■ General

The LQ300A00****** Density Meter measures the total solids density of the fluid flowing through pipes by means of the phase difference method using microwave.

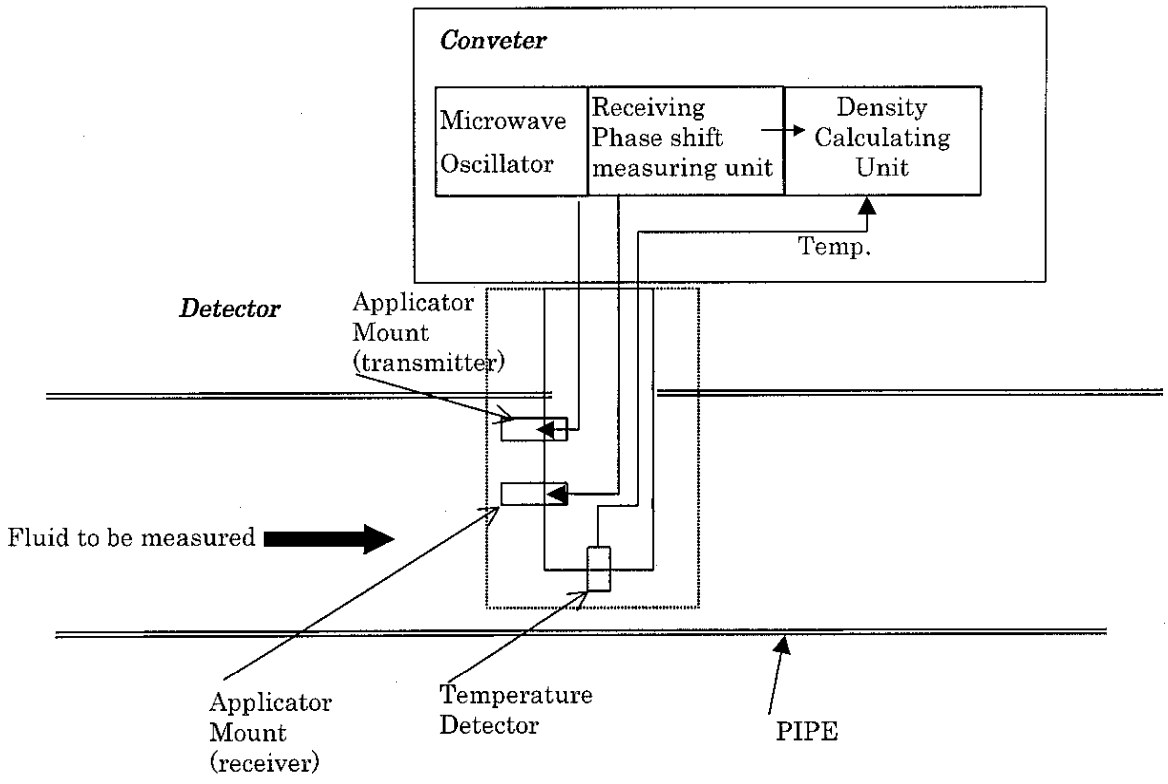
Microwave propagation speed varies according to the physical properties of the medium. Because the dielectric constant of fluids varies according to their total solids density, it is possible to find the density of the fluid by measuring the microwave propagation speed change. This method measures the received microwave's phase lag after it has passed through the fluid to be measured. This method is resistant to the contamination and bubbles, and also is unaffected by flow speed. Therefore it achieves excellent measurement precision in the field. Furthermore, it achieves superb reliability and ease maintenance thanks to its lack of moving parts and projections inside the piping.

The LQ300A00****** Density Meter can be applied to the total solids density measurement of various fluids, for example the sludge density of the sewage treatment plant, the pulp density in the paper manufacture factory and so on. And it can contribute to improvement of efficiency of the plant, excellent quality of the products and so on.

The LQ300A00****** Density Meter is composed of the detector and the converter. Fig.1 shows a basic composition. The microwave is applied to the object substance that flows through a pipe from the antenna enclosed with the metallic case (which is called "Applicator Mount") of the detector. The output level of this microwave is about 1mW.

