DETECTOR

CONVERTER

MODEL LQ500

Presenter: Sing Madden 1

❑ *Optional Line Up (Wetting parts):*

TOSHIBA provides - on your request.

Wetting parts: Main pipe, Applicator base unit, and RTD sheath.
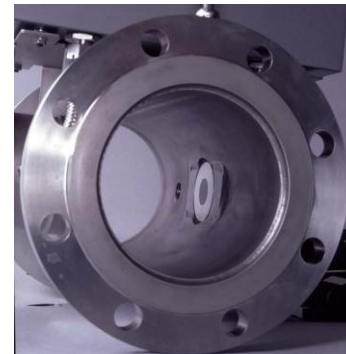
(1) SCS14A cast (equivalent to 316 SS) type.

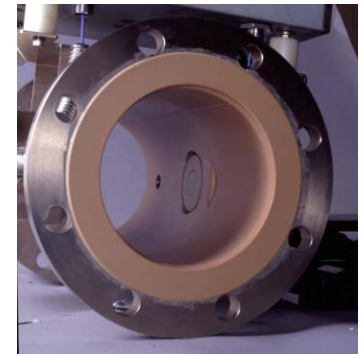**(2) Teflon PFA coating type.**

(for sticky products)

<Note>
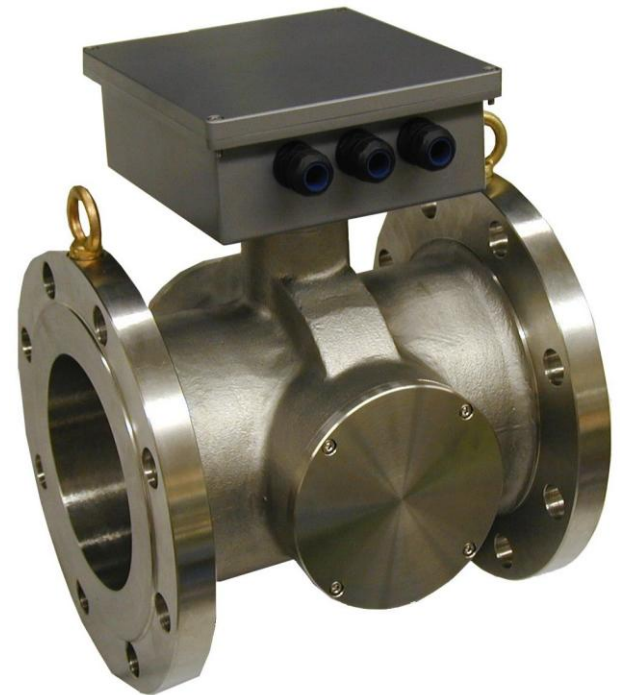 (a) RTD sheath material: 316 SS.
  (b) Applicator window: Polysulfone

SCS14A (std)
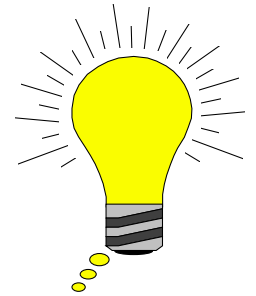
Teflon PFA coating

Presenter: Sing Madden

No License Needed to Operate!

- **Approved by FCC in USA.**

- **Declared CE.**
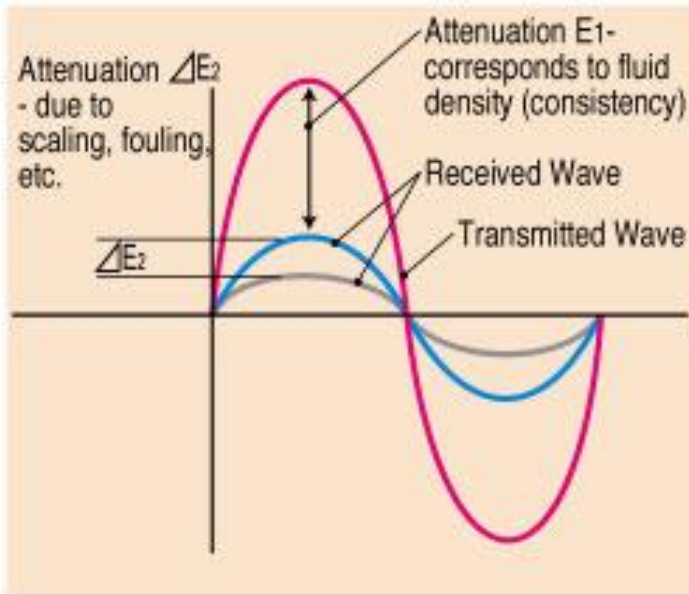
C E

Presenter: Sing Madden 3

❑*FCC notice*

LQ500 has been tested and found to comply with the limits for a field disturbance sensor, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. LQ500 generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
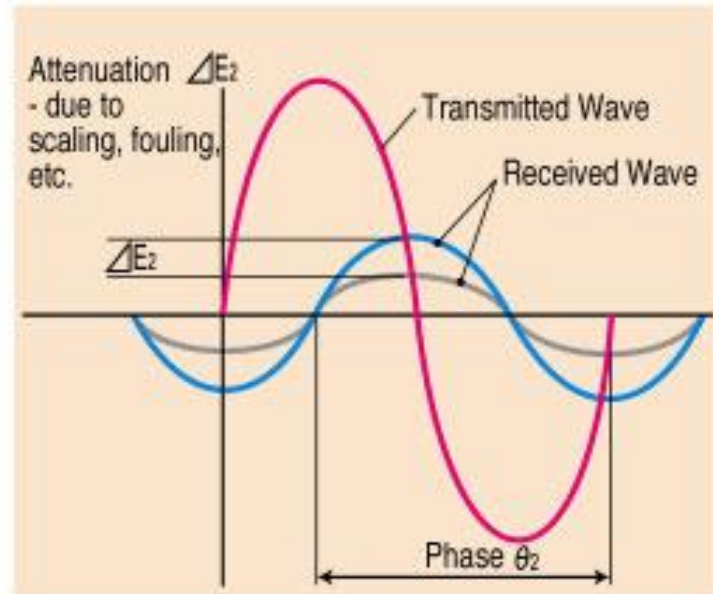
     Presenter: Sing Madden

TOSHIBA

Microwave Phase Difference

Presenter: Sing Madden 5
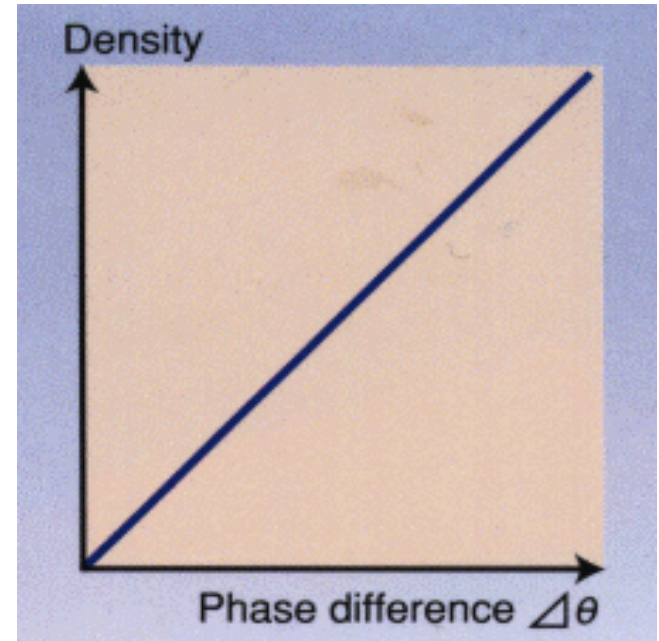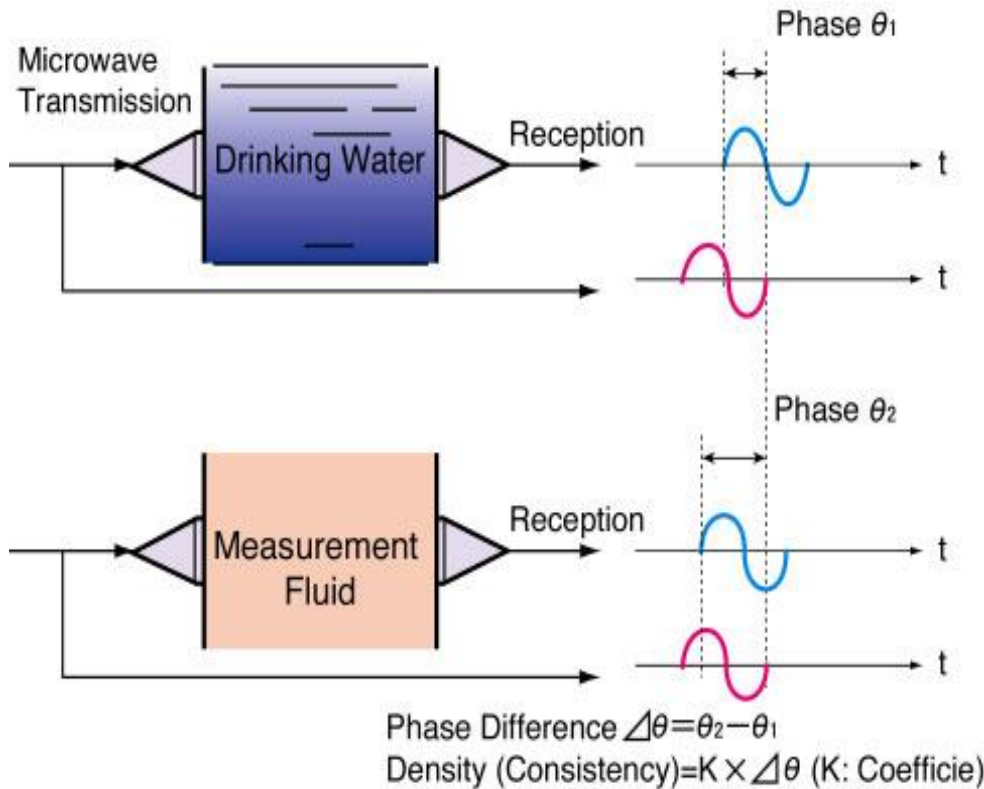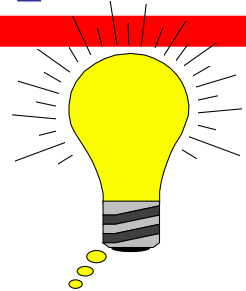
❑ **Not Easily Affected by *Contaminants !***

Optics and Ultrasonic   **LQ500 (Microwave)**

 Presenter: Sing Madden   6

$$TS = SS + DS \quad \text{(DS: Dissolved Solids)}$$

%TS : Total Solids

Water + Solids

= Water with solids of dissolved (Total Solids)

