz				
Material	Main pipe(probe)	SCS 14A cast (Equivalent to 316 SS)	316L SS		
	Converter case	Steel plate with polyurethane coating			
	RF part case of detector	Steel plate with polyurethane coating	304 SS plate		
Output signal	Density (Consistency) measurement output (4 to 20 mA dc analog signal) Density (Consistency) fault or Maintenance signal (Solidstate contact)				
Input signal	Externally synchronized input signal (dry "make" contact) Density multiplier switching signal, etc.....				
Power consumption	Approximately 25 VA (100 Vac) Approximately 40 VA (240 Vac)				
Approvals	FCC, CE, UL/CUL-C1-D2	————— (*5)		3A	

Please refer to the specification sheet in detail.  
The material to be measured must be fluid and be filled evenly with no voids.  
Note 1 : TS : Total Solids (= Dissolved solids + Suspended solids)  
Note 2 : Span = Upper range - Lower range  
Note 3 : Equipment ability.  
Note 4 : 100mm (4") flange size is used in the LQ500 Insertion style.  
Note 5 : NO UL APPROVAL



ISO9001 Certified.



ISO14001 Certified.

The works producing the LQ Series is registered as an environment management system factory specified by ISO14001.

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2007.12(TD) H15028

**Safety Instructions**

**Misuse of product can result in property damage or human injury.  
Read related manuals carefully before using this product.**

Specifications are August, 2003 and subject to change without notice.  
For further information, please contact your nearest Toshiba Representative or International Operations-Producer Goods.



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**TOSHIBA**  
Leading Innovation >>>

**LQ Series**  
DENSITY(CONSISTENCY)METER

Converter for LQ500 & LQ510

LQ500 (Spool Style)



LQ510 (Sanitary Style)



**Improve Your Product Quality With The LQ Series Meter**

LQ500 (Insertion Style)