(NOTE): Refer to the attached document, "Density meter through Application of Microwave Technology".

*Fig.1 Principle Construction of LQ300A00****** Density Meter*



■ SPECIFICATIONS

●General Specifications

Measurement method: Microwave phase difference method

Measurement range:

Span : 1 to 50% TS

Upper range (20mA) : 1 to 50%TS

Lower range (4mA) : 0 to 49%TS

Note

1) TS: Total Solids

2)Upper, lower range can be selectable in 0.1%TS increments.

Electric Resolution : Density 0.001 %

Note) Recognizable resolution of test sample: Density 0.05%TS

Repeatability: : For full scale 2%TS or over ±2 %FS

: For full scale less than 2%TS ±4 %FS

Note) Applicable for measured values of 5% or more of the full scale for test fluid.

Linearity : For full scale 2%TS or over ±2 %FS

: For full scale less than 2%TS ±4 %FS

Note) Applicable for measured values of 5% or more of the full scale for test fluid.

Ambient conditions : Temperature 0 ~ 50 ℃

Humidity 5 ~ 85 %RH (No condensation)

Structure : IP65

●Detector Specifications

Nominal diameters: :

Flange ratings : Equivalent to ANSI 150, DIN 10, BS 10

Maximum working pressure : 1MPa

Fluid temperature:

Standard : 0 to 50 degrees C (No freezing)

Optional High temperature:0 to 90 degrees C (No freezing)

Materials contacting liquid : Wetted materials:

Parts name	Material
Detector (probe)	316L stainless steel
Temperature detector sheath	316L stainless steel
Applicator window	PEEK (Poly Ether Ether Keton)
Applicator window sealant	Fluorocarbon rubber

soun

Note: Viton is a registered trademark of E.I.DuPont de Nemours

Fluid conductivity : 15mS/cm

Note: Fluids that contain electrically conductive substances such as carbon power or metallic power may affect density measurement by conductive particles. Avoid using this density meter to such fluids. Contact Toshiba for details.

Applicators : As an antenna to send and receive microwave signals, one set is provided.

Temperature detector : RTD (Pt100)

Measuring range : 0 ~ 100 ℃

Mounting : Direct mounting between pipes

Weights : Refer to section "9.5 Outline dimensions"

●Converter Specifications

Output signals

Measured density : 4 ~ 20 mADC (load resistance: 750 ohms or less), insulated output

Density meter fault or under maintenance :

One dry "make" contact, 125VAC, 0.1A(resistance load)(max); opens when an error occurs at the density meter or when maintenance work is in progress, otherwise remains close

Input signals

Externally synchronized measurement control signal :

One dry "make" contact, contact capacity of 24VDC, 1A or more.

This contact signal can be used to start or stop density measurement in synchronization with an external contact, such as the contact on the pump.

Conductivity correction input:

4 to 20mAdc; corresponding to 0 to 10mS/cm conductivity

Note : If conductivity variation is small, no conductivity correction signal is necessary. For wide variation of the conductivity, prepare a conductivity meter and mount it at an appropriate point of the process where it can measure conductivity accurately. It is necessary to determine a conductivity correction factor for each individual fluid to measure.

Arresters : Arresters are installed in the current output (4-20mAdc) and AC power supply lines.

Power supply: : 100Vac to 240Vac, 50/60Hz

(Allowable power supply voltage 85 to 264Vac)

Power consumption : Approximately 50VA

Case material : Carbon steel

Coating : Polyurethane resin coating , pearl-gray colored

■Composition of LQ300A00****** Density Meter

Converter
* Main Board
* Display Board(LCD)
* Terminal Board
* Arrester Board
* LED Board
* Power Supply Board
* Noise Filter
* Switch Unit
* Power Supply Unit(5Vdc)
* Terminal Block

Detector
* Applicator Mount x2
* Temperature Detector
* Detector prove

●Explanation of Product Model

All product model of LQ300A00****** density meter is described with the code of 14 figures, "LQ300A00******" . The alphanumeric characters are selected according to the specifications of the density meter which are shown in the attached table 1 "Model Number Table".