%SS : Suspended Solids

Water + Solids

= Suspended solids. + Remained Solids

Presenter: Sing Madden   7

TOSHIBA
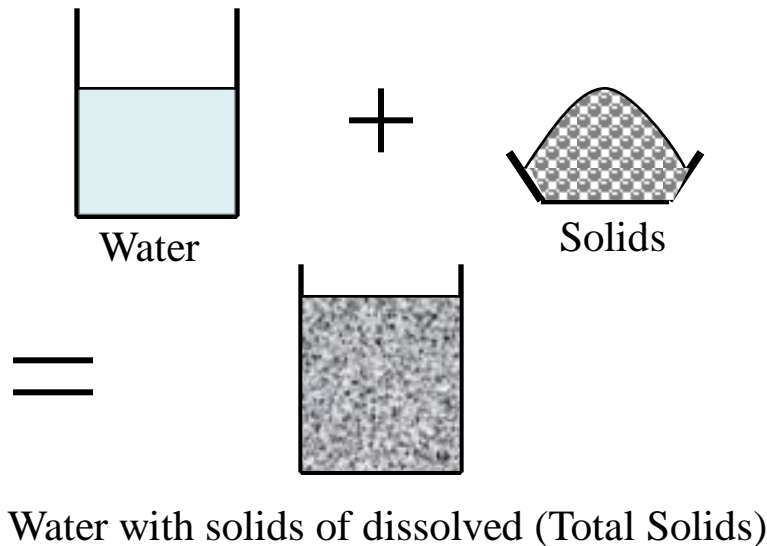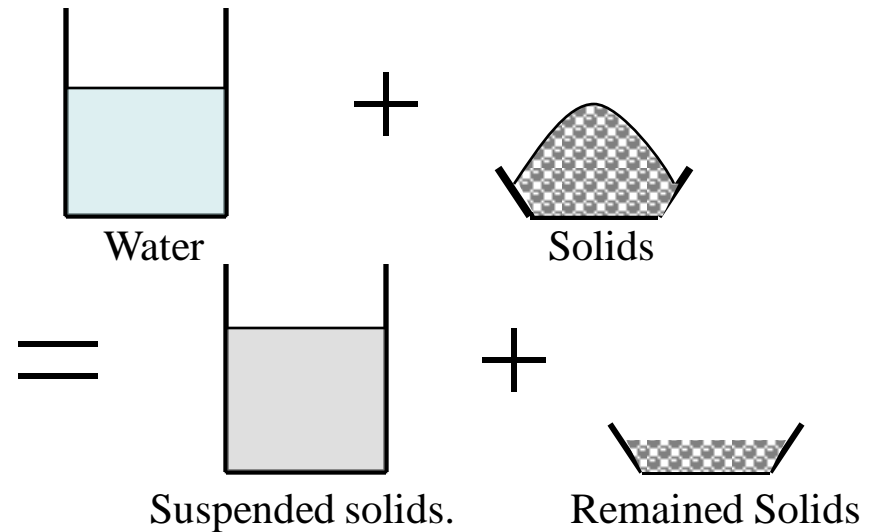
❑ *No Required Straight Pipe Length* 💡

(i.e.)

LQ500

90 deg. Bends in Pipe

Straight Pipe Length

Flow

Unnecessary !

TOSHIBA
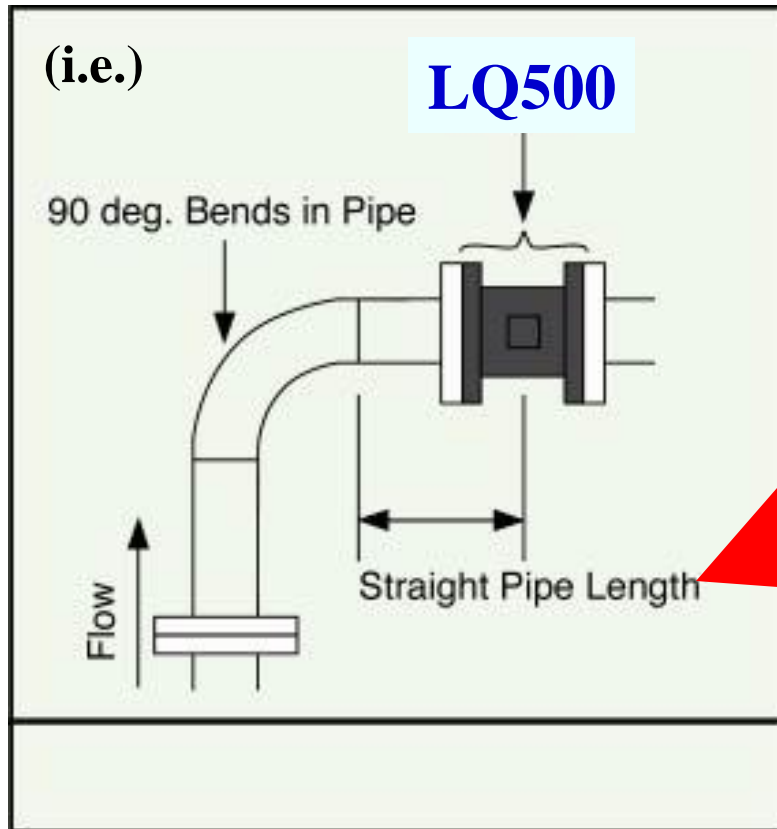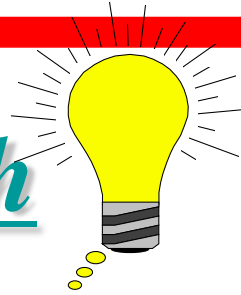
❑ *Continuous Measuring!! PV*

may be used for *Process Control!!*

HMI

Presenter: Sing Madden 9
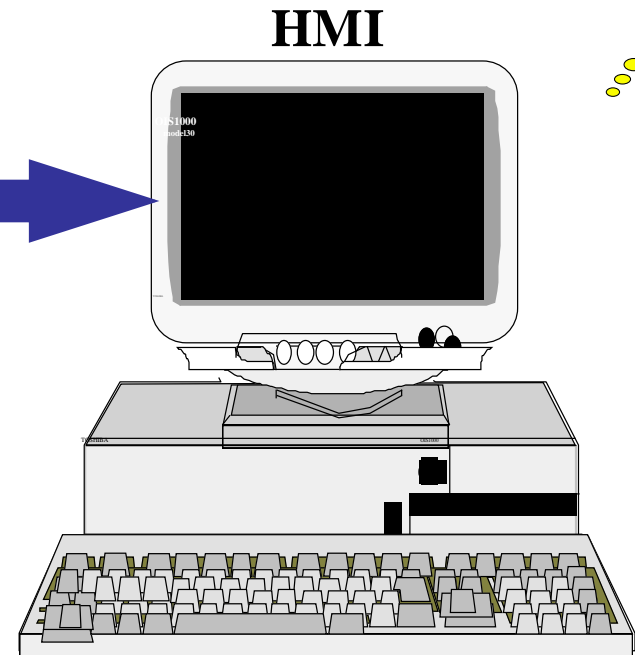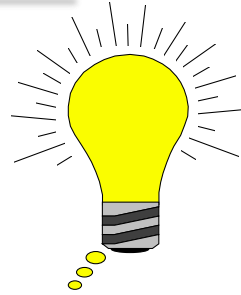
□*No Required Flow direction*

OK!!   **OK!!**

Copyright © 2002 Toshiba Corporation. All rights reserved. *Presenter: Sing Madden* 10
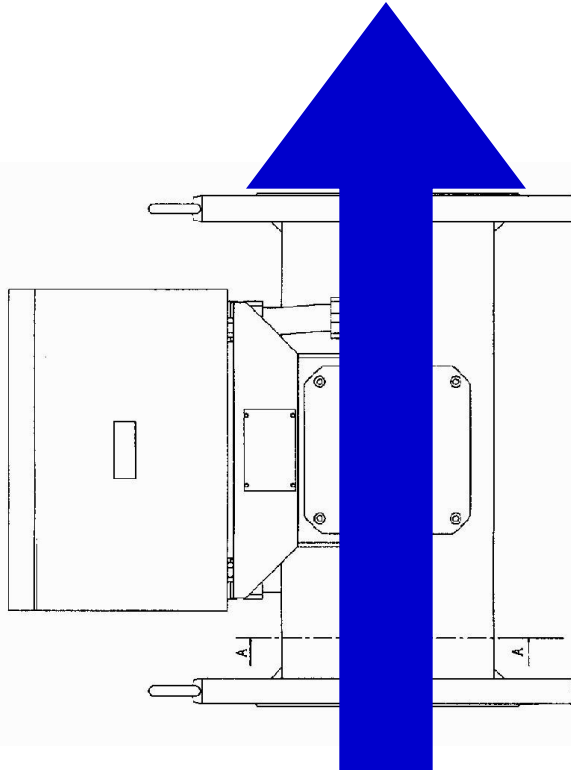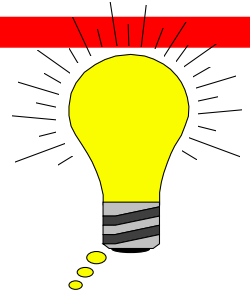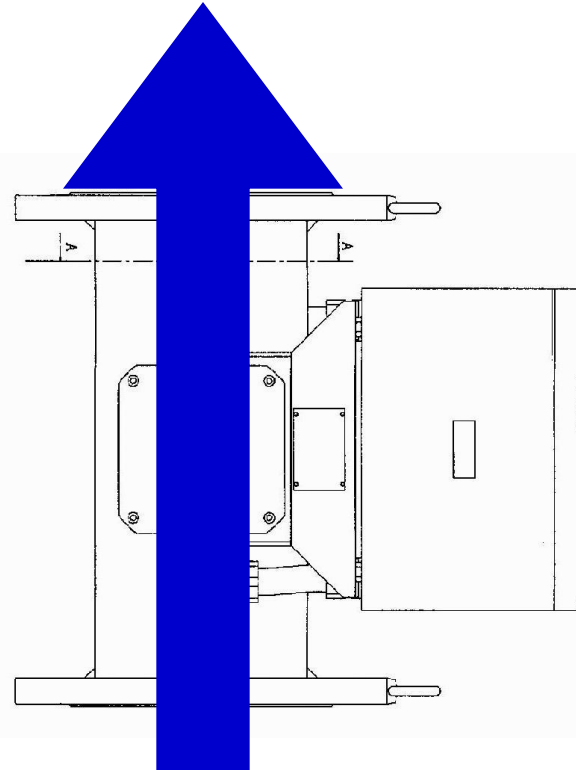
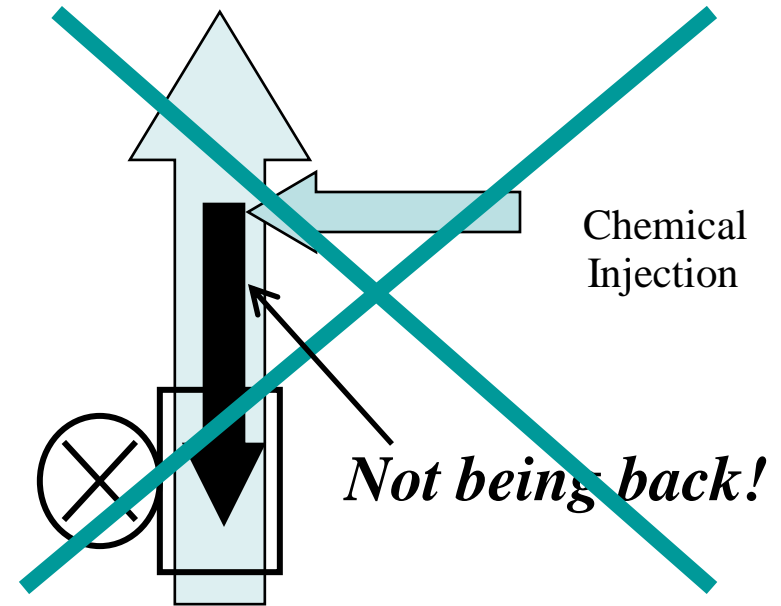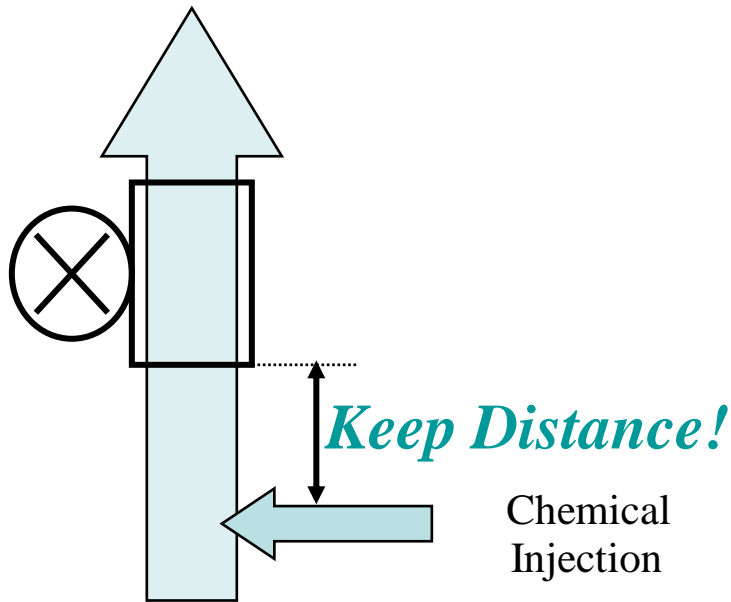# •<u>Fluid Conductivity Limitation</u>

(1) Measure the conductivity before installing LQ500.

(2) Keep distance of Chemical Injection from LQ500.

   •**To avoid Chemicals not mixed well with liquid.**
   •**To avoid unmixed Chemicals at the LQ500.**

Keep Distance!

Chemical
Injection

Chemical
Injection

Not being back!

•**<u>Conductivity meter helps to check the value.</u>**

Handy type is easy to carry!

•**Main Specification**

•**0 to 20.00 mS/cm (0.01 mS/cm step)**

•**Around US$400**

(8″)

 Presenter: Sing Madden 12

☐ *Meter size & Allowable Fluid Conductivity:*

Meter Size	Fluid Conductivity
50mm (2")	20 mS/cm max.
80mm (3")	16 mS/cm max.
100mm (4")	15 mS/cm max.
150mm (6")	10 mS/cm max.
200mm (8")	8 mS/cm max.
250mm (10")	8 mS/cm max.
300mm (12")	6 mS/cm max.
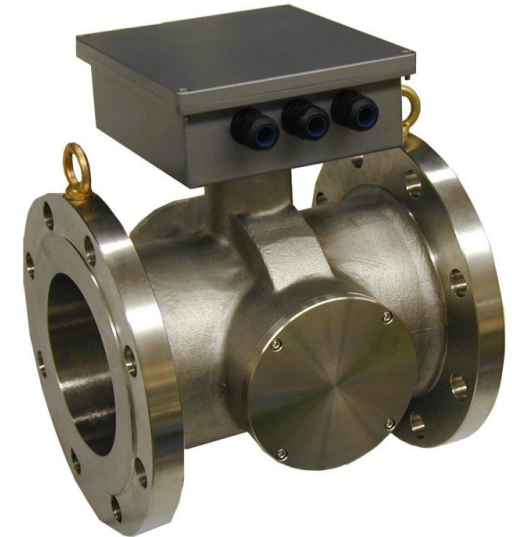
☐ *Fluid Temp.:*

0 to 100ºC (32 to 212 ºF), No freezing and bubbles conditions

Presenter: Sing Madden 13

•Fluid Conditions   in Measuring

Averaged

Flowing Solids inside the pipe

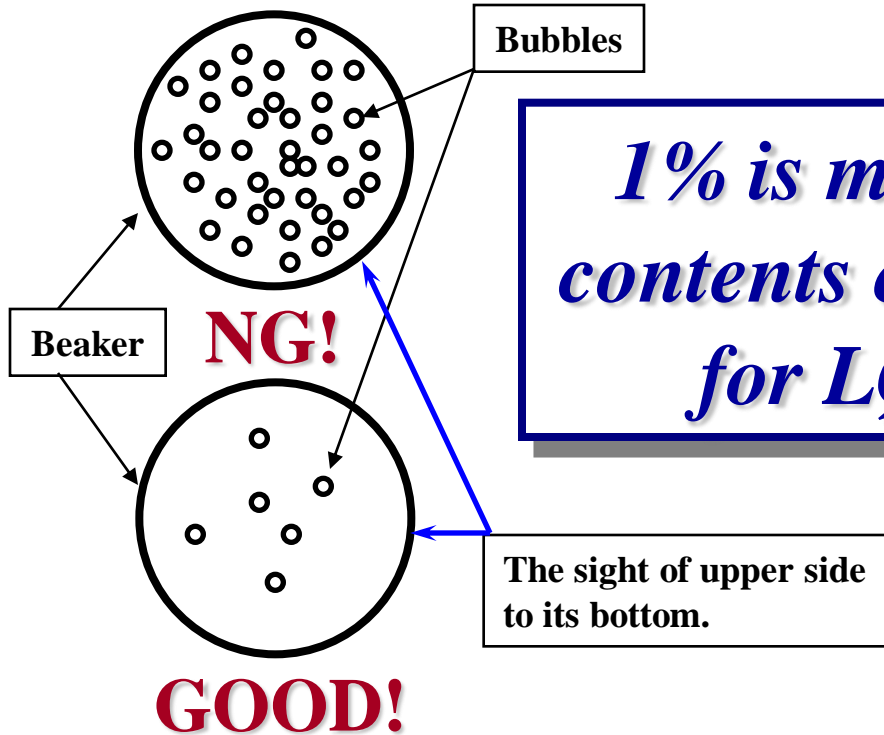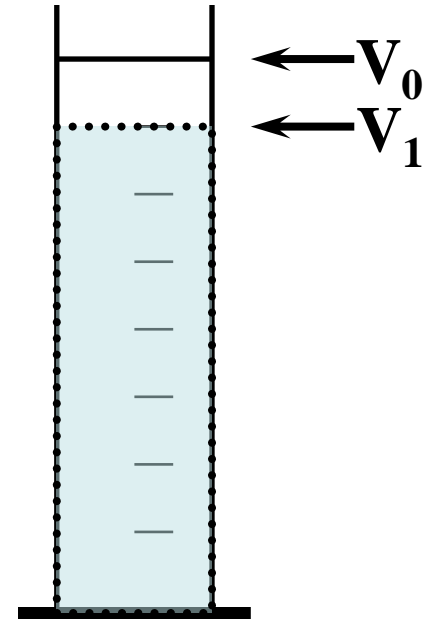Floating up   Settling down

TOSHIBA ✓
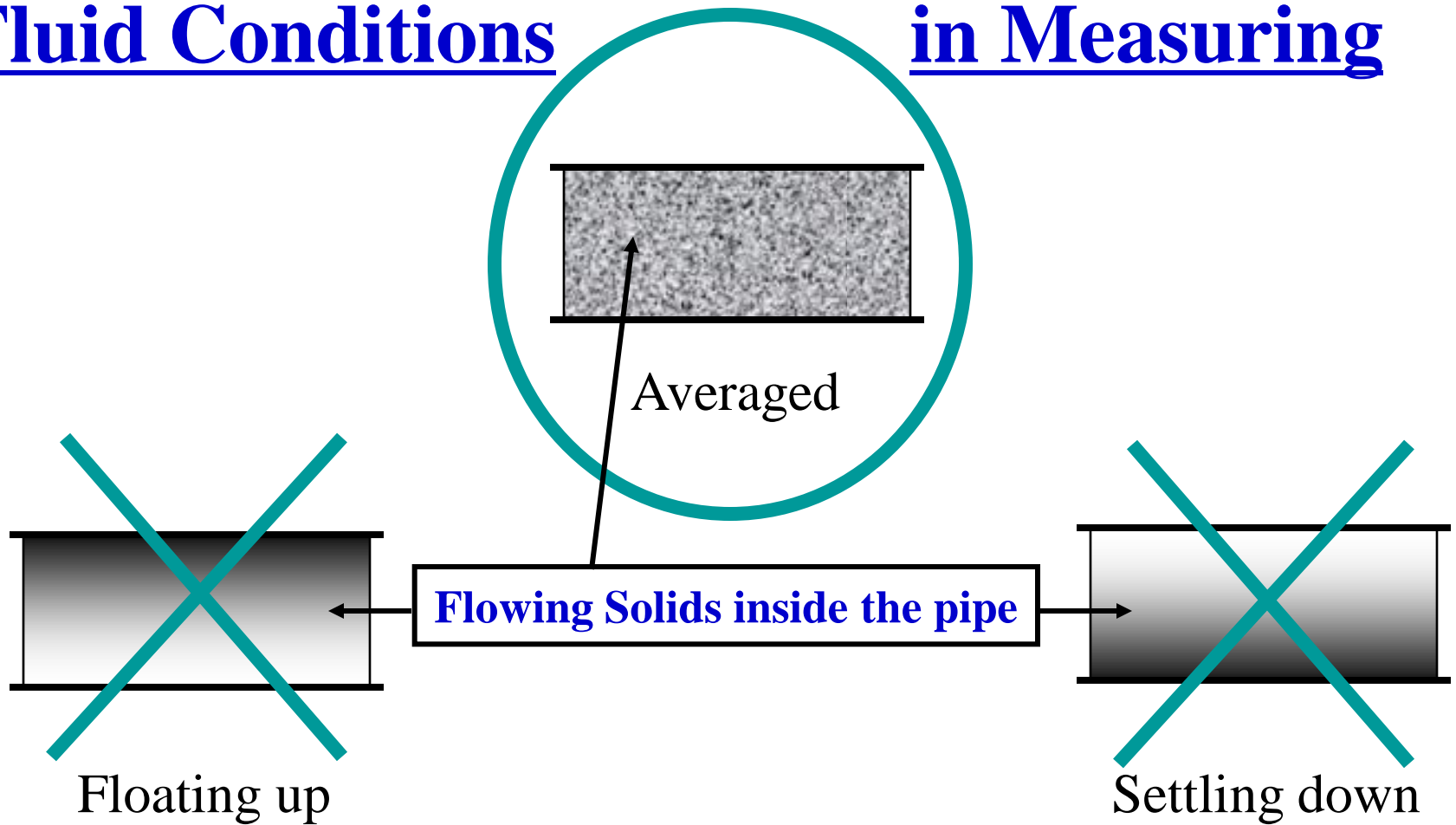
Guidance of bubble content

The method of using a beaker.
(Suitable for liquid with bubble.)