●Difference of each product model

Different parts in the products specified by the attached table 1,"Model Number Table", are the followings;

(1) Attachment hole flange
(2) Wetting parts

●Selection of the tested product model

The model number of the tested product is "LQ300A00BBACAA". Therefore, the specifications of the product are the following.

(1) Attachment hole flange	JIS 10K (JIS B 2238 10K) meter size 100mm (4")
(2) Wetting parts	Standard (316SS)

Interference is the same, even if the nominal diameter and the flange rating of the detector is the different one, because the applicator, the level and the frequency of microwave is common.

Kind of Unit	*Frequencies Generated by this unit*	*Radio interference suppression components used*
Converter／Detector :		
Display Board <LCD>	220kHz.	**C1:Ceramic condenser** NEC Corporation Type:D47Y5V1E155ZS1(25V 1.5uF)
Main Board	29.4912MHz, 3.6864MHz, 800.0kHz, 460.8kHz, 400.0kHz,	**C3,C4,C5,C6:** **Ceramic condenser** Murata Manufacturing Co,.LTD Type:M1530B222-630V(2200pF) **C7,C8,C9,C10,C11,C12,C13** **C15,C16,C18:** **Ceramic condenser** NEC Corporation Type:D47Y5V1E155ZS1(25V 1.5uF) **C514,C526:Ceramic condenser** TDK Type:C1608JF1E104(25V 0.1uF) **Ferrite core:** KITAGAWA INDUSTRIES CO,.LTD Type:SFC-8
Power Supply Unit(5Vdc)	140kHz.	**L1,L2: Balun Coil** **DELTA** Type:LFZ2404V11
Power Supply Board(±15Vdc)	165kHz.	**C5,C6,C7,C8:** **Ceramic condenser** TDK Type:C1608JF1E104(25V 0.1uF)
Terminal Board	none	none
Arrester Board	none	none
Noise Filter	none	**FL1:Noise Filter** NEMIC-LAMBDA Type:MBS-1205-22
Switch Unit	none	none

Converter's Case assembly and Cover Assembly	none	steel , 1.6mm thick
RF Unit	f1 MHz,[*Note1] f2 MHz,[*Note2] 30 MHz. 145.2kHz	**Shield Case** Aluminum 1.0mm thick **C29,C30,C48,C49:** **Ceramic condenser** TDK Type:C1608JF1E104(25V 0.1uF) **Ferrite core:** KITAGAWA INDUSTRIES CO,.LTD Type:SFC-8,SSH-33.5-12-F
LED Board	250Hz.	**C512:Ceramic condenser** TDK Type:C1608JF1E104(25V 0.1uF)
Applicator Mount	none	none
Temperature Detector (RTD)	none	none
Detector prove	none	none

*Note1: F1 is any of adjusted frequency between from 1825MHz to 1975MHz.

*Note2: F2 is any of fixed frequency between from 1824.85MHz to 1974.85MHz.

The following relational expression consists in f1 and f2.

f2= f1- 0.150 [MHz]

●Table1. Model Number Table

TYPE					CAT Code									SPECIFICATION
1	2	3	4	5	6	7	8	9	10	12	13	14	15	
L	Q	3	0	0										LQ300 Density (Consistency) meter
					A									Standard
														Meter Size
						0	0							Insertion type (Suitable Pipe size 250mm (10") or larger)
														Attachment hole flange for LQ300 insertion type
								C						Equipment for ANSI 150 (meter size 100mm (4"))
								E						Equipment for DIN 10 (meter size 100mm (4"))
								G						Equipment for BS 10 (meter size 100mm (4"))
								B						Equipment for JIS 10K (JIS B 2238 10K) meter size 100mm (4")
								Z						Others
									B					Fluid Temperature
														High temperature type (0-100 deg. C) (32 to 212 deg. F)
										A				Power Supply
														100-240Vac, 50/60Hz
														TYPE
											C			Insertion type
														Wetting parts
												A		Standard (316SS)
												H		Hastelloy C 276
												Z		Others
														Other
													A	Standard