The method of using a cylinder.
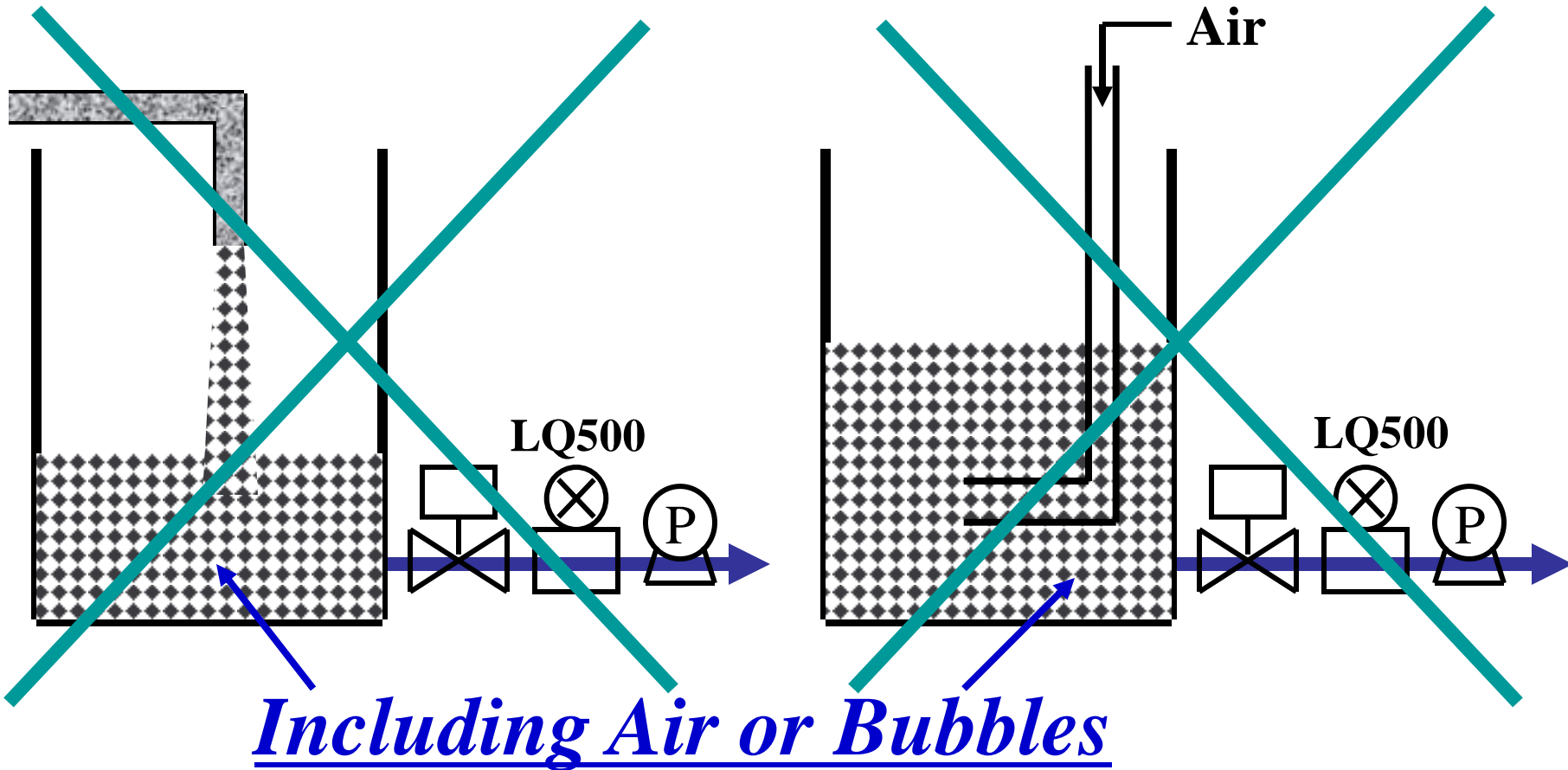**(Suitable for slurry with bubble.)**

Bubbles

NG!

Beaker

1% is maximum contents of bubbles for LQ500!

V_0
V_1

The sight of upper side to its bottom.

GOOD!

V_0: The upper line when the fluid pour into cylinder.
V_1: The upper line after leaving bubbles from the fluid.

Presenter: Sing Madden 15

- **Need to avoid the Air or Bubbles (Case 1&2).**

Air

LQ500

P

LQ500

P

Including Air or Bubbles

 Presenter: Sing Madden

TOSHIBA ✓

- **Need to avoid the Air or Bubbles (Case 3&4).**

Mixer

LQ500

LQ500

P

P

Including Air or Bubbles
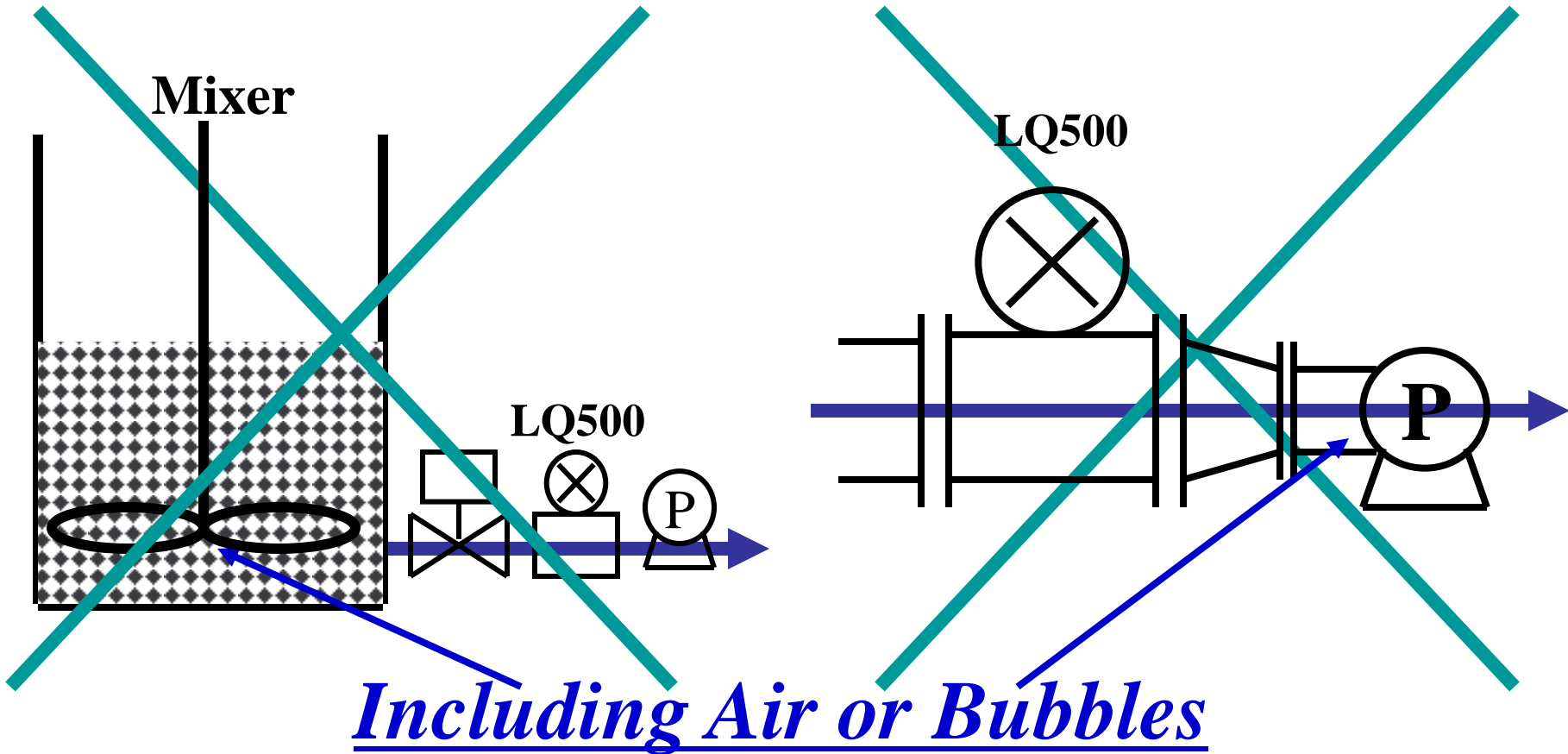
❑*Flow Velocity vs. Density!*

With No Bubbles

Presenter: Sing Madden 18

□ **Rotation Number** *!!*

Rotation 0   Rotation 1

1st 360 degrees of phase shift   2nd 360 degrees of phase shift
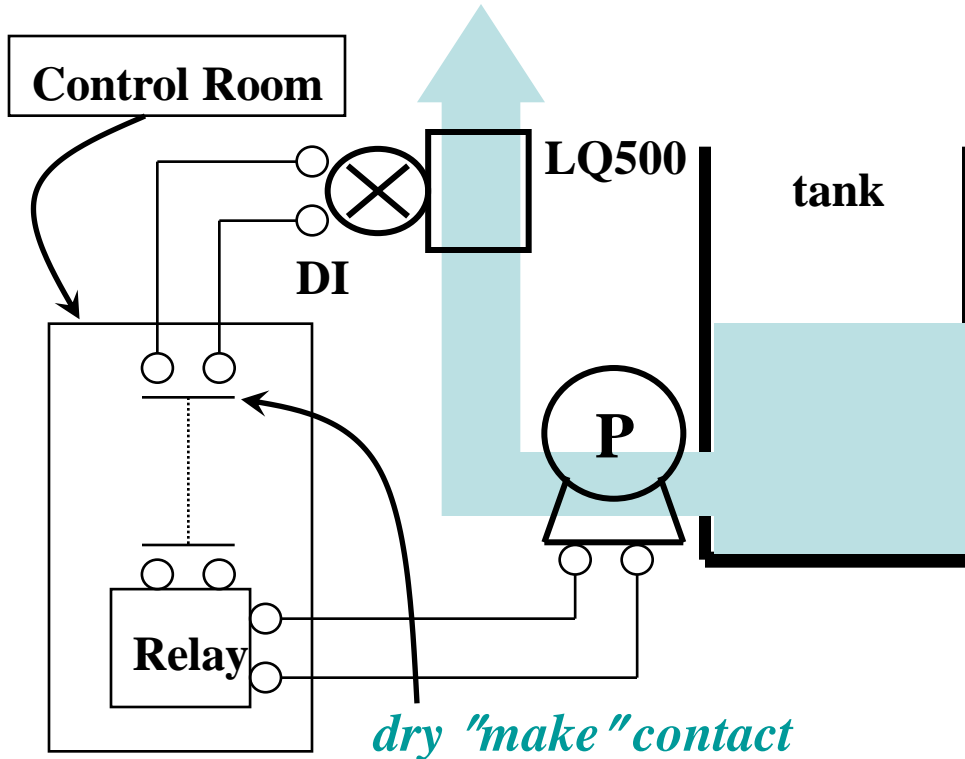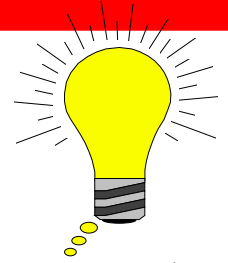
     Presenter: Sing Madden
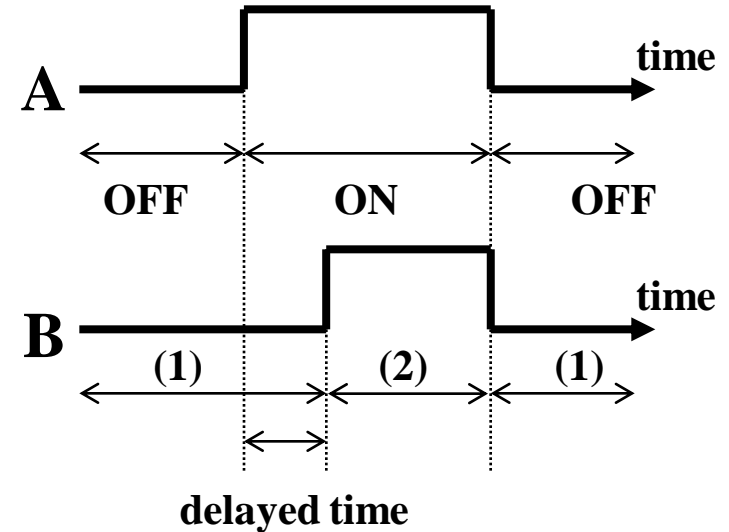
Example
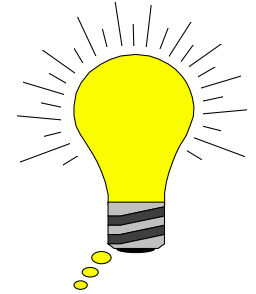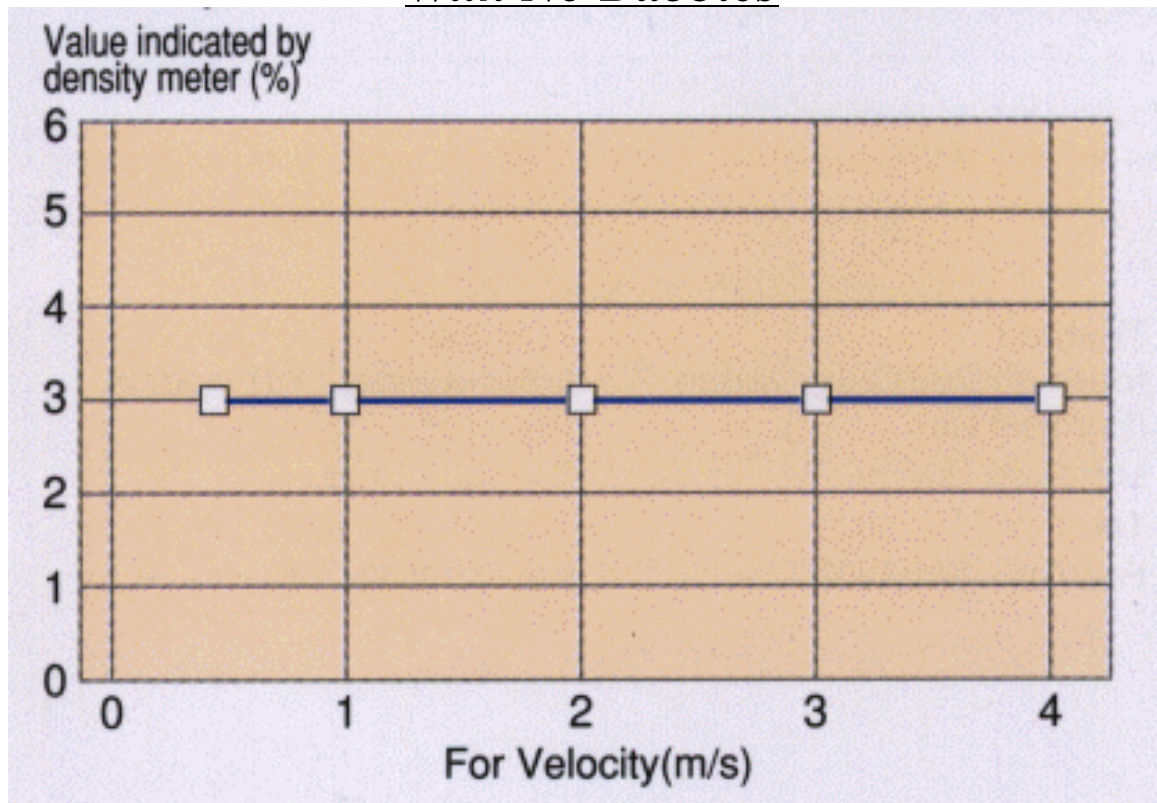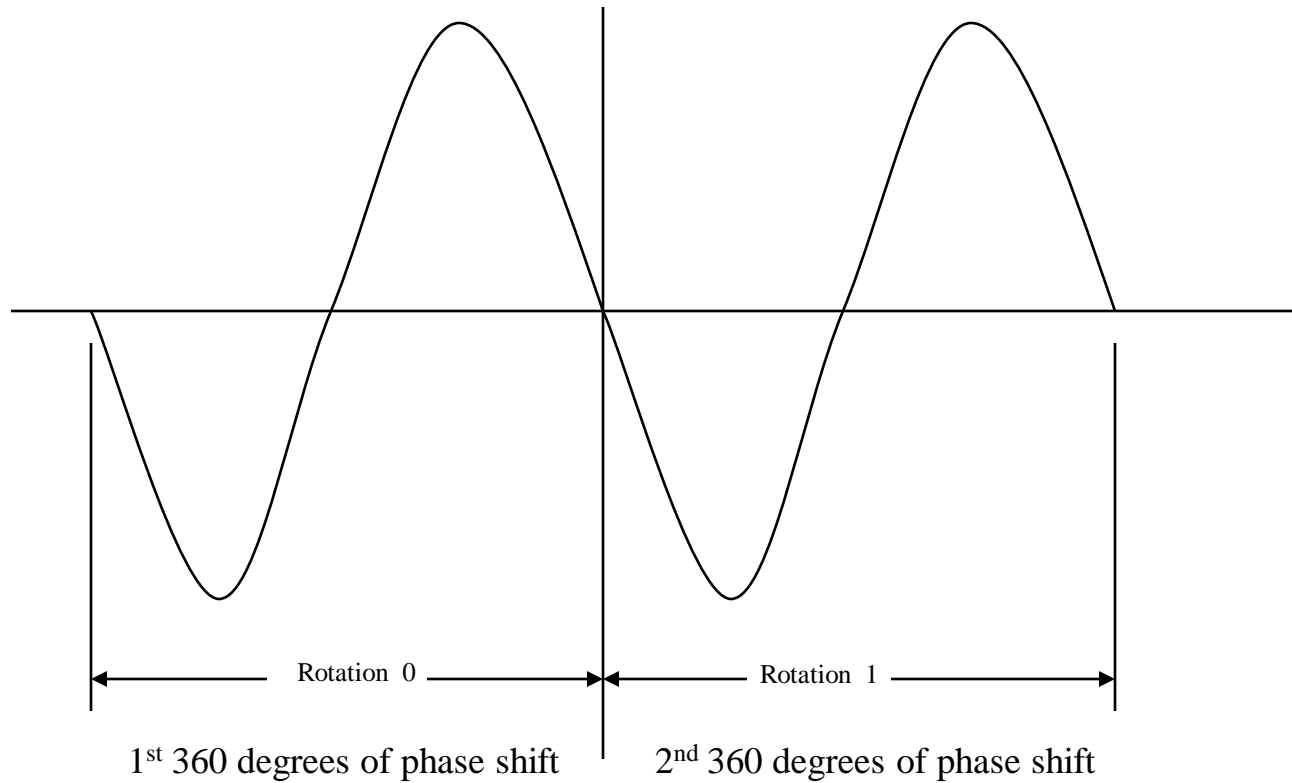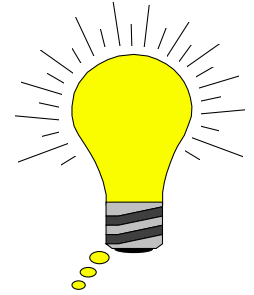
External Synchronized Operation

- **For Discontinuous consistency measurement.**

- **For Possible Empty pipe.**

A: Pump operating status (External contact).
B: Consistency measuring status (output).

Control Room

LQ500

tank

DI

P

Relay

dry "make" contact

A

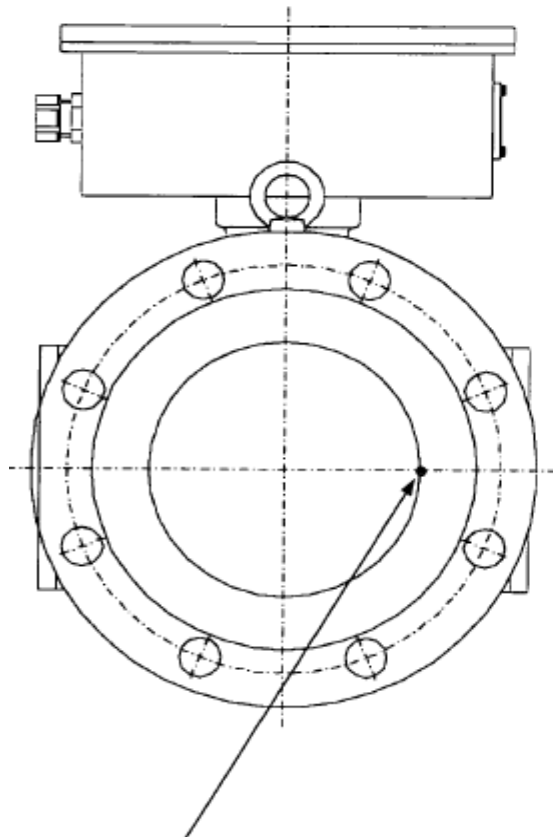OFF   ON   OFF

time

B

(1)   (2)   (1)

time

delayed time

(1) Suspension of consistency measurement.
   (Simulated output)
(2) Execution of consistency measurement.
   (Measured value output)

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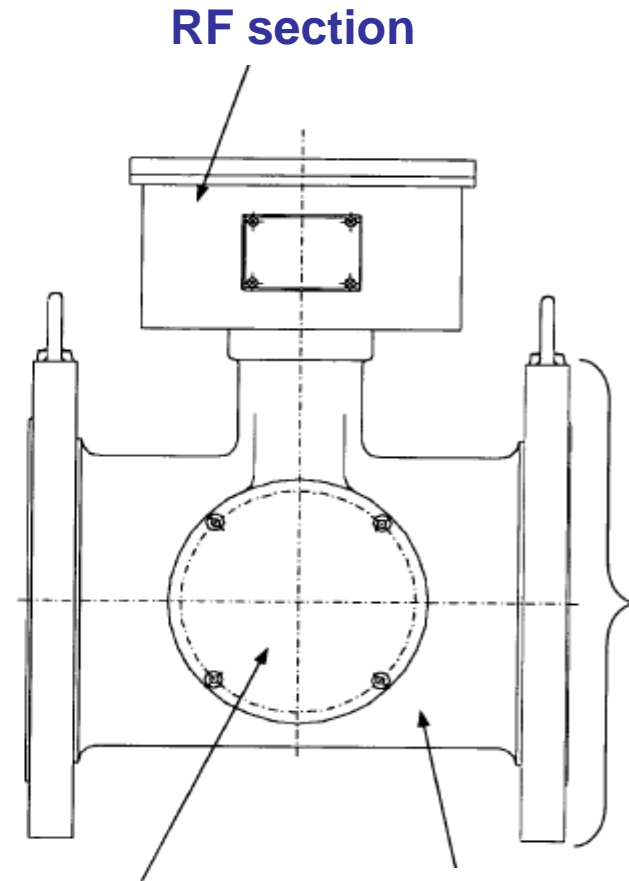
TOSHIBA

Data Save Function

- **Measurement data save and read at intervals (1 to 1800 seconds)**

- **Use RS232C communication function**

- **Save up to 256 points**

- **At 10 minutes intervals 42 hours of data can be saved**

- **Communication terminal of PC (such hyper terminal) can be used to collect data**

TOSHIBA

Detector

RF section

(2) Applicator section **(1) Main pipe**

(3) Temperature detector

Presenter: Sing Madden 22

TOSHIBA

Converter

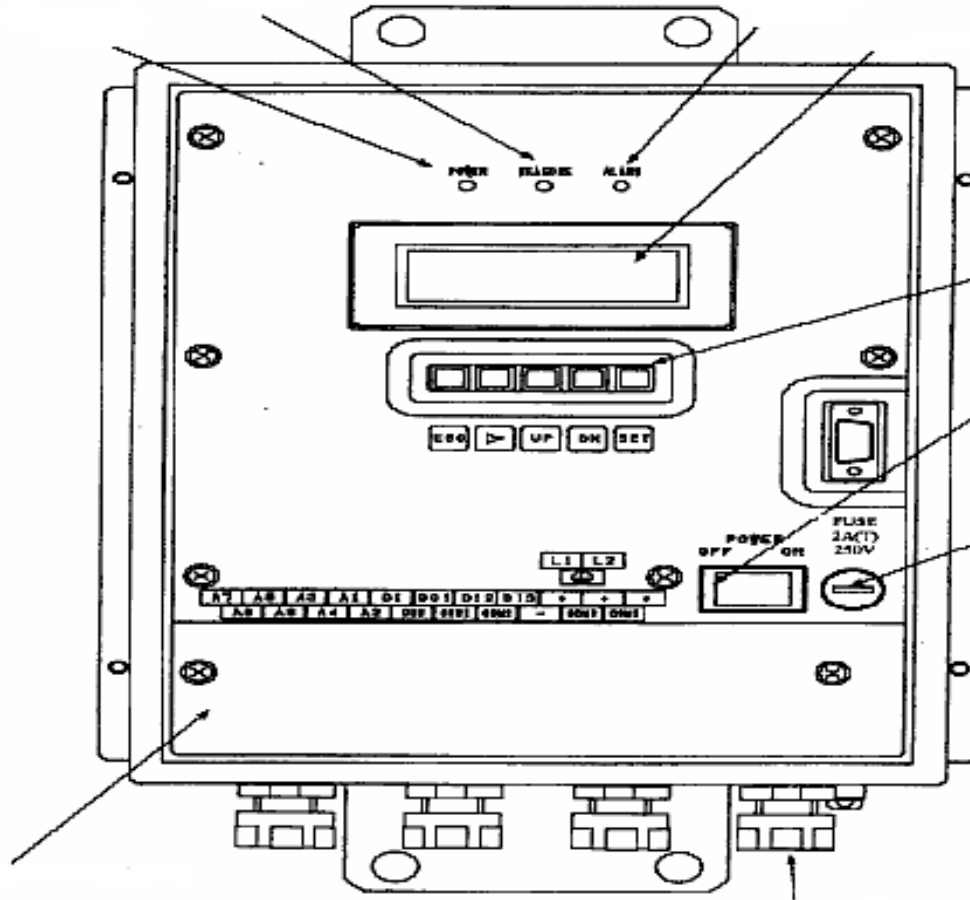(3) Power indicator

(4) Measure indicator

(5) Alarm indicator
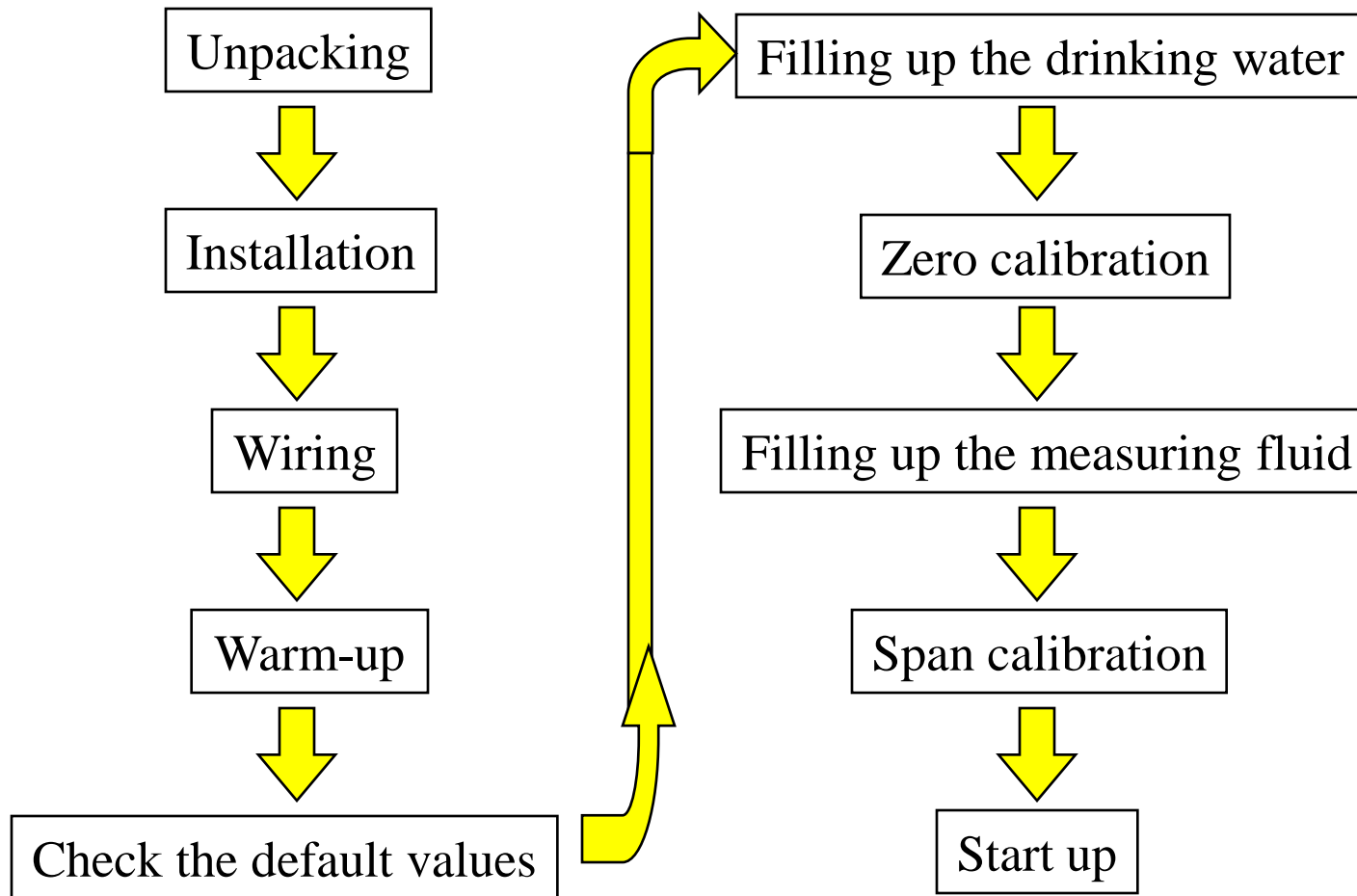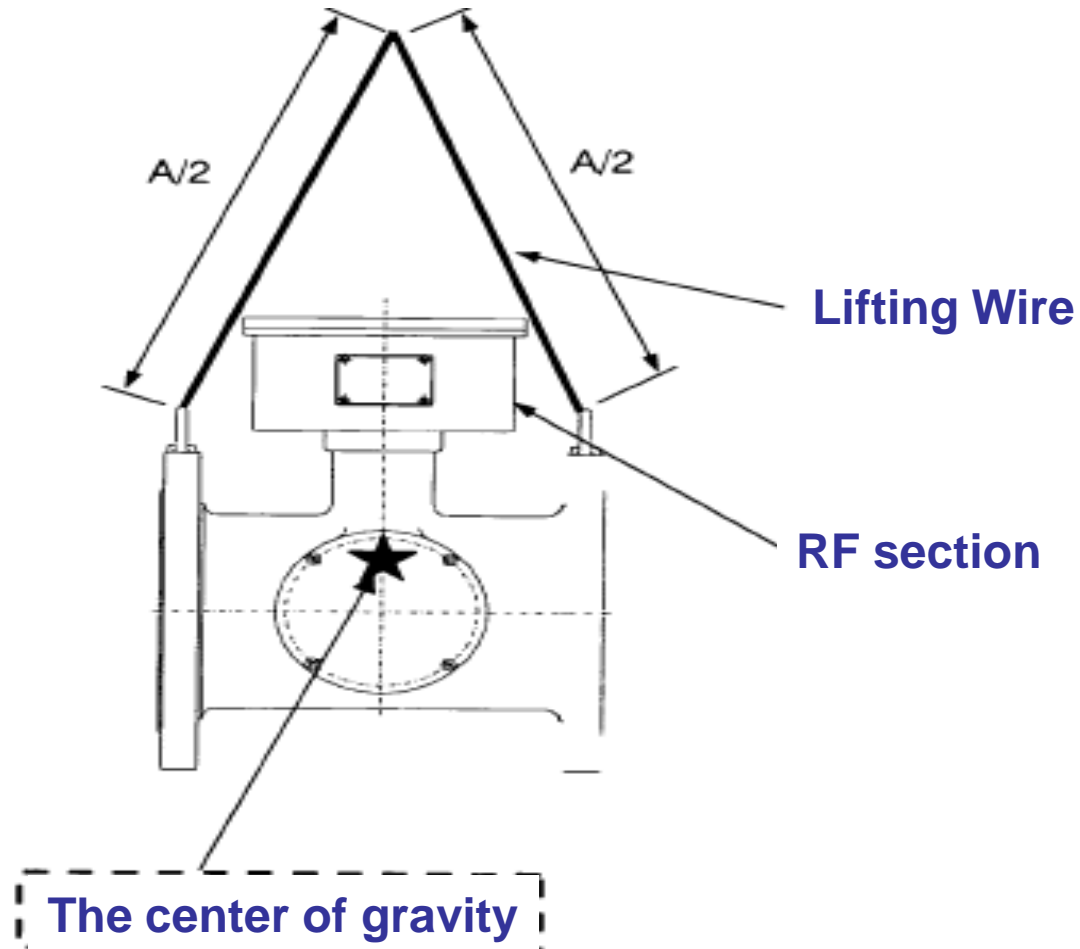
(6) LCD indicator

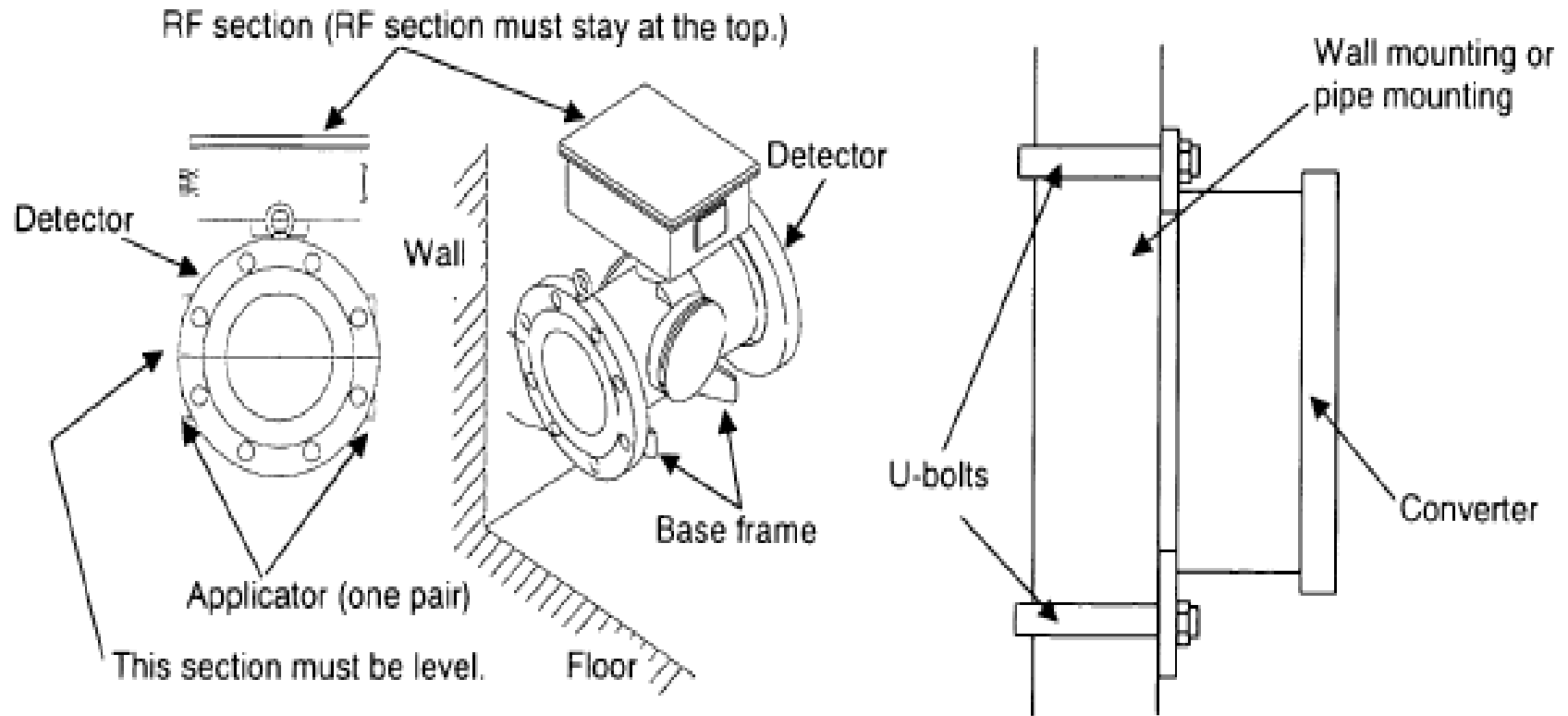(7) Setting Keys
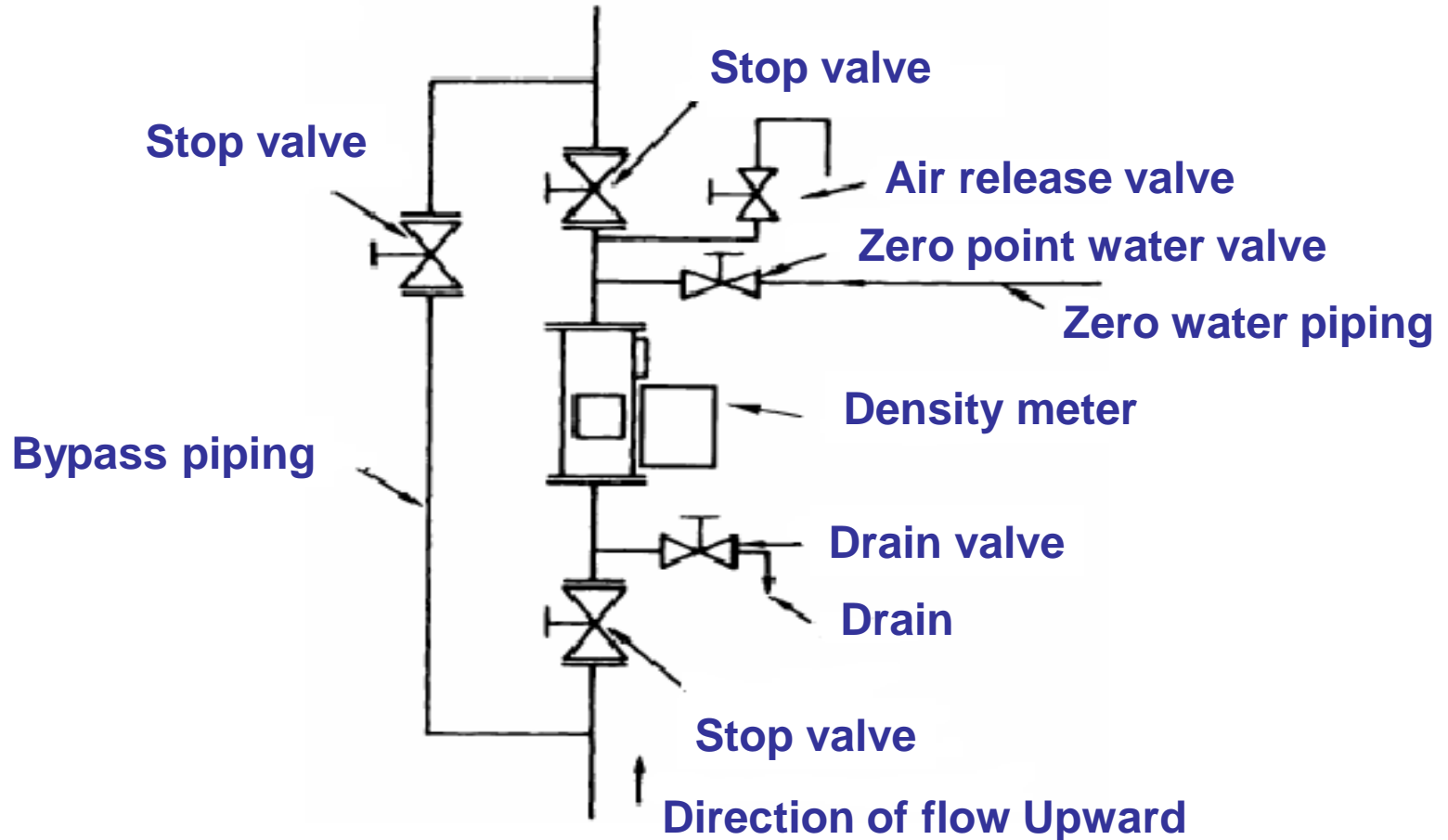
(1) Power Switch

(2) Fuse

(8) Terminal Block

(9) Cable gland

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TOSHIBA

```
┌──────────────┐                    ┌──────────────────────────┐
│  Unpacking   │                    │ Filling up the drinking water │
└──────────────┘                    └──────────────────────────┘
       ↓                                       ↓
┌──────────────┐                    ┌──────────────────────────┐
│ Installation │                    │    Zero calibration      │
└──────────────┘                    └──────────────────────────┘
       ↓                                       ↓
┌──────────────┐                    ┌──────────────────────────┐
│    Wiring    │                    │ Filling up the measuring fluid │
└──────────────┘                    └──────────────────────────┘
       ↓                                       ↓
┌──────────────┐                    ┌──────────────────────────┐
│   Warm-up    │                    │     Span calibration     │
└──────────────┘                    └──────────────────────────┘
       ↓                                       ↓
┌──────────────────────────┐        ┌──────────────────────────┐
│ Check the default values │        │        Start up          │
└──────────────────────────┘        └──────────────────────────┘
```

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TOSHIBA

A/2   A/2

Lifting Wire

RF section

The center of gravity

Presenter: Sing Madden

Horizontal

Vent valve   Zero point water valve
Stop valve   Density meter   Stop valve
Sampling valve
Drain valve
Stop valve   Bypass piping

TOSHIBA

Horizontal

RF section (RF section must stay at the top.)

Detector

Detector

Wall

Base frame

Applicator (one pair)

This section must be level.   Floor

Wall mounting or pipe mounting

U-bolts

Converter

Presenter: Sing Madden

TOSHIBA

Vertical

Stop valve

Stop valve

Air release valve

Zero point water valve

Zero water piping

Density meter

Bypass piping

Drain valve

Drain

Stop valve

Direction of flow Upward

Note: The FG wires of the dedicated cables A and B should not be connected to the FG terminal on the detector (measuring section) side.

Note: The ground should be connected to either the PE terminal of the terminal bock inside converter or to the grounding terminal of the case.

TOSHIBA

Terminal block of converter
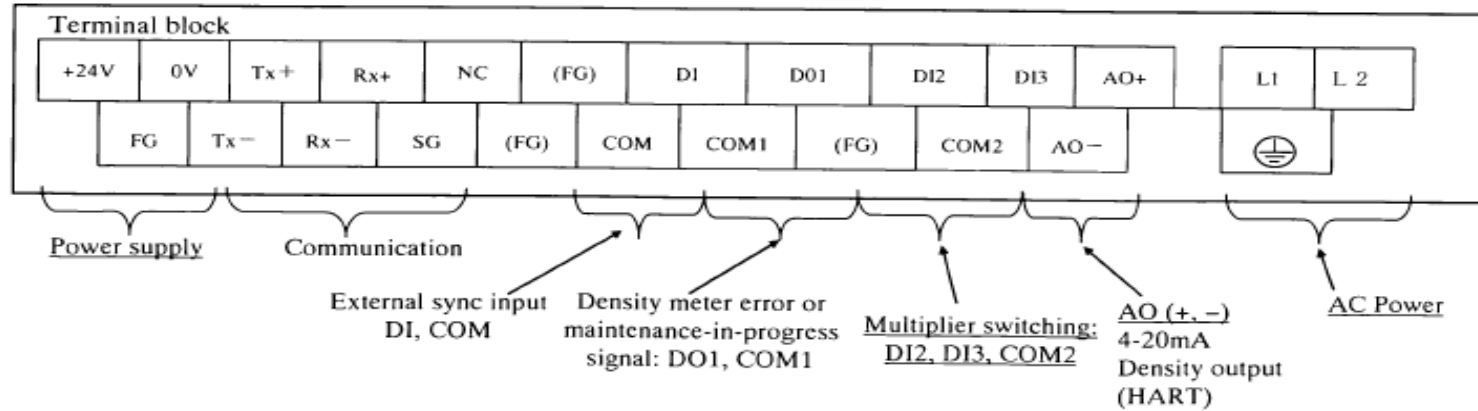
Terminal block in RF unit

Copyright © 2002 Toshiba Corporation. All rights reserved. *Presenter: Sing Madden*
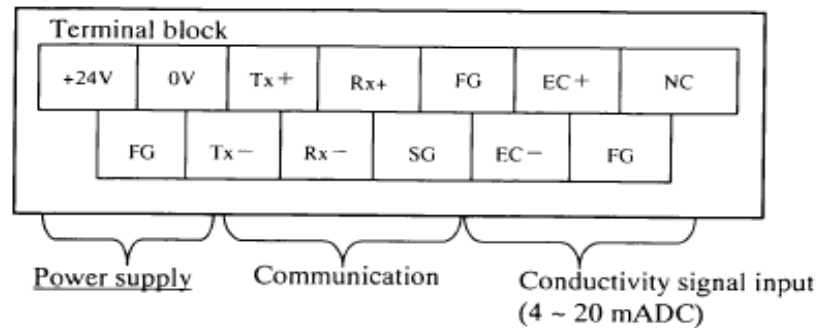
Start-up Inspection sheet (On-site Adjustment Inspection sheet)

1st page

2nd page

Presenter: Sing Madden 31

Why is this sheet so important?

• A sign of start-up operation of LQ500 being done successfully.
• Easy to recognize a problem with the LQ500 by comparing
 this data as default with the current data.

<Note>
Need to use this sheet every time
when you check the condition of LQ500 or calibrating.

 Presenter: Sing Madden 32

❑ *Easy Programming !*

Presenter: Sing Madden 33

TOSHIBA
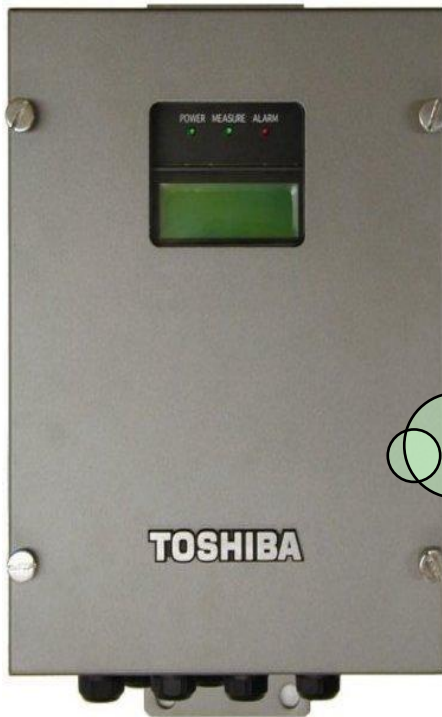
4-20 mA Range

❑ *Wide Range Measurement !*

❑ *RL may be set at any TS less than RH !!*

Presenter: Sing Madden 34
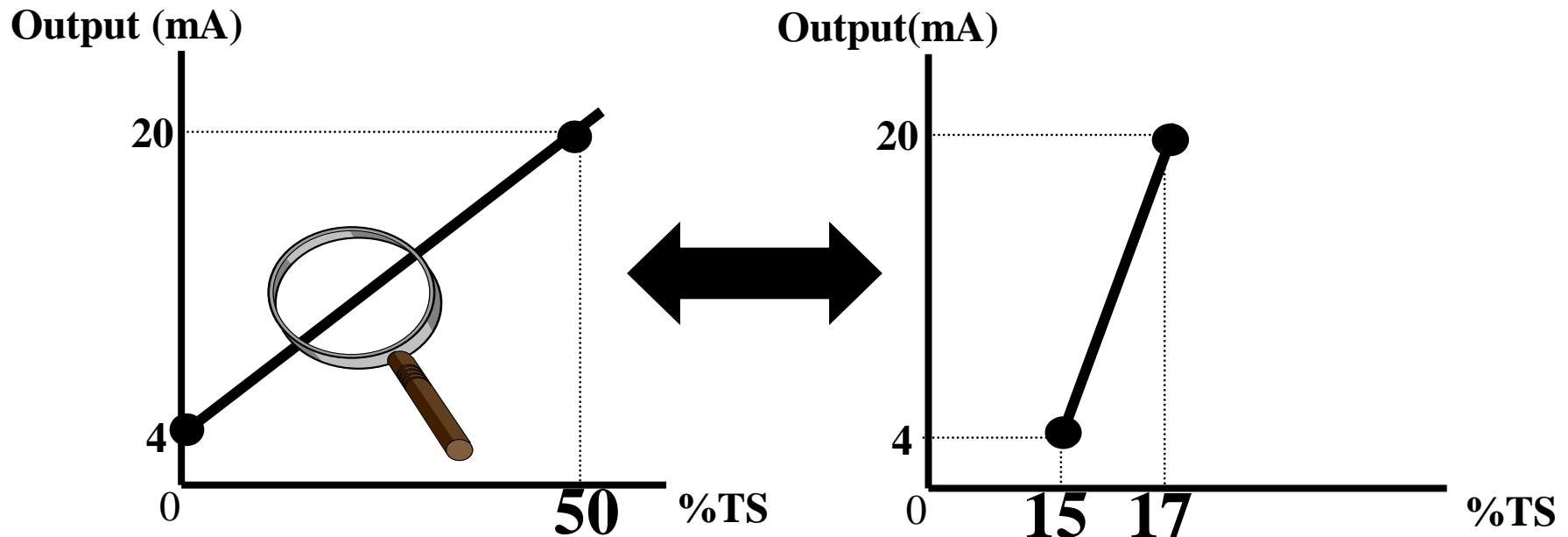
C = Density Multiplier

☐ *Easy Calibration!*

Output (mA)

Only One point Calibration!

(In most Cases)

Density Intercept may be needed in some applications

Density (%TS)

Presenter: Sing Madden
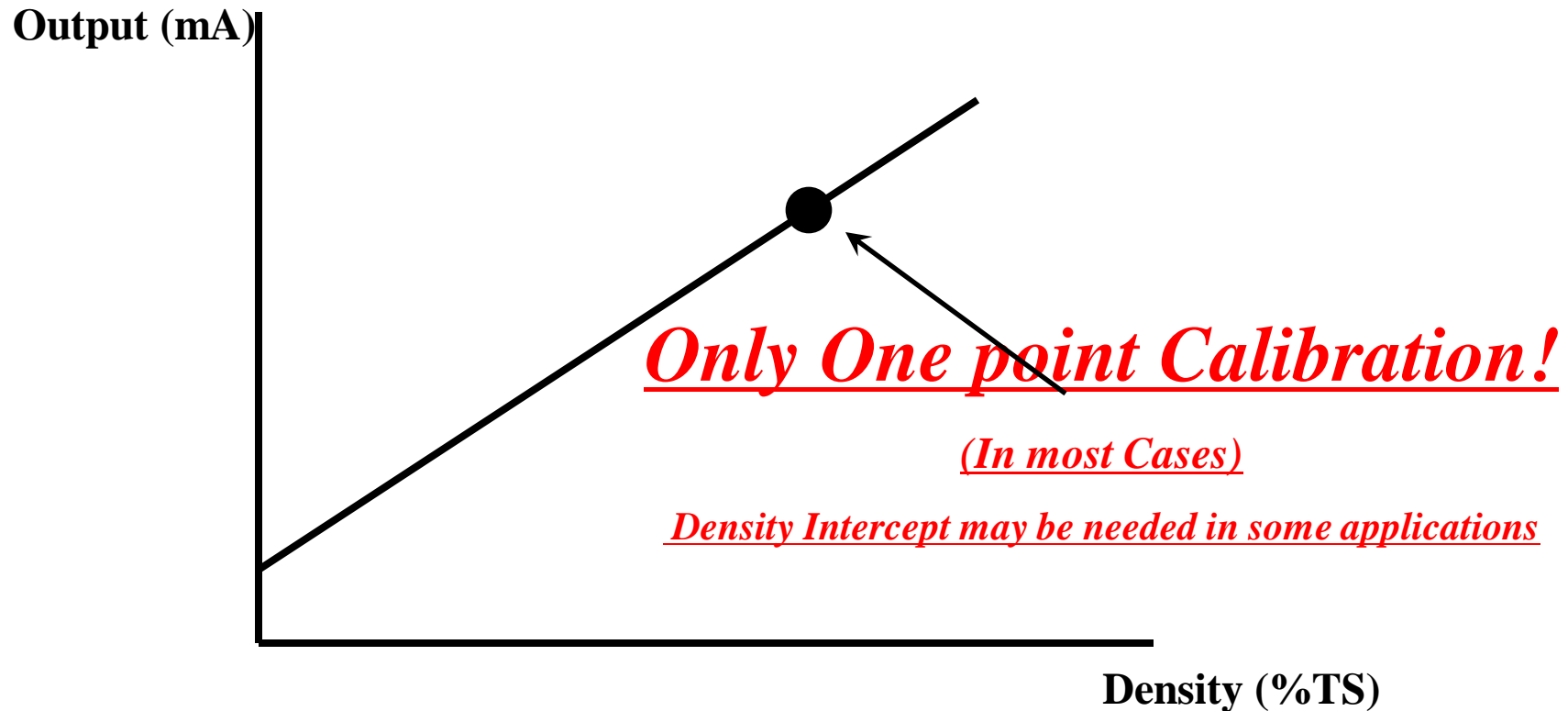
Calculating C

Calibration.

(a) Note the value of "density multiplier, (C)".
(The default value of "C" is "1.000".)
(b) Wait until there is a stable indication on the LED.
(c) Take a sample of fluid, and note the indicating value of LQ500 at the same time.
(d) Manual analysis.
(e) Calculate the value of "C".
(f) Input the value of "C" into the converter.

\<Calculation for deciding "C"\>

$$C = A / (M / C'(old))$$

C= density multiplier, A= result of manual analysis,
M= LQ500 indicated value when taking a sample.
C'(old)= density multiplier before span calibration.


Presenter: Sing Madden

Manual Analysis.

• Manual analysis and how it reflects on the LQ500.

(1) Need to carry out the manual analysis several times (min 3 samples).
(2) Calculate a "C" value based on the average of several samples.

\<Notice\>
An error of manual analysis links to the error of LQ500 indication.
We normally work with the customer's lab. They must understand
that accurate measurement is important. The LQ500 accuracy depends
on this lab data

Presenter: Sing Madden 37

TOSHIBA
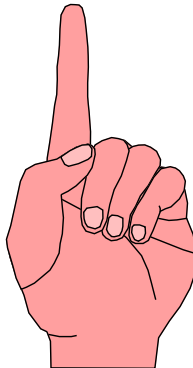
Parameter setting

(a) Go to the "SETTING MENU".

(b) Input the measuring range. (UR & LR)
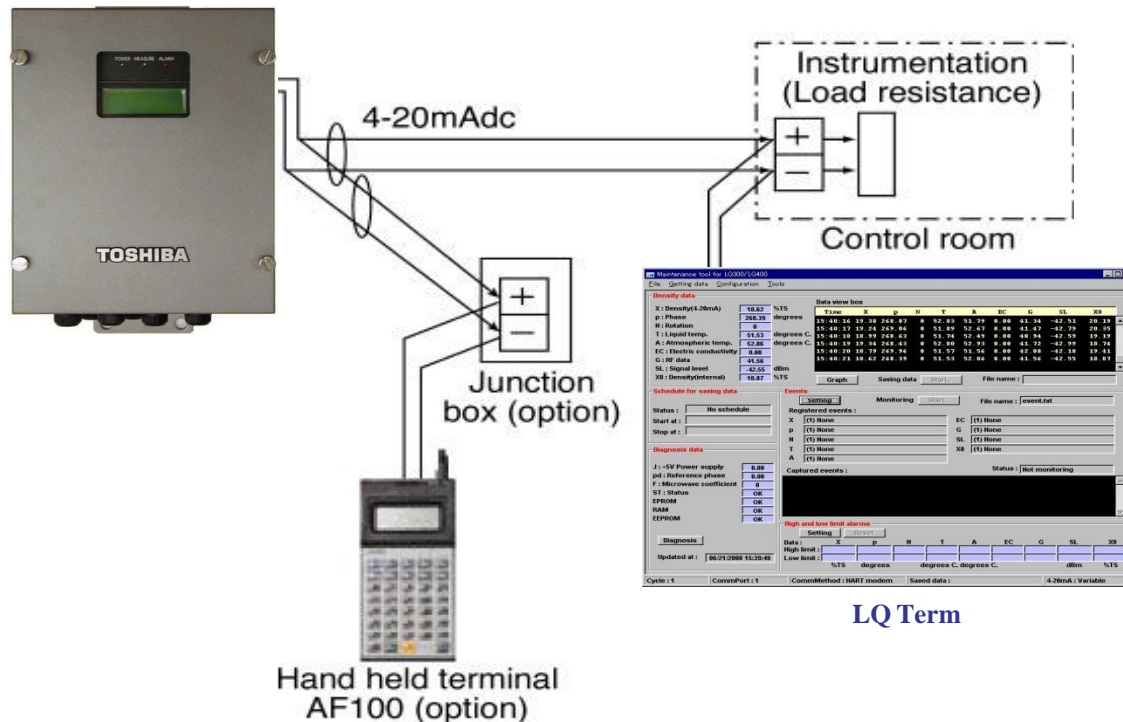
(c) Go to "SPAN CALIB" and set C1 (Density Multiplier)

Main menu of converter

7 June 2004

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HART

☐ *Different Monitoring Methods Available !*

(1) 4-20 mAdc (2) Hand Held (3) LQ Term

LQ Term

TOSHIBA

Maintenance tool (Option)

❑ *LQterm™ provides details of your consistency meter.*

Features

- Ability to choose HART or RS232C as communication protocol.
- Monitoring, and Parameters R/W.
- Simulating without changing set parameters.
- Analyzing received data.

Benefits

- Tool is PC compatible.
- Simulation function and Analyzing function will help you to choose the best parameters for your consistency measurement.

7 June 2004

Presenter: Sing Madden 40

TOSHIBA

For Successful Applications:- Things to remember.

- *Application data sheet*
  - *- very important, helps with unit selections*

- *Commissioning and Training*
  - *- must be sold with all jobs*

- *Technical support availability*
  - *- both before and after job*

- *View LQ500 as an analyzer, instead of a meter*
  - *- No two products behave the same*
  - *- Density will vary from product to product*

Presenter: Sing Madden 41